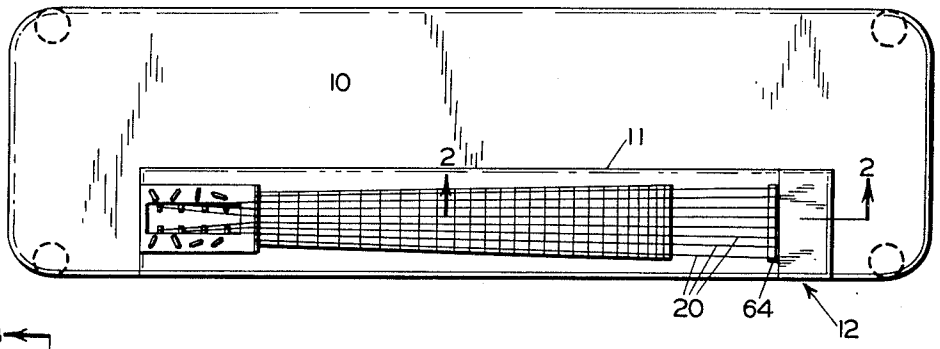
June 9, 1964 R. I. SMITH ETAL 3,136,198

TONE CHANGER FOR ELECTRIC STEEL PEDAL GUITARS

Filed Oct. 13, 1961 2 Sheets-Sheet 1

FIG. 1



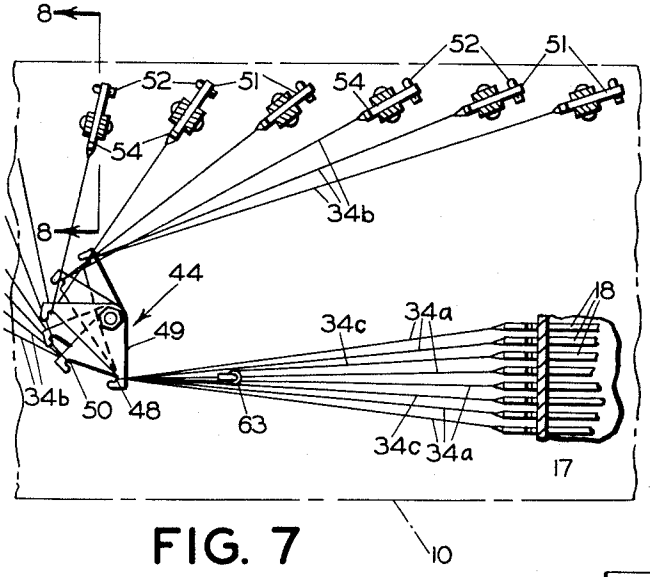


FIG. 7

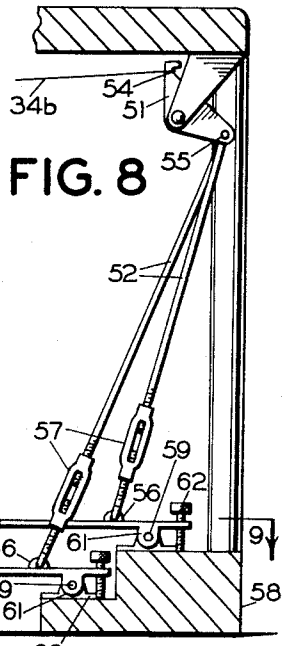
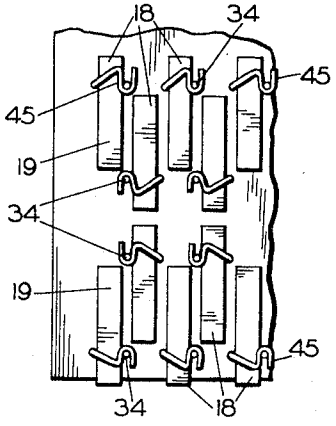


