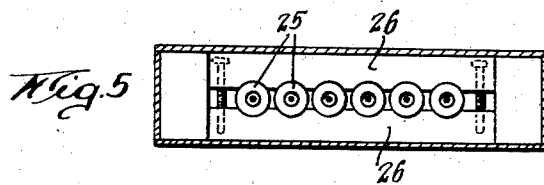
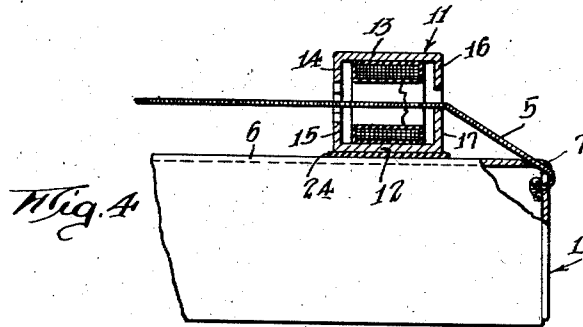
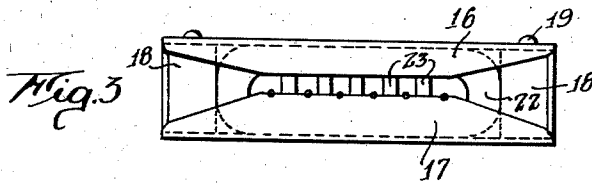
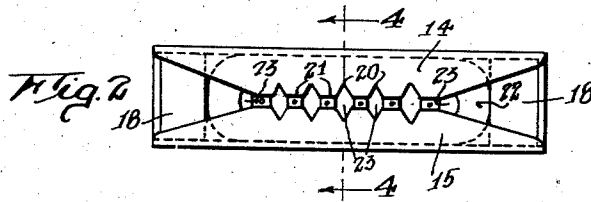
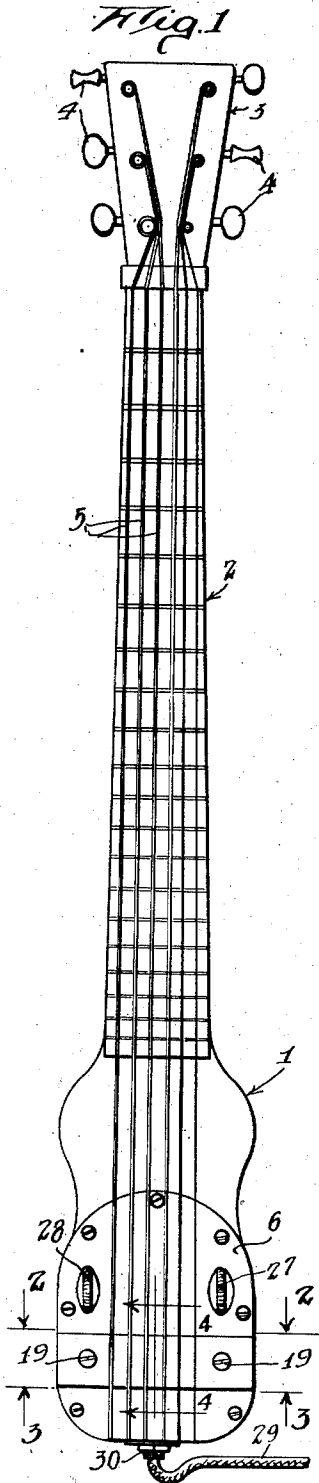


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PICKUP UNIT FOR INSTRUMENTS

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## PICKUP UNIT FOR STRINGED INSTRUMENTS

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13 Claims (Cl. 84-1.15)

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Our invention relates to electrical pick-up units for stringed instruments; and among the objects of our invention are:

First, to provide an electrical pick-up unit for stringed instruments, which produces a more natural tone than has previously been attained by electrical pick-up devices of this character.

Second, to provide an electrical pick-up unit for stringed instruments wherein the string itself is the only moving element in the magnetic circuit, thus producing with great fidelity corresponding fluctuations or vibration in the associated electrical circuit.

Third, to provide an electrical pick-up wherein all sounding boards or sounding-boxes may be eliminated.

Fourth, to provide an electrical pick-up which may be associated with any type of stringed instrument such as guitar, violin, piano, and many others.

With the above and other objects in view, reference is directed to the accompanying drawings in which:

Fig. 1 is a plan view of our pick-up unit as adapted to use in conjunction with a guitar.

Fig. 2 is an enlarged elevational view of the pick-up unit taken from the line 2-2 of Fig. 1.

Fig. 3 is a similar elevational view of the pick-up unit taken from the line 3-3 of Fig. 1.

