May 22, 1956 J. H. SMIT 2,746,337

CHORD-CHANGING DEVICE

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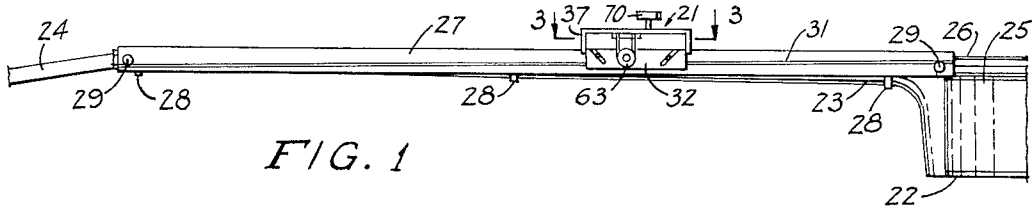


FIG. 1

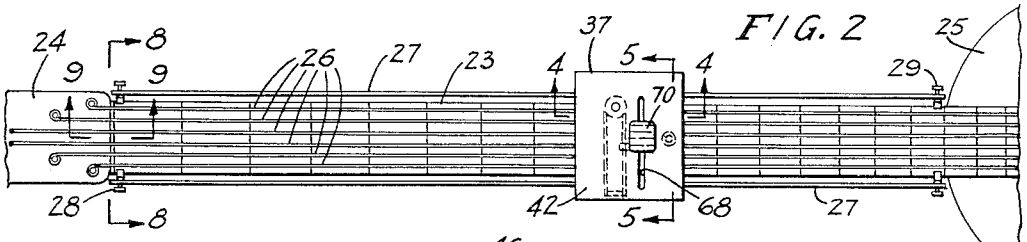


FIG. 2

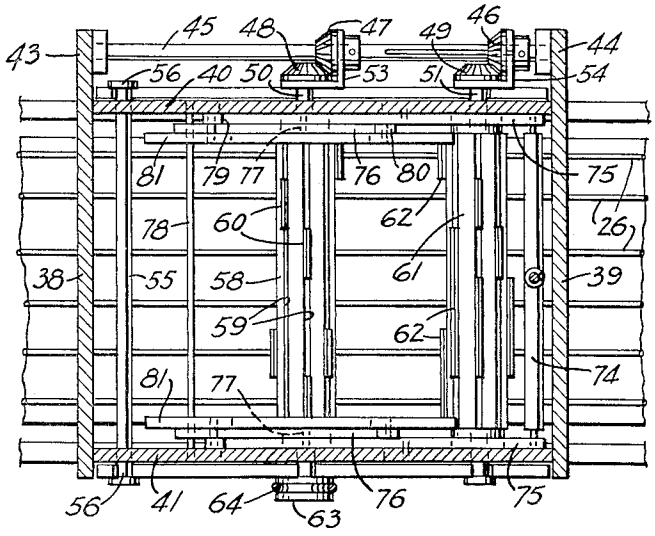


FIG. 3

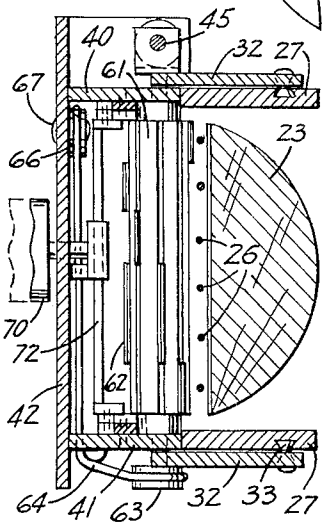


FIG. 5

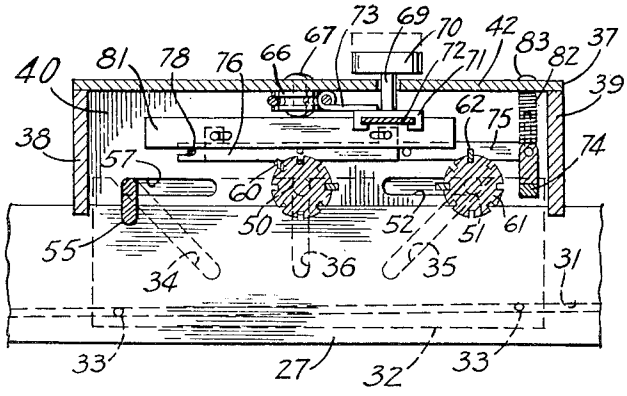


FIG. 4

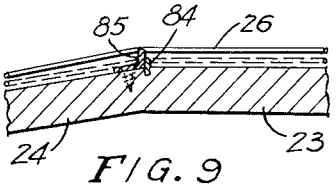


FIG. 9

JOHANNES H. SMIT
INVENTOR.

