United States Patent [19]

Fields

[11] **3,733,954**

[45] **May 22, 1973**

[54] PEDAL GUITAR WITH SELECTIVE STRING CONTROLLING ARRANGEMENT

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[73] Assignee: **Columbia Broadcasting System, Inc.,** New York, N.Y.

[22] Filed: **June 2, 1969**

[21] Appl. No.: **829,560**

[52] **U.S. Cl.** .....**84/312,** 84/297 R

[51] **Int. Cl.** **G10d 3/14**

[58] **Field of Search** 84/312, 297, 205

[56] **References Cited**

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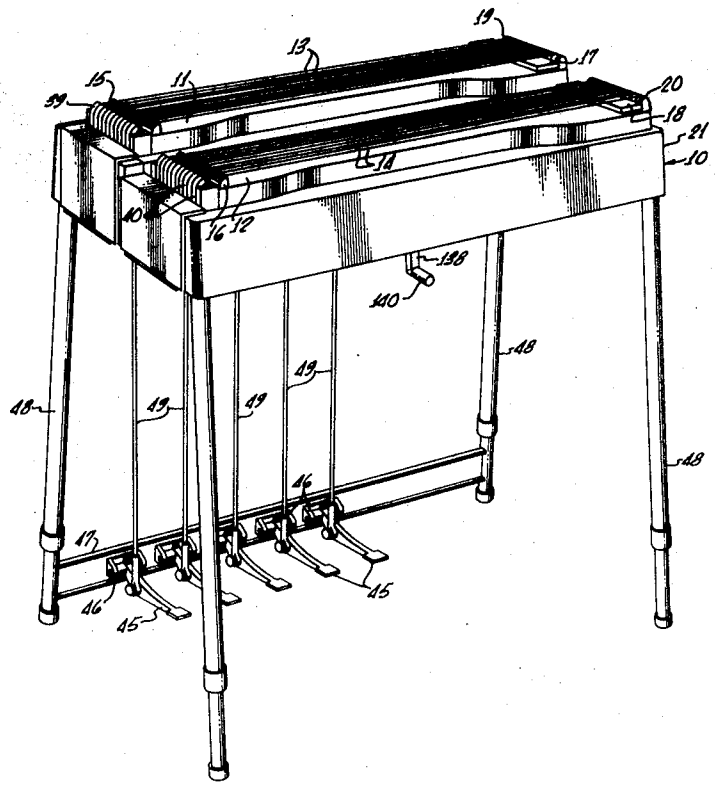
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Primary Examiner—Richard B. Wilkinson
Assistant Examiner—John F. Gonzales
Attorney—Gauswitz & Carr

[57] **ABSTRACT**

This invention provides an electric steel pedal guitar having two sets of horizontal strings, which at one end are extended downwardly over the end of the body of the instrument, engaging slides which are adjusted in position in vertical slots by means of threaded elements for thereby tuning the strings. The string tension is adjustable during playing of the instrument by a mechanism that includes pedals which, through rods, rotate bell cranks which pull on additional rods and levers to linearly move operating members having outward projections on the opposite sides of their end portions. These outward projections are engageable with the ends of two sets of levers which, in turn, pull triangular plates which, through rods, move bars carrying adjustable screws for engaging either of two levers mounted at the end of the instrument and supporting the ends of the strings. Inward movement of the bars when engagement is made with one lever of the set will cause the string tension to increase, while engagement with the other lever of the set will relax the string tension. A shifting mechanism actuated by an additional lever causes the support for the operating member to be pivoted, causing it to disconnect the levers used in moving the triangular plates for either set of strings, depending upon the direction of rotation of the shift lever, so that only one set of strings will be adjusted in tension during the playing of the instrument. A switching mechanism disconnects the pickup for the strings disconnected from the tension-adjusting mechanism.

11 Claims, 18 Drawing Figures



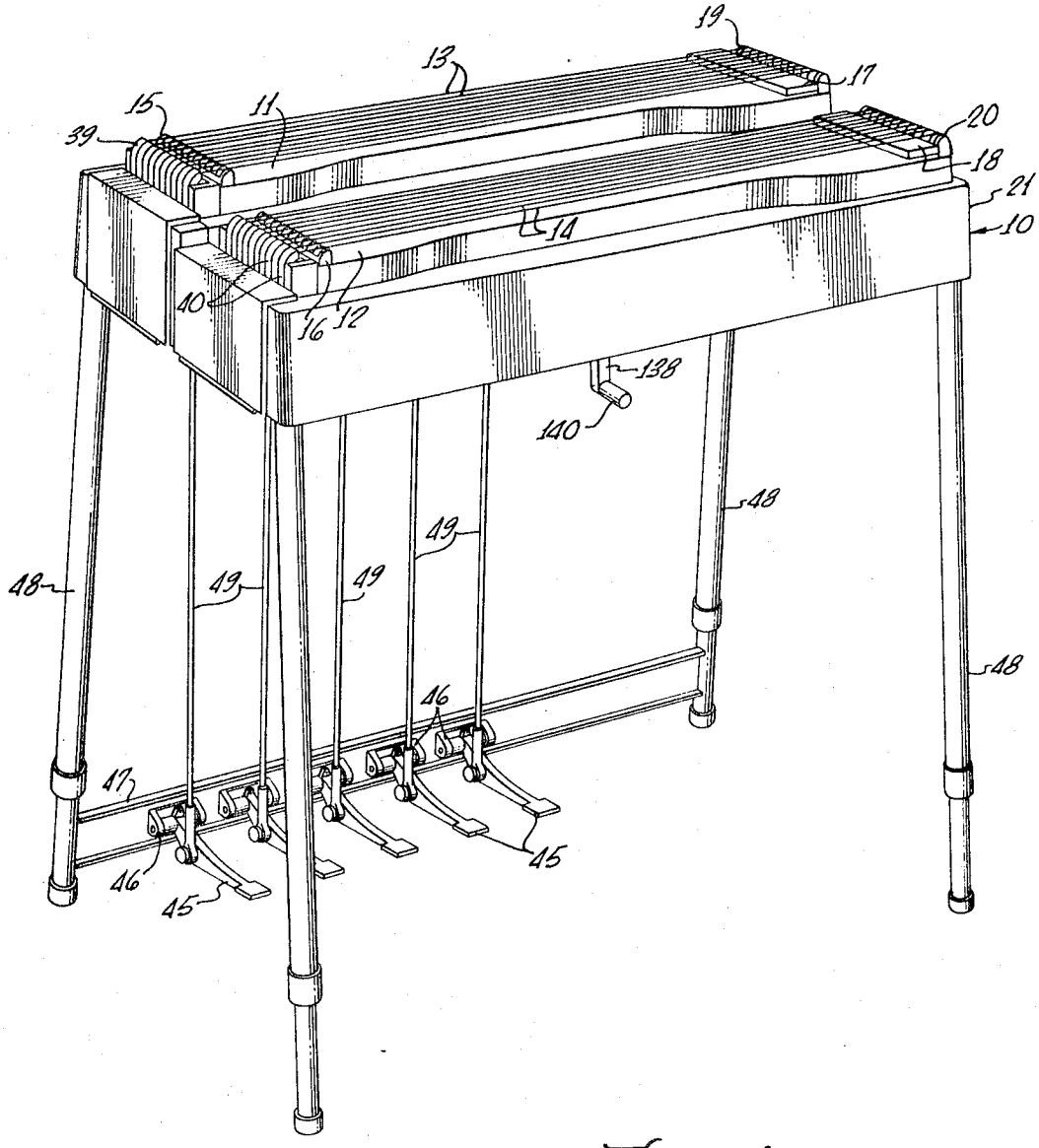


FIG. 1.

