May 5, 1970 C. J. McKENZIE 3,510,566

FOOT OPERATED WALKING STRING BASS PLUCKED BY TOE AND TUNED BY HEEL

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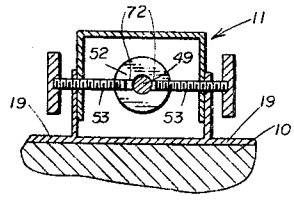


FIGURE 4

FIGURE 1

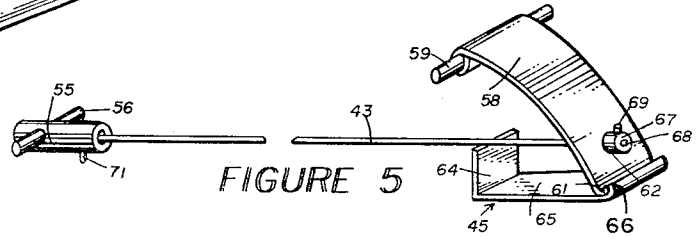


FIGURE 5

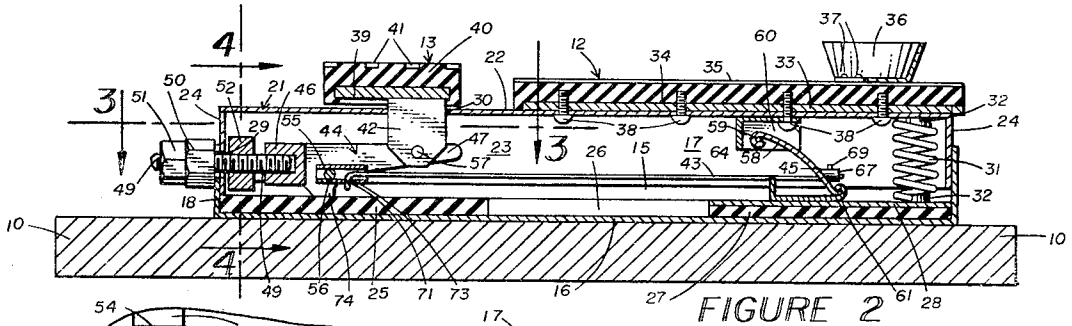


FIGURE 2

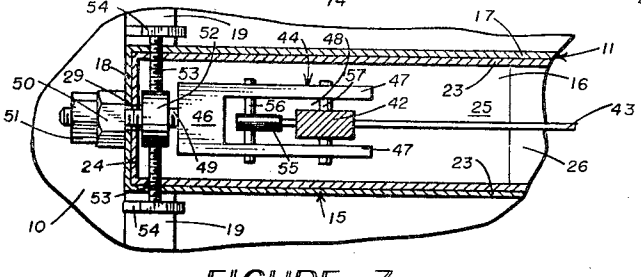


FIGURE 3

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FOOT OPERATED WALKING STRING BASS PLUCKED BY TOE AND TUNED BY HEEL

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ABSTRACT OF THE DISCLOSURE

A foot operated string instrument providing a taut string which may be vibrated by an agitator pedal operated by the forefoot and varied in tension, to vary tone, by a notation pedal operated by the heel of the same foot to provide a musical instrument that simulates the sound of a bass violin with an electro-magnetic pickup device associated with the string to provide an electrical signal (responsive to string tone) that may be amplified by traditional methods for audio display. The vibrating string is carried between a movable frog, mechanically linked to the agitator pedal, and a floating bridge mechanically moved by the notation pedal.

This invention relates generally to a foot operated string bass instrument and more particularly to such a device that simulates the audio output of a bass violin but yet may be operated by one foot of a musician.

Heretofore the bass violin has become a popular rhythm instrument, especially in small combination dance bands. The operation of the instrument is relatively simple but the type of instrument in common use generally has required the full time services of a musician for its operation. The instant invention seeks to provide a musical instrument that simulates the sound of the plucked bass violin but yet may be operated by only one foot of a musician while his hands might be otherwise engaged, as in playing some other lead instrument. In so doing, it is:

A principal object of my invention to provide a foot operated musical instrument that simulates the sound and tonal qualities of a bass violin, particularly the sound of the plucked instrument.

A further object of my invention to provide an instrument of the nature aforesaid that may be set into vibration as desired by the foot and may be changed as to frequency of vibration by appropriate manipulation of the same foot.

A still further object of my invention to provide an instrument of the nature aforesaid that operates through an ordinary magnetic pickup system commonly used with electric guitars and presents its sound through a normal amplifying system used with such instruments.