BY

McMorrow, Berman & Davidson
ATTORNEYS

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CHORD-CHANGING DEVICE

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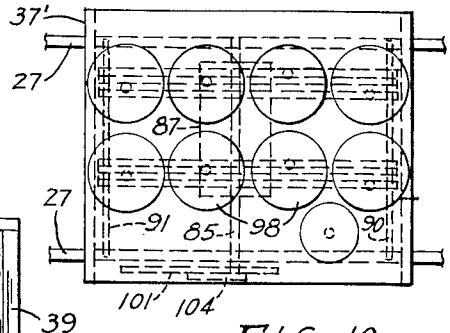


FIG. 10

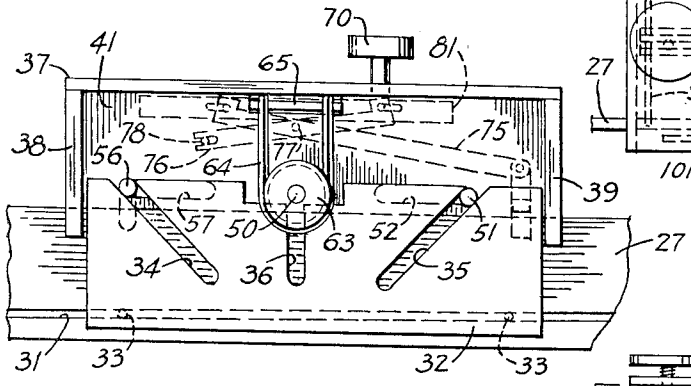


FIG. 6

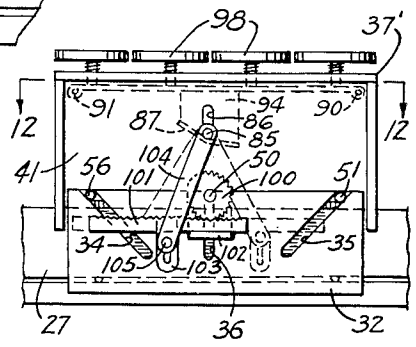


FIG. 11

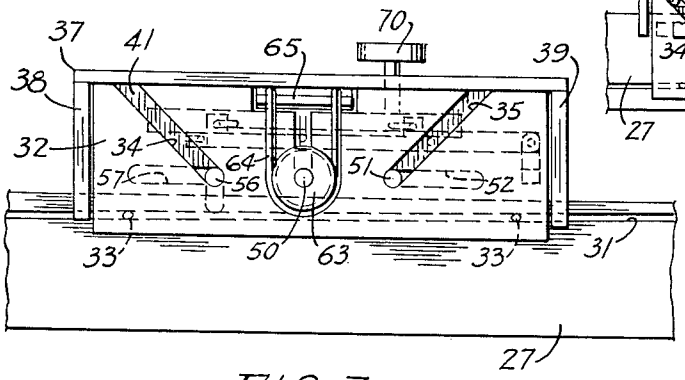


FIG. 7

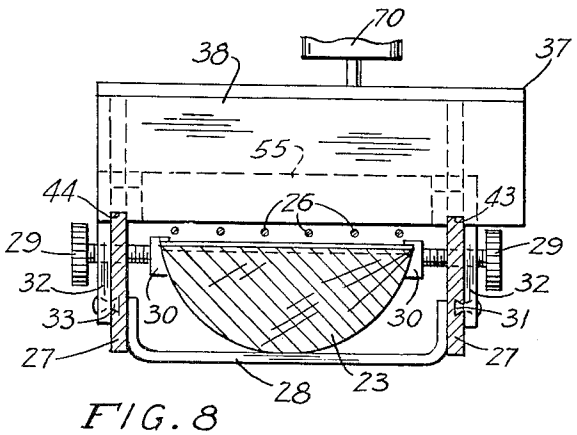


FIG. 8

JOHANNES H. SMIT
INVENTOR.

