April 24, 1951 J. W. McBRIDE 2,549,914

STRINGED MUSICAL INSTRUMENT

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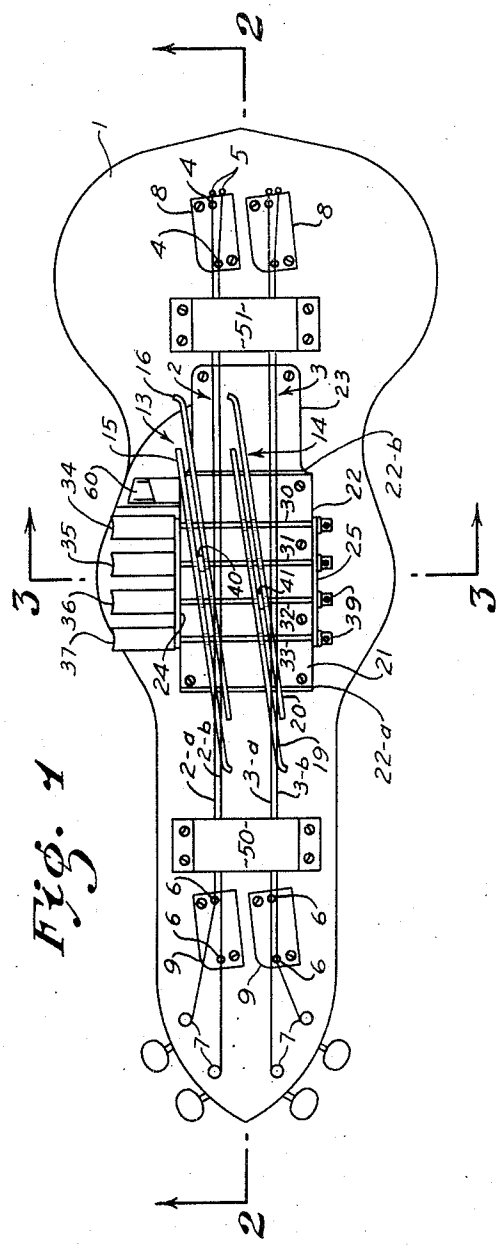


Fig. 1

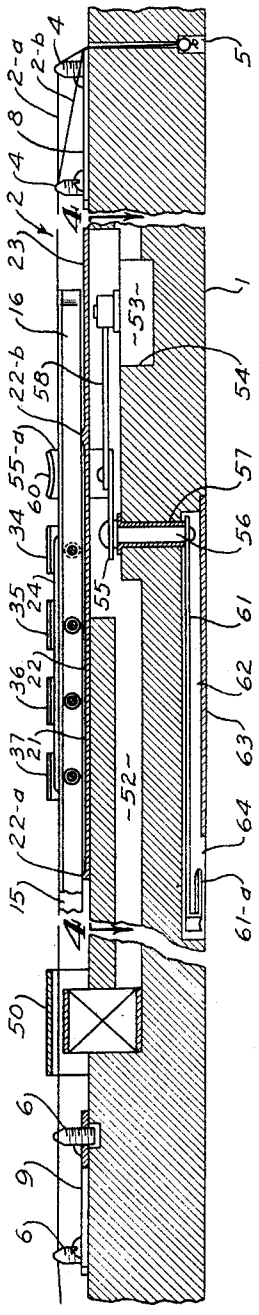


Fig. 2

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April 24, 1951 J. W. McBRIDE 2,549,914

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Filed Oct. 5, 1946 6 Sheets-Sheet 2

