Aug. 13, 1929. W. D. PACK 1,724,360

TRANSMITTER

Filed April 19, 1928

Fig. 1

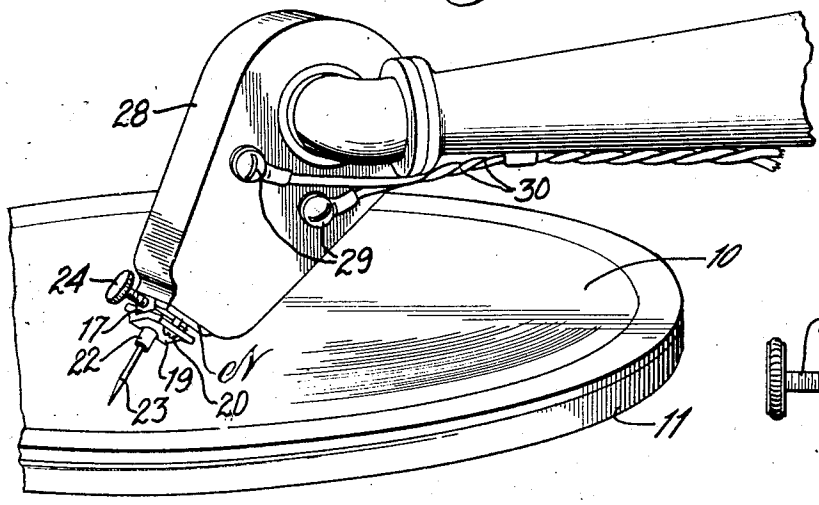


Fig. 6

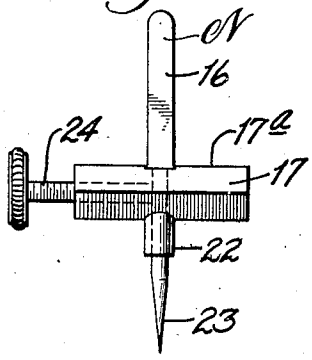


Fig. 2

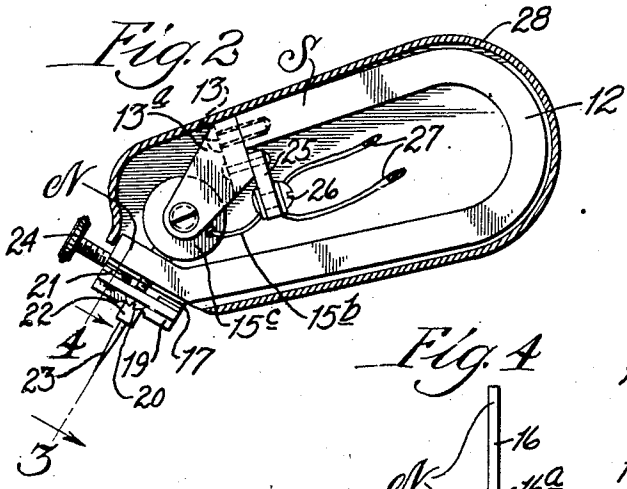


Fig. 3

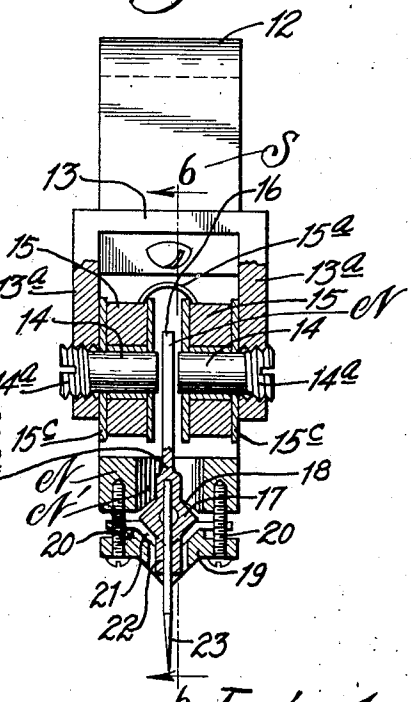


Fig. 4

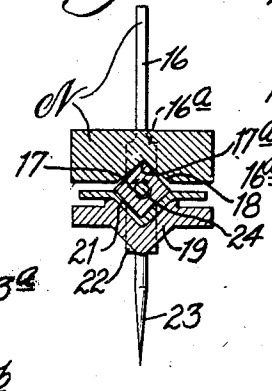
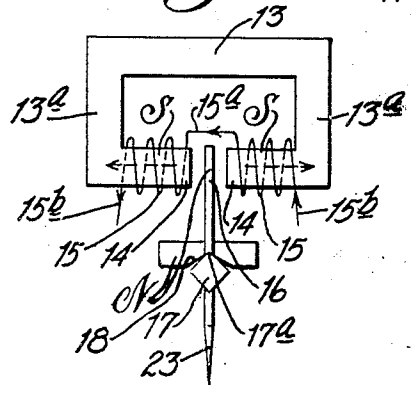


Fig. 5



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Patented Aug. 13, 1929. 1,724,360

UNITED STATES PATENT OFFICE.

WEHRLI D. PACK, OF CHICAGO, ILLINOIS.

TRANSMITTER.

Application filed April 19, 1928. Serial No. 271,199.

This invention relates to improvements in transmitters, and is here shown embodied in a device particularly adapted for transmitting the impression on a phonographic record to a distant point by electrical impulses. Such a device is frequently referred to as a magnetic pickup for phonograph records, and is used to transmit the impression to a radio-receiving set in a well known manner so that the sound recorded will be heard from the phones or loud-speaker of the radio set.

Although I have here shown the invention embodied in the particular kind of device referred to above, it is to be understood that it may have many other uses. The invention broadly contemplates a device for transforming mechanical into electrical energy and vice versa, and may be used in a great variety of ways. For example, with the necessary changes and modifications, it may be embodied in microphones, loudspeakers, electrical measuring devices, and the like.

One of the features of my invention is the provision of a magnet having a single and a double pole; or single and double pole pieces, both lying in the magnetic flux circuit. Hereafter, when I use the term "pole piece" I mean also to include pole, since there does not necessarily have to be a separate pole piece in each case. That is, for example, one pole of the magnet could be divided instead of providing a separate divided pole piece therefor. I find it advisable, however, to provide a separate divided pole piece in order to make the same of relatively soft iron. Means are provided for vibrating one of the pole pieces, relatively to the other, in response to the