United States Patent

[11] 3,621,420

[72] Inventors **Rudolf Gorike;**
Wilhelm Kollesberger, both of Wien, Austria

[21] Appl. No. **2,595**
[22] Filed **Jan. 12, 1970**
[45] Patented **Nov. 16, 1971**

[73] Assignee **AKG Akustische u. Kino-Gerate Gesellschaft mbH**
Wien, Austria

[32] Priority **Jan. 14, 1969**
[33] **Austria**
[31] **A 342/69**

[54] **MAGNET SYSTEM FOR AN ELECTRODYNAMIC TRANSDUCER**
8 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **335/231,** 179/115.5, 179/179
[51] **Int. Cl.** **H01f 7/00**
[50] **Field of Search** 335/231, 297; 179/117, 119, 115.5, 179; 29/602

[56] **References Cited**

UNITED STATES PATENTS

2,537,253	1/1951	Andersen	179/115.5
3,258,543	6/1966	Mosier, Jr.	179/115.5

Primary Examiner—G. Harris
Attorney—McGlew and Toren

ABSTRACT: A magnet system for an electrodynamic transducer includes a magnetic core with a cover of a thermoplastic material thereon which includes a plurality of radially extending longitudinal ribs on its side face and studs which project from its end face and which bear against an inturned end wall of a magnetic cup. The ribs in turn bear against the sidewall of the cup. The cup is provided with an aperture to receive a pole plate which is attached to the magnetic core and which defines an airgap with the edge of the end wall of the cup which bounds the pole aperture in the cup. A baseplate is disposed over the opposite end of the core to retain the magnetic core in position within the cup. An external cover of thermoplastic material is then applied over the magnetic cup and the baseplate leaving the pole aperture in the end wall of the magnetic cup free. The cover is made of a plastic material which contracts to a greater degree than the metal, so that all of the metal parts are pressed firmly against each other by the external coating of plastic material. With the method of the invention, the external coating of thermoplastic material is applied so that the pole aperture is opened to permit the pole plate to be secured to the magnetic core and this is advantageously done for example, by means of an adhesive applied with the aid of a gap-forming tool.

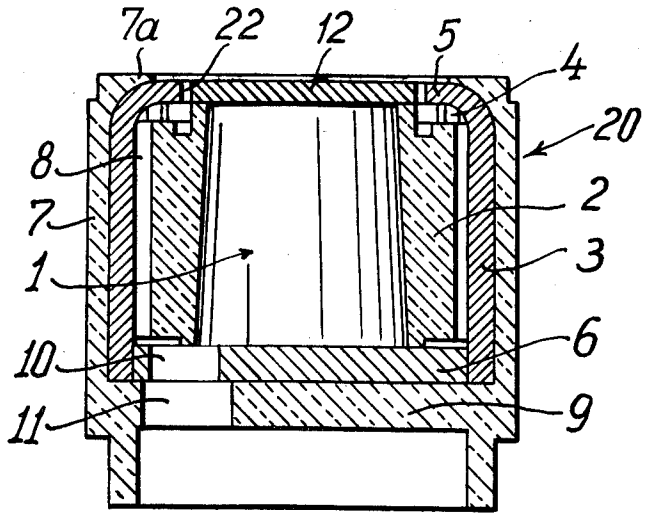


Fig. 1

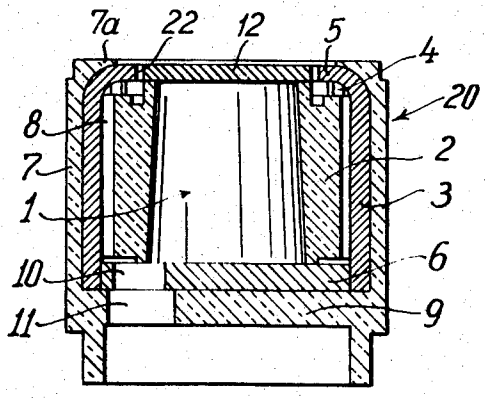
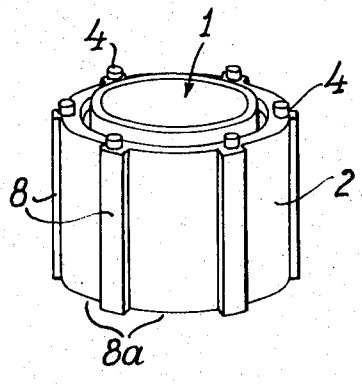


Fig. 2



MAGNET SYSTEM FOR AN ELECTRODYNAMIC TRANSDUCER

SUMMARY OF THE INVENTION

This invention relates in general to the construction of a system having many parts and in particular to new and useful magnet system for an electrodynamic transducer such as a microphone, or headphone, and to a method of producing such a magnet system.

