Feb. 20, 1951 D. F. BALMER 2,542,457

ELECTRODYNAMIC PICKUP

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Fig. 1

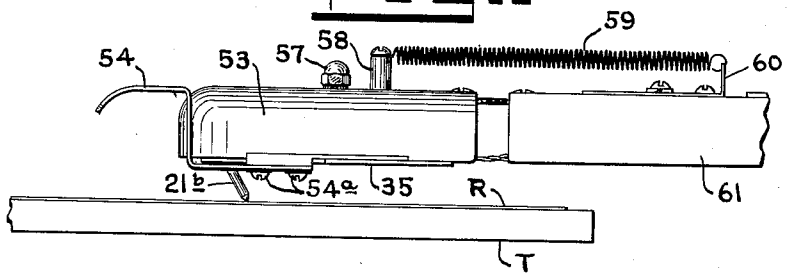


Fig. 2

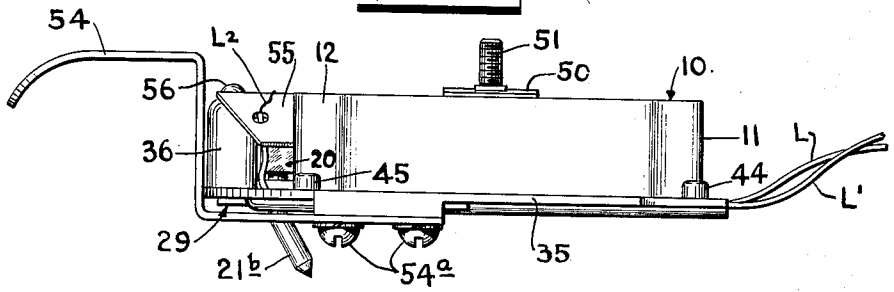


Fig. 3

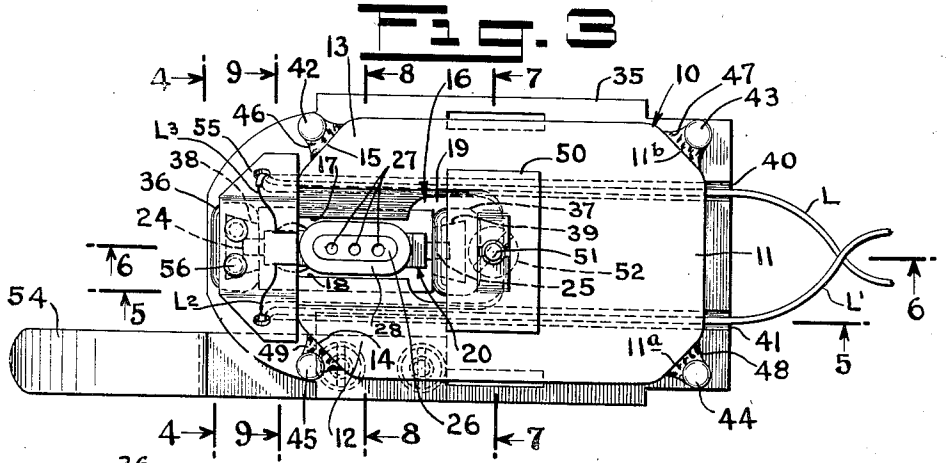
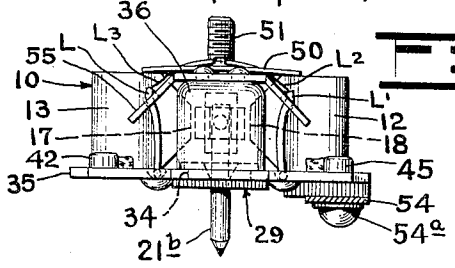