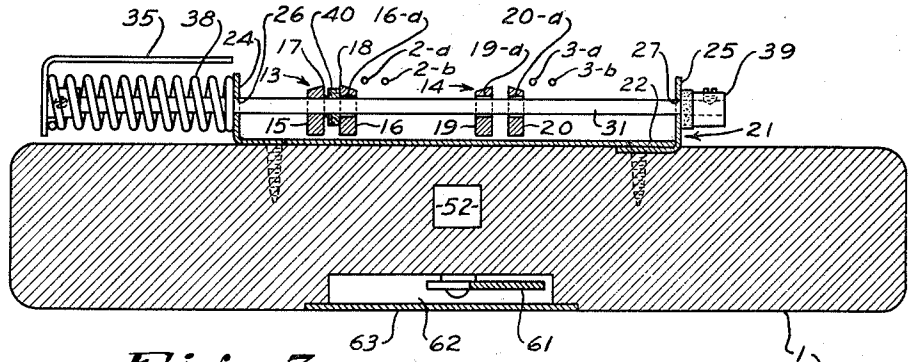


Fig. 3

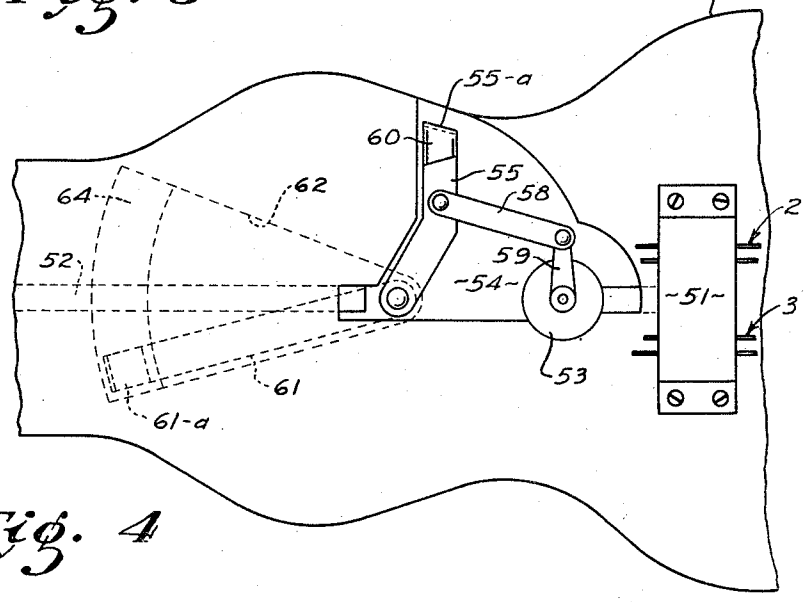


Fig. 4

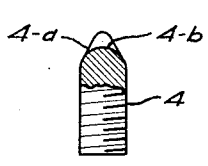


Fig. 6

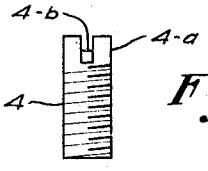


Fig. 5

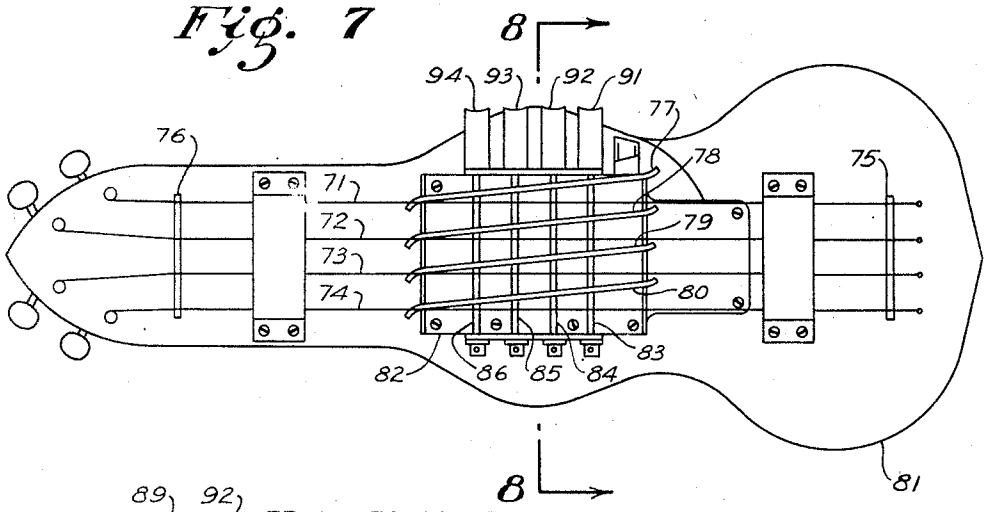
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April 24, 1951 J. W. McBRIDE 2,549,914

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Filed Oct. 5, 1946 6 Sheets-Sheet 3

Fig. 7



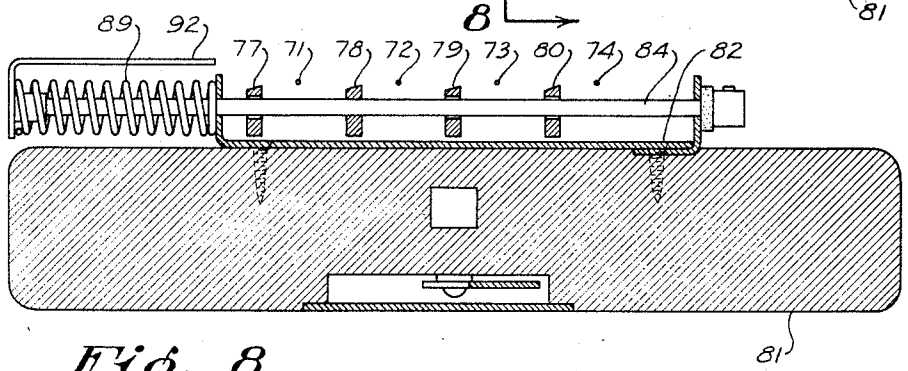


Fig. 8

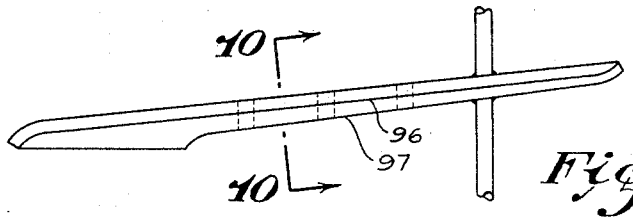


Fig. 9

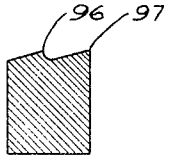


Fig. 10

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April 24, 1951 J. W. McBRIDE 2,549,914

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Filed Oct. 5, 1946 6 Sheets-Sheet 4

Fig. 11

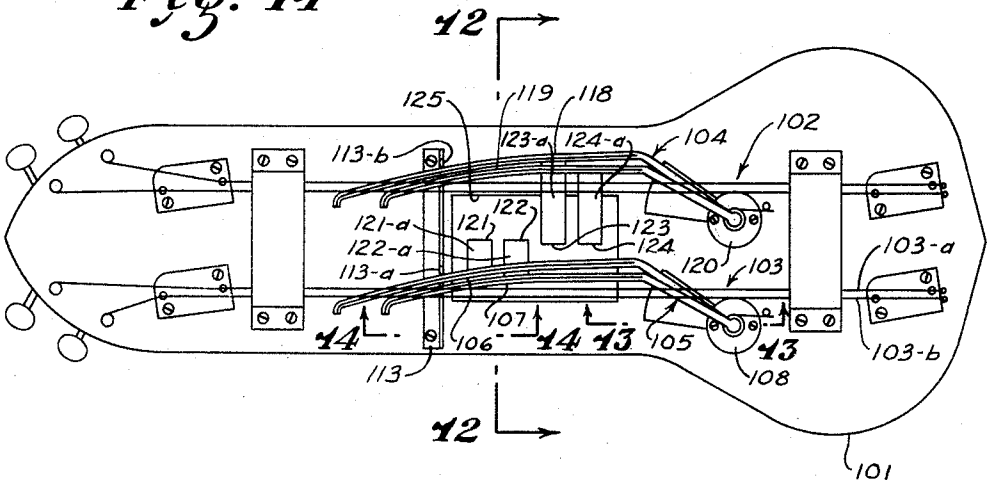
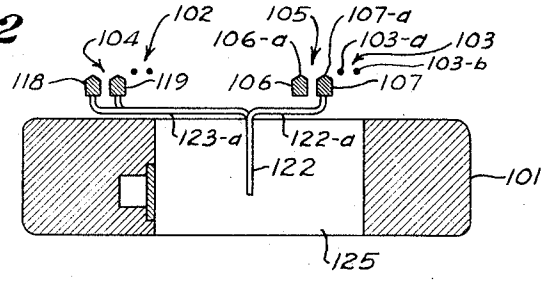


