

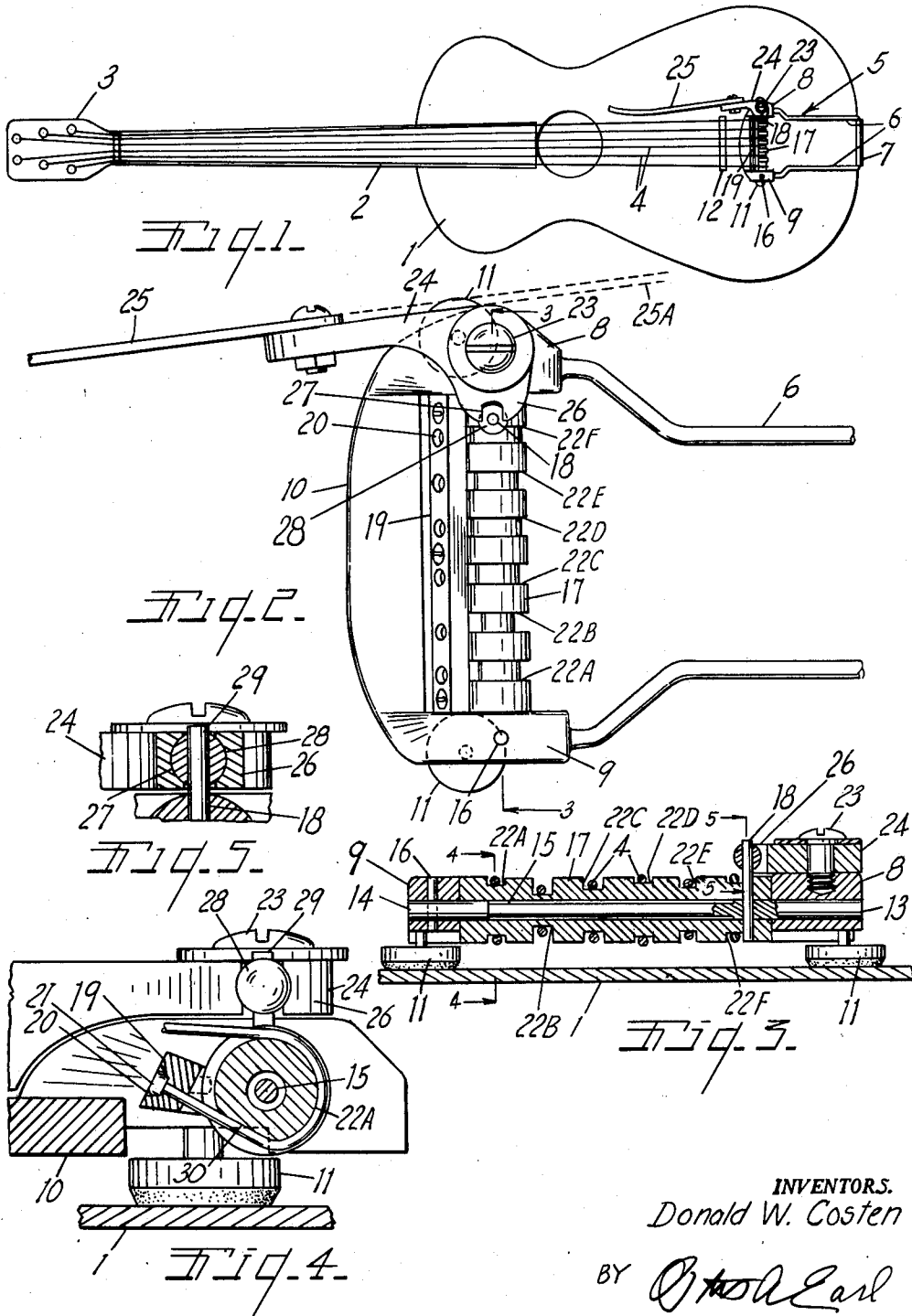
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VIBRATO TUNING DEVICE FOR STRINGED MUSICAL INSTRUMENTS

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**VIBRATO TUNING DEVICE FOR STRINGED
 MUSICAL INSTRUMENTS**

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This invention relates to improvements in vibrato tuning device for stringed musical instruments. The principal objects of this invention are,

First, to provide a manually operable mechanism for varying the tension and therefore the tone of the strings of a musical instrument such as a guitar during the playing of the instrument to produce a vibrato effect.