BY

McMorrow, Berman & Davidson
ATTORNEYS

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CHORD-CHANGING DEVICE

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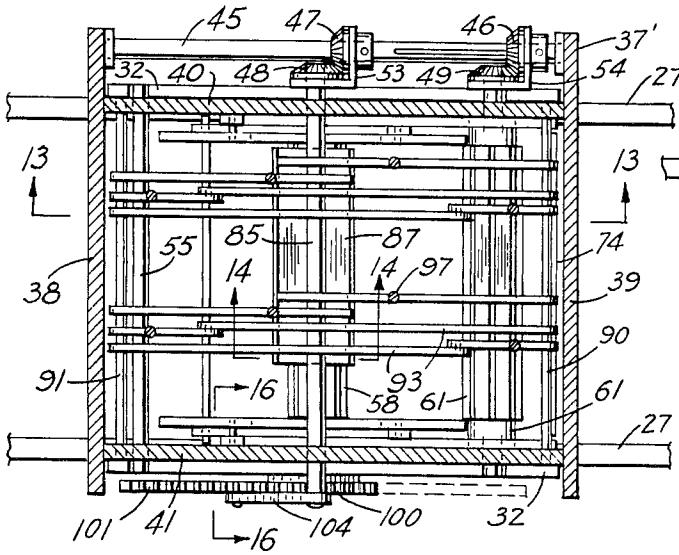


FIG. 12

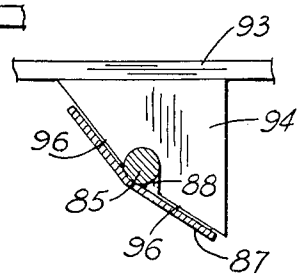


FIG. 14

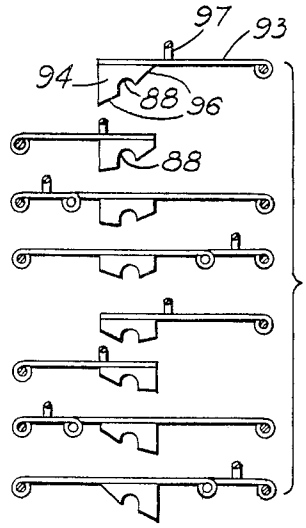


FIG. 15

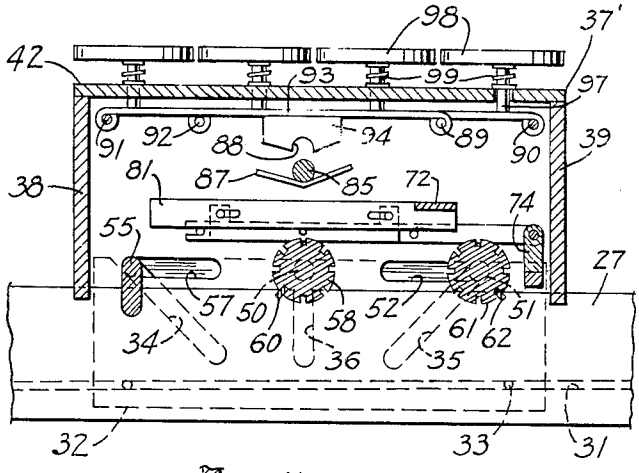


FIG. 13

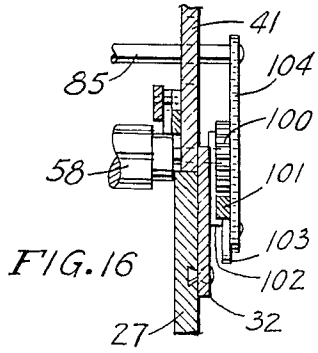


FIG. 16

JOHANNES H. SMIT
INVENTOR.

BY

McMorrow, Berman + Davidson
ATTORNEYS

United States Patent Office 2,746,337 Patented May 22, 1956

2,746,337

CHORD-CHANGING DEVICE

Johannes H. Smit, Amsterdam, Netherlands

Application January 28, 1955, Serial No. 484,718

6 Claims. (Cl. 84—317)

This invention relates to fingering attachments for stringed instruments, and more particularly to an improved chord-changing device for a guitar or similar stringed instrument.

A main object of the invention is to provide a novel and improved chord-changing device for a stringed instrument, said chord-changing device being simple in construction, being easy to mount on the neck portion of an instrument, and being arranged so that the contact elements thereof are automatically adjusted in longitudinal spacing in accordance with their location along the neck of the instrument to compensate for the change in spacing of the frets of the instrument along said neck.

A further object of the invention is to provide an improved chord-changing attachment for a stringed instrument, such as for a guitar or the like, said chord-changing attachment involving inexpensive components, being durable in construction, providing a means for playing the various chords on the instrument by relatively simple manual operations, and greatly reducing the difficulty in playing a stringed instrument so that a person who is relatively unskilled may readily play chords on the instrument.

