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[54] **PLURAL ELECTROMAGNETIC PICKUP SYSTEM**
FOR STRINGED MUSICAL INSTRUMENT WITH
TONE AND VOLUME CONTROLS
16 Claims, 10 Drawing Figs.

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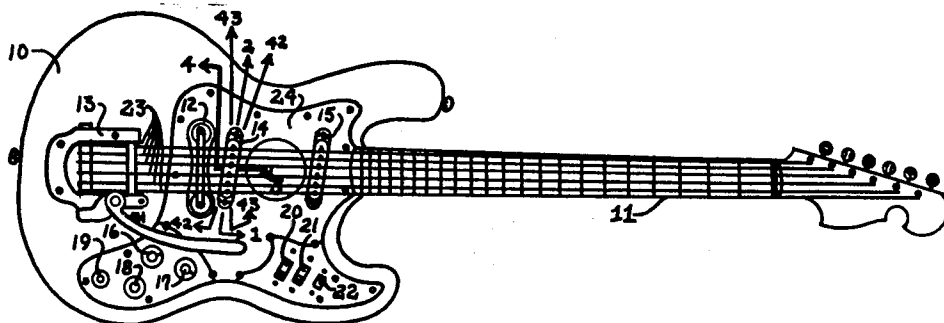
References Cited

