United States Patent

[11] **3,580,124**

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[54] **NOVEL PITCH ADJUSTMENT MEANS FOR STRINGED INSTRUMENTS**
21 Claims, 8 Drawing Figs.

[52] **U.S. Cl.** **84/313**
[51] **Int. Cl.** **G10d 3/00**
[50] **Field of Search** 84/312, 313, 314, 318

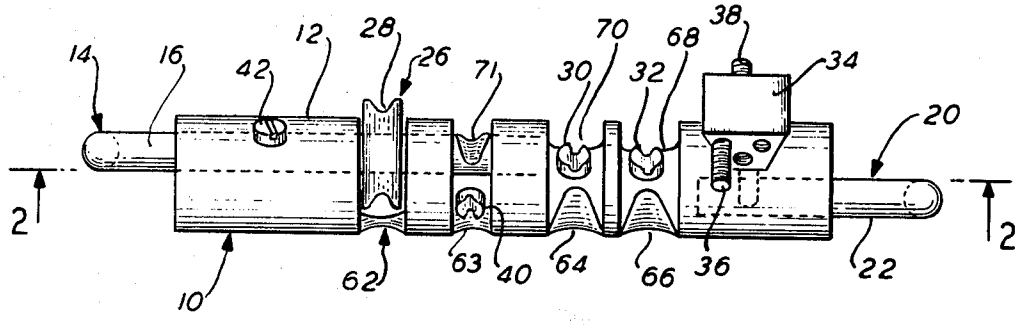
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Assistant Examiner—John F. Gonzales
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ABSTRACT: There is provided a simple and novel device principally intended for use with a double bass or similar instrument, whereby the pitch of one string may be adjusted in a precise, predictable and reversible manner to a pitch other than that at which it is normally played. The device comprises a cylinder having a pulley mounted therein whose axis is parallel to but eccentric in relation to the principal axis of the cylinder. The device further optionally comprises excisions having adjustable plugs therein for the minor and, reversable, adjustment of the pitch of the other strings, means for rotating the cylinder into a "contact" and "noncontact" position wherein the string of the instrument to be adjusted in pitch either is in contact or is not in contact respectively with the pulley. The device further optionally comprises a means for controlling the degree of rotation of the device between the "-contact" and "noncontact" positions.