A still further object of the invention is to provide an improved chord-changing attachment for a stringed instrument, such as a guitar or the like, said attachment involving only a few components, being compact in size, being light in weight, and being neat in appearance, the improved attachment greatly facilitating the playing of chords on the instrument and providing chords which are clean in tone and which are tonally accurate.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

Figure 1 is a fragmentary side elevational view of the neck portion of a guitar on which is mounted an improved chord-changing attachment according to the present invention.

Figure 2 is a top plan view of the structure shown in Figure 1.

Figure 3 is an enlarged horizontal cross sectional view taken on the line 3—3 of Figure 1.

Figure 4 is an enlarged vertical longitudinal cross sectional view taken on the line 4—4 of Figure 2.

Figure 5 is an enlarged transverse vertical cross sectional view taken on the line 5—5 of Figure 2.

Figure 6 is an enlarged side elevational view of the chord-playing attachment of Figures 1 to 5, shown with the elements thereof in their positions of maximum longitudinal spacing along the neck of the stringed instrument, as when strings of the instrument are engaged adjacent the head of the instrument.

Figure 7 is a side elevational view similar to Figure 6, but showing the elements of the attachment in their positions of minimum longitudinal spacing along the neck of the instrument, as when the strings are engaged adjacent the sounding board of the instrument.

Figure 8 is an enlarged transverse vertical cross sectional view taken on the line 8—8 of Figure 2.

Figure 9 is an enlarged cross sectional detail view taken on the line 9—9 of Figure 2.

Figure 10 is a top plan view of a modified form of chord-changing attachment according to the present invention.

Figure 11 is a side elevational view of the chord-changing attachment shown in Figure 10.

Figure 12 is an enlarged horizontal cross sectional view taken on the line 12—12 of Figure 11.

Figure 13 is a vertical cross sectional view taken on the line 13—13 of Figure 12.

Figure 14 is an enlarged cross sectional detail view taken on the line 14—14 of Figure 12.

Figure 15 is a view showing the cam lever elements of the chord-changing attachment of Figures 10 to 14.

Figure 16 is an enlarged cross sectional detail view taken on the line 16—16 of Figure 12.

Referring to the drawings, and more particularly to Figures 1 to 9, 21 generally designates a chord playing attachment for a stringed instrument, for example for a guitar 22. The guitar 22 has the neck portion 23, the head portion 24, the souunding board 25 and the strings 26.

Designated at 27, 27 are a pair of elongated bars which are disposed parallel to each other and which are secured together by transversely extending U-shaped cross members 28 which rigidly hold the bars in parallel relationship in the manner illustrated in Figure 8. The cross-members 28 may be provided adjacent the opposite ends of the bars 27 and at the intermediate portions of said bars, if so desired, to provide the required rigidity of the connections between the elongated bars 27, 27. As shown in Figure 8, the cross members 28 are arranged to underlie the neck portion 23 of the guitar with the bars 27, 27 disposed on opposite side of and substantially parallel to said neck portion.

As shown in Figure 8, the bars 27 are provided adjacent their opposite ends with the fastening screws 29, the screws 29 opposing each other, as shown in Figure 8, and being provided with shoe elements 30 shaped to receive the edge portions of the neck 23 of the instrument, whereby the bars 27, 27 will be rigidly secured to said neck portion when the screws 29 are tightened.

The bars 27 are formed at their outer faces with the inclined, substantially longitudinally extending cam grooves 31, said grooves being inclined upwardly toward the sounding board 25, as shown in Figure 1. The grooves 31 are preferably dovetailed in cross section. Designated at 32, 32 are respective vertical plate members which are disposed outwardly adjacent the respective bars 27, 27, said plate members being provided with respective pairs of dovetailed pin elements 33, 33 which are slidably engaged in the respective dovetailed grooves 31, a dovetailed pin element 33 being provided adjacent each end of each plate element 32, whereby said plate elements are supported adjacent the bars 27 and will be moved upwardly or downwardly relative to said bars as they are moved longitudinally along the bars.

As shown in Figures 6 and 7, the plate elements 32 are formed with the oppositely inclined upwardly and outwardly extending slots 34 and 35 opening at the top edges of the respective plate members 32 and being located adjacent the opposite ends of said plate members. Said plate members are also formed with the vertical slots 36 at their intermediate portions, also opening at the top edges of the plate members.