A still further object of my invention to provide an instrument of simple and practical construction, of efficient and reliable use, of neat and attractive appearance, of relatively inexpensive manufacture, and otherwise well adapted to the purposes for which it is intended.

Other objects and advantages residing in the construction and operation of my invention are more particularly set forth and described in the accompanying drawings, specification and claims which form a part of this application.

In the accompanying drawings, wherein like numbers of reference refer to similar parts throughout:

FIG. 1 is an isometric view of the upper part of my entire invention showing its parts, their relationship and external configuration.

FIG. 2 is a longitudinal, cross-sectional view of the instrument of FIG. 1, taken on the plane 2—2 of FIG. 1, in the direction indicated by the arrows thereon.

FIG. 3 is a partial, horizontal cross-sectional view of the rearward portion of the instrument of FIG. 1, taken on the plane 3—3 of FIG. 2, in the direction indicated by the arrows thereon.

FIG. 4 is a vertical, cross-sectional view through the frog supporting mechanism of my invention taken on the plane 4—4 of FIG. 2, in the direction indicated by the arrows thereon.

FIG. 5 is an isometric view of the string and string-holding mechanism of my instrument, removed from the covering structure to show its configuration.

Referring now to the drawings in more detail and particularly to that of FIG. 1, it will there be seen that my invention comprises essentially rigid planar base **10** supporting string box **11**, which in turn supports in its upper part rearward notation pedal **12** and forward agitator pedal **13**, with switch box **14** adjacent thereto on the base.

Base **10** is a flat, planar, structurally rigid member preferably of a substantially non-resonant nature such as wood. It serves no musical purpose but only physically supports my invention.

String box **11** comprises lower channel member **15** with bottom **16**, elongate sides **17**, and ends **18**. It is rigidly attached to base **10** by laterally extending ears **19**, preferably formed integrally with bottom **16** and having appropriate holes to receive screws **20** attaching the two members.

Upper channel member **21** comprises top **22**, elongate sides **23** and end members **24**. This upper member **21** is sized so as to slidably pivotably fit within lower channel member **15**, with its lower edge some substantial distance within the upper edge of the lower channel to define a closure about the string chamber giving it protection against acoustical interference and physically deleterious substances or forces.

The bottom of lower channel **15** in its forward part is provided with hard rubber pad **25**, immediately rearward medial electronic pickup device **26** and rearward rubber pad **27** protected in its upper surface from physical abrason by non-magnetic metal plate **28**. Each of these members is preferably co-extensive laterally with bottom **16** of lower channel **15** and may be affixed therein, if desired to prevent noise, by gluing, screwing or similar fastening means. Forward end parts **18**, **24** of both lower channel member **15** and upper channel member **21** are provided with aligned cooperative holes **29** to receive frog stud **49**. An appropriate orifice **30** to receive the depending structure **42** of agitator pedal **13** is provided in top **22** of upper channel **21**. Compression spring **31** is provided in the rearward part of the channel members to bias the two members away from each other but allow them to pivotably move toward each other by overcoming the tension in the spring. This spring is preferably maintained in proper position by opposed cooperating pins **32** adapted to fit within the central void of the spring and carried respectively by inner surface of top **22** of the upper channel and inner surface of bottom **16** of the lower channel.

Notation pedal **12** is an elongate member having metalic body **33** carrying rubber pedal member **34** having its upper surface broken by grooves **35** to provide a non-slipping surface for the foot of an operator. The rearward portion of the pedal carries forwardly curving, upwardly projecting heel guard **36** maintained thereon by bolts **37** communicating through the rubber pedal to threadedly engage metalic body **33** to aid in maintaining a shoe in place upon the pedal without rearward slippage. The notation pedal is preferably rigidly attached to the upper surface of upper channel **21** by screws **38** extending with heads on the underside of top **22** through appropriate holes therein

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to threaded engagement with the metallic body of the notation pedal.

The agitator pedal **13** is of similar construction having central metal body **39** carrying external rubber pedal **40** with grooves **41** in its upper surfaces to aid in non-slipping maintenance of a foot thereon. This pedal has downwardly depending frog arm **42** communicating movably through orifice **30** in top **22** of the upper channel member into the string chamber.

Within the chamber of string box **11**, vibrating string **43** is carried between forward frog **44** and rearward floating bridge **45** in such fashion that it is free to vibrate in its normal resonate fashion between such supports.

