Sept. 30, 1930. W. C. ANDERSON 1,777,271

ELECTROMAGNETIC SOUND REPRODUCER

Filed June 12, 1928 2 Sheets-Sheet 1

FIG. 1

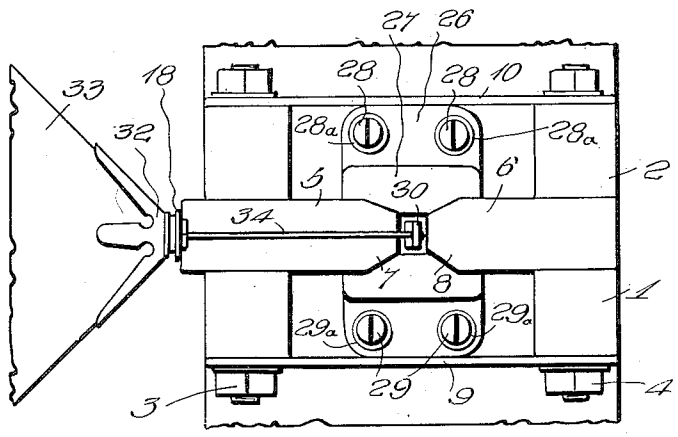
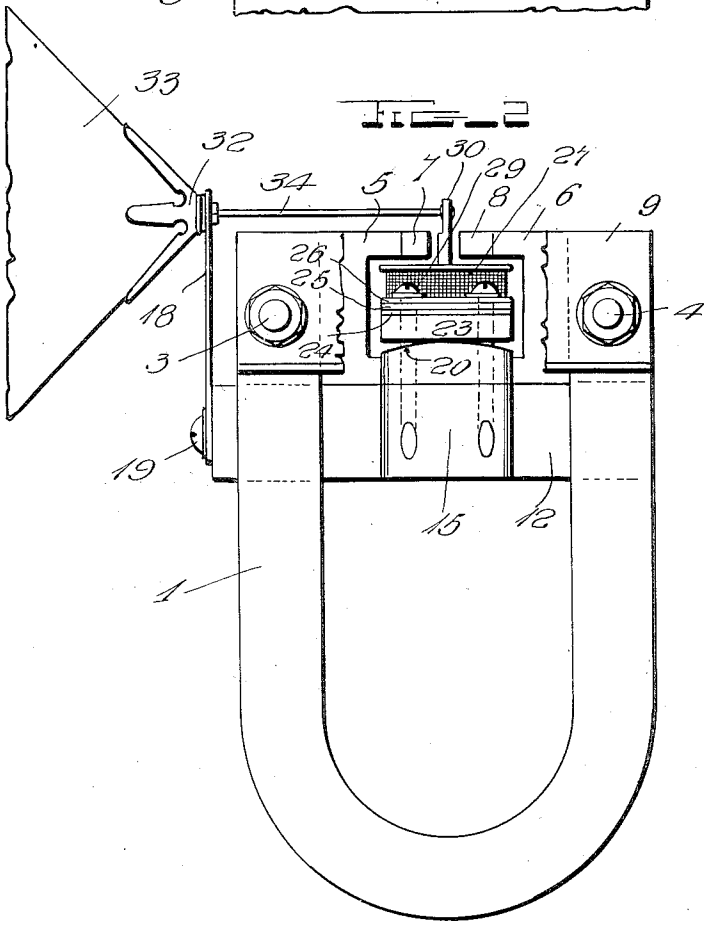


FIG. 2



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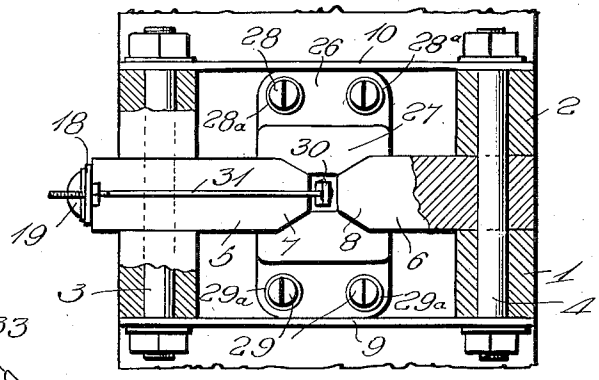
Filed June 12, 1928 2 Sheets-Sheet 2

