April 9, 1940. C. H. LARISCH 2,196,531

MUSICAL INSTRUMENT BRIDGE

Filed Jan. 7, 1939 2 Sheets-Sheet 1

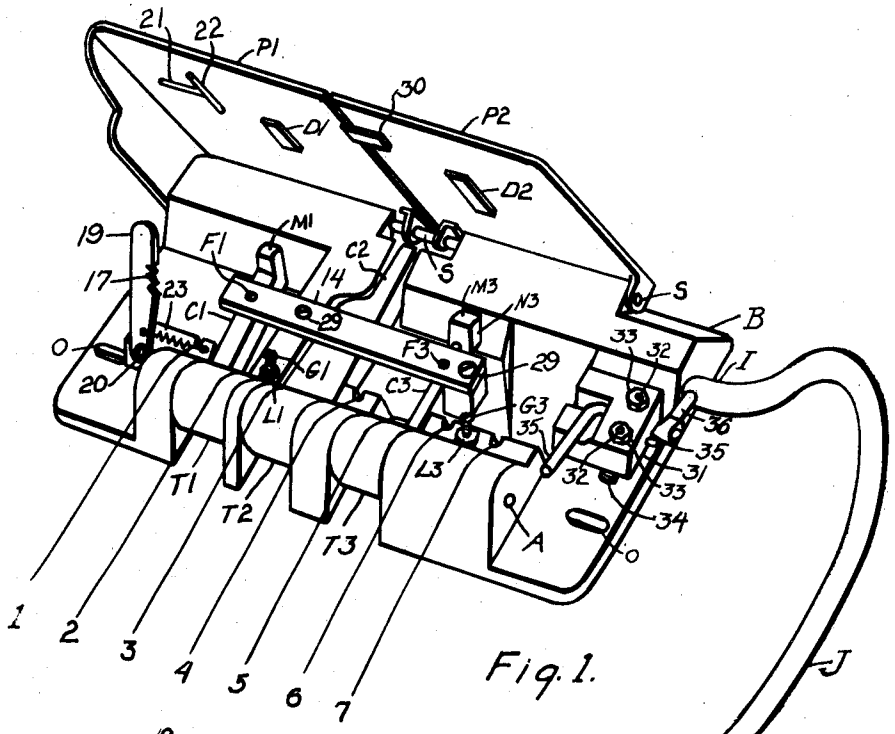


Fig. 1.

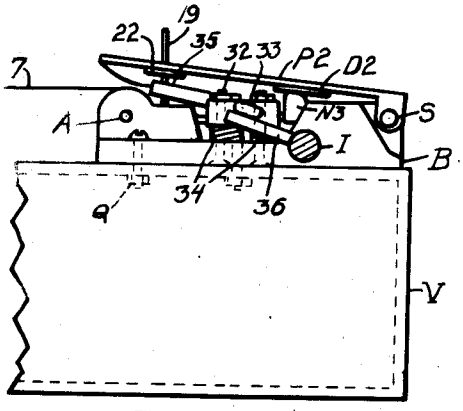


Fig. 2.

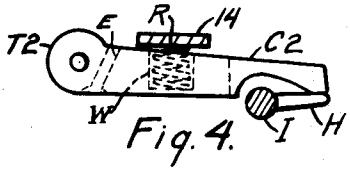


Fig. 4.

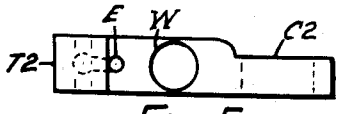


Fig. 5.

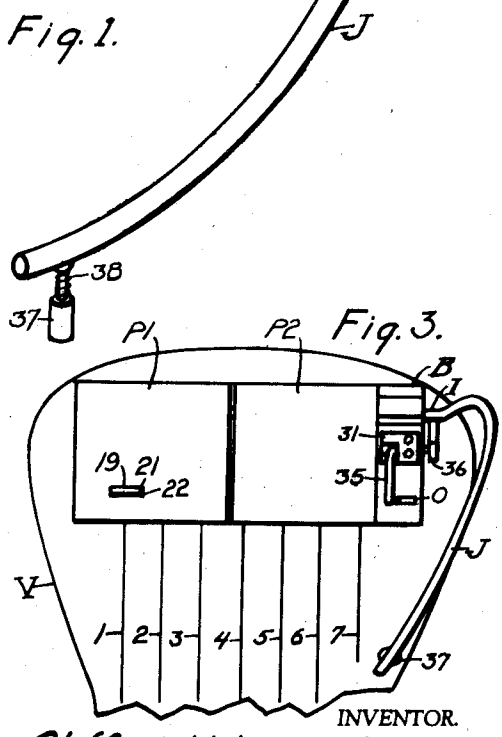


Fig. 3.