FIG. 8

FIG. 6



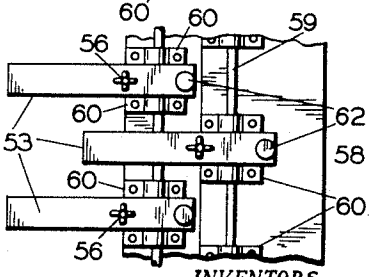


FIG. 9

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TONE CHANGER FOR ELECTRIC STEEL PEDAL GUITARS

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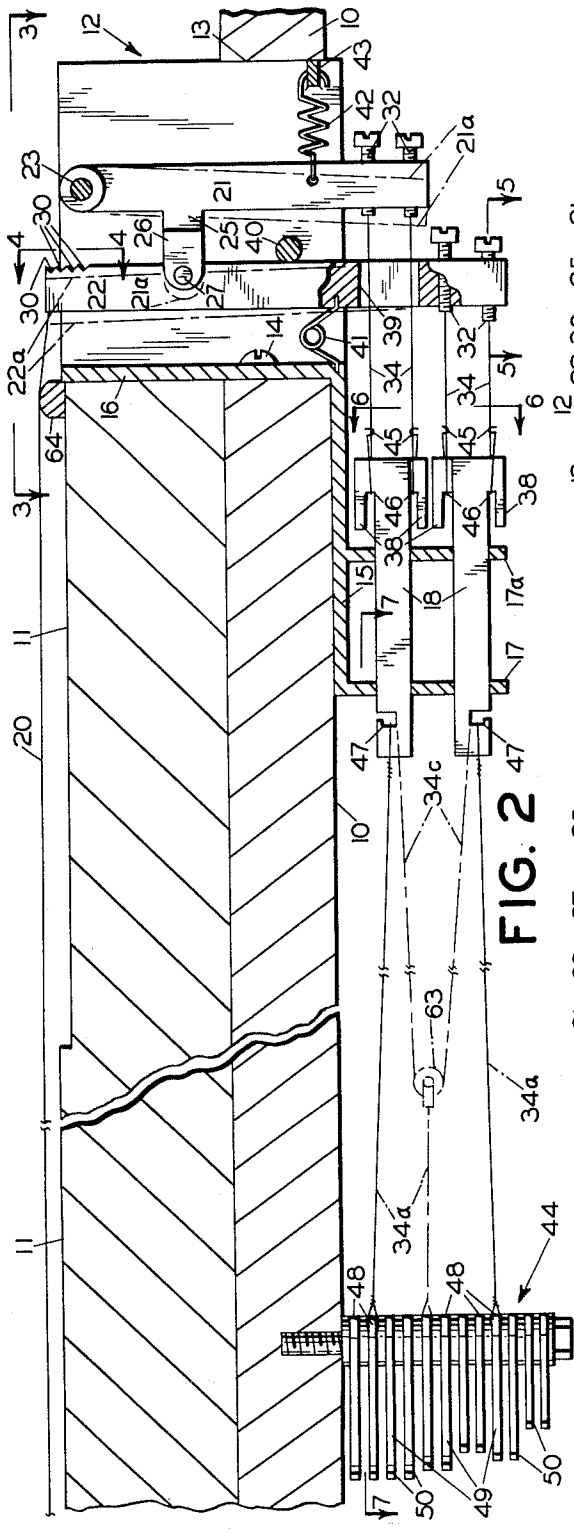

