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NECK FOR STRINGED INSTRUMENTS

Filed Oct. 3, 1962

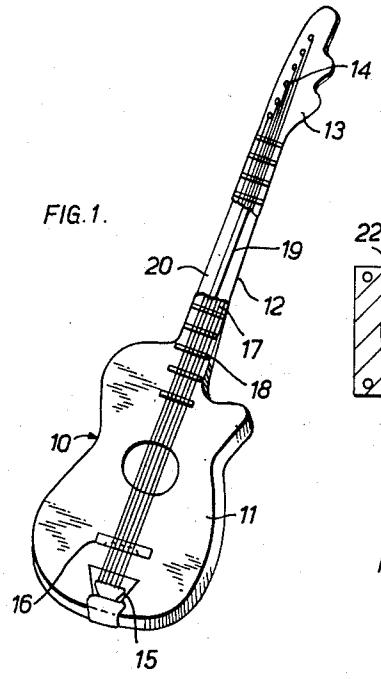

FIG. 1.

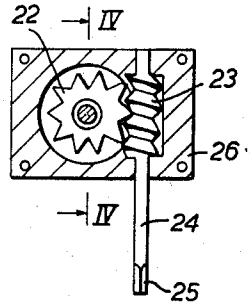

FIG. 3.

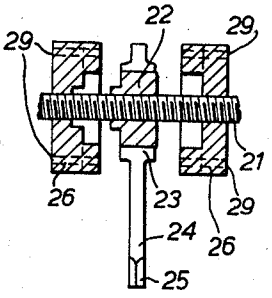

FIG. 4.

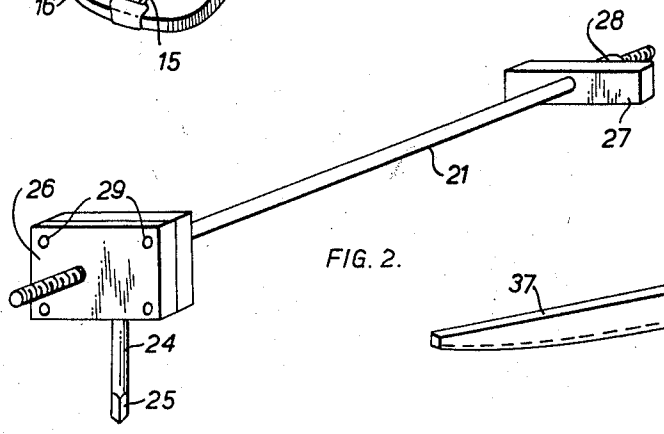

FIG. 2.

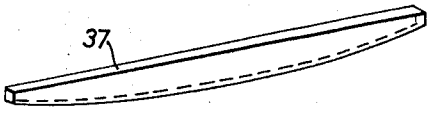

FIG. 7.

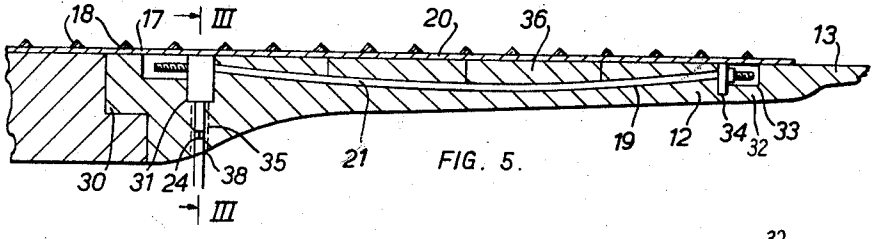

FIG. 5.

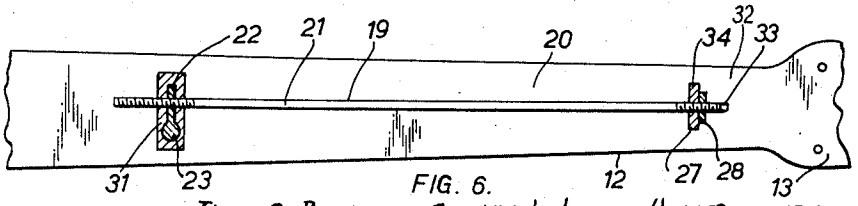

FIG. 6.

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NECK FOR STRINGED INSTRUMENTS

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This invention relates to stringed instruments especially guitars and is more particularly concerned with the reinforcement of the neck of such an instrument.

When the strings of a stringed instrument are tensioned, the strings exert a pull on the neck and the pull would normally tend to cause the neck to bow, thus bringing the neck out of parallelism with the line of the strings.

The present invention provides a means whereby the neck of the instrument can be restored to a position wherein the neck is in substantial parallelism with the line of the strings.