Fig. 12



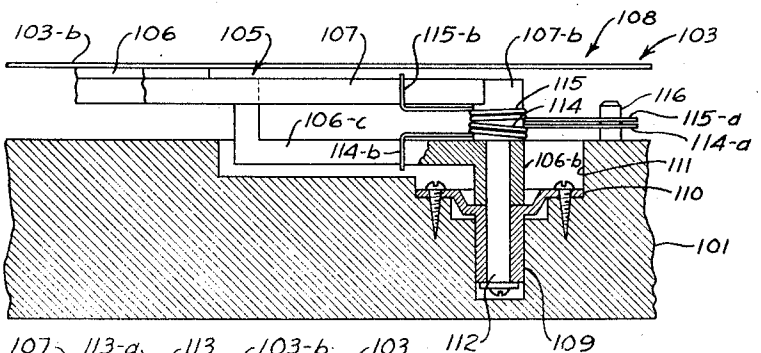


Fig. 13

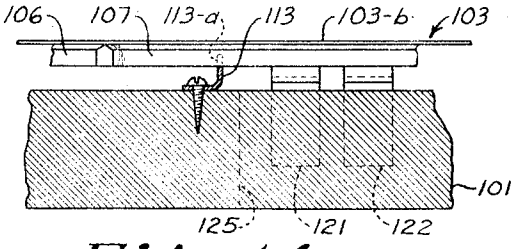


Fig. 14

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April 24, 1951 J. W. McBRIDE 2,549,914

STRINGED MUSICAL INSTRUMENT

Filed Oct. 5, 1946 6 Sheets-Sheet 5

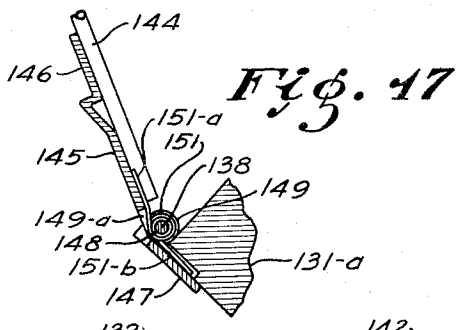


Fig. 17

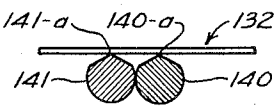


Fig. 18

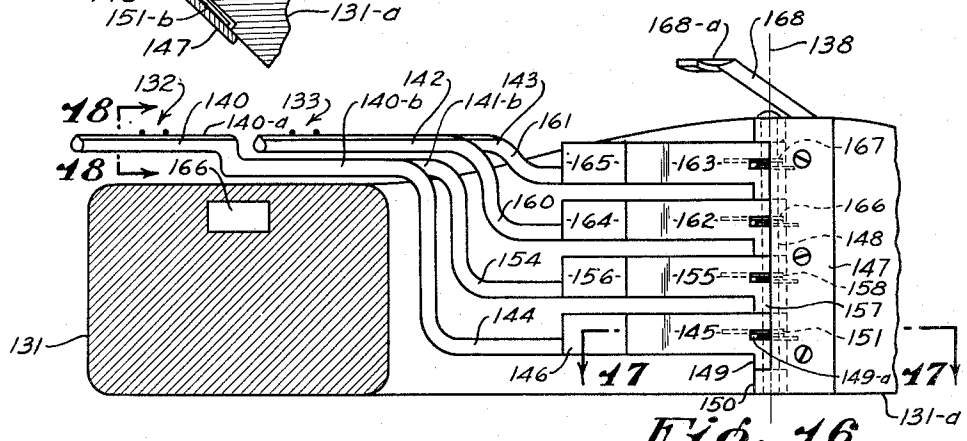


Fig. 16

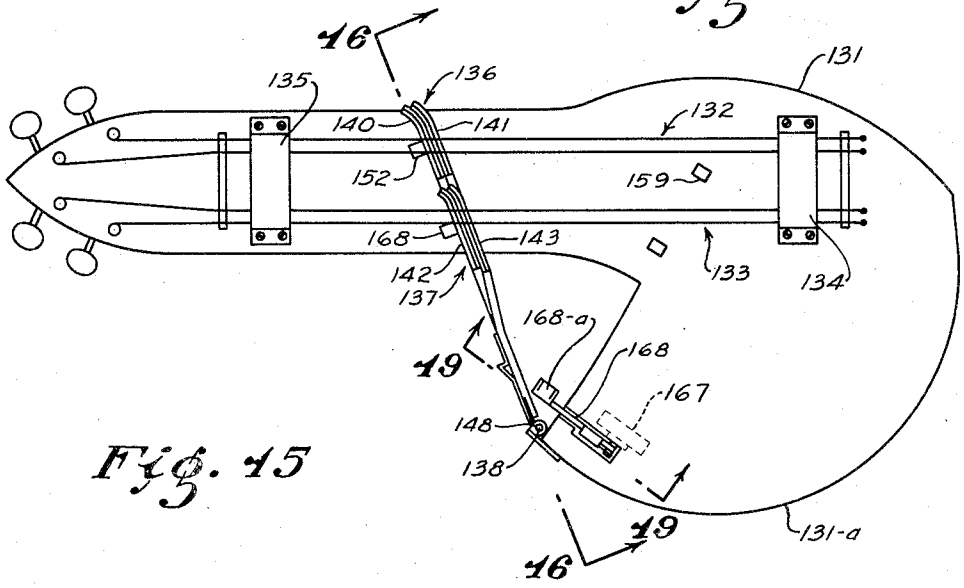


Fig. 15

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April 24, 1951 J. W. McBRIDE 2,549,914