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MUSICAL INSTRUMENT BRIDGE

Filed Jan. 7, 1939 2 Sheets-Sheet 2

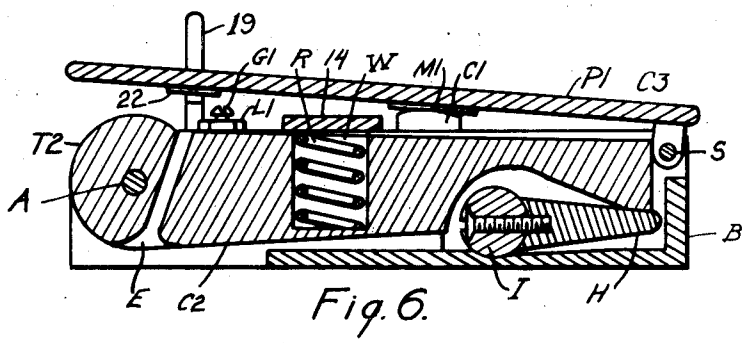


Fig. 6.

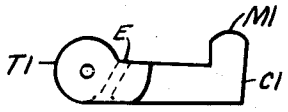


Fig. 7.

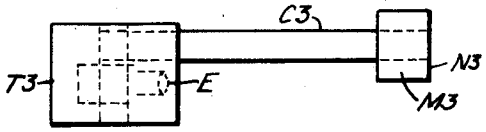


Fig. 9.

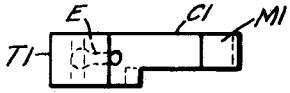


Fig. 8.

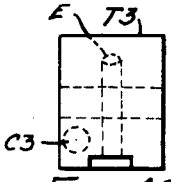


Fig. 10.

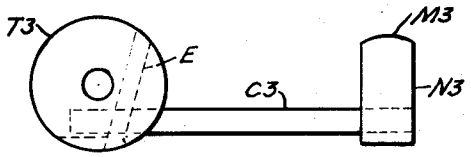


Fig. 11.

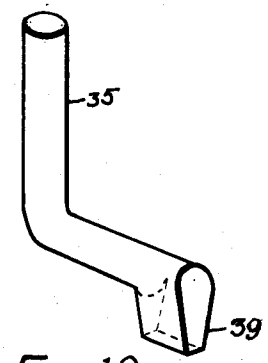


Fig. 12.

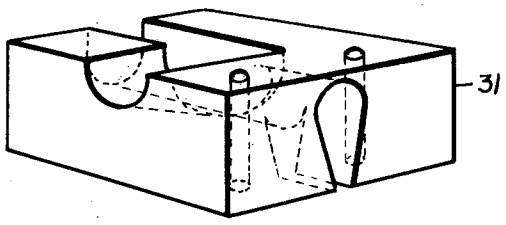


Fig. 13.

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UNITED STATES PATENT OFFICE

2,196,531

MUSICAL INSTRUMENT BRIDGE

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Application January 7, 1939, Serial No. 249,680

13 Claims. (Cl. 84—312)

My invention relates to musical instruments and specifically to an improved bridge which will vary the pitch of the strings of a stringed instrument of the lute type so as to effect changes, not only of chords, but of individual tunings as well, and a particular adaptation of the invention is to an electric Hawaiian guitar.

One of the objects of the invention is to replace the conventional bridge on a stringed musical instrument, such as an electric Hawaiian guitar, with an adjustable bridge designed to vary the pitch of selected strings, such adjustable bridge being adapted to be fastened to the face of the instrument preferably in the exact position of the conventional bridge, which is removed, making use of the same means of fastening, and thus eliminating the necessity of drilling additional holes in the body of the instrument or of otherwise defacing it. The invention is so designed that it has substantially the same height as the conventional bridge, thereby making it possible to carry the conventional instrument, with the device attached, in its original instrument case.

Another object of the invention is to provide an improved method of varying the pitch of selected strings by a stretching or slackening of such strings, while under the positive control of the hand and arm of the player, while playing, so as to effect desired changes in individual tunings as well as chords.

