Dec. 27, 1949 A. SCHUMANN 2,492,446

PIEZOELECTRIC PHONOGRAPH PICKUP HAVING RESILIENT COUPLING MEMBER

Filed Sept. 15, 1945

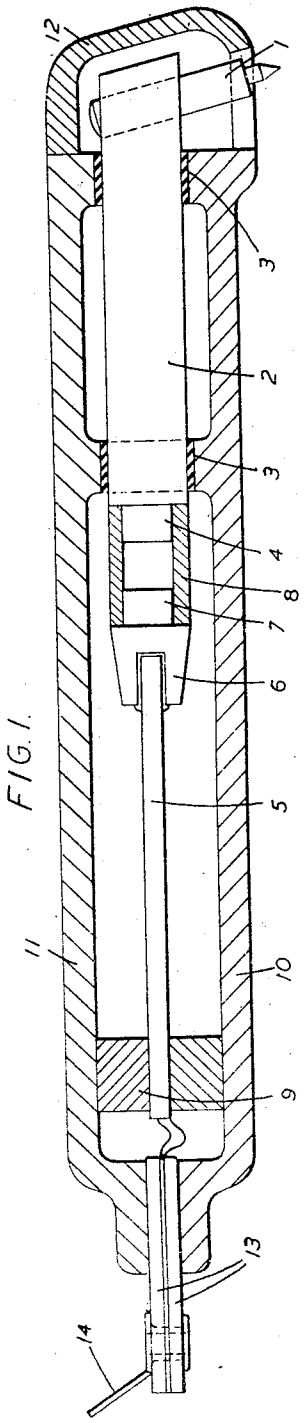

FIG. 1.

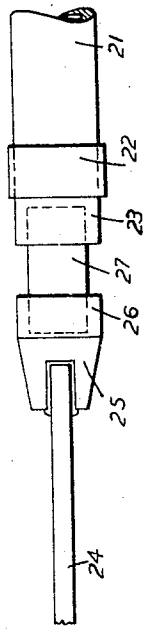

FIG. 3.

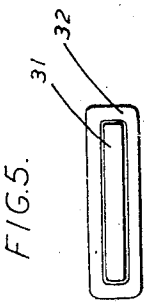

FIG. 5.

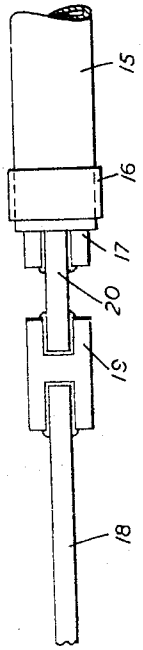

FIG. 2.

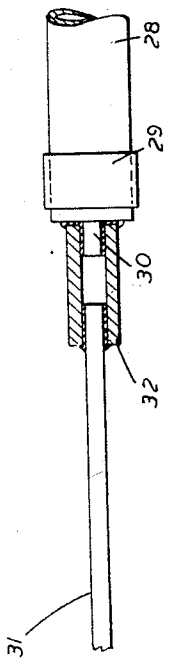

FIG. 4.

INVENTOR
Alec Schumann.
BY
ATTORNEY

Patented Dec. 27, 1949 2,492,446

UNITED STATES PATENT OFFICE

2,492,446

PIEZOELECTRIC PHONOGRAPH PICKUP HAVING RESILIENT COUPLING MEMBER

Alec Schumann, Enfield, England

Application September 15, 1945, Serial No. 616,606
In Great Britain May 16, 1944

Section 1, Public Law 690, August 8, 1946
Patent expires May 16, 1964

4 Claims. (Cl. 179—100.41)

1

This invention relates to electrical devices employing piezo-electric crystals such as the well known "Rochelle" crystals and is concerned with the method of mounting such crystals so as to eliminate or reduce distortion of the signal transmitted by such crystals.

In electrical apparatus involving oscillatory systems where such crystals are employed—such for example, as gramophone pick-ups, to which my invention is specially applicable—the movement of the stylus, consequent on the relative movement of the record, sets up mechanical torsional moments in a crystal connected to the stylus through a transmission member and the consequent distortion of the crystal results in the transmission of an electrical signal in accordance with well known principles.

In such pick-ups the stylus is, of course, connected in some way to the crystal. I have found by experiment that superior results are attained if the connection between the stylus and the crystal is a torsionally actuated resilient connection and the present invention consists broadly, therefore, in the interposition between any two members of an oscillatory system employing a crystal element such as a Rochelle salt crystal of a torsionally actuated resilient coupling.

The preferable arrangement in the case of gramophone pick-ups is to employ a crystal and utilise a short length of rubber or like resilient tubing as the connection between the transmission member to which the mechanical vibrations are applied from the stylus of the crystal.

The accompanying drawings illustrate an application of the invention to a gramophone pick-up,

Figure 1 being a longitudinal section through the pick-up;

Figures 2, 3 and 4 are fragmentary views partly in section illustrating modified methods by which the crystal can be connected to the transmission member of the pick-up; and

Figure 5 is an end view of Figure 4.

