Oct. 10, 1950 B. A. ENGHOLM 2,524,780

POLE PIECE CENTERING ARRANGEMENT FOR PERMANENT MAGNET ELECTRODYNAMIC LOUDSPEAKERS

Filed July 7, 1945

FIG. 2

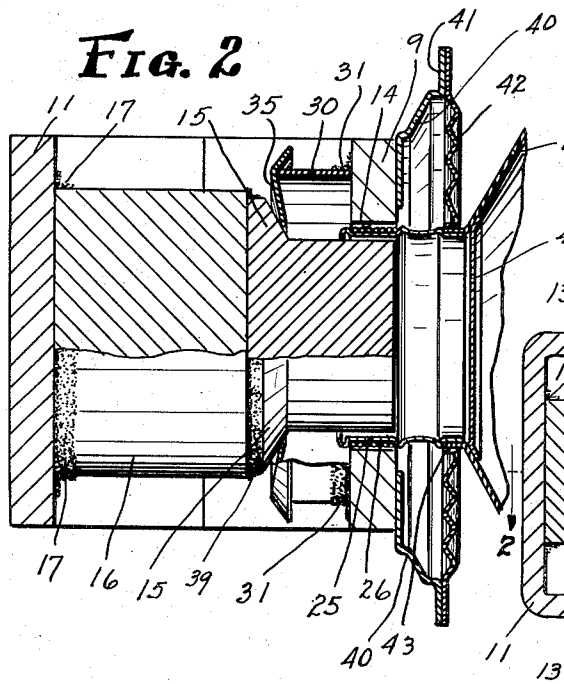


FIG. 1

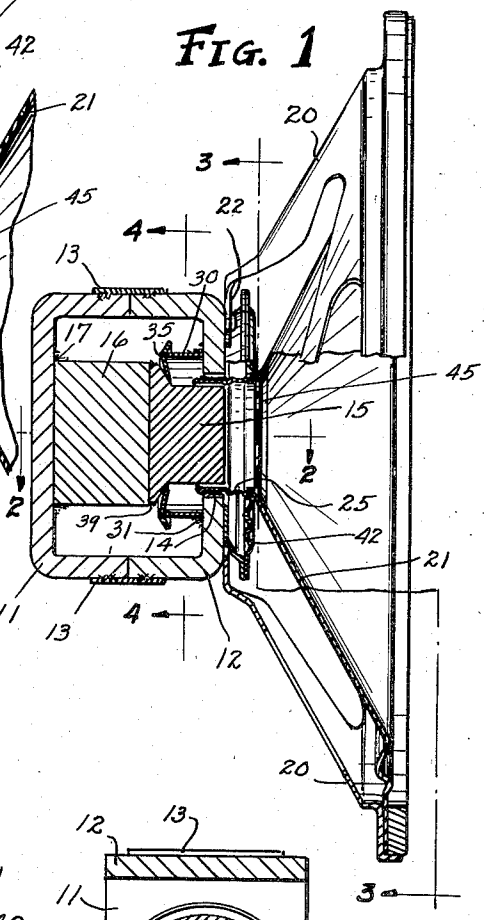
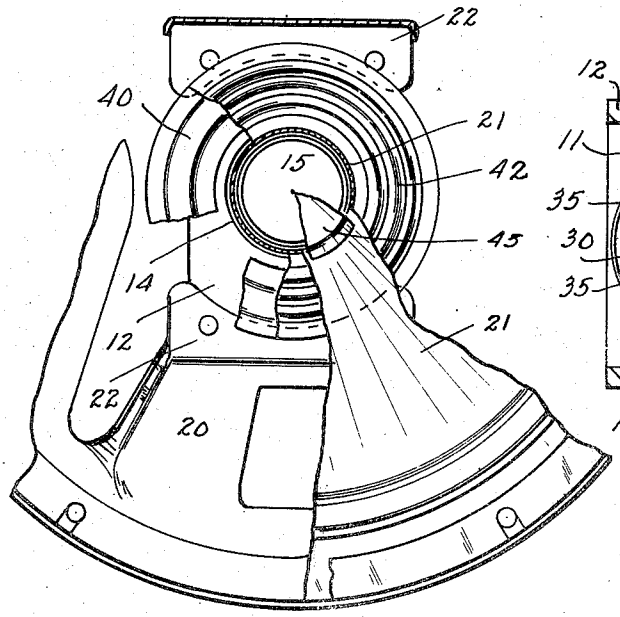


