Nov. 15, 1927. 1,649,257

C. R. ROWE ET AL

SUSPENSION FOR ARMATURES OF ELECTROMAGNETIC SOUND REPRODUCERS

Filed Aug. 7, 1925

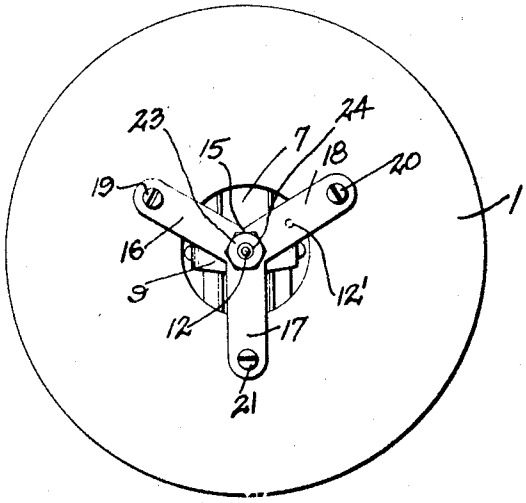


FIG. 1

To sound reproducing diaphram or phonograph stylus

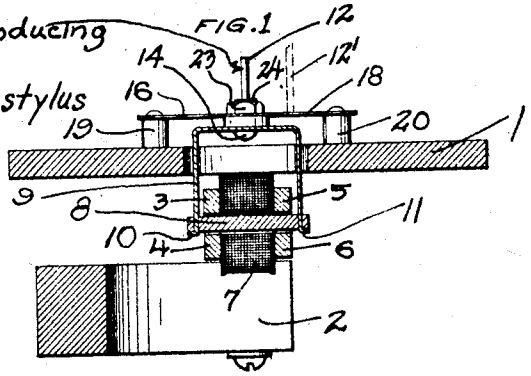


FIG. 2.

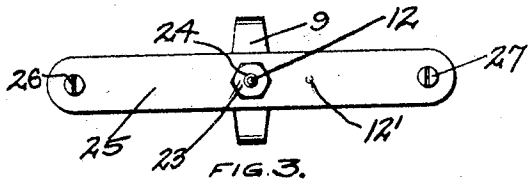
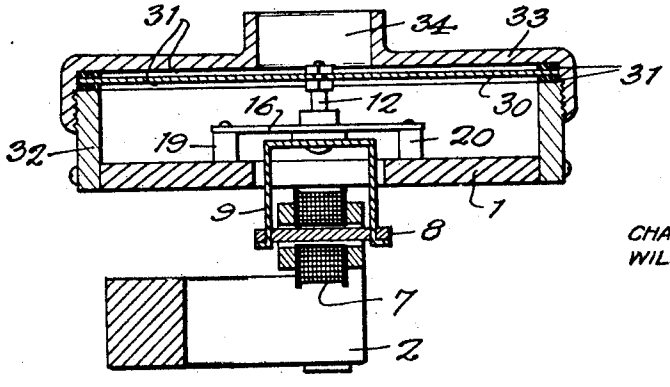


FIG. 3.

FIG. 4.



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Patented Nov. 15, 1927. 1,649,257

UNITED STATES PATENT OFFICE.

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SUSPENSION FOR ARMATURES OF ELECTROMAGNETIC SOUND REPRODUCERS.

Application filed August 7, 1925. Serial No. 48,916.

Our invention relates broadly to electromagnetic sound reproducers and more particularly to a suspension for armatures in electromagnetic sound reproducers.

One of the objects of our invention is to provide a suspension for electromagnetic sound reproducers in which a balanced armature is provided with means for supporting the armature in neutral position.

Still another object of our invention is to provide an electromagnetic sound reproducer construction in which a spider member of resilient material is arranged to carry the armature of the electromagnetic sound reproducer normally in a neutral position within the electromagnetic field of the sound reproducer and having small inertia against the movement of the armature transverse to the magnetic field of the electromagnetic system.

Our invention will be more fully understood from the specification hereinafter following and the accompanying drawings, in which:

Figure 1 is a plan view showing the arrangement of the armature suspension member of our invention; Fig. 2 is a vertical cross-sectional view through the loud speaker construction and armature suspension of our invention; Fig. 3 is a modified form of armature suspension which we may provide in the electromagnetic sound reproducer construction and Fig. 4 is an assembly view showing a sound reproducing diaphragm in association with the driver and armature suspension of our invention.

Our invention makes use of a type of electromagnetic sound reproducer which is more fully described in United States Letters Patent 1,533,372, granted April 14, 1925, to C. E. Brigham. We have found that a driving force having its operating parts arranged in such manner that the armature freely floats within the electromagnetic field surrounding the driver, is not readily adaptable for use with phonograph attachments or with cone type loud speakers. In adapting the freely floating armature construction of electromagnetic sound reproducer as a driver for a phonograph stylus or a cone diaphragm, we have devised a balanced system for the armature which introduces negligible mechanical inertia against the free movement of the armature transversely to the magnetic field of the electromagnetic driver. We provide a yoke member which is secured to opposite ends of the armature on opposite sides of the electromagnetic driver. The yoke member is suspended at a central point from a resilient spider member which normally maintains the armature in a neutral position. The material of the spider is made just stiff enough to support the armature in neutral position, but is not of such strength as to introduce mechanical loss of any large degree of inertia.