Another object of the invention is to provide a method of tightening and slackening selected strings of a musical instrument, without carrying such strings beyond the bridge, and without causing such strings to be moved or pulled across a surface with which they are in contact.

Another object is to provide a method of regulating the various changes in pitch of the selected strings of a musical instrument so that such changes in pitch may be effected by the player by mechanical means, and without the use of the otherwise necessary "ear" and skill of the player.

Another object of my invention is to replace the original handrest found on the more expensive makes of guitar, with a movable means constituting a handrest and at the same time permitting positive control, by the player, of the slackening and tightening of selected strings of the instrument, while playing; thus permitting changes in the pitch of the selected strings at will so as to produce the desired harmonics.

Other objects and advantages of the invention will become apparent as this description proceeds, and the novelty thereof will be particularly pointed out in the appended claims.

I am aware that the prior art contains devices the purpose of which is to vary the pitch of the strings of musical instruments. By certain of such devices it has been sought to accomplish such purpose by shortening the vibrating length of the strings, or by pressing the strings upwardly or downwardly, or by forcing a non-vibrating portion of the string from a straight line. Such devices have been found impracticable, particularly because the results of the use of such devices were not of such uniformity as is required by good music. Another device disclosed by the prior art is one whereby the pitch of the strings of the instrument is varied above and below the tuned pitch by a stretching or slackening of the strings by means of foot treadles, and wherein the selected strings are continued beyond the bridge of the instrument. In practice it has been found difficult to operate such a device without kinking the selected strings at the point where they change from horizontal to perpendicular, or without undue wear upon the strings because of frequent movement across the bridge or plate at the point where the string is changed from the horizontal to the perpendicular. My invention is not to be confused with these devices of the prior art, for the distinguishing characteristic is that I accomplish the desired changes in the pitch of the selected strings by means of a device which replaces the conventional bridge of the instrument and stretches or slackens the strings by a rotatory movement of the bridge itself without causing the strings to be moved across any metal or substance with which they are in contact, such changes in pitch being effected under the positive control of the hand and arm of the player while playing and while the fingers of the player are kept free to manipulate the "pick;" thus insuring the proper tuning of the instrument at all times and producing the desired harmonics without the use of cumbersome auxiliary equipment and without defacing the instrument.

I have found that in practice it is desirable, while playing, to be able to raise the pitch of the second and fifth strings of the instrument above the tuned pitch through half tone changes for a total of three half tones, and to be able to effect momentary changes in tone, within the above limits, on the fifth string, and also to be able to either raise or lower the pitch of the third string one half tone either above or below the tuned pitch of the instrument. Such a combination of changes in pitch, while not indis-

pensable to suitable changes in pitch, results in a wider variety of possible changes in tone and greatly increases the range of the instrument from a given normal tuning. The invention hereinbefore described accomplishes such result.

In the drawings forming a part of this specification:

Fig. 1 is a perspective view of a bridge embodying features of the invention, with the hand-rest plates raised above their normal position so as to disclose the mechanism of the device.

Fig. 2 is a view mainly in side elevation of the bridge attached to the face of a musical instrument, the tail of a conventional guitar being shown with the device attached in the place of the conventional bridge, and showing the plates in position for playing the instrument.

Fig. 3 is a plan view of the bridge in position on the instrument.

Fig. 4 is a view mainly in side elevation of a string terminal.

Fig. 5 is a plan view of the string terminal shown in Fig. 4.

Fig. 6 is a view mainly in cross section of the device through the center of the radial surfaced string terminal to which is attached the third string of the instrument.

Figs. 7 and 8 are views in side elevation and plan, respectively, of another string terminal.

Figs. 9, 10 and 11 are plan, front and side views of another string terminal.

Fig. 12 is a perspective view of the locking stop showing the boss on the lower end used for holding in position the minor control lever.

Fig. 13 is a perspective view of the base block.

The device is attached to the musical instrument by any conventional means, preferably by screws or bolts, Q, Q, through the slots O, O which are elongated so as to make use of the original screw or bolt holes used for fastening the original conventional bridge to the instrument V. The original or conventional bridge is removed, being replaced by the invention. The master screw of the original bridge, not shown in the drawings, is also used on the invention.