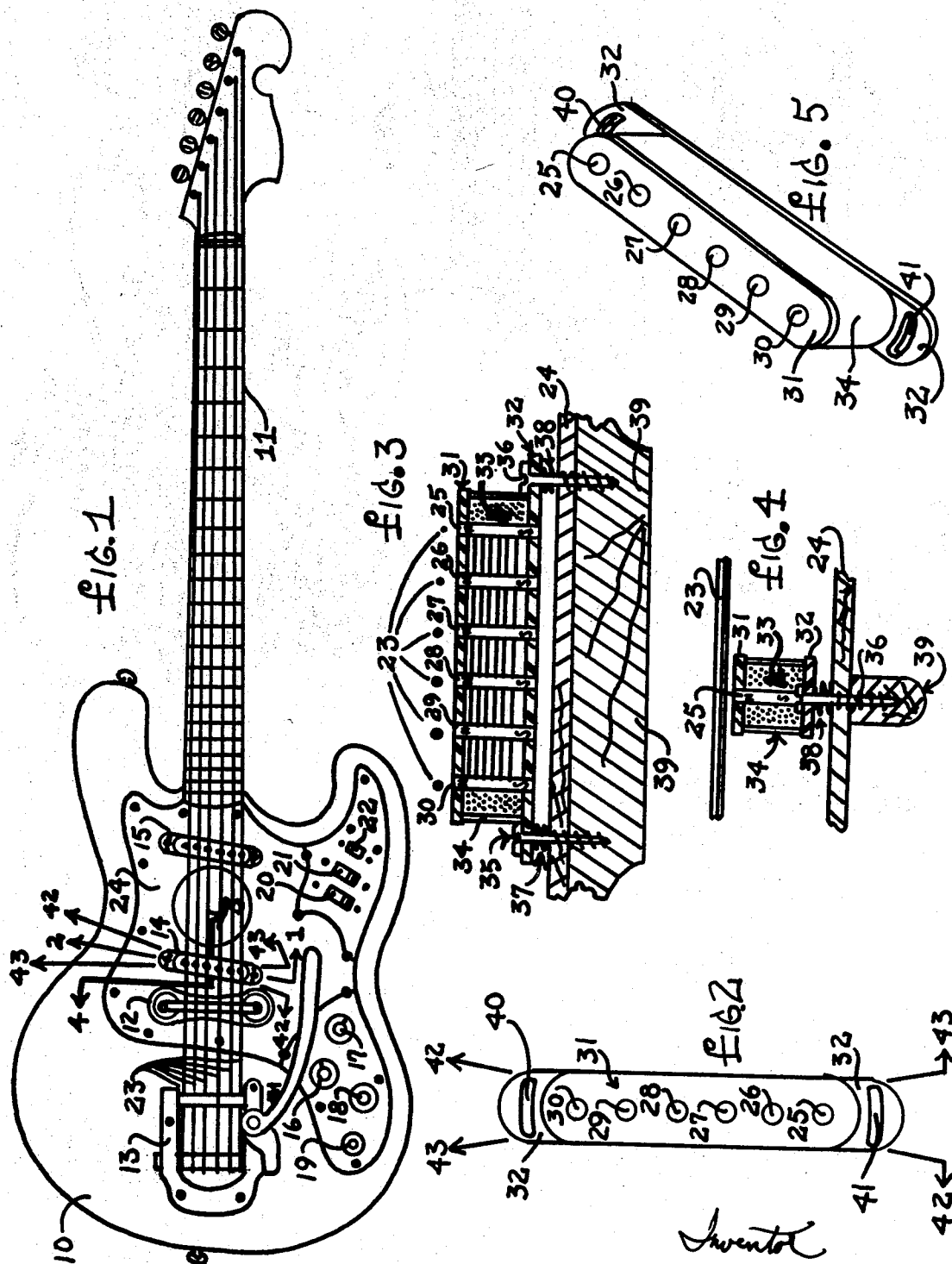
UNITED STATES PATENTS

2,573,254	10/1951	Fender	84/1.16
2,612,072	9/1952	DeArmond	84/1.15
2,784,631	3/1957	Fender	84/1.15
2,964,985	12/1960	Webster	84/1.15
3,066,567	12/1962	Kelly	84/1.16
3,192,304	6/1965	Rizzutti	84/1.16
3,213,180	10/1965	Cookerly et al.	84/1.16
3,456,063	7/1969	Teranishi et al.	84/1.16
3,472,943	10/1969	Kawabata et al.	84/1.16X

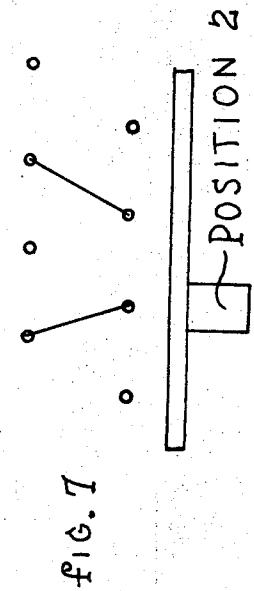
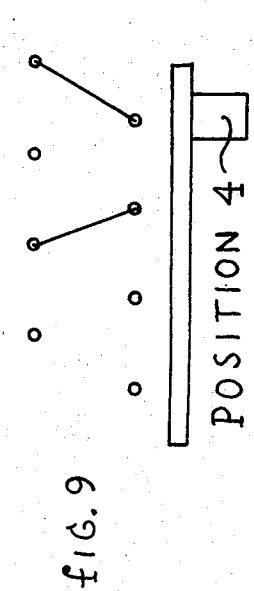
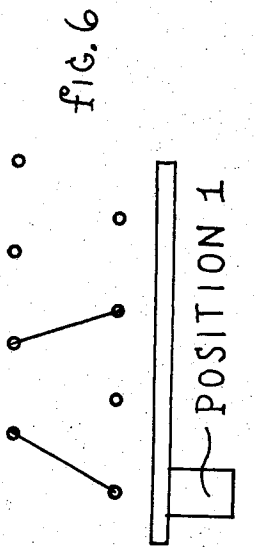
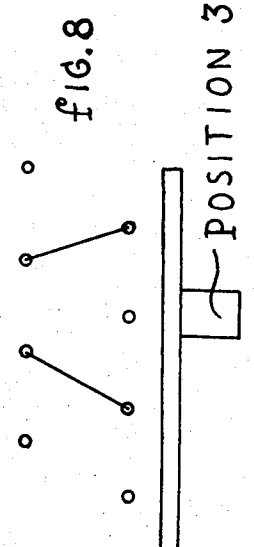
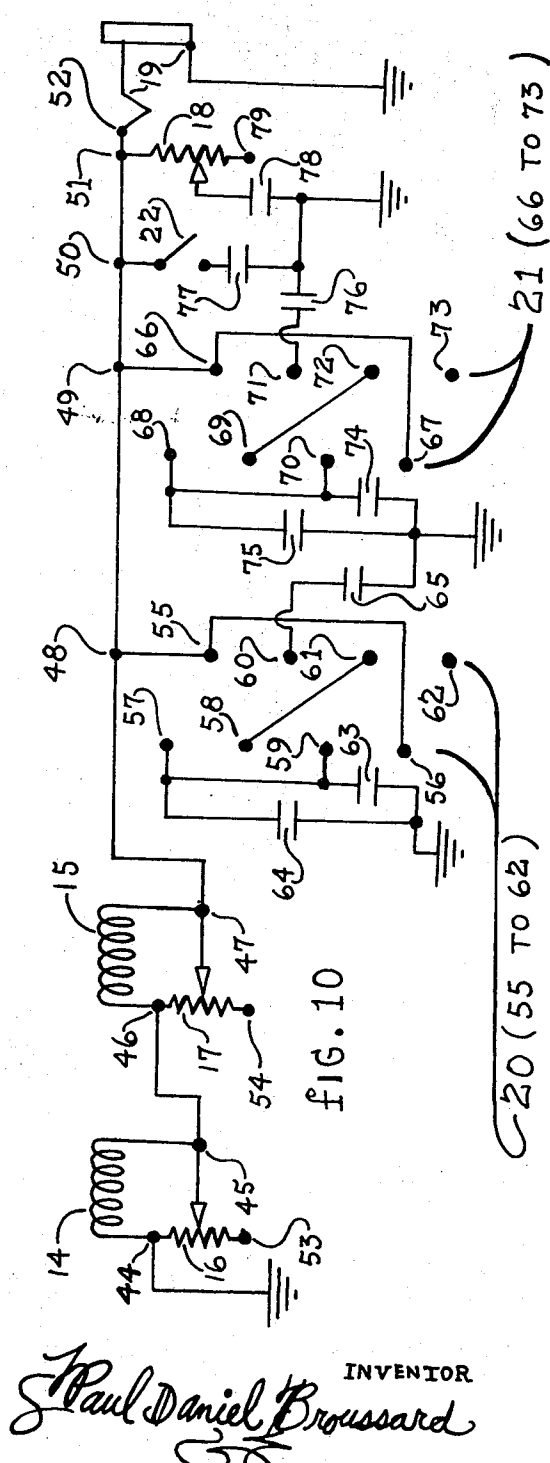
Primary Examiner—W. E. Ray

