May 27, 1930. L. T. ROBINSON 1,760,527

ELECTRICAL DEVICE

Original Filed March 10, 1927

Fig. 1.

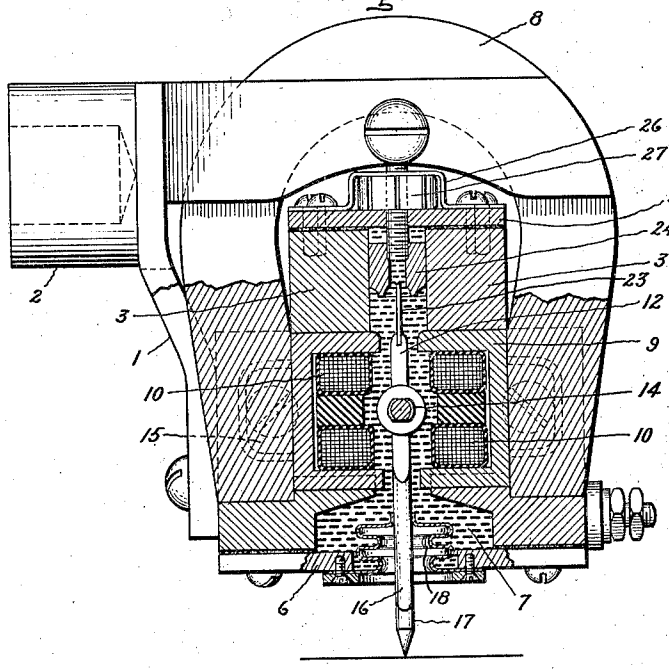


Fig. 2.

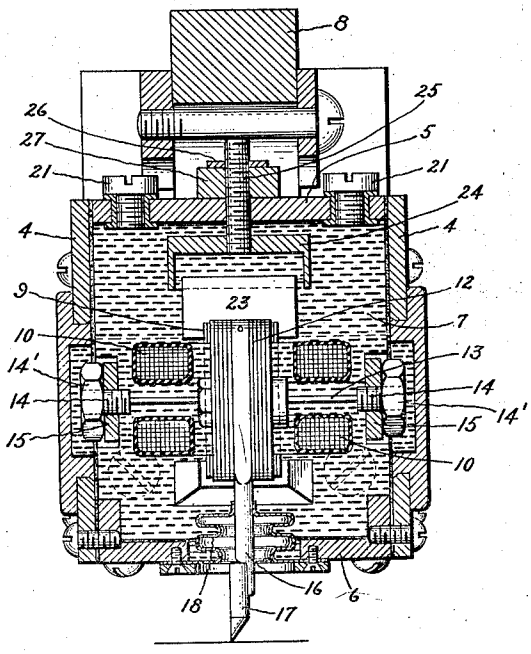
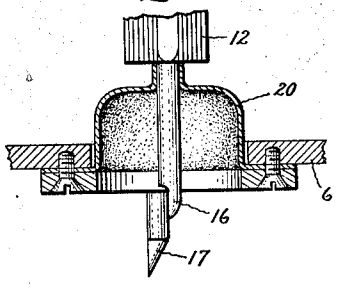


Fig. 3.



Inventor:
Lewis T. Robinson,
by Alexander S. Lunt
His Attorney.

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1,760,527

UNITED STATES PATENT OFFICE

LEWIS T. ROBINSON, OF NISKAYUNA, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

ELECTRICAL DEVICE

Application filed March 10, 1927, Serial No. 174,355. Renewed February 10, 1928.

My invention relates to speech current devices producing phonograph records such as those used reproducing sounds from such records or for converting sound impulses into electrical impules or vice versa. An object of my invention is the provision of an improved device of this character, the moving element of which follows accurately the complex wave form peculiar to sound.

In the construction of speech current apparatus utilized to convert sound impulses into electrical impulses or to convert electrical impulses into sound, difficulties have been encountered in providing the device with a moving system which would not produce objectionable distortions of these impulses. These distortions have been found to be due largely to inertia effects of the moving parts and to excessive vibration thereof at frequencies corresponding to their natural vibration periods. While these effects, particularly the former, have been greatly lessened by a reduction in the mass of the moving parts to the minimum value found practicable, distortion is most effectively prevented by the proper damping of the moving system.

In accordance with my invention these difficulties are avoided by the provision of a damping means for the moving system depending in its action upon fluid friction and adjustable in its effects within comparatively wide limits.

My invention will be better understood from the following description taken in connection with the accompanying drawing, and its scope will be pointed out in the appended claims.

