

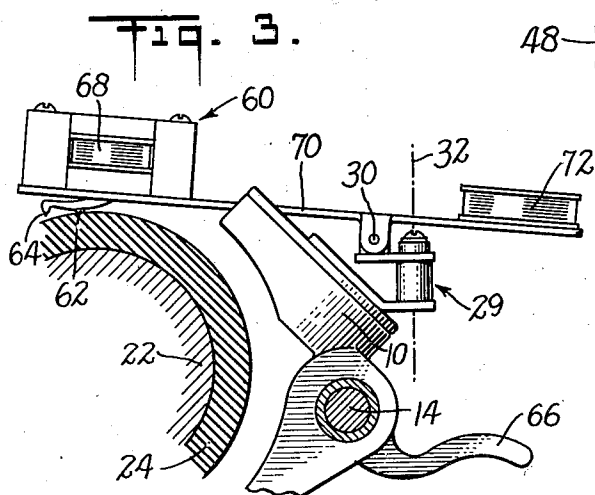
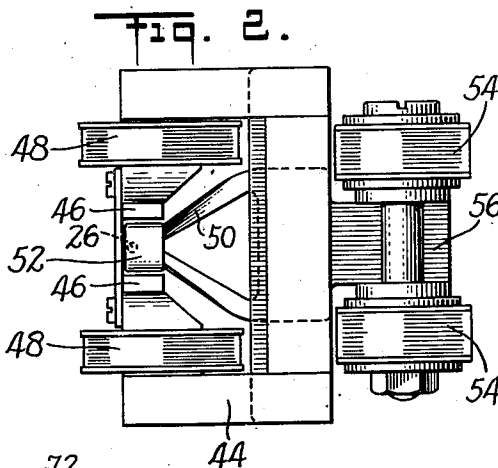
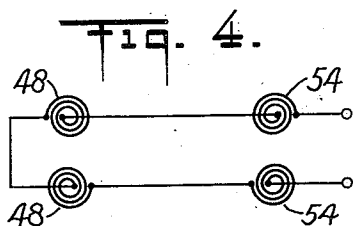
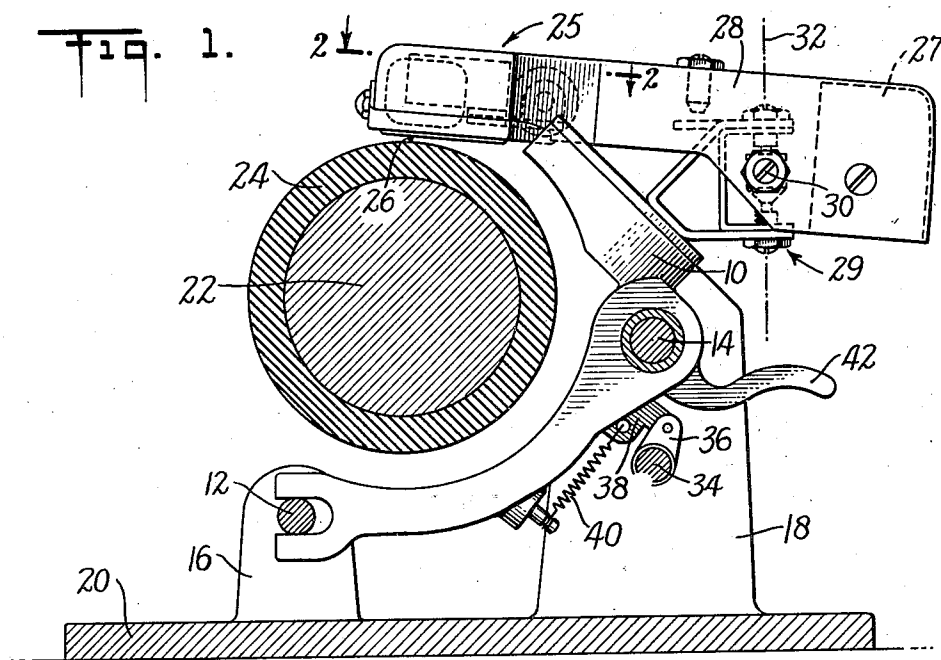
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2,275,309

REPRODUCER FOR ELECTRIC PHONOGRAPHS

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REPRODUCER FOR ELECTRIC
PHONOGRAPHS

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2 Claims. (Cl. 179—100.41)

This invention relates to electric phonographs, dictating machines, and the like, and more particularly to such machines of the transcribing type and to reproducers for use with such machines.

One difficulty frequently encountered in the operation of electric sound reproducing machines is that the sound reproducing or "pickup" unit, in addition to picking up the sound from the record groove, also picks up considerable noise, usually termed "hum," from stray electrical fields in the neighborhood of the machine. Such stray electrical fields are frequently developed by the apparatus customarily used in electric phonographs, such as driving motors, power transformers, choke coils, and other electromagnetic devices, and these stray fields are particularly disadvantageous when the electrical phonograph is operated from an A. C. power supply.