ABSTRACT: Resiliently mounted and circularly adjustable plural permanent magnet-coil pickups for stringed instruments such as a guitar. An individual volume control is provided for each pickup with interconnections between controls whereby changing one does not affect the others. Tone control circuitry includes a pair of four-position switches, a single-position switch, and a variable resistor.





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PLURAL ELECTROMAGNETIC PICKUP SYSTEM FOR STRINGED MUSICAL INSTRUMENT WITH TONE AND VOLUME CONTROLS

This is a continuation of Pat. application Ser. No. 724,901, filed Apr. 29, 1968, for Pickup and Circuit Means for Stringed Musical Instrument, now abandoned.

This invention relates to stringed musical instruments such as the guitar, the mandolin, the lute, the violin, and related musical instruments. In prior art the instrument pickup is not adjustable circularly in relationship to the longitudinal axis of the instrument's strings, thus precise bass and treble tonal adjustment may not be readily performed to a precise degree. Prior art electrical circuits for the aforesaid pickups as relating to the volume control of each individual inductance could not be independently controlled, that is, in a series circuit only one volume control can be used due to one control controlling all inductances in the series. Thus, in series circuits, the pickups can be switched on and off by switches while the volume can only be controlled with one control even though there might be three pickups per instrument. This prevents the instrumentalist from custom blending and mixing the outputs of more than one pickup. In a parallel circuit, inductances again cannot be independently controlled since when more than one pickup is switched on, if the instrumentalist turns off one of the volume controls this automatically turns off the other pickup or pickups, as well known in the art. Furthermore, although prior art tonal circuits in some instances provide a variable tone control, the present tonal circuit provides improved and increased tonal modification, versatility, and variability through the use of two four-position switches, a single-position tone switch, and a variable tone control which are interconnected so as to produce and provide 10 distinct tonal settings or any combination thereof.

It is therefore an object of the present invention to provide a stringed musical instrument pickup which may be circularly adjusted for custom tone adjustment and response.