STRINGED MUSICAL INSTRUMENT

Filed Oct. 5, 1946 6 Sheets-Sheet 6

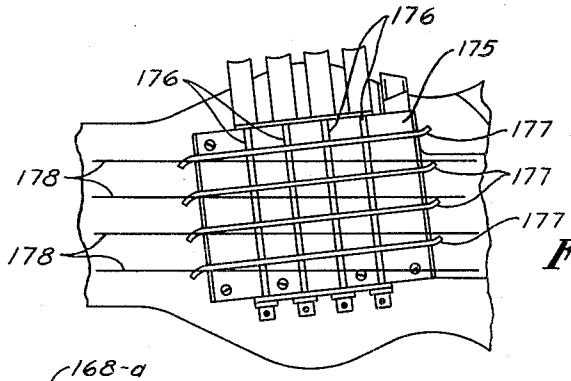


Fig. 20

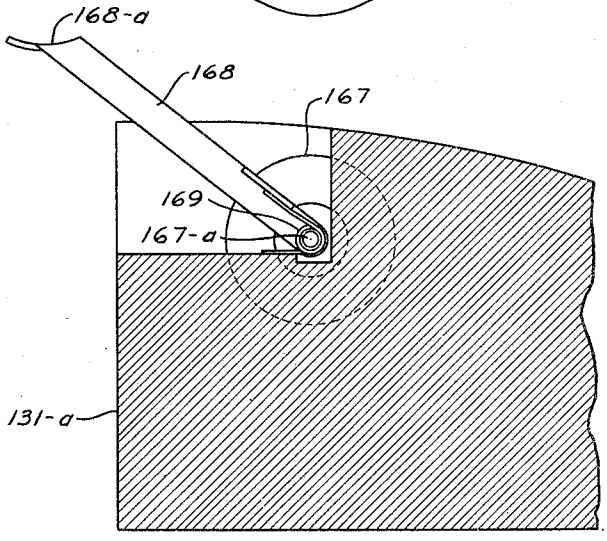


Fig. 19

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Patented Apr. 24, 1951 2,549,914

UNITED STATES PATENT OFFICE

2,549,914

STRINGED MUSICAL INSTRUMENT

John W. McBride, Burbank, Calif., assignor to Bantar, Incorporated, Burbank, Calif., a corporation of California

Application October 5, 1946, Serial No. 701,564

18 Claims. (Cl. 84—315)

1

This invention relates to a stringed musical instrument.

In such instruments the pitch of the musical note produced by any of the strings is determined by the free vibrating length of the string. The conventional manner of determining such length and hence the pitch of the note is by "stopping" the string with the finger. However, it has been proposed to provide mechanical means for this purpose, controlled by a key mechanism operated by the fingers of the player.

For example, in Patent No. 2,405,316, issued to John W. McBride on August 6, 1946, a tuning mechanism is disclosed utilizing a movably supported member having a string contacting crest. The crest lies substantially in a plane parallel with the direction of movement of the member which movement is constrained to be parallel with the string. The crest itself is transverse to the string. A key is provided for operating the member, movement of the member causing the point of contact between the string and the crest to move progressively along the string and thus to alter its free vibrating length.

It is an object of this invention to provide an improved form of such mechanism.

It is another object of this invention to provide mechanism of this type giving improved support to the tuning members.

It is another object of this invention to provide such mechanism having an improved arrangement of the operation keys for the tuning members.

In the above mentioned patent, the tuning members are mounted at one end for pivotal movement past the cooperating string, in a direction generally transverse of the string, the movement of the crest along the string being due to the oblique positions of the crest with respect to the string.

It is still another object of this invention to provide a tuning mechanism in which the entire tuning member is movable past the string. In this way, the mechanism may be simplified.

It is still another object of this invention to provide a tuning mechanism in which the tuning member moves generally lengthwise of the string.

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.

2

In the drawings:

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

Fig. 2 is a transverse sectional view on an enlarged scale, taken as indicated by the lines 2—2 of Fig. 1, parts of the instrument being broken away to reduce the size of the figure;

Fig. 3 is a cross sectional view on a further enlarged scale, taken as indicated by lines 3—3 of Fig. 1;

Fig. 4 is a fragmentary plan view with the tuning mechanism removed, taken substantially as indicated by lines 4—4 of Fig. 2, and on an enlarged scale;

Figs. 5 and 6 are detail views of one of the string supporting elements;

Fig. 7 is a view similar to Fig. 1 but showing a modified form of the invention;

Fig. 8 is a cross sectional view on an enlarged scale, taken as indicated by lines 8—8 of Fig. 7;

Fig. 9 is a plan view of a modified form of tuning element which may be employed with the instrument of Fig. 7;

Fig. 10 is a cross section on an enlarged scale, taken as indicated by lines 10—10 in Fig. 9;

Fig. 11 is a view similar to Fig. 1, but showing another modified form of the invention;

Fig. 12 is a cross sectional view on an enlarged scale, taken as indicated by lines 12—12 of Fig. 11;

Fig. 13 and 14 are detail sections, taken as indicated by correspondingly numbered lines on Fig. 11;

Fig. 15 is a plan view showing still another modified form of the invention;

Fig. 16 is a cross sectional view, partly in elevation and on an enlarged scale, taken as indicated by lines 16—16 on Fig. 15;

Figs. 17 and 18 are detail sections, taken as indicated by correspondingly numbered lines on Fig. 16;

Fig. 19 is a detail section taken as indicated by line 19—19 on Fig. 15; and

Fig. 20 is a plan view of another modified form of the invention.

Referring to Figs. 1–6 of the drawings, an instrument is shown wherein the strings are adapted to be set into vibration by plucking, as in a guitar or banjo. The instrument comprises a body 1, formed of wood or other suitable material, which serves to mount the operating parts of the instrument, suitable cavities

and recesses being provided where required for their accommodation.

A pair of string structures 2 and 3 extend in substantial parallelism over the top of the body 1. As shown, each of these structures 2 and 3 comprises a set of two strings 2—*a* and 2—*b*, and 3—*a* and 3—*b* respectively, the strings in each set being quite closely spaced. However, it is to be understood that either or both of these string structures may comprise any other desired number of strings, or a single string.