FIG. 2

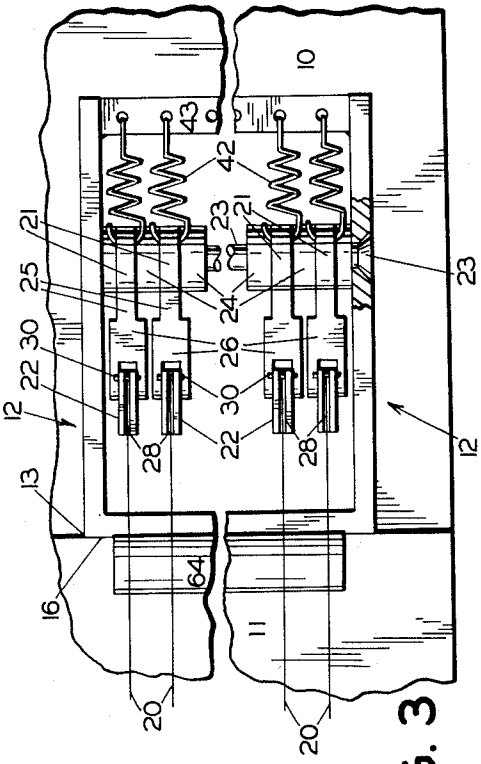

FIG. 3

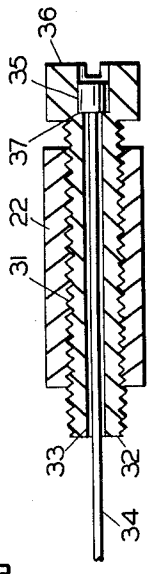

FIG. 5

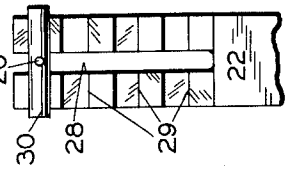

FIG. 4

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3,136,198

TONE CHANGER FOR ELECTRIC STEEL PEDAL GUITARS

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Filed Oct. 13, 1961, Ser. No. 144,968
2 Claims. (Cl. 84—312)

This invention relates to a tone changer to be used with an electric steel guitar which will convert it to a pedal operated guitar, the pedals changing the tone of the guitar, toning it either up or down. The range of tone change and the combination of different sounds is almost infinite, being limited only by the musician himself. At present an electric steel guitarist must have a separate guitar, or neck of strings, for each different tuning desired and at times some players have as many as four or five separate guitars, each with a different tuning. By the use of the device of the instant invention, the need for multiple separate guitars is eliminated since this device will achieve basically the same effect plus a near-infinite combination of sounds or tones.

Each player has a tone or combination of tones in which he particularly desires to play and, further, each artist has an individual style, or can develop an individual sound, for which he desires to be known. This is especially true of electric steel guitar players, and a primary object of this invention is to make this desire a reality while only using one guitar. The device is designed primarily as an adapter or attachment for standard pre-existing guitars, and costs but a fraction of those pedal electric steel guitars which attempt to accomplish a similar result in a very limited range without the versatility of the instant invention. However, this device may also be built into the guitar at the time of manufacture.

An important object of the invention is, therefore, the provision of a tone changer of this character which will impart a wide versatility of tone to a single electric guitar without the necessity of intensive substitution or alteration of existing components.

Other objects reside in the combinations of elements, arrangements of parts and features of construction, all as will be more fully pointed out hereinafter and shown in the accompanying drawings, wherein:

FIGURE 1 is a plan view of a guitar on its associated stand illustrating their relation to each other;

FIGURE 2 is an enlarged longitudinal cross-sectional view taken substantially along line **2**—**2** of FIG. 1 and viewed in the direction of the arrows;

FIGURE 3 is a plan view of the instant invention alone, partially broken away, as viewed in the direction of the arrows of line **3**—**3** of FIG. 2;

FIGURE 4 is an enlarged view of the attachment means of securing the guitar strings to their companion up-tone bars, as taken along line **4**—**4** of FIG. 2 as viewed in the direction of the arrows;

FIGURE 5 is a longitudinal cross-section of one of the several control wire tension adjusting anchoring screws, as taken along line **5**—**5** of FIG. 2 as viewed in the direction of the arrows;

FIGURE 6 is a fragmentary sectional view illustrating the arrangement of the control wire connecting bars, as viewed in the direction of the arrows of line **6**—**6** of FIG. 2;

FIGURE 7 is a plan view partially in section and partially in elevation of the bell crank and control wire distribution, located beneath the guitar stand, taken along line **7**—**7** of FIG. 2 and viewed in the direction of the arrows;

FIGURE 8 is a sectional view of the foot pedal platform adjacent to the floor, taken substantially along line

8—**8** of FIG. 7, as viewed in the direction of the arrows; and

FIGURE 9 is a plan view of the foot pedals and their means of attachment on the foot pedal platform as viewed in the direction of the arrows of line **9**—**9** of FIG. 8.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Referring now to the drawings in detail, there is generally indicated at **10** a base stand or table on which is placed a guitar neck **11**, as best illustrated in FIGS. 1 and 2. The device of the instant invention is composed of a generally U-shaped frame or housing **12** which is fitted through a suitable hole **13** through the top of table **10** and extending above table **10** and held in place by a screw **14**, as best shown in FIG. 2. Beneath table **10**, and extending from the bottom of housing **12**, oppositely disposed to the open end, is a flat plate or leg **15** forming a generally L shaped bracket with the closed end **16** of housing **12**. Extending downwardly and perpendicularly disposed to leg **15** are two control wire connecting bar supports **17** and **17***a*; support **17** located at the end of leg **15** and **17***a* located along leg **15** a suitable distance to support the multiplicity of control wire connecting bars **18**. Through control wire connecting bar supports **17** and **17***a* are a multiplicity of matching vertical slots **19** by which a corresponding control wire connecting bar **18** is supported and operated, as will be described later. The control wire connecting bars **18** are arranged in two rows of sixteen bars each, two bars in each row operating on one guitar string **20**, operation of which will also be explained later.