According to one feature of the present invention a reinforced neck structure for a stringed musical instrument, such as a guitar, comprises a neck for attachment to an instrument body, and containing a reinforcing member, means for anchoring one end of said member at or near one end of the neck, means for establishing pre-set relative movement between the other end of the member and the neck in a region remote from said one end of the neck and comprising a toothed wheel-worm gear screw and nut mechanism, for pre-stressing the member in at least one direction.

The reinforcing member can conveniently be disposed in the neck in a groove adjacent to or opening on to a finger board receiving surface thereof, and a fillet of complementary shape to that of the groove inserted into the groove to slightly bow the member disposed in the groove and to hold the member in position when the finger board is affixed to the finger board receiving surface of the neck.

Preferably the groove in the neck is of a slightly bow-shaped longitudinal section over most of its length to accommodate the bow of the reinforcing member.

Conveniently the reinforcing member is anchored at the machine head end of the neck and has the means for adjustably tensioning the member situated at the instrument body end of the neck.

Preferably the reinforcing member is in the form of a metal rod-like element which is screw-threaded at its ends. The member can conveniently be anchored at one end of the neck by a transversely extending strip or flange and the means for adjustably tensioning the member comprises a toothed wheel, apertured and tapped to receive a threaded end of the reinforcing member, engaging a worm gear. The toothed wheel and the worm gear are conveniently enclosed in a metal housing. A shaft, on which the worm gear is mounted, extends into a bore which opens onto the back of the neck of the instrument. The end of the shaft, situated in said bore, is squared to receive a key, the key being introduced into the entrance of the bore at the back of the neck.

The reinforcing member can be pre-stressed under tension or compression, the desired effect being achieved by engaging said shaft with the key and turning the key in the appropriate direction.

The invention will be further described by way of example with reference to the accompanying drawings which illustrate one embodiment of the invention, and in which:

FIG. 1 is a perspective view, partly cut away, of a guitar embodying the present invention;

FIG. 2 is a perspective view of the reinforcing member to an enlarged scale;

FIG. 3 is a detail view of the toothed wheel-worm gear mechanism in section along the line III—III of FIG. 5;

FIG. 4 is an exploded detail view of the toothed wheel-worm gear mechanism in section along the line IV—IV of FIG. 3;

FIG. 5 is a longitudinal sectioned elevation of the neck of the guitar of FIG. 1;

FIG. 6 is a plan view of the neck of the guitar with the finger board removed;

FIG. 7 is a detail perspective view of the fillet shown in FIG. 5.

A guitar **10** comprises a body **11** to which is attached a neck **12** having at its outer end a machine head **13** to receive one end of a plurality of strings **14**, the other ends of which are anchored at **15**, adjacent a bridge **16**. On the neck **12** is a finger board **17** having a plurality of frets **18**.

The neck **12** is grooved longitudinally as at **19** from the finger board receiving surface **20** thereof, to receive a reinforcing member **21**.

As can be seen more clearly from FIG. 2, the reinforcing member **21** is in the form of a metal rod (preferably of steel and having a diameter of say 5/16 inch) which is screw threaded at its ends. Received on one end of the member **21** is a toothed wheel **22** which engages a worm gear **23**, said gear being mounted on a shaft **24**, the outer end of which is squared as at **25** to receive a key. The toothed wheel-worm gear mechanism is enclosed in a metal housing **26**, as can be seen in FIGS. 2, 3 and 4. The other end of the member **21** threadedly receives a flange or anchoring strip **27** held firmly in position by a lock nut **28**.

Preferably the housing **26** is made from two rectangular blocks of metal, said blocks constituting the two halves of the housing and being machined to receive the toothed wheel **22** and the worm gear **23**, and being held together by screws **29**. The toothed wheel **22** is bored and tapped for mounting on one end of the member **21**.

The neck **12** is longitudinally grooved, as indicated generally at **19**; the groove having a slightly bow-shaped longitudinal section for most of its length. The portion of the groove adjacent the instrument attachment end **30** of the neck is deeper and transversely extended as at **31** to receive the housing **26** of the reinforcing member. At the outer end **32** of the neck adjoining the machine head **13**, the groove is lengthened as at **33** to accommodate the outer end of the member **21** and is also extended transversely and deepened as at **34** to receive the flange or anchoring strip **27** and the lock nut **28**, as can be seen more clearly in FIGS. 5 and 6. A bore **35** is made in the neck, perpendicular to the line of the finger board receiving surface **20**, extending from the portion of the groove **31** to the back of the neck **12** producing the opening **38**.

