Feb. 5, 1929. 1,701,000

C. F. GOUDY

ELECTROMAGNETIC PHONOGRAPHIC REPRODUCER

Filed Oct. 5, 1927

Fig. 1.

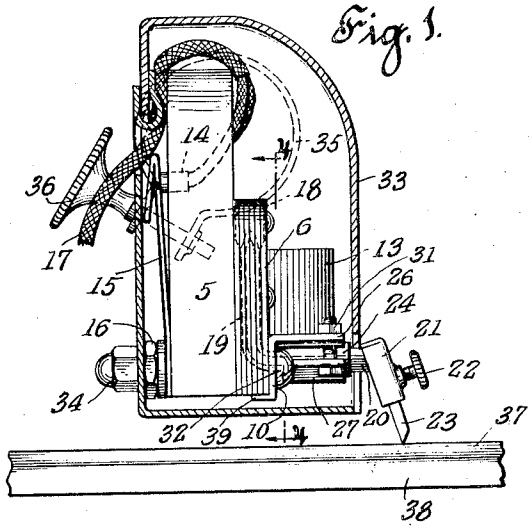


Fig. 2.

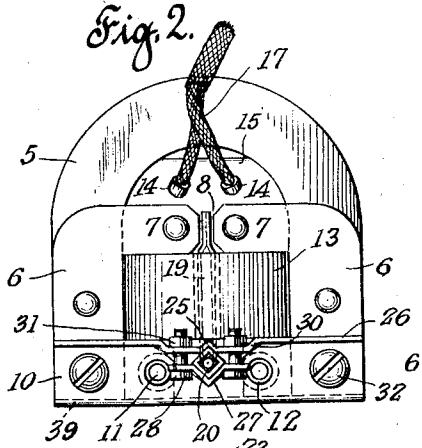


Fig. 3.

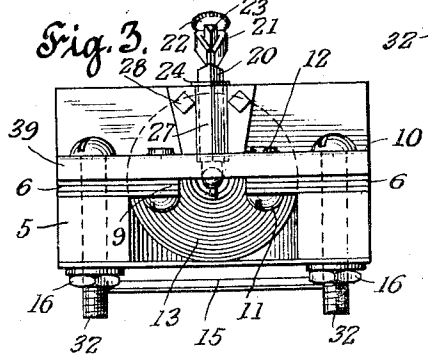
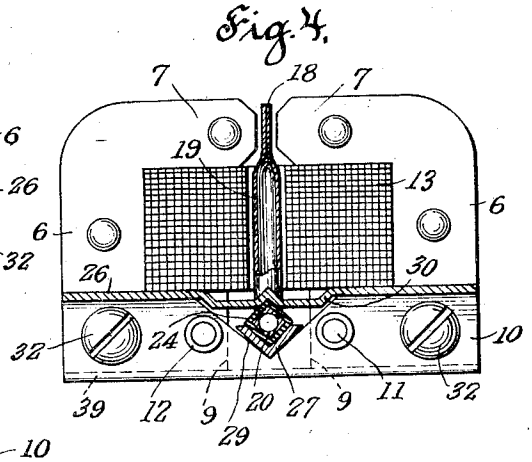


Fig. 4.



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UNITED STATES PATENT OFFICE.

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ELECTROMAGNETIC PHONOGRAPHIC REPRODUCER.

Application filed October 5, 1927. Serial No. 224,050.

This invention relates particularly to electromagnetic reproducers of the type disclosed in co-pending patent application, Serial #209,500.

Special objects in this case are to provide a more sensitive action, to obtain greater energy; to reproduce faithfully without distortion or "blast"; to construct the apparatus in such a form that the parts may be assembled and properly adjusted without being subjected to magnetic or other possible disturbing influences and in general, to provide a more practical and efficient form of apparatus than has heretofore been attained.

These and other desirable objects are attained by certain novel features of construction, combinations and relations of parts as set forth in the following specification and broadly covered in the appended claims.

The drawing accompanying and forming part of the specification illustrates one practical commercial embodiment of the invention, but it should be understood that such disclosure is primarily illustrative in character and that changes and modifications in the structure may be made without departure from the true spirit and broad nature of the invention.

Figure 1 is a side view of the reproducer or "pick-up" in cooperative relation with a phonograph record, the case of the device appearing in section.