Referring to FIGS. 2 and 3, there are located with U-shaped housing **12** eight "down-tone" bars **21** and eight "up-tone" bars **22**, one each for each guitar string **20**. Bridging between the side housing walls, near the upper edge of housing **12**, is a "down-tone" bar pivot rod **23** from which is suspended the "down-tone" bars **21** with suitable spacers **24** between each of said "down-tone" bars. Suitably located along each "down-tone" bar **21** is perpendicularly disposed an integral arm **25** extending from the leading edge of each "down-tone" bar **21** and terminating in a U-shaped "up-tone" bar mount **26**. Within each "up-tone" bar mount **26** is pivotally affixed an "up-tone" bar **22** by a pivot screw or pin **27**.

On the upper end of each "up-tone" bar **22**, is a deep cut slot **28**, as best seen in FIGS. 3 and 4, running the width of each "up-tone" bar **22**. Associated with slot **28**, and located on the rearward edge of each "up-tone" bar **22**, are several guitar string retaining notches **29**, which retain the appropriate guitar string **20** by having placed therein guitar string anchoring pin **30**, for purposes of adjustment, to be explained later.

At the opposite, or lower, end of "up-tone" bar **22** are located two threaded bores **31** running through the width of bar **22** to receive adjustable control wire anchoring screws **32**, each anchoring screw **32** having a smaller bore **33** longitudinally centered through it, as illustrated in FIG. 5. Through small bore **33**, within screw **32**, runs the appropriate control wire **34**, the control wire having on its end an anchoring ferrule **35** designed to be retained within a screwhead **36** of anchoring screw **32** by abutting against a shoulder **37**, located within screwhead **36**. The purpose of adjustable anchoring screw **32** is to adjust control wire **34** to its proper length so that when the appropriate control wire connecting bar **18** is activated and moved forward until an integral stop member **38** strikes the control wire connecting bar support **17***a*, the associated "up-tone" bar **22** will be moved the proper distance to produce the desired up-tone change of the associated guitar string **20**. Anchoring screw **32** is retained in its properly adjusted position by the ten-

sion friction of control wire 34 and its end ferrule 35 within anchoring screw 32.

Located above anchoring screw 32 of each "up-tone" bar 22, is a rectangular slot 39 running the width of "up-tone" bar 22 for the purpose of allowing the appropriate control wires 34 to pass through said "up-tone" bar 22 in order freely to operate the associated "down-tone" bar 21 located directly behind each "up-tone" bar 22.

Suitably affixed to and bridging the side housing walls near the lower edge of housing 12, is a solid "up-tone" bar stop member 40 upon which the lower part of each "up-tone" bar 22 rests when not activated by its associated control wire 34. Oppositely disposed to stop member 40 on "up-tone" bar 22 is a wire coil return spring 41 of suitable tension to insure the proper and positive return of "up-tone" bar 22 against stop member 40 when the bar is not operating. Since the "up-tone" bar rests upon a solid stop member and wire coil spring 41 is of sufficient tension to hold "up-tone" bar 22 firmly against stop member 40, the resonating of the associated guitar string 20 is stopped or impaired when said guitar string 20 has produced its desired sound.

The foregoing described "up-tone" bar 22, when activated, will up-tone its associated guitar string 20 by increasing the tension or tightness of the string, because by pulling the lower extremity of the "up-tone" bar to the left, as seen in FIG. 2, the bar will pivot about pivot 27, thereby forcing the upper extremity of the bar to the right, as seen in FIG. 2, increasing the tension on the guitar string 20 associated therewith. This tightening of guitar string 20 obviously produces a higher tone or tuning when played or picked. Each guitar string 20 may also be down-toned by the following described "down-tone" assembly.

