Oct. 11, 1927. 1,645,231

F. DIETRICH ET AL

ELECTROMAGNETIC SOUND REPRODUCER

Filed March 5, 1926

FIG. 1

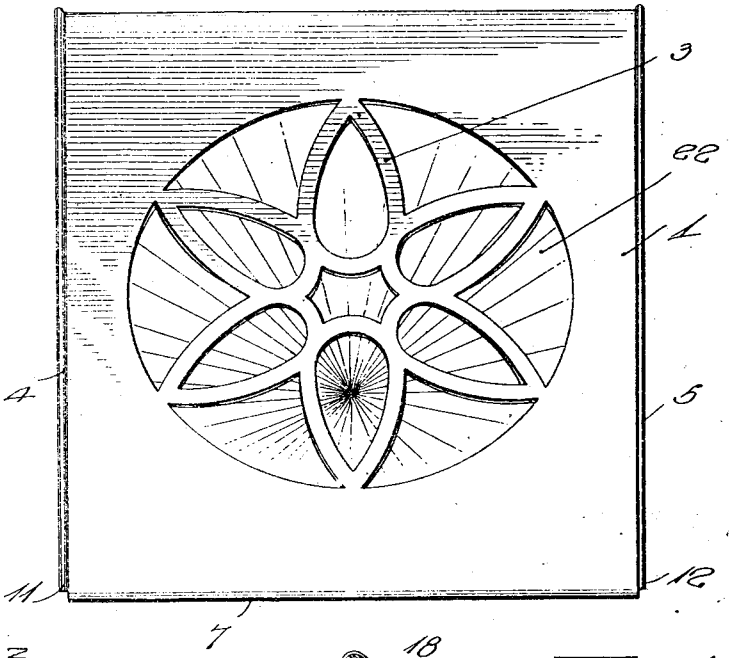


FIG. 3

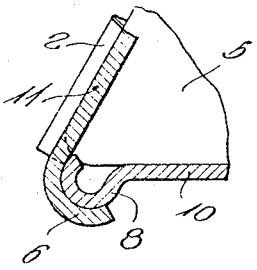
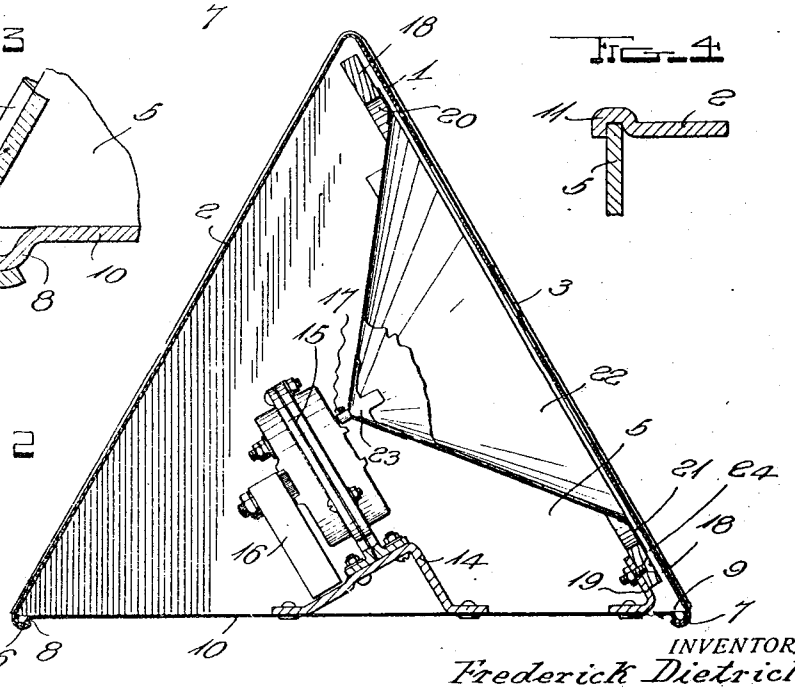


FIG. 4

FIG. 2



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UNITED STATES PATENT OFFICE

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ELECTROMAGNETIC SOUND REPRODUCER.

Application filed March 5, 1926. Serial No. 92,540.

Our invention relates broadly to electromagnetic sound reproducers, and more particularly to a construction of cone speaker for use in radio broadcast reproduction.

One of the objects of our invention is to provide a simplified construction of cone speaker which may be manufactured inexpensively on a quantity production basis and yet have parts arranged for the efficient reproduction of a broad band of frequencies over the entire musical scale.