The invention preferably comprises a base B upon which is mounted the plates P1 and P2 for rotation upon a shaft S, and upon which base B is mounted a shaft A upon which are disposed to be rotated, three string terminals T1, T2 and T3 having circular surfaces concentric with the axis of shaft A. The second, third and fifth strings of the instrument are securely fastened to the terminals T1, T2 and T3, respectively, by being inserted in a string eye E in each terminal. The first, fourth, sixth and seventh strings are securely fastened to the base B by means of any conventional form of string eye and are not adjustable thereon.

The string terminals T1 and T3 each has an arm C1, C3, projecting from the round or circular surface, as shown in Figs. 7 to 11. An upper surface M1 or M3 at the end of the corresponding arm is brought into contact with a steel bearing plate D1 or D2 on plate P1 or P2 whenever plate P1 or P2 is pressed downward by the wrist and arm of the player. The arm may be made an integral part of the string terminal T3 by being pressed into the terminal and having a boss N3 pressed onto the end of the arm C3, as shown in Figs. 9, 10 and 11; or the entire arm, C1, contact surface M1, and string terminal T1 may be made in one piece, as shown in Figs. 7 and 8. Both constructions are shown in use in Fig. 1.

The arc through which the arm of the string terminal is permitted to travel in changing the pitch of the string attached to its circular surfaced part is regulated and limited by an adjusting screw F1 or F3 set in a cross piece 14, as to the maximum movement of the corresponding bars upward, and by the adjusting screw G1 or G3 and lock nut L1 or L3 in the maximum movement of the bar downward. Intermediate positions are fixed by the notches 17 in the tuning lock lever 19.

The string terminal T2 has an arm C2, as shown in Figs. 4, 5 and 6, in which is a seat or well W for a spring R, the upward movement of which is limited by the cross piece 14 fastened to the base B by any conventional means, preferably by screws 29. The outer end of the arm on the terminal T2 is kept in constant contact, by the pressure of the spring R, with the cam H attached to shaft I of minor control lever J, as shown in Fig. 6.

The downward movement of the plates P1 and P2 is checked and regulated by the notches 17 in the tuning lock lever 19 pivoted at 20. The maximum downward movement of the plates P1 and P2 is also limited by the adjusting screws G1 and G3 and lock nuts L1 and L3 which, in practice, are set so that when the plate P1 is in the third or bottom notch 17 on the lever 19, the plates P1 and P2 are in contact with such adjusting screws G1 and G3.

The lever 19 passes through a slot 21 in plate P1 and is kept in constant contact with a hardened piece of metal 22 by the tension of a spring 23 fastened to the base B at its terminal by any conventional means. The notches 17 in the lever 19 are spaced so that a movement of the plate P1 from one notch to another will result in a change of a one half tone in the second and fifth strings of the instrument. In practice it is not essential for the skilled player to use the lever 19 in regulating the changes of pitch in the second and fifth strings, as such changes in pitch may be accomplished by ear by means of the pressure of the hand on plate P1. Momentary changes of pitch in the fifth string may be similarly made by the pressure of the hand on plate P2 alone.

Plates P1 and P2 may, in practice, be combined into one plate, if desired, or the fifth string may be unadjustably fixed to the base B, as shown in Fig. 1, for the first, fourth, sixth and seventh strings.

A bar or stop 30 causes plate P2 to move downward at any downward movement of plate P1, but permits plate P1 to be released for upward movement without, at the same time, releasing plate P2. The stop 30 also permits of free movement downward of plate P2 without a concurrent downward movement of plate P1. Such movements permit a wider variety of pitch changes to be made.

In practice, it has been found that the tension of the strings of the instrument is sufficient to cause the terminal bars C1 and C3 and plates P1 and P2 to move upward to their normal position whenever the notches 17 on the lever 19 are disengaged from the bar 22 in plate P1, thus bringing the instrument to its normal tuning.

The movement of the minor control lever J upward is regulated by an adjustable base block 31 secured to the base B by adjusting anchors 32 and lock nuts 33. The base block 31 is kept forced upward against the lock nuts 33 by springs 34. A locking stop 35 is inserted in the

base block 31 by means of a loose fit, whereby it may be turned upward and moved backward or forward, as desired, in order to bring the same in contact or not with the stud 36. The locking stop 35 has a boss 39 on its lower end, as shown in Fig. 12 which, when the locking stop 35 is raised to a little past perpendicular, will cause the minor control lever J to be held down to its lowest position with its downward stop 37 at the end thereof in contact with the face of the instrument. When the locking stop 35 is raised upward and pushed backward from its position in contact with the stud 36, the minor control lever J is raised to its highest position. The downward movement of the minor control lever J is regulated by the adjustable downward stop 37 at its end which is kept at tension by the spring 38.