It is also an object of the present invention to provide a volume control means of for independent volume control of more than one inductance without affecting any other pickup inductance or its control.

Another object of the present invention is to provide a tone control circuit for increasing tonal modification, versatility, and variability.

In addition to these, other objects, and advantages of the present invention will become apparent in the following specification, claims, and the drawings to which they relate.

In the drawings:

FIG. 1 is a face plan view of an instrument incorporating the present invention;

FIG. 2 is an enlarged plan view of a pickup less the mounting screws;

FIG. 3 is an enlarged section taken substantially along the line 1—2 of FIG. 1;

FIG. 4 is an enlarged section taken substantially along the line 4—4 of FIG. 1;

FIG. 5 is a perspective view of the pickup less mounting screws;

FIG. 6 is a schematic of switch 20 and 21 shown in FIG. 10 showing the slide-switch slider in position 1 with corresponding terminal interconnections;

FIG. 7 is a schematic of switch 20 and 21 shown in FIG. 10 showing the slide-switch slider in position 2 with corresponding terminal interconnections;

FIG. 8 is a schematic of switch 20 and 21 shown in FIG. 10 showing the slide-switch slider in position 3 with corresponding terminal interconnections;

FIG. 9 is a schematic of switch 20 and 21 shown in FIG. 10 showing the slide-switch slider in position 4 with corresponding terminal interconnections; and

FIG. 10 is a schematic illustration illustrating the pickup, volume, and tone control circuit.

Referring now specifically to the drawings, the present invention illustrated in FIG. 1 comprises of a body 10, a neck

11, a bridge 12, a tailpiece 13, pickups 14 and 15, volume controls 16 and 17, tone control 18, plug-in jack 19, tone control switches 20, 21 and 22, the strings 23, and a resonator 24. The pickups 14 and 15 in FIG. 1 each comprise of magnets 25, 26, 27, 28, 29, and 30 such as of alnico, as shown in FIGS. 2, 3 and 5, which all have their north poles N in one direction while all the south poles S are placed adjacent to a like pole. The said pickups also comprise bobbin plates 31 and 32 shown in FIGS. 3, 4, and 5. The pickups 14 and 15 in FIG. 1 each have a coil 33 as shown in FIGS. 3 and 4 which comprises a large number of turns of magnet wire wound around the aforesaid magnets. The coil cover 34 is illustrated in FIGS. 3 and 5, and the mounting screws 35 and 36 as well as the compression springs 37 and 38 are illustrated in FIG. 3.

Each of the pickups 14 and 15 shown in FIG. 1 are mounted above the resonator 24 to prevent resonator distortion as further illustrated in FIGS. 3 and 4. The height of each pickup 14 and 15 in FIG. 1 is adjusted with the mounting screws 35 and 36 as shown in FIG. 3 for custom string and tone balance. Each pickup 14 and 15 in FIG. 1 is mounted above a strut such as indicated by 39 in FIGS. 3 and 4, and thus at a vibrational node where it does not interfere nor distort string and resonator vibration.

The angle and position of each pickup such as 14 and 15 in FIG. 1 in relationship to the longitudinal axis of the strings 23 may be adjusted by sliding or rotating pickup 14 and/or 15 in FIG. 1 circularly for custom tone adjustment and response as indicated in FIGS. 1 and 2 by 42 to 43. Adjustment of pickup 14 and/or 15 is allowed due to the mounting holes 40 and 41 provided in bobbin plate 32 in FIGS. 3 and 5. Preferably the angle within which each pickup 14 and/or 15 may be adjusted and varied is a total of approximately 20° indicated by 42 to 43 in FIGS. 1 AND 2. Thus, if the mounting screws 35 and 36 mounted in the resonator 24 in FIG. 3 are positioned at right angle to the longitudinal axis of the instrument's strings 23, the said pickups may each be varied and rotated circularly from at right angle to the strings 23 to approximately 10° in either direction from the perpendicular to the longitudinal axis of the said strings.

