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SOUND RECORDING AND REPRODUCING DEVICE

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Fig. 1.

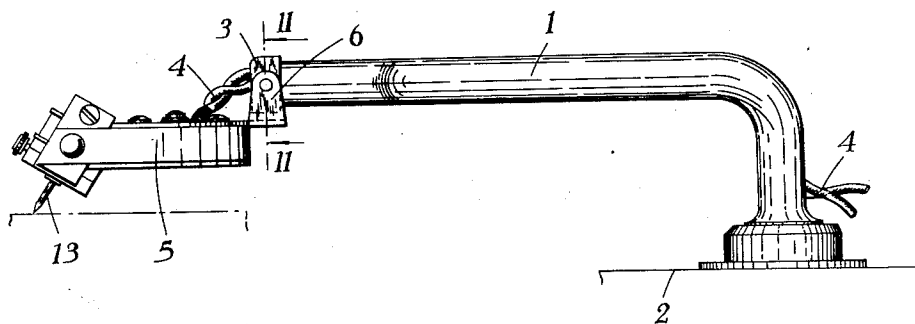
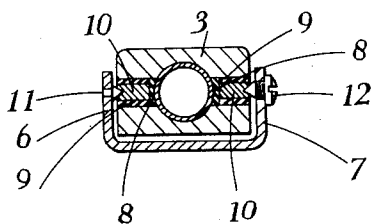


Fig. 2.



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SOUND RECORDING AND REPRODUCING
DEVICEAlbert Frederick James Wright, Walthamstow,
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and in Great Britain March 1, 1930

10 Claims. (Cl. 179—100.41)

This invention relates to sound recording and reproducing devices for gramophone records and in particular to devices known as electro-magnetic recorders and pick-ups.

5 In operation the recording or reproducing device is generally supported by a carrying arm and it is found that owing to its inertia and to the compliance of its elements this combination has a resonance of from 100–200 cycles which naturally disadvantageously affects the quality of the recording or reproduction, particularly in the case of a pick-up since tracking is upset at that frequency, and it is the object of this invention to reduce this resonance to a point below 50–60 cycles at which its effects will no longer be perceptible.

The resonant frequency f of the system is proportional to

$$20 \quad \frac{1}{\sqrt{LC}}$$

where L is the equivalent mass and C the equivalent compliance of the system viewed from the stylus and the problem is to reduce the value of f which, of course, can be done by increasing either L or C or both. It is not, however, desirable to increase L to any great extent since such an increase involves both too great a stress at the point of attachment of the device to the carrying arm and is liable to damage the record or produce excessive wear. Having then chosen the maximum value for L , which will give satisfactory results, the problem resolves itself into finding a method of suitably increasing the value of C .

35 In accordance with the invention the inherent resonance of an electromagnetic sound recording or reproducing device is reduced by introducing a resilient element into the joint which allows the body of the device to move so as to keep the stylus in the recorded groove or in the groove that is being recorded and thus increasing the compliance of the device in a direction parallel to that in which the point of the stylus is moving under the influence of the vibrations imparted to it.

40 It is also of advantage to have a certain flexibility or compliance in the direction at right angles to that of the stylus motion but parallel to the record surface. Further, it is desirable that this added flexibility should be located as near as possible to the axis in the carrying arm which permits the recorder or the pick-up to have a freedom of motion in a plane perpendicular to the record surface. For best results it is found that the distance of this axis from the stylus point should not be greater than about 3 to 4 inches and the axis itself should be perpendicular to the plane which passes through the stylus at right angles to the record surface. Al-

though providing flexibility the connection must be such as to avoid rattle between the recording or reproducing device and the carrying arm. Further, in a construction in accordance with the present invention the resilient joint may provide a self-aligning bearing for the body of the device. In order that the invention may be fully understood and more readily carried into effect, one example of construction in accordance therewith will now be described as applied to an electromagnetic pick-up and with reference to the accompanying drawing, in which:

Figure 1 is an elevation of the pick-up and its carrier arm in its operative position, and

Figure 2 is a cross-section on the line II—II of Figure 1.

The carrier arm 1 is a metallic tubular member fixed at one end to a base 2 and rotatable thereon and having a rectangular enlargement 3 at its other end and houses the leads 4 to the pick-up 5.

The pick-up 5 is formed with two upstanding lugs 6 and 7, which embrace the rectangular enlargement 3. The latter is drilled at both sides and the bottoms of the holes thus formed are covered by rubber pads 8 and the holes themselves are lined with rubber bushes 9, which in turn surround steel centres 10. The lugs 6 and 7 are provided with correspondingly shaped steel centres 11 and 12, one of which is adjustable so that as tight a joint as is required can be obtained.

The rubber pads 8 and bushes 9 thus afford the required flexibility and all metallic contact is destroyed between the pick-up 5 and the carrier arm 1, so that rattle is entirely eliminated. Moreover, this construction allows the centres 10 to align themselves correctly and therefore provides a self-centring bearing.

Of course, both centres 11 and 12 may, if desired, be made adjustable or, on the other hand, they may both be fixed, the inherent spring in the lugs 6 and 7 being sufficient to allow a tight joint to be made. This inherent spring is an important factor in any case as it allows a good joint to be made which is self-adjusting without the necessity of delicate adjustment, and eliminates play which otherwise would be occasioned by wear.

