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1,905,702

LOUDSPEAKER

Filed April 4, 1931

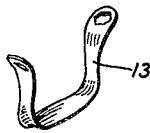


FIG. 6

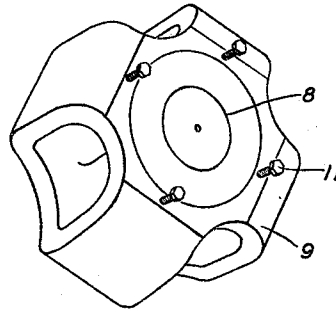


FIG. 3

FIG. 1

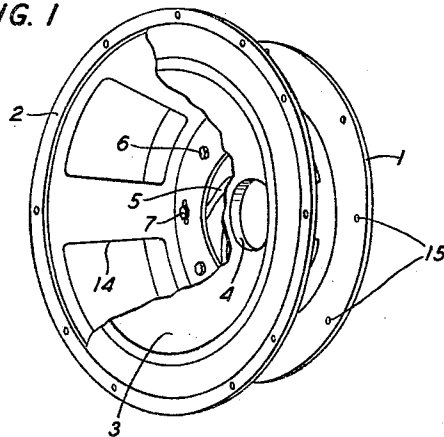


FIG. 2

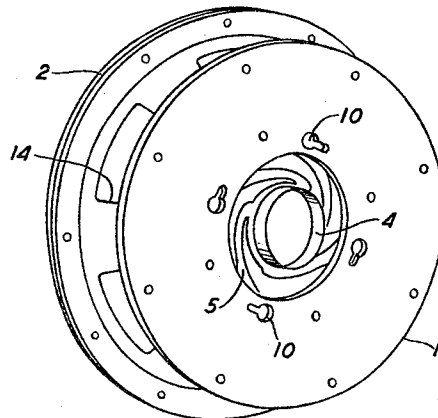


FIG. 4

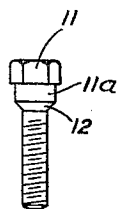
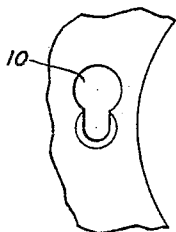


FIG. 5

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LOUDSPEAKER

Application filed April 4, 1931, Serial No. 527,656, and in Great Britain June 19, 1930.

The present invention relates to improvements in and relating to loud speakers and the object of the invention is to provide an improved constructional arrangement which embodies certain important advantages, as will be hereafter described. The invention is mainly applicable to moving coil loud speakers of the permanent magnet type, in which the constant magnetic field is provided by a highly magnetized permanent magnet.

With such permanent magnet moving coil loud speakers it is frequently found that after a period of service particles of metallic dust become lodged in the narrow annular gap in the magnet, causing the moving coil to rub. The present invention provides an arrangement whereby the coil and diaphragm assembly can be easily and quickly removed from the gap so that the gap can be cleaned, and the arrangement is such that the coil is automatically re-centered in the gap when the assembly is replaced, so that the troublesome operation of re-centering the coil in the gap is eliminated.

According to the present invention, in a moving coil loud speaker, a moving coil and diaphragm are mounted on a frame assembly detachable as a unit from the magnetic system, and positioning means are provided between the frame assembly and the magnet for accurately re-centering the coil in the magnetic gap on replacement after removal therefrom.

The invention is more particularly described with reference to the accompanying drawing, in which,

Fig. 1 represents a front view of the diaphragm and coil assembly, with part of the diaphragm broken away to show the structure of the front frame and the centering device for the coil;

Fig. 2 shows a rear view of the assembly;

Fig. 3 shows the permanent magnet;

Fig. 4 a detail;

Fig. 5 one of the fixing bolts; and

Fig. 6 a further detail of the construction.

The front frame assembly consists of a plate 1 carrying a conical frame 2, the larger rim of which supports the large end of the

conical diaphragm 3. The small end of the frame 2 is bolted to the plate 1. The small end of the cone carries the moving coil 4, which projects through the opening in the plate 1. The coil is held in permanent central relationship to the plate 1 by the four-armed centering device 5, which is sufficiently flexible to permit free movement of the coil and diaphragm. The centering device 5 and the frame 2 are fixed to the plate 1 by bolts passing through a clamping ring 6. The clamping ring 6 and also the frame and centering device contain a series of oval spaced apertures 7 to be afterwards referred to.

