

PATENT SPECIFICATION

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(54) PICKUPS

(71) We, ORTOFON MANUFACTURING A/S, a Danish company, of Mosedalvej 11 B, DK-2500 Valby, Denmark, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to pickups.

10 In a known pickup, an armature is mounted perpendicularly on an end of a stylus arm and has a central portion which is held in engagement with a firmly supported resilient bearing element with a certain pressure. The armature is held tightly against a rubber pad provided as bearing element by a nickel plated piano wire, one end of which extends into and is secured in an axial central bore in the end of a pole leg and the other end of which is attached to the end of the tubular stylus arm. Over a short length immediately behind the armature the nickel plating has been removed, and this length will form the armature fulcrum about which it can oscillate in all directions in response to the movements of the stylus in a stereo sound track. The rubber pad acts as bearing element and restoring spring which defines the neutral position of the stylus arm and armature. To ensure that the armature fulcrum is fixed and well defined at both low and high frequencies and to provide adequate damping and channel separation, the rubber pad should be relatively rigid and should preferably consist of a relatively hard rubber of high elasticity modulus. If the pad is of a softer rubber it has to be correspondingly tighter compressed. The high rigidity required in the bearing element reduces the compliance and tracking ability of the pickup. In other words, the various functions assigned to the elastic bearing element in the known construction make it necessary in dimensioning, mounting and selection of material for the bearing element to compromise between partly conflicting considerations.

50 A dynamic pickup with wound armature suffers from the further disadvantage that the armature windings make the side face of the armature abutting on the rubber pad

uneven, with the result that the reaction of the rubber pad will not be the same in all directions and the neutral position will be less well defined than desirable.

As will become apparent later, in an embodiment of the present invention which is illustrated herein and is described below, we aim to provide a pickup in which it is possible to combine a well defined bearing for the oscillating system with good tracking and damping properties, to provide a smooth frequency response with good channel separation and low distortion.

According to the present invention, there is provided a pickup comprising a transducer means which is mounted on an end of a stylus arm for universal pivotal movement and is arranged in a magnetic or electrostatic field so as to convert movement of the stylus arm into electrical signals, an area of said transducer means around and adjacent to the pivot being in engagement with a firmly supported resilient bearing element, and there being further provided at least one firmly supported rubber member of a material that is softer and has better damping qualities than that of the resilient bearing element, which rubber member abuts the stylus arm or a part that moves therewith at a greater distance from said pivot than that at which said bearing element bears against the transducer means, and with a lower pressure than that with which said bearing element bears against the transducer means.

In such a construction, the damping and partly the restoring function are performed by the additional rubber member or members, which can be adapted specifically to serve that purpose. The invention, in other words, offers the designer increased possibilities of selecting desired properties in designing a pickup and thus leads to less compromised solutions.

The additional rubber member or members may contribute to restoring the transducer means to neutral position with considerable effect because they act with a greater moment arm than does the bearing element. A further possible advantage of the additional rubber member or members is that

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they may prevent or at any rate highly impede torsional vibrations of the stylus arm and transducer means, thus eliminating or attenuating the crosstalk caused by such vibrations.

In the case of a dynamic pickup having a wound armature as transducer means, the invention may provide the still further advantage that the additional rubber member or members may be arranged to engage the armature outwardly of the windings so that any unevenness of the windings will not result in directional irregularities.

The additional rubber member or members should preferably consist of a relatively soft synthetic rubber having a relatively high attenuation effect, because the desired degree of intrinsic attenuation can be imparted to synthetic rubber.

In an embodiment of the pickup which is particularly expedient, the additional rubber member is formed as a sleeve against which edge portions of the transducer means abut. The said rubber sleeve may be easy to manufacture and mount, and may engage the transducer means right out at its edges where the moment arm is longest and the effect therefore greatest.

A particularly good contact between the transducer means and the rubber sleeve is obtained by a construction in which the sleeve is provided on its inner face with a peripheral flange against which edge portions of the transducer means abut.

The stylus pressure at which a pickup engages a gramophone record displaces the stylus arm and transducer means from the rest position. To ensure that the transducer means will be in the neutral position after this displacement, the rubber pad may be suitably unsymmetrical and an outer face of the sleeve flange may extend in a plane forming an angle slightly less than 90° with the sleeve axis.

To assist in understanding the invention and to show how it may be carried out, an embodiment thereof will now be described, by way of example, with reference to the accompanying drawing, in which:

Fig. 1 presents a longitudinal section through part of a pickup; and

Fig. 2 presents an end view of the pickup with a yoke removed.