FIG. 3



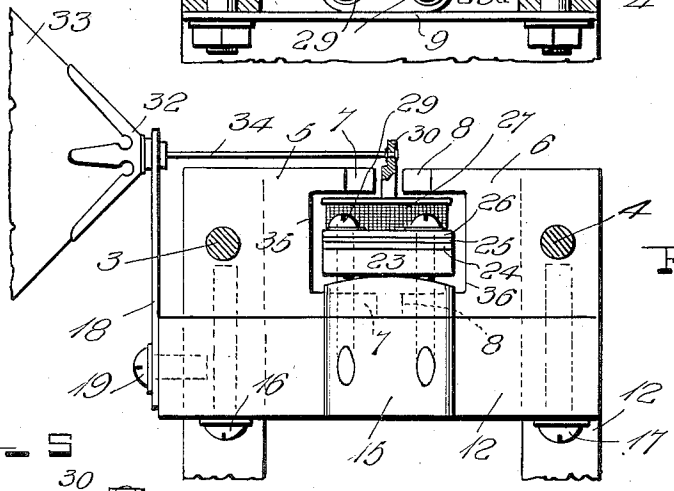


FIG. 4

FIG. 5

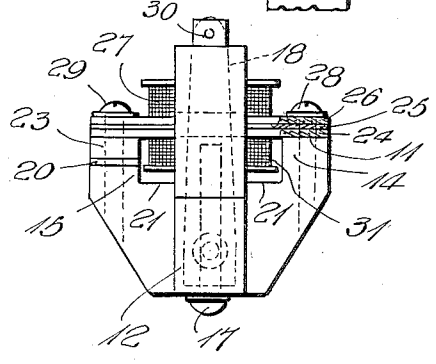


FIG. 6

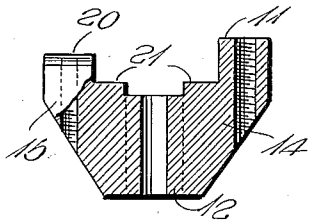


FIG. 7

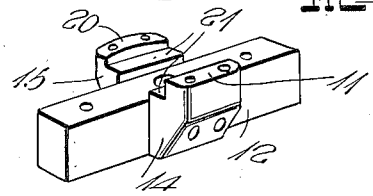


FIG. 8

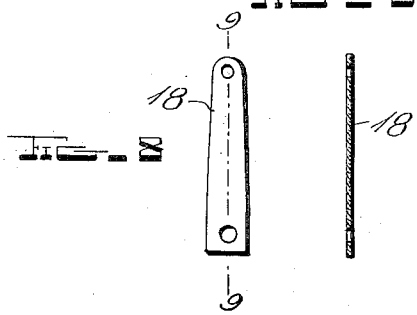


FIG. 9

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UNITED STATES PATENT OFFICE

WALTER C. ANDERSON, OF GLEN ROCK, NEW JERSEY, ASSIGNOR TO BRANDES LABORATORIES, INC., OF NEWARK, NEW JERSEY, A CORPORATION OF NEW JERSEY

ELECTROMAGNETIC SOUND REPRODUCER

Application filed June 12, 1928. Serial No. 284,772.

My invention relates broadly to electromagnetic sound reproducers and more particularly to a sound reproducer of the pivoted armature type.

One of the objects of my invention is to provide a construction of pivoted armature electromagnetic sound reproducer wherein an armature is pivoted within an electromagnetic winding and provided with means for accurately centering the armature within the winding and between opposed pole pieces for insuring the efficient operation of the sound reproducer.

Another object of my invention is to provide means for adjusting the position of a pivoted armature between adjacent poles and with an electromagnetic actuating winding for insuring uniformity in operation of loud speakers produced on a quantity production basis.

Still another object of my invention is to provide a construction of loud speaker in which a carrier is provided for supporting the poles of the electromagnetic operating mechanism including a pivoted armature member, with means on the carrier for adjusting the position of said armature member within the electromagnetic operating mechanism for insuring efficient operation of the sound reproducer.