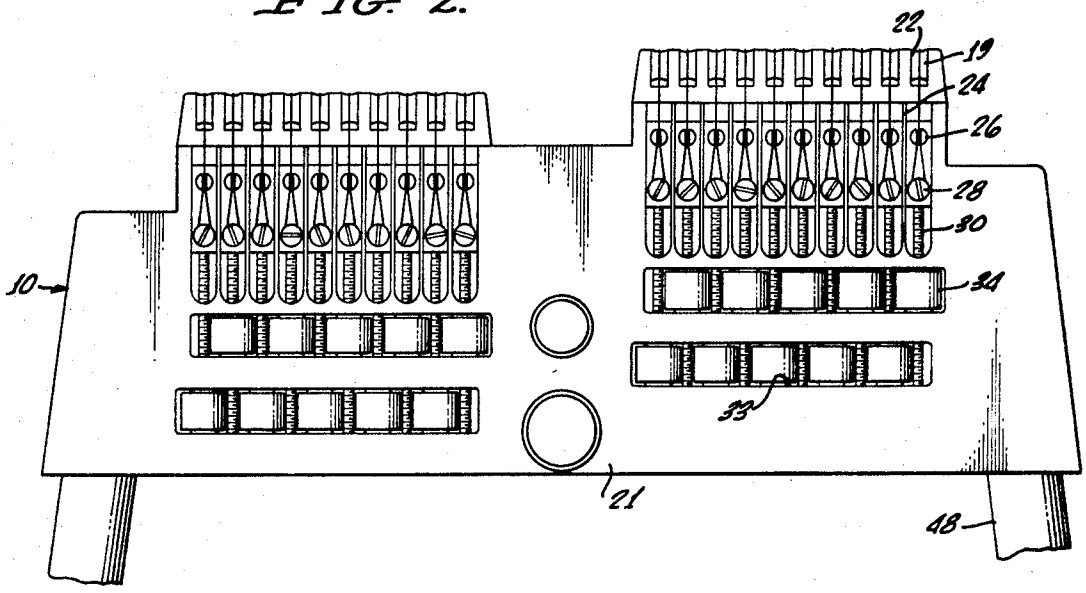
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FIG. 2.



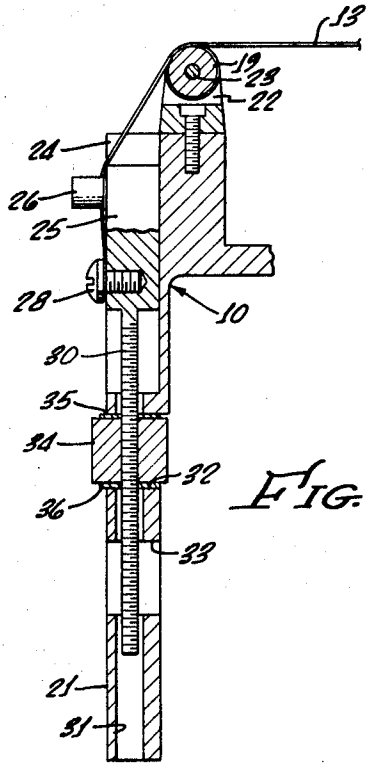


FIG. 4.

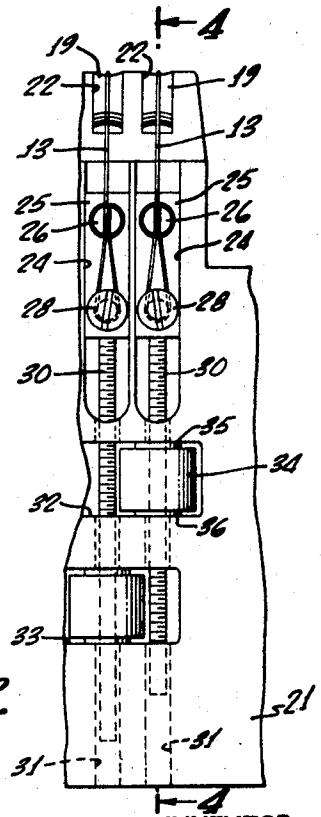


FIG. 3.

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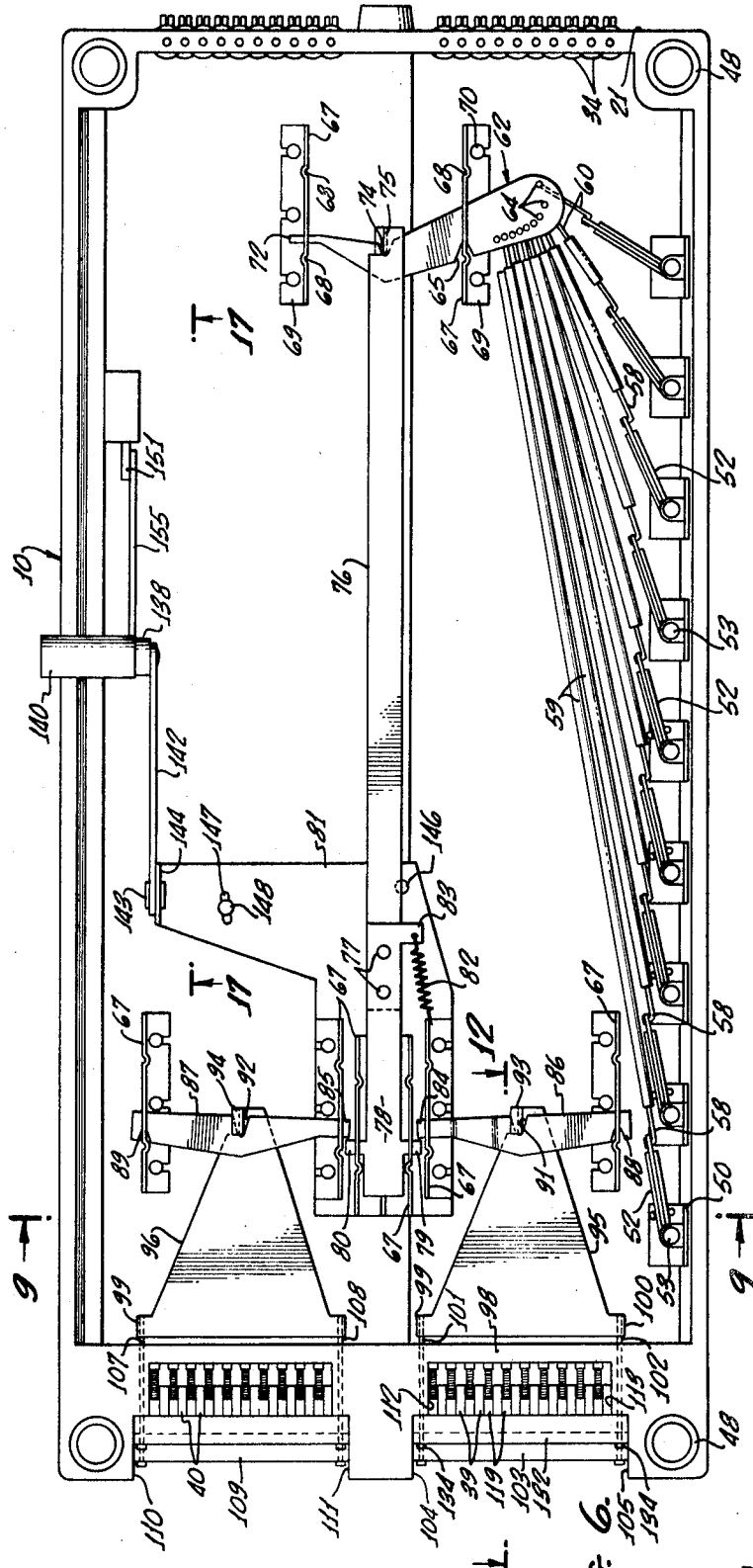


FIG. 6.

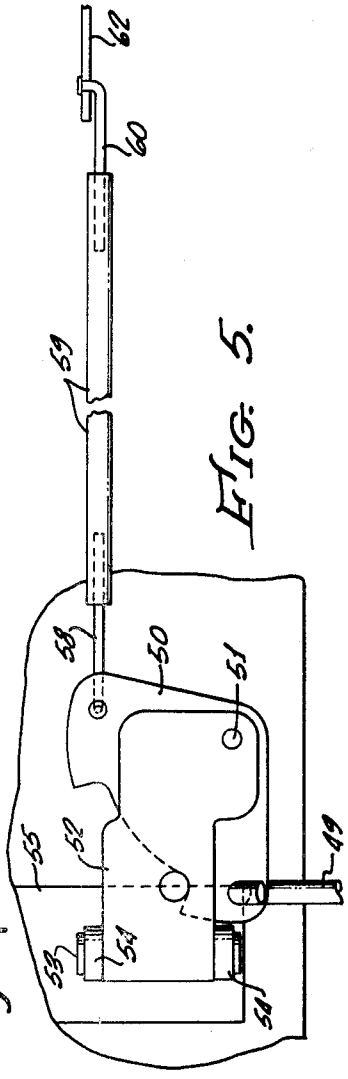


FIG. 5.

