Feb. 28, 1950 J. W. McBRIDE 2,499,194

STRINGED MUSICAL INSTRUMENT

Filed Aug. 19, 1946 5 Sheets-Sheet 1

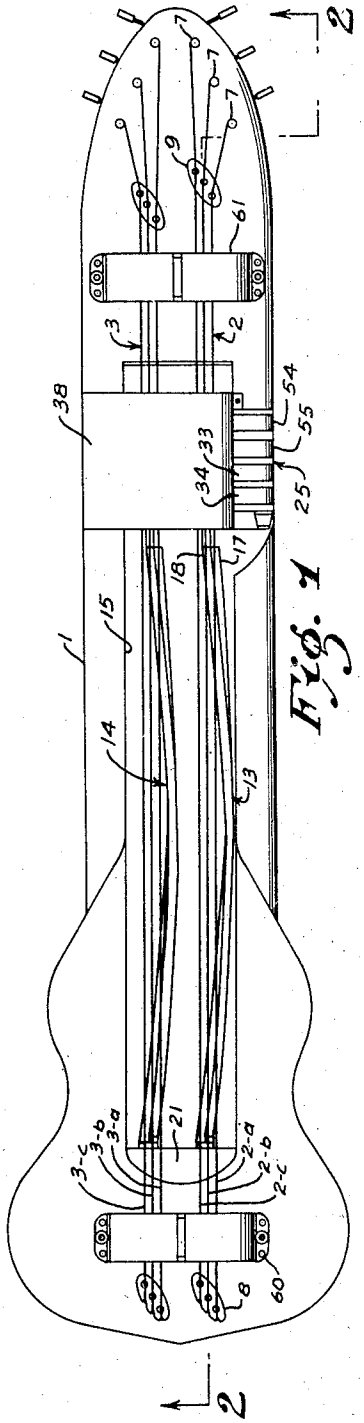

Fig. 1

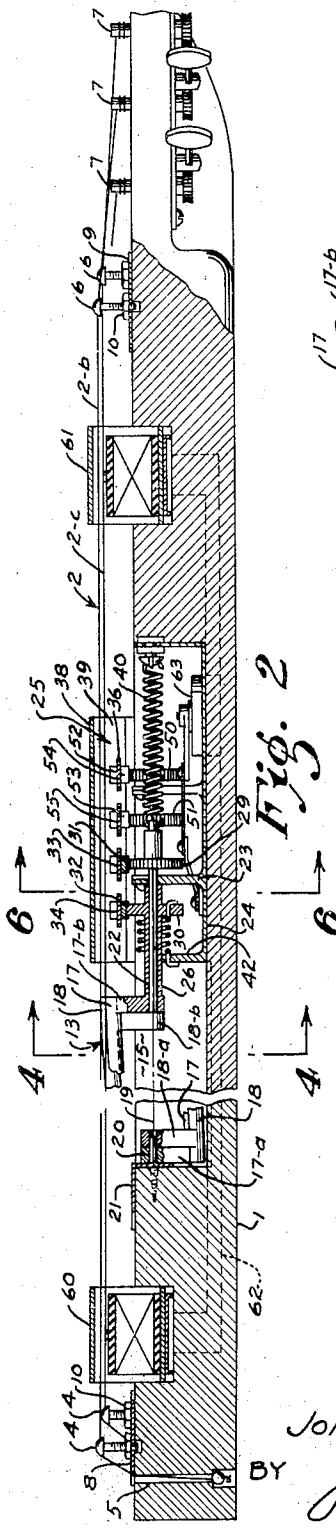

Fig. 2

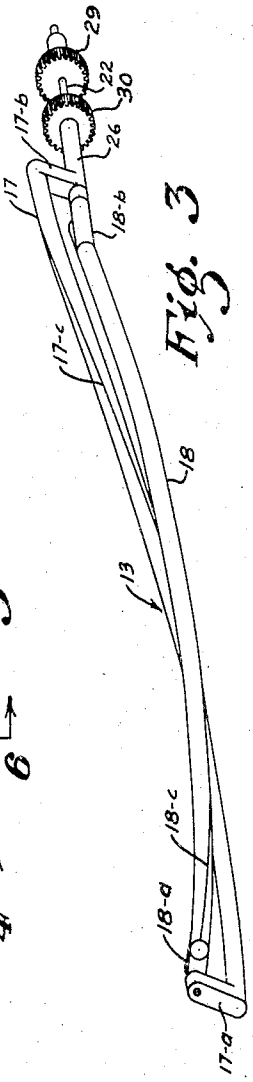

Fig. 3

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STRINGED MUSICAL INSTRUMENT

Filed Aug. 19, 1946 5 Sheets-Sheet 2

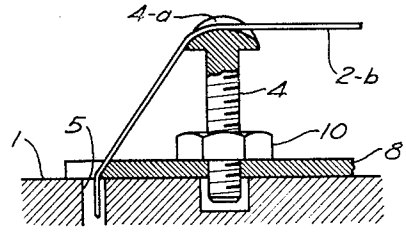

