Aug. 15, 1950 H. M. HISE 2,519,044

STRINGED MUSICAL INSTRUMENT

Filed Aug. 14, 1948 2 Sheets-Sheet 1

Fig. 1

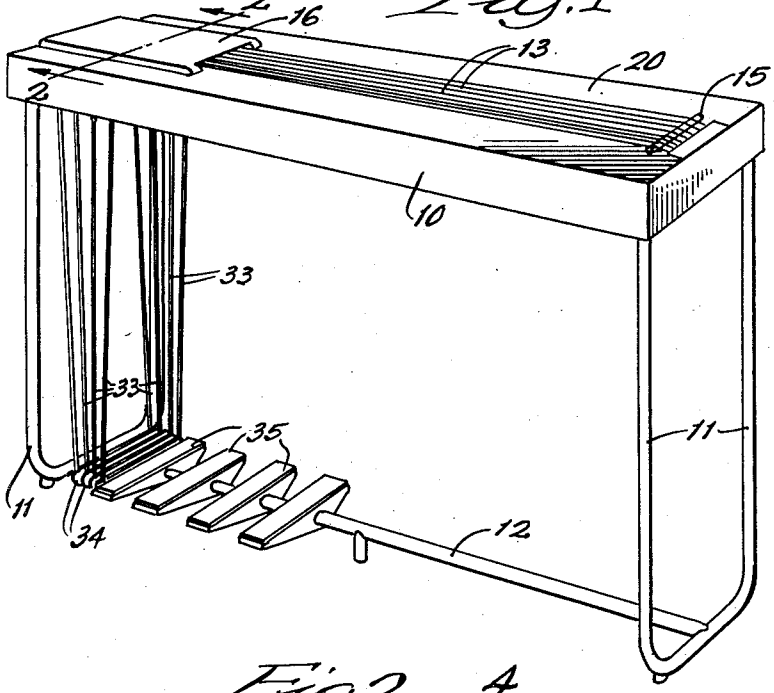


Fig. 2

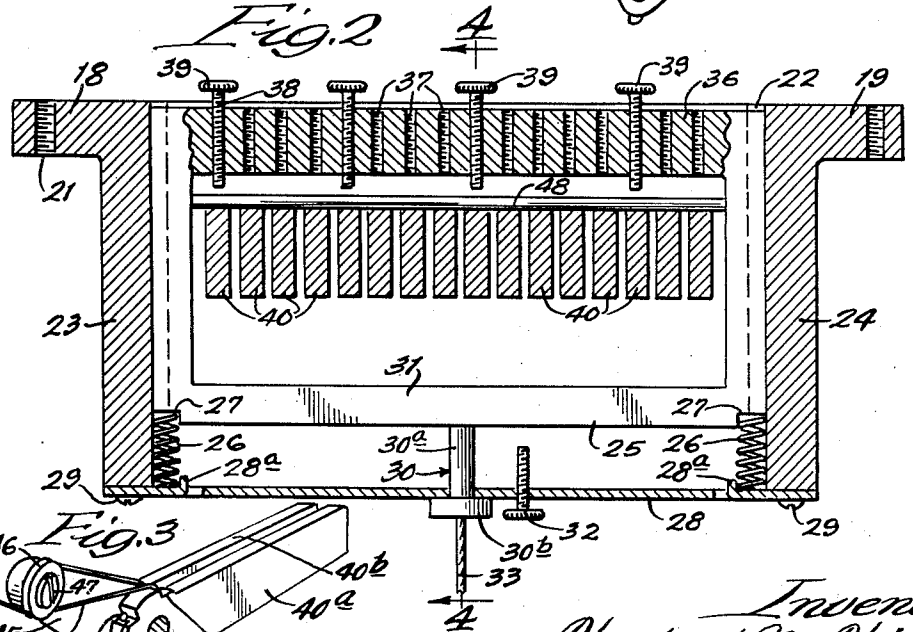


Fig. 3

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Filed Aug. 14, 1948 2 Sheets-Sheet 2

