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BRIDGE FOR FRETTED STRINGED MUSICAL INSTRUMENTS

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1

This invention has to do with a bridge for fretted string instruments, such for example as Spanish guitars, tenors, mandolins, ukeleles, and the like, and it is a general object of the invention to provide a bridge whereby the strings

of such an instrument can be adjusted more accurately than has heretofore been possible. In the usual string instrument of the type referred to a series of strings is strung over a finger-board between a nut and a bridge. In the case of a Spanish guitar, for example, there are frets on the finger-board and for proper tonal quality the strings should be supported and tensioned so the tonal harmonic of the string occurs at the 12th fret. In general to gain such a condition the instrument is proportioned so that the distance from the nut to the 12th fret is approximately equal to the distance from the 12th fret to the bridge. In practice various factors enter into the problem of gaining the proper location of the string harmonic. For instance, individual strings vary somewhat in character and it is obvious that there is a wide variation between small or light treble strings and heavy or large bass strings. The difficulty of locating string harmonics relative to the frets has long been recognized and structures have been proposed as solutions. As an example variations have been made from the original fixed straight bridge by making the bridge adjustable vertically, by disposing the bridge at an angle, and by stepping the bridge. However, such means have only been general corrections and have not made perfect tuning possible.

It is a general object of my present invention to provide a bridge for a stringed instrument of the character referred to whereby the several strings can be individually adjusted so their tonal harmonics are related in exactly the desired manner relative to the frets of the instrument. Through individual adjustment I may be able to vary or adjust each individual string independently of all of the other strings to compensate for variations incidental to the peculiarities of strings.

It is a further object of my present invention to provide a bridge construction of the general character referred to which is such that the individual strings can not only be adjusted as desired, but individual strings can be removed and replaced when necessary without disturbing the general setting of the instrument and individual adjustment can be made for a new string, as circumstances may require.

2

It is another object of my present invention to provide a bridge of the general character referred to involving string seats which are small, easily replaced parts making it possible for a user to easily and quickly renew or re-establish proper string support when the string seats become worn in a manner to cause noise or undesirable vibration.

A further object of my present invention is to provide a bridge of the general character referred to which involves various unique features of construction, making it simple of manufacture, easy to manipulate and highly efficient in operation.

The various objects and features of my invention will be fully understood from the following detailed description of typical preferred forms and applications of the invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a plan view of a typical string instrument involving a fretted key-board and equipped with the bridge construction provided by this invention. Fig. 2 is an enlarged view showing the bridge as it is applied to the instrument being a view taken substantially as indicated by line 2—2 on Fig. 1, and showing one simple form of construction provided by the invention. Fig. 3 is a plan view of the structure shown in Fig. 2 being a view taken as indicated by line 3—3 on Fig. 2. Fig. 4 is a transverse sectional view taken as indicated by line 4—4 on Fig. 2. Fig. 5 is an enlarged view of a portion of a bridge taken in the same general direction as Fig. 2, showing a somewhat modified form of construction, and Fig. 6 is a view similar to Fig. 5, showing a further form of construction.

The bridge that I have provided is applicable, generally, to fretted string instruments such as I have referred to above, and although I will describe it as applied to a Spanish guitar, as shown in the drawings, it is to be understood that it is in no way limited to this particular form or class of instrument, but rather can be used, generally, in stringed instruments. Furthermore, it is to be understood that in carrying out my invention I may use any suitable material or combination of materials for the formation of the parts that I require. In practice, portions or all of the construction can be formed of wood, or of so-called plastics, or of any suitable material or combination of different materials. Generally, however, it may be said that it is desirable to employ a material or materials having the general characteristics of hard woods,

or of the materials that are generally employed in the manufacture of bridges for stringed instruments.

The guitar illustrated in the drawings involves, generally, a body A, a neck B projecting from the body, a plug head C carried by the neck, a nut D at the outer end portion of the neck, a bridge E on the body, and strings S strung between the bridge and nut. The instrument may have various other parts or accessories as circumstances require. For instance, there may be a tail piece 10 carried by the body to anchor the strings S and the posts 11 may be operated through suitable keys 12 all in the manner common to instruments of this general character.

In the drawings I have shown different modifications of my present invention in order to show that the invention can be embodied in various forms and in order to make it clear that certain features of the invention can be used apart from other features. For example, in Fig. 6 of the drawings I have shown certain features of my invention applied to or incorporated in a very simple form of bridge with the result that the construction is capable of adjustment in one direction only, whereas, in Figs. 1 to 5, inclusive, I have shown forms of construction by which I gain adjustment in two different directions. In Figs. 1 to 4, inclusive, I show a form of construction that is without certain of the features that are incorporated in the form shown in Fig. 5.

The body A of the guitar illustrated in the drawings has a slightly rounded top 13 on which the bridge E mounts a suitable distance forward of the tail piece 10. The neck B attaches to the body A and projects therefrom and has its upper side finished or formed as a key-board characterized by a plurality of frets 14. In practice for perfect tonal quality it is desired that each string have its tonal harmonic coincidental with the twelfth fret 14 indicated at X in Fig. 1 of the drawings. In accordance with usual instrument manufacture the plug head C is fixed on the neck and the nut D is a fixed element at the outer end of the neck. Furthermore, the several frets are fixed as to position. To effect the desired string adjustment the variations or adjustments are made at the bridge E.