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SHEET 1 OF 2

FIG. 1

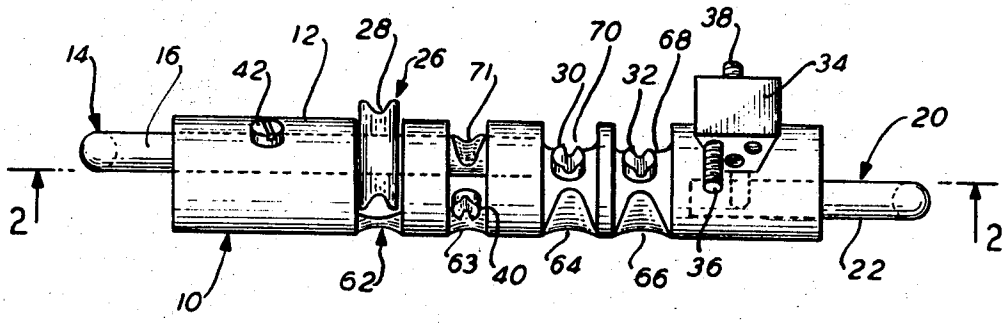


FIG. 2

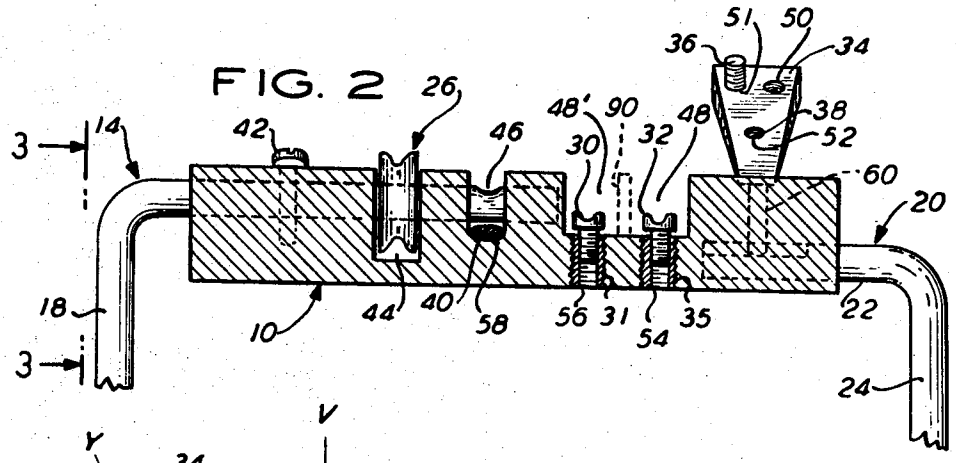
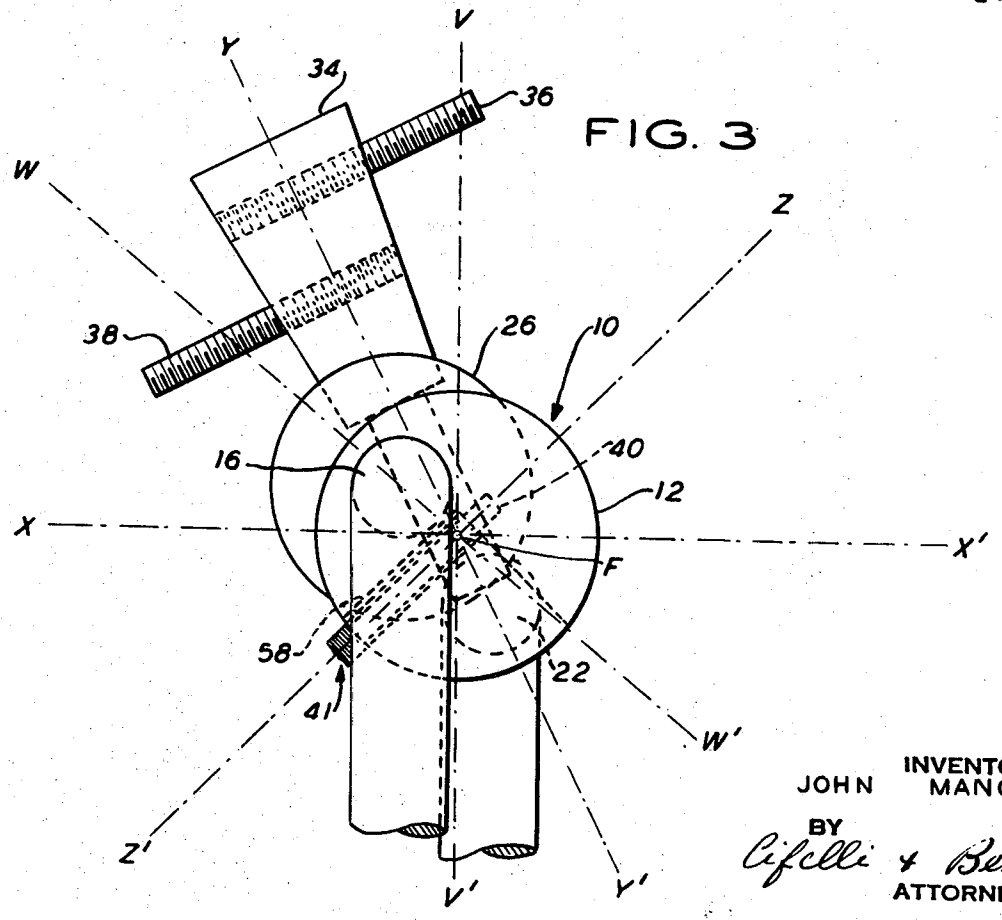