Second, to provide a vibrato tuning device which varies the tone of all of the strings of a guitar by an equal proportion of the musical tones of the strings so that the tone of a chord being sounded by all of the strings remains in tune.

Third, to provide a vibrato tuning attachment for a guitar which is easily actuated by the musician, while playing with the same hand that picks the strings of the guitar.

Other objects and advantages of the invention will be apparent from a consideration of the following description and claims. The drawings, of which there is one sheet, illustrate a highly practical form of the vibrato tuning device of the invention.

FIG. 1 is a plan view of a stringed musical instrument of the guitar type with the vibrato tuning device of the invention mounted thereon.

FIG. 2 is a fragmentary enlarged plan view of the vibrato tuning device of the invention.

FIG. 3 is a fragmentary vertical cross sectional view through the tuning device and the adjacent portion of the strings and instrument taken along the plane of the line 3-3 in FIG. 2 and looking in the direction of the arrows.

FIG. 4 is a fragmentary transverse cross sectional view taken along the plane of the line 4-4 in FIGS. 2 and 3.

FIG. 5 is a fragmentary cross sectional view through the driving connection to the string tensioning mechanism taken along the plane of the line 5-5 in FIGS. 2 and 3.

The drawings illustrate the invention applied to a guitar type musical instrument having a body, conventionally illustrated at 1, and provided with the usual neck 2 and peg head 3 for anchoring and tuning the strings 4. In the example illustrated, the instrument is provided with six tuned strings which are secured at their inner or right end to a combined string anchor and tremolo tuning device of the invention indicated generally at 5. The anchor 5 includes a yoke having spaced arms 6 and a hinged attaching plate 7 secured to the end of the body 1. The yoke arms 6 overlie the top of the body and are connected to enlarged end pieces 8 and 9. The end pieces may further be connected by a crosspiece 10 and adjustable screw feet 11 engaged with the bottoms of the end pieces support the yoke at the desired level above the body 1. A conventional bridge 12 supports the strings between the yoke and the peg head.

As appears more clearly from FIGS. 2, 3 and 4, the end pieces 8 and 9 are transversely bored to receive the enlarged ends 13 and 14 of a torsion bar having a central portion 15 of reduced diameter. The enlarged end 14 is nonrotatably secured in the end member 9 by a pin 16, while the enlarged end 13 is rotatably supported in the end member 8. Positioned around the torsion bar and between the end members 8 and 9 is a tuning cylinder 17 which is supported radially on the enlarged ends 13

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and 14 of the torsion bar. A second pin 18 passed transversely through the sleeve and the enlarged end 13 of the torsion bar prevents relative rotation between the sleeve and the end 13.

On its forward side toward the bridge 12, the sleeve 17 is provided with a transverse anchor bar 19 having anchor holes 20 therein for receiving knots 21 on the ends of the strings 4. The strings wrap around approximately 270° of the sleeve and each string is disposed in an annular groove 22, which will be described in greater detail presently. The anchor bar 19 and sleeve 17 thus form a fixed anchor for the ends of the strings, which are tuned at the peg head 3 in the usual manner. The tendency of the tensioned strings to rotate the sleeve 17 is resisted and balanced by torsion forces created in the reduced center portion 15 of the torsion bar 14 between the pins 16 and 18.

