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3,447,411

STRINGED MUSICAL INSTRUMENT

Filed Oct. 11, 1965

Sheet 2 of 2

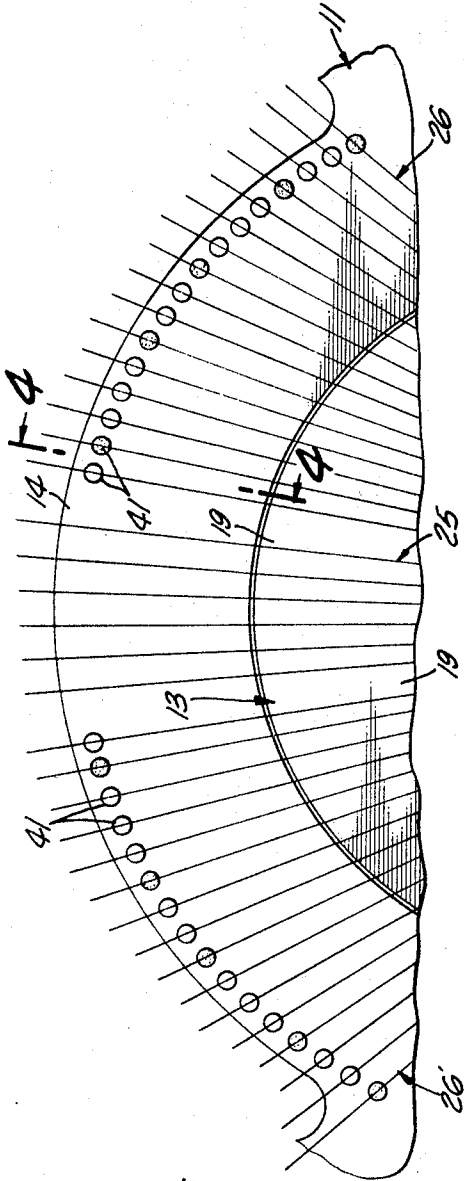


FIG. 3.

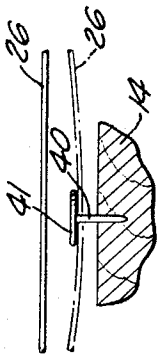


FIG. 4.

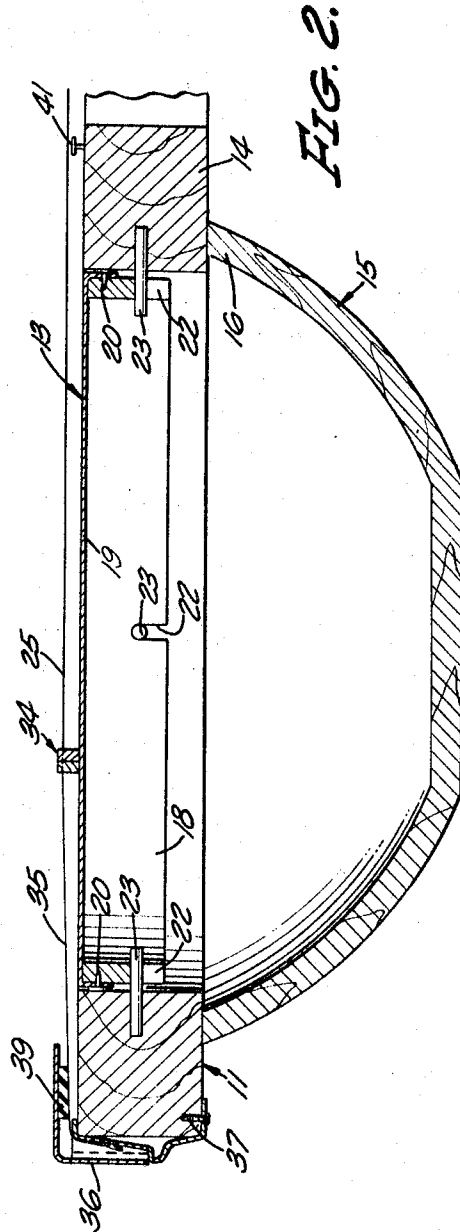


FIG. 2.