Referring to FIGS. 2 and 3, for each "up-tone" bar 22 is a companion "down-tone" bar 21, as before described, pivotally mounted on pivot rod 23 with spacers 24 separating each "down-tone" bar 21 from its adjacent bars. On the lower, or opposite end from pivot rod 23, is a pair of threaded bores 31 to receive adjustable control wire anchoring screws 32, identical to the above-described screws in connection with the "up-tone" bars 22 and performing the same function as the afore-described anchoring screws 32. Located suitably along the lower rear edge of "down-tone" bar 21, is a coil spring 42 which has its one end attached to the rearward edge of said "down-tone" bar 21 and its opposite end connected to a spring mounting bar 43 located at the lower rear edge of housing 12 and bridging the housing 12. Coil spring 42 is of sufficient tension to retain "down-tone" bar 21, as well as return it to, its inoperative position, as shown by full lines in FIG. 2, and further, retain this position when "up-tone" bar 22 is operated by its associated control wires 34. This is possible since return spring 41 is of less tension than coil spring 42.

When the appropriate control wire 34, controlling any given "down-tone" bar 21, exerts a pulling force near its lower end, the "down-tone" bar 21 pivots about pivot rod 23, thus moving said lower end to the left, as seen in FIG. 2, to its limit of travel, as determined by a stop member 38 of control wire connecting bar 18, as above described for the "up-tone" bar. This action places the "down-tone" bar 21 in the position as shown by broken lines in FIG. 2. Now, "up-tone" bar 22 is forced also, to the left, as illustrated by broken lines in FIG. 2, and this movement loosens the tension on the associated guitar string 20, producing a down-toning or tuning of that string. The upper end of "up-tone" bar 22, only, moves to the left due to the pressure action of return spring 41 against the lower end of said "up-tone" bar 22. The "up-tone" bar 22 is pressed firmly against stop member 40 by said spring 41 when the pulling force on the "down-tone" bar 21 is released thereby stopping the guitar string 20 from resonating as described herein above.

Referring to FIGS. 2 and 6, and specifically to control wire connecting bars 18, these connect wires 34, operating the toning bars, to control wires 34*a*, leading to a horizontally disposed bell crank assembly 44. Control wires 34 are secured or anchored to the appropriate "up-tone" bars 22 and "down-tone" bars 21 by anchoring screws 32, as hereinbefore described. The opposite ends of control wires 34 are connected to the appropriate control wire connecting bars 18 by a snap hook 45 formed on the end of each control wire 34. Control wires 34 are constructed of stiff wire stock so as to allow the snap hook 45 to be formed on their ends, insuring a generally rectangularly permanent shape. This is necessary to insure that the four compannion control wires 34 are kept in vertical alignment with each other, as best illustrated in FIG. 6. As seen in FIG. 6, the uppermost row of connecting bars 18 are the "down-tone" bar control wire connectors. The purpose for vertical alignment of the four companion control wires 34 is to insure that the two "down-tone" bar control wires pass through the rectangular slot 39, located through each "up-tone" bar 22, since the "down-tone" bar 21 is directly behind its companion "up-tone" bar 22 and these control wires must not bind within slot 39. The bottom row of connecting bars 18 are the "up-tone" bar control wire connectors which need to be vertically aligned so that a straight forward pulling force is exerted on the "up-tone" bars 22. Snap hook 45 is joined with a hook 46, formed by the stop member 38 and the control wire connecting bar 18. To properly achieve the desired alignment the hooks 46 must be alternately disposed in each row of control wire connecting bars 18, as best shown in FIG. 6.

Each control wire 34*a* has formed on each end a loop; one end being looped over a hook 47 on control wire connecting bar 18 and its opposite end looped over a hook 48 of the appropriate bell crank plate 49, as seen in FIGS. 2 and 7. From a companion hook 50 of each bell crank plate extends a third control wire 34*b* of suitable length to reach from the appropriate bell crank plate 49 to a vertically disposed bell crank 51 from which a pedal connecting rod 52 connects each foot pedal 53 to its vertically disposed bell crank 51. Each control wire 34*b* has a loop formed on each of its ends; one end being looped over hook 50 of horizontal bell crank plate 49 and the other end looped over a hook 54 of vertical bell crank 51.