The bridge E shown in Figs. 1 to 4, inclusive, involves, primarily, a body carrying a plurality of individually adjustable string seats and it includes means whereby vertical adjustment can be made to vary the location of the strings above the finger-board. The particular bridge that I have shown in these figures of the drawings involves, generally, a body formed of two sections, a base section 20 and an arch or head section 21. The several string seats 22 are carried by the head section of the bridge body. Vertical adjustment is obtained between the head 21 and the base 20 through adjusting means 23, preferably a screw means.

The base 20 is an elongate element arranged transversely of the instrument so that its end portions 24, in effect, form feet which rest upon the top 13 of the instrument body A.

The head 21 of the bridge is an elongate part arranged parallel with the base and above the base and it supports the several seats 22 in a series extending transverse of the instrument so that the strings S are held spaced apart in the desired manner forward of the tail piece 10. The head 21 is an arch-like element in that it is supported at its ends by the means 23, and is

made sufficiently heavy so that it is, for all intents and purposes, rigid.

The means 23 provided for effecting adjustment of the head 21 relative to the base 20 may vary widely in practice, in fact, any suitable means may be employed that will operate to adjust the end portions of the head 21 vertically relative to the base 20, it being preferred to employ means that will adjust the two ends of the head individually or independently of each other.

The particular form of adjusting means 23 shown in the drawings involves a post 30 projecting upwardly from the base 20, which post extends through a guide opening 31 in the head 21. A rest 32 is screw threaded on the post and forms a support on which the end portion of the head 21 rests. The construction just described is repeated at each end of the bridge, making it possible to effect adjustment of each end of the bridge by merely rotating the rest 32 on the post 30.

Each string seat 22 involves, primarily, a base or bottom 40 with a flat bottom face 41 that rests on the head 21 of the bridge and a top or string rest 42 carried on and located above the bottom and provided with a notch 43 for holding a string S. The string seat is a unitary element preferably formed of one body of material and in the preferred form of the invention the base or bottom 40 of the rest is an elongate part extending in the direction of the string to be supported while the rest 42 projects upwardly a suitable distance above the bottom to support the string at the desired height above the head 21 of the bridge. In the particular case illustrated the front or forward end of the rest has a lower wall portion 44 extending upwardly and rearwardly from the forward end of the bottom 40 to a point where it joins the upper portion 45, which upper portion extends upwardly or is vertically disposed. The rear end of the top 42 is formed by an inclined rear face 46 that extends the full height of the top. I preferably proportion the string rest relative to the head 21 of the bridge so that the bottom of the rest projects somewhat in both directions from the head of the bridge, that is, both forward and rearward from the head of the bridge when in operating position, as shown in the drawings. By this construction parts of the seat rest project in the manner to be readily engaged for shifting when it is desired to adjust the seats relative to the head of the bridge.

In accordance with my invention the string rests are supported on or bear upon the head section of the bridge and the head section of the bridge is provided with upwardly projecting ribs 50 which extend up at either side of each string seat so that the several seats are properly spaced along the bridge and so that the end seats of the series are confined against displacement. The ribs 50 accommodate the string seats so that the seats are free to be moved lengthwise of the strings but are positively confined against lateral movement. I prefer to provide the ribs with flanges 51 which overhang the bottoms 40 of the string seats so that the seats are confined to the head of the bridge leaving them free only for movement lengthwise of the strings.

In the form of the invention illustrated in Fig. 5 of the drawings the ribs 50^a which are between the string seats laterally of the bridge are formed separate from the head section proper and are attached thereto by screw members 55 so that

they can be tightened toward the head in order to clamp the seats to the head. The endmost ribs 50^b in this case may be rigid or integral the same as those first described. Further, in the form of the invention shown in Fig. 5 the side walls 65 of the bottoms 40^a of the seats are shown upwardly and inwardly inclined and the surfaces of the ribs 50^a and 50^b which register with these parts are correspondingly pitched or inclined so that the bottoms of the several seats are wedged or clamped laterally, as well as downwardly, when the screws 55 are made tight.

In the form of the invention shown in Fig. 6 the bridge instead of being sectional is a solid, rigid unit whereas the string seats may be as shown in Fig. 5, or may be slightly modified from the form shown in Fig. 5 to the extent that the sides of the bottoms of the seats are not inclined but are perpendicular.

In accordance with the preferred form of my invention I provide means in connection with the bridge or in connection with the several string seats so that the seats are held against accidental displacement when the bridge is not in use with the strings bearing on the seats to hold them tight on the bridge. In practice various means may be provided for this purpose. However, I preferably employ friction means and, as shown in the drawings, this may involve a pressure spring 70 in connection with each string seat so that the seat is held in pressure engagement with a part adjacent it in a manner to prevent accidental movement. In the particular case illustrated a spring socket 71 is provided in the head 21 immediately below the bottom of each string seat and a helical spring 70 is arranged under compression in the socket so that each string seat is yieldingly urged upwardly and thus bears on the means that confines the seats against vertical movement. It will be apparent that the springs 70 function to hold the seats against movement only when the strings of the instrument are removed or are loose, but when the strings are in operating position the strings act to force the bottoms of the string seats tightly against the head 21.