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3,447,411
STRINGED MUSICAL INSTRUMENT
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16 Claims

ABSTRACT OF THE DISCLOSURE

A fretless stringed instrument having a main frame of generally elliptical shape provided with a resonator supported within one end of the frame and having a group of chord strings along its major axis arranged between two groups of octavely-related strings. Preferably, each of the latter groups include two sets of octavely-related strings with the scales of one group progressing oppositely to those in the other group. All strings are supported by a bridge resting on the resonator and extending crosswise of the major focus of elliptical frame with their opposite ends flaring in opposite directions from the longitudinal axis of the frame. A separate mute is provided for each string and includes means for releasably holding the associated string muted for prolonged periods if so desired. Plucking one string creates sympathetic resonant response of both simple and complex nature in other strings to produce strong overtones characterized by their brilliance, fullness, richness and pleasing timbre.

This invention relates to musical instruments and more particularly to a unique string-type instrument without frets and having numerous unique features.

The invention musical instrument is characterized by a hoop-like rigid main frame of either a circular or non-circular configuration and characterized by a tambourine type resonator supported in the plane of the frame and inwardly of one rim edge thereof. A plurality of groups of strings are provided transversely of the tautly stretched thin skin carried by the tambourine and appropriately and suitably arranged in a convenient array over one face of the main frame. Each string is provided with an individual peg for tuning the respective strings to a different note of one or more selected musical scales depending upon the number of strings employed. Not less than 7 strings are utilized and preferably a much larger number such as 38 strings, this number being present in a typical embodiment of the invention illustrated in the present drawings.

According to a preferred mode of practicing the present invention the main frame is elliptical in configuration with the amplifying resonator located at one minor end of the main frame and preferably with the center of the resonator coincident with the associated major axis of the frame. For convenience and ease of playing it is desirable that the strings diverge or fan out from a common bridge having its inner lateral edge pressed against the taut skin of the resonator. The strings preferably include a group of chord strings located lengthwise of the main axis of the frame and two groups of similarly arranged strings disposed to either side of the chord strings and spaced therefrom by a distinctive readily recognized gap. The lower note strings of these side strings are close to the chord strings whereas the shorter and higher note strings are along either lateral edge of the strings taken as a whole.

A feature of the instrument is the use of simple, easily-operated means for temporarily but positively muting any one or more of the strings comprising means for locking the midportion of the longer end of each string depressed and out of the normal strumming plane. Depressing any string to underlie the rim edge of the associated lock-out means mutes and deactivates this string until released.

Another feature of the instrument is the provision of a lightweight but high-strength common bridge formed of flexible laminated components. Owing to the diverging arrangement of the strings this bridge is placed under high tension lengthwise of the bridge but when constructed in the manner disclosed below, is found to have a long and reliable service life.

Simple but highly reliable means are employed for holding the principal parts of the resonator assembled. No fasteners are required and the skin ring assembly is removable by the average user without need for any special instructions, skill or tools of any kind.

This unique instrument has unusual tonal quality owing to numerous factors including the fact that all notes are amplified very substantially by the resonator and set up sympathetic vibrations in other strings. This factor taken together with the presence of a large number of strings having a common bridge connection with the amplifier produces plentiful and rich overtones through sympathetic resonance phenomena. Thus plucking any string creates complex harmonic vibrations in one or more of the other strings of highly pleasing fullness, richness, timbre and brilliance. Additional complexes of pleasing musical sounds are easily produced by plucking a plurality of selected strings simultaneously and in predetermined sequence.

It will therefore be appreciated that the present instrument is highly versatile and offers the skilled musician an unusual opportunity to play an endless variety of arrangements both with and without muting selected strings.

Accordingly it is a primary object of the present invention to provide a fretless, stringed musical instrument having at least 7 strings operatively associated with a resonator.

Another object of the invention is the provision of a stringed musical instrument having a hoop-like rigid main frame and a plurality of strings arranged and tuned in one or more preselected octaves.

Another object of the invention is the provision of a stringed musical instrument having a hoop-like rigid main frame having a resonator mounted closely inwardly of one rim portion and provided with groups of fretless strings operatively associated with the resonator.

Another object of the invention is the provision of a musical instrument having a rigid hooplike main frame supporting a plurality of groups of fretless strings, certain of which groups are tuned to the same or appropriately related musical scales and suitably positioned with respect to a group of chord strings.

Another object of the invention is the provision of a fretless stringed musical instrument having a multiplicity of strings tuned to a predetermined octave and including simple means for muting individual selected strings and for restoring these to normal position at the user's option.

Another object of the invention is the provision of a stringed instrument having a bridge adapted to be supported on the taut skin of a resonator and having the strings of the instrument so arranged as to place the bridge in tension lengthwise thereof.

Another object of the invention is the provision of a fretless stringed musical instrument having a main frame of generally elliptical contour and provided with a resonator having its center disposed in general alignment with the major axis of the elliptical frame.