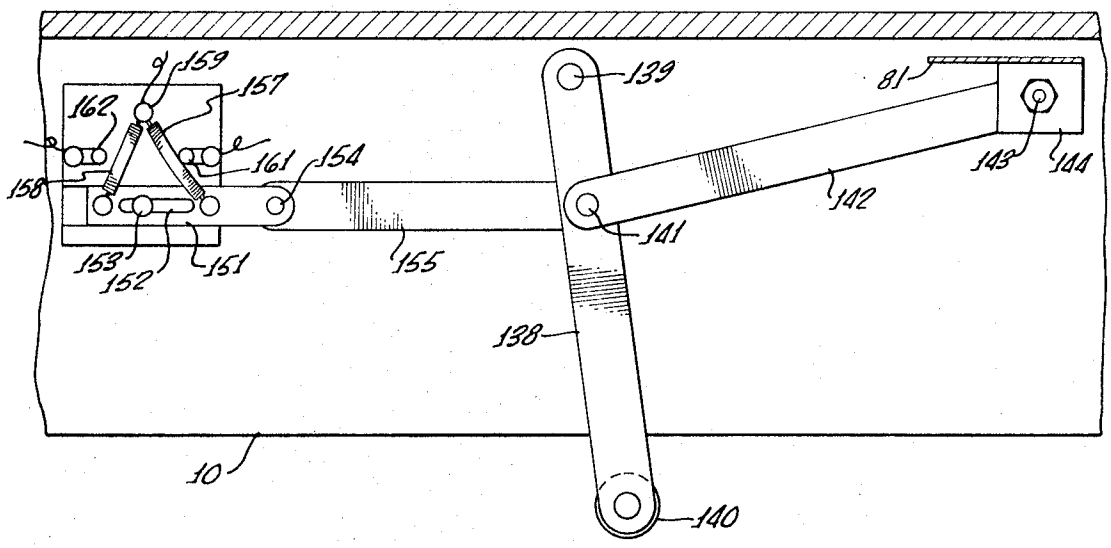
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FIG. 17.



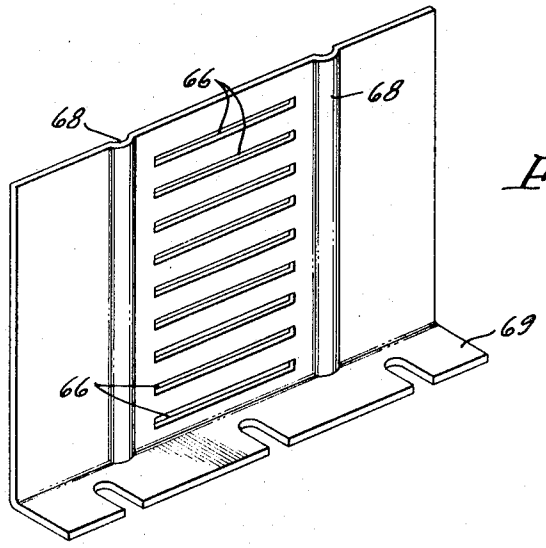


FIG. 7.

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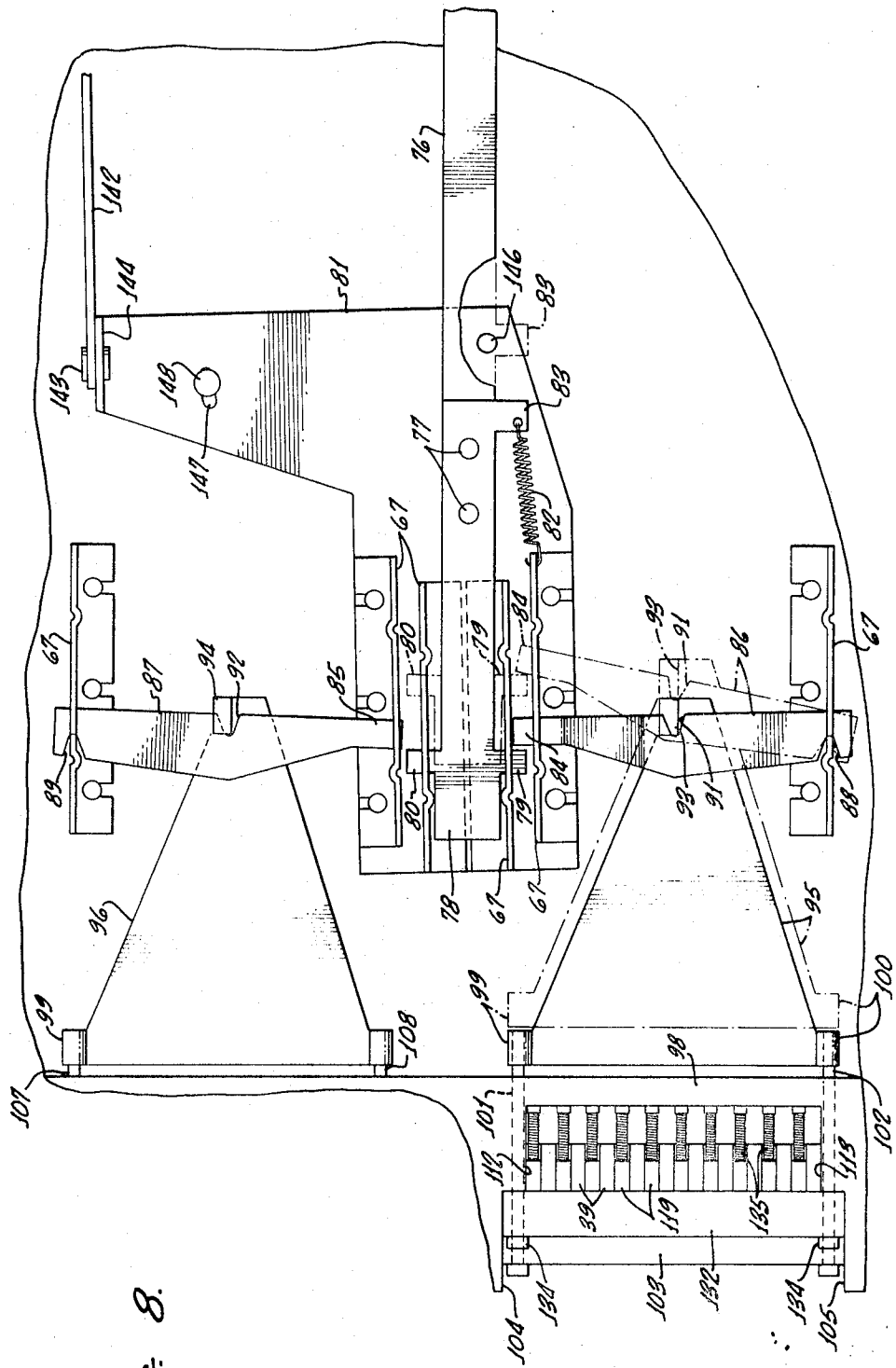


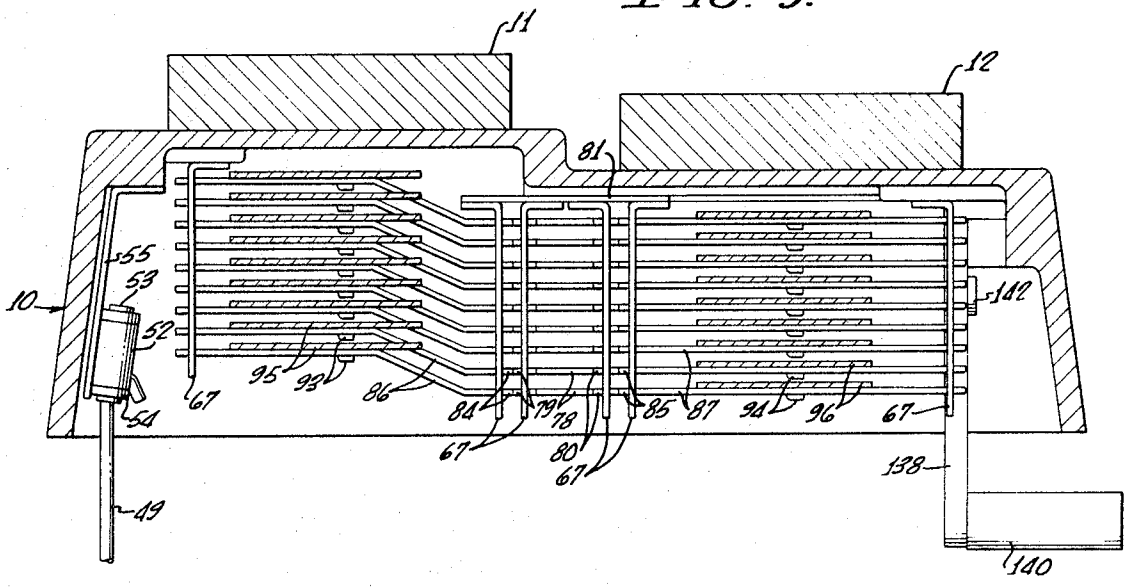
FIG. 8.

