May 14, 1968 J. W. WATSON 3,382,749

DEVICE FOR PRODUCING A TREMOLO EFFECT ON STRINGED MUSICAL INSTRUMENTS

Filed March 10, 1966 2 Sheets-Sheet 1

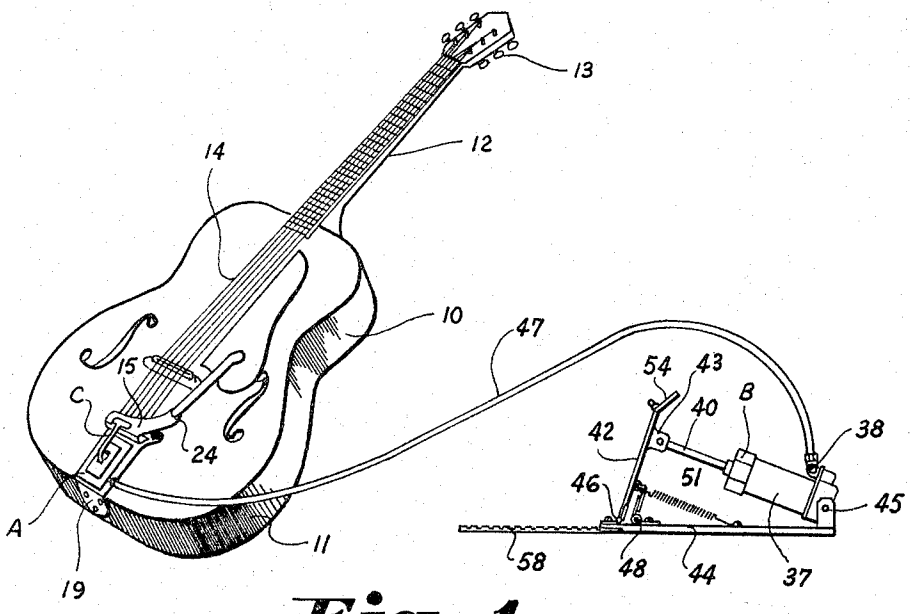


Fig. 1.

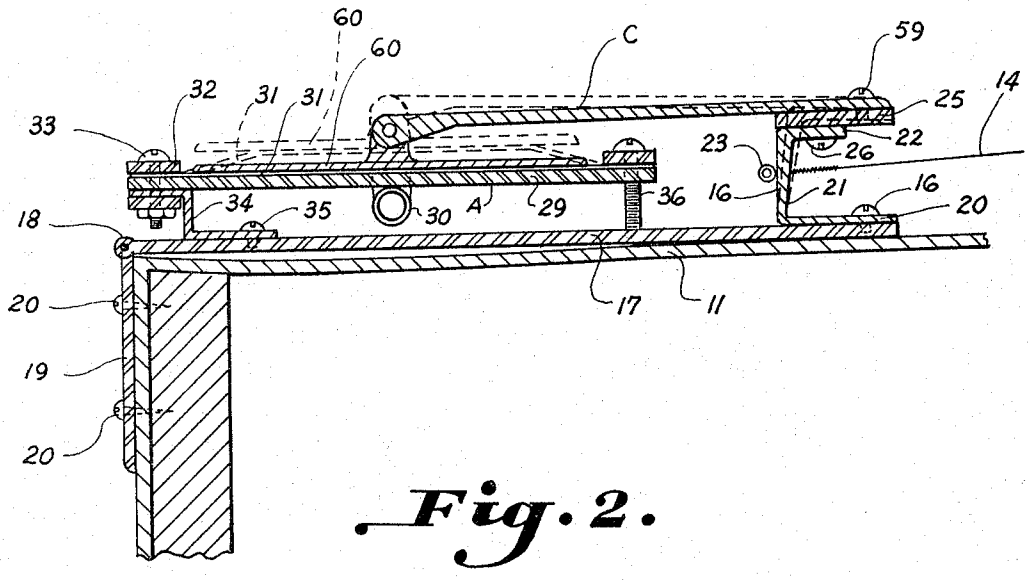


Fig. 2.