Fig. 4

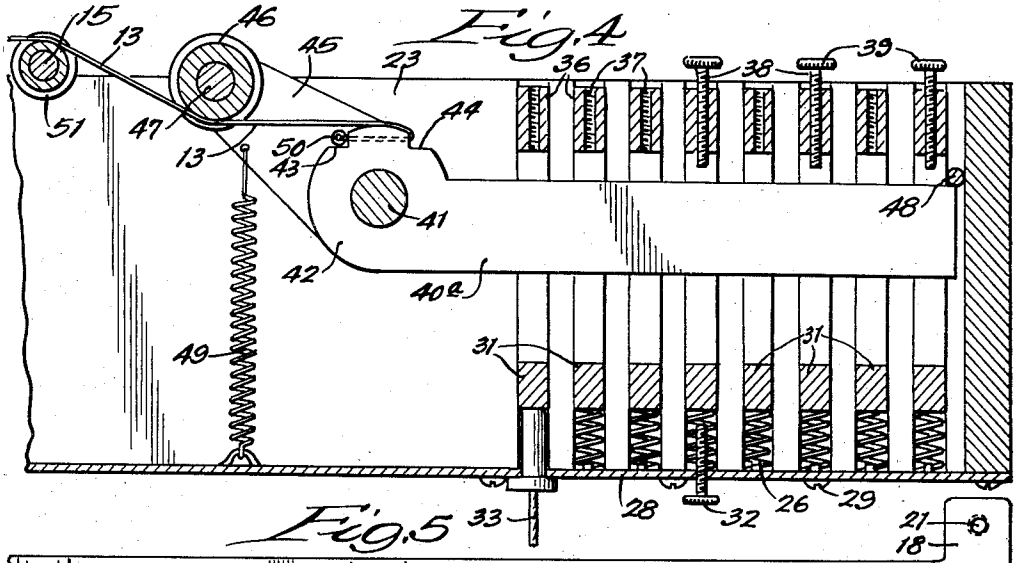
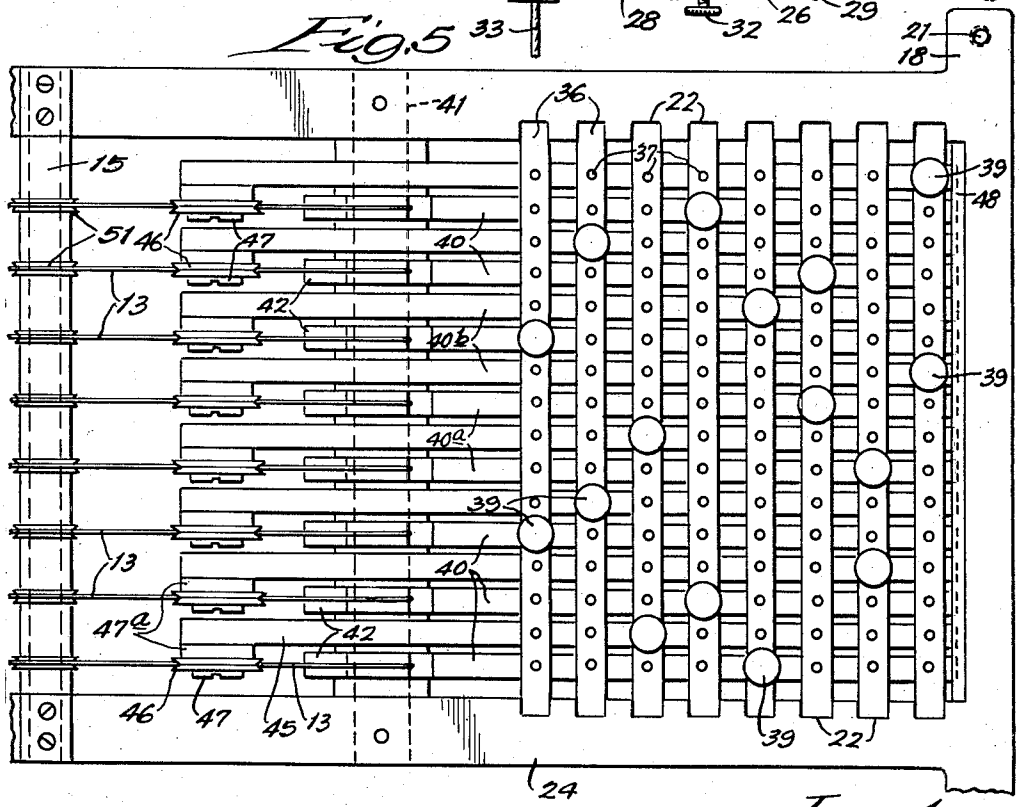


Fig. 5



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STRINGED MUSICAL INSTRUMENT

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15 Claims. (Cl. 84—312)

1

This invention relates to improvements in stringed musical instruments of the type described in the pending application of Hise and Cousineau, Serial No. 26,344, filed on May 11, 1948.