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FIG. 9.



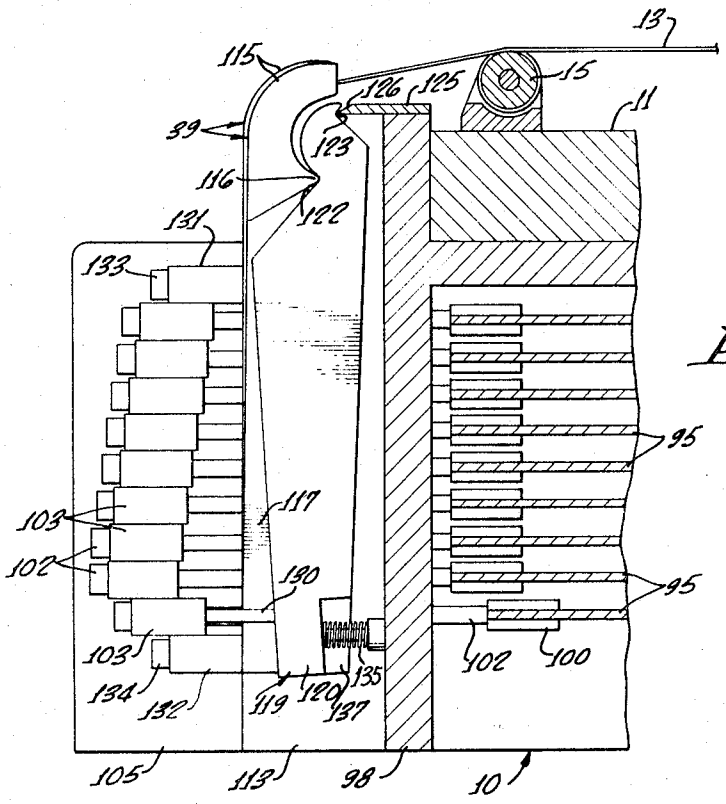


FIG. 16.

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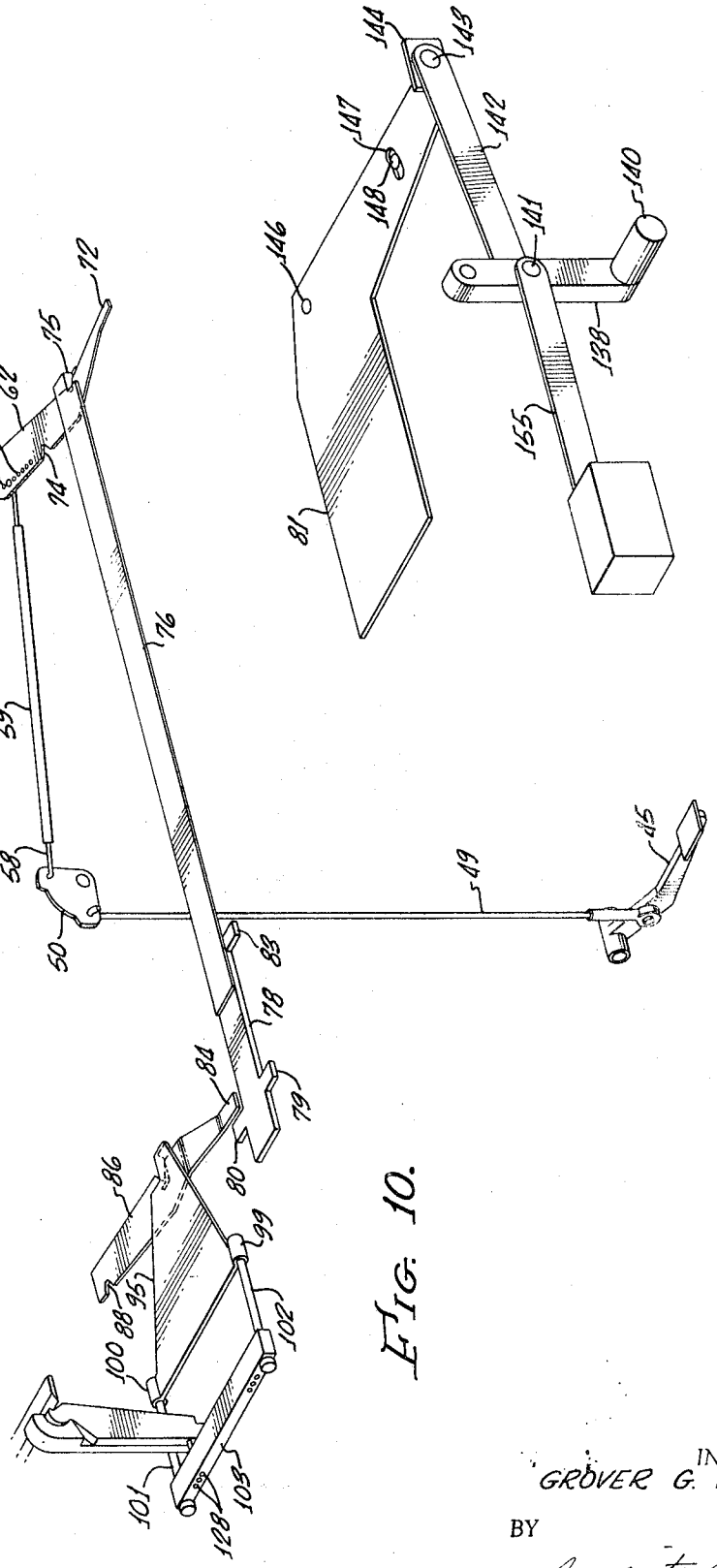


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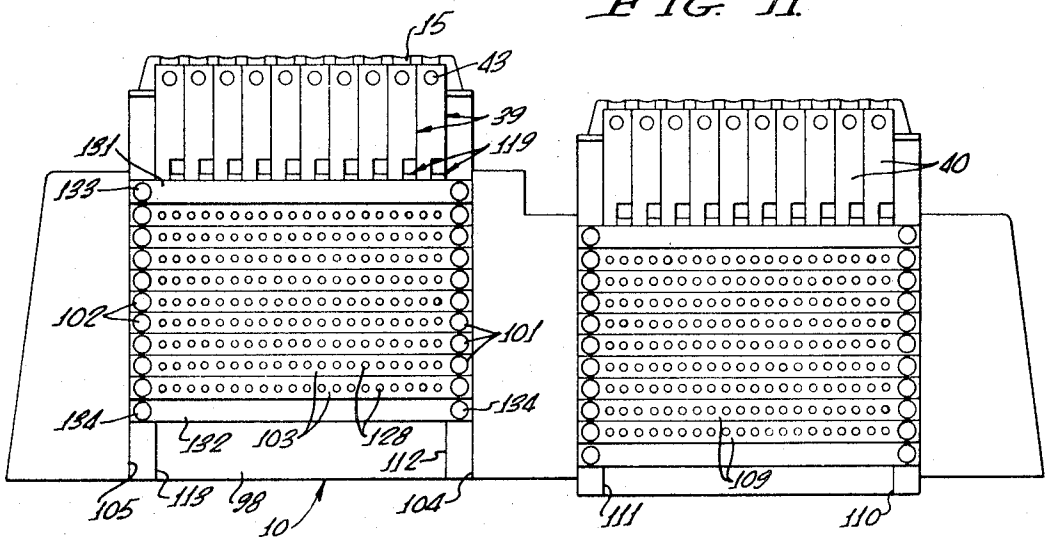
FIG. 10.

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FIG. 11.