Each pedal connecting rod 52 is suitably connected through a port 55, located on the opposite arm of bell crank 51 from the hook 54, and is connected to its associated foot pedal 53 by an eye ring 56, as shown in FIGS. 8 and 9. Associated with each pedal connecting rod 52 is an adjustable turnbuckle 57 for the specific purpose of allowing control wires 34*a* and 34*b* to be drawn taut so that no slack exists in the control wire system of this device.

Foot pedals 53 are affixed to a two-step pedal platform 58 which is an integral part of base stand or table 10. The foot pedals 53 are arranged in two rows, one on each step, and secured to foot pedal platform 58 by a rod 59 held down by a plurality of hold down clamps or brackets 60 which also serve to space foot pedals 53 and retain them in their proper positions along rod 59 since one bracket 60 is located along each edge of each foot pedal 53, as seen in FIGS. 8 and 9. Rod 59 serves as a pivot for each pedal to revolve about since rod 59 passes through a bored dog or ear 61 suitably located beneath and integral with each foot pedal 53. An adjustable stop screw 62 is suitably located near one end of each foot pedal 53 to provide pedal angle adjustment and to limit the return travel of said pedal when the foot pressure is removed therefrom.

In the operation of the instant invention, the player has predetermined the tone or sound changes that he will use later, or has become accustomed to use, and has accordingly rigged or connected control wires 34, 34*a* and 34*b*.

It is to be noted that not all control wires or pedals need be used, and that, combinations of control wires may be attached to one pedal so that, for example, one pedal may up-tone one string and at the same time down-tone another, or up-tone more than one, or down-tone more than one, or effect any number of combinations of tone changes. This is accomplished by connecting two, or more, control wire connecting bars **18** by running a control wire **34***c* through a suitable equalizing pulley **63**, which is in turn suitably connected to one control wire **34***a*, controlled by one of the foot pedals **53**, as shown by broken lines in FIG. 2.

Additional combinations of sound or tone changes may be attained by depressing two or three foot pedals **53** simultaneously. This, of course, is a matter of technique with individual artists and made possible by the staggered arrangement of foot pedals **53** mounted on the two-step platform **58**, as best shown in FIG. 9.

For purposes of simplicity of disclosure, only one control wire hook-up controlling one "up-tone" bar **22** and one control wire hook-up controlling one "down-tone" bar **21** will be explained. The depression of an appropriate foot pedal **53** will create a pull on control wire **34**, through pedal connecting rod **52**, bell crank **51**, control wire **34***b*, bell crank plate **49**, control wire **34***a* and control wire connecting bar **18**, which in turn activates either the appropriate "up-tone" bar **22** or "down-tone" bar **21**. When an "up-tone" bar **22** is activated, it pivots about pivot pin **27** causing guitar string **20**, which rests on guitar string bridge **64**, to tighten, since, as seen in FIG. 2, the lower end of said "up-tone" bar **22** is pulled to the left, forcing the upper end to the right, thus tightening the associated guitar string **20**. Guitar string **20**, being tightened, produces a higher tone or tuning when that particular string is picked. Return spring **41** insures the return of "up-tone" bar **22** to its original position when the pressure is relieved from foot pedal **53**.

The two positions provided for anchoring screws **32** of each bar provide approximately half tone changes because of the differences in the distance that any given bar is allowed to move. Additional adjustment of degree of tone change is made by using a different guitar string retaining notch **29** into which is placed a guitar string anchoring pin **30**. Throughout the entire operation of this device, only a very slight movement of the functional parts of this device is made in order to effect a tone or tuning change, said movement being barely perceptible to change the toning from the slightest half-tone to the greatest tolerable change practical in guitar playing.

In the down-toning operation, the appropriate foot pedal **53** is depressed, causing a pull on control wire **34** in like manner as above-described. This pull on the lower extremity of "down-tone" bar **21** causes said "down-tone" bar **21** to pivot about pivot rod **23** until the position illustrated as **21***a*, by broken lines in FIG. 2, is attained. This allows "up-tone" bar **22** to assume the position **22***a*, also illustrated by broken lines, since said "up-tone" bar **22** is connected to arm **25** and U mount **26** which are integral with "down-tone" bar **21**. When the upper extremity of "up-tone" bar **22** assumes the position, as shown by **22***a*, the guitar string **20** is loosened sufficiently to effect a down-toning. Coil spring **42** insures the immediate and positive return of "down-tone" bar **21** and "up-tone" bar **22** to their resting positions when the appropriate foot pedal **53** is released.