In order to vary the tension in the strings 4 to produce a vibrato effect, an upright pivot pin 23 is secured in the upper side of the end member 8 as a support for a sectional lever 24. The lever projects forwardly or to the left alongside of the strings 4 and has a pivoted outer end 25 which may be swung backwardly to an inoperative position, as shown by the dotted lines 25A when not in use. The lever 24 has a transversely projecting ear 26 which is bifurcated or notched as at 27 to receive a swivel ball 28. The ball 28 is vertically drilled and slidably received around the upwardly projecting end 29 of the pin 18 which as previously described connects the sleeve 17 to the end 13 of the torsion bar. It will be apparent that lateral swinging motion of the lever 24 about the pivot 23 will result in angular rotating motion of the projection 29 and pin 18 about the axis of the torsion bar 14. Since one end of the torsion bar is anchored in the end member 9, the torsion bar will be twisted to either increase or decrease the torsion force therein created by the tension of the strings 4. It will further be apparent that the musician may strum the strings in the usual manner and simultaneously press against the outer end 25 of the lever 24 to oscillate the torsion bar and the sleeve 17.

As the sleeve 17 oscillates, it will wind or unwind the strings 4 slightly, thus varying their tension and tone and this will produce a vibrato effect. Since the several strings of a guitar are of different strengths and are tuned to different pitches by being stretched to different tensions, a uniform change in the tension of all strings would not result in a uniform change in the pitches of the six strings. Accordingly the several annular grooves 22 are of different diameter so that for each unit or degree of rotation of the sleeve 17 the tension of the several strings will be changed to a different degree. The difference in diameter of the grooves 22 is calculated to change the tension in each string in proportion so that the altered pitches of all of the strings are raised or lowered with respect to their normal tuning by the same amount. The vibrato pitch of the instrument thus remains in tune or harmony at all times.

By way of example, for the tuning of a standard guitar the left groove 22A (see FIG. 3) has a diameter equal to .375" designed to cooperate with the "E" or "6" string of a guitar having a cross section of .057". The next groove 22B cooperative with the "A" or "5" string has a diameter of .325" when used with an "A" string having a cross sectional diameter of .043". The next groove 22C has a diameter of .372" to cooperate with a "D" or "4" string having a cross sectional diameter of .032". The next groove 22D has a diameter of .493" to cooperate with a "G" or "3" string having a cross sectional diameter of .028". The next groove 22E has a diameter of .330" to cooperate with a "B" or

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"2" string having a cross sectional diameter of .015". The last groove 22F has a diameter of .478" when used in cooperation with an "E" or "1" string having a normal diameter of .012". Where desired to provide clearance for the heavier strings of the instrument, the base of the groove may be cut away as at 30 in FIG. 4 to facilitate stringing the instrument. This, however, will not change the tone of the string as the string still wraps around a substantial cylindrical portion of the sleeve. The drawings only approximate these dimensions.

The specific lever 24 and associated linkage connected to the sleeve 17 and anchor or torsion bar 19 constitute one example of means for actuating the vibrator from adjacent the area in which the strings are picked. It will be appreciated that various lever systems can be employed without departing from the scope of the invention as defined in the following claims.

What is claimed as new is:

1. A string anchor for the strings of a guitar type musical instrument having a body comprising a yoke attachable to the body of the instrument and having spaced arms to extend over the top of the instrument generally parallel to the strings,

a torsion bar having a central portion of reduced diameter and having one end thereof non-rotatably fixedly supported in one of said arms and its other end rotatably supported in the other of said arms, a sleeve supported around said bar between said arms and secured relatively non-rotatably to the bar adjacent said other arm,

lever means connected to angularly oscillate said sleeve and located adjacent the playing portion of said strings,

and means on said sleeve forming a plurality of string anchors positioned so that the strings of the instrument pass over the top of said sleeve and partially therearound in extending from said anchors,

said sleeve having a plurality of peripheral grooves corresponding to strings of the instrument,

said grooves being of different radial dimensions at their bottoms proportioned so that rotation of said sleeve will vary the tension of all said strings to vary the pitch of each string by equal proportions of their musical pitch.