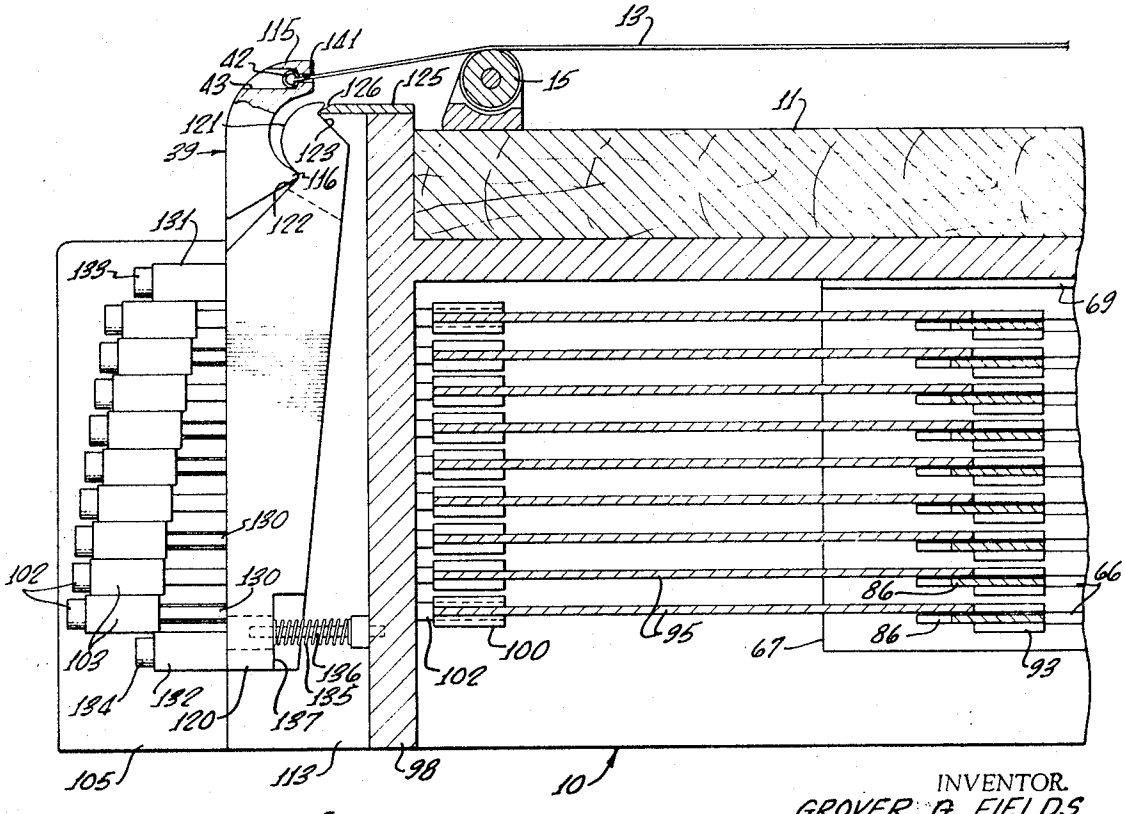


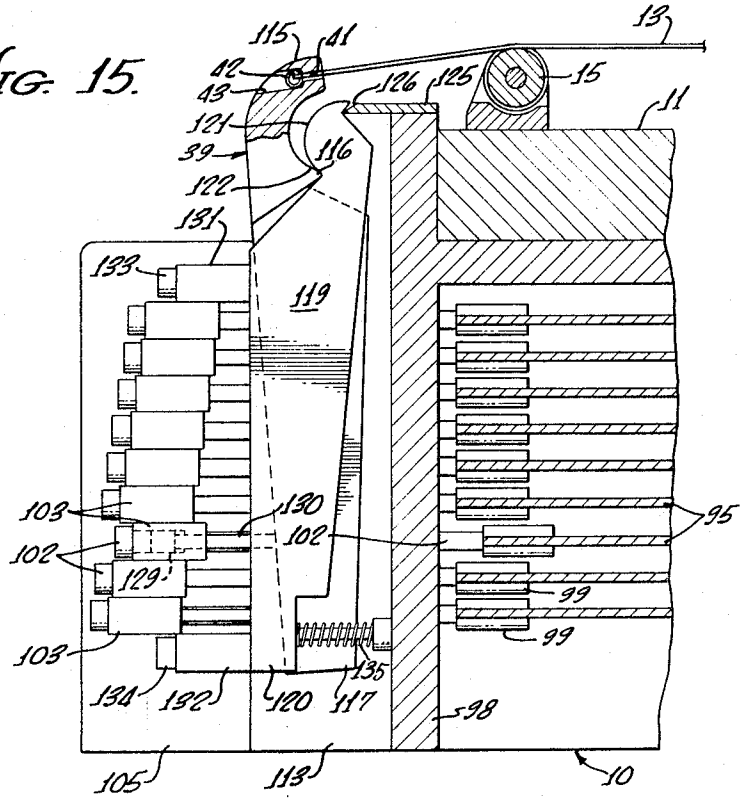
FIG. 12.

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FIG. 15.



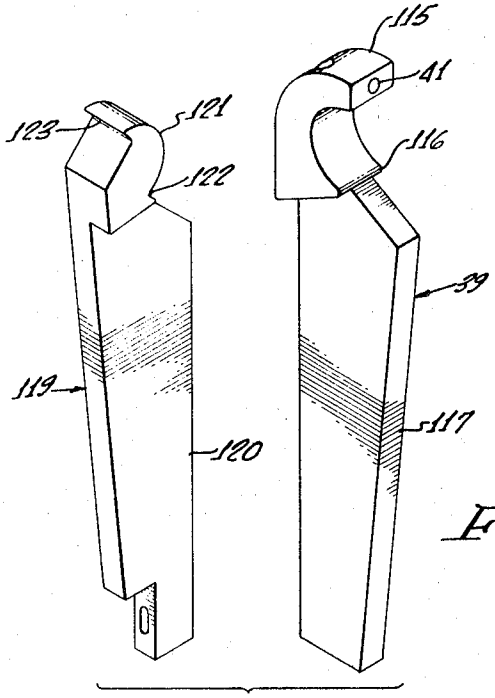


FIG. 13.

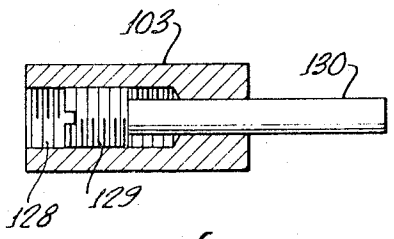


FIG. 14.

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PEDAL GUITAR WITH SELECTIVE STRING CONTROLLING ARRANGEMENT

BACKGROUND OF THE INVENTION

1. The Field of the Invention

This invention relates to stringed musical instruments.

2. The Prior Art

Electric pedal guitars frequently may be provided with arrangements for varying the string tension during the playing of the instrument. This enables the note to be made sharp or flat to varying degrees as the instrument is played. An example of such a design is illustrated in U.S. Pat. No. 3,352,188. The string tension is controlled by manipulation of various pedals mounted beneath the horizontal guitar body to produce the desired effects. Some pedal guitars are provided with two sets of strings, one or the other of which is played at any one time. The two sets of strings may be differently tuned and controlled to provide a variety of effects during the playing of the instrument. When a string tension-control arrangement is provided for a guitar having two sets of strings, the complexity and overall size of the mechanism increases substantially. It results in double the number of control pedals and many more operating parts, as there must be a set of pedals and associated mechanisms for each set of strings. With the added number of components, the cost of manufacture of the instrument becomes greater. The instrument also becomes more complex to play, and with more parts the possibility of mechanical failure is increased.

Conventional tuning pegs also have been used in pedal guitars, positioned on a portion of the horizontal body of the instrument that extends longitudinally beyond the nut. This has caused such guitars to become quite long and, consequently, bulky because of the extra space required for the tuning arrangements.

SUMMARY OF THE INVENTION

the present invention provides a guitar having two sets of strings together with a means for varying the tension in the strings as the instrument is played, utilizing only one set of pedals for controlling both sets of strings. A shift arrangement is provided for selectively disconnecting from the tension-adjusting mechanism the set of strings which is not in use. The guitar also embodies an improved and more compact means for tuning the strings of the instrument.

The tension-controlling means is operated by pedals which, through linkages, operate members that include elements for rotating two oppositely arranged levers. Rotation of these levers, through additional elements that connect to the strings, causes the tensions in the two sets of strings to be increased or decreased. A shifting means is provided which includes a lever rotatable by the musician to pivot the support for the operating members. When rotated in one direction, the operating members disconnect one set of the levers that effect the adjustment of the string tension. Rotation of the support in the opposite direction disconnects the other set of tension-adjusting levers. In the neutral position, which is used during tuning the instrument, the levers are both rotated at once by the operating members. A switching arrangement is operated automatically as the shifting lever is moved for disconnecting the pickup of the strings which are not in use.