As can now readily be seen, an efficient and improved pedal tone changer for electric steel guitars has been devised which allows any standard electric steel guitar to be converted to such use. The instant invention is primarily an accessory, or attachment, to effect the above conversion, however, this device may be built in and integral with an electric steel guitar as a single unit at the time of manufacture, if so desired.

As many embodiments may be made of this inventive concept, and as many modifications may be made in the embodiment hereinbefore shown and described, it is to be understood that all matter herein is to be interpreted merely as illustrative, and not in a limiting sense.

We claim:

1. A tone changer for electric guitars comprising, in combination, a base, a plurality of guitar strings mounted on said base and means for varying the tension of each string to vary the tone thereof, said last-mentioned means comprising a housing fixed to one end of said base, a plurality of up-tone bars each having a top end and bottom end, each of said up-tone bars having an operative position wherein it is adapted to increase the tension on one of said strings, and an inoperative position, a plurality of down-tone bars each having a top end and a bottom end, each of said down-tone bars having an operative position wherein it is adapted to decrease the tension on one of said strings, and an inoperative position, the top end of each of said down-tone bars being pivotally mounted on a first pivot means within said housing, a perpendicularly disposed arm integral with each of said down-tone bars intermediate its ends, each of said arms carrying a second pivot means, each of said up-tone bars being pivotally mounted intermediate its ends on one of said second pivot means, thereby associating one up-tone bar with each down-tone bar, one of said strings being adjustably secured to the top end of each up-tone bar, means actuated by a first foot pedal means to selectively pivot each of said down-tone bars about said first pivot means into its operative position, means actuated by a second foot pedal means to selectively pivot each of said up-tone bars about its associated second pivot means into its operative position, a first spring means operatively connected to each of said down-tone bars to return the same to its inoperative position when said first foot pedal means is released, and a second spring means operatively connected to each of said up-tone bars to return the same to its inoperative position when said second foot pedal means is released, each of said up-tone bars having a plurality of spaced string retaining notches adjacent its top end, and each of said strings having an anchoring pin fixed to its end selectively engageable with one of said notches to adjustably secure each string to one of said up-tone bars.

2. A tone changer for electric guitars comprising, in combination, a base, a plurality of guitar strings mounted on said base and means for varying the tension of each string to vary the tone thereof, said last-mentioned means comprising a housing fixed to one end of said base, a plurality of up-tone bars each having a top end and bottom end, each of said up-tone bars having an operative position wherein its is adapted to increase the tension on one of said strings, and an inoperative position, a plurality of down-tone bars each having a top end and a bottom end, each of said down-tone bars having an operative position wherein it is adapted to decrease the tension on one of said strings, and an inoperative position, the top end of each of said down-tone bars being pivotally mounted on a first pivot means within said housing, a perpendicularly disposed arm integral with each of said down-tone bars intermediate its ends, each of said arms carrying a second pivot means, each of said up-tone bars being pivotally mounted intermediate its ends on one of said second pivot means, thereby associating one up-tone bar with each down-tone bar, one of said strings being adjustably secured to the top end of each up-tone bar, means actuated by a first foot pedal means to selectively pivot each of said down-tone bars about said first pivot means into its operative position, means actuated by a second foot pedal means to selectively pivot each of said up-tone bars about its associated second pivot means into its operative position, a first spring means operatively connected to each of said down-tone bars to return the same to its inoperative position when said first foot pedal means is released, and a second spring means operatively connected to each of said up-tone bars to return the same

to its inoperative position when said second foot pedal means is released, said means actuated by said first and second foot pedal means including a pair of vertically aligned, horizontally extending, control wires adjustably secured adjacent to the bottom end of each up- and down-tone bar, the bottom end of each up-tone bar extending vertically below the bottom end of its associated down-tone bar, means defining vertically extending slots adjacent the bottom end of each up-tone bar aligned with, and allowing passage therethrough of, the control wires secured to its associated down-tone bar, and means operatively connecting each pair of control wires to one of said first and second foot pedal means, respectively.

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