Fig. 8-a

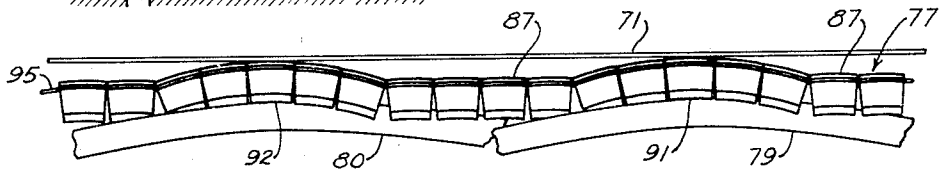

Fig. 11-a

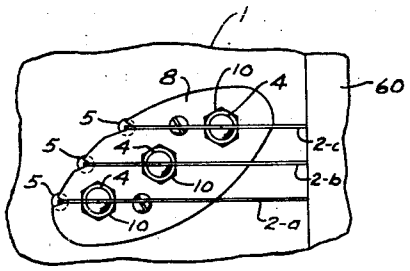

Fig. 8

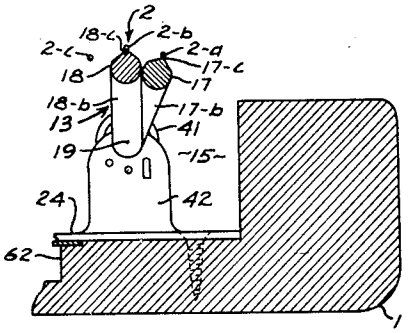

Fig. 4

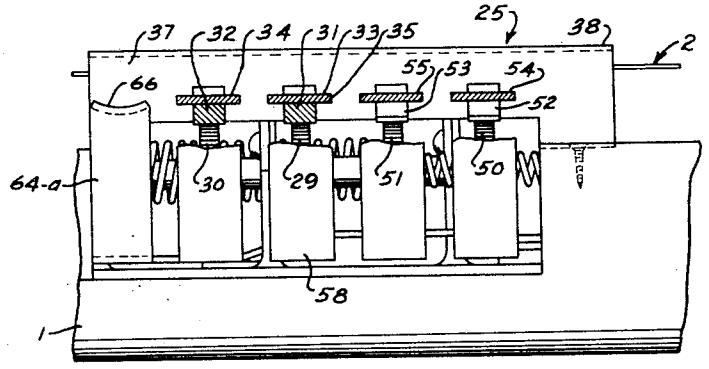

Fig. 7

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STRINGED MUSICAL INSTRUMENT

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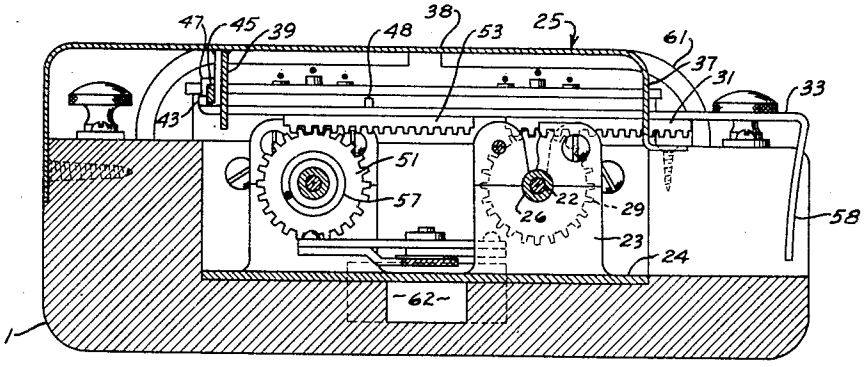