Referring to the drawing, Fig. 1 is a side elevation partly in section of a device illustrating one embodiment of my invention; Fig. 2 is a cross sectional view of the same at right angles to that of Fig. 1; and Fig. 3 is a detail view of an alternative construction. Inasmuch as the device herein disclosed is very small, it has been illustrated on a greatly enlarged scale. The device is shown comprising a built-up frame 1, having a projecting handle portion 2 by which it is supported and having right and left castings 3. The frame 1 has end plates 4, a top plate 5 and a bottom plate 6 forming therewith a hollow member or casing containing the moving system and the damping liquid 7, preferably oil. Permanent magnet 8 spans the casing and has its poles engaging pole pieces 9 which are set into the castings 3. The pole pieces 9 each have two inwardly extending polar projections between which lie the coils 10 forming the winding. The laminated soft iron armature 12 is supported in a vertical position between the polar projections by the ligament 13, the ends of which are secured to the tensioning screws 14 having nuts 14′ and being supported by the plates 15 attached to the castings 3. Secured to and extending downwardly from the armature is the rod 16 which carries the stylus 17. If the device is to be used for cutting a master record or a record from which others are to be made the stylus will have a suitable cutting point while if the device is to be used as a pick-up in the reproduction of the recorded sound the stylus will have a point adapted to follow in the record groove. Where the rod 16 passes through the bottom plate 6 of the casing, I have shown in Figs. 1 and 2 the sylphon diaphram 18 secured at opposite ends to the rod and the plate. The diaphram 18 is very light and flexible so as to offer a minimum resistance to the movements of the rod 16 yet effectively to retain the damping liquid. In Fig. 3 I have illustrated a modified form of diaphram comprising the rubber cap 20 secured as before to the rod 16 and the bottom plate 6. For filling and emptying the casing with damping liquid I have shown two screw plugs 21 in the top plate 5. A certain amount of damping of the moving system is thus provided by the damping liquid which surrounds the armature, the supporting ligament and portions of the rod 16 and diaphram 18. To provide for greater damping I have mounted the vane 23 on the upper end of the armature in such a way that movements of the armature cause a displacement of the damping liquid in the upper portion of the casing. For still further increasing and adjustably varying the damping of the

moving system I have provided a hollow downwardly opening member 24 which, guided by the castings 3, is vertically movable to enclose more or less of the vane, it being understood that when the member is in its lowermost position the liquid offers the greatest frictional resistance to movements of the vane and hence the maximum damping.

Member 24 is shown supported on the screw stud 25 extending through the top plate 5 and through the strap 26 between which and the top plate is the nut 27. By rotating the nut, the position of the member 24 may be varied from without the casing. It will be noted that the lower edges of member 24 are rounded off to conform to the curved edges of the armature and the polar projections when the member is in its extreme lowermost position.

I have chosen the particular embodiment described above as illustrative of my invention and it will be apparent that various modifications may be made without departing from the spirit and scope of my invention which modifications I aim to cover by the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. A phonograph device of the character described comprising a magnet, an armature mounted to vibrate adjacent thereto, a stylus, a connection between the stylus and the armature, and a casing containing a damping liquid enclosing the armature, said casing having a flexible wall portion through which said connection extends.

2. A phonograph device of the character described comprising a magnet, an armature mounted for pivotal movement adjacent thereto, a stylus connected with the armature, a casing containing a damping liquid enclosing the armature and a damping vane carried by the armature in said liquid.

3. A phonograph device comprising a magnet, an armature pivotally mounted adjacent thereto, a stylus connected therewith, a casing containing a damping liquid enclosing the armature, a vane carried by the armature in the liquid, and means for varying the damping effect of the liquid on the vane.

4. A phonograph device comprising a magnet, an armature pivotally mounted adjacent thereto, a stylus connected therewith, a casing containing a damping liquid enclosing the armature, a vane carried by the armature in the liquid, and a member associated with the vane for adjusting the damping effect of the liquid on the vane.

5. A phonograph device comprising a magnet, an armature pivotally mounted adjacent thereto, a stylus connected therewith, a casing containing a damping liquid enclosing the armature, a vane carried by the armature in the liquid, and a hollow member arranged to be moved from without the casing to cover said vane in varying amounts.

6. A phonograph device comprising a permanent magnet, a winding associated with the poles thereof, an armature pivotally mounted adjacent said poles, a vane carried by the armature, a stylus, a connection between the armature and the stylus, a casing forming a chamber enclosing the armature and the vane, an adjustable hollow member adapted to be moved to enclose varying amounts of the vane and means exterior of the casing for moving the member.

7. A speech current apparatus including means for producing a magnetic field, a casing provided with a flexible wall portion, a damping fluid in said casing, an armature immersed in said fluid and arranged to move in said field, and a movable member connected to said armature through said flexible wall portion.

8. A speech current apparatus including means for producing a magnetic field, a casing, a fluid enclosed in said casing, an armature immersed in said fluid and arranged to move in said field, and a member arranged to extend through said casing for moving said armature.

In witness whereof, I have hereunto set my hand this 9th day of March, 1927.

LEWIS T. ROBINSON.