Another object of the invention is the provision of a musical resonator having a simple, light-weight frame notched along its inner rim edge to interlock with supporting pegs carried by a surrounding main resonator frame.

Another object of the invention is the provision of a fretless stringed instrument featuring a hoop-like main frame provided with a resonator at one inner rim edge

and a multiplicity of strings arrayed over the resonator and diverging therefrom to adjustable peg means distributed along the rim edge of the main frame.

Another object of the invention is the provision of a lightweight high-strength laminated bridge for a stringed instrument and capable of withstanding high tension forces applied lengthwise of the bridge.

Another object of the invention is the provision of a fretless stringed musical instrument having multiple groups of strings each tuned to a predetermined musical scale and including identically tuned groups all operatively associated with an amplifying resonator whereby strumming of one or more strings creates sympathetic resonant vibration of a complex nature in other of the strings producing overtones characterized by their brilliance, fullness and timbre.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawing to which they relate.

Referring now to the drawing in which a preferred embodiment of the invention is illustrated:

FIGURE 1 is a top plan view of one preferred embodiment incorporating the principles of this invention;

FIGURE 2 is a fragmentary cross-sectional view taken along line 2—2 on FIGURE 1;

FIGURE 3 is a fragmentary view on an enlarged scale showing details of the muting device;

FIGURE 4 is an enlarged sectional view taken at right angles to one of the muting devices shown in FIGURE 3; and

FIGURE 5 is a fragmentary view taken along line 5—5 on FIGURE 1 showing details of the combined string anchorage and tuning means.

Referring more particularly to FIGURE 1, there is shown a stringed musical instrument designated generally 10 incorporating the principles of this invention and there shown as including a hoop-like rigid frame of elliptical contour. While this configuration has certain advantages, it is to be understood that the frame may be circular or of various other closed configurations other than elliptical. An elliptical configuration has certain advantages both appearancewise and as respects convenience in holding and playing the instrument. Frame 11 may be formed of any suitable material including wood, plastic compositions, lightweight metals, or combinations of these materials. The amplifying resonator designated generally 13 is located in close association with one inner rim portion of the main frame and includes an arcuate cross frame member 14 cooperating with the adjacent portion of the main frame to form a complete circular frame for the resonator. The rear side of the resonator is closed by a suitably shaped reflector 15 having its rim 16 rigidly secured to resonator frame 11, 14 by adhesive or other appropriate means. As herein shown, all frame components as well as the resonator bowl 15 are formed of wood.

Referring to FIGURE 2, it will be understood that the resonator includes a tambourine subassembly comprising a lightweight ring member 18 covered across its face edge by a very thin taut skin 19. This skin may comprise an appropriately processed skin, hide or strong sheet plastic of the type commonly employed in banjos and preferably having a thickness ranging between 0.01 and 0.001 inch. This skin is secured to the outer surface of ring 19 by tacks 20, adhesive or other suitable means. Ring 18 has notches 22 extending inwardly from its inner edge arranged to seat over pegs or pins 23 projecting radially inwardly from the frame opening. Notches 22 have a depth so related to pins 23 as to support the outer surface of skin 19 generally flush with the main frame of the instrument.

The instrument illustrated in the drawing is equipped with a total of 38 strings including a centrally disposed group of six chord strings designated 25, and two identical

groups 26, 26' of 16 strings or wires arranged to either side of chord strings 25. As herein illustrated by way of example, chord strings 25 include a pair each of G, D and low-G strings. Likewise, strings 26 and 26' each include two octaves reversely arranged and tuned as marked from F-sharp through G-very high. Although a total of 38 strings are shown in FIGURE 1, it will be understood that any suitable smaller number of strings may be employed if desired, but not less than seven strings.

The tuned longer end of each string is anchored to the base of an adjustable peg 28 (FIGURE 5) of any suitable design as is well known in the stringed instrument art and having a strong friction fit with mating holes formed in frame 11. As herein shown, pegs 28 each have a transverse opening 29 spaced above its base end in which the associated one of the strings is anchored in the usual way. Overlying these holes is a pair of openings 30, 30 for receiving a tuning tool, such as the rod 31. Normally this rod is carried in a pair of spring clip retainers 32 secured in some suitable storage location on the instrument frame. This tool can be easily removed from the clips and inserted in a selected opening 30 to rotate the peg in the customary manner to tune the associated string.