Figure 2 is a front view of the device removed from its case.

Figure 3 is a bottom view of the device.

Figure 4 is an enlarged sectional view as on substantially the plane of line 4—4 of Figure 1.

The magnetic system of the unit comprises a short but relatively powerful permanent horse-shoe magnet 5 having laminated pole pieces 6 secured to the legs of the same and formed with polar projections 7 approached to provide a magnetic gap at 8. These polar projections are located up near the arch of the magnet and at their lower ends the pole pieces are shown formed with lesser projections 9 approaching each other across the space between the ends of the magnet. As shown particularly in Figures 2 and 3, a considerable gap is provided between the projections 9 to prevent magnetic leakage therebetween.

The pole pieces 6 are secured in properly spaced relation by means of a bridge piece 10 to which the lower projections 9 of the pole pieces are secured by means of screws 11 extending through projections 9 into screw seats 12 shown formed as integral screw bushings on said bridge piece.

Also supported by the bridge piece is the coil 13 shown centered in position thereon between the upper and lower arms 7, 9, of the pole pieces. This coil has terminals 14 on an insulating base strip 15 secured by nuts 16 at the back of the magnet, said terminals having the cord conductors 17 connected therewith.

Operating in the magnetic gap between the pole tips 7 is a magnetic reed or armature 18 carried by an upstanding arm 19 projecting freely up through the center of the coil. This arm is shown as of cylindrical form so as to fit closely but without contact in the bore of the coil and is further shown as an integral angularly projecting upward extension on the inner end of a squared bearing portion 20. At the outer end this squared bearing portion carries a downwardly directed angularly extending needle holder 21 provided with a clamp screw 22 and preferably of a size and shape to accommodate various styles of needles such as the usual steel needles or fiber needles 23, etc.

The squared base or shank portion 20 of the reed is supported and resiliently held in a tubular sleeve 24 of rubber or other elastic material clamped in an inverted V-groove 25 provided in the outstanding flange or shelf 26 of the bridge piece by a V-trough clamp plate 27 secured to the shelf of the bracket by small screw bolts 28. The inner end of the clamp plate 27 seats in a V slot 29 in the back of the bracket or bridge piece 10, which seat as shown in Figure 4 is of wider angle than the V clamp so that said V clamp may have a rocking motion therein for the purpose of tilting the squared shank one way or the other to center the end of the reed between the pole tips.

It will thus be seen that the clamp screws 28 may be set up together to compress the elastic sleeve and thus firmly secure the reed in place and may be adjusted one independently of the other to rock the reed slightly one way or the other and hence bring it into centered relation in the magnetic gap.

The supporting flange 26 is illustrated in Figure 2 as depressed at 30 on opposite sides

of the inverted V seat therein to provide recessed seats for the nuts 31 on the upper ends of the clamp screws 28.

With the construction disclosed it is possible to assemble the coil with the pole pieces and the reed on the supporting bracket 10, securing these parts in their proper adjusted relation by means of the screws 12 which directly fasten the pole pieces to the bracket and the screws 28 which fasten the reed clamp in place. The screws, 28, furthermore, enable the reed to be "centered" in the gap between the pole tips so that as shown in Figure 4, these parts may be made up and properly adjusted apart from the permanent magnet and ready to go on to the permanent magnet as a single unit after they have once been so arranged and adjusted.

This pole piece unit, as it may be termed, comprising the pole pieces, coil and reed all secured together in properly adjusted relation, is attached to the permanent magnet in the unitary form described, by means of two screws 32 extending through the bracket 10, the lower end portions of the laminated pole pieces and the arms of the U magnet, the nuts 16 before referred to being engaged on the projecting rear ends of these screws. These same screws are shown utilized in the present illustration for securing the casing 33 in place, cap nuts 34 engaged on the extended ends of said screws serving this latter purpose.

The casing 33 is indicated in Figure 1 as having a flexible strap or loop 35 at one side of the same which can be contracted by a thumb screw 36 to grip the unit on the end of a phonograph tone arm so that the needle will properly cooperate with the record shown at 37 carried by the usual turn table 38.