Referring to FIGS. 1 and 10 in the drawings, pickup 14 is controlled by variable bypass resistance 16 which is connected to the two terminals of pickup 14 while pickup 15 is controlled by variable bypass resistance 17 which is connected to the two terminals of pickup 15. The terminal 44 connects one terminal of pickup 14 and resistance 16 to ground while terminal 45 connects the other terminal of pickup 14 and resistance 16 to terminal 46 which connects one terminal of pickup 15 and resistance 17. Terminal 47 connects the other pickup 15 and resistance 17 to the tone switch 20 at terminal 48, the tone switch 21 at terminal 49, the tone switch 22 at terminal 50, the tone control resistance 18 at terminal 51, and the jack 19 at terminal 52. The other terminal of the jack 19 is returned to ground, and thus may be connected or adapted to a sound system in the manner well known in the art.

In the circuit illustrated in FIG. 10, the coil 14 and the volume control potentiometer 16 is grounded at 44 only and leads to terminal 45. Terminal 45 leads to terminal 46 which is connected to the volume control potentiometer 17 and coil 15 as indicated at 46. The variable resistance 17 is further connected at terminal 47 which leads to the jack 19 at 52. It is to be noted in FIG. 10, that terminal 53 of variable resistance 16 and terminal 54 of variable resistance 17 are not connected to anything. Therefore the potentiometers 16 and 17 in FIG. 10 are used as rheostats.

In the operation of the volume control circuit in FIG. 10, when the resistance of resistance 16 is at or near zero then pickup 14 is off, while if the resistance of control 16 is high then pickup 14 is switched on. Likewise, when the resistance of resistance 17 is at or near zero then pickup 15 is switched off, while if the resistance of resistance 17 is high then pickup 15 is switched on. The pickup coil 14 is, however, controlled only by resistance 16 and the pickup coil 15 is controlled only by resistance 17 since the said controls do not shunt the signal

output of the coils 14 and 15 to ground as does prior art. Instead, the signal output of coil 14 is eliminated by causing the bias voltage and current to bypass coil 14 and/or 15. Thus the bias voltage and current bypasses coil 14 when the resistance of resistance 16 is low or zero while bypassing coil 15 when the resistance of resistance 17 is low or zero. The said bias voltage and current, however, bypasses resistances 16 and 17 when their resistances are high. Therefore the outputs of coils 14 and 15 may be blended and mixed to any desired setting without affecting the other and vice versa, which is not the case as known in prior art. When one volume control resistance is raised to a high level or lowered to a low level of resistance the other pickup will not be shut off as in prior art series and parallel circuits. Furthermore, as the resistance of resistance 16 is gradually raised or if the resistance of resistance 16 is gradually lowered, then the pickup coil 14 output will gradually be lowered. Likewise, when the resistance of resistance 17 in FIG. 10 is gradually raised the output of pickup coil 15 will gradually be raised or if the resistance of resistance 17 is gradually lowered then the output of pickup coil 15 will be correspondingly lowered.

The four-position tone switch 20 in FIGS. 1 and 10 comprises of terminals 55, 56, 57, 58, 59, 60, 61 and 62. The terminals 55 and 56 are connected to the pickups 14 and 15 through terminal 48. Terminal 57 is connected to terminal 59 and to capacitors 63 and 64 which are returned to ground. Terminal 58 is connected to terminal 61 and terminal 60 is connected to capacitor 65 which is returned to ground. Terminal 62 is not connected to anything in this circuit. The terminals 55 to 62 are also connected to capacitors 74 and 75 as indicated in FIG. 10. The tone switch 20 provides four slide positions as indicated in FIGS. 6, 7, 8, and 9 thus providing four distinct tonal settings.

The four-position switch 21 in FIGS. 1 and 10, comprises of terminals 66, 67, 68, 69, 70, 71, 72, and 73. Terminals 66 and 67 are connected to pickups 14 and 15 through terminal 49. Terminal 68 is connected to terminal 70 and to capacitors 74 and 75 which are returned to ground, while terminal 69 is connected to terminal 72 and terminal 71 is connected to capacitor 76 which is returned to ground, and terminal 73 is not connected to anything in this circuit. The terminals 66 to 73 are also connected to capacitors 65, 77, and 78 as indicated in FIG. 10. The tone switch 21 provides four-slide positions as indicated in FIGS. 6, 7, 8, and 9 thus provides another four distinct tonal settings.

The tone switch 22 in FIGS. 1 and 10, in addition to being connected to terminal 50, is coupled to capacitors 76, 77, and 78 to provide yet another tonal setting.