Fig. 6

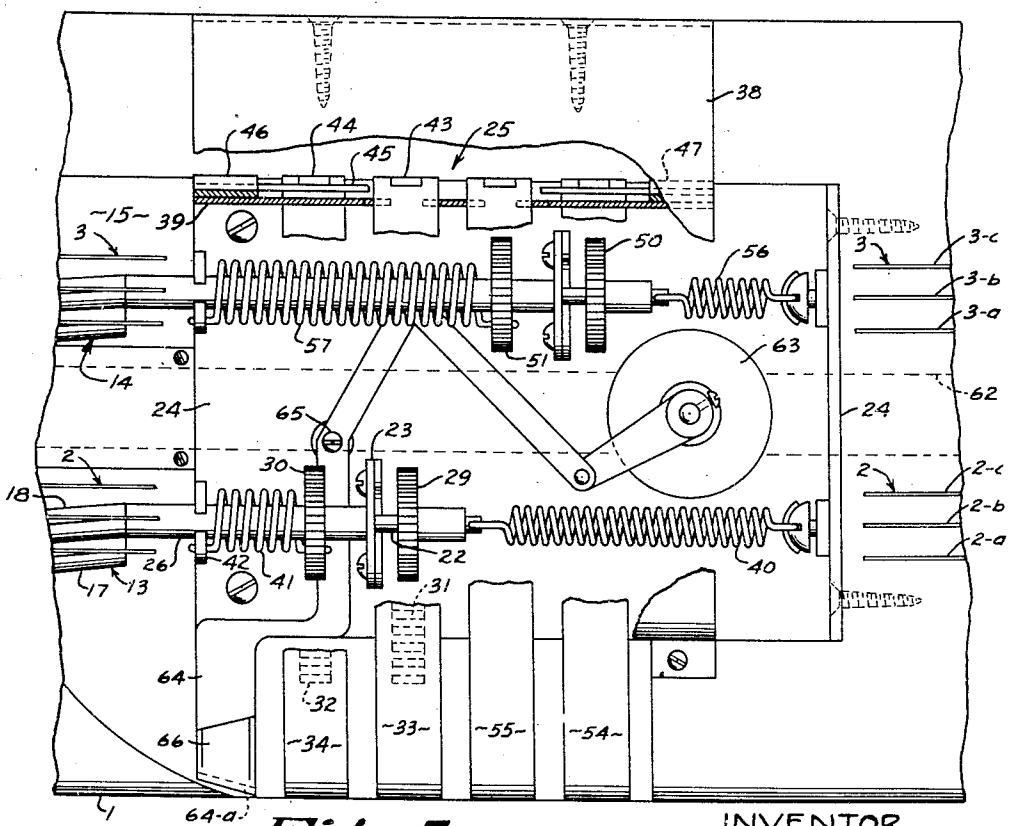

Fig. 5

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STRINGED MUSICAL INSTRUMENT

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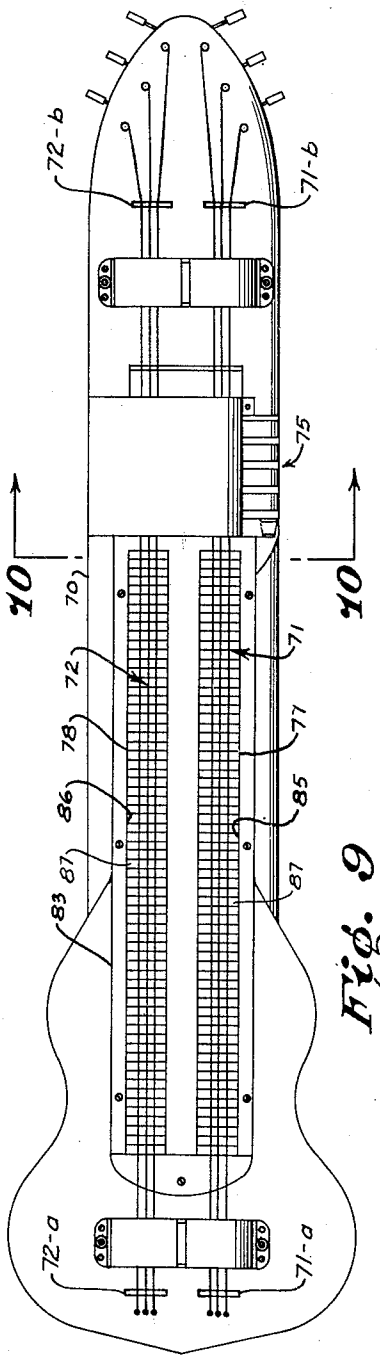

Fig. 9

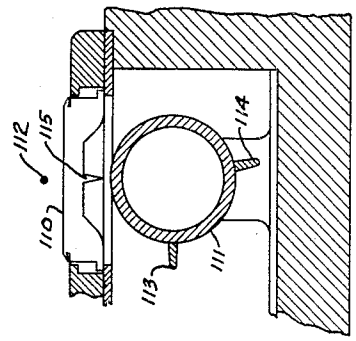

Fig. 12

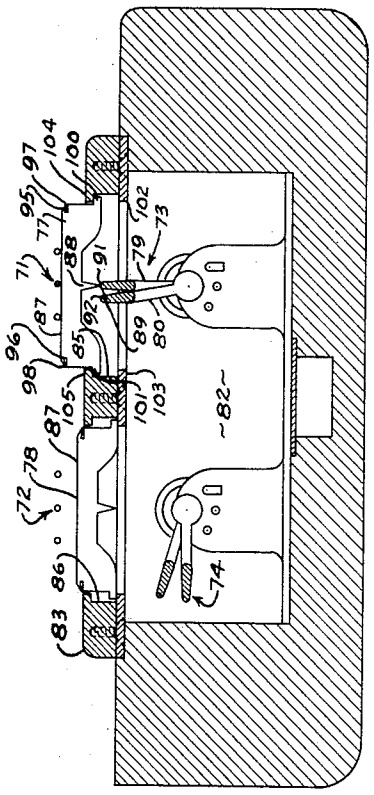

Fig. 10

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STRINGED MUSICAL INSTRUMENT

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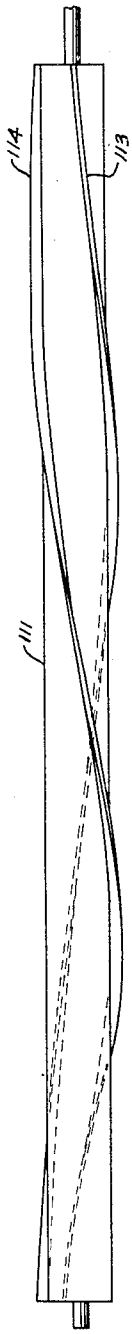

