GUITAR TONE CHANGING DEVICE

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3 Claims

ABSTRACT OF THE DISCLOSURE

A tone changing device for a steel guitar having a pair of cooperating linkages associated with each guitar string which are selectively movable by one or more foot pedal-actuated control rods to vary the string tension and change the musical pitch of the string accordingly.

The present invention contemplates an attachment for a stringed musical instrument such as a steel guitar for changing a tone while the instrument is being played. A player of such a stringed instrument is limited in the range and combination of tones he can produce on the instrument because the tones are produced by plucking the strings with one hand and varying the operating or vibrating length of the string with the other hand. The pitch of the tone produced by a string of a musical instrument when plucked is largely determined by the tension in the string, and ordinarily the tension in the strings is set before the player begins playing his instrument. Makers of stringed musical instruments have for many years been trying to devise a foot operated attachment for providing maximum variation in pitch that will selectively engage the strings of a musical instrument to vary the tension in the string while the instrument is being played and hence vary the pitch of the tone produced by the strings of the instrument. Such an attachment would permit the player to increase the range in combination tones he can produce on the instrument.

The invention contemplates the addition to an otherwise more or less conventional stringed instrument of one or more mechanisms, each of which may be individually adjusted, as by means of adjustable actuating screws or the like, so that when it is brought into action, as, for example, by depressing the foot pedal individual thereto, certain strings of the instrument are consequently tightened while others may be slackened, or all may be tightened or all slackened, as the case may be; or certain strings may be tightened, others slackened and still others unchanged from their normal tension, depending entirely upon the make-up of the chord which it is desired to produce.

Presently marketed units do have devices for providing such tone flexibility, however, these devices are limited since they provide at the most only one definite step increase or decrease from the preselected pitch of a guitar string. For the present, players and advocates of this instrument have been satisfied with this two step limitation.

The present invention represents the first positive step in achieving a wide range of pitch variations on a pre-tuned string, and it provides, if the opportunity for even greater variation should the individual player so desire.

It is, therefore, an object of this invention to provide a pedal mechanism and tone changer apparatus for selectively varying the original or normal pitch of a steel guitar string to desired positions.

Another object of this invention is to provide a universal pedal mechanism for rapid modification and change.

Yet another object of the present invention is to provide a tone changer apparatus that will raise and lower in distinct steps a pretuned and pitched steel guitar string.

Yet another object of the present invention is to provide a tone changer apparatus for a steel guitar that is actuated by a pedal and rod assembly to provide positive displacement and tone change within the instrument.

Yet still another object of this invention is to provide a stringed musical instrument that has a wider variety of range while being played than prior art string instruments.

Other objects and many of the attendant advantages of this invention will become more readily apparent to those skilled in this art from the following detailed description taken in conjunction with the accompanying drawings in which like characters of reference designate corresponding parts throughout the several views, and wherein:

FIG. 1 is a perspective view of a steel guitar having a tone changer mechanism attached thereto and showing the external pedal and rod assemblies mounted for operation beneath the playing surface of the guitar;

FIG. 2 is a side view showing the exposed interior of an alternative embodiment of the present invention, the exposed interior illustrating the cooperating finger and linkage mechanism used to achieve tone variations of a prepitched guitar string;

FIG. 3 is an enlarged perspective exposed and fragmentary view of the tone changer mechanism for varying the tension in a single string mounted within a standard steel guitar frame and represents the preferred embodiment of the present invention;

FIG. 4 is an enlarged exploded view of the cooperating and coating finger or linkage members to which a single prepitched guitar string is attached;

FIG. 5 shows the linkage members of FIG. 4 mounted within the guitar structure in an exploded and fragmentary view, the fingers in this figure being in the normal or originally tuned and pitched position;

FIG. 6 shows the mechanism of FIG. 5 in position to achieve a change in pitch of the tensioned string when plucked from the original tuning to a tone one half step above that tuning;

FIG. 7 shows the structure of FIG. 5 in a position to achieve a change in pitch of the tensioned string when plucked to a tone one half step below the original tuning; and

FIG. 8 shows the structure of FIG. 5 in a position to achieve a change in pitch of the tensioned string when plucked to a tone one half step above the original tuning.