Each string 2—*a*, 2—*b*, 3—*a* and 3—*b*, passes over a supporting post 4 adjacent the right hand end of the body 1, and thence downwardly through an aperture 5 in the body, in which the string is anchored in a conventional manner (see Fig. 2). At the opposite end of the body the string passes over a similar post 6 and thence to a conventional tuning peg 7. By appropriate adjustment of the tuning peg 7, the string may be tensioned as required between the posts 4 and 6.

The posts 4 and 6 are adjustable for height. For this purpose they comprise headless machine screws threaded into plates 8 and 9 secured respectively to the body 1 adjacent the opposite ends thereof, each plate accommodating a pair of posts. Lock nuts (not shown) may be provided, if desired, for securing the post 4 or 6 in adjusted position.

The posts 4 and 6 are substantially identical, one of the posts being shown in detail in Figs. 5 and 6. The upper end 4—*a* of the post is of inverted V-form, and has a kerf 4—*b* with a convex bottom surface, for supporting the string and positioning it laterally. The strings 2—*a*, 2—*b*, 3—*a* and 3—*b* are not necessarily all at the same height as shown, since under some conditions it may be desirable to have one or more of the strings higher than the others.

Provisions are made for stopping each of the strings 2—*a*, 2—*b*, 3—*a* and 3—*b* at one or more points intermediate the supports 4 and 6. These provisions include pairs of tuning members generally indicated by the numerals 13 and 14 and cooperating respectively with the string structures 2 and 3. Since each pair of members 13 and 14 and its manner of tuning the associated string structure are substantially identical, only one of such pairs, as the pair indicated by the numeral 13, will be described.

This pair 13, as clearly shown in Figs. 1, 2 and 3, comprises the flat elongated members 15 and 16 supported for transverse movement with respect to the string structure 2, and located between the body 1 and the string structure. The members 15 and 16 have oppositely bevelled upper edge surfaces providing string contacting crests 17 and 18 respectively. Furthermore, the members 15 and 16 are inclined in the direction of their movement so that the crests 17 and 18 cross the string structure 2 at an angle. Accordingly, the crests 17 and 18 contact the string structure 2 at points located along the string structure in accordance with the transverse positions of the members with respect to the string structure. Thus by moving the members to alter such positions, the crests are caused to move progressively along the string structure and vary the free vibrating lengths thereof.

The pair 14 comprises the members 19 and 20 which are shown as substantially identical respectively with the members 15 and 16, and are similarly supported for transverse movement between the body 1 and the string structure 3.

The mechanism for supporting and operating the members 15, 16, 19 and 20 is shown as including a frame 21 formed of sheet metal and suitably secured on the body 1. This frame 21 comprises a rectangular plate 22 with raised portions or rails 22—*a* and 22—*b* at its opposite ends, extending crosswise of the body 1, for slidably supporting the members 15, 16, 19 and 20. The plate 22 has an extension 23 at one end for a purpose to be pointed out shortly. Due to the proportioning of the parts, crests 17, 18, etc. are contacted with a slight pressure by the strings.

The longitudinal edges of the plate 22 are provided with upstanding projections or legs 24 and 25. These legs have pairs of aligned apertures, such as 26 and 27 in Fig. 3, for slidably accommodating respectively rods 30, 31, 32, 33. All of these rods extend through the tuning members 15, 16, 19 and 20, each rod being secured to one of the respective members, and being freely slidable through the other members. Thus, as clearly shown in Fig. 3, the rod 31 is fixed to the member 15 and passes through clearance apertures 16—*a*, 19—*a* and 20—*a* in the members 16, 19 and 20. Similarly, rod 30 is secured to bar 16, rod 32 is secured to bar 19, and rod 33 is secured to bar 20, the rods passing through clearance apertures in the bars to which they are not attached. In this way the rods 30, 31, etc., serve to position the members 15, 16, etc.

The rods 30, 31, 32 and 33 have operating or finger keys 34, 35, 36 and 37 respectively secured on the corresponding ends thereof. Each key serves to confine a compression spring, as 38 (Fig. 3) against the frame leg 24. The springs urge the respective rods, as 31, together with the attached member or bar 15 to the left referring to Fig. 3, or upwardly referring to Fig. 1. This upward movement is limited by a collar 39 (Fig. 3) secured to the end of the rod opposite the key 35 and engaging the frame leg 25. These collars 39 serve to limit movement of the respective bars 30, 31, etc., in response to springs 38, so that the tuning members are normally in their initial or home positions.

Thus appropriate pressure on the keys 34, 35, etc. serves to move the attached tuning members, or bars 15, 16, etc., from their initial positions against the force of the springs 38 so that the associated string structures will be stopped at the desired points. Release of such pressure will allow the members 15, 16, etc. to be returned by the springs 38 to their initial positions.

Although the bars 15 and 16 of the pair 13 have independent keys 34 and 35, relative movement between the bars 15 and 16 is limited since the bars are quite closely spaced. A cushioning washer 40 of felt or rubber is provided between the members 15 and 16 on one or more of the rods, such as shown on rod 31. Thus in Fig. 1, downward movement of the member 15 by pressure on key 35 will cause corresponding movement of the member 16, the members 15 and 16 thus moving as a unit. Release of pressure on the key 35 will allow the members 15 and 16 to return upwardly, also as a unit. However optionally pressure may be exerted on the key 34 to prevent such return movement of the member 16, or to cause it to move downwardly independently of the member 15.

The bars 19 and 20 of the other pair 14 similarly have limited independent movement. Thus the key 36 serves to control the position

of the member 19, which by means of the cushionary washer 41 limits the upward movement of the other member 20. However, this member 20 may be moved downwardly independently of member 19 by means of the key 37. These bars 19 and 20 are movable entirely independently of the bars 15 and 16 of the other pair 13.

The tuning member 15, by virtue of its crest 17 contacting the strings 2—*a* and 2—*b*, will divide the strings between their supporting posts 4 and 6 into two portions having relative lengths in accordance with the position of member 15 transversely of the string structure 2. Further, the other tuning member 16 will divide one of these portions into two shorter portions having relative lengths determined by the transverse position of the member 16.