The various strings converge toward one another and pass through separate passages or openings traversing the upper edge of bridge 34. As herein shown, the shorter ends 35 of the strings also diverge from one another in two separate groups to an anchorage in a suitable end piece 36 secured to and embracing the rim edge of frame 11, in the manner indicated in FIGURES 1 and 2, and secured to frame 11 as by screws 37. Suitable dampening means of sponge rubber, felt or the like 39 (FIGURE 2) is frictionally retained between the top side of the strings and an overlying portion of end piece 36.

Owing to the fact that the opposite ends of the strings fan out from the bridge, this bridge is placed under very considerable tension when the strings are properly tuned. It is therefore important that the bridge be made of lightweight yet high-strength material capable of withstanding these tension forces. A preferred construction employs a plurality of thin strips of carefully selected high-strength bone laminated together by a strong adhesive, such as epoxy. Fiber glass in combination with a high strength resin or plastic composition also provides a satisfactory bridge structure. It is found that such a laminated bridge structure possesses far greater strength for a given thickness and weight of material. The passages for the string openings may be notched downwardly from the top edge of the bridge although a stronger construction results from using small bores just sufficiently large to accommodate the associated string.

The muting means employed to deactivate any one or more of the strings will be best understood by reference to FIGURES 2, 3 and 4. As therein shown, the individual muting devices comprise a shank 40 pressed into or otherwise anchored to the main frame directly beneath each individual string. The exposed upper end of this shank is provided with either notches along its opposite sides or with a disc-like head 41 or the like means effective to retain the string depressed in the dotted line position shown in FIGURE 4 whenever it is desired to deactivate the string. These strings are easily engaged beneath these heads and are likewise readily dislodged when it is desirable to reactivate the string. Desirably, at least certain of the outwardly facing surfaces of discs 41 are distinctively colored to aid the musician in quickly identifying the different strings for the muting operation. The location of the bridge is important, superior results being achieved when the bridge is located as shown overlying the midlength of the resonator radius adjacent the shorter end of the strings. The strings are spaced about 1/8 inch apart at the bridge and flare to a spacing of about 3/4 inch adjacent the connection of the longer ends to the tuning pegs. With the bridge located as described, it is found that the amplification factor of the resonator is

approximately the same for all strings and all frequencies.

The diameter of the resonator skin is related to its resonance frequency and it is found that a diameter of 8 to 10 inches and a skin thickness of 0.01 inch exhibits a resonance frequency lower than low G and has a capability of vibrating at a frequency higher than the frequency of the highest string, as is desirable for most satisfactory results. To achieve these results it is found that the skin must be under uniform tension throughout its circumference. The use of a light supporting hoop 18 to support the skin is likewise of importance in obtaining maximum resonance as is the uniform, loose and level support of the tambourine ring on pins 23.

The strings are preferably of high-strength metal such as Phosphor bronze and should be as small as practical, as 0.012 inch in diameter, since these provide more brilliant harmonics and overtones. Strings ranging between 5 and 12 mils in diameter are satisfactory for the octave groups 26, 26' whereas the chord strings 25 vary over a wider range. A diameter range of 5 to 12 mils suffices for strings G, whereas the D strings may vary between 15 and 20 thousandths and the low G strings provide best results in a size of 20 to 30 mils.

The described musical instrument has highly distinctive performance characteristics quite unlike any other stringed instrument and is particularly characterized by its greater sensitivity to sound and its pronounced responsiveness to the slightest energization. This sensitivity is achieved in large measure by the arrangement of the strings relative to the skin of the resonator which is so arranged as to provide high efficiency acoustical coupling between the skin and the atmosphere. The presence of numerous sympathetic strings provides additional tone power and a greatly enhanced overtones capability. The simple provision made for stopping or muting out one or more selected strings also adds very materially to the flexibility and versatility of the instrument and provides for striking contrasts and adds an element of surprise.

While the particular stringed musical instrument herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiment of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. A fretless stringed musical instrument having a continuous hoop-like main frame provided with a resonator near the rim thereof equipped with a taut thin skin, at least seven non-parallel strings arranged in a plurality of distinct groups and having their ends attached to remotely spaced portions of said main frame with their midportions operatively associated with and spaced outwardly from the exterior of said resonator skin, adjustable support means secured to one end of each string for tuning the same to vibrate at a different predetermined frequency of a musical scale, and single bridge means supported on said resonator skin and engaging and supporting the overlying midportion of each of said strings, said strings being closely spaced from one another at said bridge means and the string near the opposite ends of said bridge flaring V-fashion in opposite directions from one another.

2. A fretless stringed musical instrument as defined in claim 1 characterized in the provision of separate easily operated means associated with each of said strings for temporarily deactivating individual ones of said strings at the user's option.