Fig. 4 is an enlarged sectional view of the pick-up unit taken through 4-4 of Fig. 1, the associated parts of the guitar head shown fragmentarily and in elevation.

Fig. 5 is a longitudinal sectional view of a modified form of our pick-up unit wherein individual pick-up coils are provided for each string.

Our pick-up unit may be adapted for use in any of the various stringed instruments whether held in the hands, such as a guitar or violin, or whether larger in size, such as a bass viol. Also, our device may be employed irrespective of the number of strings contained in the musical instrument, that is, it may be used for an instrument containing only a few strings, such as a guitar or violin, or for an instrument containing many strings, such as a piano or harp.

For convenience of illustration, our pick-up unit is shown as adapted to a guitar. In place of the usual sound-box, there is provided a head member 1 which is for the most part solid and conveniently shaped. It may be much smaller than the conventional guitar sound-box. A fretted neck 2 similar in size and shape to the conventional guitar, extends from the body 1 and terminates in a conventional guitar head 3 having

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keys 4 which serve to adjust the tension of steel guitar strings 5.

A portion of the top and the extended end of the body 1 is covered by a plate 6 formed of sheet material preferably metal. At the right angular juncture of the top and end portions of the plate 6, there is formed a series of V-holes 7 which receive and secure the extremities of the strings 5.

Our pick-up unit, designated generally by 11, comprises a bottom pole member 12 and a top pole member 13. These are channel-shaped in cross-section, forming confronting forward flanges 14 and 15 respectively, and rearward flanges 16 and 17 respectively. The extremities of the bottom and top pole members are spaced by magnets 18. These magnets may be permanent magnets or electromagnets. In the latter case, they are connected to a suitable source of direct current. Screws 19 secure the assembly comprising the pole plates and magnets together. The pairs of forward and rearward flanges define gaps through which are threaded the strips 5. The lower rearward flange 17 may form a bridge for supporting the strings 5, and is slightly notched to retain the strings in place.

The forward flanges 14 and 15 are provided with a series of opposed notches 20 located between the strings so as to form tooth-like pole elements 21 having parallel extremities on opposite sides of each string.

Between the bottom and top pole members and the magnets 18 is placed a pick-up coil 22 which may embrace all of the strings. The upper and lower portions of the pick-up coil may be maintained in spaced relation by spacers 23 located between the strings 5.

The pick-up unit is suitably mounted on the plate 6 preferably with an insulation pad 24 therebetween. The plate 6 may be flat as shown, or raised or depressed at its portion supporting the pick-up unit in order to place the strings 5 at the proper height, or the thickness of the insulation pad 24 may be chosen to provide the desired string spacing.

In place of the single pick-up coil 22 the strings 5 may be surrounded by individual pick-up coils 25 as shown in Fig. 5. In this case, the individual pick-up coils are held in place by non-magnetic holder bars 26 placed above and below the pick-up coils.

The body 1 of the musical instrument may be provided with cavities to accommodate a volume-control and a tone-control having dials 27 and 28 exposed through slots in the plate 6. A cable 29 leading to a suitable amplifier (not shown) ex-

tends from the head 1 through a cable fitting 30.

The portions of the strings 5 between the bridge-forming flange 17 and the pole elements 21, form armatures in the magnetic circuits comprising the magnets 18 and pole members 12 and 13. Vibration of the individual strings between their respective pole elements, causes fluctuations in the magnetic field, which fluctuations are picked up with fidelity by the pick-up coil 22 or the individual pick-up coils 25. It is, of course, essential that the strings 5 be formed at least in part, of magnetic material such as steel.

It should be observed that by reason of the fact that the strings rest on the rearward flange or pole piece 17 and utilize this flange as a bridge, the fundamental and all of the harmonious vibrations of each string share a common node point located at the bridge. It has been found that this arrangement substantially increases the sensitivity of the instrument to all of the harmonic as well as the fundamental notes produced by each string.

Also, it should be observed that the pole pieces formed by flanges 14 and 16 have like polarity, which polarity is opposite to the polarity of the flanges or pole pieces 15 and 17; that is, if the pole pieces associated with the upper channel 13 are north, the pole pieces associated with the lower channel 12 will be south.

Many other embodiments of the invention may be resorted to without departing from the spirit of the invention.

We claim.

1. A pick-up device for stringed musical instruments, comprising a pair of U-shaped pole pieces disposed with their leg portions confronting but spaced from each other and forming pole tips; a magnetic musical string extending longitudinally between said pole tips and forming an armature, said string being in physical contact with one of said pole tips to establish a common node point for all oscillations of said musical string; magnet means connecting said pole pieces to complete a magnetic circuit through said pole pieces and said musical string armature in which the polarity of the tips of each pole piece is the same but opposed to the polarity of the tips of the other pole piece; and a pick-up coil positioned in the magnetic field established by said magnetic circuit and influenced by variations in said magnetic field caused by movement of said musical string armature.

