Nov. 1, 1949 F. H. GOLDSMITH 2,486,837

MAGNETIC ASSEMBLY FOR PERMANENT MAGNET TYPE LOUDSPEAKERS

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Fig. 1

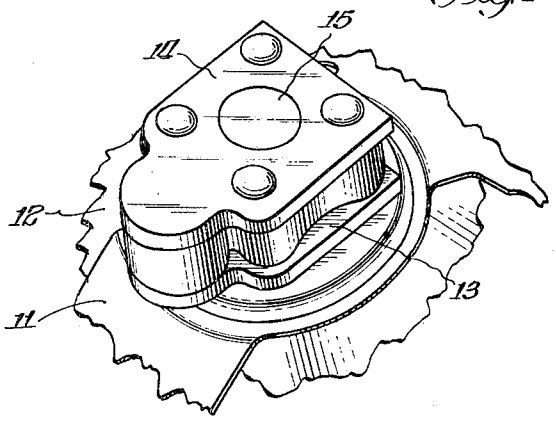


Fig. 3

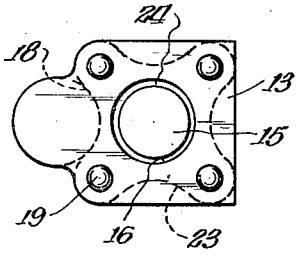


Fig. 2

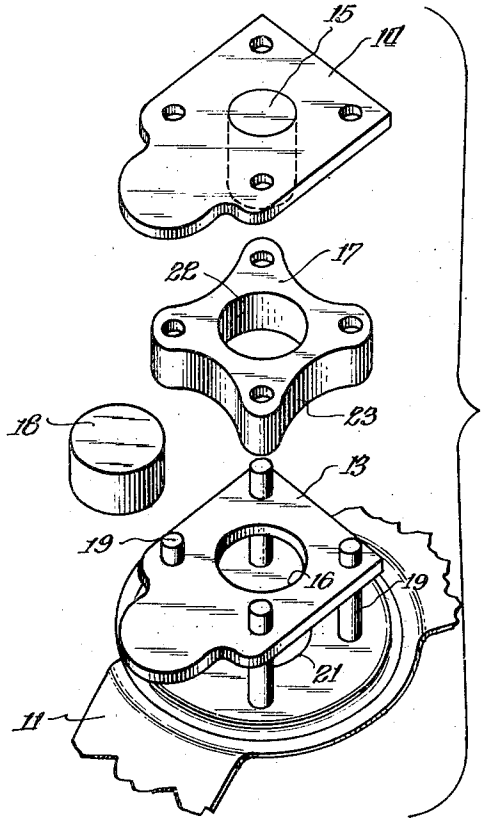


Fig. 4

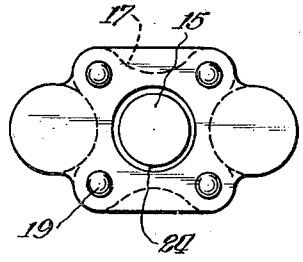
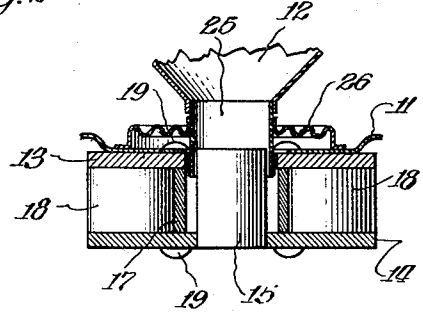


Fig. 5



Inventor:
Francis H. Goldsmith
By: Alden D. Redfield
Attorney.

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MAGNETIC ASSEMBLY FOR PERMANENT MAGNET TYPE LOUDSPEAKERS

Francis H. Goldsmith, Bloomington, Ind., assignor to Avco Manufacturing Corporation, Cincinnati, Ohio, a corporation of Delaware

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2 Claims. (Cl. 179—115.3)

1

The present invention relates to dynamic loud speakers and more particularly to an improved construction of a permanent magnet dynamic speaker.