Fig. 4



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Fig. 5

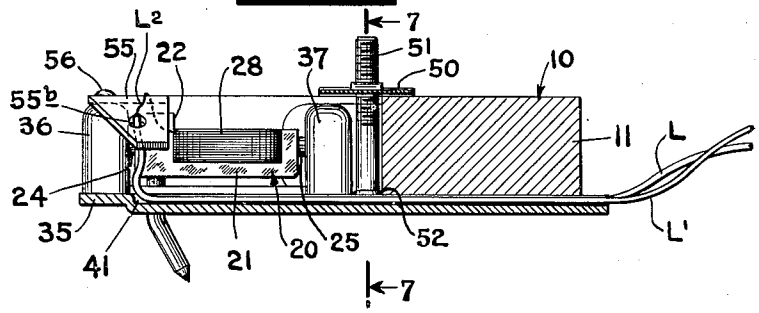


Fig. 6

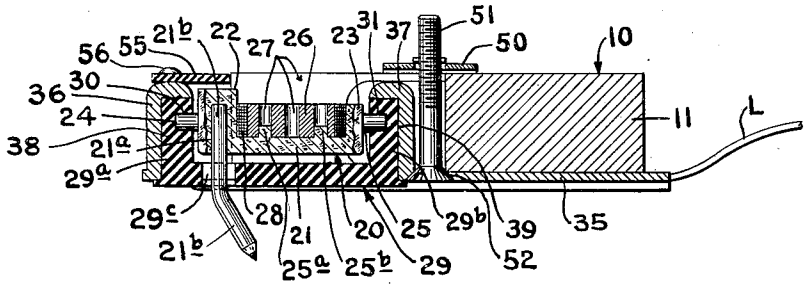


Fig. 7

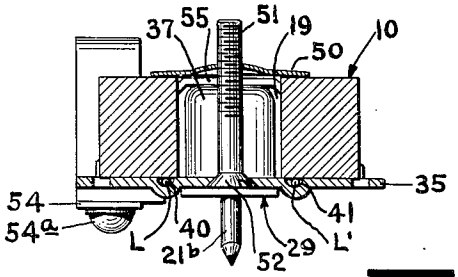


Fig. 8

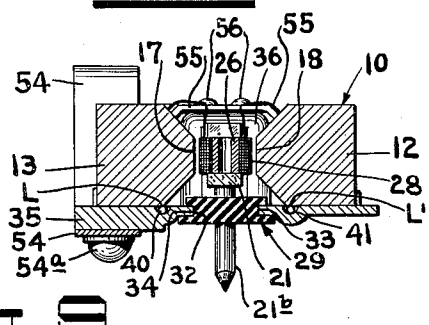
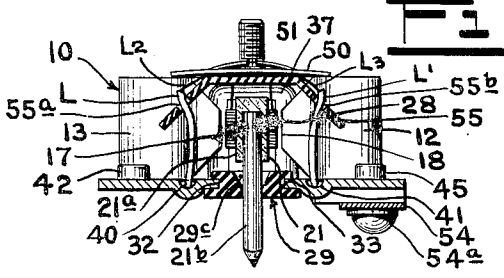


Fig. 9



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Patented Feb. 20, 1951 2,542,457

UNITED STATES PATENT OFFICE

2,542,457

ELECTRODYNAMIC PICKUP

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Application December 31, 1946, Serial No. 719,381

9 Claims. (Cl. 179—100.41)

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This invention relates to phonographs, and more particularly to an electrodynamic moving coil pickup located in a magnetic field and especially adapted for use on a rotating flat disk record.

One object of the present invention is to provide an improved moving-coil pickup of the above nature having an elongated iron core surrounded by a similar-shaped coil mounted in a rigid light weight plastic stylus-carrying armature freely and flexibly supported in an integral soft rubber base in such a manner as to reduce undesired vertical oscillations of the pickup stylus, and thus avoid resultant gurgling sounds which might otherwise occur.

A further object is to provide a pickup unit of the above nature having a unitary rubber armature mounting having a stylus-receiving aperture of wedge-shaped cross section to limit and dampen the lateral vibrations of said stylus.

A further object is to provide a pickup unit of the above nature having a flat base on which are four upstanding corner lugs for locating and holding the field magnet rigidly in operating position.

A further object is to provide an improved pickup of the above nature, which will be inexpensive to manufacture, freely movable, simple in construction, having reduced record wear, compact, improved tracking, low surface noise, ornamental in appearance, faithful in reproduction, and very efficient and durable in use.

With these and other objects in view, there has been illustrated on the accompanying drawings one form in which the invention may conveniently be embodied in practice.

In the drawings,

Fig. 1 represents a side view of the pickup head as it appears during use mounted on a supporting arm, and with its stylus resting upon a disk record.

Fig. 2 is a side view of the pickup head, shown on a larger scale, and with the cover casing removed to illustrate the interior construction.

Fig. 3 is a top plan view of the same.

Fig. 4 is a transverse sectional view of the same, taken along the line 4—4 of Fig. 3, looking in the direction of the arrows.

Fig. 5 is a longitudinal sectional view of the same, taken along the line 5—5 of Fig. 3.

Fig. 6 is a similar longitudinal sectional view, taken along the line 6—6 of Fig. 3.

Fig. 7 is a transverse sectional view, taken along the line 7—7 of Figs. 3 and 5.

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Fig. 8 is a transverse sectional view, taken along the line 8—8 of Fig. 3.