Designated generally at 37 is a generally rectangular housing member having the transverse vertical end walls 38 and 39, the longitudinal side walls 40 and 41 and the top wall 42, the walls being rigidly secured together in

any suitable manner to define a generally rectangular, box-like housing. The transverse end walls 38 and 39 are formed at their bottom edges with the respective notches 43 and 44 in which the top edge portions of the bars 27, 27 are slidably engaged, whereby the housing 37 is slidably supported on the bars 27, 27. As shown in Figure 3, the transverse end walls 38 and 39 project beyond the longitudinal side walls 40 and 41 to define recesses in which the plate members 32, 32 are receivable and in which said plate members are guided for vertical movement relative to the side walls 40 and 41, since said plate members 32 are substantially rectangular in shape and slidably fit in the recesses defined between the outwardly projecting edges of the transverse members 38 and 39.

The transverse members 38 and 39 are formed with the outwardly projecting lug elements 43 and 44 adjacent the side wall 40, and journaled in said lug elements is the longitudinally extending shaft 45. Secured on the shaft 45 are the respective bevel gears 46 and 47, said bevel gears meshing with respective additional bevel gears 48 and 49 mounted on the ends of respective transverse shaft elements 50 and 51.

The shaft 50 extends rotatably through respective apertures provided in the intermediate portions of the longitudinal wall elements 40 and 41 and extends through the vertical slots 36 provided in the intermediate portions of the cam plates 32. The shaft 51 extends rotatably and slidably through respective horizontal slots 52 formed in the longitudinal wall elements 40 and 41 and through the inclined slots 35 of the cam plates 32.

The respective pairs of bevel gears 47 and 48, and 46, 49 are retained in meshing engagement by right-angled bracket members 53 and 54 through which the shaft 45 and the respective shafts 50 and 51 extend, the flange of the brackets being positioned behind the bevel gears, as shown in Figure 3, to hold the bevel gears in their meshing engagement.

As will be readily apparent, the shafts 50 and 51 may be varied in their spacing by the movement of the shaft 51 along its slots 52, and this variation may be produced by moving the cam plates 32, 32 vertically relative to the side wall elements 40 and 41. Such vertical movement of the cam plates 32, 32 occurs when the housing 37 is moved longitudinally along the bars 27 due to the engagement of the pin elements 33 in the inclined grooves 31.

Designated at 55 is a transversely extending depending contact bar which is arranged in the housing 37 adjacent the transverse wall 38, said contact bar 55 having squared end lugs 56, 56 which extend through horizontal slots 57 provided in the side walls 40 and 41 and which also project through the inclined slots 34 of the cam plates 32. The transverse member 55 is arranged to contact the strings 26 and functions as a "barre."

Mounted on the shaft 50 is a cylindrical roller 58 formed with longitudinal grooves 59 which are equally spaced angularly around the axis thereof, for example, formed with eight evenly spaced grooves. Secured in the grooves 59 are contact projections 60, said projections being spaced to engage respective strings 26, as shown in Figure 3, one or more of the projections 60 being in contact with respective strings in each adjusted position of the roller 58, as will be presently explained.

Mounted on the shaft 51 is a roller 61, similar in construction to the roller 58 and provided with respective string engaging projections 62. Since the rollers 58 and 61 are coupled together by the respective pairs of beveled gears 48, 47 and 49, 46, rotation of the roller 58 automatically causes a rotation of the roller 61, whereby the setting of the projections 60 on the roller 58 into engagement with respective strings also causes the projections 62 on the roller 61 to be moved into engagement with strings, whereby specific chord may be defined. It will be understood that the chords are formed by the combination of the settings of the projections 60 on the roller 58, the settings of the projections 62 on the roller 61, and the engagement of the transverse contact bar 55 with the strings.

As above explained, the spacing of the shaft 51 with respect to the shaft 50 is automatically varied by the movement of the cam plates 32 vertically as the housing 37 is moved along the neck of the instrument. Similarly, the spacing of the transverse contact bar 55 with respect to shaft 50 is varied in the same manner because of the camming engagement of the inclined slots 34 with the outwardly projecting end lug portions 56 of the transverse contact bar 55. Thus, the spacings between the elements 55, 50 and 51 is varied as the housing 37 is positioned at different points along the neck of the instrument, and this variation is arranged in accordance with the variation in the spacing of the transverse frets on the neck of the instrument.

As is well known, the spacing between the transverse frets of a stringed instrument is usually much greater adjacent the head of the instrument than adjacent the sounding board thereof, the spacing gradually diminishing from the head toward the sounding board to enable the required theoretical tones to be obtained from the various strings when said strings are touched at various points along the neck of the instrument. The angles of inclintion of the cam slots 34 and 35 are arranged in accordance with the variation in the spacing between the frets on the neck of the instrument so as to provide the same change in relative spacing between the members 55, 50 and 51 as occurs between the successive frets along the neck of the instrument. This insures uniformity in tonal accuracy in the production of chords when the strings 26 are engaged by the contact elements 55, 60 and 62 of the device, regardless of the position of the housing 37 along the neck 23 of the instrument.