With the perfection of high flux density permanent magnet alloys, permanent magnet dynamic speakers are universally used in radio and television receivers. In the more common construction of permanent magnet dynamic speakers the cast alloy permanent magnet has one end thereof held by a press fit in a flux path structure arranged to provide an annular air gap at the other end of the magnet. Such construction requires considerable care in grinding the end of the permanent magnet which extends into the air gap so as to be assured of proper concentricity. This structure furthermore requires the return path for the flux to be formed of metal which must be bent into shape, and as is now common is then spot welded to the speaker cone basket or support. As greater power is to be applied to a speaker of this type the magnet must be increased in length. It, therefore, is apparent that as the amount of power to be handled by the speaker increases, the weight or size of the permanent magnet also increases so that the space occupied in back of a speaker cone support or basket also is increased.

In present day construction of television and FM receivers it has been found desirable to minimize as much as possible the space which is occupied by the dynamic speaker. In the manufacture of speakers it obviously would be desirable to employ a more economical construction without sacrificing the quality of reproduction of the speaker.

It, therefore, is an object of the present invention to provide an improved structure for permanent magnet dynamic speakers which is particularly suited for economical mass production methods.

Still another object of the present invention is to provide an improved permanent magnet dynamic speaker which will reduce the amount of labor required, eliminate bending and welding and yet utilize much of the present conventional design.

A further object of the present invention is to provide an improved structure for permanent magnet speakers which will materially reduce the depth of the speaker as compared to conventional constructions.

A still further object of the present invention is to provide an arrangement whereby speakers of different power outputs will have the same depth dimension.

Still another object of the present invention is to provide an arrangement in permanent magnet speaker construction which will eliminate the

2

critical grinding operation heretofore employed on the permanent magnet material.

A still further object of the present invention is to provide an improved loud speaker construction whereby a simple assembly jig can be employed to obtain perfect alignment of all the component parts.

Yet another object of the present invention is to provide a permanent magnet loud speaker construction which employs a spacer and magnet position guide serving also to minimize accumulation of dust and other foreign material within the air gap.

It is also an object of the present invention to provide a loud speaker construction whereby a single fastening operation may be used to secure together the permanent magnet structure in position on the speaker cone basket or support.

Other and further objects of the present invention subsequently will become apparent by reference to the following description taken in conjunction with the accompanying drawings wherein:

Fig. 1 is a perspective view of a permanent magnet dynamic speaker constructed in accordance with the principles of the present invention;

Fig. 2 is an exploded view of the structure shown in Fig. 1 which illustrates the various components and also the mode of assembly;

Fig. 3 is a view of the permanent magnet structure as seen from a plane passing between the structure and the speaker cone basket or support;

Fig. 4 is a view similar to Fig. 3 showing an arrangement whereby a speaker is to be constructed having a greater power output; and

Fig. 5 is a cross-sectional view through a structure of the type illustrated in Fig. 4.

Referring to Fig. 1 and Fig. 2 it will be seen that there has been shown a portion of a loud speaker cone basket or support 11 which engages the periphery of the conical diaphragm or loud speaker cone 12.

Mounted upon the loud speaker basket or support 11 is a magnetic structure which includes two similarly shaped plates 13 and 14, each having centrally arranged holes. The holes in the plate 14 support by means of a press fit a cylindrical member 15.

The plates 13 and 14 are held in spaced relation by a spacer structure 17 and a cylindrical permanent magnet 18. The entire assembly is held in position on the support member 11 by means of a plurality of rivets 19.

The plate 13 has an opening 16 of greater diameter than the diameter of the cylindrical body 15 so as to provide an annular air gap within which there is positioned a voice coil support and voice coil. The speaker basket 11 is pro-

vided with an opening 21 which may be slightly larger than the opening 16 in the plate 13 so as to provide adequate clearance for the voice coil.

From Figs. 2 and 3 it becomes evident that the spacing member 17 has a plurality of curved sides 23 which are so designed as to serve as guides for the placement of the permanent magnet 18. The spacer member 17 is made of a non-magnetic material which serves as a spacing element in the assembly of the various components as shown in the exploded view of Fig. 2. The spacer 17 furthermore serves to provide a chamber which protects the air gap 24 formed between the opening 16 of the plate 13 and the extremity of the cylindrical member 15 which is supported by the plate 14.

In assembling the structure illustrated in Figs. 1, 2 and 3, a plurality of rivets 19 are inserted in suitable openings in the support basket 11 and the rivets are passed through corresponding holes in the plate 13. The spacer member 17 is next placed in position and a permanent magnet 18 is placed upon the plate 13 with one surface of the magnet 18 in contact with the surface 23 of the spacer 17. The plate 14 is then brought into position and the ends of the rivets 19 are then upset to form suitable heads.