During construction the groove is formed in the neck and the reinforcing member **21**, together with the toothed wheel-worm gear mechanism in the housing **26** and the flange **27** and the lock nut **28**, are laid in the groove. The shaft **24** extends into the bore **35**. The member **21** is then bowed to the same shape as the bottom of the groove by forcibly inserting into the groove against the member and between the housing **26** and the flange **27**, a fillet **36**, preferably made of plywood. The fillet, as seen in FIG. 7, has a shape complementary to that of the groove and when in position in the groove the upper face **37** of the fillet lies flush with the finger board receiving surface **20**. The finger board **17** is then affixed to the finger board receiving surface of the neck so that the reinforcing member, the housing, the flange and the lock nut are completely enclosed.

When the neck **12** is attached to a body **11** to complete an instrument and strings are fitted and tensioned

between the machine head 13 and the anchorage 15, the neck normally tends to become bowed. This results in the finger board presenting a concave surface towards the line of the strings since the tensions in the strings exert a pull on the neck 12. In such a case, the reinforcing member 21 is then pre-stressed in the appropriate manner so as to counteract or oppose the action of the tensions in the strings and enable the bow to be reduced to bring the neck, more especially the finger board, into substantial parallelism with the line of the strings.

With continued pretensioning of the reinforcing member there may, in practise, be a tendency for the neck to become permanently bowed in the other direction, that is to say so as to present a convex surface towards the longitudinal line of the strings. If the action of the tensions in the strings, when adjusted, are insufficient to bring the finger board into substantial parallelism with the line of the strings, the reinforcing member can be pre-stressed in a direction to supplement the action of the tensioning of the strings to bring the finger board more nearly into parallelism with the line of the strings.

The member 21 is pre-stressed under tension or compression by inserting a key into the entrance 38 of the bore 35 at the back of the neck 12, engaging the key with the shaft 24, and turning the key in the appropriate direction.

Thus by providing the toothed wheel-worm gear mechanism in the housing 26, said housing having transverse faces abutting transverse faces of a groove at the inner end of the neck 12, and by providing the flange 27 at the outer end of the neck with transverse faces abutting transverse faces of a groove at the outer end of the neck, it is possible for the reinforcing member to be pre-stressed under tension or under compression so as to exert an influence on the neck which is either supplemental or opposed to the action of the tension of the strings.

The abovementioned effect produced by the reinforcing bar could be achieved equally well if the whole arrangement of the member as seen in FIG. 2 was in a position in the neck reverse to that as seen in FIGS. 5 and 6.

We claim:

1. A stringed musical instrument, such as a guitar, having an instrument body, a reinforced neck structure having one end thereof connected to said instrument body and the other end thereof formed as a machine head, said reinforced neck structure comprising a neck, a reinforcing rod, said rod being slightly bowed and disposed in a channel arranged longitudinally and centrally of said neck, anchoring means mounted at one end of said rod and arranged in a recess in said neck at said machine head end thereof to be held against longitudinal movement with respect to said neck, and means comprising a toothed wheel and worm gear screw mechanism secured in said neck at said instrument body end of said neck and held against longitudinal movement with respect to said neck, said toothed wheel being threadedly mounted on the other end of said rod and being adapted upon rotation of said worm gear screw to establish relative movement between said rod and said neck in at least one direction to stress said rod whereby to exert an influencing force on said neck to restore it to its desired condition, said worm gear screw having a drive shaft accessible from externally of said neck by which said worm gear screw can be rotated.

2. A reinforcing assembly for incorporation in the neck of a stringed musical instrument, such as a guitar, which neck is provided with a longitudinal channel, comprising, in combination, a reinforcing rod member adapted to be non-rotatably arranged in said channel, a flange and a lock nut therefor threadedly mounted on one end of said rod member and adapted to be inserted in a transverse recess at one end of said channel to be restrained against longitudinal movement relatively to said neck, a housing, said rod member having an externally threaded portion at the other end thereof and extending through said housing, an internally threaded and extrenally toothed wheel within said housing and engaging the threaded portion of said rod member, a worm gear within said housing and operatively engaging said toothed wheel, a drive shaft journalled in said housing and extending externally thereof and operating said worm gear, said housing being adapted to be inserted in a transverse recess at the other end of said channel to be anchored therein and restrained against longitudinal movement relatively to said neck.

3. In a stringed musical instrument, such as a guitar, a reinforced neck structure comprising a neck, a finger board receiving surface on said neck, said neck having a longitudinal channel extending substantially over the length of said neck, said channel opening onto said finger board receiving surface, and terminating at each of its ends in a transverse groove in said neck, a housing disposed in one of said grooves so as to be anchored against axial movement with respect to said neck, a flange member disposed in the other of said grooves so as to be anchored against axial movement with respect to said neck, a slightly bow shaped reinforcing member disposed in said channel, said member having one end thereof rigidly attached to said flange member and having an externally threaded portion in the region of the other end thereof and extending through said housing, an internally threaded nut member within said housing and engaging the threaded portion of said reinforcing member, a worm and worm wheel transmission within said housing and operatively connected to said nut member, and a drive shaft journalled in said housing and extending externally thereof and being adapted to operate said transmission whereby said reinforcing member can be stressed in one direction under tension and in the opposite direction under compression to restore said neck to its desired condition.