The subject musical instrument is a stringed instrument of the guitar type that is played by plucking or strumming strings tensioned between spaced bridges as a steel is shifted longitudinally to change the effective lengths of the strings. As the tension of a string is changed, its tone or pitch is accordingly altered. By varying the tension of selected strings in varying combinations while playing, numerous types of chords and chord progressions are secured without unduly increasing the number of strings or unduly complicating the tuning instrumentality with which they are associated; that is, the tone of the stringed instrument may be changed from a major chord to a minor chord, a seventh chord, or an augmented chord. It may be changed a half chord, a full chord, one and one half chords and the like.

It is an object of this invention to provide, in a stringed musical instrument of the type described, an improved tuning instrumentality by which the tension of the strings in various selected combinations may be varied while playing.

A further object is to provide a tuning instrumentality of the type described which is composed of relatively few simple parts which co-act to provide for the desired chord changes while playing without unduly increasing the number of strings or complicating the mechanism by which the changes are effected.

A still further object is to provide an improved tuning instrument of the type described which is versatile in that initial adjustment of string tension can be easily effected and changes of string tension easily made for accurate selection of chords responsive to actuation of a minimum number of foot pedals adapted to be operated by the player.

These and other objects and advantages of this invention will hereinafter appear, and for purposes of illustration but not of limitation an embodiment of the invention is shown in the accompanying drawings in which,

Figure 1 is a perspective view of a guitar of the console type embodying features of my invention;

Figure 2 is a sectional view taken along the line 2—2 of Figure 1;

Figure 3 is a perspective view of a cooperating

2

pair of levers in their assembled relation by which string tension is adjusted;

Figure 4 is a sectional view taken along the line 4—4 of Figure 2; and

Figure 5 is a plan view of the tuning instrumentality shown in Figure 4.

As shown in Figure 1, the preferred embodiment of the invention is drawn to a stringed musical instrument of the guitar type wherein a horizontally disposed box-like chamber 10 is supported in spaced relation with the floor by upright legs 11 that are joined transversely by a cross rod 12. The invention may equally be incorporated in other types of stringed musical instruments otherwise supported or carried.

The box-like chamber 10 is hollow to provide resonance, and to be fully effective an opening may be provided in the upper wall immediately below the strings 13. Ordinarily a plurality of strings are provided in laterally spaced parallel relation, the strings being tensioned between spaced bridges 14 and 15 and anchored at their opposite ends to binding posts (not shown) and to elements of the tuning instrumentality which will hereinafter be described in greater detail. The strings are initially tuned by way of the binding posts and they may be tuned while playing by way of the tuning instrumentality to provide a wide variety of progressions and chord changes. When desired, a fret board may underlie the strings throughout a portion of their lengths disposed between the spaced bridges.

The tuning instrumentality by which the strings 13 are anchored is arranged at one end of the instrument beyond the bridge 15, and ordinarily it is concealed by a cover plate 16. The instrumentality includes a rectangular housing or bracket 17 open at each end. The housing 17 seats in a suitable opening provided through the box-like chamber 10, and it is provided with outwardly extending flanges 18 and 19 integral with the upper end of the bracket. The flanges which rest upon the face of the upper wall 20 of the box-like chamber 10 are fixed in this relation by suitable means, such as insertable through screw threaded openings 21 provided in the flanges.