Another object of our invention is to provide a construction of cone speaker having its parts arranged for the reinforcement of sound waves emanating from the front of a cone diaphragm by the sound waves emanating from the rear of the cone diaphragm for reproduction of radio broadcast entertainment at relatively large amplitude.

Still another object of our invention is to provide an assembly of conical sound reproducing diaphragm in a casing shaped in such manner that sound emanating from the rear of the diaphragm is reflected in such manner as to reinforce the sound emanating from the front of the diaphragm for efficiently reproducing sound over a broad band of frequencies.

Still another object of our invention is to provide a casing for an electromagnetic sound reproducer having its parts pressed from sheet metal and locked together to form a rigid casing from the interior of which sound is directed outwardly in a direction by which the sound may be distributed over a relatively large area at the desired amplitude.

Other and further objects of our invention will be understood from the specification hereinafter following by reference to the accompanying drawings, in which:

Figure 1 is a front view of the cone speaker of our invention; Fig. 2 is a lateral cross-sectional view taken through the cone speaker casing of Fig. 1 and showing the electromagnetic driver and a portion of the cone diaphragm in side elevation; Fig. 3 is a fragmentary cross-sectional view showing the method we employ for locking together the edges of the cone speaker casing; and Fig. 4 is a detailed fragmentary view showing one of the pressed side joints by which the sides of the cone speaker casing are bound together.

Heretofore in the art cone speakers have been constructed with both sides thereof freely exposed to unconfined air. It has been supposed that the confinement of air around the diaphragm would largely impair the sound reproducing characteristics thereof. It has also been proposed to rigidly mount cone diaphragms at their periphery by an annular supporting member with a relatively large sized rim between the supporting member and the conical portion of the diaphragm. Heretofore in the art various forms of mechanical movements have been interposed between the driver and the cone diaphragm proper. It has also been considered heretofore that in order to secure a desired degree of amplitude in sound reproduction it was necessary to employ a cone diaphragm having a diameter of more than nine inches. By our invention we radically depart from the characteristics of the prior art and provide a relatively small sized cone diaphragm as a sound reproducer for radio broadcast entertainment and we flexibly suspend the cone diaphragm at its periphery for free plunger movement. Reciprocating forces are imparted to the cone diaphragm from an electromagnetic driver. The cone diaphragm is assembled within a casing substantially closing one side of the diaphragm whereby the diaphragm operates in substantially confined air. We so shape the casing with respect to the rear of the conical diaphragm that the sound waves emanating from the rear of the conical diaphragm are reflected in phase with the sound waves emanating from the front of the diaphragm for reinforcing such waves and increasing the amplitude of the reproduced sound. We prefer to construct the casing for the cone speaker from sheet metal which is pressed into a hollow triangular prism for housing all of the sound reproducer parts. Abutting edges of the casing are provided with locked-together joints for insuring a tight seal at the edges of the casing.

Referring now to the drawings in more detail, the sheet metal casing which encloses the parts of the cone speaker is represented as having contiguous quadrangular walls 1 and 2 bent with respect to each other. The side portion 1 is provided with a grille 3 through which sound waves may emanate.

The sides of the casing are formed by triangular sheet members 4 and 5. The lower edges of the front and rear walls 1 and 2 terminate in curved portions 6 and 7 which cooperate with the similarly curved portions 8 and 9 of a base plate 10, forming a rigid lock joint therebetween. The front and rear walls 1 and 2 are also provided with turned over edges 11 and 12 to form rigid connections with the side members 4 and 5. The electromagnetic driver is mounted within the casing upon an angularly disposed bracket member 14. The electromagnetic driver is enclosed by a case 15 and is provided with a permanent magnet system 16. The mounting of the driver within the casing is such that the reciprocating member 17 which leads from the armature within the case 15, is disposed in a line substantially normal to the front plate 1 of the casing. Behind the front wall 1 but substantially spaced therefrom we provide a supporting member 18 carried by means of a bracket 19 secured to the base plate 10. The supporting member 18 is centrally apertured, as represented at 20, and extending inwardly from the edges of the aperture is a resilient annular gasket 21 to which the outer periphery of cone diaphragm 22 is secured. The apex of the cone diaphragm 22 is secured by means of a reinforcing member 23, to the plunger 17 whereby sound vibrations are imparted to the sound reproducing diaphragm 22 from the electromagnetic driver within case 15. It will be observed that the supporting member 18 for the cone diaphragm 22 is spaced, as represented at 24, from the rear of the front wall 1, thereby avoiding undesirable compression forces within the casing.