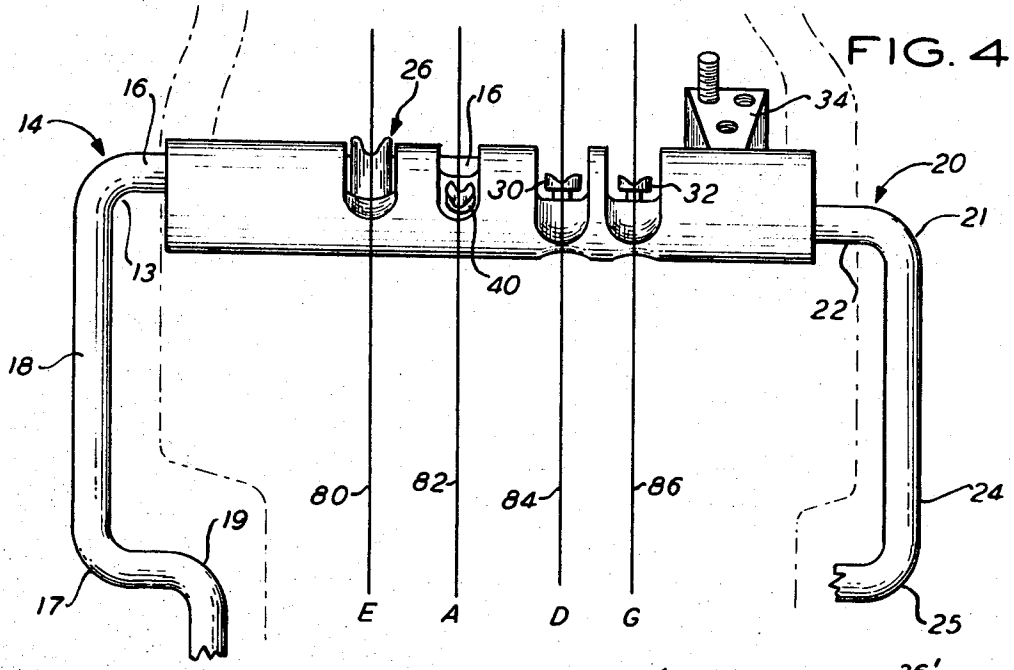
FIG. 3



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FIG. 4



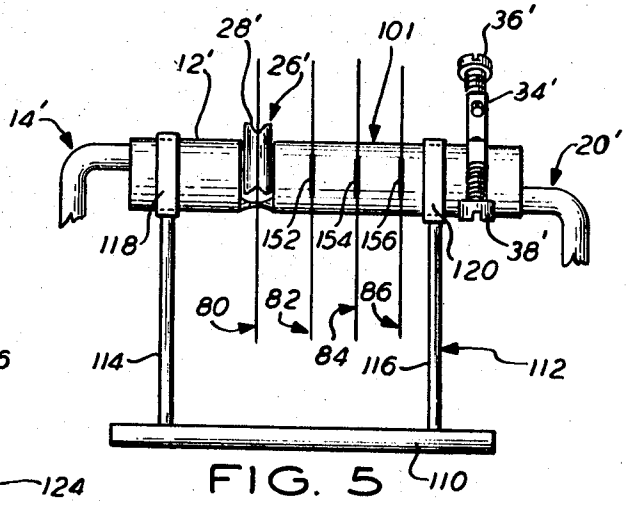


FIG. 5

FIG. 6

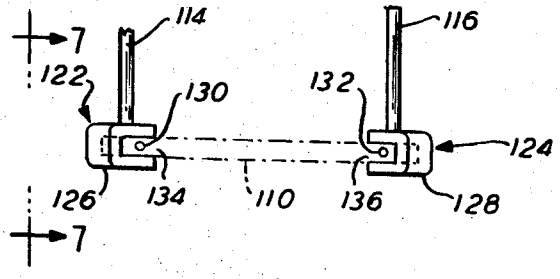


FIG. 7

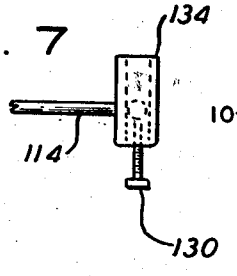
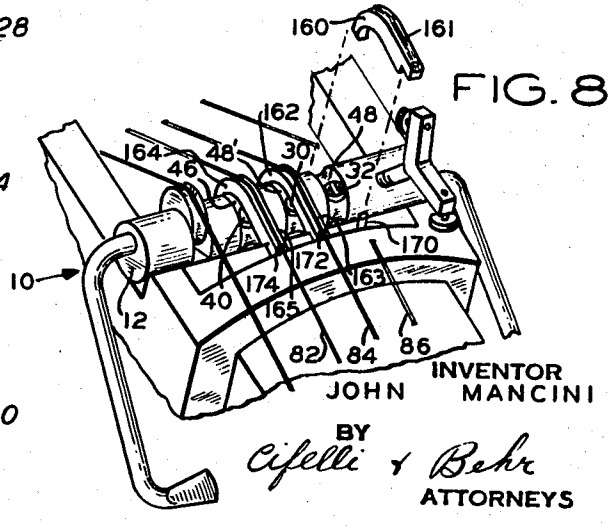


FIG. 8



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NOVEL PITCH ADJUSTMENT MEANS FOR STRINGED INSTRUMENTS

DESCRIPTION OF THE PRIOR ART

The Pitch of strings in stringed instruments is adjusted by changing the degree of tension in the strings. This is effected by attaching the strings to tension adjusting screws set in the scroll of the instrument and adjusting the tension to give the desired pitch.

It has been found desirable to alter the pitch of strings of a stringed instrument during the course of the performance of a piece of musical composition. Under such circumstances, it is clearly impracticable to retune the strings during the performance, therefore preset tensioning devices were developed, which could be activated during the performance in order to give the desired new pitch.

The devices of the prior art are, for the most part, rather complex and some indeed require structural adjustment to the instrument itself.

The need, therefore, existed for a simple, inexpensive device, which was structurally separate from the instrument itself and which, moreover, could be attached to and detached from the instrument without any inconvenience.

SUMMARY OF THE INVENTION

There is provided a novel simple device for the regulation of the pitch of one string of a stringed instrument while maintaining the proper pitch relationship with the remaining strings. While the principal aspect of the present invention is directed to changing the pitch of one string the invention should not be considered so limited and, if desired, the pitch of one or more additional strings may be changed in the same manner, utilizing modifications of the present invention, which will be apparent to one skilled in the art.