A plurality of vertically disposed grooves 22 are provided on the inner face of each of the side walls 23 and 24 of the bracket 17, opposed pairs of which receive rectangular yokes 25 slidable vertically between two positions of adjustment relative to the housing 17. Each yoke 25 is constantly urged to its upper or normal position of adjustment. As illustrated, the means for urging the yokes toward their normal position

of adjustment may comprise coil springs 26 that bear against the under side of each yoke 25, two coil springs being provided for equalization purposes. One end of each spring is seated in notches 27 in the lateral end portions of the yoke, while the other end of each spring bears against a plate 28 secured to the underside of the housing by screws 29 and having a lip 28a struck upwardly to define a seat for the coil spring.

An inverted T-member 30 is fixed to the underside and intermediate the ends of the lower cross member 31 of each yoke 25. The shank or stem portion 30a extends through an opening provided in the plate 28 whereby the corresponding yoke is stopped in its upper position of adjustment upon engagement of the cross arm 30b of the T-member with the underside of the plate 28. An adjustable screw 32 operative in the plate 28 limits the downward movement of the yoke 25 to determine its lower position of adjustment. A flexible shaft 33 in the form of a wire, rod or cord connects the T-member with one end of a rocker arm 34 which is operated by one of the foot pedals 35. It will be manifest that the use of a T-member rigidly connected to the central portion of a yoke and slidable through a stationary plate which may serve as a bearing member, better control of movements and better performance will be achieved, however, other connections may be used between the rocker arms and the respective yokes. In the manner described in the pending application previously pointed out, the number of rocker arms 34 corresponds to the number of foot pedals 35, and each end of the rocker arm may be connected to separate yokes 25 and therefore, the four foot pedals may be used to operate eight yokes.

The upper cross member 36 of each yoke is provided with a plurality of laterally spaced vertical screw threaded openings 37 adapted to receive threaded adjusting pins 38 having knurled heads 39 to facilitate turning movement. By rotating the pins 38 in one direction or the other, the length by which the lower end of the pin extends below the cross member 36 may be adjusted. The number of screw threaded openings 37 will correspond to the number of lever arms 40 arranged therebelow in the arrangement to be described.

The lever arms 40 are each separately pivoted on a common horizontally disposed axis 41 carried by the bracket 17 in a position forwardly of the foremost yoke 25 and they extend rearwardly beyond the pivot 41 to underlie each of the upper cross members 36 of the yokes 25. The lever arms are arranged in pairs, with each arm 40a and 40b that make up a pair operatively engaging one string. In the illustrated embodiment, there are eight strings, and therefore, the tuning instrumentality includes eight yokes 25, sixteen lever arms and sixteen screw threaded openings 37 in each cross member 36.

The lever arms 40a and 40b in each pair are like the corresponding lever arms in the other pairs, and therefore, description to one pair should suffice for all. One lever arm 40a, hereinafter called the first lever arm or tensioning arm, has an enlarged hub section 42 on the end concentric with the axis 41. A longitudinal opening extends through the upper portion of the hub section from a notch 43 in the front to a cut-out portion 44 in the rear, and periphery of the hub section between the notched and cut-out portions is grooved. The other or second lever arm 40b has an upwardly and forwardly inclined extension 45 which carries a grooved roller 46 on a horizontally disposed pin 47 extending laterally from a stub 47a carried on the end of the extension 45. The lever arms 40a and 40b are constantly urged upwardly to engage the under side of stop rod 48 extending transversely between the walls 23 and 24 and which defines the upper position of adjustment of the lever arms 40a and 40b. Tension inherent in the assembly serves constantly to urge the lever arm 40a toward its upper position of adjustment, while it may be necessary to provide spring means, such as the tension spring 49 connected at one end to the extension 45.

In the assembly, a string 13 having an eyelet 50 in the end is threaded rearwardly through the opening in the hub section 42 until it is stopped because the eyelet is unable to pass through the opening. Thereafter the string is drawn forwardly over the hub section and then under the roller 46, over a roller 51 carried by the bridge 15 and across the spaced bridge 14. The free end of the string 13 is then threaded through the binding post upon which the string is wound until tensioned to initial tune. As the string becomes tensioned, the operating forces tend to cause the lever arm 40a to swing in the counterclockwise direction whereby the lever arm is brought into the desired engagement with the stop 48.