In practice, the instrument is in normal tuning when the plates P1 and P2 are in normal position just above the first or top notch 17 on the lever 19, out of contact with the arms C1 and C3, and the minor control lever J is in position with its stud 36 in contact with the under surface of the locking stop 35, as shown in Fig. 1. This position of normal tuning permits the changing of pitch upward from normal tuning of the second and fifth strings through a series of three half tones and the changing of pitch of the third string one half tone both above and below the normal tuning.

Operation

The electric Hawaiian guitar should be normally tuned to E major. While playing the instrument the player allows his hand and wrist to rest on the plates P1 and P2 and plays the instrument in the conventional manner.

Pressure on the plate P1 downward from its normal position causes an increase of tension in the second and fifth strings of the instrument, resulting from the downward movement of the bars C1 and C3 rotating their string terminals on the shaft A. As the bar 22 on plate P1 engages each of the three notches 17 on the lever 19, progressively and respectively, the second and fifth strings rise a half tone at each notch or stop, or, namely, *b* to *c*, to obtain *e* augmented, in the first or upper notch or stop; *c*# to obtain *e* 6th in the second or middle notch or stop; and *d* to obtain *e* 7th in the third or bottom notch or stop. As before indicated, the plate P2 may be operated independently of plate P1 for momentary changes of chord on the fifth string of the instrument only.

When the plate P1 is in the second or middle notch 17 on the lever 19, the slanting at the second fret of the instrument of the Hawaiian steel or bar which is held and used in the left hand of the player will result in a 9th chord.

By pressure of the hand against the lever 19 in an outward movement from the player and a concurrent release or lessening of the pressure of the hand on plates P1 and P2 the notch 17 on the lever 19 is disengaged from the bar 22, causing the plates P1 and P2 and the terminal bars C1 and C3 to move upward toward the normal tuning position of the instrument by reason of the lessening of the tension on the second and fifth strings of the instrument, thereby making possible half tone changes of tuning or pitch in the second and fifth strings in the reverse order as above indicated.

With the instrument normally tuned to E major, the third string of the instrument is held to such E major tuning when the locking stop 35 is in position as shown in Fig. 1 with its lower end in contact, as shown, with the stud 36. It is held in such normal tuning with the locking stop 35 in contact with the stud 36, as shown in Fig. 1, by reason of the pressure of the arm of the string terminal T2 on the cam H of the minor control lever J. The contact of the arm of the string terminal T2 with the cam H on the minor control lever J is shown in detail in Fig. 6. The pressure of the spring R on the arm C2 of the string terminal T2 keeps such arm in constant contact with the cam H.

When the minor control lever J is depressed by the wrist or forearm of the player until the stop 37 at its end comes in contact with the surface of the face of the instrument, the arm of the string terminal T2 is raised or lifted upward by the upward movement of the cam H of the minor control lever J, loosening the tension in the third string of the instrument and lowering its pitch one half tone from *g*# to *g* to obtain an *e* minor chord and tuning.

By releasing the locking stop 35 by raising it to a perpendicular position and moving it outwardly from the body of the player, causing the lower end of the stop 35 to disengage the stud 36, the minor control lever J is rotated by the pressure of the arm of the string terminal T2 on the cam H of lever J, until such arm of the terminal T2 strikes bottom by reason of the pressure of spring R, thereby increasing the tension in the third string of the instrument and raising its pitch a half tone to *a*. If at the same time the plate P1 is pressed downward to the second or middle notch or stop 17 on the lever 19, *a* tuning results.

When the instrument is in *a* tuning as described, if the minor control lever J is pressed downward until the stop 37 at its end comes in contact with the surface of the face of the instrument, an *a* 7th tuning results. To obtain an *a* minor tuning from this last position, plate P1 is released upward to the first or top notch 17 on lever 19.

When plate P1 is in the first or upper notch 17 on lever 19, depressing the minor control lever J until the stop 37 at its end is in contact with the face of the instrument, will result in a C major tuning of the instrument. When playing with the instrument in C major tuning as described, the stop 37 of the minor control lever J may be kept in constant contact with the face of the instrument by raising the locking stop 35 to a bit past perpendicular thereby causing the stud or boss 39 on its lower end to depress the stud 36 and hold the lever J in its maximum downward position.

