Nov. 30, 1948. H. DE ARMOND 2,455,046

GUITAR MAGNETIC MICROPHONE

Filed March 20, 1946

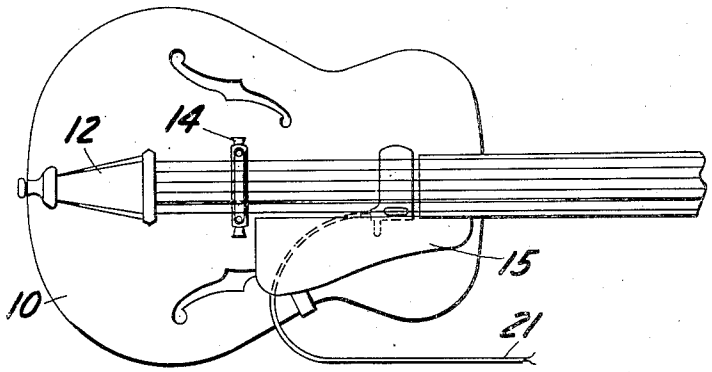

Fig. I

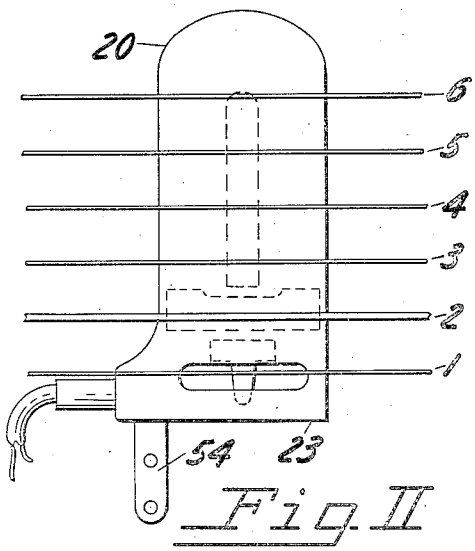

Fig. II

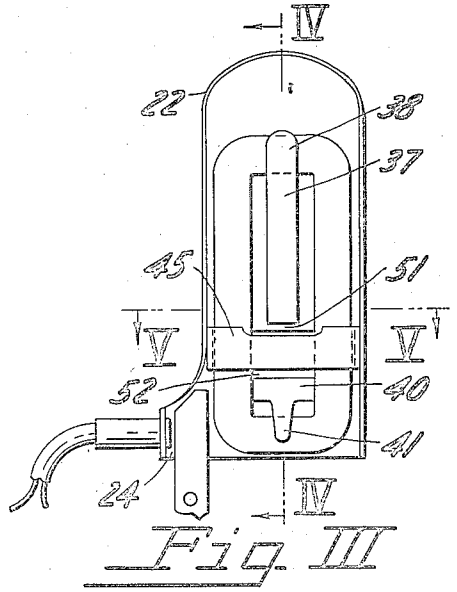

Fig. III

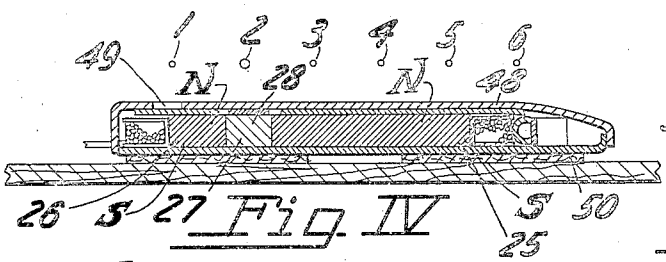

Fig. IV

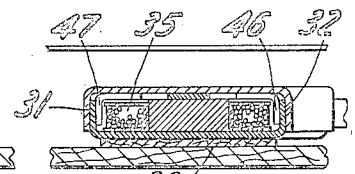

Fig. V

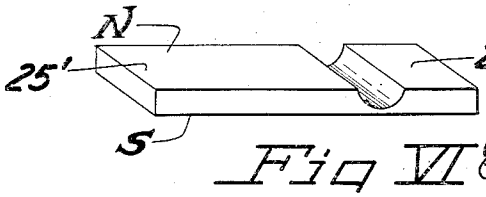

Fig. VI

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GUITAR MAGNETIC MICROPHONE

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3 Claims. (Cl. 84—1.16)

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This invention relates to an electromagnetic pick up device for use with stringed instruments to amplify the tones produced by instruments.

One of the objects of the present invention is to provide an electromagnetic pick up device of the type indicated which will amplify the several varying types of strings used on such an instrument in a more or less equal manner so that the tone produced by one string is not amplified more than those produced by others. More specifically, an object of the present invention is to provide a special arrangement of the magnets of the electromagnetic pick up device so arranged with relation to the several strings of the instruments as to accomplish the uniform amplification referred to.

A further object is to provide a correlation of magnets, pole pieces, windings; supporting casing and unique assembly thereof to produce an improved pick up greatly improving the tone quality and uniformity of the amplified notes produced by the instrument.