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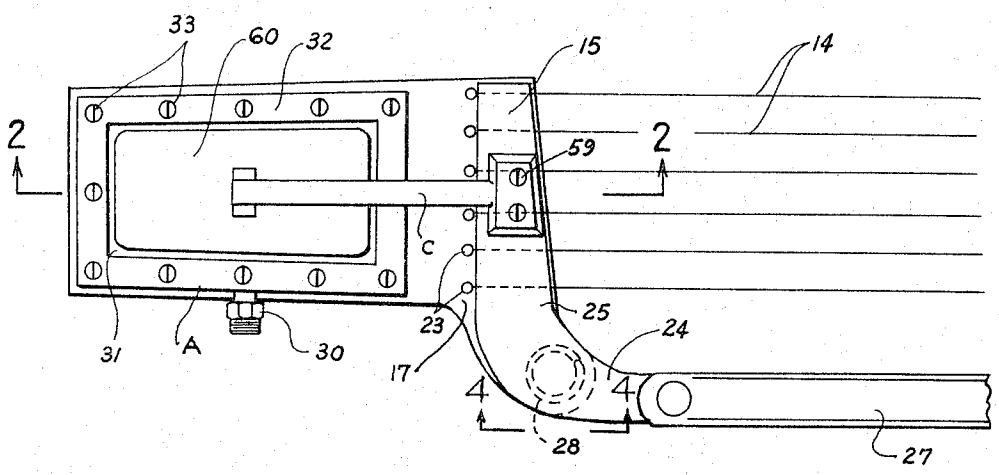


Fig. 3.

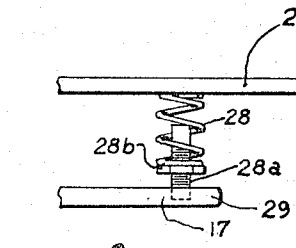


Fig. 4.

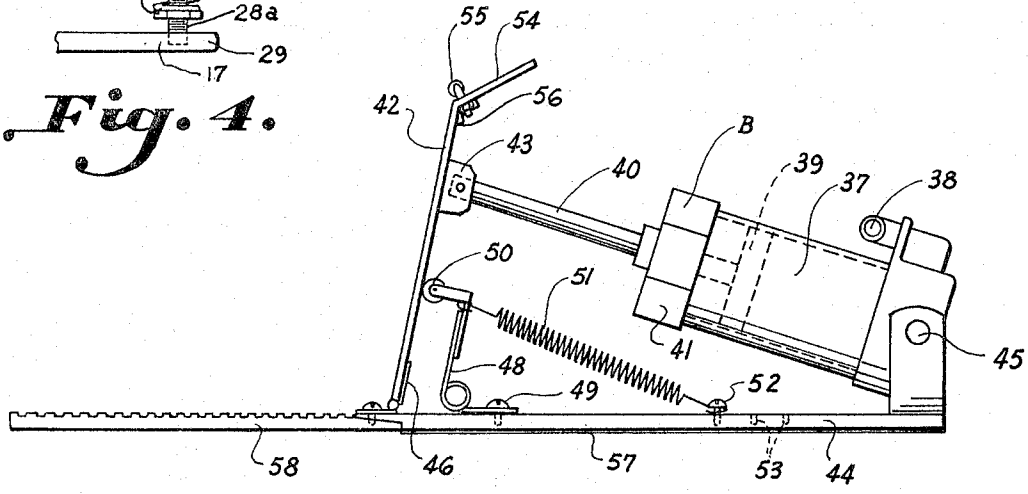


Fig. 5.

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DEVICE FOR PRODUCING A TREMOLO EFFECT ON STRINGED MUSICAL INSTRUMENTS

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4 Claims. (Cl. 84—313)

This invention relates to a device for producing a tremolo effect on stringed musical instruments.

Heretofore, various devices have been provided for reciprocally varying the tensions in stringed musical instruments, such as a guitar, so as to produce a tremolo effect in the tones of the strings when the musical instrument is being played. One well-known device utilizes a handle connected to a flexible tail stock carried on the guitar. When the handle is oscillated causing the tail stock to move therewith, the tension in the strings connected to the tail stock is varied producing a tremolo effect in the tones of the springs. One disadvantage of such a device is that the handle must be moved with the hand normally used in playing the guitar. Thus, the hand is not free to play the guitar.