FIG. 3



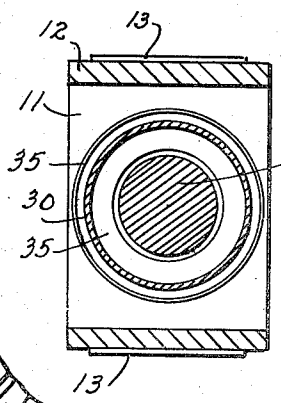


FIG. 4

INVENTOR.
BERNARD A. ENGHOLM
BY
Bates, Teare, & McBean
ATTORNEYS

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POLE PIECE CENTERING ARRANGEMENT FOR PERMANENT MAGNET ELECTRODYNAMIC LOUDSPEAKERS

Bernard A. Engholm, Cleveland, Ohio, assignor, by mesne assignments, to The Rola Company, Inc., Cleveland, Ohio, a corporation of Ohio

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3 Claims. (Cl. 179—115.5)

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This invention relates to loud speakers and particularly to those which utilize a moving coil which operates in an annular air gap between magnetic pole pieces. The pole pieces usually comprise a magnet frame having an aperture therein and a pole tip which projects into the aperture and terminates substantially flush with the outer face of the magnet frame. There is an annular space or air gap between the pole pieces within which the aforesaid coil is supported for operation.

In prior magnetic assemblies the pole tip has been held onto the back frame by a screw that would extend through the back of the frame and into the pole tip, or the tip would be soldered to the frame, but either operation is difficult to attain and at the same time to maintain the desired degree of efficiency of operation.

One of the objects of the present invention is to make an assembly which includes the magnetic elements as aforesaid without the necessity for using a screw or solder for holding the magnet and pole tip in place. The invention contemplates resilient means for centering the magnet and pole tip in proper position and for exerting spring tension thereon to maintain the desired relationship between the respective parts of the assembly.

An additional object of the present invention is to protect the air gap against the entry of foreign particles which would interfere with the accuracy of voice reproduction. Such additional object contemplates the construction of a magnetic assembly as aforesaid, and the prevention of access of foreign particles to the air gap from inside the magnet structure. The invention is thus well adapted for installations employing a permanent magnet.

My invention as hereinafter described provides at once the means for preventing access of particles to the air gap from the region within the magnetic frame, and the means for holding the separate magnetic pole piece in place. The invention may be summarized as comprising the means by which I accomplish these objects, or either of them. A preferred form of such means is illustrated in the drawings hereof and hereinafter more fully explained.

In the drawings, Fig. 1 is a diametric section partly in elevation through a loud speaker embodying this invention; Figs. 2, 3 and 4 are sections taken on planes indicated by the correspondingly numbered lines in Fig. 1.

In each of the views, I have shown an open rectangular magnetic frame composed of two

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channel-shaped members 11 and 12 with their edge flanges secured together as, for instance, by straps 13 spot-welded to the flanges. The web 9 of the member 12 commonly known as a magnet frame has a central opening 14 and into this extends a pole piece 15 abutting a permanent magnet 16 which is suitably secured, as by cement 17, to the web of the member 11. There is thus provided a permanent magnet within an open frame and having a central pole piece extending into an opening in the frame with an annular air gap between them.

In Fig. 1, 20 indicates the housing or frame of the cone 21 which is of suitable vibratory material to deliver sound. The housing 20 has a central portion 22 which is shown as riveted to the web of the channel member 12. The outer edge of the cone is secured to the housing 20 in the usual manner. The cone 21 carries at its apex the voice coil form 25 about which is placed a suitable coil 26 which operates within the air gap 14.

