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(54) Movable coil for loudspeakers and microphones

(57) The movable coil is wound in two ways with electrically conductive strip (1) laid with its wider side on the coil carrier (3). With the first method, the strip is wound coil over the coil in the form of a strip spiral (Fig.1), one and several spirals wound one next to the other (Fig.2) depending on the planned power and Ohms rating of the coil (2). With the other method, the strip is wound coil-to-coil in one row (Fig.3) and in several rows (Fig.4) on a coil carrier (3) fixed to the membrane (4) (the carrier is not absolutely necessary since the coil may be fitted directly) centered by means of the centering piece (5) at the level and between the magnet pole extensions N and S (7), allowing higher dynamics, higher efficiency and precise turning of electric signals into sound waves in the case of loudspeakers, and vice-versa - higher sensitivity and precise turning of sound waves into electrical signals in the case of microphones.

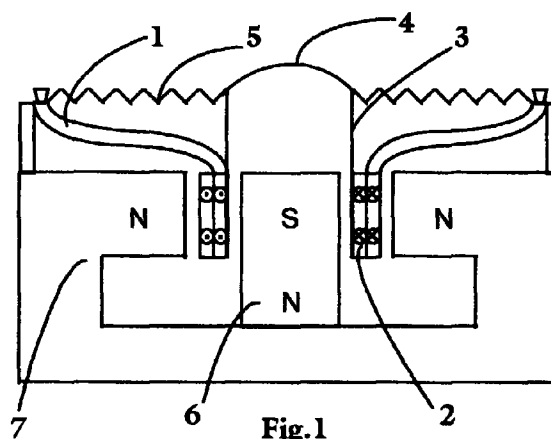


Fig. 1

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Description

The invention belongs to the area of electrical engineering and electroacoustics and relates to loudspeakers and microphones with movable coils designed based on electrically conductive strip.

The invention resolves the problem of more precise conversion of electrical signals into sound waves in the case of loudspeakers, and more precise receiving of sound waves and their conversion into electrical signals in the case of microphones.

The movable coil of a loudspeaker allows electrical signals to be converted into sound waves, whereas the coil of a microphone turns the sound waves into electrical signals.

The known designs of the loudspeaker and microphone movable coil are based on a rectangular wire, with the narrow side adjacent to the coil mounting and wound coil-to-coil in one row, or made of a round wire wound coil-to-coil in one or more rows. Both these designs have a long coil, and with the round wire there are voids between coils, so that end coils at both ends are out of the permanent magnetic field. As the coil assembly moves, the number of coils not affected by the magnetic field increases and causing thereby less precise turning of electric signals into sound waves, and vice-versa - less precise turning of sound waves into electric signals.

The movable coil for loudspeakers and microphones is made in two ways, and consists of electrically conductive strip wound with one or more beginnings, laid one over the other and with the strip folded or twisted, once or more times along its longitudinal axis and laid with its wider side on the coil carrier. With the first method of making the coil, the strip is wound coil over the coil (in a cross section appears like strip spiral). One or more spirals may be wound one next to the other depending on the planned power and Ohm rating of the coil. With the other method, the strip is wound coil-to-coil in one or more rows. The advantages of these coils are: production and winding tooling are cheaper, each coil is equally located within the permanent magnetic field in the case of the first production method, and with the other production method a majority of coils is within the field, so that the coil in loudspeakers allows higher dynamics, higher efficiency and precise turning of electric signals into sound waves, as well as higher sensitivity and precise turning of sound waves into electric signals in the case of microphone.

The invention is described in details on an example of the design shown in drawings:

Fig.1 -Represents a longitudinal cross section of the loudspeaker and microphone coil with the movable coil system and the coil wound coil over the coil in one spiral.

Fig.2 -Represents a longitudinal cross section of the loudspeaker and microphone coil wound coil

over the coil in several spirals one next to the other.

Fig.3 -Represents a longitudinal cross section of the loudspeaker and microphone coil wound coil-to-coil one row.