As illustrated the rear wall 2 and the base plate 10 of the casing are disposed at such an angle that the divergence of these plate members forms a pocket behind the rear of the conical diaphragm 22 tending to reflect sound waves from the rear of the diaphragm in the direction of the sound waves emanating from the front of the diaphragm, thereby reinforcing such sound waves and increasing the amplitude of the reproduced sound. The direction of propagation of the reproduced sound is upwardly and outwardly, consequently the sound is distributed over a relatively large area when the cone speaker is mounted upon a horizontal support. The wall 2 and the base plate 10 diverge in the same direction that the side walls of the diaphragm 22 diverge, thus insuring a uniform distribution of the sound. It will be manifest that the entire casing for the cone speaker may be pressed from sheet metal and the edges thereof locked together in pressing operations. The triangular prism of the casing provides angles of sixty degrees between the front, rear, and bottom walls, giving symmetry of construction and simplifying the pressing operations employed in the manufacture of the cone speaker.

While we have described one constructional form of our invention 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 as new and desire to secure by Letters Patent of the United States is as follows:

1. An electromagnetic sound reproducer comprising in combination a prism shaped casing, an electromagnetic driver positioned within said casing, and a cone diaphragm having its base disposed adjacent one wall of said casing and its apex connected with said electromagnetic driver within said casing whereby sound waves reproduced by said cone diaphragm are directed upwardly and outwardly when said triangularly shaped casing is mounted upon a horizontal base.

2. An electromagnetic sound reproducer comprising in combination a casing having an apertured front and a rear wall diverging with respect to each other, an electromagnetic driver positioned within said casing in a plane substantially between said walls, a cone diaphragm having its base located in a plane substantially parallel with the front wall and its apex connected with said electromagnetic driver, whereby sound reproduced by said cone diaphragm is directed upwardly and outwardly when said casing is disposed on a horizontal base.

3. An electromagnetic sound reproducer comprising in combination a casing in a shape of a hollow triangular prism, an electromagnetic driver mounted within said casing, a cone diaphragm having its base disposed in a plane substantially parallel with one wall of said casing and having its apex connected with said electromagnetic driver at a central point within said casing whereby sound reproduced by said cone diaphragm is directed upwardly and outwardly when said casing is mounted upon a horizontal base.

4. An electromagnetic sound reproducer comprising in combination a casing having three quadrangular closure members disposed at substantially equal angles with respect to each other, an electromagnetic driver mounted substantially at the center of one of said closure members, a cone diaphragm having its base disposed in a plane substantially parallel to another of said closure members, and means secured to said first mentioned closure member for supporting said cone diaphragm, and a connection be-

tween the apex of said cone diaphragm and said electromagnetic driver whereby mechanical vibrations are imparted to said cone diaphragm.

5. In an electromagnetic sound reproducer the combination of a casing in the shape of a hollow triangular prism, an electromagnetic driver positioned centrally within said casing, a plunger member connected with said electromagnetic driver, and lying in the plane that bisects one of the angles of said casing, a cone diaphragm, means for mounting said cone diaphragm adjacent the side of said casing opposite the aforesaid angle, and a connection between the apex of said cone diaphragm and said plunger member whereby sound reproduced by said diaphragm is propagated upwardly and outwardly when said casing is mounted upon a horizontal base.

6. An electromagnetic sound reproducer comprising in combination a casing in the shape of a hollow triangular prism, an electromagnetic driver centrally disposed within said casing, a cone diaphragm having its apex connected with said electromagnetic driver and having its base extending in a plane substantially parallel with one side of said casing, the remaining sides of said casing forming a pocket in the rear of said diaphragm for reflecting sound waves emanating from the rear of said diaphragm in the direction of sound waves emanating from the front of said diaphragm for the reinforcement thereof.

7. In an electromagnetic sound reproducer the combination of a casing formed by three quadrangular wall portions locked together at the edges thereof with a pair of end wall portions forming closures for said first mentioned wall portions, a pair of bracket members mounted on one of said first mentioned wall portions, an electromagnetic driver mounted on one of said bracket members, a support for a cone diaphragm mounted upon the other of said bracket members, a cone diaphragm resiliently suspended in said support and having its base lying in a plane substantially parallel with one of said first mentioned wall portions, and a connection between said electromagnetic driver and the apex of said cone diaphragm whereby sound reproduced by said diaphragm is directed upwardly and outwardly when said casing is mounted upon a horizontal base.

In testimony whereof we affix our signatures.

FREDERICK DIETRICH.
WILLIAM H. GERNS.