The device comprises a solid cylinder, preferably a metallic cylinder, having excisions therein. The direction of said excisions being substantially perpendicular to the principal axis of the cylinder. In the first of these excisions is rotatably mounted a pulley wheel, rotatable about an axis parallel to but eccentric in relation to the principal axis of the cylinder. In the remaining excisions there are located plugs which, optionally, may be adjustable in the direction of their principal axis. When used, the device is placed on the scroll of the stringed instrument in such a manner that the string whose pitch is to be adjusted passes over the pulley and the remaining strings pass over the plugs located in the remaining excisions. The device further comprises a protrusion mounted perpendicular to the principal axis of the cylinder, and a pair of levers mounted in the ends of the cylinder. The device is used by rotating the cylinder in such a manner that the pulley wheel is either in "contact" or in "noncontact" with the string whose pitch is to be altered. This is achieved by moving the levers which are mounted in the ends of the cylinder. In the simplest modification of the device these levers are L-shaped with one leg of each of said levers inserted into the base of the cylinder at opposite ends thereof. The inserted legs are located so as to lie in opposite quadrants of the cross section of the cylinder in order to provide the appropriate rotatory leverage. The aforesaid protrusion is located in such a manner as to prevent excessive rotation of the cylinder and may, if desired, be further equipped with adjusting means to accurately control the degree of rotation of the cylinder.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a preferred modification of the present invention.