Devices such as illustrated in Patent No. 2,893,282 granted to T. F. Searles and Patent No. 3,163,073 granted to J. F. Elmore utilize foot pedals in conjunction with a tension varying device mounted on a Hawaiian guitar for effecting changes in the tone of certain strings of the instrument. Both such devices have a cable connecting the foot pedal to the tension varying device.

Accordingly, it is an object of the present invention to provide an improved device for producing a tremolo effect on a stringed musical instrument which overcomes the foregoing difficulties and objections.

Another object of the present invention is to provide a device for producing a tremolo effect in the tones of the strings of a musical instrument, such as a guitar, by simple manipulations of a foot pedal.

Still another important object of the present invention is to provide a pneumatically operated device for producing a tremolo effect in the tones of the strings of a musical instrument.

A further important object of the present invention is to provide a device for varying the tones of the strings of a musical instrument which leaves the player's hands free for playing the instrument.

Another object of the present invention is to provide a device for producing a tremolo effect in the tones of the strings of a musical instrument which is readily installed on the instrument.

The construction designed to carry out the invention will be hereinafter described, together with other features thereof.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings forming a part thereof, wherein an example of the invention is shown and wherein:

FIGURE 1 is a perspective view of a conventional guitar with a device for producing a tremolo effect in the tones of the strings attached thereto constructed in accordance with the present invention,

FIGURE 2 is a longitudinal sectional elevation taken on line 2—2 in FIGURE 3,

FIGURE 3 is an enlarged, fragmentary top plan view of a portion of the instrument illustrated in FIGURE 1,

FIGURE 4 is an enlarged sectional view taken on line 4—4 of FIGURE 3, and

FIGURE 5 is an enlarged elevational view of the foot pedal illustrated in FIGURE 1.

The drawings illustrate a device for producing a

tremolo effect on a stringed musical instrument having a plurality of aligned tensioned strings extending along the instrument with one end of the strings being connected to keys carried by the instrument and the other end of the strings being connected to a movable tail stock carried on the main body of the instrument. The device includes an expansible means A which is carried by the instrument adjacent the tail stock. Means B is provided for reciprocally supplying fluid to the expansible means causing a reciprocating movement of the expansible means A. A connecting element C is carried by the expansible means for movement therewith responsive to the flow of fluid into the expansible means A. A free-end of the connecting element is connected to the movable tail stock for imparting movement from the expansible means to the tail stock. Thus, the tail stock is moved, varying the tension in the strings connected thereto, responsive to the movement of fluid into and out of the expansible means A producing a tremolo effect in the tones of the springs while the musical instrument is being played.

In FIGURE 1 of the drawings a typical guitar is indicated at **10** having a conventional sound box **11** and neck **12** with keys **13** positioned adjacent the top of the neck. A plurality of aligned tensioned strings **14** extend along the instrument with one end of the strings being connected to the keys **13** and the other end of the strings being connected to a movable tail stock **15** carried on the sound box **11**.

The tail stock **15** is connected by means of screws **16** to one end of a conventional tail plate **17**. The other end of the tail plate **17** is connected through a hinged connection **18** to an anchor plate **19**. The anchor plate **19** is secured to a tail wall of the sound box **11** by means of screws **20**. The tail stock **15** is a U-shaped member having a lower horizontal leg **20** with a vertical back member **21** integral therewith, terminating in an upper forwardly extending horizontal leg **22**. The lower leg **20** and a portion of the back member **21** adjacent the junction of the lower leg **20** and the back member **21** is thinner than the upper leg **22** and a portion of the back member **21** adjacent the junction of the upper leg **22** and the back member **21**. Such permits the tail stock to flex below the string level when the upper leg is forced forwardly and downwardly to vary the tension in the strings **14**. The vertical back member **21** has holes therein through which the strings are threaded and secured thereto in any suitable manner, such as by placing a plug **23** in a loop carried on the ends of the strings.