Where it is desired to provide a greater flux density in the air gap 24 the plates 13 and 14 are enlarged sufficiently to support two or more permanent magnets 18 as illustrated by Figs 4 and 5. The arrangement shown in Figs. 4 and 5 shows two permanent magnets 18 mounted between the plates 13 and 14 which have been given similar reference numerals because their purpose and general construction is the same as those plates illustrated in Figs. 1–3. It, furthermore, will be apparent that four magnets 18 could be employed to obtain a still greater flux density in the air gap. Thus it becomes apparent that the power output rating of the loud speaker may be increased by increasing the number of magnets 18. This is accomplished without increasing the dimensions of the structure in back of the support or basket 11.

Fig. 5 furthermore illustrates a certain feature of the construction which is common to all types of permanent magnet loud speakers since it is common to cement a voice coil support or cylinder 25 to the speaker cone 12. At the lower extremity of the cylinder 25 a fine wire voice coil is wrapped so as to be positioned within the air gap 24. The voice coil cylinder 25 is centered by a spider or corrugated structure 26, which in turn is suitably secured to the support basket or member 11.

In the structure which employs a plurality of permanent magnets 18 it is preferable that the spacer member 17 be of a material which is softer than the permanent magnet 18 so that the force of the rivets 19 presses together the plates 13 and 14 so as to insure good contact between the surfaces of the cylindrical members 18 and the plates. The spacing and assembling member 17, therefore, may be made of such material as rubber, laminated paper, molded paper, impregnated felt, processed cork, or the like. In the instance where a single magnet is employed as shown in Figs. 1–3 it may be found preferable to have the spacer member 17 formed of a material having slightly greater rigidity so as to insure absolute parallelism between the plates 13 and 14 and yet maintain a good contact with the surfaces of the permanent magnet 18. Obviously, of course, the spacer 17 could be made of some non-magnetic material such as aluminum, brass, zinc or the like.

While for the purpose of illustrating and describing the present invention certain embodiments have been illustrated in the drawings, it is to be understood that the invention is not to be limited thereby since such variations in the construction and in the components are contemplated as may be commensurate with the spirit and scope of the invention as set forth in the accompanying claims.

What I desire to protect by United States Letters Patent is claimed as follows:

1. A permanent magnet dynamic loud speaker construction comprising a generally rectangular plate having an integral extension and formed with a central hole, a cylindrical pole piece frictionally mounted in said hole, a second generally rectangular plate arranged parallel and relatively close to said first plate, said plate also having an integral extension and being formed with a hole of greater diameter than said cylindrical pole piece to form an annular air gap thereabout, a one piece non-magnetic generally rectangular spacing and positioning element formed with concave sides and an opening therein arranged concentric to said pole piece, said element being located between said plates, a solid cylindrical permanent magnet positioned between the extensions of said plates and located adjacent said spacing element, and in abutment with one of said sides, a loud speaker diaphragm frame, and fastening means, comprising spaced apertures on said frame, said plates and said spacing element, and rods extending through said apertures to hold said frame and plates and spacing element in registry and said magnet in position, said rods and apertures being located symmetrically with relation to said pole piece.

2. A permanent magnet dynamic loud speaker construction comprising a plate having a central hole therein, a cylindrical pole piece frictionally mounted in said hole, a second plate arranged parallel and relatively close to said first plate, said second plate being formed with a hole of greater diameter than said cylindrical pole piece to form an annular air gap thereabout, a one piece non-magnetic spacing and positioning element formed with concave sides and a central opening concentric to said pole piece, said element being located between said plates, at least one solid cylindrical permanent magnet positioned between said plates and located adjacent said spacing element in abutment with one of said sides, and fastening means, comprising spaced apertures on said plates and said spacing element, and rods extending through said apertures to hold said plates and spacing element in registry and at least one magnet in position.

FRANCIS H. GOLDSMITH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,115,795	Warnke	May 3, 1938
2,123,640	Warnke	July 12, 1938
2,129,628	Serge	Sept. 6, 1938
2,175,994	Quam	Oct. 10, 1939
2,298,764	Horlacher	Oct. 13, 1942
2,475,516	Quam	July 5, 1949

FOREIGN PATENTS

Number	Country	Date
383,480	Great Britain	Nov. 17, 1932