The drawing shows the end portion 10 of a cylindrical pole leg which conducts the magnetic flux from a permanent magnet (not shown) to the air gap between the end face of the pole leg and a yoke 11 placed opposite said end face and returning the flux to the magnet. In the air gap is provided transducer means in the form of a flat substantially square armature 12 having a projection 13 in each corner. The armature may consist of magnetizable or non-magnetizable material and is provided with two windings

14 perpendicular to one another for generating signals in respective stereo channels. The armature is secured to the rear end of a tubular stylus arm 15 extending through a central aperture in the armature and through an opening 16 in the yoke 11 and carrying at its front end a stylus 17. To the rear end of the stylus arm 15 is attached one end of a piano wire 19 provided with a nickel plating 18 and the other end of which is secured in a sleeve 20 which in turn is secured in an axial central bore 21 in the end of the pole leg 10. The nickel plating 18 is removed over a short distance immediately adjacent to the armature 12. Between the pole leg 10 and the armature 12 is interposed a rubber pad 22 abutting on the pole leg and a rubber pad 23 abutting on the armature winding. Both the said rubber members are provided with a central aperture for the nickel plated piano wire and are made from a relatively hard rubber of high elasticity modulus. The armature 12 is held firmly pressed against the pad 23 by the tension of the piano wire 19.

Between the armature 12 and the pole leg 10 there is further provided a rubber sleeve 25 consisting of a relatively soft synthetic rubber of high intrinsic attenuation capacity. In relaxed state this sleeve is substantially cylindrical with a slightly smaller external diameter than the pole leg 10, to the end face of which it is secured by means of an adhesive 26. The sleeve is provided inwardly with a peripheral flange 27 against which the corner projections 13 of the armature abut. When the armature is introduced into the sleeve the upper portion of the sleeve will be deformed to an approximately square cross-section as shown in Fig. 2. The flange 27 forms an angle of 3°—5° with the end faces of the sleeve so that the armature 12 and the stylus arm 15 in the illustrated state of rest assume a position in which their axis forms the same angle with the axis of the pole leg 10. This angle is adjusted so that the stylus arm and armature will be urged by the normal stylus pressure into a position co-axial with the pole leg.

To facilitate accurate mounting of the sleeve 25 it is provided outwardly with a marking nose 28 opposite the lowest point of the flange 27.

All armature movements will cause compression of both the rubber sleeve 25 and of the rubber pad 23 and for that matter also of the rubber disc 22 whose main object, however, is to bridge the bore 21 in the pole leg 10. Without the sleeve 25 it would be necessary to dampen the natural vibrations of the pickup by making the pad 23 of a relatively hard rubber, but this would impede the tracking ability of the pickup. The attenuation of the natural vibrations by the sleeve 25, the material and dimensioning

of which are selected first and foremost with a view to this function, makes it possible to preserve the good tracking ability of the pickup and at the same time to provide the desirable attenuation. It will be seen that the corner projections 13 of the armature extend slightly into the sleeve 25. This serves to prevent or at any rate to strongly reduce crosstalk producing vibrations of the armature about its own axis, that is torsional vibrations about the piano wire 19.

The structural details of the illustrated and described pickup may be modified in many ways within the scope of the invention as defined in the appended claims. For instance, the pickup could be magnetic, instead of electrodynamic as shown, and have an armature comprising soft iron, or a permanent magnet. As a further alternative, the pickup could be electrostatic, in which case the transducer means may comprise an insulating plate provided with a conductive coating. Instead of the illustrated rubber sleeve acting upon the armature, there might be used a rubber bushing positioned in an opening 16 in the yoke and adapted to act upon the stylus arm. Further, the rubber disc 22, the rubber pad 23 and the rubber sleeve 25 might be manufactured as a single, substantially cup shaped element with a central column corresponding to the pad 23 and of such height that it would be compressed more than the outer cylindrical portion when the armature unit was mounted.

WHAT WE CLAIM IS:—

1. A pickup comprising a transducer means which is mounted on an end of a stylus arm for universal pivotal movement and is arranged in a magnetic or electrostatic field so as to convert movements of the stylus arm into electrical signals, an area of said transducer means around and

adjacent to the pivot being in engagement with a firmly supported resilient bearing element, and there being further provided at least one firmly supported rubber member of a material that is softer and has better damping qualities than that of the resilient bearing element, which rubber member abuts the stylus arm or a part that moves therewith at a greater distance from said pivot than that at which said bearing element bears against the transducer means, and with a lower pressure than that with which said bearing element bears against the transducer means.

2. A pickup according to claim 1, wherein said rubber member is of synthetic rubber.

3. A pickup according to claim 1 or 2, wherein said rubber member is formed as a sleeve against which edge portions of the transducer means abut.

4. A pickup according to claim 3, wherein the sleeve is provided on its inner surface with a peripheral flange against which edge portions of the transducer means abut.

5. A pickup according to claim 4, wherein that face of the flange which abuts the edge portions of the transducer means extends in a plane forming an angle of slightly less than 90° with the sleeve axis.

6. A pickup substantially as hereinbefore described with reference to the accompanying drawing.

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