vibrations or waves to be transmitted. Such vibrations of one of the pole pieces changes the relative proportions of the magnetic flux flowing through the two parts of the double pole piece. A coil is provided for conducting the currents generated by such changes in flow. It is obvious that such currents will correspond to the movements of the vibrating pole pieces. It will be seen that, although the relative proportions of flow through the two parts of the double pole piece are varied, the total flow through the entire circuit will be substantially constant. This is of particular advantage since, in such a device, it is not necessary to change or vary the flow through the magnet itself which is ordinarily made of relatively harder iron. The double pole piece where the variations in flow occur is preferably of relatively soft iron, thus reducing lag to a minimum and greatly increasing the sensitivity of the device.

In that form of device embodying my invention shown in the accompanying drawings, Figure 1 is a view in perspective, Fig. 2 is a view in side elevation showing the cover in section, Fig. 3 is an enlarged view taken on the line 3 of Fig. 2; Fig. 4 is a view taken on the line 4 of Fig. 2, Fig. 5 is a diagrammatic view of the wiring, and Fig. 6 is a view taken on the line 6—6 of Fig. 3.

As shown in the drawings, 10 indicates a phonographic record on the turntable 11.

My improved transmitter comprises a natural horseshoe magnet 12 with one pole slightly longer than the other and bent inwardly slightly. For convenience, I have given the poles the usual designations S and N, the latter being longer.

The shorter pole S carries an inverted U-shaped member comprising the cross-bar 13 with the two depending arms 13^a. Each of these arms is equipped with an inwardly projecting core 14 with its outer end threaded into the arm, as indicated by 14^a, in order to afford adjustability. The cross-bar 13 with the arms 13^a and cores 14 may be considered a bifurcated or divided pole piece for the pole S. Carried on the inside of each arm 13^a and surrounding the core 14 is a coil of wire 15, preferably carried on a suitable spool 15^c. The spool may be attached to the arm by cementing.