Fig.4 -Represents a longitudinal cross section of the loudspeaker and microphone coil wound coil-to-coil in several rows.

Fig.5 -Represents a cross section of the strip twisted along its own axis.

Fig.6 -Represents a cross section of the strip folded along its own longitudinal axis.

Fig.7 -Represents the strip having two beginnings for simultaneous coil winding.

Fig. 1,2,3,4 -Represent the coil having one beginning for winding.

Fig.1 shows a longitudinal cross section of the loudspeaker and microphone with the moving system and coil assembled of electrically conductive strip (1), coil (2), coil carrier (3), membrane (4), centering piece (5), permanent magnet (6) with magnet poles extensions (7).

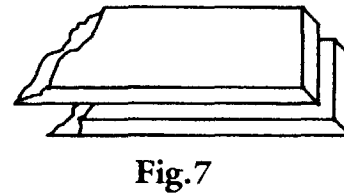
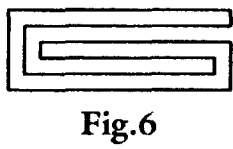
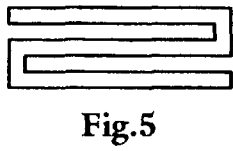
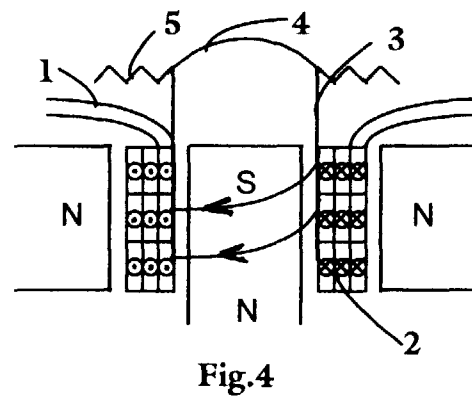
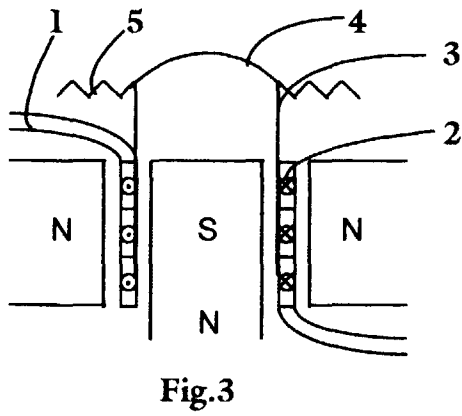
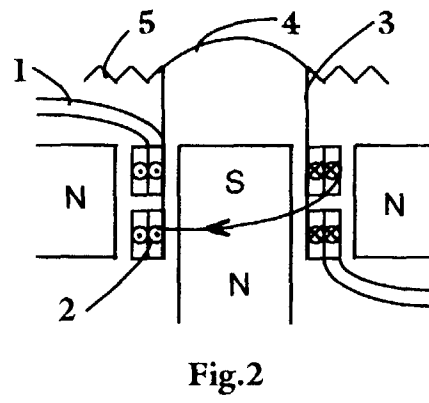
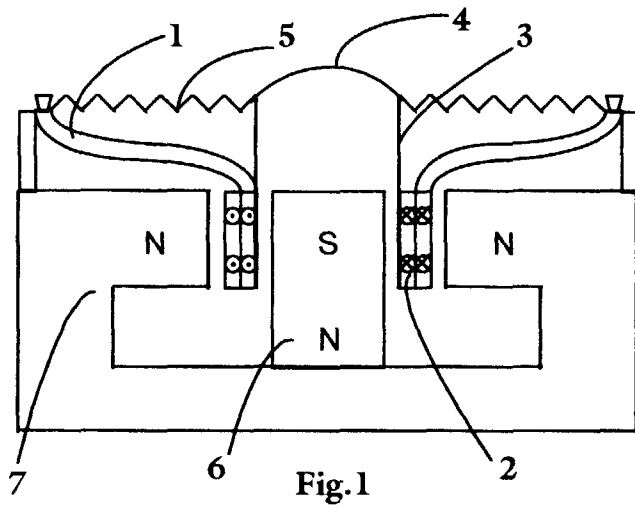
In compliance with the concept of this invention, the coil would be wound in two ways with an electrically conductive strip having one beginning (1) (Figs. 1,2,3,4), with two beginnings of the strip laid one over the other for simultaneous winding (Fig.7), and with the strip folded once or several times along its own axis (Fig.5), or with the strip twisted once or several times along its own axis (Fig.6), the strip being laid with the wider side on the coil carrier (3). For the first method of making the coil, select the strip type (Fig.5,6,7) and wind coil over the coil (in the cross section the coil would appear like a strip spiral) (Fig. 1) wound in one or several spirals one next to the other to obtain the planned power and Ohm rating of the coil (2) (Fig.2). For the second method of making the coil, select the type of the strip and wind coil-to-coil in one row (Fig.3) or in several rows (Fig.4) on the coil carrier (3) (which is not absolutely necessary since the coil can be fitted directly) and fix the coil with the carrier to the membrane (4) and center it with the centering piece (5) at the level and between the permanent magnet pole extensions N and S (7).