Referring to the drawings in more detail reference character 1 designates the top of a supporting casing from which depends the permanent electromagnetic system 2 with pole pieces 3, 4, 5 and 6 extending transversely across the ends thereof. The electromagnetic system is represented by reference character 7, between which armature 8 is positioned. The armature 8 is carried by a yoke 9 which is substantially in the form of a U shaped strip with the extremities thereof, secured to opposite ends of the armature 8 as represented at 10 and 11. At a central point in the upper portion of the U shaped strip 9, we provide a rod member 12 having a head 14 engaging the underside of the U shaped strip. A spider member 15 having arms of springy metal 16, 17 and 18, is supported at points 19, 20 and 21, on the supporting casing 1. The spider member 15 is spaced on the upper portion of the U shaped strip 9 by means of collar 22. The spider member 15 and U shaped strip 9 are bound together to enable the passage of sound vibrations from one portion to another by means of binding nut 23 working upon screw threads 24 co-extensive with the head of rod member 12.

The spider 15 may be shaped in the form of a strip 25 as represented in Fig. 3, suspended at opposite extremities 26 and 27 upon the top of casing 1. For certain types of diaphragms, we may desire to drive the diaphragm by a rod member which extends at a point off center from the spider or strip as represented at 12′ in order to secure the benefit of multiplication of the motion through what amounts to a system of levers.

The spider or strip of springy metal which supports the armature is just stiff enough to normally locate the armature in a neutral position so that a balanced operation

of the armature is obtained. We may provide spacing members 19, 20, and 21 which are machined with precision to exactly center the armature within the electromagnetic driver or a spacing member 22 intermediate yoke 9 and strip 15 may be employed to exactly center the armature within the electromagnetic device.

The vibratory rod member 12 may be connected with the apex of a cone diaphragm for driving the cone, or the rod member may be provided with a head forming a seat for a stylus needle and the device used as a phonograph attachment, where the electromagnetic sound reproducer actuates the phonograph sound box. Our device is intended particularly as a loud speaker reproducer for radio broadcast concerts,

In Fig. 4 we have shown the assembly of the loud speaker mechanism and armature suspension within the casing of a loud speaker. The diaphragm has been designated by reference character 30 resiliently supported in gaskets 31 centered upon the frame structure 32 to which the cap member 33 is secured with a sound conduit 34 therein through which sound may be conveyed to a suitable sound amplifying horn. It will be understood that the diaphragm may be mounted in some other manner and that the resilient mounting which we have shown is merely for the purpose of illustrating the invention.

While we have described our invention in one of its preferred embodiments, we desire that it be understood that modifications may be made and that no limitations upon the invention are intended other than are imposed by the scope of the appended claims.

What we claim and desire to secure by Letters Patent of the United States is as follows:

1. In an electromagnetic sound reproducer the combination of a supporting casing, a sound reproducing diaphragm, an electromagnetic driver, an armature positioned within said electromagnetic driver, a yoke member secured to opposite ends of said armature and extending over said electromagnetic driver and means for suspending said yoke member from said casing comprising a resilient strip of spring metal and a connection between said sound reproducing diaphragm and the midpoint of said yoke member and said strip of spring metal for transferring sound vibrations from said armature to said strip of spring metal for delivery to said sound reproducing diaphragm.

2. In an electromagnetic sound reproducer the combination of a supporting casing having a central aperture therein, an electromagnetic driver carried by said casing beneath said aperture, an armature member positioned within said electromagnetic driver a yoke member extending through said aperture connected to opposite ends of said armature member and extending around said electromagnetic driver and resilient means supported from said supporting casing and connected to said yoke member for normally locating said armature member within a neutral position within said electromagnetic driver and allowing free movement of said armature member transverse to the electromagnetic field of said electromagnetic driver for reproducing sound vibrations.

3. In an electromagnetic sound reproducer the combination of a supporting casing, a sound reproducing diaphragm, an electromagnetic driver carried by said casing, an armature member positioned within said electromagnetic driver a yoke member connected to opposite ends of said armature member and extending around said electromagnetic driver and a spider member of resilient metal carried by said casing, a connection between said spider member and said diaphragm, a connection between a midpoint in said yoke member and said spider member whereby said armature may be normally balanced in a neutral position within the field of said electromagnetic driver.

4. In an electromagnetic sound reproducer the combination of a supporting casing, a sound reproducing diaphragm, an electromagnetic driver carried by said casing, an armature member positioned within said electromagnetic driver, a yoke member connected to opposite ends of said armature member and extending around said electromagnetic driver and a resilient member having three arms of spring metal extending from a central point outwardly and secured at the outer extremities thereof to said supporting casing, a connection between the midpoint of said yoke member and said resilient member, and a connection between said resilient member and said sound reproducing diaphragm whereby said armature is normally located in a neutral position within said electromagnetic driver.

In testimony whereof we affix our signatures.

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