In the assembled relation, it will be manifest that the end of the string 13 is anchored to the lever arm 40a and is arranged thereon in a manner which causes tensioning of the string as the lever arm 40a is rocked downwardly upon engagement with the adjustable screws as the corresponding yoke is actuated toward its lower position of adjustment responsive to foot pedal operation. The degree of tensioning will correspond to the adjustment of the screws 38. The roller 46 on the second lever arm 40b is aligned with the grooved portion on the hub 42, and it engages the spring 13 intermediate the anchored end and the bridge 15 to deflect the string from its normal path. Thus, as the second lever arm 40b is rocked downwardly, string tension will be relaxed.

From the description, the operation of my tuning instrumentality will be obvious.

Each cross member 36 is provided with one or more pins 38 arranged through selected openings 37 to engage selected lever arms. As a foot pedal 35 is rocked in one direction, the yoke 25 operatively connected therewith through the rocker arm 34 is actuated to its lower position of adjustment. As this occurs, those lever arms 40a or 40b engaged by the pins 38 carried by the cross member 36 of the yoke 25 actuated are simultaneously rocked to their lower position of adjustment, thereby to increase the tension of the strings in the event that the engaged lever arm is of the type 40b or to decrease the tension of the strings associated with actuated lever arms of the type 40b. As the foot pedal is returned to its normal position, coil springs 26 return the yoke 25 to its normal positions of adjustment, enabling the actuated lever arms to return to their normally raised position. As the selected foot pedal or other foot pedals are rocked in the opposite direction, the yoke or yokes connected with the other end of the rocker arm or rocker arms are actuated to their lower positions of adjustment. Thus, by proper arrangement and adjustment of the pins 38, one or more of which extend through the respective cross mem-

bers to engage one or more lever arms 40a and 40b at the same time, and by proper manipulation of the foot pedals 35, numerous chord changes of varying scope can be made while playing.

It will be understood that the number of operative members are not limited to the amounts described but their number may be increased or decreased to conform with the requirements of the instrument. Description has been made to specific means for actuating the yokes 25 in accordance with the system described in the pending application, however, the invention is not limited to that system, as other means for actuating the yokes may be employed.

It will be further understood that numerous changes may be made in the details of construction, arrangement and operation without departing from the spirit of the invention, especially as defined in the following claims.

What I claim is:

1. In a stringed musical instrument having a plurality of strings tensioned between spaced bridges, each string having a first lever arm rockable between normal and operated position of adjustment and anchoring one end of the string in a manner to increase string tension as it is rocked to one position of adjustment and to decrease string tension as it is rocked to the other position of adjustment, each string also having a second lever arm rockable between normal and operated positions of adjustment and having an offset that engages the string to decrease strong tension as it is rocked to one position of adjustment and to increase string tension as it is rocked to the other position of adjustment, means constantly urging each of the lever arms to its normal position of adjustment, and an operative connection responsive to externally applied force for selectively rocking the lever arms to their operated position of adjustment.

2. In a stringed musical instrument having a plurality of strings tensioned over spaced bridges, pairs of first and second lever arms for each string rockable about a common pivot between two positions of adjustment, the first lever arm anchoring the corresponding string which is threaded thereon in a manner to cause further tensioning of the string as the lever arm is rocked in one direction and relaxation of tension as the lever arm is rocked in the other direction, an extension on the second lever arm which engages the string intermediate the anchor and adjacent bridge whereby string tension is increased or decreased responsive to rocking movement in the direction opposite that for effecting like results with the first lever arm, means constantly urging the lever arms to one position of adjustment, and means for actuating selected lever arms to the other position of adjustment responsive to the application of external forces while playing.

3. A stringed musical instrument as claimed in claim 2 in which the first lever arm is urged to its first position of adjustment by reaction of the tensioned string and spring means constantly operate on the second lever arm to urge the same to its first position of adjustment.