Rather than extending outwardly to conventional tuning pegs, the ends of the strings extend downwardly at one end of the instrument to engage slides guided by the walls of vertical slots. Threaded studs extending from the slides are engaged by nuts which are held against axial movement. Therefore, rotation of the nuts shifts the slides in the slots and effects the tuning of the strings. This tuning arrangement, being vertically oriented, shortens the overall length of the instrument.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a pedal guitar embodying the present invention;

FIG. 2 is an end elevational view of the guitar, illustrating the tuning arrangement;

FIG. 3 is an enlarged fragmentary end elevational view showing the details of the tuning arrangement;

FIG. 4 is a fragmentary sectional view taken along line 4—4 of FIG. 3;

FIG. 5 is a fragmentary elevational view showing the arrangement of the bell crank and associated parts operated by a pedal of the instrument and used in controlling the string tension;

FIG. 6 is a bottom plan view showing the underside of the instrument and the string tension-controlling mechanism;

FIG. 7 is a perspective view separately illustrating one of the support and guide plates used in the controlling mechanism;

FIG. 8 is an enlarged fragmentary bottom plan view of one end portion of the tension-controlling mechanism, with the shifting mechanism actuated to disconnect the tension-controlling mechanism from one set of strings;

FIG. 9 is a transverse sectional view taken along line 9—9 of FIG. 6;

FIG. 10 is a perspective view illustrating the movable components of the tension-adjusting mechanism separated from the remainder of the structure;

FIG. 11 is an end elevational view of the instrument taken at the opposite end from that of FIG. 2;

FIG. 12 is an enlarged fragmentary longitudinal sectional view taken along line 12—12 of FIG. 6;

FIG. 13 is an exploded perspective view illustrating the two components of the lever assembly that engages the string and connects it to the body of the instrument;

FIG. 14 is a sectional view through one of the adjustable bars used in actuating the lever assembly illustrated in FIG. 13;

FIG. 15 is a fragmentary sectional view illustrating the string lever assembly operated to increase the tension in the guitar string;

FIG. 16 is a view similar to FIG. 15, but illustrating the device as used for decreasing the tension in the guitar string;

FIG. 17 is an enlarged fragmentary sectional view taken along line 17—17 of FIG. 6, and illustrating the lever arrangement for shifting the tension-controlling mechanism from one set of strings to the other and, unlike FIG. 6, showing the shift lever in a rotated position; and

FIG. 18 is a perspective view of the movable components of the shifting mechanism separated from the remainder of the structure.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With particular reference to FIG. 1, the electric pedal guitar embodying the present invention includes a rectangular frame 10, carrying horizontal finger boards 11 and 12 across which extend individual sets of horizontal strings 13 and 14. The tensions of the strings of the two sets 13 and 14 may be varied independently as the instrument is played, as will be explained below. The strings 13 and 14 extend over bridges 15 and 16 at one end of the frame 10, and above pickups 17 and 18 at the opposite end.

Rather than continuing outwardly to conventional tuning pegs, the strings 13 and 14 extend over pulleys or rollers 19 and 20 that form the nuts for the strings 13 and 14, and downwardly at right angles along the end 21 of the frame, where they are held by the tuning members. This reduces the overall length of the instrument and improves its appearance. The arrangement for the strings 13 may be seen in FIGS. 2, 3 and 4, the other strings 14 being secured in a similar manner. The pulleys 19 that the strings 13 engage are received in slots 22 provided along the upper edge of the end wall 21 of the frame 10. This accurately positions the pulleys 19. A common shaft 23 extends through the pulleys 19 and attaches them to the frame. In the end 21 of the frame, aligned with the pulleys 19, are vertical slots 24, one slot being provided for each of the strings 13. Within each slot 24 is a slide 25 which carries a slotted pin 26. The string 13 is extended downwardly through the slot of the pin 26, wrapped around one portion of the pin 26, then looped around a screw 28 that is received in a threaded opening in the slide 25. The end of the string 13 then is extended backwardly into the slot in the pin 26 and again wrapped around the pin.

Projecting downwardly from each of the slides 25 is a threaded stud 30. These members extend into vertical clearance openings 31 through the end 21 of the frame. Horizontal slots 32 and 33 are provided in the end 21 of the frame 10, communicating with the openings 31. Within the slots 32 and 33 are nuts 34, threadably received also on the stubs 30. Washers 35 and 36 are positioned at the ends of the nuts 34 and act as bearings so that the nuts are held against axial movement. The nuts 34 have knurled cylindrical exteriors and project outwardly of the slots 32 and 33 so that they can be engaged and rotated at the end 21 of the frame. Therefore, rotation of the nut 34, through its threaded engagement with the stud 30, causes the slide 25 to move vertically in the slot 24. This, in turn, controls the position of the end of the string 13 to effect the tuning of the string. Once the setting has been made, the nut 34 on the stud 30 will hold the string end and retain the adjustment.

The opposite ends of the strings 13 and 14 are held by pivotal levers 39 and 40, respectively. As seen for the lever 39 in FIG. 12, an opening 41 is provided at the upper portion of the lever, through which the string 13 extends. An enlarged retaining element 42, secured on the end of the string 13 and positioned within the counterbore 43 of the opening 41, anchors the end of the string. The levers 40 connect to the strings 14 in a similar manner.

The levers 39 and 40 may be moved appropriately during the time the instrument is played for varying the tensions of the strings 13 and 14. The mechanism to accomplish this includes pedals 45 pivotally mounted by brackets 46 to a horizontal rail 47 that extends between the rearward pair of the legs 48 that support the frame 10. A rod 49 pivotally connects to the central portion of each of the pedals 45. The upper ends of the rods 49, as seen in FIGS. 5 and 6, connect to bell cranks 50 that may rotate about pins 51 extending through plates 52. The latter elements are pivotally carried by pins 53 which connect them to brackets 54 of supports 55 that are secured to the frame 10.

Also connected to the bell cranks 50 are rods 58 that extend to threaded tubes 59, from which project additional rods 60. Each of the rods 60 connects to a flat lever 62. The latter members have a plurality of openings 64 enabling the several rods 60 to be connected at different locations so that the levers 62 may be positioned in a stacked relationship, one above the other.

The levers 62 have V-shaped notches 65 intermediate their ends. These portions of the levers 62 extend through slots 66 in a plate 67. The slots 66 are horizontal, as seen in FIG. 7, and intermediate reinforcing ribs 68. A base flange 69 provides the means for mounting the member 67 to the body of the instrument by means of fasteners 70 so that the plate 67 extends downwardly in a vertical plane. By this arrangement, the ends of the slots 66 are engaged by the apical portions of the notches 65 of the levers 62, thereby providing fulcrums about which the levers 62 can pivot.

The ends 72 of the levers 62 opposite from the rods 60 are of reduced width and received within the slots 66 of an additional member 67. The slot 66 of this additional member 67, therefore, act as guides for the ends of the levers 62, helping to maintain the levers 62 in a horizontal plane. In addition, the ends of the slots 66, when engaged by the ends 72 of the levers 62, provide stops which limit the pivotal movement of the levers 62.

Inwardly of the ends 72, the levers 62 are provided with additional V-shaped notches 74 which are engaged by tabs 75 bent downwardly from flat straps 76. These are relatively thin members connecting at their opposite ends by rivets 77 to strap members 78 that provide continuations of the strap 76. Ears 79 and 80 extend laterally outwardly from each of the strap members 78 and are received in the opposite slots 66 of a pair of members 67 which are mounted in parallelism on a flat plate 81 and positioned on opposite sides of the members 78. Thus, the members 67 maintain the straps 78 in a horizontal plane, permitting limited linear movement longitudinally of the instrument along the paths defined by the slots 66. Springs 82, engaging tabs 83 on the members 78, bias the members 78 to the left as the device is shown in FIGS. 6 and 8.

Two additional members 67 are mounted longitudinally of the instrument and adjacent the side edges of the plate 81, being close to but outside of the inner pair of members 67. The slots 66 of this second set of members 67 receive the ends 84 and 85 of levers 86 and 87. This places the ends 84 of the levers 86 in alignment with the ears 79 of the members 78. Similarly, the ears 80 are aligned with the ends 85 of the levers 87.

The opposite ends of the levers 86 and 87 extend through the slots 66 in still additional longitudinally arranged members 67 located adjacent the side edges of the frame 10 of the instrument. V-shaped notches 88 and 89 in the levers 86 and 87 engage the ends of the

slots 66 in these members 67, thereby providing fulcrums about which the levers can pivot.

Additional V-shaped notches 91 and 92 are at the intermediate portions of the levers 86 and 87, engaged by tabs 93 and 94 bent downwardly from the ends of triangular plates 95 and 96. The frame 10 includes a vertical end wall 98 adjacent the bases of the triangular members 95 and 96. The member 95 includes opposite edge portions 99 and 100 adjacent the wall 98, which are bent to a tubular form and tapped. These receive screws 101 and 102, which slidably extend through openings in the wall 98 and at their outer ends engage bars 103. The wall 98 is recessed to provide opposed surfaces 104 and 105 that guide the bars 103 so that they are movable longitudinally of the frame 10 and are maintained aligned transversely of it.

A similar provision is made on the other side of the instrument, where screws 107 and 108 extend from the triangular plate 96 through the end wall 98 of the frame to bars 109. The latter elements are guided by opposed parallel walls 110 and 111.

