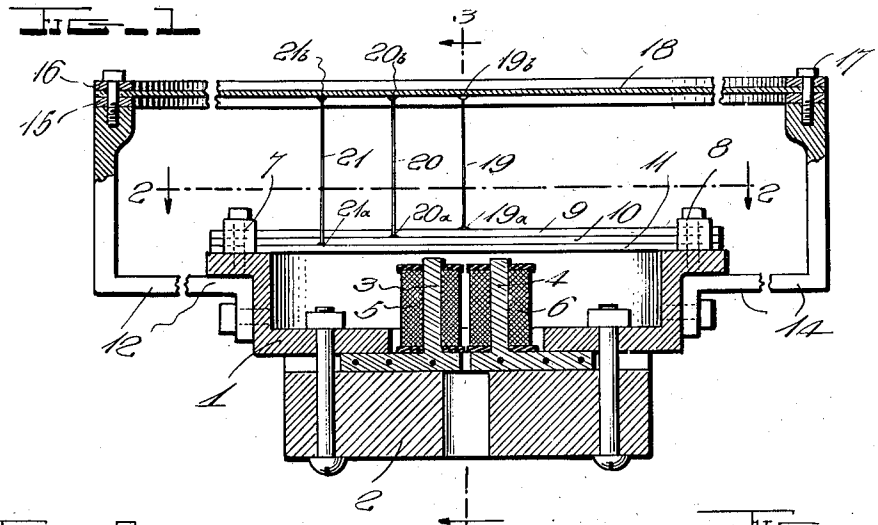
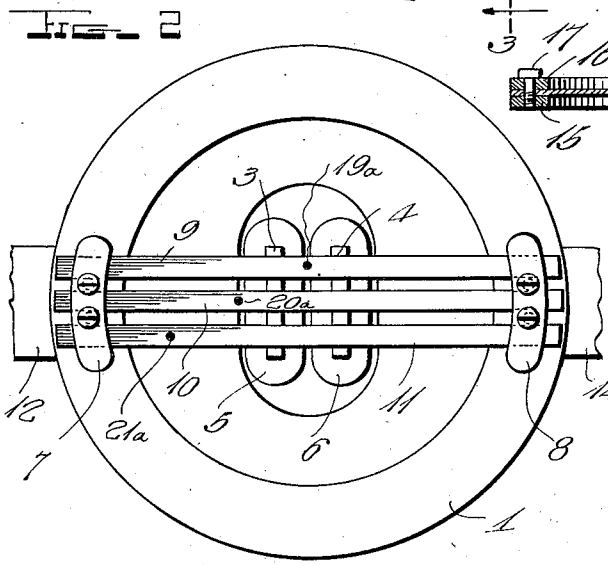
March 22, 1927. 1,621,562

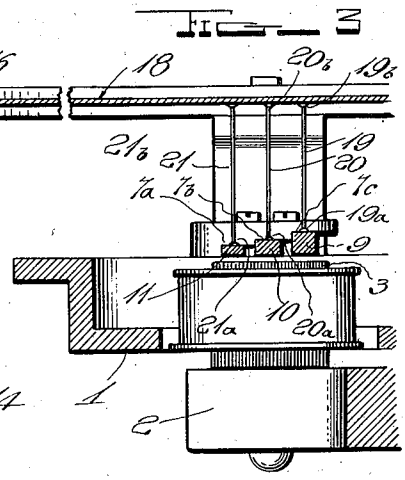
LE ROY W. STAUNTON

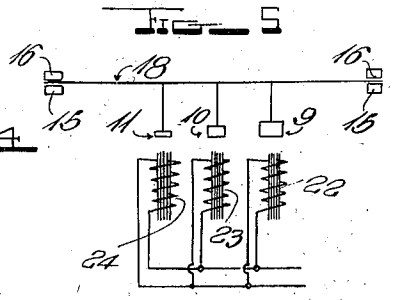
ELECTROMAGNETIC SOUND REPRODUCER

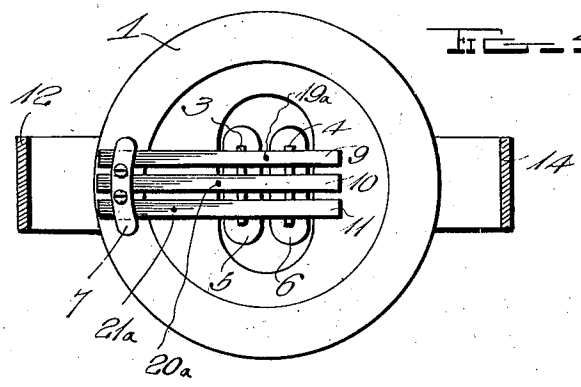
Filed Oct. 16, 1926











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ATTORNEY.