Fig. 13

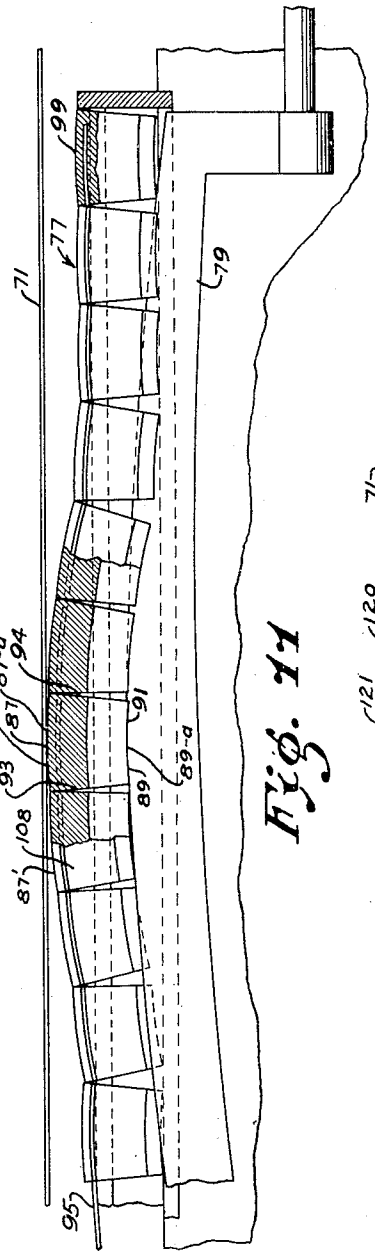

Fig. 11

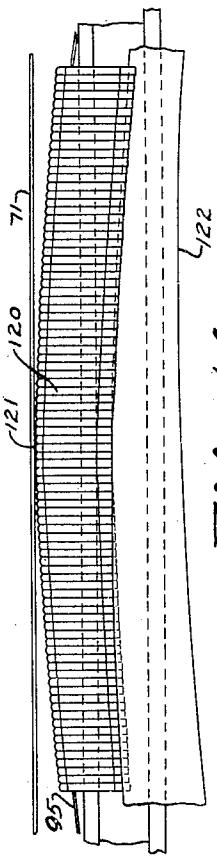

Fig. 14

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Patented Feb. 28, 1950 2,499,194

UNITED STATES PATENT OFFICE

2,499,194

STRINGED MUSICAL INSTRUMENT

John W. McBride, Burbank, Calif., assignor to Bantar, Incorporated, Burbank, Calif., a corporation of California

Application August 19, 1946, Serial No. 691,550

21 Claims. (Cl. 84—315)

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This invention relates to a string musical instrument.

As is well understood, the musical sounds of such instruments are produced by vibration of the strings, the pitch of the sounds being varied by altering the free vibrating length of the strings. Such tuning or "stopping" of the strings can be accomplished in various ways; for example, as by the aid of mechanism illustrated in a patent issued to John W. McBride on April 20, 1943, bearing Number 2,316,799 and entitled "Stringed musical instrument." This mechanism includes a rod rotatable about an axis substantially parallel with the string and having a helical-like crest. The angular position of the rod about its axis determines which point along the crest contacts the string, and thus determines the free vibrating length.

Such strings are usually tensioned between two fixed points, so that "stopping" the string at an intermediate point defines two vibrating lengths, respectively between the point of contact and the two fixed points. Generally, the musical sound from but one of these vibrating lengths is utilized, a resonant cavity or an electrical sound system being provided for amplifying the sound.

In a copending application filed in the name of John W. McBride on May 29, 1943, under Serial No. 489,040 now Patent No. 2,479,757 and entitled "Stringed musical instrument," an instrument is shown having tensioned strings stopped at an intermediate point by a crested rod, rotatable about an axis substantially parallel with the string, to provide two vibrating lengths, and arranged to utilize the sound from both of these vibrating lengths. For this purpose, an electric pick-up device is provided for each vibrating length, which transmits electrical impulses corresponding to the string vibrations. The electrical impulses from both pick-ups are fed to a circuit including suitable volume and tone controls, and thence to an amplifier and speaker system.

It is an object of this invention to provide an improved instrument of this type.

It is another object of this invention to provide a musical instrument arranged to utilize simultaneously vibrations from a plurality of adjusted lengths of a tensioned string, wherein the sum of these lengths is not necessarily equal to the total tensioned length of the string.

It is another object of this invention to provide a musical instrument utilizing simultaneously vibrations from a plurality of adjusted lengths of a tensioned string, wherein one of such lengths may be adjusted independently of the other.

It is another object of this invention to provide a musical instrument utilizing a tensioned string structure having means to form a pair of free vibrating string portions, separated by an intermediate portion of adjustable length and position along the string structure, whereby the length of the free vibrating portions may be altered.

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The capability of the instrument to provide these adjustable lengths along one or more string structures, (each of which may comprise a single string or a member of close parallel strings) may be utilized by musicians to produce a large variety of chords simultaneously, or in succession, with attendant novel artistic effects. It is accordingly another object of this invention to make it possible to produce a large variety of chords by relatively simple manipulation, and with a compact apparatus.

In an application filed in the name of John W. McBride on June 17, 1944, under Serial No. 540,794 now Patent No. 2,489,657 and entitled "Musical instrument with tensioned strings" an instrument is shown having a series of movable frets operated by a rotatable rod with a helical-like crest for contacting the string and altering the free vibrating length thereof. These frets are shown as having arched surfaces adapted to engage the string and are so arranged that, when operated by the rod, different parts of each such surface are brought successively into contact with the string by an action similar to a rolling action. It is another object of this invention to provide such an instrument arranged optionally to stop the string simultaneously at more than one point.

It is still another object of this invention to provide a modified form of fret capable of production in a simple and inexpensive manner and which has a different mode of operation to vary the point of contact with the string in a substantially continuous manner.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of several embodiments of the invention. For this purpose there are shown a few forms in the drawings accompanying and forming part of the present specification. The forms will now be described in detail illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of this invention is best defined by the appended claims.