3. A fretless stringed musical instrument as defined in claim 1 characterized in that said bridge means is in contact with said resonator skin means in a plane extending transversely of said strings in a zone approximately bisecting a radius of said skin means on the remote side of

the resonator center from the adjustable tuning support for said strings.

4. A fretless stringed musical instrument as defined in claim 1 characterized in that the longer ends of said strings flare away from a longitudinal bisector extending lengthwise centrally of all of said strings.

5. A fretless stringed musical instrument as defined in claim 1 characterized in that the opposed halves of said main frame on the opposite sides of a bisector extending lengthwise of said strings are placed under compression by the tensioning of the strings to tune said strings.

6. A fretless stringed musical instrument as defined in claim 1 characterized in that said main frame comprises a rigid hoop of generally elliptical configuration as viewed from the face side of said instrument and wherein the center of the resonator lies approximately on an axis normal to and passing through one focus of said elliptical main frame.

7. A stringed musical instrument devoid of frets and having a rigid generally hoop-shaped main frame provided with thin taut-skinned resonator means closely inside a rim portion thereof, a plurality of chord strings extending crosswise of the midportion of said main frame, a plurality of octavely-related strings arranged in separate planar groups to either lateral side of said chord strings with the strings in each group tuned to the different predetermined frequencies of at least one musical scale, separate means for tuning each of said strings, elongated bridge means underlying and common to each of said strings and attached thereto and supported on said resonator skin midway between the center and rim portion thereof remote from the tuning end of said strings, and means on the rim of said resonator means for deactivating individual ones of said strings by muting the same.

8. A musical instrument as defined in claim 7 characterized in that the strings in said two groups thereof are tunable to identical octavely-related frequencies and with the notes of these groups arranged in order in opposite directions from the respective adjacent lateral sides of said chord strings.

9. A musical instrument as defined in claim 8 characterized in that the opposite ends of all of said strings flare away from one another beginning at the connection of the same to said common bridge means.

10. A musical instrument as defined in claim 9 characterized in that said common bridge means is formed of lightweight material having high tensile strength.

11. A fretless stringed musical instrument having a hoop-like rigid main frame of generally elliptical configuration provided with a thin taut-skinned resonator closely adjacent the inner edge of said main frame adjacent one end thereof, means including common bridge means securing a plurality of groups of non-parallel strings crosswise of said resonator means and having their opposite ends flaring away from one another and secured to spaced apart points on said main frame, said groups of strings including tuned sets of octavely-related sympathetic strings arranged to provide a series of notes in a musical scale whereby the plucking of one string creates sympathetic resonant response of both a simple as well as a complex nature in other of said strings to produce colorful overtones of brilliance, fullness, richness and pleasing timbre.

12. A fretless stringed instrument as defined in claim 11 characterized in the provision of a separate group of chord strings located between groups of said sympathetic strings and tuned to a selected chord structure thereof.

13. A fretless musical instrument as defined in claim 14 characterized in that the center of said resonator means is closely adjacent one focus of said main frame.

14. A fretless musical instrument as defined in claim 11 characterized in that the longer ends of said groups of strings converge from the ends thereof anchored to said main frame to said common bridge means.

7

15. A fretless musical instrument as defined in claim 14 characterized in the provision of a plurality of separate end piece means for anchoring the shorter ends of said strings to said main frame, said separate end piece means being spaced laterally to either side of a longitudinal bisector extending lengthwise of said groups of strings.

16. Resonator means for a stringed musical instrument, said resonator means having a ring-like main frame, an arcuate sound-reflecting shell underlying said ring with the rim thereof firmly secured to said main frame, a plurality of rigid supports projecting inwardly from the interior rim edge of said main frame, tambourine means having a ring-like frame sized to be received within said main frame and provided with notches opening axially through the inner rim edge thereof positioned to receive and seat a respective one of said rigid supports to support the face of said tambourine means at a desired level relative to the adjacent face of said main frame, and said tambourine means being adapted to be held in assembled position in

8

said main frame by taut string and bridge means bearing against the exterior of said tambourine means.

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U.S. Cl. X.R.

84-270, 296

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,447,411

June 3, 1969

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It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 6, line 54, "cosswise" should read -- crosswise --; same column 6, line 69 and column 7, line 1, claim reference numerals "14", each occurrence, should read -- 12 --.

Signed and sealed this 21st day of April 1970.

(SEAL)

Attest:

Edward M. Fletcher, Jr.

Attesting Officer

WILLIAM E. SCHUYLER, JR.

Commissioner of Patents