Other and further objects of my invention reside in the arrangement of parts in a pivoted armature type of sound reproducer for the reproduction of sound of good tone quality, as will be more fully understood from the specification hereinafter following by reference to the accompanying drawings, in which:

Figure 1 is a plan view of the loud speaker showing the position of the pivoted armature between the pole pieces of the electromagnetic operating mechanism; Fig. 2 is a side elevation of the loud speaker partially broken away and showing the arrangement of the pivoted armature with respect to the electromagnetic operating mechanism; Fig. 3 is a plan view showing the parts of the electromagnetic operating mechanism partially in cross-section; Fig. 4 is an elevational view through the loud speaker mechanism, with parts shown in cross-section where one of the permanent magnets has been removed to more clearly show the means for shifting the position of the armature between the pole pieces; Fig. 5 is an end view of the assembled electromagnetic operating mechanism; Fig. 6 is a partial cross-sectional view taken through the carrier which supports the electromagnetic operating mechanism; Fig. 7 is a perspective view of the carrier for the electromagnetic operating mechanism; Fig. 8 is a front view of the supporting strap which carries the sound reproducing diaphragm and link which connects with the vibratile armature member; and Fig. 9 is a cross-sectional view through the supporting strap illustrated in Fig. 8.

My invention is directed to a construction of electromagnetic sound reproducer which has been found to be extremely practical and is capable of production on a quantity scale at minimum expense where substantially uniform characteristics may be obtained in large numbers of loud speakers on an extensive production scale. I have found that in the pivoted armature type of loud speaker that there is a tendency for the armature member to be so positioned within the electromagnetic operating mechanism that the armature abuts with one of the pole pieces, thus impairing the operation of the loud speaker. I provide a die casting forming a unitary support for both the electromagnetic windings and the armature, where the die casting is so shaped that the support which carries the armature and electromagnetic operating mechanism is angularly shiftable permitting an adjustment after the assembly of the loud speaker mechanism for precisely centering the armature in the air gap between the pole pieces. By virtue of the independent adjustment of each loud speaker, which is thus permitted during inspection after assembling, uniformity in characteristics of large numbers of loud speakers passing through a production program may be assured, and the defects, brought about by displacement of the armature with respect to the pole pieces, avoided.

The construction of the electromagnetic

sound reproducer of my invention will be clear from the drawings where reference characters 1 and 2 designate permanent magnets forming part of the assembly of the electromagnetic sound reproducer. The permanent magnets are secured on opposite sides of pairs of inwardly directed pole pieces represented at 5 and 6 by means of bolt members 3 and 4 passing through the assembled magnets and pole pieces. The pole pieces 5 and 6 have tapered pole faces 7 and 8 directed toward each other and spaced apart by a gap in which is positioned the rockable armature 30. The assembly of the parts of the sound reproducer is mounted upon a suitable supporting chassis by means of angle members which I have indicated at 9 and 10 as secured to the bolt members 3 and 4 which pass through the permanent magnets and through the sets of pole pieces. The die casting which forms the unitary support for the parts of the electromagnetic operating mechanism is shown in perspective view in Fig. 7 comprising a longitudinally extending bar member 12 supported beneath the pole pieces 5 and 6 by means of screw members 16 and 17. The longitudinally extending bar member 12 is provided with laterally extending portions 14 and 15, each of which is cut away in steps as represented at 21 and have terminating surfaces 20 and 11. The surface 20 terminates below the plane of the surface 11 and is substantially curved as illustrated in the drawings. The electromagnetic operating mechanism includes bobbins 27 and 31 which have laterally extending end flanges 26 and 24, respectively, which are secured on opposite sides of a resilient plate member 25 which forms the mounting means for the armature 30 within the gap between the pole faces 7 and 8 and within the bobbins 27 and 31. By virtue of the resilient properties of the plate 25 the armature 30 is free to vibrate within the bobbins 27 and 31 with the supporting plate 25 as a pivot or center of rocking motion. The ends of the bobbins at 26 and 24 together with the intermediate resilient plate 25 are secured upon the die casting by means of screws 28 which pass into the laterally extending portion 14 and through the face 11 thereof for anchoring the electromagnetic operating mechanism in position. A metallic spacer block 23 is interposed between the opposite ends of plates 24, 25, 26 and the curved surface 20. Screw members 29 pass through the parallel plates 24, 25, 26 and into the laterally extending portion 15, of the die casting for securing the electromagnetic operating mechanism in assembled position. The armature 30 extends between the pole faces 7 and 8, and while the armature is approximately centered therebetween by reason of the normal assembly of parts I have found some instances where the armature 30 is displaced out of accurate center contacting at one side with either pole face 7 or 8. The curved surface 20 affords means for effecting a rocking movement of block 23 by adjusting the end of screws 29 to shift the armature in the exact central position between the pole faces 7 and 8. When once shifted in position the screws 28 and 29 are tightened and locked in the selected position by lock washers 28^a and 29^a. I provide a mounting strip 18 secured by suitable means 19 to one end of the die casting 12, which strip provides a support for the apex piece 32 which is secured to the conical shaped sound reproducing diaphragm 33. A connecting rod 34 extends between the apex piece 32 and the upper end of the armature 30 for transferring vibrations from the armature to the sound reproducing diaphragm.