Referring to these drawings and particularly to Figure 1, a replaceable stylus 1 is carried in a transmission member 2 which is supported in two resilient bearings 3 between the lower halves and the upper halves 10 and 11 of a casing. At the rear end of the transmission member 2 is a cylindrical projection 4 of a somewhat smaller diameter around which is fixed one end of a flexible tubular coupling 8. The other end of this resilient coupling piece 8 is fixed over a similar cylindrical projection 7 of a claw 6. The claw 6

2

is rigidly fixed to one end of a crystal element 5. The other end of the crystal element 5 is held between two pads 9. At the back of the unit, held between the two halves of the case are two terminal plates or board 13 which carry at their free end two eyelet tags 14. The electrodes of the crystal element are passed between the two terminal plates or boards 13, and connected to the two eyelet tags 14. At the front end of the unit a hollow head cover 12 is fixed to protect the stylus 1 from accidental damage.

The resilient coupling pieces although preferably tubular may, of course, take various shapes.

Figures 2, 3, 4 and 5 show modifications of the arrangement shown in Figure 1. In Figure 2 the transmission member 15 has at its rear a slotted projection 17, into which is fixed one end of a flat or blade-shaped resilient coupling piece 20. The crystal element 18 has fixed to it a claw 19, the front end of which is similar to the slotted projection 17 of the transmission member 15, and into which the rear end of the resilient coupling piece 20 is fixed. The rear resilient bearing for supporting the transmission member 15 is indicated by the numeral 16.

In Figure 3 the transmission member 21 has a hollow projection 23, into which is fixed one end of a cylindrical coupling piece 27, the crystal element 24 carrying at its front end a claw 25 which has a hollow projection 26 which holds the other end of the resilient coupling piece 27. The numeral 22 indicates the rear resilient bearing of the transmission member 21.

Figures 4 and 5 show a still further arrangement, the transmission member 28 has, in this arrangement, a blade-shaped projection 30, similar in cross section to the crystal element 31. The resilient coupling piece 32 being at one end placed over the blade 30, and at the other end over the end of the crystal 31. 29 is the rear resilient bearing.

It will be observed that in all cases the mechanically created movements of the stylus are torsionally transmitted to the crystal through a resilient coupling. The back end of the crystal may obviously be similarly connected to its support or supported in the manner shown in Figure 1.

It will be plain that by selecting the resiliency of the coupling, either by increasing its length or thickness, precise adjustment as to the degree to which it can absorb or damp the movements transmitted can be effected.

The ends of the crystal can be rigidly connected to its carrier or supporting elements by means of the more-or-less usual claw but some advantage may be derived by providing the carrier or supporting elements with a hole of slightly larger size than the crystal and effecting the connection by means of a cold setting cement for the reason that when the cement is first applied it will be plastic and will permit the crystal to find its own position so that it will be initially free of stress.

Whether there is employed the form of construction shown in Fig. 1, or the forms shown in the other figures of the drawing, there exists in any case a distinct portion of the resilient coupling member positioned between the transmission member and either the crystal itself or a mechanical prolongation thereof which is free from longitudinal and torsional stresses, for the reason above given. Upon rotational movement of the transmission member, torsional forces will be transmitted by the resilient coupling member and it will be evident that the arc over which the transmission member may rotate will be relatively great, since torsional displacement of an elongated elastic body is possible to a much greater extent than compressional displacement of such body. This portion of the resilient coupling member situated between the driving and the driven elements may conveniently be termed the free portion of such resilient coupling element and constitutes an important feature of this invention.

The invention has been described particularly with relation to a gramophone pick-up but it is to be understood that the principle of the invention, i. e. the interposition of a resilient torsional transmission connection between two members of an oscillatory system employing a Rochelle salt or like crystal element is applicable to other devices.

What I claim and desire to secure by Letters Patent is:

1. In a sound translating device, a stylus carrying element mounted so as to be capable only of oscillating movement about a pivotal axis therein, a piezo-electric element lying on the pivotal axis and having a supported end remote from said stylus carrying element and a free end adjacent but spaced from said stylus carrying element, and a torsionally resilient coupling member of a material having substantially greater torsional resilience than said stylus carrying element, said member being disposed between said elements and providing a torsional movement transmitting connection therebetween, said coupling member being such that a cross section taken through the space between said elements and normal to said axis intersects only said torsionally resilient member.

2. In a sound translating device, the combination set forth in claim 1, said member being hollow.

3. In a sound translating device, the combination set forth in claim 1, said member being tubular.

4. In a sound translating device, the combination set forth in claim 1, said member being in the form of a solid bar.

ALEC SCHUMANN.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
2,177,239	Bird	Oct. 24, 1939
2,313,324	Balby	Mar. 9, 1943
2,326,280	Bauer	Aug. 10, 1943
2,326,468	Hasbrouck	Aug. 10, 1943
2,328,952	Burt	Sept. 7, 1943