In the drawings:

Figure 1 is a plan view of a musical instrument incorporating the features of the invention;

Fig. 2 is a longitudinal section, partly in elevation, on an enlarged scale, taken as indicated by line 2—2 of Fig. 1, part of the figure being broken away;

Fig. 3 is a pictorial view of a pair of the tuning members;

Fig. 4 is a fragmentary cross-section on an enlarged scale taken as indicated by line 4—4 of Fig. 2;

Fig. 5 is a top plan view of the operating mechanism for the tuning members, certain parts being broken away better to illustrate the structure;

Fig. 6 is a cross-section on an enlarged scale, taken as indicated by line 6—6 of Fig. 2;

Fig. 7 is a fragmentary elevation, partly in section, as seen from the right of Fig. 6;

Fig. 8 is a detail plan of one of the bridge structures utilized for tensioning the strings;

Fig. 8—*a* is a cross-section on an enlarged scale, taken along one of the strings of Fig. 8;

Fig. 9 is a view similar to Fig. 1, but showing a modified form of the invention;

Fig. 10 is a cross-section on an enlarged scale, taken as indicated by line 10—10 of Fig. 9, one pair of the tuning members being shown in a different operating position;

Fig. 11 is a fragmentary longitudinal section on a further enlarged scale showing the manner of cooperation between the frets and one of the tuning members of Fig. 10;

Fig. 11—*a* is a similar view, showing diagrammatically the operation of the frets by a pair of tuning members;

Fig. 12 is a fragmentary cross-section similar to Fig. 10, but showing a further modified form of the invention;

Fig. 13 is an elevation of one of the tuning members used in that form of the invention illustrated in Fig. 12; and

Fig. 14 is a view similar to Fig. 11, showing still another form of the invention.

Referring to Figs. 1–8 of the drawings, the instrument is shown as one of the plucking type such as a guitar or banjo. It comprises a body 1, which may be formed of wood, or other suitable material, and which serves to mount the operating parts of the instrument, suitable cavities and recesses being provided for their accommodation.

A pair of string structures 2 and 3 extend in substantial parallelism over the top of the body 1. As shown, each of these structures 2 and 3 comprises three strings 2—*a*, 2—*b*, 2—*c*, and 3—*a*, 3—*b*, 3—*c* respectively. but it is to be understood that either or both of these string structures might comprise any other desired number of strings, or a single string. The strings in each set are placed quite close together.

Each of these strings passes over a supporting post 4 (Fig. 8) adjacent the left-hand end of the body 1, and thence downwardly through an aperture 5 (see Fig. 2) in the body, where the string is anchored. At the opposite end of the body the string passes over a similar post 6 and thence to a conventional tuning peg 7. By appropriate adjustment of the tuning peg 7, the string may be tensioned as required between posts 4 and 6.

The posts 4 and 6 are adjustable for height, for this purpose comprising round-headed machine screws threaded into plates 8 and 9 respectively fastened to the body 1 and held in adjusted position by lock nuts 10. The kerf in the screw head accommodates the associated string, positioning it laterally, and as shown in Fig. 8—*a*, is formed with a convex bottom surface 4—*a* for supporting the string. The string elements 2—*a*, 2—*b*, 2—*c*, and 3—*a*, 3—*b*, 3—*c* are not necessarily at the same height; and, in some cases, it is desirable to have the center strings 2—*b* and 3—*b* above the other strings.

Provisions are made for stopping each of the strings 2—*a*, 2—*b*, 2—*c*, 3—*a*, 3—*b*, and 3—*c*

at one or more points intermediate the supports 4 and 6. For this purpose, pairs of rotatable tuning members, generally indicated by 13 and 14, are provided for the string structures 2 and 3 respectively, and are accommodated in a longitudinal cavity 15 in the body 1. Since each pair of members 13 and 14, and the manner in which it cooperates with its associated string structure 2 and 3, are substantially identical, only one of such pairs, for example, that indicated by the numeral 13, will be described.

This pair 13, as best shown in Figs. 1, 2 and 3 comprises a pair of rods or tubes 17 and 18, bent to a helical-like form and supported at the proper distance from a common axis of rotation 19 by crank arms 17—*a* and 17—*b*, and 18—*a* and 18—*b*, respectively adjacent the opposite ends of the rods 17 and 18. These rods 17 and 18, as clearly shown in Fig. 4, have their outer surfaces ground, or otherwise formed, to provide definite crests 17—*c* and 18—*c*, respectively, and conforming to the required helical-like form, and serving to contact one or more of the strings of the associated string structure 2.

As shown in Fig. 2, the crank arms on rod 17 are appropriately offset from those on rod 18 to permit assembly of the rods. The arms 17—*a* and 18—*a* at the left-hand end of the pair of rods 13 are provided with apertures adapted to receive a common bearing pin 20, secured to an angle bracket 21 attached to the body 1 and extending into the cavity 15. The arm 18—*b* at the opposite end of the rods has a shaft 22 fixed therein which extends through a bearing bracket 23 mounted on the frame 24 of the key mechanism 25, which is provided for operating both pairs of rods, 13 and 14. This key mechanism 25 will be described hereinafter. The arm 17—*b* of rod 17 has a tubular extension 26 adapted to telescope over the shaft 22, and is freely rotatable thereon. In this way the tuning members 17 and 18 are supported for relative angular movement about the axis 19.