4. A reinforced neck structure for a stringed musical instrument, such as a guitar, comprising a neck for attachment to an instrument body, a finger board receiving surface on said neck, a longitudinal groove in said neck, a transverse recess at each end of said groove, a reinforcing rod member disposed in said groove and being externally screw threaded at each of its ends, a fillet having a shape complementary to the shape of said groove and adapted to be inserted into said groove to slightly bow said rod member disposed in said groove and to hold said rod member in position therein, a housing, said housing being disposed in one of said recesses such that transverse faces of said housing abut transverse faces of said one of said recesses so as to prevent longitudinal movement of said housing relatively to said neck, an internally threaded and externally toothed wheel in said housing, said toothed wheel being threadedly mounted on one end of said rod member, a worm gear in said housing engaging said toothed wheel, said worm gear having a drive connection accessible from externally of said neck on the side thereof remote from said finger board receiving surface, an anchoring strip and a lock nut therefor threadedly engaging the other end of said rod member and being disposed in the other of said recesses, transverse faces of said anchoring strip abutting transverse faces of said other of said recesses to prevent longitudinal movement of said anchoring strip relatively to said neck, said toothed wheel and worm gear being operable upon rotation of said drive connection to stress said rod member in one direction under tension and in the opposite direction under compression, as desired, so as to exert an influence on said neck to restore it to its desired condition.

5. In a stringed musical instrument, such as a guitar, a reinforced neck structure comprising a neck, a finger board receiving surface on said neck, said neck having a longitudinal channel extending substantially over the length of said neck, said channel opening onto said finger board receiving surface and exhibiting a slightly bow shaped section over most of its length, a metal rod dis-

posed in said channel, said rod being externally screw threaded at both ends thereof, a fillet of complementary longitudinal section to that of said channel and adapted to be forcibly inserted into said channel to slightly bow said rod and to retain said rod therein when a finger board is affixed to said finger board receiving surface, said neck at one end thereof having a transverse groove merging with said longitudinal channel, a transversely extending flange and a lock nut threadedly engaging said one end of said rod, said flange being received in said transverse groove so as to be anchored therein against axial movement with respect to said neck, a housing, an internally threaded and externally toothed wheel in said housing, a worm gear in said housing engaging said toothed wheel, said toothed wheel being threadedly mounted on said other end of said rod, said neck having in the region of its other end a recess merging with said channel and having an aperture opening into said recess and opening in an external surface of said neck remote from said finger board receiving surface, said housing being received in said recess to anchor said housing against axial movement with respect to said neck, and a drive shaft journalled in said housing and carrying said worm gear and extending into said aperture, an end portion of said drive shaft being shaped to receive external operable driving means whereby on rotation of said drive shaft said rod can be stressed in the direction necessary to restore said neck to its desired condition.

6. A reinforced neck structure for a stringed musical instrument, such as a guitar, comprising a neck, a fingerboard receiving surface on said neck, said neck having a longitudinal axially extending channel formed therein, said channel opening onto said fingerboard receiving surface and having a slightly bow shaped section over most of its length, a metal rod disposed in said channel, a fillet of complementary longitudinal section to that of said channel and adapted to be forcibly inserted into said channel to slightly bow said rod and to hold said rod

therein when a finger board is attached to said finger board receiving surface, said neck in the region of one end thereof having a transverse groove connecting with said channel, said rod having a traversely extending portion at one end thereof, said traversely extending portion being disposed in said transverse groove so as to be anchored therein against axial movement with respect to said neck and to restrain said rod against rotation in said channel, said rod having an externally screw threaded portion at the other end thereof, a housing, an internally threaded and externally toothed wheel in said housing, a worm gear in said housing engaging said toothed wheel, said toothed wheel being threadedly mounted on said other end of said rod, said neck having in the region of its other end a recess merging with said channel and having an aperture opening into said recess and opening onto an external surface of said neck remote from said fingerboard receiving surface, said housing being received in said recess to anchor said housing against axial movement with respect to said neck, and a drive shaft journalled in said housing and carrying said worm gear and extending into said aperture to be accessible from externally of said neck by a driving member, whereby on rotation of said drive shaft said rod can be stressed in the direction necessary to restore said neck to its desired condition.

7. A reinforced neck structure as set forth in claim 6, wherein said toothed wheel is bearingly mounted within said housing for restraining axial movement relatively thereto.

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