Referring now to the drawings and particularly to FIG. 1, the preferred embodiment of the present invention is largely housed within the interior 10 of the steel guitar frame 11, the only external components being pedal connecting rods 12 and the cooperating and attached pedals 13 secured to the pedal supporting structure 14. The conventional operation and play of a steel guitar requires the musician to sit or stand and face the open side of the apparatus 15 so that each of pedals 13 is within convenient reach and access to the particular instrument illustrated in FIG. 1. It has mounted two plugging heads 16 to facilitate easy transition from the play of one style of music to another. The tone changing apparatus is equally adapted for use on multiple head instruments as on single instruments since there is only required an extension of pivot rods to encompass the second instrument.

The cooperating elements of the preferred embodiment of the present tone changer device is best illustrated in FIG. 3 where there is shown a pair of coating, elon-
gated string tensioning linkages or fingers 19 and 22 pivotally mounted from a common support shaft 18 for restricted movement thereabout. The first of the two linkages 19 is clearly illustrated in FIG. 4 and consists of a thin tapering body member having a string securing tip at its periphery and an aperture 21 in the end opposite the pivot point for attachment to a spring and actuating rod 35 which will be described later in more detail. The second spring tensioning finger or linkage 22 consists of a similar thin cooperating member having a first restraining flange 23 on its leading edge and a second restraining flange 24 molded along its lower trailing edge. Flange 23 has a spring support peg 25 positioned thereon to be described later in more detail and a perforation 26 to permit a passage therethrough of a projecting actuating rod 35a, this rod and its operation also later to be discussed fully. Restraining flange 24 has an aperture 27 threaded for receiving a set screw which may vary positions and limits the rearward displacement of linkage 19.

As the coating linkages 19 and 22 pivot about shaft 18 within the guitar structure 10, their total movement is limited at the rear of the guitar body by set screw 28 and at the front by recessed opening 29 (FIG. 3) in the rear wall of the guitar frame 11. Movement in a forward direction by linkages 19 and 22 is restricted by contact with a wooden planar member 30 which is essentially the upper surface of the guitar head supporting structure. As can be seen in FIGS. 5, 6, 7 and 8, linkages 19 and 22 more in unison between set screw 28 and wooden planar member 30 and in addition, linkage 19 moves independently of linkage 22 between restraining flanges 23 and 24 regardless of the positioning of finger 22. The dependent and independent movement of one or both of fingers 19 and 22 constitutes the guitar string 31, a flexing and relaxing assembly, and it is readily apparent that by adjusting and positioning set screw 28, wooden planar member 30, and restraining flanges 23 and 24, any number of tone variations may be achieved since these elements directly influence such a tone change by affecting linkage rotation and hence the tension in a guitar string 31. A set screw 32 is adjustably received in restraining flange 24 for adjusting the linkage 19.

The controlled operation and displacement of linkage assembly made up of linkages 19 and 22 are best illustrated in FIG. 3 where there is shown a linkage 33 for translating rotational motion 34 to actuating rods 35 and 35a which move in a straight line, these rods directly contacting linkages 19 or 22 for the displacement thereof. Rotating linkage 33 pivots with its supporting rod 36 and is held secure thereon by a bushing 37 and set screw 38. Supporting rod 36 is fastened at one end to a rocker arm 39 through a separate bushing and set screw 40. Rocker arm 39 is slotted to cooperatively receive one end of a pedal connecting rod 12 which is fastened to foot pedal 13 by forming a small bend in its other end and inserting that bend into an aperture 41 located within the body portion of the pedal structure. Rod 12 is prevented from accidental or inadvertent withdrawal by a latch 42. A common pedal supporting axle 43 securely retains all of pedal members 13 in a preselected position equidistant from each other and is itself affixed to supporting member 14 and legs 44.