The angular or squared shank of the reed clamp diagonally in the elastic sleeve provides in effect a resilient pivot having an axis substantially at a right angle to the lateral traverse of the needle and the movement of the reed between the pole tips. The leverage of the needle and of the reed are therefore both effective in the translation of mechanical vibrations from the record to electrical oscillations in the coil. By varying the length of these levers, the mechanical effects of the needle may be increased or decreased as desired.

To facilitate assemblage of the pole pieces on the bracket, the latter is shown in Figures 1 and 2 as having an inturned flange 39 at its lower edge forming a gage or stop for the lower ends of the pole pieces and serving also as a rib for strengthening and reinforcing the bracket.

In constructing the reed, the upstanding arm portion of the same is preferably hollowed, by drilling or otherwise, as indicated at 40, to make it as light as possible and the upper end of this hollowed portion is then flattened as indicated in the drawing, to provide a maximum area exposed to the pole pieces. A light, rigid reed is thereby provided and this reed has maximum areas opposed and exposed to the pole pieces of the magnet. Consequently, the action is most sensitive.

What is claimed is:

1. An electromagnetic pick-up device comprising a shank having angularly projecting elements at opposite ends of the same, one of said elements providing a magnetic reed and the other a needle holding clamp, a magnet system having a magnetic gap in which the free end of said reed element oscillates, a coil associated with and forming part of said magnet system, and a continuously extending clamp adjustably holding the intermediate portion of said shank between the magnetic reed at one end and the needle clamp at the opposite end of the same.

2. An electromagnetic pick-up device comprising a magnet having spaced pole pieces, a coil associated with said magnet, a bracket rigidly attached to said magnet, a reed magnetically related to the pole pieces and having an angularly extending supporting shank and clamping means resiliently securing said shank to the bracket and adjustable to vary the position of the shank and the location of the reed relative to the pole pieces.

3. An electromagnetic pick-up device comprising a bracket, pole pieces secured in proper spaced relation on said bracket, a magnetic reed movably secured on the bracket in proper cooperative relation to said pole pieces, whereby said bracket, pole pieces and reed constitute a single unit structure. a magnet and means for rigidly securing the unit structure aforesaid to said magnet with the pole pieces properly related to the poles of the magnet and whereby said pole pieces are immovably connected with the permanent magnet and the reed is then movably related to said immovably held pole pieces.

4. An electromagnetic pick-up device comprising a bracket, co-related pole pieces, coil and magnetic reed all mounted on said bracket and held thereby in proper cooperative relation in a single unit structure, a magnet, means for rigidly securing said unit structure to said magnet with the pole pieces properly co-related to the poles of the magnet and means for adjustably setting the magnetic reed on the bracket in proper cooperating relation to the pole pieces.

5. An electromagnetic device of the character disclosed comprising a U magnet, laminated pole pieces overlying the legs of said magnet and having cooperating opposed projections affording a magnetic gap and other opposed projections more widely separated, a bridge piece overlying said latter projections and secured thereto, a coil held between said two sets of projections, an outstanding flange

carried by said bridge piece, a clamp plate adjustably secured to said flange, a shank element surrounded by a resilient sleeve and secured between said flange and clamp, an arm on the inner end of said shank projecting up through the coil into the magnetic gap, a needle holder on the outer end of said shank and screws fastening the bridge piece and parts attached thereto to the arms of the magnet.

6. In a device of the character disclosed, a U-magnet, a clamp bar for bridging the arms of said magnet, pole pieces secured to said clamp bar and thereby held in predetermined spaced relation, a magnetic reed, a clamp for securing said reed to the clamp bar and adjustable to variably position the reed with respect to the pole pieces and means for fastening the end portions of the clamp bar to the sides of the magnet to rigidly secure the assembly described in position on the magnet.

7. In a device of the character disclosed, a magnet having spaced arms, pole pieces for flat engagement against the face of said magnet arms, a clamp bar overlying said pole pieces and bridging the space between the arms of the magnet, screws for fastening the pole pieces to the clamp bar in definitely spaced relation, screws for fastening the end portions of the clamp bar to the arms of the magnet, a coil associated with the pole pieces, a magnetic reed projecting through said coil, said reed having an armature portion disposed between the pole pieces and a shaft portion adjacent the clamp bar and screw means for adjustably securing the shaft portion of said magnetic reed to the clamp bar.