Inwardly of the bars 103, between parallel frame surfaces 112 and 113 at the end wall 98, are the levers 39 to which are attached the ends of the strings 13. The levers 40 for the strings 14 are inwardly of the bars 109. A second lever is associated with each of the levers 39 and 40. The arrangement for the levers 39 may be seen in FIGS. 12, 13 and 15, this being similar to that provided for the levers 40. Each lever 39 has an arcuate shape at its upper end 115, beneath which is a laterally projecting, generally V-shaped portion 116. Beyond this, the lever 39 includes a lower portion 117 of reduced thickness. The companion lever 119 includes a lower portion 120 of reduced thickness, above which is an arcuate upper portion 121. The latter part on its backside includes a transverse recess 122. On its forward side near the top is a V-shaped notch 123.

When the levers 39 and 119 are associated, the lower portions 117 and 120 are adjacent, while the projection 116 of the lever 39 fits within the recess 122 of the lever 119. This provides a fulcrum arrangement allowing the lever 39 to pivot relative to the lever 119. A transverse plate 125 is mounted at the top of the wall 98 and has a chamfered outer edge 126 that is engaged by the lever 119 at the V-shaped notch 123. The result is a fulcrum for the lever 119 so that it may pivot about the edge 126 of the plate 125.

Outwardly of the levers 39 and 119, there are stop bars 132 held to the wall 98 by screws 134. The fixed bars 132 are engageable by the outer edges of the lower portions 117 and 120 of the levers. In the normal position where there has been no rotation of the pedals 45, the levers 39 and 119 engage the stops 132, so that they can hold the ends of the strings 13 against the tension in the strings. Additional fixed bars 131, held by screws 133, retain the lever assembly to the instrument in the event a string is broken or removed.

The bars 103 are provided with a plurality of openings 128 extending transversely through them. These openings are aligned with the rearward edges of the lower portions 117 and 120 of the levers 139 and 119. The openings 128 are tapped, allowing them to receive headless screws 129 from which project unthreaded shanks 130 (see FIG. 14). Thus, for each of the strings 113, there may be provided a screw 129 having a shank 130 aligned with either the lever 39 or the lever 119 for the string. In some instances, there may be no screw 129 for either lever of a set of the levers 39 and 119, depending upon whether adjustment of the tension of a particular string 13 is desired.

By this arrangement, it is possible, through manipulation of the pedals 45, to cause the shanks 130 of screws 129 to engage the levers 39 or 119 of selected strings 13 to vary the string tension. When a pedal 45 is depressed and pivots about its connection to its bracket 46, it pulls downwardly on the rod 49 connected to it. This causes rotation of the bell crank 50 at the upper end of the rod so moved. This rotation is counterclockwise as the device is shown in FIGS. 5 and 10. When the bell crank 50 is turned in this manner, it pulls on the rod 58, threaded tube 59 and rod 60 connected to it. This displacement of the rod 60 causes one of the levers 62 to be pivoted about its fulcrum where it engages the end of the slot 66 of the mounting member 67 for it. Therefore, the selected lever 62 will be caused to rotate clockwise as the device is shown in FIG. 6. Such pivotal movement of the lever 62, through its engagement with the tab 75 of the strap 76, pulls the latter member to the right as the device is shown. The strap 76 moves with it the operating strap member 78 so that the ears 79 and 80 projecting laterally from it contact the end 84 and 85 of the levers 86 and 87. Consequently, the lever 86 is caused to pivot clockwise about its fulcrum at the notch 88, pulling the triangular plate 95 to the right. At the same time, the lever 87 is rotated counterclockwise and also pulls to the right on the triangular plate 96. This translational movement of the plates 95 and 96 pulls one bar 103 and one bar 109 inwardly, or to the right as the device is shown in FIGS. 6 and 8, toward the levers 39 and 40, respectively.

Wherever there is a screw 129 in an opening 128 aligned with a lever 39, the string 13 will be tightened. This takes place, as shown in FIG. 15, as the end of the shank 130 engages the edge of the lower portion 117 of the lever 39 beneath its fulcrum 116, where it is pivotally mounted with respect to the lever 119. Pushing inwardly on the lower portion of the lever 39 moves the upper portion of this lever outwardly, away from the wall 98, thereby increasing the tension on the string 13.

A compression spring 135, centered by a pin 136 and located in a cutout 137 in the lower end 120 of the lever 119, bears against the wall 98 and pushes the lower end of the lever 119 toward the stop 132. This provides a resistance to inward movement of the bottom end of the lever 119, so that the notch 122 will ordinarily remain stationary and not be shifted by the pressure exerted through the fulcrum 116 of the lever 39. Its resistance to movement is enhanced by the fact that the spring 135 is spaced a considerable distance from the fulcrum 126, while the lever 39 bears against the lever 119 at a location close to the fulcrum 126. This provides the spring with a greater moment arm and a mechanical advantage. Therefore, even though the lever 39 is rotated inwardly, the force on the fulcrum will not overcome the spring 135, so that the lever 119 will remain motionless.

Rotation of the levers 119 by the screws 129 produces a result opposite to that accomplished when the levers 39 are pivoted, relaxing the tension in the springs 13. This effect can be seen in FIG. 16. As the lower end 120 of the lever 119 is moved inwardly against the force of the spring 135, the lever 119 is rotated so as to also move the notch 122 inwardly, or toward the bridge 15. Consequently, the lever 39, being in engage-

ment with the lever **119** beneath the fulcrum **126**, moves inwardly (to the right as shown) with the lever **119**, so that the pull on the string **13** is decreased.

Therefore, pressing on the pedal **45** can selectively increase or decrease the tension in the strings **13**. The extent of this adjustment is controlled by the rotation of the screws **129** in the tapped openings **128** to position the ends of the shanks **130** at locations to effect desired amounts of rotation. For strings **13** where no change in tension is desired, the screws **129** simply are omitted.

The arrangement for the strings **14** is the same as that for the strings **13**, with dual lever assemblies being provided to selectively increase or decrease string tension.

While it is desirable to control the tension simultaneously in the strings **13** and **14** while the instrument is being tuned, at other times individual control is preferable. The instrument is played on only one set of strings at a time, and continued variation in tension in the unused set can lead to premature string breakage. Also, it requires added effort to control both sets of strings at once, which would be fatiguing to the musician. Therefore, a provision is made for selectively inactivating either the strings **13** or the strings **14** from the effect of the operation of the pedals **45**. Through this shifting arrangement, either set of strings may be chosen for tension control by the pedals **45**, while the other set remains unaffected. This control of the instrument is accomplished by rotation of a shift lever **138**, which is pivotally connected to the frame **10** by means of a pin **139**, so that its lower end depends below the forward side edge of the instrument. A horizontally projecting lower end element **140** is engageable by the knee of the musician, permitting the lever **138** to be rotated in either direction.

Beneath the pin **139**, the lever **138** is connected by a pin **141** to one end of a link **142**. The opposite end of the link **142**, by means of pin **143**, connects to a tab **144** that is bent downwardly from a portion of the plate **81** that is adjacent the the forward side of the instrument. This connection is to one side of the straps **76** and members **78** that engage the levers **86** and **87** of the tension-adjusting mechanism. The plate **81** is rotatable about a pin **146** spaced from the tab **144** and located near the longitudinal center of the instrument, connecting to its undersurface. A guide slot **147** outwardly of the pin **146** receives a guide pin **148**. The slot **147** is arcuate, having a radius centered at the pin **146**.

As a result of this construction, movement of the lever **138** will, in turn, cause rotation of the plate **81** about the pin **146**. If the lever **138** is moved toward the plate **81**, or to the right in the illustration of FIG. **18**, the plate **81** will be caused to rotate counterclockwise as the device is shown in FIG. **8**. Conversely, rotation of the lever **138** away from the plate **81**, or to the left in FIG. **18**, causes the plate **81** to be pivoted clockwise about the pin **146** as it is seen in FIG. **8**. The effect of this rotation is to disconnect either the levers **86** or the levers **87** from the pedals **45** and their associated mechanisms. As the device is shown in FIG. **8**, with counterclockwise rotation being imparted to the plate **81**, the ends of the operating strap members **78** are moved transversely by the inner pair of guide members **67** on the plate **81** away from the levers **87**. The ears **80** of the members **78** are shifted past the ends **85** of the levers **87** by this movement so that they no longer are aligned with the lever ends. This means that, when a pull is exerted on any of the straps **78**, its ear **80** will miss the end **85** of the adjacent lever **87**. Consequently, the movement of the strap **76** occasioned by the rotation of the selected pedal **45** will have no effect on the lever **87** and, hence, will not affect the tension in the strings **14**. However, the other ear **79** is only moved farther toward the end **84** of the adjacent lever **86** by this counterclockwise rotation of the plate **81**, so that the other ear **79** of the member **78** continues to cause rotation of the lever **86** when a pull is exerted on the strap **76**, as shown in phantom in FIG. **8**. Therefore, only the lever **86** is rotated when the pedal **45** is pressed as the instrument is illustrated in FIG. **8**. This means that the selected strings **13** are changed in tension, while there is no such adjustment of the strings **14**.