Fig. 9 is a transverse sectional view, taken along the line 9—9 of Fig. 3.

The present invention is an improvement over a prior patent No. 2,213,936, granted to Lincoln Thompson, September 3, 1940, entitled "Electrodynamic Pickup," a prior Patent No. 2,360,021 granted to Lincoln Thompson and Robert L. Stone, October 10, 1944, entitled "Stylus Brace for Stepback Mechanisms," and a prior application, Serial Number 548,583, filed August 8, 1944, by Donald F. Balmer, entitled "Humless Electrodynamic Pickup," Patent No. 2,416,082, dated February 18, 1947.

Referring now to the drawings, in which like reference numerals denote corresponding parts throughout the several views, the numeral 10 indicates a U-shaped magnet having a rear section 11 provided with beveled corners 11a, 11b, and a pair of forward integral pole pieces 12, 13, having bevelled corners 14, 15, similar to the corners 11a, 11b, previously mentioned.

The forward part of the magnet 10 is provided with a key-hole shaped aperture 16 having a round-cornered square rear section 19 for embracing the rear mounting of the armature 20, to be described later, said square section being located substantially at the center of said magnet 10.

The forward portion of the keyhole aperture 16 has a pair of inwardly converging pole faces 17, 18 for concentrating the magnetic flux on a light weight non-magnetic U-shaped armature frame 20 preferably of rigid plastic material and having a lower base section 21.

The armature frame 20 comprises an upstanding front lug 22 provided with a bottom-opening socket 21a for receiving an angular stylus 21b, preferably having a sapphire ball point. The armature frame 21 also has an upstanding rear lug 23, and a pair of horizontal small longitudinal bearing pins 24, 25 are provided on the front and rear of said lugs 22, 23.

Mounted upon the lower section 21 of the armature 20 is an elongated iron core 26, provided with rounded ends, having three vertical holes 27, and a surrounding elongated coil 28 preferably of enameled insulated copper wire. Provision is also made of a pair of upstanding short guide pins 25a, 25b fitted into the front and rear holes 27.

The armature frame 20 is adapted to be mounted in a unitary soft rubber U-shaped supporting block 29 having upstanding integral end posts

29a, 29b, provided with dove-tailed diverging ends.

The posts 29a, 29b of the armature supporting block 29 are provided with a pair of integral horizontal pin-receiving sockets 30, 31, and the base of said support 29 has a rectangular opening 29c, the sides of which are wedge-shaped in cross-section for engaging the pickup stylus 21b for limiting and dampening the vibrations thereof. The wedge-shaped sides are so constructed that the limiting force will increase more rapidly than the lateral excursions of the stylus 21b, i. e. in accordance with a non-linear function thereof.

One advantage of this construction is that when the pickup is backspaced in transcribing, the use of a stylus brace to prevent undue yielding of the armature unit is avoided—the wedge-shaped edges of the rectangular opening in the rubber mounting serving to limit movements of the armature to a small angle.

The rubber supporting block is also provided with a pair of longitudinal side grooves 32, 33 for embracing the side edges of a rectangular slot 34 in the forward part of a non-magnetic base plate 35.

The base plate 35 has a pair of upstanding hollow arms 36, 37 provided with interior dovetail recesses 38, 39, which are adapted to receive and reinforce the upstanding dovetailed legs of the rubber armature support 29.

The corners of the base plate 35 are provided with upstanding magnet-locating pins 42, 43, 44, 45, which are connected to said magnet by anchors 46, 47, 48, 49 of cement, for rigidly securing said pins to the bevelled corners 11a, 11b, 14, and 15 of the magnet 10.

The base plate 35 is also provided with a pair of depressed longitudinal grooves 40, 41 for embracing a pair of lead wires L and L_1.

The playback head is also provided with a rectangular nut plate 50 for holding the magnet 10 firmly upon the base plate 35. The nut plate 50 has a pair of inwardly-extending inclined fingers for resiliently engaging a vertical screw 51 having a head 52 located under the base plate 35.

The pickup head is also provided with a Z-shaped forward handle 54 secured to the base plate 35 by screws 54a for facilitating the lifting of the same from the record R located on the turntable T. A casing cover 53 is secured in position by an ornamental cup-shaped nut 57 on the top of the screw 51.

Provision is also made of a U-shaped terminal guide strip 55 located in front of the magnet 10 for accurately positioning a pair of connecting wires L_2, L_3, said strip having a pair of side apertures 55a, 55b. The strip 55 is connected to the forward post 36 by a pair of rivet pins 56. The casing cover 53 has an upstanding post 58 to which is connected the forward end of a counter-balancing spring 59, the rear end of which is secured to a post 60 on a horizontal pickup arm 61.