The variable tone control 18 in FIGS. 1 and 10, in addition to being connected to terminal 51 is also coupled to capacitors 76, 77, and 78 to provide another adjustable tonal variation.

It is to be noted that terminal 79 in FIG. 10 is not connected to anything in the circuit. Therefore, with the tonal circuit as described and as illustrated in FIG. 10, there are provided 10 distinct tonal modifications as well as any combination thereof.

In FIG. 10 all inductances such as the pickup coils 14 and 15 are connected in series, thus adding to provide greater signal output when combined. All capacitances in FIG. 10 are connected in parallel to each other and the pickups 14 and 15 thus also adding to increase tonal modification, versatility, and variability.

SPECIFIC EXAMPLE OF COMPONENT VALUES IN FIGURE 10

Switches:

- 20—four position two pole.
- 21—four position two pole.
- 22—single throw single pole.

Resistances:¹

- 16—may be 250,000 ohm potentiometer.
- 17—may be 250,000 ohm potentiometer.
- 18—may be 250,000 ohm potentiometer.

Capacitors:

- 63—may be .05 microfarad.
- 64—may be .05 microfarad.
- 65—may be .006 microfarad.
- 74—may be .05 microfarad.
- 75—may be .05 microfarad.
- 76—may be .006 microfarad.
- 77—may be .006 microfarad.
- 78—may be .05 microfarad.

¹ Resistances 16, 17, and 18 may be potentiometers used as rheostats.

With the aforestated values, the capacitance range to ground is therefore from normal output to any stated value as well as any combination of such values. When combined with the tone controls of a sound system and/or amplifier the present tone circuit may be used to increase tone attenuation. If coupled to an amplifier, the amplifier tone setting can be set at extreme treble setting to thus provide the instrument control from extreme treble setting to approximately the same or lower setting than if the amplifier had been set at extreme bass setting.

The foregoing is considered as illustrative of the principals of the invention, further, since modifications and changes may readily occur, it is not desired to limit the invention to the exact construction, circuit, and operation shown and described, and accordingly, all such suitable modifications and equivalents may be resorted to, without falling beyond the scope of the present invention.

I claim:

1. In a stringed musical instrument, the combination comprising a body, strings stretched over and connected to said body, a signal pickup system including a mounting plate having elongated holes on said body under said strings, pickup means on said mounting plate, said elongated holes permitting said pickup means to be rotated circularly with respect to said strings to obtain precise response.

2. In a stringed musical instrument according to claim 1 wherein said pickup means may be rotated up to 10° in either direction from a central position.

3. In a stringed instrument according to claim 1 further including a strut on said body upon which said pickup means mounting plate is mounted.

4. In a stringed instrument according to claim 3 further including at least one antivibration means between said strut and said mounting plate.

5. In a stringed instrument according to claim 1 wherein said pickup means comprises at least one coil means and one permanent magnet means.

6. In a stringed instrument according to claim 1 wherein said pickup means comprises a plurality of coils and permanent magnets.

7. In a stringed instrument according to claim 1 wherein said pickup means comprises a pair of spaced pickups.

8. In a stringed instrument according to claim 7 wherein each of the pickups include a coil.

9. In a stringed instrument according to claim 8 wherein said signal pickup system includes a volume control means connected to said coils.

10. In a stringed instrument according to claim 9 wherein said volume control means comprises a floating resistor connected to a first end of each said coil, a ground connected to the junction of said first coil end of a first coil and said resistor, a slider for said resistor connected to the other end of each coil, and a connection between the other end of the first coil and the first end of a second coil.

11. In a stringed instrument according to claim 10 further including a jack connected to said other end of said second coil.

12. In a stringed instrument according to claim 9 further including tone control means connected to said volume control means.

13. In a stringed instrument according to claim 12 wherein said tone control comprises at least one multiposition switch.

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14. In a stringed instrument according to claim 12 wherein said tone control comprises a plurality of multiposition switches.

15. In a stringed instrument according to claim 12 wherein said tone control comprises a single-throw switch.

16. In a stringed instrument according to claim 12 wherein

said tone control comprises a common bus and further including at least one multiposition switch, a single-throw switch, variable resistor, and a jack, all connected to said common bus.

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