Mounted on the outer end of the shaft 50 adjacent the side wall 41 of housing 37 is a peripherally grooved pulley 63 which is engaged by an endless cable 64 which extends over a bearing bar 65 secured externally to the top marginal portion of the side wall 41 over the end of shaft 50. The inner portion of the belt 64 is engaged on a peripherally grooved horizontal pulley 66 rotatably mounted on a pin or rivet 67 secured to the top wall 42 of housing 37. The top wall 42 of the housing is formed with a transversely extending slot 68 through which extends the shank 69 of a button member 70, the lower end of said shank being provided with a channeled shoe 71 which is slidably mounted on a transversely extending support bar 72, shown in Figure 4. The shoe 71 is connected to the belt 62 by a connecting lug 73, one end of said lug 73 being secured to the belt and the other end of said lug 73 being rigidly fastened to the shoe 71.

It will be understood that the belt 64 is of suitable flexible material so that the button 70 may be at times depressed from a normal position thereof relative to the top wall 42. It will be readily apparent that by moving the button 70 transversely along the slot 68, the belt 64 will be moved, causing the pulley 63 to rotate shaft 50, thus causing the rollers 58 and 61 to be simultaneously rotated, whereby the settings of the string-contacting elements 60 and 62 may be varied.

Designated at 74 is a transversely extending damping bar which is located in the housing 37 adjacent the transverse end wall 39, said damping bar 74 being mounted on the ends of a pair of longitudinally extending levers 75, 75 pivoted at their intermediate portions to the respective cooperating scissor link levers 76, as shown at 77. The opposite ends of the scissor link levers 76 are pivotally supported on a transverse rod 78 secured between the side walls 40 and 41. The free ends of the cooperating scissor link levers 75 and 76 are formed with the upstanding lugs 79 and 80. Pivotally and slidably secured to said lugs are the respective longitudinal link bars 81, 81, the transverse plate-like support bar 72

being secured between opposing end portions of the longitudinal bars **81**, **81**, as shown in Figure 4.

The damper bar **74** is biased downwardly by a coiled spring **82** surrounding a guide bolt **83** secured to the housing top wall **42** over the intermediate portion of said damping bar, the spring **82** bearing downwardly on the damping bar and biasing said damping bar into engagement with the springs **26**.

When a chord is to be played, the button **70** is set to the proper position to cause the contact elements **60** and **62** to engage the desired strings, and the button **70** is then depressed, to elevate the damping bar **74**, releasing the spring so that the chord may be played.

It will be understood that the damping bar is located on the side of the device most closely adjacent to the sounding board **25**, whereby the strings are normally engaged by the damping bar, and the chords cannot be played unless the button **70** is depressed.

As shown in Figure 9, when the chord playing attachment is employed, the strings **26** are preferably elevated somewhat above their normal positions at the head end of the neck **23**, as by the use of a transversely extending angle member **85** which is fastened to the head immediately adjacent the nut **84** of the instrument.

Referring now to the form of the invention shown in Figures 10 to 16, a generally rectangular housing **37'** is slidably mounted on the longitudinal bars **27**, **27** in the same manner as in the previously described form of the invention. The attachment of Figures 10 to 16 also includes the vertically adjustable cam plates **32** which act to adjust the longitudinal spacings of the respective elements **55** and **51** with respect to the intermediate transverse shaft **50**, the shaft **50** carrying the roller **58** having the string engaging projections **60** and the shaft **51** carrying the roller **61** having the string engaging projections **62**.

Designated at **85** is a transverse shaft which is rotatably and slidably mounted in the intermediate portions of the side walls **40** and **41** of the housing, the ends of the shaft projecting through vertical slots **86** provided in said side walls. Secured beneath the shaft **85** is a V-shaped plate **87** which is upwardly concave. Pivoted to respective transverse supporting shafts **89**, **90**, **91** and **92** secured between the upper portions of the side walls **40** and **41** of the housing are a plurality of longitudinally extending levers **93**, each lever being provided with a depending cam element **94** having a generally V-shaped bottom edge engageable transversely in the plate **87** and being arranged to rotate the plate **87** when moved downwardly into said recess. As will be seen from Figure 15, each of the cam elements **94** has radial edge portions **96**, **96** adapted to cooperate with the walls of the V-shaped plate **87** to cause the plate **87** to rotate to a position wherein the cam element **94** is fully received in a transverse position in the V-shaped plate **87**.