Further objects and advantages are within the scope of the invention such as relate to arrangement, operation, and function of the related elements of the structure, to various details of construction and to combinations of parts, elements per se, and to economies of manufacture and numerous other features as will be apparent from a consideration of the specification and drawing of a form of the invention, which may be preferred in which:

Figure I is a plane view showing the application of the pick up to a six-stringed guitar;

Figure II is a top plane view on an enlarged scale of the pick up showing its relation with respect to the strings of the instrument;

Figure III is a similar view with the cover of the pick up removed;

Figure IV is a longitudinal, sectional view taken on the line IV—IV of Figure III;

Figure V is a cross sectional view taken on the line V—V of Figure III; Figure VI shows a modified magnet.

Referring to the drawings, the invention may be applied to various types of stringed instruments, but I have here shown it applied to the body of a guitar as indicated at 10 having the usual type of tail piece 12 to which the several strings are connected. The usual type of bridge 14 is illustrated and a form of pick guard 15 is shown located as it is usually arranged along side the first string.

My electromagnetic pick up is designated generally by numeral 20 and is thin enough to be inserted between the strings and the guitar body 10.

It is understood that wires 21 are connected to

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the pick up 20 in and led to a suitable amplifier not shown. As indicated, the pick up 20 may have one end closed rounded as at 22 and the other end 23 squared off in relation to the sides so that the device may fit as closely as possible to the pick guard 15 at this end. A short lateral extension 24 receives the terminal for the wires 21.

One of the most important features of my invention is the arrangement of the magnets, the production of the magnetic field and the location of the same with respect to the strings of the guitar. Referring to Figure IV showing a successful embodiment of my invention, it will be seen that I have provided a plurality of flat permanent magnets 25 and 26 with the north pole at the top side and the south pole at the bottom in each case. These two magnets 25 and 26 are particularly spaced apart as indicated at 27, and in order to satisfactorily assemble the mechanism, a suitable spacer 28 of non-magnetic material is inserted between the magnets 25 and 26. These magnets 25 and 26 are secured to and supported by a base member 30 of U-shaped in cross section, as indicated in Figure V having the side upwardly extending side walls 31 and 32. This base is made of soft iron and forms a magnetic path cooperating with the magnets 25 and 26 so as to, in effect, bring the south pole up to a plane adjacent the top of the magnets or opposite the north pole, but spaced therefrom on either side and around the ends. Within the space between the magnets 25 and 26 of the upturned arms 31 and 32 of the base is located a winding 35 of a relatively large number of turns of wires which is connected to the wire 21 and hence to the amplifier.

Overlying one of the permanent magnets 25 is a soft iron pole piece 37, which I make narrower than the width of the magnet and also of such length as to extend over the edge thereof as indicated at 38 for purposes as will hereinafter be set forth. Over the other magnet 27 is also located a soft iron pole piece 40 of the shape indicated having a narrowed extended tongue 41 likewise for purposes more fully hereinafter set forth.

To further improve the uniformity of the amplification produced by my device, over the space 27 between the two magnets 25 and 26 is a soft iron blanking or flux conducting strip 45 having (in the particular embodiment I have here made), legs 46 and 47 to fit outside the coil 35 as indicated in Figure V. It will be also noted that the thickness of the blanking strip 45 is substantially equal to that of the pole pieces 37 and 40 so as to make the over all top surface of the pick up 20 substantially uniform throughout.

I provide a top cover 48 adapted to fit over the pick up mechanism thus far described, the cover 48 being of non-magnetic material, and in the particular embodiment herein illustrated has a transverse slot 49 therein for purposes as will hereinafter be set forth.

I also provide a pair of felt pads 50 secured to the bottom 30 so that the pick up may be applied to the equator without marring the surface of the instrument.

In Figures II and IV, I have shown the pick up 20 in its relation to the strings of the guitar which I have numbered 1, 2, 3, 4, 5, and 6 as these strings are usually thus referred to in musical nomenclature. Attention is called to the fact that in musical instruments of this kind, the number 2 string of the treble set is the relatively heavy string as is intended to be shown in Figure IV so that with ordinary electrical pick up devices the tones produced by this string are unduly amplified. By my invention it will be noted from Figure IV, particularly, that this second string 2 comes opposite the space 27 between the two magnets 25 and 26. From this it will be understood that this string 2 is more or less outside the magnetic field produced by either of the magnets 25 and 26. On the other hand, strings 3, 4, 5, and 6 in an instrument of this kind are such as to produce a more or less uniform amplification requiring no further modification of the sound produced by the magnet 25 particularly with the pole piece 37 and extended end 38. The number 1 string is a very fine string, and it will be noted from Figure II that this comes opposite the slot 49, which I provide in the cover of the device so as to aid in producing the correct volume to the amplification derived from the number 1 string. It will be also noted that the blanking soft iron blanking piece 45 is located in the space 27 between the magnets 25 and 26, and this, I have discovered, is important in connection with the use of the device in amplifying the tones produced from the other strings. This prevents the winding 35 from picking up and receiving an induced current from the number 2 string to the extent that it otherwise would in case the strip 45 were omitted.