The displacement of either or both of linkages 19 and 22 is governed by the placement of control collars 45 adjacent to that portion of rotating linkage 33 which will move one or more actuating rods 35 and 35a. Should it be necessary for linkage 19 to be displaced singularly to tighten a string 31, a collar 45 is positioned securely by a set screw or similar means on one force-exerting side of rotating linkage 33 as illustrated in FIG. 6 so that rotation of linkage 33 will pull rod 35 and displace finger 19 through its maximum allowable path of travel, that path of travel being terminated when linkage 19 contacts wooden planar member 30. Similarly, should there be a requirement for relaxing string 31 to achieve a lower tone, a collar 45 can be secured on a second force-exerting side of rotating linkage 33 to displace rod 35a against linkage 22 as illustrated in FIG. 7. FIG. 8 illustrates the simultaneous movement of both rods 35 and 35a, one against linkage 22 and the other away from linkage 19 to achieve still another tonal variation by changing the tension and hence the pitch of string 31. Total displacement of linkage 33 and hence linkage actuating rods 35 and 35a is controlled by the operation of pedal 13 as is clearly shown in FIG. 3.

Since the tone changer apparatus is composed of a plurality of individual tone changing devices, one for each particularly desired or selected string, the devices are constructed so as to all operate from a common shaft 36. Attaching a string tensioning device to a particular number of strings for maximum tone variation of that string is largely a matter of preference for each particular operator with a larger number of such attachments providing maximum versatility. In order to provide operating means for maximum tonal variation, it is necessary to provide a rotating linkage 33 and actuating rods 35 and 35a for each combination of linkages 19 and 22. As is apparent in FIG. 3, only one foot pedal 13 and pedal connecting rod 12 and bar 39 is needed for each shaft 36. Conceivably, there can be on a single shaft 36 a rotating linkage 33 and connecting thereto for operating every tone changing device. The preferred practice, however, is to provide a plurality of pedal assemblies and strategically place rotating linkages 33 where most used so as to have available a variety of pedal assemblies for maximum practicable flexibility. This will enable the operator to rig the most frequently used strings to provide a number of additional and heretofore unattainable chords by a preselection of given strings to be raised or lowered or raised and lowered from their original pitch. It is obvious that the many variations available afford important and desirable flexibility to the musician and the preselected pattern or arrangement of the actuating assemblies is, at best, a personal preference.

The spring tensioning device composed of linkages 19 and 22 retains its normal position as shown in FIG. 5 by the force exerted through spring 46 secured at one end to spring retaining tip 25 and at the other end to setscrew 47 fastened to the body of the guitar structure. Spring 46 essentially retains finger 22 in its normal position while the initial tuning of guitar string 31 which is secured to tip 20 on finger 19 holds finger 19 in its normal position as shown in FIG. 5 also.

Although it is apparent that a large number of tone variations may be achieved by the simple operation and manipulation of the various setscrews and restraining members used herein, the preferred tonal arrangement may be best illustrated by referring first to FIG. 6 wherein there is shown a string tensioning device as controlled by collar 45 and rod actuating member 35 when linkage 33 is rotated as to achieve a tone one full step above the original tuning of string 31. The actuation of pedal 13 simply displaces actuating rod 35 in the direction of the arrow shown to move finger 19 against restraining flange 23 thus tightening string 31.

FIG. 7 illustrates the commonly used collar arrangement for lowering by the half step the pitch of string 31. Collar 45 and installing collar 45 to displace actuating rod 35 and against restraining flange 23 to displace finger 22 against set screw 28. Finger 19 moves with finger 22 and is kept in its original position with respect thereto by the tension in string 31. The cooperating movement of these two linkages results in a lowering of the pitch of string 31 by one-half step.

FIG. 8 illustrates the cooperating bidirectional movement of actuating rods 35 and 35a to both push and pull and affect the change of pitch in string 31. By the arrangement of a collar 45 on both sides of linkage 33, finger
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22 is displaced against setscrew 28 while finger 19 is pulled forward and constrained by restraining flange 23. The net result of this cooperating movement of elements is to increase the pitch of string 31 by one-half step.