For imparting angular movement to the members 17 and 18, pinions 29 and 30 are secured respectively to the shaft 22 and sleeve 26, meshing with racks 31 and 32 (Figs. 5, 6 and 7) carried by keys 33 and 34. The key 33 is guided for movement transversely of the body 1 by aligned slots 35 and 36, formed respectively in the depending front lip 37 of a protective cover 38 for the key mechanism 25, and in an intermediate wall 39 of the cover. The key 34 is guided in a similar manner. Of course, the amount of relative motion between the rods 17, 18 is limited by the contact of one rod with the other.

A light torsion spring 40 is suitably anchored at one end to the frame 24 (see Fig. 5), and at its other to the shaft 22, and serves to urge the tuning member 18 to rotate in a clockwise direction (Fig. 4), causing the key to move downwardly in Fig. 5. Another light torson spring 41, secured at one end to the pinion 30 and anchored at its other end to a bracket 42 on the frame 24, similarly urges the tuning member 17 clockwise and key 34 downwardly. To limit such rotation of the members 17 and 18 so as to locate them in their home or initial position, shown in Figs. 4 and 5, keys 33 and 34 have stop lugs 43 and 44 formed respectively on their inner ends, and which are engageable with a stop bar 45 detachably mounted in a pair of ears 46 and 47.

Upward movement of keys 33 and 34 in Fig. 5

will impart counter-clockwise angular movement to the members 17 and 18 in opposition to springs 40 and 41, as desired, stop lugs, such as shown at 48 on key 33 in Fig. 6, being provided to limit the movement of the keys by engaging the left-hand side of bar 45.

The tuning members of the other pair 14 are similarly arranged for operation, being provided respectively with pinions 50 and 51 engaged by racks 52 and 53 carried by keys 54 and 55, torsion springs 56 and 57 being provided for urging the members toward their initial positions.

To facilitate operation of the keys 33, 34, 54 and 55, each key has a downward extension as 58 on key 33 (Fig. 6) adapted for engagement by the player's fingers. Appropriate pressure on the keys will serve to turn the tuning members against the force exerted by their associated springs 40, 41, 56 and 57, so that the strings are stopped at the desired points. Release of such pressure will allow the tuning members to be returned by the springs.

The tuning member 17 will, by its contact with the strings of the structure 2, serve to divide the strings between their supporting posts 4 and 6 into two portions having relative lengths in accordance with the angular position of the member 17 about its axis 19. Further, the other tuning member 18 will divide one of these portions into two shorter portions having relative lengths determined by the angular position of member 18 about its axis. As shown most clearly in Fig. 4, the center string 2—*b* is higher than the other two strings; this occurs because these strings are equi-distant from axis 19.

Any or all of these portions of the string may be set into vibration by the player, either separately or in unison. Conventional electric pick-ups 60 and 61 are provided adjacent respectively the string supports 4 and 6. These pick-ups are affected when any of the string portions are put in vibration.

As is well understood, such pick-ups usually comprise means forming a magnetic circuit and a winding, the magnetic circuit being arranged to be influenced by the vibrating strings in a manner to create a minute current in the winding. The windings of the pick-ups 60 and 61 may be appropriately connected by wiring (not shown) accommodated in a channel 62 (Fig. 6) formed in the body 1. This wiring may include a phone jack (not shown) to facilitate connection to a conventional circuit including an amplifier and speaker. A rheostat 63 (Fig. 5) serves to control the output, being arranged for adjustment by means of a lever 64. This lever 64 is pivoted at 65 to the key mechanism frame 24, and has an upward extension 64—*a* adjacent the key 34 providing a thumb rest 66 for the player. Thus, the rheostat and the key mechanism 25 may be operated conveniently with one hand by the player.

The instrument is utilized by the player in a position commonly used for guitars and such instruments, that is, the player uses his right hand to pluck the string structures 2 and 3, or otherwise set them into vibration at suitable points along the length of the tuning members 13 and 14. The left hand, which usually is employed to stop the strings, rests on the housing 38 and extends thereacross, so that the fingers may operate the keys 33, 34, 54, and 55 conveniently, the thumb resting on the thumb rest 66 for operating the volume control. Thus, the instrument as viewed in Fig. 1 would be turned end-for-end from the position illustrated when played.

It may be desirable to avoid the sliding contact between the crests of the rotatable tuning members and the tensioned strings, such as occurs in the type of instrument just discussed when the free vibrating length of the strings is altered. For this purpose, a modified form of instrument shown in Figs. 9, 10, and 11 is provided.

Referring to Fig. 9, the instrument is shown as comprising a body 70 with a pair of string structures 71 and 72, each comprising three strings, by way of example, tensioned lengthwise of the body 70 between conventional bridge forming members 71—*a* and 71—*b*, and 72—*a* and 72—*b*, respectively, in a manner similar to that in the first described form, except that the strings are on a common level. Pairs 73 and 74 of independent, angularly movable tuning members (Fig. 10) are provided respectively for each string structure 71 and 72, and are arranged for operation by a key mechanism 75, as before. However, in the present instance, a series of movable frets 77 and 78 is interposed respectively between the tuning members of the pairs 73 and 74 and the associated string structure 71 and 72. Since the pairs of tuning members 73 and 74 and series of frets 77 and 78 are substantially identical in structure and in their manner of cooperation with their respective string structures 71 and 72, only the tuning members and frets associated with the string structure 71 will be described.

In Fig. 11, a few of the frets extending from the right-hand end of the series 77 associated with the string structure 71 are shown. In this figure only one of the tuning members, as 79, of the pair 73 is shown, the other member 80 being omitted. The member 79 is shown as turned from its initial position, so that an intermediate fret, indicated by the numeral 81 is urged against the string structure 71. Member 79 is shown in this instance as formed of a flat bar and its contacting edge is quite narrow.