It is an object of this invention to provide an electrical reproducer for use in electric phonographs in which the deleterious effect of stray electric fields is minimized or eliminated.

It is a further object of this invention to provide means adapted to cooperate with electric reproducers to overcome the effects of stray fields, and thereby to eliminate undesirable noise effects in the output of the phonograph.

These and other apparent objects and advantages of this invention are obtained by the means described in the following specification and may be more readily understood by reference to the accompanying drawing, in which:

Figure 1 is a side elevation, partly in section, of a portion of an electric phonograph including an electromagnetic reproducer unit;

Figure 2 is a plan view of the electromagnetic reproducer unit shown in Figure 1, taken on line 2—2;

Figure 3 is a side elevation, partly in section, of a portion of an electric phonograph showing another embodiment of the invention; and

Figure 4 shows schematically suitable electrical connections for the apparatus shown in Figures 1 and 2.

The phonographic machine, shown in Figures 1 and 2 for the purpose of illustrating the invention, is a transcribing machine having a carriage 10 mounted on guide rods 12 and 14 supported on frames 16 and 18, respectively, attached to a base 20. A mandrel 22, adapted to support a sound record blank 24, is suitably rotatably mounted above the base 20 parallel to the guide rods 12 and 14. An electromagnetic reproducer unit, generally indicated at 25, having a vibratory

stylus 26, is encased in a supporting arm 28 which in turn is suitably mounted on the carriage 10 by means of a gimbal-type pivot structure, generally indicated at 29.

The pivot structure 29 may be of any suitable type which permits motion of the reproducer unit 25 toward and away from the record 24 by rotation of the arm 28 about a substantially horizontal axis 30, and one which further permits limited rotation in a horizontal plane about a substantially vertical axis 32 to permit the stylus 26 freely to track the record sound groove when the machine is conditioned for reproducing. This pivotal mounting structure 29 may also be provided with an arrangement to limit the oscillatory motion about the vertical axis 32 during those periods when the machine is not conditioned for reproducing. Suitable apparatus for accomplishing all of these functions is illustrated in U. S. Patent 2,152,440 to Leland D. Norton and is not further described herein, because this apparatus per se does not form a portion of the present invention.

The reproducer support arm 28 is provided with a counterweight 27 mounted on the other side of the pivotal axis 30 from the reproducer 25 to partially counterbalance the pressure exerted on the record 24 by the stylus 26 due to the weight of the reproducer 25 alone.

The usual mechanism is also provided for progressively moving the reproducer carriage 10 along the surface of the record 24 so that the stylus 26 may follow the spiral sound groove cut in the surface of the record 24. This is accomplished by means of a feed screw 34 rotatably supported on the frame 18 and preferably driven by the same motor which drives the mandrel 22. A feed nut 36, pivotally mounted on a pivotal arm 38 attached to the carriage 10 and normally held against the feed screw 34 by means of a spring 40, supplies the driving connection between the feed screw 34 and the carriage 10. A manually operable lever 42 is provided for temporarily disengaging the feed nut 36 from the feed screw 34 and for lifting the stylus 26 from the surface of the record 24 when it is desired to move the reproducer 25 to some other portion of the record.

The reproducer unit 25 may be any suitable sound translating device, such, for example, as that shown in the co-pending application Serial No. 263,229 filed by Leland D. Norton. As may be more easily seen in the enlarged section shown in Figure 2, this device comprises a C-shaped magnetic circuit structure 44 in which the tips

of the C form the pole tips 46 of the magnet. Two pickup coils 48 surround the pole tips 46 and a resilient armature supporting member 50 supports an armature member 52 carrying the stylus 26 between the pole tips 46, substantially as shown. It is to be understood that this electromagnetic reproducer device does not per se form a portion of the present invention, and might be any suitable reproducer unit having operating coils corresponding to the coils 48.

In a phonograph instrument of the type just described, the driving motor, amplifier transformers, chokes, etc., are frequently mounted in the proximity of the electromagnetic reproducer 25, usually beneath the base 20. Thus the pickup coils 48 of the reproducer 25 usually are cut by stray fields from these elements and thus transient voltages are developed in these coils. These transient voltages, as well as the sound signals developed by the reproducer unit, are amplified and produce undesirable noises in the output of the phonograph. When the apparatus is operated on an A. C. power supply, the stray field is usually a 60-cycle field or the equivalent, so that the transient voltages developed in the pickup coils 48 by this stray field usually manifest themselves as a 60-cycle hum in the output of the phonograph.