8. In a device of the character disclosed, a magnet having spaced arms, pole pieces overlying the face of said magnet arms, a clamp bar bridging the space between the arms and overlying said pole pieces to secure the same to the magnet, said clamp bar having an angularly projecting flange, a coil associated with the pole pieces, a magnetic reed extending up through said coil and having an armature portion disposed between the pole pieces, said reed having a shaft portion extending substantially parallel with the angularly projecting flange of the bar and means for securing said shaft of the reed to said flange.

9. In a device of the character disclosed, a magnet having spaced arms, pole pieces overlying the face of said magnet arms, a clamp bar bridging the space between the arms and overlying said pole pieces to secure the same to the magnet, said clamp bar having an angularly projecting flange, a coil associated with the pole pieces, a magnetic reed extending up through said coil and having an armature portion disposed between the pole pieces, said reed having a shaft portion extending substantially parallel with the angularly projecting flange of the bar, means for securing said shaft of the reed to said flange, said reed supporting flange projecting out from the upper edge of the bar and an angularly projecting flange extending inwardly from the lower end of the bar into position beneath the pole pieces.

10. In a device of the character disclosed, a magnet having spaced arms, pole pieces overlying the face of said magnet arms, a clamp bar bridging the space between the arms and overlying said pole pieces to secure the same to the magnet, said clamp bar having an angularly projecting flange, a coil associated with the pole pieces, a magnetic reed extending up through said coil and having an armature portion disposed between the pole pieces, said reed having a shaft portion extending substantially parallel with the angularly projecting flange of the bar, means for securing said shaft of the reed to said flange and said clamp bar having an angularly projecting flange additional to said reed mounting flange for reinforcing and rendering the bar rigid to hold the pole pieces firmly engaged with the arms of the magnet.

11. In a device of the character disclosed, a magnet of the U-type, flat pole pieces in flat engagement with and overlying the arms of the magnet at one face of the magnet, an insulating base overlying the arms at the opposite face of the magnet coil, terminals mounted on said insulating base, a bar overlying the pole pieces and clamping the same to the face of the magnet, a coil supported above said overlying bar and connected with the terminals on the insulating base, a magnetic reed having a mounting portion, a part projecting through the coil and an armature portion in magnetic relation to the pole pieces and means for securing the mounting portion of the reed to the clamp bar independently of the fastening of the clamp bar to the magnet and adjustable to vary the relation of the reed to the pole pieces.

12. In a device of the character disclosed, a magnet structure having spaced pole pieces, a magnetic reed having a mounting shaft and an armature portion extending angularly from said mounting shaft, said armature portion being magnetically related to said pole pieces, a rocking clamp engaged over the mounting shaft for said reed and adjustable to rock said shaft to tilt the armature portion of the reed toward one or the other of the pole pieces for accurately centering the armature portion between the pole pieces and a winding associated with said magnetic reed.

13. In a device of the character disclosed, a magnet having pole pieces, a magnetic reed having an armature portion magnetically related to said pole pieces and an angularly related mounting shaft, a clamp engaging said mounting shaft for supporting the magnetic reed and including screw means by which the clamp may be tipped to tilt the

mounting shaft and hence the armature portion of the reed relative to the pole pieces and a magnetizing coil associated with said reed.

14. In a device of the character disclosed, a magnet having pole pieces, a reed having an armature portion associated with said pole pieces and a mounting portion, a bar having a V-shaped opening for passage of the mounting portion of the reed and a flange above said opening, said flange having a seat for the mounting portion of the reed, a clamp plate supported at one end in the edge of said opening, screw means for supporting the opposite end of said clamp plate to secure the mounting portion of the reed to its seat in the flange and a coil associated with the reed.

15. In a device of the character disclosed, the combination with a magnet structure having spaced pole pieces, of a magnetic reed having an armature portion positioned in the gap between the pole pieces, said magnetic reed having a shaft portion angularly related to the armature portion, a supporting member having a seat for said shaft portion, a clamp plate overlying said shaft portion and holding the same to the seat of the support and screws acting on said clamp plate at opposite sides of the shaft portion to thereby tiltably secure said clamp plate in position, so that by tilting adjustments of said clamp plate the shaft portion may be rocked one way or the other to center the armature portion in the magnetic gap aforesaid.

In testimony whereof I affix my signature.

CARL F. GOUDY.