As shown in Figures 13, 14 and 15, each cam element **94** is formed with a generally semi-circular notch **88** between the bottom edge portions **96**, **96** thereof to receive the shaft **85** when the cam element is lowered to engage plate **87**, the shaft **85** being freely rotatable in the notch **88**.

Secured to each lever **93** is an upstanding shank **97** which extends slidably through an aperture provided therefor in the top wall **42** of the housing, a suitable push button **98** being secured to the top end of each shank **97**, and the buttons being biased upwardly by coiled springs **99** provided on the shank **97** above the top wall **42**, as is clearly shown in Figure 13.

The damper bar **74** is controlled by linkage elements similar to that described in connection with the previously disclosed form of the invention, and the top bars **81** are engageable by the shaft **85** when said shaft is moved downwardly whereby the damper bar **74** will be elevated. Suitable spring means is provided to bias the damper bar **74** into engagement with the strings. The shaft **50** has secured to its end the rack gear **100** which meshes with the

rack bar **101** slidably supported on an angle bracket **102** suspended from the shaft **50**, the shaft **50** being rotatable with respect to said bracket **102**. As shown in Figure 16, the bracket **102** has a bottom flange on which the rack bar **101** is slidable. The rack bar **101** is formed with a depending slotted lug **103**. Rigidly secured to the end of the shaft **85** of plate **87** is a crank arm **104** which is slidably and pivotally connected at its end to the slotted lug **103**, as by a stud **105** secured to the end of the crank arm **104** and extending through the slot in the lug **103**. Thus, rotation of the plate **87** is transmitted to the rack bar **101** by the action of the crank arm **104**, causing the rack bar **101** to move along the bracket **102** and to rotate shaft **50** because of the meshing engagement of rack bar **101** with rack gear **100**. Thus, when a selected push button **98** is depressed, the plate **87** will rotate through a predetermined angle, producing a predetermined movement of the rack bar **101**, thereby producing a predetermined rotation of the shaft **50** and of the shaft **51** which is coupled thereto. At the same time, the link bars **81** are depressed, causing the damper bar **74** to be elevated and allowing the desired chord to be played. As in the previously described form of the invention, the spacing between the transverse contact bar **55**, the shaft **50** and the shaft **51** is automatically adjusted along the neck of the instrument by the action of the inclined cam slots **34** and **35** previously described.

While certain specific embodiments of an improved chord-changing attachment for a stringed instrument have been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. A chord-changing attachment for a stringed instrument of the type having a neck provided with a fingerboard, said fingerboard comprising spaced frets whose spacing varies along said neck, said attachment comprising a support member, means for securing said support member to said neck in substantially parallel relation thereto, a frame slidably mounted on said support member, said frame being arranged to extend over the strings of the instrument, a transverse string-engaging bar carried by said frame at its rear portion, a first transverse rotor rotatably carried by the intermediate portion of said frame, a second transverse rotor rotatably carried by the forward end portion of the frame, said rotors being arranged to engage the strings, contact projections on said rotors engageable with selected strings in accordance with the rotated positions of said rotors, manual means arranged to simultaneously rotate said rotors to bring selected contact projections into engagement with selected strings, and cooperating means on the frame and on said support member arranged to vary the spacing of the transverse string-engaging bar and the second rotor with respect to the first rotor as the frame is moved along said support member in accordance with the variation in spacing of said frets.

2. A chord-changing attachment for a stringed instrument of the type having a neck provided with a fingerboard, said fingerboard comprising spaced frets whose spacing varies along said neck, said attachment comprising a support member, means for securing said support member to said neck in substantially parallel relation thereto, a frame slidably mounted on said support member, said frame being arranged to extend over the strings of the instrument, a transverse string-engaging bar carried by said frame at its rear portion, a first transverse rotor rotatably carried by the intermediate portion of said frame, a second transverse rotor rotatably carried by the forward end portion of the frame, said rotors being arranged to engage the strings, contact projections on said rotors engageable with selected strings in accordance with

the rotated positions of said rotors, manual means arranged to simultaneously rotate said rotors to bring selected contact projections into engagement with selected strings, cooperating means on the frame and on said support member arranged to vary the spacing of the transverse string-engaging bar and the second rotor with respect to the first rotor as the frame is moved along said support member in accordance with the variation in spacing of said frets, a transverse damping bar carried by said frame forwardly of said second rotor, and being arranged to normally engage the instrument strings, and means for at times elevating said damping bar.