2. A string anchor for the strings of a guitar type musical instrument having a body comprising arms spaced to extend over the top of the instrument generally parallel to the strings,

a torsion bar having one end thereof non-rotatably fixedly supported in one of said arms and having its other end rotatably supported in the other of said arms,

a sleeve supported around said bar between said arms and secured relatively non-rotatably to the bar adjacent said other arm,

lever means on said other arm connected to angularly oscillate said sleeve,

and means on said sleeve forming a plurality of string anchors positioned so that the strings of the instrument pass partially around said sleeve in extending from said anchors,

said sleeve having a plurality of peripheral grooves corresponding to strings of the instrument,

said grooves being of different radial dimensions at their bottoms proportioned so that rotation of said sleeve will vary the tension of all said strings to vary the pitch of each string by equal proportions of their musical pitch.

3. A string anchor for the strings of a musical instrument having a body comprising a connecting bracket attachable to the body of the instrument and having spaced arms to extend over the top of the instrument generally parallel to the strings,

a metallic torsion bar having one end thereof non-rotatably fixedly supported in one of said arms and

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having its other end rotatably supported in the other of said arms,

a sleeve supported around said bar between said arms and secured relatively non-rotatably to the bar by a pin passed diametrically through the sleeve and the bar adjacent said other arm,

manually operable means on said other arm connected to angularly oscillate said sleeve,

and means carried by said sleeve forming a plurality of string anchors positioned so that the strings of the instrument pass partially around said sleeve in extending from said anchors,

said sleeve having a plurality of peripheral string supporting surfaces corresponding to strings of the instrument,

said surfaces being of different diameters so that rotation of said sleeve will vary the tension of all said strings to vary the pitch of each string by equal proportions of their musical pitch.

4. In combination with a guitar type instrument having strings adapted to be plucked and strummed by hand and having a peg head individually tuneably anchoring one end of said strings,

an adjustable anchor for the opposite ends of said strings for manually and simultaneously varying the tension in all said strings to produce a vibrato effect comprising a torsion bar supported on said instrument adjacent said other ends of said strings and transverse thereto,

means non-rotatably connecting one end of said bar to the body of said instrument and rotatably but transversely fixedly supporting the other end of said bar,

a sleeve positioned around said bar and fixedly connected thereto adjacent the rotatably supported end of said rod,

individual anchors on said sleeve anchoring the other ends of said strings to the sleeve in partially wrapped relation around said sleeve,

and manually operable means connected to said sleeve and movable to oscillate said sleeve rotatably about its axis transverse to said strings upon oscillation of said manually operable means,

said sleeve having peripheral portions engaging said strings which differ in diameter where the strings diverge from the sleeve to create different variations in the tension of said strings upon each increment of rotation of the sleeve.

5. In combination with an instrument having strings adapted to be plucked and strummed by hand and having a peg head individually tuneably anchoring one end of said strings,

an adjustable anchor for the opposite ends of said strings for manually and simultaneously varying the tension in all said strings to produce a vibrato effect comprising an anchor member supported on said instrument adjacent said other ends of said strings and transverse thereto,

means anchoring the other ends of said strings in partially wrapped relation around said anchor member,

manually operable means connected to said anchor member and movable to oscillate said anchor member rotatably about its axis transverse to said strings upon oscillation of said manually operable means,

said anchor member having peripheral portions engaging said strings which differ in diameter where the strings diverge from the anchor member to create different variations in the tension of all said strings upon each increment of rotation of the anchor member,

and spring means connected to said anchor member opposing rotation of the anchor member under the influence of tension in said strings, whereby all of the strings will always be in tune with each other.

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6. A stringed musical instrument of the class described including a body, a plurality of strings, tuning means to which said strings are connected at one end, a tailpiece to which said strings are connected at their other ends and comprising a body member having a plurality of laterally spaced annular string rests of varying radial diameters spaced therealong and having a longitudinal bore therein, supporting means for said tailpiece comprising a torsionally twistable bar nonrotatably mounted at one end and rotatably mounted at its other end on said instrument body and disposed through said longitudinal bore in said member, said body member being connected at one end to said bar,

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and manually operable means operatively connected to one end of said member and said bar for rotatably adjusting said member thereby variably varying the degrees of tension on said strings to vary the tones thereof whereby at least the highest treble string and the next three lower pitched strings will always be in tune.

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