FIG. 2 is a cross-sectional view of the device of FIG. 1 taken at 2–2.

FIG. 3 is a cross-sectional end view of the device of FIG. 2 viewed at 3–3.

FIG. 4 is a plan view of the device of FIG. 1 showing its location in use on the scroll of a stringed instrument.

FIG. 5 is a plan view of an alternate preferred modification.

FIG. 6 is a partial plan view of a modification of the invention.

FIG. 7 is a partial cross-sectional view of FIG. 6 taken at 7–7.

FIG. 8 is an exploded perspective view of a modification of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The device **10** of the present invention comprises a cylinder **12**. This cylinder is preferably made of metal such as hard aluminum or stainless steel, the latter being preferred. Into this cylinder are inserted, into opposite bases thereof, legs **16** and **22** of engaging and disengaging levers **14** and **20** respectively. These levers further comprise segments **18** and **24** which adjoin segments **16** and **22** respectively, perpendicularly thereto. In the preferred embodiment the levers **14** and **20** are of unitary construction having a right angle bend at points **13** and **21**. In a further preferred modification of this invention, segment **18** is bent at points **17** and **19** to produce additional segments which are respectively parallel to and perpendicular to segment **16**, and furthermore lever **20** is bent at point **25** to form a segment substantially parallel to segment **22**. The purpose of these further bends is to facilitate operation of the device so that it may be readily rotated between the "contact" and "noncontact" positions by movement of the fingers of the hand holding the stem of the instrument near the scroll.

In order to obtain the desired degree of rotatory leverage segment **16** and **22** are inserted not only into opposite ends of the cylinder, but in opposite quadrants of the cross section of the cylinder. Thus segment **16** is located in quadrant VFX as shown in FIG. **3** and segment **22** is located in segment V^1FX^1 as shown in FIG. **3**.

The principal purpose of the device is to reversably change the pitch of the E string of a bass or similar instrument between E and low C. There are, on such an instrument, **4** strings E, A, D and G designated **80, 82, 84** and **86** respectively.

The cylinder **12** has cut herein **3** excisions of variable width having a principal direction of cut perpendicular to the principal axis of cylinder **12**; in the preferred modification as illustrated these are designated **44, 46** and **48** respectively. In an alternate modification of the device a separator **90** is located substantially in the middle of excision **48**. Thus if desired, excision **48** may be cut into two parts leaving barrier **90** intact there between. Excision **44** is rounded into a U-shaped cross section at one end thereof to give scalloped opening **62**, similarly excision **46** is rounded to give scalloped opening **63**. Excision **48** is rounded at both sides thereof to give two scalloped portions **64** and **66** adjacent to scallop **63** and scallops **70** and **68** on the other side of excision **48**.

The purpose of these scallops is to permit passage of strings **80, 82, 84** and **86** across the device without interference therewith when the device is in the "noncontact" position.

Pulley wheel **26**, having a circumferential indentation **28** therein is rotatably mounted on segment **16** of lever **14** which passes into the body of cylinder **12** through excisions **44** and **46**. Thus leg **16** provides an axis for pulley wheel **26**, which is parallel to but eccentric in relationship to the principal axis of cylinder **12**. If desired, leg **16** is threaded into cylinder **12**. Further, if desired a set screw **42** in cylinder **12** passes through leg **16** thus preventing further rotation thereof during the operation of the device.

The exposed segment of leg **16** in excision **46** is further cut to give scalloped excision **71**.

A set screw **40** having a slotted or scalloped head is inserted into threaded channel **58**. As shown in FIG. **3** axis ZZ^1 passes through segments VFX^1 and XFV^1 respectively In the preferred modification of the invention the angle ZFX^1 is between 30 and 60°, most suitably about 45°.

In a further modification of the invention the set screw **40** may be adjusted as to height by use of a micronic screw **41**.

In excision **48** two threaded channels **56** and **54** respectively bear set screws **30** and **32** respectively each having slots or scallops in the heads thereof.