Of course, when the lever **138** is moved in the opposite direction to rotate the plate **81** in the clockwise direction, the ends **84** of the levers **86** are disengaged, and the ears **80** are caused to manipulate the levers **87**, while the levers **86** remain motionless when the pedal is moved.

An additional provision is included to disconnect the pickup of the set of strings which is inactivated from the effect of the pedals **45**. This takes place simultaneously with the operation of the lever **138**. The result of this is to provide for increased power at the set of strings which is being played, while also avoiding the danger of inadvertently obtaining a signal upon striking a string not selected for playing. To this end, there is a switch assembly, as seen in FIG. **17**, which is normally closed and is in series in the circuits of the pickups **17** and **18**. This switch includes a block **151** having a central slot **152** that receives a guide pin **153** that connects to the frame of the instrument. One end of the block **151** connects by a pin **154** to a link **155**, which, in turn, connects by the pin **141** to the lever **138**. Therefore, movement of the lever **138** causes longitudinal sliding movement of the block **151**.

Spring conductors **157** and **158** extends from the block **151** in a V-shaped pattern and connect to a pin **159**, which is in the circuit of both of the pickups **17** and **18**. The conductor **157** normally engages a contact **161**, which connects to the pickup **17**. The other conductor **158** normally engages the contact **162**, which connects to the pickup **18**. Therefore, in the neutral position used for tuning, both pickups are in operation. However, when the lever **138** is pivoted to disconnect the levers **87** for the strings **14**, the block **151** is slid longitudinally to the right as it is shown in FIG. **17**. This causes the conductor **158** to disengage the contact **162**, while the conductor **157** merely stretches around the contact **161**. By being in series with the pickup **18**, disconnecting the contact **162** interrupts the circuit to the pickup **18** for the strings **14** at the same time that these strings are disengaged from the tension-controlling arrangement. Similarly, movement in the opposite direction disconnects the contact **161** and interrupts the circuit to the pickup **17** for the strings **13**.

I claim:

1. A musical instrument comprising

a first set of strings,

a second set of strings,

a first tension-control means for varying the tension in strings of said first set of strings,

a second tension-control means for varying the tension in strings of said second set of strings,

a single operating means for operating said first and said second tension-control means,
and shift means for selectively causing said operating means to be connected to either one of said tension-control means and disconnected from the other of said tension-control means,
said shift means additionally including means for selectively causing said operating means to be connected simultaneously to said first and said second tension-control means, for thereby providing simultaneous operation of said first and said second tension-control means.

2. A musical instrument comprising
a body,
a first set of strings on said body,
a second set of strings on said body,
a first means for adjusting the tension in strings of said first set,
said first means including a plurality of first lever means connected to said strings of said first set,
a second means for adjusting the tension in strings of said second set,
said second means including a plurality of second lever means connected to said strings of said second set,
movable means for operating said first and second means,
said movable means including
a plurality of first translatable means, each of said first translatable means being connected to one of said first lever means for rotating the same,
a plurality of second translatable means, each of said second translatable means being connected to one of said second lever means for rotating the same,
and manually operable means for simultaneously moving said first and second translatable means,
and shift means for causing said movable means to selectively disengage one of said first and second means for operating only the other of said first and second means,
said shift means including means for selectively disconnecting said manually operable means from either said first translatable means or said second translatable means.

3. A device as recited in claim **2** in which
each of said first translatable means includes
a first linearly movable member connected to one of said first lever means,
and a first pivotal member connected to said first linearly movable member for moving said first linearly movable member upon rotation of said first pivotal member,
each of said second translatable means includes
a second linearly movable member connected to one of said second lever means,
and a second pivotal member connected to said second linearly movable member for moving said second linearly movable member upon rotation of said second pivotal member,
said manually movable means includes a member engageable simultaneously with both said first and second pivotal members,
and said shift means includes means for causing said member of said manually movable means to selectively disengage either one of said first and second pivotal members.

4. A device as recited in claim **3** in which
said first pivotal members are on one side of said member of said manually movable means,
said second pivotal members are on the opposite side of said member of said manually movable means,
and in which said means for causing said member of said manually movable means to selectively engage either one of said first and second pivotal members includes means for displacing said member of said manually movable means away from either said first or said second pivotal members to a position remote therefrom,
whereby said member of said manually movable means will not cause rotation of the pivotal members away from which it has been displaced.

5. A device as recited in claim **4** in which
said means for displacing said member of said manually movable means includes a pivotal member,
said pivotal member of said means for displacing said member of said manually movable means having guide means for defining a path of movement for said member of said manually movable means, said means for displacing said member of said manually movable means including means for rotating said pivotal member thereof for causing said guide means to so displace said member of said manually movable means.

6. A device as recited in claim **5** in which said shift means includes
a manually movable lever,
and link means interconnecting said manually movable lever and said pivotal member of said shift means,
whereby rotation of said manually movable lever causes rotation of said pivotal member of said shift means.

7. A device as recited in claim **2** in which
each of said first lever means includes a first duality of levers,
one of said levers being pivotal about a point on said body,
the other of said levers pivotally engaging said one lever at a location on one side of said point on said body,
said other lever being connected to one of said strings of said first set at a location on the other side of said point on said body,
said first translatable means including means for selectively so pivoting said one lever and said other lever,
whereby, upon said rotation of said one lever, said one lever pulls on said string of said first set for increasing the tension therein and, upon rotation of said other lever, the location of said pivotal engagement of said one lever and said other lever is shifted for decreasing the pull on said string of said first set and decreasing the tension therein,
and each of said second lever means includes a second duality of levers,
one of said levers of said second duality of levers being pivotal about a point on said body,
the other of said levers of said second duality of levers pivotally engaging said one lever of said second duality of levers at a location on one side of said point on said body,

said other lever of said second duality of levers being connected to one of said strings of said second set at a location on the other side of said point on said body,

said second translatable means including means for selectively so pivoting said one lever and said other lever of said second duality of levers,

whereby, upon said rotation of said one lever of said second duality of levers, said one lever pulls on said string of said second set for increasing the tension therein, and, upon said rotation of said other lever of said second duality of levers, the location of said pivotal engagement of said one lever and said other lever of said second duality of levers is shifted for decreasing the pull on said string of said second set and decreasing the tension therein.

8. A device as recited in claim **7** in which

said means of said first translatable means for so pivoting said one lever and said other lever of said first duality of levers includes

a plurality of first transverse members movable toward said first duality of levers on said one side of said point on said body,

and a plurality of first adjustable members projecting from each of said first transverse members for engagement with selected ones of said one lever and said other lever of said first duality of levers for rotating the same upon said movement of said first transverse members,

and said means of said second translatable means for so pivoting said one lever and said other lever of said second duality of levers includes

a plurality of second transverse members movable toward said second duality of levers on said one side of said point on said body,

and a plurality of second adjustable members projecting from each of said second transverse members for engagement with selected ones of said one lever and said other lever of said second duality of levers for rotating the same upon said movement of said second transverse members.

9. In combination with a musical instrument having a body, and a plurality of substantially coplanar strings on said body extending from one end thereof to the other, an arrangement for holding said strings at one end for permitting the tuning thereof comprising

a first means for engaging said strings at one end of said body,

a slide means for each of said strings,

guide means for guiding said slide means at said one end of said body in paths substantially at right angles in the plane of said strings,

attachment means on said slide means,

said strings extending from said first means to said slide means and being attached to said attachment means,

and means for selectively positioning said slide means in said paths for thereby effecting the tuning of said strings,

said means for selectively positioning said slide means including

a threaded stud projecting from and rotationally fixed relative to each of said slide means,

a nut on each of said studs and rotatable relative thereto,

and means for preventing axial movement of said nuts relative to said body,

whereby rotation of said nuts causes said threaded studs and said slide means to move relative to said guide means.

10. A device as recited in claim **9** in which said guide means includes a plurality of slots substantially at right angles to said plane of said strings, said slide means including a member received in and guided by each of said slots.

11. A device as recited in claim **9** in which said first means comprises the nut for said strings.

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