The longer pole N of the magnet carries a rockable armature or pole-piece in the form of a flattened bar 16 with its inner end lying between the ends of the cores 14, 14, and its outer end 16^a projecting through the enlarged hole N′ in the pole N. The outer end of the armature 16 is provided with a square cross-bar 17 lying on one edge in a groove 18 in the pole N. The angle of the sides of the groove 18 is somewhat greater than the angle of the adjacent sides of the cross-bar 17 so that such cross-bar is permitted to rock on the edge 17^a which lies in such groove. The cross-bar 17 is held in the groove 18 by a cover plate 19 attached to the pole N by the screws 20. 21, 21, indicate strips of rubber or similar material placed between the cross-bar 17 and the cover plate 19 to permit

rocking of the cross-bar 17 to vibrate the armature 16 between the ends of the cores 14.

The cross-bar 17 is provided with a depending needle carrying arm 22 alined with the armature 16. The arm 22 is preferably drilled out to receive a needle, the socket extending upwardly through the cross-bar 17. One end of such cross-bar is provided with an intersecting thread hole to receive the needle holding screw 24. By means of this construction, vibrations of the pointed end of the needle 23, caused by its relative travel in the groove on the record, will cause rocking of the cross-bar 17 on its edge 17^a lying in the groove 18, and corresponding vibration of the armature 16 between the ends of the cores 14.

In Fig. 5, I have shown diagrammatically the windings of the coils 15. It will be seen that they are both wound in the same direction, the inner terminals being connected as indicated by 15^a. The two outer terminals as indicated by 15^b are attached to a suitable insulating block 25 carried by the member 13. The block 25 is equipped with suitable binding posts 26 to permit attachment of the connecting wires 27 to maintain the same in electrical connection with the terminals 15^b.

28 indicates a suitable housing or cover which may be provided with connecting devices 29 to receive the lead wires 30 on the outside and the connecting wires 27 on the inside and maintain the same in electrical connection. The lead wires 30 may be conducted to any device (not shown), which is adapted to receive electrical impulses which will be generated by the vibrations of the armature 16.

It will be seen that the armature or pole-piece 16 will take the polarity of the N pole and the cores 14 on the other pole-piece will both take the polarity of the S pole. This is clearly shown in the diagrammatic view in Fig. 5. Vibration of the needle 23 will vibrate the armature or pole-piece 16 between the two cores 14, 14. Such vibration will change the relative proportions of magnetic flux flowing through the two cores 14, 14, and consequently generate currents in the coils in accordance with such changes.

It is to be noted, however, that the amount of flux flowing through the entire circuit is not substantially changed. In Fig. 5, the arrows on the cores 14 indicate diagrammatically the flow of magnetic flux from the N armature through both of the cores 14 to the S pole of the magnet. When the armature is midway between the cores 14 the flow will be in substantially equal amounts through the two cores. When the armature moves nearer to one of the cores (for example, to the right as viewed in Fig. 5), the reluctance through that core is reduced, causing an increase of flow through that core and a corresponding decrease of flow through the other. This change in the relative proportions of flow through the two cores will cause an electrical current to be generated through the coils 15 in the direction indicated by the arrows. In like manner each movement or vibration of the armature 16 between the cores 14, 14, will change the path of part of the flow of magnetic flux and generate a corresponding current in the coils 15.

While I have shown and described certain embodiments of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims, in which it is my intention to claim all novelty inherent in my invention as broadly as possible in view of the prior art.

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

In a transmitting device of the character described; a magnet; a transversely arranged U-shaped coil supporting member carried by one pole of the magnet; a pair of transversely arranged alined coils carried by the arms of said coil supporting member; cores in said coils with their inner ends separated; an armature having a cross-piece with a sharp edge and pivotally supported by the other pole of the magnet with said sharp edge lying in a groove in said pole, said armature having one end lying between the ends of the cores of said coils and adapted to vibrate therebetween; said other pole of the magnet having a hole therein and the other end of said armature extending through said hole in said pole; a stylus holder attached to the end of the armature extending through the hole in the pole and means for imparting to said armature the vibrations to be transmitted by said device.

In witness whereof, I have hereunto set my hand and affixed my seal, this 17th day of April, 1928.

WEHRLI D. PACK.