Any or all of these string portions may be set into vibration by the player, either separately or in unison. For utilizing the sound vibrations from these string portions, conventional electric pick-ups 50 and 51 are mounted on the body 1 respectively adjacent the string supports 4 and 6 so as to be affected when any of the string portions are caused to vibrate.

As is well understood, such pick-ups usually comprise means forming a magnetic circuit and a winding, the magnetic circuit being so arranged that when influenced by the vibrating strings, electrical impulses are created in the winding corresponding with the vibrations of the strings. The windings of the pick-ups 50 and 51 are connected by appropriate wiring (not shown) accommodated in a passage 52 formed in the body 1, with a phone jack to facilitate connection to a conventional loud speaker system.

A rheostat 53 (Figs. 2 and 4) for controlling the output from the pick-ups 50 and 51 is mounted in a cavity 54 formed in the body 1, and covered by part of the plate 22 and the extension 23 thereof. An operating lever 55 for the rheostat 53 is mounted for angular movement in the cavity 54, as by being secured to the upper end of a shaft 56 rotatably carried by a bushing 57 fixed in the body 1. A pivoted link 58 connects the lever 55 with the rheostat arm 59. The lever 55 has an upward extension 55—*a* (Fig. 2) with a thumb rest 60 formed thereon adjacent the key 34.

The instrument may be played optionally in either of two positions. Thus it may rest on the player's lap or on a suitable table or stand with the key mechanism and strings generally horizontal. The player then reaches across the strings with his left hand, manipulating the keys 34, 35, 36 and 37 with his fingers, and operating the volume control lever 55 with his thumb. The right hand is utilized to "pluck" the strings or otherwise to set them vibrating. However, if desired, the player may extend his left hand between the instrument, so as to support the instrument, and direct his fingers upwardly to operate the keys 34, etc.

For operating the volume control with the instrument played in this manner, a supplemental operating lever 61 accommodated for angular movement in a recess 62 formed on the lower side of the body 1, secured on the lower end of shaft 56. A cover plate 63 is provided for the recess 62 cooperating therewith to form an arcuate opening or slot 64 (Fig. 2) for accommodating a thumb rest 61—*a* formed on the lever 61, which is engageable by the player's thumb.

In Figs. 7 and 8, a form of the invention is shown which is quite similar to the instrument just described. Four string structures 71, 72, 73 and 74, appropriately tensioned between conventional bridges 75 and 76, are provided, and are tuned respectively by independently operable tuning members 77, 78, 79 and 80. Each of these members comprises an elongated bar supported for transverse movement between the respective string structure and the instrument body 81 by a frame 82, and having a string contacting crest crossing the string structure obliquely.

The members 77, 78, 79 and 80 are secured respectively to the rods 83, 84, 85 and 86 slidable in the frame 82 and passing through clearance apertures in the members to which the rods are not secured. Springs, as 89, urge each tuning member to its initial position, keys 91, 92, 93 and 94 being provided for operating respectively the tuning members to vary the free vibrating lengths of the strings.

In Figs. 9 and 10, a tuning member is shown having a plurality of string contacting crests 96 and 97. Such a bar may be substituted for one or more of the members 77, 78, 79 and 80 in the instrument of Fig. 7.

In the instruments of Figs. 1 and 7, the string contacting crests are straight in the direction of movement of the tuning member, and cross the string obliquely and at an angle which is constant for all positions of the tuning member, since the member moves along a right line. Thus the crest moves progressively along the string at a constant rate with respect to transverse movement of the tuning member. It may be desirable to have such progressive movement along the string occur at a rate which varies for different positions of the tuning member. Such change in rate can be provided by curving the crest.

In Figs. 11–14 an instrument is shown utilizing tuning members having curved crests, and which are movable transversely of the strings.

This instrument is quite similar to the instrument of Fig. 1. It includes a body 101 with string structures 102 and 103 supported thereon, each comprising a pair of tensioned strings. Pairs of tuning members 104 and 105 are provided for altering the free vibrating lengths respectively of the string structures 102 and 103. Since the pairs of members and their cooperation with the associated string structure are substantially identical, only the members of one pair, for example, the pair 105, will be discussed.

This pair 105 comprises the tuning members 106 and 107 having string contacting crests 106—*a* and 107—*a* respectively so curved in the direction of movement of the member as to cross the strings 103—*a* and 103—*b* of the string structure 103 at an angle, each crest contacting each string at but one point. The members 106 and 107 are supported for limited independent movement with respect to the strings 103—*a* and 103—*b* by a pivot structure 108 (Fig. 13).

Referring to Fig. 13, the pivot structure 108 comprises a bearing 109 with a mounting flange 110 therein, secured in a recess 111 provided in the body 101. A shaft 112 rotatable in the bearing 109 extends upwardly thereupon and has the hub 107—*b* of member 107 secured thereon a suitable distance above the bearing 109 to accommodate hub 106—*b* of the tuning member 106 therebetween. The hub 106—*b* is freely movable both angularly and axially on the shaft 112 and is supported on the upper end of the bearing 109.

The hub 107—*b* in turn is axially supported on the upper end of the hub 106—*b*. The member 106 is offset as at 106—*c* to permit this arrangement while positioning the crest 106—*a* at the same distance above the body 101 as crest 107—*a*.

Additional support is provided for the tuning members 106 and 107, as well as for the members of the other pair 104 by a member 113 extending across the body 101 providing a rail, which slidably supports the ends of the tuning members remote from the pivots. Additionally, this rail structure serves to determine the initial position of the tuning members 106 and 107 by means of a projection 113—*a* engageable by the member 106 and a projection 113—*b* similarly cooperating with the members of pair 104.

A pair of torsion springs 114 and 115 are accommodated on the hub 107—*b* for urging the members 106 and 107 respectively to their initial positions. For this purpose, the spring 114 has an extension 114—*a* from one end engaging a stop 116 on the body 101 and an extension 114—*b* from the other end engaging the member 106. These extensions and the spring 114 are so arranged that movement of the member 106 from its initial position (downwardly about pivot 108 in Fig. 11) is resiliently opposed by the spring. Similarly, the spring 115 has an extension 115—*a* engaging the stop 116 and an extension 115—*b* engaging the member 107.