Forward frog **44** has forward body part **46** structurally communicating with rearwardly extending lateral legs **47** forming therebetween string support channel **48**. Frog foot **74** depends from the body to contact forward pad **25**. The forwardmost surface of body **46** threadedly communicates with frog stud **49** which in turn communicates forwardly through holes **29** to pivotably join upper and lower channels **15, 21**, to their forwardmost surface where it threadedly engages first nut **50** and second nut **51** to form a rotatably locked juncture therebetween.

Annular frog support collar **52** is threadedly carried on frog stud **49** between frog body **46** and the inner surface of end member **24** of the upper channel. This member has diametrically opposed substantially horizontal bores **72** to threadedly receive frog pivot screws **53** rotatably extending from the external surface of each channel side member through appropriate rotatably mounting holes to the frog support collar. These screws **53** are preferably provided with an enlarged head **54** to aid in their manual adjustment when necessary.

Frog stud hole **29** in the forward end of the channels is slightly larger than the external diameter of frog stud **49** to allow slight motion therebetween, especially in a vertical plane. With this structure in mind it is seen that the frog structure described will be pivotably supported in the string chamber about an horizontal axis extending through frog pivot screws 53.

String holder **55** is pivotably supported in the forward part of string support channel **48** by string support pin **56** communicating between lateral legs **47** of the frog and pivotably through the support member. Preferably it is an elongate cylinder having a small hole **73** to receive the bent end **71** of a string; however, many string holders in common commercial use today adequately serve the purposes of my invention and the one illustrated is merely one of convenience. Rearwardly of string support **55** agitator frog arm **42** communicates with frog legs **47**; this communication is preferably of a pivotable type with agitator pin **57** extending between frog arms **47** and through the lower portion of the depending agitator pedal frog arm as illustrated particularly in FIGS. 2 and 3.

Rearward floating bridge **45** is carried by tension spring **58**. This spring rotatably communicates with pin **59** carried in and by housing **60** structurally depending from the undersurface of top **22** of upper channel **21** in an appropriately positioned rearward portion. The tension spring is arcuately curved in a rearwardly, downwardly extending fashion as illustrated particularly in FIG. 2 and its lowermost portion is formed with an upturned edge **61** to prevent excessive wear from this member. Spring **58** has an appropriately located medial hole **62** for passage of string **43** to allow for fastening on the rearward surface thereof.

At its lowermost rearward surface spring **58** carries bridge member **45** with forward, upwardly extending string leg **64**, flat central body part **65** and rearward curved portion **66** communicating with spring **58**. A notch is provided in forward string leg **64** to slidably receive string **43** in a fret fashion. On the rearward surface of spring **58** is provided string collar **67** to receive the rearward end of string **43** in its central channel **68** and releasably fasten it therein by means of set screw **69** extending from

the exterior surface of the collar into the central channel. The abutting surfaces of bridge body **65** and plate **28** are in slideable engagement; this communication should be smooth and non-magnetic to prevent excessive noise in my instrument. I prefer to lubricate the juncture of these members and form at least one from material that is not magnetically susceptible to further this operation. A large bearing surface also aids a smooth slide action.

String member **43** preferably has hook **71** formed in its forwardmost extension to cooperate with string holder **55** as before provided. The other end part may be fastened in similar fashion, but with the collar-type fastener **67** specified, this end need have no special structure. Obviously the string may be fastened by many other means known in the art without departing from the essence of my invention. The string preferably is of the metal type, and with structures of a size of approximately eight inches, I prefer to use one-third of a standard "E" electric bass string, though obviously the nature and physical characteristics of the string could vary widely according to well known principles, depending upon the particular scale and tonal characteristics desired from my invention. I have in this regard found a short piece of ordinary speedometer cable of commerce to be quite suitable in my instrument.

From the foregoing structure it is to be noted that string **43** will vibrate about a forward nodal point essentially at the rearward extension of string holder **55** and a rearward nodal point essentially at the contact of bridge leg **64** with the rearward portiton of the string. As downward pressure is applied to notation pedal **12**, spring **58** will be moved rearwardly to change the positioning of the bridge and the tension on the vibrating string to change its tone. From this motion tension will be increased in the string to shorten the time required for one cyclical vibration and thusly raise its tone; the bridge movement, however, tends to lengthen the vibrating portion of the string and thus lengthen the time required for one cyclic vibration and lower the tone. The effect of the tensioning is many fold greater than the lengthening effect, though, so the resultant of increasing spring tension is to raise the pitch of the string. The counteraction of these two effects is desirable in my invention, as it aids in making the instrument more easily and finely tuned. By this means then, the tone produced by string **43** may be changed, within limits generally of the same nature as the limits of an ordinary bass viol of standard construction.