In an alternate modification the screws **30** and **32** are carried by adjusting micronic screws **31** and **35** respectively.

A rotation prevention device **34** is inserted into the cylinder. The inserted portion **60**, may, if desired, be threaded into the cylinder and protrude into leg **22** of lever **20**, thereby preventing further rotation of same.

In order to accurately adjust the degree of rotation of the device, segment **34** bears adjustable rotation prevention means. Tn the preferred embodiment there are drilled into segment **34** two or more holes **50**, **51** and **52**, for example, which carry at least two adjustable protruding screws **36**, and **38** which protrude in different directions, by adjustment of screws **36** and **38** which will, when the device is in position, impringe upon the scroll of the instrument, the degree of rotation of the device may be accurately controlled.

The device is utilized by placing it on the scroll of a stringed instrument, such as a bass, which strings **80**, **82**, **84** and **86** passing through excisions **44**, **46** and **48** respectively. This modification is illustrated FIG. **4**, where the device is shown in the "noncontact" position. In this position, only the string **82** is actually in contact with an adjustable part of the device, namely screw **40**.

When the device is rotated approximately 120° to 180° into the "contact" position, string **80** passes over pulley **26** resting in groove **28** thereof, string **82** rests upon the exposed portion of leg **16** in excision **46** and strings **84** and **86** rest on screw plugs **30** and **32** respectively in excision **48**.

Thus by presetting the height of protrusion of adjustable support means **40**, **30** and **32**, the instrument may be pretuned to play with string **80** in the proper tension for low C in the "noncontact" position or in turn with string **80** at the proper tension for an E string in the "contact" position.

In the foregoing description there is disclosed a device having a combination of excisions and adjustable plugs for the correct placement of the A,D, and G strings designated **82**, **84**, and **86** respectively.

In a stringed instrument the strings are attached to adjusting screws set in different positions in the scroll of the instrument. At the point where the device of the present invention is located they do not run substantially mutually parallel. If they were parallel at this point the need for these excisions and adjusting screws could be eliminated.

The strings may be made to run parallel by utilizing a simple bar in combination with the device of the invention. It is preferred that the bar be a cylindrical bar resting on the sides of the scroll of the instrument rearwardly of the location of the principal portion of the device bearing the pulley wheel. The term rearwardly means in the direction of the location of the string tension adjustment screws rather than in the direction of the bridge of the instrument.

It is further preferred that the cylindrical bar be held parallel to the pulley bearing cylinder by a holding means holding the bar at a preset distance. Suitably, these holding means should be connected loosely to the pulley bearing cylinder by a means which will permit the pulley bearing cylinder to rotate about its axis without causing the cylindrical bar to also rotate. Thus when the pulley bearing bar is rotated the cylindrical bar remains substantially at rest.

The modified embodiment of this invention comprises the basic device **101** comprising a cylinder **12'**, preferably of stainless steel equipped with turning levers **14'** and **20'** operating in the same manner as and located in the same position as in the previously described embodiment, a rotation control device **34'** having adjustable screws **34'** and **36'** again located and operating as above and a pulley wheel **26'** having a groove **28'** in which the E string **80** will rest in the contact position. The slots **46** and **48** and the adjusting screws therein are eliminated entirely.

When the device is moved from the contact into the noncontact position a slight change in the tension of strings **82**, **84** and **86** will occur. In order to adjust for this change grooves **152**, **154** and **155** are filed in cylinder **12'**. These grooves are a depth of the order of 0.1—1.0 of the diameter of strings **82**, **84** and **86** and are preferably slightly adjusted for the individual instrument. Once the grooves have been filed no further adjustment will be required.

In the preferred embodiment of the device a cylindrical bar **110** is connected to the device **101**. It is especially preferred to effect this connection by means of a yoke **112** comprising a pair of rigid bars **114** and **166** rigidly affixed to a pair of annular rings **118** and **120** placed at either end of cylinder **12'** in which said cylinder **12'** can freely rotate. The other ends of bars **114** and **116** are attached to bar **110** near but not at the ends thereof so that the ends of bar **110** may extend therefrom to rest on the raised edge of the scroll.