As above indicated, the tuning members 118 and 119 of the pair 104 are arranged substantially the same respectively as members 106 and 107, being pivotally supported by a structure 120 similar to the pivot structure 108 and urged resiliently toward the projection 113—*b*.

A series of keys 121, 12, 123 and 124 are provided intermediate the ends of the tuning members 106, 107, 118 and 119 respectively for operating the members to tune the string structures. These keys extend downwardly in a through opening 125 in the central portion of the body 101, so as to be readily accessible to the fingers of the player's left hand, which hand is used to support the instrument, while the right hand plucks or otherwise sets the strings vibrating.

These keys 121, 122, 123 and 124 have lateral portions 121—*a*, 122—*a*, 123—*a* and 124—*a*, joining the keys to the tuning members 106, 107, 118 and 119 respectively.

In the forms of the invention so far described, the tuning members are arranged to move in a direction generally transverse of the strings, the string contacting crest being so inclined as to be moved along the string by such movement of the tuning member.

In Figs. 15 to 19, an instrument is shown in which the tuning members are arranged to move generally lengthwise of the strings.

Referring to Fig. 15, the instrument is shown as comprising a body 131 having a pair of tensioned string structures 132 and 133 thereon cooperating with the electric pick-ups 134 and 135. The body 131 has an extension 131—*a* on which the pairs of tuning members 136 and 137 are mounted for angular movement about a common axis 138. This axis is located at a point intermediate the ends of the string structures 132 and 133 and spaced a substantial distance laterally therefrom, so that those portions of the tuning members adjacent the string move generally lengthwise of the string structures upon movement of the tuning members through a considerable angle about the axis 138.

As best shown in Figs. 15 and 18, tuning members 140 and 141 having string contacting crests 140—*a* and 141—*a*, comprise the pair 136. These crests are straight throughout most of the lengths, but may be curved if desired to maintain the angle at which the crest crosses the string more nearly constant for all positions of the members. The outer end portions of the members 140 and 141 are positioned between the body 131 and the string structures 132 and 133, and are offset as at 140—*b* and 141—*b* to clear the members 142 and 143 of the other pair 137. (See Fig. 16.)

The member 140 is further offset to provide a portion 144 to which is secured one leaf 145 of a hinge-like structure which pivotally supports the member 140 for movement about the axis 138. This leaf 145 extends a suitable distance along the offset 144 to provide a key surface 146 adapted to be engaged by the player's finger for operating the member 140. The other leaf 147 of the hinge is common to all the tuning members, 140, 141, 142 and 143 and is suitably secured to the body extension 131—*a* so as to support a hinge pin 148. The axis of pin 148 coincides with the axis 138.

The leaf 145 terminates in a hublike portion 149 which encircles the pin 148 and axially supports the leaf 145 and member 140 by engaging the hub 150 on the fixed leaf 147. The hub 149 has a slot 149—*a* intermediate its ends for accommodating a torsion spring 151 encircling the pin 148. The spring 151 has an extension 151—*a* engaging the leaf 145 and an oppositely directed extension 151—*b* engaging the leaf 147 (see Fig. 17). The spring 151 is so formed and arranged that the member 140 is urged counterclockwise about the axis 138 to engage a stop 152, which determines the initial or home position of the member 140.

The other member 141 also has an offset portion 154 carrying a hinge leaf 155 having a key surface 156 as well as a hub 157 arranged to encircle the pin 148 so as to be pivoted therein and being axially supported on the hub 149. The offset 154 is also slightly inclined so that the portion of member 141 which is about the surface of the body 131 extends parallel with the member 140. A torsion spring 158 similar to the spring 151 urges the member 141 counterclockwise until stopped by contacting the member 140. If member 140 is in home position against stop 152, member 141 will then also be in home position.

Appropriate pressure exerted on the key surface 146 will swing both members 140 and 141 against the force exerted by the springs 151 and 158 about the axis 138 until stopped by the engagement of the member 141 with stop 159. (Fig. 15.) The member 141 can be moved independently against the force of spring 158 to engage stop 159 by pressure on the key surface 156. Release of the pressure on the key surfaces 146 and 156 will allow the members 140 and 141 to be returned counterclockwise by the springs 151 and 158. However it will be clear that independent movement of the members 140 and 141 is limited, since member 140 can be moved clockwise independently only until it contacts the member 141, and conversely the member 141 can be moved independently counterclockwise only until it contacts the member 140.

The other pair of members 142 and 143 similarly have offsets 160 and 161 to which are attached respectively the hinge leafs 162 and 163

forming key surfaces 164 and 165 and supporting the members 142 and 143 on the hinge pin 148. Torsion springs 166 and 167 urge the members 142 and 143 to home position against stop 168, the members being capable of limited independent movement, as before.

It will be apparent that appropriate pressure on the various key surfaces 146, 156, 164 and 165 will cause the associated tuning members 140, 141, 142 and 143 to adjust the free vibrating lengths of the string structures. Further, the pair of crests, as 140—*a* and 141—*a*, provided for each string structure will divide the string structures into end portions and an intermediate portion, all independently adjustable within limits.

The pick-ups 134 and 135 are connected by suitable wiring, (not shown) accommodated in passages as 166 formed in the body 131, with a conventional phone jack. A rheostat 167 (see Figs. 15 and 19) is provided in the body extension 131—*a* to control the sound volume, and is arranged to be operated by an arm 168 secured on the rheostat shaft 167—*a*. A torsion spring 169 serves to urge the arm 168 to one of its limiting positions, appropriate pressure on the thumb rest 168—*a* provided on the free end of arm 168 serving to operate the rheostat 167. As clearly shown in Figs. 15 and 16, the thumb rest 168—*a* is so located as to be comfortably reached by the player's thumb when the fingers are in position to engage the key surfaces 146, 156, 164 and 165.

Other arrangements may be utilized to provide movement of the tuning members along the strings. For example, in Fig. 20 a fragment of an instrument is shown which employs tuning members having straight string contacting crests and which is otherwise quite similar to the form of Fig. 7. However, in this form the frame 175 is set so that the operating rods 176 for the respective tuning members 177 move at an angle with respect to the strings 178. Accordingly movement of the tuning members will have a component parallel with the strings, depending on the size of this angle.