In accordance with the present invention, in order to counteract this stray field effect and eliminate the hum from the phonograph output, a compensating coil is provided, mounted near the pickup coil of the reproducer. This coil is given electrical characteristics similar to those of the pickup coil of the reproducer, it is connected oppositely in series with the pickup coil, and it is mounted as close to the reproducer pickup coil as possible and is moved therewith so as to be subject to substantially the same stray field effects. Thus, the parasitic voltages developed in this compensating coil due to the stray fields, are substantially equal and opposite to the voltages produced by the stray fields in the pickup coil. If the particular electromagnetic translating unit being used is provided with more than one pickup coil, then a plurality of compensating coils may be used, if desired, each one corresponding to a particular pickup coil of the translating device. In accordance with the preferred embodiment of the present invention, a compensating coil is provided for each pickup coil in the reproducer unit, and this compensating coil is given electrical characteristics substantially the same as those of its corresponding pickup coil. Each compensating coil is mounted as closely as possible to its corresponding pickup coil, and it preferably lies in the plane of its pickup coil with its axis parallel to the axis of the pickup coil. However, it is positioned so that its winding runs in the opposite direction to the winding of the pickup coil, and it is connected in series with the pickup coil.

In the present embodiment of the invention, as shown in Figure 2, the reproducer unit 25 is provided with two pickup coils 48, and two compensating coils 54 are mounted on a bracket 56 extending rearwardly from the frame supporting the magnetic structure 44. These coils 54 are connected in an opposed manner in series with the pickup coils 48, as shown in Figure 4.

With this arrangement, the parasitic voltages developed in the pickup coils 48 due to stray fields are canceled out because equal and opposite voltages are developed in the corresponding

compensating coils 54, in the manner above described.

Figure 3 shows a portion of a double purpose electric phonograph which may be used either for dictating or transcribing. For the purpose of describing the present invention, it may be considered as having substantially the same parts as the transcribing machine shown in Figure 1 and similar characters have been used on similar elements, except that additionally it is provided with means for moving the combined recorder-reproducer unit, generally indicated at 60, which is provided with a recording stylus 62 and a reproducing stylus 64, into either its recording or reproducing positions by means of a lever 66 associated with the carriage 10 and the carriage guide 14. The dual purpose electromagnetic translating device 60, which is provided with only one pickup coil 68, is mounted on one end of a lever secured to the carriage 10 by means of a suitable pivotal arrangement 29, in the manner above described. However, in this embodiment a compensating coil 72, having electrical characteristics similar to those of the pickup coil 68, is positioned on the lever 70 on the other side of the pivotal axis 30 from the translating unit 60 in approximately the same plane as pickup coil 68 and with its axis approximately parallel to that of pickup coil 68. With this arrangement, the compensating coil 72 not only is effective in eliminating the hum picked up by the pickup coil 68, but, in addition, the weight of this coil 72 is used as a counterweight to counterbalance the weight of the translating device 60 to effectively replace the counterweight 27 shown in Figure 1.

As many possible embodiments may be made of the above invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In an electric phonograph adapted for use with cylindrical records of the "hill and dale" type, the combination of, a base plate, a mandrel mounted above and parallel to said base plate and adapted to support and drive a cylindrical record surface, a carriage guide rod mounted above said base plate and parallel to the axis of said mandrel, a carriage member slidably mounted on said guide rod and adapted to be moved longitudinally along said mandrel, a support member pivotally mounted on said carriage member for movement about an axis parallel to the axis of said mandrel, an electromagnetic translating device having an operating coil and adapted to coact with a "hill and dale" type record groove mounted on one end of said support lever for movement toward and away from a record surface on said mandrel, and a hum compensating coil mounted on the other end of said support lever on the opposite side of its pivotal mounting from said sound translating device and at approximately the same distance above said base plate as the operating coil of said translating device whereby said compensating coil partially counterbalances the weight of said translating device while traveling in the same direction with said translating device along said record surface in a path parallel to the axis of said mandrel and always at approximately the same distance as the operating coil of said translating device from sources of stray electric fields beneath said base plate.

2. In an electric sound reproducing machine

adapted to reproduce cylindrical wax records of the "hill and dale" type, the combination of, a base, a cylindrical mandrel mounted above and with its axis parallel to said base and designed to support and drive a cylindrical record, carriage 5 guide rods mounted above said base parallel to the axis of said mandrel, a carriage slidably mounted on said guide rods, means moving said carriage longitudinally in a path parallel to the axis of said mandrel, a pickup support member 10 pivotally mounted on said carriage for movement about an axis parallel to said guide rods, an electromagnetic phonograph pickup having a pickup coil mounted on one end of said pickup support lever for movement toward and away 15

from a record on said mandrel, and a hum compensating coil mounted on the other end of said pickup support lever on the opposite side of its pivotal mounting from said pickup with its axis parallel to the axis of said pickup coil and at approximately the same distance above said base as said pickup coil whereby said hum compensating coil partially counterbalances the weight of said pickup while traveling in the same direction with said pickup along said record in a path parallel to said base and the axis of said mandrel and always at approximately the same distance as the pickup from sources of stray electric fields beneath said base.

LELAND D. NORTON.