Within the frame of the magnet and surrounding the air gap at some distance from it, I provide a hollow cylindrical member or thimble 30 of non-magnetic material which is suitably secured to the web 12 of the magnet frame. Bearing against the outer peripheral edge of this drum is an annular disc 35 having spring-like characteristics, the inner periphery of which bears against the pole piece 15 of the magnet. The disc 35 is flanged at its outer edge toward the adjacent wall of the frame so that it is retained in place by overhanging the thimble 30. The pole piece 15 is preferably made conical, as shown at 19 and the inner periphery of the disc 35 bears against such conical surface, this disc being slightly flexed inwardly when the parts are assembled. Thus the disc exerts a constant pressure against the pole tip 15 to maintain it in central position with respect to the opening 14.

It will be seen that the simple arrangement of the drum and disc described provides at once the means for positioning the separate pole piece and the means for preventing access from the region about it to the air gap.

I have found it very satisfactory to make the non-magnetic thimble 30 of formed zinc and the resilient disc of Phosphor bronze and to secure the drum in place by cement, shown at 31, but the invention is not limited to those particular materials. After the pole tip has been centered, it may also be cemented to the part 16.

In Figs. 2 and 3, I have shown the voice coil spider as surrounded by a dust protector. Briefly,

such construction comprises an annular cup-like member 40 secured to the magnet frame 9 and having radially extending flange 41 to which the outer portion of an imperforate spider 42 is attached. The inner end of the spider is shown as having a cylindrical flange 43 which is rigidly attached as by cement to the neck of the cone 21. A closure disc 45 is shown as being attached to the inner face of the cone for sealing the outer end of the voice coil form.

An advantage of the present invention is the fact that constant pressure is exerted against the pole tip to maintain it in centralized position with reference to the aperture in the front plate of the magnetic structure. A further advantage is the fact that the aforesaid means also operates to protect the air gap from the entrance of foreign particles.

I claim:

1. A permanent magnet loud speaker comprising an open frame having spaced walls, a central magnetic member secured at one end to the wall of the frame, a separate pole piece laterally shiftable on the other end of the magnetic member and having a conical head, the larger end of which engages the magnetic member and the smaller end of which joins a cylindrical portion which extends into an opening in the opposite wall of the frame leaving a surrounding air gap, a protecting device surrounding the separate pole piece and secured at one edge to the wall of the frame having the opening and having a portion under constraint constantly pressing axially on the conical portion of the separate pole piece to maintain the same centered in the air gap.

2. A permanent magnetic loud speaker comprising an open frame having spaced walls, a central magnetic member secured at one end to the wall of the frame, a separate pole piece laterally shiftable on the other end of the magnetic member and having a conical head, the larger end of which engages the magnetic member and the smaller end of which joins a cylindrical portion which extends into an opening in the opposite wall of the frame leaving a surrounding air gap, a thimble surrounding the pole piece and secured at its outer edge to the wall of the frame having the opening, and a flexible disc having a central opening surrounding the separate pole piece and bearing at its inner edge against the conical portion thereof, said disc bearing against the thimble and constrained thereby to press against the conical surface of the separate pole piece.

3. A permanent magnetic loud speaker comprising an open frame having spaced walls, a central magnetic member secured at one end to the wall of the frame, a pole piece on the other end of the magnetic member and having a conical head, the larger end of which engages the magnetic member and the smaller end of which joins a cylindrical portion which extends into an opening in the opposite wall of the frame leaving a surrounding air gap, a thimble surrounding the pole piece and secured at its outer edge to the wall of the frame having the opening, and a flexible disc having a central opening surrounding the pole piece and bearing at its inner edge against the conical portion thereof, said disc overlapping the inner end of the thimble and constrained thereby to press against the conical surface of the separate pole piece, the disc being flanged at its outer edge in the direction toward the frame portion having the opening to prevent the shifting of the disc upon the thimble.

BERNARD A. ENGHOLM.

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