The inventor claims:

1. In a stringed musical instrument: a body; a plurality of parallel tensioned strings spaced from the body; a plurality of bars having crests for contacting respectively said strings; and means for independently translating said bars to different positions between said body and said strings to move said crests progressively along the respective strings and vary the free vibrating length thereof.

2. In a stringed musical instrument: a body; a plurality of tensioned strings spaced from the body; a plurality of bars having crests for contacting respectively said strings; and means for independently translating said bars to different positions in substantially a common plane between said body and said string so that the apexes of the crests move progressively along the respective strings and vary the free vibrating length thereof.

3. In a stringed musical instrument: a tensioned string; a bar having a string contacting crest; means mounting said bar for movement to cause the crest to move progressively along the string and vary the free vibrating length thereof; and means attached to said bar forming an operating key therefor intermediate the ends of the bar.

4. In a stringed musical instrument: a body; a tensioned string spaced from the body; a bar having a string contacting crest; means mounting said bar for movement between said body and said string to cause the crest to move progressively along the string and vary the free vibrating length thereof; and means attached to said bar forming an operating key therefor intermediate the ends of the bar.

5. In a stringed musical instrument: a tensioned string; a bar having a string contacting crest; means mounting said bar for movement between limiting positions to cause the crest to move progressively along the string and vary the free vibrating length thereof; means resiliently urging said bar toward one of said limiting positions; and means attached to said bar forming an operating key therefor intermediate the ends of the bar.

6. In a stringed musical instrument: a body; a plurality of tensioned strings spaced from the body; a bar for each of said strings having a string contacting crest; means mounting said bars for independent movement between said body and said string to cause the crests to move progressively along the respective strings and vary the free vibrating length thereof; stop means for limiting movement of said bars in one direction; means resiliently urging said bars toward said stop means; and means attached to each bar forming an operating key therefor.

7. In a stringed musical instrument: a body; a tensioned string structure spaced from the body; a plurality of members providing crests for contacting said string structure at points spaced therealong to form a plurality of free vibrating string lengths; and means for independently translating said members between said body and the string structure to move the crests progressively along the string structure and vary said free vibrating string lengths.

8. In a stringed musical instrument: a body; a tensioned string structure spaced from the body; means providing one or more string contacting crests; and means supporting said crest providing means adjacent its end portions on the body for movement between the body and said string structure to cause said crest or crests to move progressively along the string structure and vary the free vibrating lengths thereof, one of said supporting means comprising a member extending transversely of the string structure on the body and movably engaging said crest providing means.

9. In a stringed musical instrument: a body; a tensioned string structure spaced from the body; means providing one or more string contacting crests; and means supporting said crest providing means on the body for movement between the body and said string structure to cause said crest or crests to move progressively along the string structure and vary the free vibrating lengths thereof, said supporting means comprising a pair of rails extending transversely of the string structure on the body and slidably engaging the opposite end portions of the crest providing means.

10. In a stringed musical instrument: a body; a tensioned string structure spaced from the body; means providing one or more string contacting crests; means pivotally mounting said crest providing means on the body for movement between the body and said string structure to cause said crest or crests to move progressively along the string structure and vary the free vibrating lengths thereof; and a plurality of electric pick-up means respectively at points spaced

along the string structure to amplify independently the vibrations of different free vibrating lengths of said string structure.

11. In a stringed musical instrument: a body; a tensioned string structure spaced from the body; a bar having one or more string contacting crests; means mounting said bar for translating movement between the body and the string structure transversely past the string structure, said crest or crests being inclined with respect to said structure and the direction of movement, whereby movement of the bar moves said crest or crests progressively along the string structure and varies the free vibrating lengths thereof; and means for moving said bar.

12. In a stringed musical instrument: a body; a tensioned string structure spaced from the body; a bar having one or more string contacting crests; means mounting said bar for translating movement between the body and the string structure transversely past the string structure, said crest or crests being inclined with respect to said structure and the direction of movement, whereby movement of the bar moves said crest or crests progressively along the string structure and varies the free vibrating lengths thereof; means resiliently urging said bar to an initial position; and means for moving said bar with respect to said position.

13. In a stringed musical instrument: a body; a tensioned string structure spaced from the body; a bar having one or more string contacting crests; means pivotally mounting said bar adjacent the string structure for swinging movement between the body and the string structure in a direction generally transverse of the string structure, said movement causing said crest or crests to move progressively along the string structure and vary the free vibrating lengths thereof; and a plurality of electric pick-up means respectively at points spaced along the string structure to amplify independently the vibrations of different free vibrating lengths of said string structure.

14. In a stringed musical instrument: a tensioned string structure; a bar, at least a portion thereof having one or more string contacting crests; and means for moving said bar to move said portion bodily generally lengthwise of the string structure, whereby said crest or crests move progressively along the string structure and vary the free vibrating lengths thereof.

15. In a stringed musical instrument: a tensioned string structure; a bar having a crested portion, the crest or crests on said portion contacting said string structure; means mounting said bar for pivotal movement with respect to a point so located that movement of said bar causes said crested portion to move generally lengthwise of said string structure, whereby said crest or crests move progressively along the string structure to vary the free vibrating lengths thereof.

16. In a stringed musical instrument: a tensioned string structure; a bar having one or more string contacting crests inclined at an angle with respect to said structure; and means for bodily translating said bar and one or more crests past the string structure in a direction to maintain the inclination of said crest or crests constant, in order to move said crest or crests progressively along the string structure and vary the free vibrating lengths thereof.

17. In a stringed musical instrument: a tensioned string structure; a bar having a string contacting crest, at least a portion of said crest being inclined at a constant angle with respect to said structure; and means for moving said bar in a direction normal to said structure, to move said crest progressively along the string structure and vary the free vibrating lengths thereof.

18. In a stringed musical instrument: a tensioned string structure; a bar having a string contacting crest, at least a portion of said crest being inclined at a constant angle with respect to said structure; and means for moving said bar in a direction substantially normal to the inclination of said crest, to move said crest progressively along the string structure and vary the free vibrating lengths thereof.

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