Referring to Figure III, it will be seen that I have made the overall length of the pick up shorter by reason of providing the extension 38 on the pole piece 37 which aids in the pick up for the number 6 string since extension 38 comes under string 6 and the tongue 41 on the soft iron pole piece 40 is important in the pick up for number 1 string. In each case, it will be noted that a minimum amount of shielding from the coil 35 is effected by reason of the particular configuration of pole 37; the extension 38; the shape of pole 40, tongue 41.

Referring to Figure III a further important feature of my assembly resides in the fact that the soft iron pole piece 47 is spaced as indicated at 51 from the blanking strip 45 and the pole piece 40 is likewise spaced as indicated at 52 from said blanking strip in order to insure maintenance of the several fields of magnetic flux as produced by the separated magnets 25 and 26 as heretofore referred to.

Referring to Figure II, it will be seen that I have secured to the base of the pick up an attaching foot 56 adapted to be screwed on the underside of the pick guard 15 as indicated in dotted lines, Figure I.

In Figure VI, I have shown a modification in which the two part magnet 25 and 26 and separation gap 27 are illustrated as connected together or made in one piece as designated at 25' and 26' with a transverse separating kerf or groove as shown. The magnets shown in Figure VI are then assembled as in the other embodiment shown in Figures II to V.

It is apparent that, within the scope of the invention, modifications and different arrangements may be made other than is herein disclosed, and the present disclosure is illustrative merely, the invention comprehending all variations thereof.

What I claim is:

1. In an electromagnetic pick up device, said pick up adapted to fit between the strings and casing of a musical instrument and including a thin, oblong shaped casing having an open, box-like base portion and a top cover portion, the core of said electromagnetic device comprising a flat elongated magnet, magnetized from one flat face as one pole to the other flat face as the other pole, a juxtaposed section of non-magnetic material and a second piece of elongated magnetic material positioned at right angles to said first-mentioned magnet, said sections forming a thin transversely magnetized core of compact construction; a winding consisting of a large number of turns of conductive wire surrounding said three elements of said core binding the same in correlative position, said winding being located between said core and the walls of said box-like base, said base forming one of the pole pieces of said magnets; the other pole including two metal pieces, including one flat elongated section of metal extending over one end of said windings and said first mentioned elongated magnetic material of said core; and another pole piece located over said last mentioned magnet and having a tongue extending over the other end portion of said winding said top cover being of magnetically impermeable material and having a depending flange closely fitting over the side walls of said bottom box-like base portion of said casing to retain the parts in assembled position.

2. In an electromagnetic pick up device, said pick up adapted to fit between the strings and casing of a musical instrument and including a thin, flat casing having two telescoping box-like open base and top portions, the core of said electromagnetic device comprising a flat elongated magnet, magnetized from one flat face as one pole to the other flat face as the other pole, a juxtaposed section of non-magnetic material and second piece of elongated magnetic material spaced from said first mentioned magnet, said sections forming a thin transversely magnetized core of the compact construction; a winding consisting of a large number of turns of conductive wire surrounding said three elements of said core binding the same in correlative position, said winding being located between said core and the walls of said box-like base, said base forming one of the pole pieces of said magnets; the other pole piece including a flat elongated section of metal extending over one end of said windings and said first mentioned elongated magnetic material of said core; and another pole piece located over said last mentioned magnet and having a tongue extending over the other end portion of said winding, a flat metallic flux conducting strip over said middle section of non-magnetic material, said strip located between said top poles and of substantially the same thickness thereof; said top cover composed of magnetically imper-

meable material having a depending flange closely fitting over the side walls of said base portion of said casing to retain the parts in assembled position.

3. In an electromagnetic pick up device, said pick up adapted to fit between the strings and casing of a musical instrument and including a thin laterally extended casing having two telescoping box like open base and top portions, one end of said casing being enlarged to receive the leads to the amplifier, said ends squared off to position the device against the pick guard of a guitar, the core of said electromagnetic device including a flat elongated permanent magnet; a juxtaposed section of non-magnetizable material; and a second permanent magnet spaced from said first mentioned magnet, both of said magnets being magnetized from one flat face as one pole to the other flat face as the other pole, said sections forming a thin transversely magnetized core of compact construction; a winding consisting of a large number of turns of conductive wire surrounding said three elements of said core binding the same in correlative position, said winding being located between said core and the walls of said box-like base, said base forming one of the pole pieces of said magnets; the other pole piece including a flat elongated section of metal extending over one end of said windings and said first mentioned elongated magnet of said core; and another pole piece located over said last mentioned magnet and having a tongue extending over the end portion of said winding, a flat U-shaped transverse strip of flux conducting material over said middle core section, the depending ends of said strip located between the winding and the inside casing side walls to retain the strip in place, said top cover being of non-magnetic material and having a depending flange closely fitting over the side walls of said base portion of said casing to retain the parts in assembled position.

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