A lever **24** is secured to the upper leg **22** of the tail stock **15** for reciprocally depressing the tail stock **15** in order to produce a tremolo effect in the tones of the strings while the guitar is being played. The lever **24** includes a laterally extending leg **25**, which is secured to an upper leg **22** of the tail stock **15** by means of aligned spaced screws **26**. An arm **27** is pivotally connected to the leg **25** so that it can be pivoted away from the strings when not in use. The playing hand is used for reciprocally depressing the lever arm **27** to produce the tremolo effect. Thus, it is not free to engage the strings and in order to play the guitar while varying the tones of the strings **14**, the hand must be moved back and forth from the strings **14** to the lever arm **27**.

An adjustable spring **28** is carried on an outwardly protruding portion **29** of the tail plate **17**, and has its upper end flush with a lower surface of the lever **24**. The adjustable spring **28** includes a threaded bolt **28***a* extending upwardly from the protruding portion of the tail plate **17**. A nut **28***b* is carried on the bolt and the lower end of the spring is secured to the nut by any suitable manner, such as by welding. The upper end of spring **28** is in

contact with the lower side of the lever **24**. Thus, by rotating the nut **28***b* and spring **28**, the force necessary to depress the lever arm may be varied.

In the preferred embodiment, the expansible means A, which is carried by the instrument adjacent the tail stock, is a diaphragm. The diaphragm A consists of a flat metal palte **29** having a hole extending therethrough to which a tubular fitting **30** communicates. A flexible rubber member **31** is mounted on top of the flat plate **29** and the edges of the rubber member **31** are hermetically sealed to the edges of the metal plate **29** by means of an upper frame **32** carried on the rubber member **31** and extending around the perimeter of the rubber member. Screws **33** extend through the frame **32** and the rubber member **31** and engage the lower metal plate **29** securing the rubber member **31**, the frame **32** and metal plate **29** together. The upper frame has a rectangular opening in its center so that when fluid is forced through the tubular fitting **30** between the metal plate **29** and the rubber member **31**, the rubber member expands to the phantom position illustrated in FIGURE 2.

One end of the diaphragm is secured to an S-shaped bracket **34** by means of the screws **33**, which extend through the metal plate **29** and frame **32**. The S-shaped bracket is fixed to the tail plate **17** by screws **35**. The other end of the diaphragm A has a bolt **36** extending therethrough, the end of which rests on the tail plate **17** supporting the diaphragm.

A means B is provided for reciprocally supplying fluid to the diaphragm A for causing a reciprocating movement of the diaphragm A. The means B includes an air cylinder **37** having a port **38** communicating therewith. A piston **39** is carried within the cylinder and a piston rod **40** extends through a collar **41** carried on the cylinder **37**. The free-end of the piston rod is pivotally connected to foot pedal **42** by means of a pivot joint **43**. The lower end of the cylinder **37** is pivotally supported on a base plate **44** by means of a pivot joint **45**. A lower end of the foot pedal **42** is rotatably attached to the base plate **44** by a pair of hinges **46**. Thus, when pressure is exerted on the foot pedal **42** by the player's foot, the foot pedal **42** is depressed causing a downward motion to be imparted to the piston **39**. The piston **39** forces air out of the port **38** through a flexible tube **47** into the diaphragm A. The ends of the flexible tube **47** are equipped with coupling means so that they can be readily connected and disconnected from the air cylinder **37** and the diaphragm B. A main compression spring **48** having one end attached by screw **49** to the base plate **44** and the other end attached to a roller **50**, which rides on the lower side of the foot pedal, causes the foot pedal **42** to be returned to its original position when pressure is removed therefrom. In order to adjust the pressure being exerted on the underside of the foot pedal by the main spring **40**, a tension adjusting spring **51** is connected between the end of the main spring **48**, on which the roller **50** is attached, and the base plate **44**. The tension adjusting spring **51** is attached to the base plate **44** by a screw **52**. The screw **52** can be moved between the spaced aligned holes **53** to vary the tension exerted by spring **51**.

The top **54** of the foot pedal extends forwardly so that the player can operate the foot pedal from a standing position. A roller **55** is carried adjacent the top portion of the foot pedal **42** to prevent drag on the player's foot and produces a smoother motion between the player's foot and the pedal **42**. A small rubber stop **56** is positioned on the lower side of the foot pedal **42** to absorb the shock when the foot pedal strikes the collar **41**. In order to prevent the foot pedal from slipping on the floor, the bottom of the base plate **44** has a rubber coating **57** adhered thereto. A corrugated rubber mat **58** is attached to the front edge of the base plate on which the heel of the player's shoe rests.