Patented Mar. 22, 1927. 1,621,562

UNITED STATES PATENT OFFICE.

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ELECTROMAGNETIC SOUND REPRODUCER.

Application filed October 16, 1926. Serial No. 142,056.

My invention relates broadly to electromagnetic sound reproducers and more particularly to a loud speaker for radio broadcast reception.

One of the objects of my invention is to provide a loud speaker for radio broadcast reproduction in which the entire range of musical notes may be efficiently reproduced.

Another object of my invention is to provide a loud speaker system having a plurality of armatures each having differing natural periods, the armatures being arranged to impart vibration to the sound reproducing diaphragm for reproduction of all of the tones over the entire musical scale.

Another object of my invention is to provide a construction of loud speaker having a plurality of armature members each possessing different characteristics for the efficient response to a particular range of tone frequencies with connections to a sound reproducing diaphragm whereby the entire range of musical frequencies may be efficiently reproduced.

Still another object of my invention is to provide an arrangement for loud speakers in which a plurality of drivers are provided for actuation of individual armature members each possessing characteristics which render the cooperation of the driver and armature member extremely efficient over portions of the entire range of musical frequencies the armatures being individually connected with a sound reproducing diaphragm for delivering the armature vibrations to said diaphragm.

Still another object of my invention is to provide a loud speaker having a relatively large sound reproducing diaphragm with vibratory members each efficiently responsive to a particular range of tone frequencies connected to different points in said diaphragm, the armature which delivers the lowest register of musical frequencies being connected to substantially the center of the diaphragm, the armature which is responsive to the highest register of musical frequencies being connected to a point substantially off of the center of said diaphragm and the armature which is responsive to the middle register of musical notes being connected to a point in said diaphragm intermediate the aforementioned points whereby reproduction over the entire range of musical frequencies may be obtained.

My invention will be more clearly understood from the following specification by reference to the accompanying drawings in which:

Figure 1 is a cross-sectional view through a loud speaker embodying the principles of my invention partially in side elevation; Fig. 2 is a plan view showing the arrangement of the several armature members employed in the loud speaker of my invention taken on line 2—2 of Fig. 1; Fig. 3 is a cross-sectional view taken on line 3—3 of Fig. 1 through the loud speaker construction of my invention; Fig. 4 is a modified plan view of the multiple armature construction of my invention; and Fig. 5 shows diagrammatically the arrangement of the magnetic driving system in the loud speaker of my invention.

Referring to the drawings in detail reference character 1 designates a casing in which the operating parts of the loud speaker of my invention are mounted. Reference character 2 designates a permanent magnetic system for the loud speaker of my invention. Laminated pole pieces 3 and 4 have been shown in fixed relation to the casing 1 and the permanent magnetic system 2 with windings 5 and 6 on the pole pieces 3 and 4. In the drawings I have illustrated a continuous winding on the pole pieces 3 and 4, but I desire that it be understood that separate windings corresponding in number to the number of driving armatures may be employed as will be hereinafter more fully described.

Located on the top flange of the casing 1 I provide securing means for step like members 7 and 8 which are arranged at diametrically opposite points of the casing 1. A plurality of armature members 9, 10 and 11 are provided which for the purpose of illustrating my invention have been shown as three in number. The armature members 9, 10 and 11 each possess different natural periods for the efficient reproduction of musical frequencies over a selected range. For example, armature member 9 responds to the lowest register of musical notes. Armature members 10 responds to the middle register of musical notes, while armature member 11 is responsive to the highest reg-

ister of musical notes. Armatures 9, 10 and 11 have different thicknesses so that in order to secure the armature members in position the step like members 7 and 8 are provided. In Fig. 3 I have designated the step like member 7 as having offset faces 7^a, 7^b and 7^c for clamping the armature members 11, 10 and 9, respectively, in accordance with the thickness thereof.

A stretched sound reproducing diaphragm 18 may be employed in the loud speaker of my invention. I have illustrated the diaphragm 18 as supported by frame members 15 and 16 with securing bolt 17 passing therethrough and into the supporting members 12 and 14 which are in turn connected with the casing 1. I provide three link members 19, 20 and 21 which interconnect the armatures 9, 10 and 11 at different points along the diaphragm 18. The link member 19 connects at a point 19^a along armature 9 intermediate the pole pieces 3 and 4 of the electromagnetic driver with substantially the center of the sound reproducing diaphragm 18 as illustrated at 19^b. This arrangement provides for the reproduction of the lowest register of the musical frequencies by reason of the connection at the freest point of oscillation for the diaphragm 18. The link 20 connects at a point 20^a with armature 10 which is off-center with respect to the electromagnetic pole pieces 3 and 4 and connects to the diaphragm at 20^b which is off-center with respect to the center of diaphragm 18. This connection provides for the efficient reproduction of frequencies lying within the middle register of the musical notes.