In yet another, especially preferred modification, bars **114** and **116** are attached to a pair of saddles **122** and **124** respectively which rest on the edge of the scroll on flanges **126** and **128** attached to saddles **122** and **124** respectively. Said saddles are equipped with adjusting screws **130** and **132** respectively. The cross bar **110** rests in slots **134** and **136** in saddles **122** and **124** and may be adjusted to a desired height by screws **130** and **132**.

A further modification of the device is illustrated in FIG. **8**.

The cylinder **12** of device **10** rests against the nut of the scroll in the manner described heretofore. There are pivotally affixed to the nut by pins **170**, **172** and **174** guide means **160**, **162** and **164**. The guide means rest in slots **48**, **48'** and **46** respectively touching screws **32**, **30** and **40** respectively. In the preferred embodiment the guide means are substantially J-shaped, the end of the straight portion of the J being pivotally attached to the nut of the scroll. The guide means **160**, **162** and **164** have channels **161**, **163** and **165** respectively cut therein, strings **86**, **84** and **82** resting on said channels. By adjusting the height of screws **32**, **30** and **40**, the tension of strings **86**, **84** and **82** may be finely adjusted as the device **10** moves from the contact to the noncontact positions.

I claim:

1. A tuning device for reversably and predictably changing the pitch of one string of a stringed instrument which comprises:

a. a cylinder having a plurality of excisions cut therein, said excisions having a direction of cut substantially perpendicular to the principal axis of said cylinder; and

b. a pulley wheel, mounted in the first of said excisions having an axis of rotation parallel to but a location eccentric in relation to the principal axis of said cylinder, wherein, when the device is placed on the scroll of the stringed instrument, the string whose pitch is to be adjusted passes over said pulley when the device is in the "contact" position;

c. means for placing said device into the "contact" and "noncontact" positions.

2. A device according to claim **1** additionally comprising plugs located within the remaining excisions, said plugs being in contact with the remaining strings of the device, when said device is installed and in the "contact" position.

3. A device according to claim **2** wherein at least one of said plugs is adjustable in a direction perpendicular to the principal axis of said cylinder.

4. A device according to claim **1** additionally comprising a rotation prevention means, whereby the degree of rotation of the device when in position is controlled.

5. A device according to claim **4** wherein said rotation prevention means comprises adjustable means for presetting the desired degree of rotation.

6. A device according to claim **1** wherein the means for placing the device in the "contact" and "noncontact" positions comprises a pair of levers, each having at least one right angle bend therein, wherein one leg of each of said levers is inserted into the opposite bases of said cylinder and said inserted legs having an axis parallel to but located eccentrically in relation to the principal axis of said cylinder, and wherein

the axis of said inserted legs lie in diagonally opposite quadrants of the cross section of the cylinder taken in a plane perpendicular to the principal axis of said cylinder.

7. A device according to claim 6 wherein the legs of said levers are threaded into said cylinder and secured therein by removable securing means, whereby said legs are prevented from rotation.

8. A device according to claim 7 having three excisions therein wherein:

a. the pulley in the first excision is rotatably mounted on the leg of a first lever inserted into the cylinder, said pulley having a circumferential groove therein.

b. said leg at said first lever, passing across a second excision adjacent to said first excision and being exposed thereby; and having

c. a first adjustable plug, having a groove in the top thereof, set into said second excision, said adjustable plug having an axis substantially perpendicular to a plane passing through the axis of said leg of said first lever and of said cylinder;

d. a second adjustable plug set in a third excision adjacent to said second excision;

e. third adjustable plug set in said third excision, the axes of said second and said third adjustable plugs having an axis of adjustment line substantially on a common plane, said plane passing through the axis of said cylinder;

f. a rotation prevention means comprising an upper exposed portion and a lower embedded portion, said exposed portion comprising at least two holes therethrough and said embedded portion being embedded in said cylinder and lying substantially on a common plane with said second and said third adjustable plugs; and

g. a leg of a second lever inserted into said cylinder wherein the embedded portion of the rotation prevention device is engageable with said leg to prevent the rotation thereof.