2. A pick-up device for stringed musical instruments, comprising: a pair of U-shaped pole pieces disposed with their leg portions confronting but spaced from each other and forming pole tips; a magnetic musical string disposed between said pole tips and forming an armature; a pair of magnetic blocks connecting said pole pieces at their extremities to complete a magnetic circuit through said pole pieces and said musical string armature in which both tips of each pole piece have the same polarity, but opposite polarity from the corresponding pole tips of the other pole piece; and an electric pick-up coil surrounding said musical string armature, and shielded by said magnet blocks and pole pieces.

3. A construction as set forth in claim 2, wherein one of said pole tips is engaged by said musical string armature to form a bridge therefor; and wherein the pair of pole tips spaced along said musical string armature from said bridge forming pole tips are disposed clear of the lateral travel of said armature when said musical string armature is vibrated.

4. A pick-up device for stringed instruments, comprising: a series of tuned magnetic musical strings; a pair of channel-shaped pole pieces adapted to be disposed on opposite sides of said strings with their flange portions in confronting relation and forming sets of pole tips, the portions of said strings between said sets of pole tips forming armatures; magnet means connecting said pole pieces to form magnetic circuits through said pole tips and their respective musical string armatures the polarity of the tips of each pole piece being similar to each other but opposite from the corresponding tips of the other pole piece; and pick-up coil means disposed in said magnetic circuits and electrically influenced by vibrations of said musical string armatures.

5. A construction as set forth in claim 4, wherein one set of said pole tips is serrated to form paired individual pole elements for each of said musical string armatures, and wherein one of the remaining pole tips is engaged by all of said musical string armatures to form a bridge therefor.

6. A pick-up device for stringed musical instruments, comprising: a musical string formed of magnetic material; a pair of confronting magnetic channel elements on opposite sides of and traversing said string to form pairs of pole pieces axially displaced relative to said string whereby the portion of string embraced between said pole pieces forms an armature; a magnet means for energizing said channel elements whereby the pole pieces of each channel element have identical polarity but opposite from the polarity of the other channel element; one of said pole pieces forming a bridge engaged by said string whereby all oscillations of said string have a common node point at said bridge; and an electric pick-up means disposed in the magnetic field formed by said magnetic channel elements and armature.

7. A pick-up device for stringed musical instruments, comprising: a series of musical strings formed of magnetic material arranged side by side; a channel-shaped magnetic structure forming opposed pairs of pole pieces traversing said strings and displaced from each other axially along said strings whereby the embraced portions of said strings form armatures; one of said pole pieces forming a bridge for said strings whereby all oscillations of said strings have node points at said bridge, the other pair of pole pieces being serrated with their projecting portions in substantial registry with the several strings but spaced therefrom; and a pick-up means in the magnetic field established by said magnet structure and armatures.

8. A pick-up device for stringed musical instruments as set forth in claim 7 wherein said pick-up means is a single pick-up coil embracing the armature portions of all of said strings.

9. A pick-up device for stringed musical instruments as set forth in claim 7 wherein said pick-up means comprises individual pick-up coils surrounding the armature portions of each string.

10. A pick-up device for stringed musical instruments, comprising: a series of musical strings formed of magnetic material arranged side by side; a pair of opposed channel-shaped magnet structures of opposite polarity each forming pole pieces of like polarity traversing said strings and displaced from each other axially along said strings whereby the embraced portions of said strings form armatures; the pole pieces of said magnet structures confronting each other, one

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pole piece forming a bridge for said strings to establish common node points for the vibrations produced therein, and the confronting pair of pole pieces spaced therefrom being serrated with their projecting portions in registry to each other and said strings but spaced therefrom; and a pick-up means in the magnetic field established by said magnet structures and the armature portions of said strings.

11. A pick-up device for stringed musical instruments as set forth in claim 10 wherein said pick-up means is a single pick-up coil embracing the armature portions of all of said strings.

12. A pick-up device for stringed musical instruments as set forth in claim 10 wherein said pick-up means comprises individual pick-up coils surrounding the armature portions of each string.

13. A pick-up device for stringed instruments, involving: A pair of channel shaped pole pieces disposed with their flanges in confronting relation to define air gaps; a pair of magnets at the extremities of said pole pieces so arranged that the pole pieces have opposing polarity; a plurality of magnetic musical strings extending between

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said pole pieces, one of the flanges of said pole pieces being engaged by said strings and forming a bridge therefor, whereby each string has a node point for all mechanical oscillations thereof originating at said bridge; and an electric pick-up means within the space defined by said magnets and pole pieces.

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