The mounting of the parts of the electromagnetic operating mechanism on the die casting 12 greatly simplifies assembly of the loud speaker. The cut away portions 21 of the die casting permit the electromagnet 31 to project into the die casting and provides a compact assembly. The pole pieces 5 and 6 are cut away as represented at 35 and 36 so that the pole faces 7 and 8 embrace the electromagnetic windings on opposite sides and provide gaps within which the armature 30 may be vibrated. The amount of actual shift of the armature 30 is generally extremely small but the surface 20 is so shaped that sufficient angular displacement of the armature may be made after assembly of the parts of the loud speaker to insure precise centering of the armature in the air gap.

While I have described the preferred embodiment of my invention, I desire that it be understood that modifications 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. A loud speaker comprising an electromagnetic driving system including a pair of pole pieces, an armature member, a plate mounted in said driving system and supporting said armature member, a curved surface supporting said plate, and screw devices for rocking said plate on said curved surface for centering said armature member between said pair of pole pieces.

2. A loud speaker comprising pole pieces directed toward each other, an armature member, means for mounting said armature member between said pole pieces, a supporting surface carrying said means, said surface being curved with respect to said means, and adjusting means passing through said means and through said supporting surface for angularly shifting the position of said means on said curved surface for centering

said armature member intermediate said pole pieces.

3. In a loud speaker of a pair of permanent magnets, pole pieces extending between said magnets and directed toward each other, a casting secured between said magnets and supporting an electromagnetic system thereon, an armature member disposed within said electromagnetic system, a plate member extending laterally on said casting and between said magnets, said casting being curved on its supporting surface and means passing through said plate member and through said casting for angularly shifting the position of said armature and centering said armature between said pole pieces.

4. A loud speaker comprising pole pieces directed toward each other, an electromagnetic system, an armature supporting member positioning said armature between said pole pieces and extending normal to the axis of said electromagnetic system, a foundation member, said foundation member having a curved upper surface carrying said armature supporting member, and screw means extending through said supporting member and into said foundation member for selectively rocking said armature supporting member to a position for centering said armature between said pole pieces.

5. In a loud speaker a pair of permanent magnets, pole pieces extending from said magnets and directed toward each other, a member extending between said magnets and carrying mounting portions at each side thereof one of said mounting portions having a relatively high central part curved downwardly on either side thereof, an electromagnetic system carried by said mounting portions including an armature member suspended in a position substantially normal to the axis of said member and means for securing said electromagnetic system upon said mounting portions for shifting the position of said armature with respect to said pole pieces by movement of said electromagnetic system to a selected position with respect to the central part of said mounting portion.

6. In a loud speaker system a pair of pole pieces directed toward each other, an armature member, located between said pole pieces, a foundation plate member having a curved top surface, an electromagnetic system, supporting means carrying said electromagnetic system, and screw means passing through said supporting means for adjustably mounting said supporting means on said foundation plate member.

In testimony whereof I affix my signature.

WALTER C. ANDERSON.