Link 21 connects at point 21^a on driving armature 11 which is substantially off-center along the armature with respect to the electromagnetic driving pole pieces 3 and 4, link 21 terminating at 21^b on the diaphragm 18 which is substantially off-center for the reproduction of the higher musical frequencies.

As represented in Fig. 4 the armature members 9, 10 and 11 may be in the form of cantilever devices suspended from one side of the casing 1 by means of the step like member 7.

In Fig. 5 I have illustrated the arrangement of a plurality of magnetic windings 22, 23 and 24 each of which cooperates with armatures 9, 10 and 11, respectively, the electromagnetic driver being matched with respect to its cooperating armature for the securing of maximum efficiency in the sound reproduction.

While I have described my invention as applied to a sound reproducing diaphragm of the large direct acting disc type, I desire that it be understood that my invention is equally applicable to diaphragms of the conical type, or other shapes may be imparted to the diaphragm, connections being established as set forth in the drawings. In order to show the electromagnetic driver and sound reproducing diaphragm in compact arrangement the diaphragm has been foreshortened, as represented by the broken away portions, and it will be understood that the diaphragm is of the large direct acting type.

I desire that it be understood that modifications of my invention may be made and that no limitations upon my invention are intended other than are imposed by the scope of the appended claims.

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

1. An electromagnetic sound reproducer comprising an electromagnetic driver, a plurality of armatures each responsive to different ranges of tone frequencies arranged to be actuated by said driver, a sound reproducing diaphragm of the direct acting type and independent connections between said armatures and points spaced apart along said diaphragm whereby vibrations over the entire range of musical frequencies may be imparted to said diaphragm.

2. An electromagnetic sound reproducer comprising electromagnetic driving means, a plurality of armature members arranged to be actuated by said electromagnetic driving means, said armature members being individually responsive to different ranges of musical frequencies, a sound reproducing diaphragm of the direct acting type, a connection between one of said armatures and a center point in said diaphragm and connections between others of said armatures and points off of the center of said diaphragm whereby vibrations over the entire range of musical notes may be imparted to said diaphragm.

3. An electromagnetic sound reproducer comprising electromagnetic driving means, a plurality of armature members each responsive to a different range of musical frequencies, one of said armature members being efficiently responsive to the lower register of musical frequencies, another of said armature members being efficiently responsive to the higher register of musical frequencies, and another of said armature members being efficiently responsive to a register of musical frequencies intermediate the frequencies to which said aforementioned armature members are efficiently responsive, a sound reproducing diaphragm of the large direct acting type, and connections between said armatures and separate points on said sound reproducing diaphragm whereby sound may be reproduced over the entire range of musical notes.

4. An electromagnetic sound reproducer comprising electromagnetic driving means, a

plurality of armature members each responsive to a different range of musical frequencies, one of said armature members being efficiently responsive to the lower register of musical frequencies, another of said armature members being efficiently responsive to the higher register of musical frequencies, and another of said armature members being efficiently responsive to a register of musical frequencies intermediate the frequencies to which said aforementioned armature members are efficiently responsive, a sound reproducing diaphragm of the large direct acting type, a connection between said armature member responsive to the lower register of musical frequencies and the center point of said diaphragm, a connection between said armature member responsive to the higher register of musical frequencies and a point substantially off-center on said diaphragm, and a connection between said armature member responsive to the said intermediate register of musical frequencies and a point on said diaphragm intermediate the hereinbefore mentioned points of connection whereby notes over the entire range of musical frequencies may be efficiently reproduced by said diaphragm.

5. An electromagnetic sound reproducer comprising a casing, an electromagnetic driver positioned within said casing, an annular flange on said casing, a plurality of armature members supported by said flange and extending laterally over said electromagnetic driver, each of said armature members having a different thickness and a step like member secured to said flange for maintaining said armature members in positive spaced relation, a sound reproducing diaphragm of the large direct acting type and connections between separated points on said sound reproducing diaphragm and separated points on said armature members whereby said armature members independently impart vibrations to different parts of said sound reproducing diaphragm.

In testimony whereof I affix my signature.

LE ROY W. STAUNTON.