3. A chord-changing attachment for a stringed instrument of the type having a neck provided with a fingerboard, said fingerboard comprising spaced frets whose spacing varies along said neck, said attachment comprising a pair of elongated bars, means for securing said bars to opposite sides of said neck in substantially parallel relation thereto, a frame slidably mounted on said bars, said frame being arranged to extend over the strings of the instrument, a transverse string-engaging bar carried by said frame at its rear portion, a first transverse rotor rotatably carried by the intermediate portion of said frame, a second transverse rotor rotatably carried by the forward end portion of the frame, said rotors being arranged to engage the strings, contact projections on said rotors engageable with selected strings in accordance with the rotated positions of said rotors, manual means arranged to simultaneously rotate said rotors to bring selected contact projections into engagement with selected strings, and cooperating means on the frame and on said bars arranged to vary the spacing of the transverse string-engaging bar and the second rotor with respect to the first rotor as the frame is moved along said bars in accordance with the variation in spacing of said frets.

4. A chord-changing attachment for a stringed instrument of the type having a neck provided with a fingerboard, said fingerboard comprising spaced frets whose spacing varies along said neck, said attachment comprising a pair of elongated bars, means for securing said bars to opposite sides of said neck in substantially parallel relation thereto, a housing slidably mounted on said bars, said housing being arranged to extend over the strings of the instrument, a transverse string-engaging bar carried by said housing at its rear portion, a first transverse roller rotatably carried by the intermediate portion of said housing, a second transverse roller rotatably carried by the forward end portion of the housing, said rollers being arranged to engage the strings, contact projections on said rollers engageable with selected strings in accordance with the rotated positions of said rollers, manual means arranged to simultaneously rotate said rollers to bring selected contact projections into engagement with selected strings, and cooperating means on the housing and on said bars arranged to vary the spacing of the transverse string-engaging bar and the second roller with respect to the first roller as the housing is moved along said bars in accordance with the variation in spacing of said frets.

5. A chord-changing attachment for a stringed instrument of the type having a neck provided with a fingerboard, said fingerboard comprising spaced frets whose spacing varies along said neck, said attachment comprising a pair of elongated bars, means for securing said bars to opposite sides of said neck in substantially parallel relation thereto, a housing slidably mounted on said bars, said housing being arranged to extend over the strings of the instrument, a transverse string-engaging bar carried by said housing at its rear portion, a first transverse roller rotatably carried by the intermediate portion of said housing, a second transverse roller rotatably carried by the forward end portion of the housing, said rollers being arranged to engage the strings, contact projections on said rollers engageable with selected strings in accordance with the rotated positions of said rollers, manual means arranged to simultaneously rotate said rollers to bring selected contact projections into engagement with selected strings, said bars being formed with inclined cam grooves extending substantially longitudinally thereof, and means on said housing cammingly engageable with said grooves and arranged to vary the spacing of the transverse string-engaging bar and the second roller with respect to the first roller as the housing is moved along said bars in accordance with the variation in spacing of said frets.

6. A chord-changing attachment for a stringed instrument of the type having a neck provided with a fingerboard, said fingerboard comprising spaced frets whose spacing varies along said neck, said attachment comprising a pair of elongated bars, means for securing said bars to opposite sides of said neck in substantially parallel relation thereto, a housing slidably mounted on said bars, said housing being arranged to extend over the strings of the instrument, a transverse string-engaging bar carried by said housing at its rear portion, a first transverse roller rotatably carried by the intermediate portion of said housing, a second transverse roller rotatably carried by the forward end portion of the housing, said rollers being arranged to engage the strings, contact projections on said rollers engageable with selected strings in accordance with the rotated positions of said rollers, manual means arranged to simultaneously rotate said rollers to bring selected contact projections into engagement with selected strings, said bars being formed with inclined cam grooves extending substantially longitudinally thereof, means slidably supporting said transverse string-engaging bar and said second roller on said housing for adjustment longitudinally thereof, respective plate members disposed on opposite sides of the housing and having oppositely upwardly inclined slots respectively engaging said transverse string-engaging bar and said second roller, and follower elements on said plate members slidably engaging in said inclined cam grooves and arranged to vary the spacing of the transverse string-engaging bar and the second roller with respect to the first roller as the frame is moved along said bars in accordance with the variation in spacing of said frets, a transverse damping bar carried by said housing forwardly of said second roller, said damping bar being arranged to normally engage the instrument strings, and means for at times elevating said damping bar.

No references cited.