The pick-up is in this way made freely movable about the axis through the centres 11 and 12, which are arranged so that this axis is at right angles to the plane through the needle 13 when the latter is in its mid-position and also to the axis of the carrier arm 1 and in addition metallic contact between the pick-up 5 and the carrier arm 1 is entirely eliminated. In these circumstances it is possible to reduce the resonance of the composite system consisting of the carrier arm 1, the pick-up 5 and the stylus 13 to a frequency which is outside the recording range.

There are, of course, many practical variations that can be made to constructional features of

the invention. For instance, instead of conical centres 11 and 12, spherical pivots may be provided or steel balls may be used in spherical or conical seatings on the centres 10 and the lugs 11 and 12; or again, the enlargement 3 on the carrier arm 1 might be drilled right through and a single steel centre used, which would thus allow the pads 8 to be dispensed with. Further, the pads 8 and bushes 9 need not necessarily be of rubber but of any similar resilient material, since their function is merely to provide a flexible connection between the pick-up 5 and the carrier arm 1.

I claim:

1. An electromagnetic instrument for the inter-conversion of sound and electrical energy, comprising in combination a body member, a stylus socket, an electromagnetic vibratory device housed in said body member and in driving connection with said stylus socket, a rigid supporting arm for said body member and a joint between said arm and said body member comprising a pair of complementary pivot members and resilient means for preventing direct and indirect metallic contact between said arm and said body member.

2. An electromagnetic instrument for the inter-conversion of sound and electrical energy, comprising in combination a body member, a stylus socket, an electromagnetic vibratory device housed in said body member and in driving connection with said stylus socket, a rigid supporting member for said body member and a joint between said arm and said body member comprising a pair of similar pivot members on one of said jointed members, a pair of complementary pivot members on the other of said jointed members, and a resilient element mounted between each member of one of the said two pairs of pivot members and one of said jointed members.

3. An electromagnetic instrument for the inter-conversion of sound and electrical energy, comprising in combination a body member, a stylus socket, an electromagnetic vibratory device housed in said body member and in driving connection with said stylus socket, a rigid supporting member for said body member and a joint between said arm and said body member comprising a pair of co-axial pivot members on one of said jointed members, at least one of said co-axial pivot members being capable of axial adjustment, a pair of pivot members complementary to said first mentioned pivot members, and a resilient element in contact with and isolating said complementary pivot members from the other of said jointed members.

4. An electromagnetic instrument for the inter-conversion of sound and electrical energy, comprising in combination a body member, a stylus socket, an electromagnetic vibratory device housed in said body member and in driving connection with said stylus, a rigid supporting member for said body member and a joint between said arm and said body member comprising a pair of co-axial pivot members on one of said jointed members, a pair of pivot members complementary to said first mentioned pivot members disposed within a pair of oppositely disposed recesses in the other of said jointed members, and resilient means disposed between said last-mentioned jointed member and said complementary pivot members for absorbing vibrations of said body member and allowing said complementary members to align themselves co-

axially with said first-mentioned pivot members.

5. An electromagnetic instrument for the inter-conversion of sound and electrical energy, comprising in combination a body member, a supporting member for said body member, one of said members being formed with a pair of oppositely disposed recesses, a pair of oppositely disposed pivot members on the other of said members, a stylus socket, an electromagnetic vibratory device, housed in said body member and in driving connection with said stylus socket, a resilient lining to said recesses and a pair of oppositely disposed seating members, situated in said recesses and co-operating with said pivot members.

6. An electromagnetic instrument for the interconversion of sound and electrical energy, comprising in combination, a rigid arm mounted to swing in one plane, a body member supported from said rigid arm by a pivotal joint, said pivotal joint comprising a pair of co-axial pivot members on said arm, a pair of co-axial pivot members on said body member co-operating with said pivot members on said arm, and resilient means surrounding one of said pairs of pivot members for preventing metallic contact between said arm and said body member and for allowing movement relatively to said arm of one of said pairs of pivot members in a direction transverse to their axes.

7. An electromagnetic instrument for the interconversion of sound and electrical energy, comprising in combination a rigid body member, a rigid supporting member for said body member, a pair of co-axial pivot members, at least one of which is axially adjustable, a pair of pivot members co-operatively disposed with respect to said first-mentioned pivot members, and movable in a direction transverse to their axes, and a resilient element interposed between said second-mentioned pair of pivot members and one of said rigid members.

8. An electromagnetic instrument for the inter-conversion of sound and electrical energy, comprising in combination, a stylus socket, a body member, an electromagnetic vibratory device incorporated in said body member and in driving connection with said stylus socket, a support for said body member, and a self-aligning bearing for said body member in said support.

9. An electromagnetic pick-up, comprising in combination a body member, a pair of oppositely disposed pivot members in said body member, a supporting arm for said body member mounted to swing in a horizontal plane, a pair of pivot members disposed within recesses in said supporting member and co-operating with said first-mentioned pair of pivot members, a resilient sleeve surrounding each of said pivot members in said recesses, and a resilient pad against which each of said pivot members in said recesses abuts.

10. In an electromagnetic pick-up for reproducing sound from a gramophone record, a joint for suspending the body of said pick-up from a support, comprising pivot members at least one of which is axially adjustable, incorporated in said body member, complementary members in said support adapted to co-operate with said pivot members in said body member and vibration-absorbing elements between said complementary members and said support.

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