It is further to be noted that by rapidly depressing agitator pedal **13** with the forward or ball part of the foot, frog **44** will come into sharp contact, by its foot **74**, with rubber pad **25**, thus setting string **43** into vibration of a nature somewhat similar to that resulting from the plucking of the string of an ordinary bass violin, though not eliminating all of the inharmonic overtones that might be produced by bowing such a string. In other words, the result is probably somewhere between a plucking and a bowing of an ordinary bass violin with some harmonic and some inharmonic overtones. The result is quite pleasing and produces a satisfactory bass tone when properly amplified.

The electronic pickup device **26** is of the ordinary magnetic field variety commonly used in electric guitars, and of a nature well known in the art. This device is positioned as illustrated in FIG. 2, essentially in the central part of string **43** and immediately adjacent thereto. The field of the pickup device is disturbed by the vibration of the string and this resultant disturbance transposted into an appropriately corresponding electronic signal which is amplified by an ordinary electric guitar amplifier (not shown) of the nature well known in the art and therefore not herein illustrated.

Obviously the physical characteristics of my invention may be quite widely varied to produce various scalar tones and may be modified by various electronic methods

well known in the art to produce modifications of these tones.

The operation of my invention is apparent from the foregoing description. The player places a foot, preferably that of major dexterity, on the notation and agitator pedals with the heel of the foot against the heel guard of the notation pedal **12** and the ball of the foot resting over agitator pedal **13**. The notation pedal **12** is then depressed with the heel to form the tonal characteristic desired and at the same time the ball of the foot is rotated downwardly about the heel as a pivot to cause an impact upon agitator pedal **13**, the impact being transferred to frog **44** to set string **43** into vibration. Agitator pedal **13** then will be depressed correspondingly to normal plucking of the strings of a bass violin of ordinary structure to form the appropriate rhythmical melody desired. It is further to be noted that depression of the notation pedal **12** may at the same time be varied to produce varied desired tonal characteristics.

It is to be noted that my invention can be played by a musician with one foot while his hands may be otherwise employed and quite obviously they could be so employed in playing some sort of other lead instrument. The device does require some particular skill for its play, but a musician of any talent can learn to play it in a relatively short time, and at the same time play another instrument.

The foregoing description of my invention is necessarily of a detailed, particular character so that a specific embodiment of it may be set forth as required, but this is not to be construed as to prevent various modifications of detail and multiplication and rearrangement of parts which are included within the spirit, essence and scope of my invention as described.

Having thusly described my invention,

What I claim is:

1. In an electronically reproduced vibrating string type musical instrument of the type having a string suspended for vibration within a string chamber, a string suspension means comprising an adjustable frog communicating with one end of said string adapted to adjust tension therein and impart an impact type vibratory force thereto and a floating bridge communicating with the other end thereof adapted by spring means to change the vibratory frequency thereof in response to motion applied externally of the string chamber and transmitted by the spring means to move the floating bridge in a direction along the string axis.

2. A vibrating string instrument for electronically producing audible sounds of the nature aforesaid, comprising, in combination:

a base mounting a string box having a lower channel member and a similar upper channel member pivotably communicating therewith to form a string chamber;

a notation pedal carried by the rearward portion of said upper channel adapted to aid in moving it toward said lower channel against a tensioning force therebetween;

a string vibratorially carried within said string chamber between a forward adjustable tensioning frog and a rearward floating bridge;

an agitator pedal communicating to said forward frog to transmit an impact motion thereto causing said string to vibrate;

spring means communicating between the upper channel member and said floating bridge to cause said bridge to move in response to motion of said upper channel member to cause varying tonal vibrations in said string; and

electronic means associated with said string to convert musical vibrations of said string into audio sounds.

3. The invention of claim **2** wherein said frog comprises a forward body part having rearwardly extending legs with a central channel therebetween with said agitator pedal positioned thereabove and pivotably communicating therewith by a downwardly depending arm rotatably positioned upon a pin carried between said frog legs.

4. The invention of claim **2** wherein said means of adjustably positioning said floating bridge comprise a downwardly and rearwardly arcuate spring rotatably journaled in the underpart of said upper channel member communicating to the upper portiton of said lower channel member and carrying on the lower rearward part thereof in slidable engagement with said lower channel member a bridge adapted to movably contact said vibrating string to determine the rearwardmost nodal point.

5. The invention of claim **2** wherein said frog is pivotably journaled within the forward part of said string chamber by a collar pivotably supported for rotation about a horizontal axis in said chamber, said collar structurally communicating with adjustable tensioning means extending between said frog and the forward part of said string chamber.

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