An alternative embodiment of the present invention is illustrated in FIG. 2 and is equally efficient at affecting tonal increases and decreases from the normal. This alternative embodiment utilizes a similar string tensioning assembly 48 as that used and illustrated in FIG. 3, however, assembly 48 has been modified to remove unnecessary restraining flanges. The string tensioning device made up of linkages 48 and 54 is supported form a common shaft 49. The set screw arrangement for the device follows closely that of the preferred embodiment in that a set screw 50 accessible from the outside of the guitar frame through recess 51 controls the rearward displacement of cooperating linkages 48 and 54. A second set screw 52 carried by a restraining flange 53 restricts movement of the first coating finger 54. A wooden planar surface 55 is positioned forward the tension device and prevents movement of the device therebeyond. Actuating rods 56 and 56a are affixed to finger 48 and 54 and by use of collars 57 positioned against protruding washers 58 having rod-receiving apertures for displacing actuating members 56 and 56a when pivot bar 59 is rotated by similar means shown in FIG. 3 with pedal mechanism cooperation and a common rod support 36. In addition to the actuating rods 56 and 56a, there is provided an additional tuning rod 60 for displacing the tuning key assembly 61 about a pivot point 62. By selective positioning of collars 57, a variation in string pitch is achieved when pivot bar 59 is rotated.

In the alternative embodiment shown in FIG. 2, collars 57 are so positioned as to lower by one and one-half steps, lower by one-half step, lower by one step, raise by one step and raise by one-half step and string to which the device is attached. Obviously, preselection of collar positions can vary the sequence and steps of increase from those here designated. As was illustrated for the preferred embodiment, a plurality of pedal assemblies are provided so as to provide operator selection and preference for various combinations.

To limit the displacement of the pivoting tuning assembly 51, there is positioned within the supporting frame 62 of the guitar head a set screw 63. Tuning screw assembly 61 is maintained in its rigidity notwithstanding the tension of spring 64, one end 65 of which is secured intermediate the vertical leg of the tuning screw assembly frame while the other end 66 is attached to the stationary framework of guitar body 67. Predetermined indentures are provided on the upper surface of the tuning screw assembly to cooperatively receive the plurality of strings and maintain them in spaced relationship.

The present invention pertains generally to all steel guitars and is not specifically designed to be adapted to only specialized or custom models. Only modifications in the supporting structure necessary to secure the cooperating members of this apparatus distinguish a guitar used herein from conventional models.

Obviously, many modifications and variations may be made to the orientation of the tone changer apparatus and the specific operation thereof without departing from the purpose and spirit of this invention.

What is claimed is:

1. A steel guitar pedal attachment for effecting tone changes in a tensioned and pitched guitar string as it is plucked comprising: first and second string tensioning linkages pivotally mounted on the guitar, and in spaced relation to each other along a string to be tensioned, the first of said linkages having a string end affixed thereto and the first and second linkages each having restraining means to control the movement of said first and said second linkage; means pivotally displacing individually said first linkage and said second linkage within the limits of said restraining means of said first linkage restraining means and said second linkage restraining means to change the original tension of the guitar string affixed thereto and vary the string pitch; and means actuating said displacing means to alter the tension and pitch of the string, said displacing means for said first and second linkages including a rod having means thereon for adjusting the displacement thereof to control the tension of a string.

2. In combination with a stringed musical instrument supported for play from a seated position having a plurality of selectively tensioned and pitched strings for plucking; a plurality of tone changers, one of said changers positioned for varying the musical pitch of each of said tensioned strings above and below its tone pitch, said tone changer comprising: first and second string tensioning linkages pivotally supported on the instrument, said first linkage having secured thereto one end of the tensioned string and said second linkage having restraining flanges controlling the movement of said first linkage; first control rod means moving said first linkage to selectively tighten and relax said string; and said means actuating said first and second linkages by displacing said control rod means to raise and lower the pitch of the string to a tone above or below the originally tuned pitch.

3. In combination with a steel guitar suitably supported for play from a seated position, a plurality of tone changers for varying the musical pitch of tensioned guitar strings above and below the original tuning, each of said tone changers associated with a single guitar string and comprising: first and second pivotally supported string tensioning linkages, said first linkage secured to one end of the tensioned and tuned guitar string and said second linkage having flanges restraining the movement of said first linkage within limits; control rod means engaging with said first and second linkages; collar means secured to said control rod means contacting said linkages selectively upon movement of said rod means to displace said linkages and vary the tension in the string; and said means moving said rod means upon actuation thereof.

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