The flanged ribs on the head of the bridge formed as above described establish channels in the bridge extending in the direction of the strings S and these channels carry the string seats so they are slidable or adjustable lengthwise of the strings. The movements of the seats in their channels are retarded or restrained by the springs that establish frictional resistance to movement of the seats and when desired the ribs, above referred to, can be applied by means of screws, which screws are operable to effect clamping of the seats so that they can be set or locked against movement.

In using the structure that I have provided the bridge with the several string seats assembled therewith may be handled as a unit and may be applied to the body A of the instrument in much the same manner that an ordinary bridge can be applied. The several strings of the instrument are strung over the finger-board between the nut and the bridge, and as the individual strings are made tight they are forced into pressure engagement with the head or top of the bridge. Where the bridge is provided with means for vertical adjustment it can be adjusted at either end until the strings as an assembly are in the desired vertical position above the frets of the finger-board. In order to tune the instrument so that it has the desired vibratory action or harmonic

action at the twelfth fret indicated at X in Fig. 1, in the manner desired in such instruments, the individual string seats can be moved lengthwise of the strings backward or forward, as circumstances require. By thus being able to individually adjust the string seats I am able to perfectly adjust each individual string or any particular string to gain the exact harmonic action desired. As the instrument is used if the string seats wear so that undesirable noises or vibratory action develops it is a very simple matter to renew one or more of the string seats as may be necessary, and furthermore, whenever a new string is put in the instrument it is a very simple matter to effect adjustment to bring a new string into perfect operating tune.

Having described only typical preferred forms and applications of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art and fall within the scope of the following claims.

Having described my invention, I claim:

1. A musical instrument bridge including, a head to be supported from the instrument and a string seat bearing on the head to be shiftable longitudinally of the string, and a screw actuated clamp carried by the head and engaging the seat holding it against movement relative to the head.
2. A bridge for supporting a string including, a head arranged transversely under the string, a string seat slidably supported by the head, and a screw actuated wedge means clamping the seat against movement relative to the head.
3. A bridge for supporting a string including, a head arranged transversely under the string and having a channel extending lengthwise of the string, a string seat slidably carried in the channel, clamp means releasably holding the seat against movement relative to the head, and means normally yieldingly resisting movement of the seat relative to the head.
4. A bridge for supporting a string including, a head arranged transversely under the string and having a channel extending lengthwise of the string, a string seat slidably carried in the channel, and spring means yieldingly resisting movement of the seat relative to the head.
5. A musical instrument bridge including a head to be supported from the instrument and having parts defining a channel, a string seat carried in the channel to support a string and shiftable in the direction of the string, one of the head parts being shiftable relative to the other holding the seat against movement relative to the head.
6. A bridge for supporting a string including, a head arranged transversely under the string and having relatively movable parts defining a channel extending lengthwise of the string, a string seat slidably carried in the channel, and screw means operating one of said parts to clamp the seat against movement relative to the head.
7. An instrument of the character described including, an elongate fingerboard having frets, a string extending longitudinally of the fingerboard, a fixed support for the string at one end of the fingerboard, and a bridge extending transversely of the fingerboard and supporting the string at the other end of the fingerboard and including, a base stationary with the fingerboard, a head, means supporting the head above the base for adjustment in a direction laterally of the string, a string seat supported by the head shift-

7

able lengthwise of the string, means normally yieldingly resisting movement of the seat relative to the head, and a releasable clamp holding the seat against movement relative to the head.

8. An instrument of the character described including, an elongate fingerboard having frets, a string extending longitudinally of the fingerboard, a fixed support for the string at one end of the fingerboard, and a bridge supporting the string at the other end of the fingerboard and including, a base stationary with the fingerboard, a head, means supporting the head from the base for adjustment laterally of the string, a string seat supported by the head for movement lengthwise of the string, and a releasable clamp setting the seat against movement relative to the head.

9. A string supporting bridge of the character described including, a base applicable to an instrument body, a head above the base, means supporting the head from the base operable to adjust the position of the head above the base, a string seat bearing on the head to support a string extending over the bridge and shiftable relative to the head in the direction of the string and a releasable clamp setting the seat against movement relative to the head.

10. An instrument of the character described including, an elongate fingerboard having frets, a string extending lengthwise of the fingerboard, a fixed support for the string at one end of the fingerboard, and a bridge supporting the string at the other end of the fingerboard and including, a body including a base stationary with the fingerboard, a head above the base, screw

8

means supporting the head from the base and operable to adjust the head laterally of the string, a string seat bearing on the head and shiftable relative thereto in the direction of the string, and a screw actuated clamp setting the seat against movement relative to the head.

11. A musical instrument bridge including, a head to be supported from the instrument, a string seat to support a string and having a projecting base, members projecting from the head confining the seat to the head, and means operating one of said members relative to the head to normally clamp the seat against movement relative to the head.

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