In this instance, as shown in Figs. 9 and 10, the body 70 has a central longitudinally extending cavity 82 for accommodating the tuning members 73 and 74. A plate structure 83, providing a pair of slots 85 and 86 forming guides respectively for the frets of the series 77 and 78, is secured to the body above the cavity 82.

Each of the frets has a convex string engaging surface 87 and a thin depending projection 88, providing a narrow concave surface 89 adapted to be engaged by the helical crest 91 or 92 of the tuning members 79 and 80. Furthermore, the frets each have converging side surfaces 93 and 94 (Fig. 11), and are strung on a pair of light wires 95 and 96 accommodated in suitable openings or recesses 97 and 98 adjacent the ends of each of frets. The end frets of the series, as 99, are arranged to prevent translatory movement of the wires, as by having the ends of the opening 91 and 98, closed. As best shown in Fig. 10, the frets have lugs 100 and 101 on their opposite ends, which, by engagement with longitudinally extending lower lips 102 and 103 provided in slot 85, serve to support the frets when not engaged by the tuning members 79 or 80. Similarly, upper lips 104 and 105 serve to retain the frets in the slot 85, and to limit their upward movement.

As clearly shown in Fig. 10, the helical-like crests 91 and 92 of the tuning members are quite

high. Thus, in connection with the thinness of the projection 88 providing the cooperating surface 89 on the fret, ensures that but one fret at a time will be engaged by the tuning member 79 or 80; and, further, that there will be but a point contact between the crest of the tuning member and the surface 89, so that the fret will be free to rock, as this point moves, due to rotation of the tuning member.

Thus, in Fig. 11, the fret 81 is shown as supported by the engagement of the mid-point 89—*a* of its surface 89 by the crest 92, so that the mid-point of the surface 87 contacts the string structure 71. A few frets on each side of fret 81 are raised and supported at intermediate heights by the wires 95 and 96. These wires are light and flexible so that the weight of the frets urges them toward their lower positions, except when raised by the tuning member 79.

As the tuning member 79 is rotated, the point of support 89—*a* will move toward one end or the other of the fret 81 in accordance with the direction of rotation of the member, causing the fret 81 to rock and the point of the contact 87—*a* with the string structure 71 to move correspondingly. Assuming the rotation of the tuning member 79 is such as to cause the supporting point 89—*a* to move to the left (Fig. 11), the fret 81 will rock in a counter-clockwise direction and cause the contact point 87—*a* to move to the left also. At the same time, the left-hand side of fret 81 is being raised and, due to the wires 95 and 96, the next fret 108 to the left is being raised also. Thus, as the point of support 89—*a* reaches the end of surface 89 on fret 81 and engages the surface 89 on fret 108, the point of contact 87—*a* moves from surface 87 on fret 81 to the corresponding surface 87′ on fret 108. In this way, a continuous rolling contact between the frets and the string structure 71 is maintained. The inclination of the sides 93 and 94 of the frets is such that, when the point of support 89—*a* is about to leave the surface 89 of one fret, the corresponding surface of the next fret to be engaged by said point forms a substantially unbroken continuation thereof.

It will be understood that appropriate operation of the key mechanism 75 will serve to stop the string structures 71 and 72 in a manner to provide a plurality of adjustable, freely vibrating string lengths in a manner similar to that of the first described form of the invention, as shown diagrammatically in Fig. 11—*a*.

Series of frets, such as 77 and 78, may be employed with other types of tuning mechanism than that just described. For example, in Fig. 12, a fret 110 is shown which is identical with those just discussed, but is arranged for operation by a single tuning member 111 to stop the string 112 at one or more points intermediate its length. This tuning member 111 (see also Fig. 13) is shown as having a pair of helical-like crests 113 and 114 for cooperating with depending members 115 on the frets 110, in the manner previously described, to impart a rolling motion to the frets. These crests 113 and 114 extend in a non-parallel manner about the member 111. Thus, as the member is rotated, the free vibrating lengths of the string 112 will be altered, and will differ by an amount which varies in accordance with the angular position of the member 111. There may be a plurality of tuning members 111 arranged for operation by appropriate key mechanism, such, for example, as disclosed in a patent issued to John W. McBride on December 12, 1944, entitled "Stringed musical instrument," and bearing Number 2,364,861.

A modified form of fret is shown in Fig. 14. These frets 120 have a configuration which is the same as that of the frets illustrated in Figs. 10 and 12, and are connected by light flexible members, such as wires 95 and 96 to form a series accommodated in slot, as 85, all as before. However, the frets 120 are quite thin, having a thickness of the order of .020″ to .030″, and thus are adapted to be stamped from suitable sheet material. The string-engaging surface 121 is slightly rounded to avoid contact of the string by sharp corners.

Due to the fact that their side surfaces are parallel, the frets 120 are constrained to move straight up and down into and out of engagement with the spring structure in response to movement of the crested tuning member 122 about its axis. However, the thickness of the frets is such that the points contacted on the string by successive frets are sufficiently close to provide a substantially continuous variation in the length of the string, such as is provided by the rolling action of the previously discussed frets.

The inventor claims:

1. In a musical instrument having a tensioned string: means for stopping the string at a plurality of adjustable points along the string, comprising a plurality of members rotatable with respect to each other and mounted on a common axis substantially parallel to the string, each of said members having a helical-like crest.