The coil 4 works in the narrow annular gap 8 of the permanent magnet 9, which may be of the four-limbed or other suitable type. The magnet is secured to the rear of the plate 1. As the coil 4 is always maintained centrally in the plate 1 by the centering device 5, the coil will always be correctly re-centered in the gap 8 of the magnet if the magnet is always replaced after removal in exactly the same position on the plate 1. This is achieved by the provision of positioning means between the frame assembly and the magnet system. The positioning means comprise four pear-shaped holes 10 in the plate 1, shown in detail in Fig. 4. The front side of the smaller ends of the holes are countersunk as shown in Fig. 4, and the smaller ends all point in the same direction round the plate. The magnet 9 is attached to the plate 1 by means of bolts 11 passing through the holes 10. The bolts are shown in detail in Fig. 5. They are bevelled at 12 to agree with the countersink on the edge of the hole, while the portion 11a raises the head above the holes 7 in the fixing ring 6. The larger portion of the hole is of such a size as to slip over the head of the bolt, and the smaller portion fits the stem of the bolt snugly.

The mode of operation is as follows: The bolts 11 are screwed a short distance into the body of the magnet and the frame assembly is put on. The bolt heads pass through the larger end of the holes 10. The frame is given a slight rotation to bring the bolts into the smaller part of the holes, and the bolts are then tightened so that the bevels 12 reg-

ister with the countersunk position of the holes. By this means the frame assembly carrying the coil and diaphragm is accurately positioned so that the coil is automatically re-centered in the gap. The bolts are tightened or slackened by means of the handle 13 (Fig. 6) which is formed as a spanner, and can be inserted through the spaces between the members 14 of the frame 2. The assembly of diaphragm and magnet is secured to the casing of the instrument by screws passing through the holes 15 in the plate 1.

To remove the assembly 2 it is only necessary to remove the plate 1 from the casing of the instrument, and lay it with the magnet downwards on a table. The bolts 11 are slackened but not removed, then by rotating the plate 1 in an anti-clockwise direction and drawing forward the front frame 2 and the plate 1 may be removed from the magnet without disturbing the adjustment of the coil 4. The gap can then be cleaned and the assembly replaced, the coil being accurately re-centered by following the procedure set out above.

What is claimed is:

1. A moving coil loud speaker comprising a diaphragm, a driving coil attached to said diaphragm, a magnet structure providing a magnetic air gap for said coil, a frame assembly providing a mounting for said diaphragm and coil, said assembly, diaphragm, and coil being detachable as a unit from said magnet structure, and positioning means between the frame assembly and the magnet for recentering said coil in said air gap upon replacement after removal therefrom, said frame assembly comprising a plate member having a plurality of pear-shaped holes therein, and said positioning means comprising a plurality of fixing bolts extending from the magnet structure, the larger ends of the holes being of a size to pass over the heads of said fixing bolts and the smaller ends of a size to fit the stem of the bolts snugly.

2. A moving coil loud speaker comprising a diaphragm, a driving coil attached thereto, a magnet structure providing a magnetic air gap for said coil, a frame assembly providing a mounting for said diaphragm and coil, said assembly, diaphragm and coil being detachable as a unit from said magnet structure, and positioning means between the frame assembly and the magnet structure for accurately recentering said coil in said air gap on replacement after removal therefrom, said frame assembly comprising a plate member having a plurality of pear-shaped holes therein, said positioning means comprising a plurality of fixing bolts for securing the frame assembly to the magnet structure, the larger ends of the holes being of a size to pass over the heads of said fixing bolts and the smaller ends of a size to fit the stem of the bolts snugly, the smaller ends of the pear-

shaped holes and the undersides of the fixing bolts being countersunk and beveled respectively to correspond.