9. A device according to claim 8 wherein the adjustable plugs are adjustable screws.

10. A device according to claim 8 additionally comprising:

a. said securing means embedded in said cylinder engageable with the leg of said first lever inserted therein; and

b. adjustable protrusions passing through the holes of the exposed portion of said rotation prevention means, the axes said protrusions being substantially perpendicular to the substantially common plane of the axes of said second and third adjustable plugs and the rotation prevention means.

11. A device according to claim 8 wherein the totally exposed portion of said first lever comprises three sections defined as follows:

a. a first section substantially perpendicular to the axis of said cylinder,

b. a second section adjoining said first section substantially parallel to the axis of said cylinder,

c. a third section adjoining said second section substantially perpendicular to the axis of the cylinder,

and wherein the totally exposed portion of said second lever comprises two sections defined as follows:

d. a first section substantially perpendicular to the axis of said cylinder and

e. a second section adjoining said first section substantially parallel to the axis of the cylinder.

12. A device according to claim 8 which further comprises a separator located between said second and said third adjustable plugs.

13. A device of claim 1 wherein the excisions are grooves, said grooves having a depth of between about 0.1 to about 1.0 times the diameter of the string of said stringed instrument passing over each of said grooves.

14. A device comprising in combination:

a. a device of claim 13; and

b. a cylindrical bar, said bar being parallel to the cylinder of the device of claim 13 and resting on the scroll of the stringed instrument rearwardly of said cylinder.

15. A device which comprises in combination:

a. the device of claim 13;

b. a cylindrical bar;

c. means for holding said cylindrical bar parallel to and at a preset distance from the cylinder of device of claim 13; and

d. means for permitting the cylinder of the device of claim 13 to rotate about its axis while the cylindrical bar remains substantially at rest.

16. A device of claim 15 wherein:

a. the holding means are at least two rigid parallel bars located with their axes perpendicular to the axes of the cylindrical bar and rigidly attached to said bar at a short distance from each of the ends thereof; and

b. the means for permitting rotation of the cylinder bearing the pulley wheel comprises at least two annular rings said annular rings being located near the ends of said cylinder and having the second end of one of said rigid parallel bars rigidly affixed thereto.

17. A device of claim 15 wherein said holding means comprises:

a. at least two rigid parallel bars located with their axes perpendicular to the axis of the cylindrical bar; and

b. a pair of saddles, each of said saddles having a vertical groove therein wherein one end of said rigid parallel bars are attached to said saddles and the axes of said bars are perpendicular to the axis of the grooves in said saddles wherein the cylindrical bar of the device of claim 15 rests in the grooves of said saddles.

18. A device of claim 17 wherein each of said saddles further comprises an adjusting screw whereby the height of the cylindrical bar may be adjusted.

19. A device according to claim 1 additionally comprising a plurality of adjustable screws located within the excisions other than the excision containing the pulley wheel, in combination with string guide means resting in each of said excision, wherein the screws in the device of claim 1 contact the underside of said guide means whereby the strings passing over said string guide means are caused to be in the proper state of tension when the principal device is in the contact or noncontact position.

20. A combination comprising:

a. a device of claim 1 additionally comprising a plurality of adjustable screws located within the excisions other than the excision containing the pulley wheel;

b. a plurality of guide means having a channel in the upper surface thereof; and

c. the nut of the scroll of a stringed instrument, wherein the device of claim 1 rests against the nut of the scroll its axis being perpendicular to the strings of said instrument said guide means being pivotally mounted on said nut and resting in the excisions in the device of claim 1.

21. A combination according to claim 20 wherein said guide means are substantially J-shaped and wherein the said guide means are pivotally mounted on the nut of the scroll substantially close to the end of the straight portion of the J-shaped guide means.