A connecting element C is carried by the diaphragm B for movement therewith responsive to the flow of fluid into the diaphragm A. A free-end of the connecting element is connected by a pair of screws **59** to the laterally extending leg **25** of the lever **24** which is in turn connected to the upper leg **22** of the tail stock **15**. The other end of the connecting element C is hingedly connected to a horizontal plate **60** which rests on the rubber member **31** of the diaphragm A. Thus, when air is forced into the diaphragm A the rubber member **31** is expanded from the full line position to the phantom position causing the horizontal plate to be forced upward. The movement of the horizontal plate is transferred by means of the rigid connecting element C to the tail stock **15** causing the tail stock to flex forwardly loosening the tension in the strings **14**.

In operation a player may produce a tremolo effect in the tones of the strings by reciprocally depressing the lever **24** with his playing hand. However, when he desires to produce a tremolo effect in the tones without removing his playing hand from adjacent the strings **14**, he may produce such by reciprocally depressing the foot pedal **42**. Such causes air to be reciprocally forced into the diaphragm to produce a reciprocating motion in the diaphragm A. The rigid connecting element C transfers the reciprocating movement from the diaphragm to the tail stock **14** producing a tremolo effect in the tones of the guitar while it is being played.

The apparatus, in the embodiment illustrated, reciprocally loosens the strings of the guitar to vary the tone; however, it is within the scope of the invention to modify the apparatus so that it may be utilized to reciprocally tighten the strings on a musical instrument, such as a Hawaiian guitar. It is also within the scope of the present invention to utilize other types of expansible means, such as a cylinder with a piston therein, rather than a diaphragm.

While a preferred embodiment of the invention has been described using specific terms, such description is for illustrative purposes only, and it is to be understood that changes and variations may be made without departing from the spirit or scope of the following claims.

What is claimed is:

1. A device for producing a tremolo effect on a stringed musical instrument having a plurality of aligned tensioned strings extending along the instrument with one end of the strings being connected to keys carried by the instrument and the other end of the strings being connected to a movable tail stock carried on the main body of the instrument comprising: expansible means carried by said instrument adjacent said tail stock; means for reciprocally supplying fluid to said expansible means causing a reciprocating movement of said expansible means; a connecting element carried by said expansible means for movement therewith responsive to the flow of fluid into said expansible means, and a free-end of said connecting element being connected to said movable tail stock for imparting movement from said expansible means to said tail stock; whereby said tail stock is moved varying the tension in the strings connected thereto responsive to the movement of fluid into and out of said expansible means producing a tremolo effect in the tones of said strings while said musical instrument is being played.

2. The device as set forth in claim **1**, wherein said means for reciprocally supplying fluid to said expansible means includes a foot operated air pump.

3. The device as set forth in claim **1**, wherein said expansible means is a diaphragm and wherein said means for reciprocally supplying fluid includes, a cylinder, a port adjacent one end of said cylinder, a tube connecting said port with said diaphragm, a piston carried within said cylinder, a piston rod having one end connected to said piston, a spring biased foot pedal, said piston rod having its other end connected to said foot pedal so that reciprocating movement of said foot pedal causes said piston to reciprocally force fluid from said cylinder into said diaphragm.

4. A device for varying the tones produced by a stringed musical instrument having a plurality of aligned tensioned strings extending along the instrument with one end of the strings being connected to keys carried by the instrument and the other end of the strings being connected to a tail stock carried on the instrument comprising: an expansible means carried on said instrument adjacent said strings; means for reciprocally supplying fluid to said expansible means causing a reciprocating movement of the expansible means; a connecting element carried by said expansible means for movement therewith responsive to the flow of fluid into said expansible means, a free-end of said connecting element being positioned adjacent said strings for imparting movement from said expansible means to said strings, whereby the tension in the strings is varied responsive to the movement of fluid into and out of said expansible means thus varying the tones of said strings while said musical instrument is being played.

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