The invention relates in particular to a magnet system which includes a magnetic core which is arranged in a magnetic cup which has an aperture adjacent one end so that a pole plate may be attached to the magnetic core and define an airgap with the wall of the magnetic cup which bounds an aperture of the cup adjacent one end of the core. Means such as a baseplate is provided to hold the core within the cup. It is known to arrange a magnet system of this type in such a way that the parts thereof are held together by injected thermoplastic material. For example, attempts have been made to secure a magnetic core which is provided with a central bore and a coating of a plastic material in a fixed position and at the same time to connect the core to a pole plate. This was done by injecting a tubular sheet of plastic material through a bore of the magnetic core to form a head similar to a tubular rivet on the pole plate and thereby fixing the pole plate in position with this rivet. A disadvantage of such a construction and method lies in the fact that the comparatively large number of components have to be inserted into the injection mold. Apart from the time required for this process there is an additional time required for the components to set in the injection-molding machine and these considerations make the manufacture of such a product very expensive.

In accordance with the present invention, there is provided a magnet system having parts thereof which are reliably held together even when subjected to shock or jolts, for example when dropped. This is accomplished by providing a magnet system for an electrodynamic transducer which includes a magnetic core which is provided with a covering or sheath on its side face which includes longitudinal ribs arranged at spaced locations around its circumference which bear against the wall of a magnetic cup. In addition the sheets includes studs at the end which bear against an inturned flange which bounds an aperture, or opening in the cup, and which accommodates a pole plate. Retaining means, such as a baseplate, which is arranged at the other end of the cup, holds the core and its cover within the cup. An external coating of a thermoplastic material is then applied over the magnetic cup and the baseplate leaving free the pole aperture in the end wall of the magnetic cup.

The magnetic system of the invention is advantageously provided with a magnetic core which is formed as a conical frustum. The two end faces of the core are advantageously face ground so as to promote efficient magnetic contact. The covering or sheath for the core includes the radially projecting ribs which define circumferential spaces therebetween forming acoustic channels which connect the airgap defined around the pole plate within the aperture of the magnetic receiving cup.

In accordance with the method of the invention the core with its plastic coating is positioned within the cup and held in place by retaining means and the magnetic cup and the baseplate are given an external coating of a thermoplastic material which is applied so as to leave the end aperture of the cup free of material to facilitate the attachment of the pole plate. The pole plate is then secured to the magnetic core so as to lie in the aperture of the magnetic cup and this is accomplished by means of an adhesive applied, for example, with the aid of a gap-forming tool.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference

should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a transverse sectional view of a magnet system constructed in accordance with the invention; and

FIG. 2 is a perspective view of a magnetic core provided with a plastic covering or sheath.

GENERAL DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings in particular the invention embodied therein comprises a magnet system for an electrodynamic sound transducer generally designated **20** which includes a magnetic core **1** which is of frustoconical configuration. In accordance with the invention the core is provided with a tubular sheath or cover **2** of a thermoplastic material which is applied in a separate injection operation and which tightly embraces the core as indicated in FIGS. **1** and **2**. The cover **2** is provided with a plurality of circumferentially spaced longitudinally extending ribs **8** which leave recesses **8***a* therebetween when the core and the cover are assembled into a magnetic cup **3**. According to an embodiment of the invention the magnetic core **1** comprises a solid body in its unfinished rough-cast state.

In accordance with a feature of the invention the magnetic cup is provided with an end wall **5** having an opening **22** of a size to accommodate a pole plate **12** and still leave an airgap between the pole plate **12** and the edge bounding the aperture of the end wall **5**.

In addition to the ribs **8** the cover **2** is provided with a plurality of studs or projecting elements **4** which extend longitudinally and provide a resilient engagement of the cover with the end wall **5**. The ribs **8** may be dimensioned so that when the magnetic core **1** with its cover **2** is inserted into the magnetic cup **3** the ribs will be slightly deformed and the core **1** will be held securely within the cup **3**. The axially extending studs **4** limit the extent in which the core **1** can be inserted into the cup **3**.