When plate P1 is in the second or middle notch 17 of the lever 19, forming an *e* 6th tuning, the depressing of the minor control lever J so that the stop 37 at its end is in contact with the face of the instrument results in an *e* minor 6th chord.

When plate P1 is in the third or lower notch 17 on the lever 19, forming an *e* 7th tuning, the depressing of the minor control lever J so that the stop 37 at its end is in contact with the face of the instrument results in an *e* minor 7th chord.

Having fully described my invention, what I claim and desire to secure by Letters Patent is:

1. In a bridge for stringed musical instruments of the lute type, a rotatory string terminal, and means adapted to turn said terminal for

increasing and decreasing the tension of the string attached thereto, said terminal having an arcuate bearing surface of substantial length for such string concentric with the axis of rotation of said terminal.

2. In a bridge for stringed musical instruments of the lute type, a rotatory string terminal having a circular surface of substantial length over which a string passes, and means adapted to turn said terminal for increasing and decreasing the tension of the string attached thereto while the instrument is being played.

3. In a bridge for stringed musical instruments of the lute type, a rotatory string terminal having an arm, for increasing the tension of the string attached thereto when operated while the instrument is being played, by the operation of pressure applied to said arm of such rotatory string terminal, said terminal having an annular bearing surface for such string.

4. In a bridge for stringed musical instruments of the lute type, a rotatory string terminal having a concentric annular bearing surface and an arm, for increasing the tension of the string attached thereto while the instrument is being played, by the operation of pressure applied to said arm of such rotatory string terminal by the playing hand of the player.

5. In a bridge for stringed musical instruments of the lute type, having one or more rotatory string terminals for increasing and decreasing the tension of the string attached thereto while the instrument is being played, means for regulating the extent of such change in tension comprising of a notched lever, a handrest plate capable of being engaged therewith, and means for keeping such plate and lever engaged.

6. In a bridge for stringed musical instruments of the lute type, having one or more round surfaced rotatory string terminals for increasing and decreasing the tension of the string attached thereto, while the instrument is being played, a device for regulating such change in tension comprising a rotatory arm, a locking means for such arm, means for applying pressure to such arm, and means for causing partial rotation of such arm.

7. In a bridge for stringed musical instruments of the lute type, having rotatory string terminals for increasing and decreasing the tension of the string attached thereto while the instrument is being played, handrest plate means contacting such rotatory string terminals for rotating the same, and an axis for the rotation of such handrest plate means upon pressure being applied thereto, and means dividing such plate means for independent operation of the parts thereof.

8. A bridge for stringed musical instruments of the lute type consisting of rotatory string terminals having circular surfaces, means for rotating such terminals to regulate the amount of the increase and decrease in the tension of the strings attached to such rotatory string terminals.

9. A combination bridge and handrest for stringed musical instruments of the lute type consisting of a rotatory string terminal, means for rotating such terminal, and means for independently regulating the amount of the tension of individual strings attached to such rotatory string terminal while the instrument is being played.

10. A musical instrument bridge comprising the combination with a base adapted to be mounted on a conventional stringed instrument, a plurality of string terminals having concentric circular string bearing surfaces, said terminals being mounted on said base for limited rotational movement to change the tension of the strings attached thereto, means for selectively operating said terminals, and means for regulating the rotational movement of said terminals.

11. A musical instrument bridge comprising a base, a string terminal mounted on said base for limited rotational movement, said terminal having a circular surface for supporting a string anchored thereto, and means under the control of the hand of the player for partially turning said terminal to change the tension of the string.

12. A bridge for musical instruments of the lute type, comprising in combination: a base; a plurality of string terminals having concentric circular string bearing surfaces; a shaft mounted on said base; certain ones of said string terminals being mounted to turn on said shaft; an arm connected to each of said last named terminals; means limiting the movement of said arm in one direction under the tension of the string connected thereto; plates hinged to said base for selective contact with some of such arms to turn their string terminals to increase the string tension individually as well as collectively; and means for releasably securing said plates in one of several positions whereby to fix the string tension at a predetermined value.

13. A bridge for musical instruments of the lute type, as defined by claim 12, including in combination an arm connected to another one of the rotary string terminals; spring means urging said arm to tension the string connected to such terminal; and a minor control lever having a shaft journalled to said base and being provided with a cam into contact with which said arm is urged by said spring means, so that the string tension may be regulated by operating said minor control lever.

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