4. In a stringed musical instrument having a plurality of strings tensioned over spaced bridges, pairs of first and second lever arms for each string rockable about a common pivot between two positions of adjustment, the first lever arm anchoring the corresponding string which is threaded thereon in a manner to cause further

tensioning of the string as the lever arm is rocked in one direction and relaxation of tension as the lever arm is rocked in the other direction, an extension on the second lever arm which engages the string intermediate the anchor and adjacent bridge whereby string tension is increased or decreased responsive to rocking movement in the direction opposite that for effecting like results with the first lever arm, means constantly urging the lever arms to one position of adjustment, one or more rigid members extending transversely across the lever arms between two positions of adjustment, means constantly urging the members toward one position of adjustment, means carried by each member for engaging selected lever arms during movement of the member to the other position of adjustment, and means for actuating selected members to the other position of adjustment responsive to operation by the player whereby the engaged lever arms are actuated to their other position of adjustment.

5. In a stringed musical instrument having a plurality of strings tensioned over spaced bridges, pairs of first and second lever arms for each string rockable about a common pivot between two positions of adjustment, the first lever arm anchoring the corresponding string which is threaded thereon in a manner to cause further tensioning of the string as the lever arm is rocked in one direction and relaxation of tension as the lever arm is rocked in the other direction, an extension on the second lever arm which engaged the string intermediate the anchor and adjacent bridge whereby string tension is increased or decreased responsive to rocking movement in the direction opposite that for effecting like results with the first lever arm, means constantly urging the lever arms to one position of adjustment, a plurality of members extending transversely across the lever arms and shiftable between two positions of adjustment relative to the lever arms, means constantly urging the members to one position of adjustment, adjustable means carried by the members for engaging selected lever arms when the corresponding member is shifted to the other position of adjustment whereby the engaged lever arms are rocked to their other position of adjustment, and means for actuating selected members to the other position of adjustment responsive to operation from an external source.

6. A stringed musical instrument as claimed in claim 5 in which the members comprise longitudinally spaced yokes slidable vertically in the instrument frame, and the means constantly urging the yokes to a normal position of adjustment comprises coil springs fastened between the yokes and the frame.

7. A stringed musical instrument as claimed in claim 5 in which the actuating means comprises foot pedals are provided for operation by the player while playing, and operative connections between the foot pedals and the members whereby selected members are actuated to the other position of adjustment responsive to the operation of the pedals.

8. An instrument as claimed in claim 1 in which a stop is provided to determine the normal position of adjustment for each lever arm.

9. An instrument as claimed in claim 1 in which the operative connection responsive to externally applied forces for rocking selected lever arms to their operated position of adjustment comprises frame members extending transversely

across the arms and shiftable relative to the arms to operative and inoperative positions of adjustment, and means responsive to externally applied force for actuating selected frame members to the operative position of adjustment.

10. A musical instrument as claimed in claim 9 in which a stop is provided to determine the inoperative adjustment for the frame members, and spring means for constantly urging said frame members individually toward their inoperative position of adjustment.

11. A musical instrument as claimed in claim 9 in which fingers are provided in each frame member to engage selected arms as the corresponding frame member is actuated to its operative position of adjustment, said fingers being adjustable to rock the engaged arms to operated position of adjustment responsive to actuation of the respective frame member to its operative position of adjustment.

12. A musical instrument as claimed in claim 9 in which an adjustable stop is provided for each frame member to determine its operative position of adjustment.

13. A musical instrument as claimed in claim 1 in which spring means are employed constantly to urge the second lever arm to its normal position of adjustment.

14. A musical instrument as claimed in claim 1 in which when the arms are rocked from their normal position to their operated position the first lever arm operates to tension the corresponding string and the second lever arm operates to slacken the tension in the engaged string.

15. In a stringed musical instrument having a plurality of strings tensioned over spaced

bridges, pairs of first and second lever arms for each string rockable between two positions of adjustment, the first lever arm anchoring the corresponding string which is threaded thereon in a manner to cause further tensioning of the string as the lever arm is rocked in one direction and relaxation of tension as the lever arm is rocked in the other direction, an extension on the second lever arm which engages the string whereby string tension is increased or decreased responsive to rocking movement in the direction opposite that for effecting like results with the first lever arm, means constantly urging the lever arms to one position of adjustment, one or more rigid members extending transversely across the lever arms between two positions of adjustment, means constantly urging the members toward one position of adjustment, means carried by each member for engaging selected lever arms during movement of the member to the other position of adjustment, and means for actuating selected members to the other position of adjustment responsive to operation by the player whereby the engaged lever arms are actuated to their other position of adjustment.

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