3. A moving coil loud speaker comprising a diaphragm, a driving coil attached to said diaphragm, a permanent magnet providing a magnetic air gap for said coil, a frame assembly carried by the magnet and detachable as a unit therefrom, said diaphragm and coil being permanently centered on said frame assembly, and coil positioning means for accurately recentering the coil in the air gap after removal therefrom, said means being operative by a small rotation of the frame assembly relative to said magnet.

4. An acoustic device of the electro-dynamic type comprising a diaphragm, a moving coil secured thereto, a mounting for said diaphragm and coil, said mounting having an opening therein, a magnet structure providing a magnetic air gap for said coil, and means for securing said mounting to said magnet and for accurately centering and recentering said coil in said air gap, comprising a member projecting from said magnet through the opening in said mounting, said opening being of such shape that said mounting is turnable relative to said magnet until said projecting member clamps said mounting against said magnet.

5. An acoustic device of the electro-dynamic type comprising a diaphragm, a moving coil attached thereto, a magnet structure providing a magnetic air gap for said moving coil, a plurality of elongated members extending from said magnet, and a mounting for said diaphragm and coil, said mounting, diaphragm and coil being detachable as a unit from said magnet structure, including means engaging with the members extending from said magnet structure and turnable through an angle relative to said magnet for accurately recentering said coil in said air gap on replacement after removal therefrom.

6. An acoustic device of the electro-dynamic type comprising a diaphragm, a moving coil attached to the diaphragm, a mounting for said diaphragm and coil, said mounting including a plate member having a plurality of elongated openings therein, said openings being symmetrical in shape about their longer axes and a magnet structure having a plurality of members projecting therefrom and extending into said mounting through said openings, said members and said openings shaped so that said mounting is turnable with reference to said magnet structure and by being so turned is securely clamped against said magnet.

7. An acoustic device of the electro-dynamic type comprising a diaphragm, a moving coil attached to said diaphragm, a mounting for said diaphragm and coil, said mounting including a plate member having

a plurality of openings therein, each opening being symmetrical in shape about one of its axes, and a magnet structure providing a magnetic air gap for said coil and having a plurality of members projecting therefrom and extending into said mounting through said openings, said members and said openings shaped so that said mounting is turnable with reference to said magnet structure and by being so turned is securely clamped against said magnet, the moving coil being accurately centered in said magnetic air gap at the same time.

8. An acoustic device of the electro-dynamic type comprising a diaphragm, a moving coil attached to said diaphragm, a mounting for said diaphragm and coil, said mounting including a plate member having an opening therein of irregular contour, and a magnet structure having a member projecting therefrom and extending into said mounting through said opening, said member and said opening shaped so that said mounting is turnable with reference to said magnet structure and by being so turned is securely clamped against said magnet.

9. An acoustic device of the electro-dynamic type comprising a diaphragm, a moving coil attached to said diaphragm, a mounting for said diaphragm and coil, said mounting including a plate member having an elongated opening therein, said opening being symmetrical in shape about one axis thereof, and a magnet structure providing a magnetic air gap for said coil and having a member projecting therefrom and extending into said mounting through said opening, said projecting member and said opening shaped so that said mounting is turnable with reference to said magnet structure and by being so turned is securely clamped against said magnet, the moving coil being accurately centered in said magnetic air gap at the same time.

10. An electrical device comprising a plate member having an opening therein, a hollow member permanently centered in said opening, and a block member having an opening therein to receive centrally said hollow member, said plate member having a second opening therein, said block member having a member projecting therefrom and extending through said second opening, said projecting member and said opening shaped so that said plate member is turnable with reference to said block member for the centering of the hollow member.

11. An electrical device comprising a plate member having an opening therein, an annular member permanently centered in said opening, said plate member having a plurality of other openings therein, a block member having an annular opening therein to receive said annular member, and a plurality of members extending from said block and

projecting through said other openings whereby the annular member is accurately centered in the annular opening, the other openings being of such contour that the plate member and block are relatively turnable for the centering of the annular member.

In witness whereof, I hereunto subscribe my name, this twelfth day of March, 1931.
RUPERT W. HARDISTY.