Operation

In operation, the lateral vibrations of the pickup stylus 21b in the spiral grooves of the record R will cause the armature 20 to oscillate about a longitudinal axis passing through the small supporting pins 24, 25, with the coil 26 in the field of the magnet pole pieces 17, 18. This will produce voltage variations in accordance with the modulations of the speech or other sounds to be reproduced.

While there has been disclosed in this specification one form in which the invention may be embodied, it is to be understood that this form is shown for the purpose of illustration only, and that the invention is not to be limited to a specific disclosure, but may be modified and embodied in various other forms without departing from its spirit. In short, the invention includes all the modifications and embodiments coming within the scope of the following claims.

Having thus fully described the invention, what is claimed as new, and for which it is desired to secure Letters Patent, is:

1. In a phonographic electrodynamic pickup, a U-shaped magnet, a rigid coil-carrying longitudinally-extending armature of non-metallic material located between the poles of said magnet, a record-engaging stylus depending from said armature, a soft rubber yieldable unitary mounting attached to said magnet and supporting the front and rear ends of said armature, said mounting having a rectangular aperture in its base provided with wedge-shaped side edges engaging opposite sides of said stylus to cause the lateral vibrations of said stylus to be opposed by a damping force which increases more rapidly than the excursions of said stylus.

2. In a phonographic electrodynamic pickup, a U-shaped magnet, a narrow rigid coil-enclosing armature of plastic insulating material and having a record-engaging stylus, said armature comprising a pair of small horizontal longitudinal mounting pins at the front and rear ends thereof, a U-shaped cradle mounting comprising front and rear upstanding end posts located between the poles of said magnet, means attaching said cradle mounting to said magnet, said stylus depending from a forward portion of said armature and through an opening in said cradle mounting, said end posts having horizontal sockets frictionally embracing said mounting pins and supporting said armature between said poles, whereby undesired vertical oscillations of said armature coil may be reduced.

3. The invention as defined in claim 2, in which said attaching means comprises a base plate having upstanding reinforcing arms embracing outer surfaces of said end posts.

4. The invention as defined in claim 2, in which said upstanding end posts are dovetailed in shape, and said attaching means comprises a base plate having upstanding arms provided with dovetailed recesses receiving said end posts, whereby said arms may reinforce said end posts.

5. In a phonographic pick-up comprising a U-shaped magnet and a stylus and coil-carrying armature between the poles of said magnet; means attaching said armature to said magnet comprising a base plate, screw means clamping said base against an outer surface of said magnet, a plurality of pins projecting from said base plate outwardly of and adjacent the periphery of said magnet, and cement engaged between said pins and said magnet, whereby said base plate may be rigidly secured to said magnet and the effects of possible lateral movements of said screw means may be avoided.

6. In a support for a non-magnetic stylus and coil carrying armature mounted to vibrate between the poles of a U-shaped magnet of a phonographic electrodynamic pickup; a base plate, means for yieldably supporting said armature on said base plate, and upstanding pins integral with said base plate and cemented to the corners of said magnet to securely anchor it in

position thereon, said base plate being secured to said magnet by a screw having a head seated under said base plate, a casing covering said magnet, and a nut cap on the top of said screw engaging said casing.

7. In a support for a non-magnetic stylus and coil carrying armature mounted to vibrate between the poles of a U-shaped magnet of a phonographic electrodynamic pickup; a base plate, means for yieldably supporting said armature on said base plate, upstanding pins integral with said base plate and cemented to the corners of said magnet to securely anchor it in position thereon, said armature having a flat base provided with a plurality of upstanding pins, and an elongated iron core fitted over said pins and located within said coil.

8. In a phonographic electrodynamic pickup, a U-shaped magnet, a non-magnetic stylus-and-coil-carrying armature mounted to vibrate between the poles of said magnet, a soft rubber yieldable mounting for the front and rear ends of said armature, said mounting having a pair of parallel wedge-shaped side members engaging said stylus to dampen and limit the lateral excursions thereof.

9. The invention defined in claim 8 in which

the dampening force of said wedge members increases more rapidly than a linear function of said lateral excursions.

DONALD F. BALMER.

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The following references are of record in the file of this patent:

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Number	Country	Date
350,748	Great Britain	June 18, 1931

Certificate of Correction

Patent No. 2,542,457 February 20, 1951

DONALD F. BALMER

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 6, line 22, list of References Cited, under the heading "UNITED STATES PATENTS", for the patent number "2,463,894" read *2,453,894*; and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 29th day of May, A. D. 1951.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.