2. In a musical instrument: a string tensioned between a pair of fixed points; and means for stopping said string at a plurality of spaced points adjustable along the string and intermediate said fixed points to provide a plurality of free vibrating string portions of desired length, said means comprising a plurality of members movable independently of each other lengthwise of said string.

3. In a musical instrument: a string tensioned between a pair of fixed points; means for stopping said string at a plurality of spaced points, said means comprising a plurality of members movable independently of each other along the string intermediate said fixed points to provide a plurality of free vibrating string portions of desired length; and means for transmitting the sound from each of said string portions.

4. In a musical instrument: a string tensioned between a pair of fixed points; and means for stopping said string at a plurality of spaced points, said means comprising instrumentalities independently adjustable lengthwise along the string to provide free vibrating string portions of desired length.

5. In a musical instrument: a string tensioned between a pair of fixed points, adjustable means for stopping said string at a desired intermediate point between said fixed points; and a second means capable of limited adjustment along said string with respect to said adjustable means for stopping said string at a second desired point between said intermediate point and one of said fixed points.

6. In a musical instrument: a string tensioned between a pair of fixed points; means for stopping said string at a plurality of spaced points along the string to provide a plurality of free vibrating string portions of desired length, said means comprising a plurality of helical-like crests rotatable independently of each other about an axis

substantially parallel with said string; and means for transmitting the sound from said string portions.

7. In a musical instrument: a string tensioned between a pair of fixed points; means for stopping said string at a plurality of spaced points along the string to provide a plurality of free vibrating string portions of desired length, said means comprising a plurality of members providing substantially identical helical-like crests, said members being rotatable independently of each other about an axis substantially parallel with said string structure; and means for transmitting the sound from said string portions.

8. In a musical instrument: a string tensioned between a pair of fixed points; means for stopping said string at a plurality of spaced points along the string to provide a plurality of free vibrating string portions of desired length, said means comprising a plurality of members providing helical-like crests having substantially identical pitches and beginning at a point in a common plane normal to the string.

9. In a musical instrument: a string tensioned between a pair of fixed points; means for stopping said string at points spaced along the string intermediate said fixed points to provide a plurality of free vibrating string portions of desired length, comprising a plurality of members relatively angularly adjustable about an axis parallel with the string, each of said members having a helical-like crest.

10. In a musical instrument: a string tensioned between a pair of fixed points; means for stopping said string at points spaced along the string intermediate said fixed points to provide a plurality of free vibrating string portions of desired length, comprising a plurality of helical-like crested members, means rotatably supporting one end of each of said members, one of said members having an axially extending shaft at its opposite end, bearing means supporting said shaft, a tubular extension on the other member rotatably mounted on the shaft, and means for rotating each of said members.

11. In a musical instrument having a tensioned string: a series of frets guided for movement toward and away from the string, and extending lengthwise of the string; and means cooperating with said series to cause frets therein to stop said string simultaneously at a plurality of points spaced there along to provide a plurality of free vibrating string portions of desired length.

12. In a musical instrument having a tensioned string: a series of frets guided for movement toward and away from the string, and extending lengthwise of the string; means comprising a plurality of helical-like crests rotatable about an axis substantially parallel with the string, cooperating with said series to cause frets therein to stop said string at a plurality of spaced points to provide a plurality of free vibrating string portions of desired length.

13. In a musical instrument having a tensioned string: a series of frets guided for movement toward and away from the string, and extending lengthwise of the string; means comprising a plurality of helical-like crests relatively angularly adjustable about an axis substantially parallel with the string, cooperating with said series to cause frets therein to stop said string at a plurality of spaced points there along to provide a plurality of free vibrating string portions of desired length.

14. In a musical instrument having a tensioned string: a series of frets guided for movement toward and away from said string, and extending lengthwise of the string; means for urging the frets successively to engage the string, and a flexible member connecting the frets for causing the frets adjacent the string engaging fret to approach the string.

15. In a musical instrument having a tensioned string: a series of frets guided for movement toward and away from said string and extending lengthwise of the string, a flexible member connecting the frets, and means for rocking the frets successively.

16. In a musical instrument having a tensioned string: a series of frets guided for sliding movement with respect to each other toward and away from said string and extending lengthwise of the string; means between adjacent frets limiting the relative movement between said adjacent frets; and means for urging the frets successively to engage the string.

17. In a musical instrument having a tensioned string: a plurality of frets having convex string engaging surfaces; and a plurality of rotatable members, each of said members having a helical-like crest, and independently adjustable for urging the frets into contact with the string at a plurality of points.

18. In a musical instrument having a tensioned string: a plurality of frets having convex string engaging surfaces; and a rotatable member having a plurality of helical-like crests for urging the frets into contact with the string at a plurality of points.

19. In a musical instrument having a tensioned string; means for stopping the string at selected points along the string, comprising a plurality of members rotatable with respect to each other about a common axis substantially parallel to the string.

20. In a musical instrument having a tensioned string; means for stopping the string at selected points along the string, comprising a plurality of helical members angularly displaced with respect to each other and rotatable with respect to each other about a common axis substantially parallel to the string.

21. In a musical instrument having a tensioned string; a series of frets guided for transverse movement toward and away from the string and extending lengthwise of the string; and means separate from said frets and cooperable with said series to cause frets therein to stop said string at a plurality of points spaced therealong to provide a plurality of free vibrating string portions of desired lengths.

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