In accordance with a further feature of the invention, an external coating **7** of a plastic material is injected around the magnetic cup **3** after the magnetic core **1** has been inserted therein. Before the external coating is applied, however, a baseplate or other holding means **6** of a magnetically conductive material is inserted into the injection mold so that it is pressed against the magnetic core **1**. Because the plastic material of the coating **7** contracts to a greater extent than metal all of the metal parts are pressed firmly against each other by the external coating. The external coating **7** adheres firmly to the magnetic cup **3** due to friction and it includes an inwardly extending portion **9** which extends over the baseplate **6** and an inwardly turned flange portion **7***a* which extends over the end wall **5** of the magnetic cup **3**.

Openings **10** and **11** are formed in alignment on the respective baseplate **6** and the portion **9** and may be employed for acoustic purposes in conjunction with the air channels formed by the recesses **8***a* and defined between the cover and the interior wall of the magnetic cup **3**.

After the application of the external coating **7**, the pole aperture **22** is left free and this permits the pole plate **12** to be fixed to the free end face of the magnetic core **1** so as to lie in the aperture and define a pole gap with the end wall bounding the aperture. The attachment of the pole **12** to the magnetic core **1** is accomplished for example, by means of a contact adhesive. The construction permits the attainment of a uniform airgap around the plate **12** with the aid of a gap-forming tool.

In view of the low mass of pole plate **12** it is not likely to become detached or displaced as a result of inertia when the system receives a sharp knock. The construction forms a compact magnetic system all parts of which are impact and shock-

resistant and are therefore substantially insensitive to rough treatment.

What is claimed is:

1. A magnetic system for an electrodynamic transducer, comprising a magnetic core, a cover of thermoplastic material arranged around the side surface of said core and having a plurality of ribs on its side face and a plurality of projecting stud members on an end face, a magnetic cup in which the magnetic core is received and having an end wall with a pole aperture, said cover having a stud projecting from its end face bearing against an end wall of said magnetic cup, a pole plate attached to said magnetic core and disposed in the pole aperture of said end wall and defining an airgap between the periphery of said pole plate and the edge of said end wall bounding the pole aperture, a baseplate arranged adjacent the end of said magnetic cup which is opposite to said pole plate to retain the magnetic core, and an external covering of thermoplastic material extending over the magnetic cup and baseplate and leaving free the pole apertures in the end wall of said magnetic cup.

2. A magnetic system, according to claim 1, wherein said magnetic core is in the form of a conical frustum.

3. A magnetic system, according to claim 1, wherein said magnetic core comprises a solid body in its unfinished rough-cast state.

4. A magnetic system, according to claim 1, wherein said baseplate includes an opening, said external thermoplastic coating having an opening aligned with said baseplate opening.

5. A magnetic system, according to claim 1, wherein said ribs of said cover define air channels therebetween from the surface of said cover to said magnetic cup, said baseplate having an opening communicating with said air channels and being exposed by said external covering.

6. A magnetic system, according to claim 1, wherein said core is a solid material of frustoconical configuration, said cover defining an annular end portion surrounding said core and forming a planar base with the end of said core for receiving said pole plate, said external covering including an inturned end portion extending around said magnetic cup adjacent each end thereof.

7. A method of producing a magnet system for an electrodynamic transducer which includes a magnetic core, a magnetic cup in which the magnetic core is received having an end wall with an aperture for a pole plate which is attached to the magnetic core so as to leave an airgap between the periphery of the pole plate and the edge of the pole aperture, and means such as a baseplate arranged at the other end of the magnetic cup to retain the magnetic core in the cup, comprising applying a cover of thermoplastic material which has an exterior plurality of projecting ribs on its side and at least one stud projecting from its end over the magnetic core, inserting the core with its cover into the magnetic cup to cause the studs to bear against an end wall of the magnetic cup, inserting the baseplate into the magnetic cup over the core at the other end thereof, applying an external coating of a thermoplastic material over the cup and baseplate leaving free the pole aperture in the end wall of the magnetic cup, and securing the pole plate to the magnetic core so that it lies in the pole aperture.

8. A method, according to claim 7, wherein the cover is applied to the lateral surface of the magnetic core when the magnetic core is in the unfinished rough-cast state, and wherein said cover is applied in a separate injection operation.