In compliance with the accomplishment of the invention, the movable coil is wound with electrically conductive strip having one beginning (1) with the wider side of the strip laid on the coil carrier (3). With the first method, the strip is wound coil over the coil as a strip spiral (2) (Fig. 1), or the coil is wound in several spirals (2) (Fig.2). With the second method of making the coil, the strip is wound coil-to-coil in one row (2) (Fig.3), or in several rows (2) (Fig.4) on the coil carrier (3), the coil with the carrier being fixed to the membrane (4) and centred by means of the centering piece (5) at the level and between the magnet pole extensions N and S (7).

Claims

1. Movable coil for loudspeakers and microphones made in two ways and consisting of an electrically conductive strip (with one beginning) (1) Figs. 1,2,3,4 and with several beginnings laid one over the other (Fig.7) and form the strip folded once or several times along its own axis(Fig.5), or from the strip twisted once or several times along its own axis (Fig.6). With either of these methods, the strip is laid with its wider side on the coil carrier, so that in the case of the first method it is wound coil over the coil as a strip spiral (Fig. 1) or in several strip spirals (Fig.2), whereas with the second method the strip is wound with its wider side coil-to-coil in one row (Fig.3) or in several rows (Fig.4). 5 10 15
2. Movable coil in accordance with claim 1, characterized by that the strip has one beginning (1) (Figs.1,2,3,4) or several beginnings of the strip laid one over the other (Fig.7). 20
3. Movable coil in accordance with claim 1, characterized by that the strip is folded once or several times along its longitudinal axis (Fig.5). 25
4. Movable coil in accordance with claim 1, characterized by that the strip is twisted once or several times around its own axis (Fig.6). 30
5. Movable coil in accordance with claim 1, characterized by that the strip in any of the above described alternatives is laid with its wider side on the coil carrier (3). 35
6. Movable coil in accordance with claim 1, characterized by that it is wound coil over coil in the form of a strip spiral (2) (Fig. 1).
7. Movable coil in accordance with claim 1, characterized by that it is wound in several spirals one next to the other (2) (Fig.2). 40
8. Movable coil in accordance with claim 1, characterized by that the strip is wound coil-to-coil in one row (2) (Fig.3). 45
9. Movable coil in accordance with claim 1, characterized by that the strip is wound is several rows (2) (Fig.4). 50

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EUROPEAN SEARCH REPORT

Application Number
EP 97 10 2956

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	FR 2 527 883 A (HARMAN INTERNATIONAL INDUSTRIES)	1,2,5,6,9	H04R9/04
Y	* page 1, line 1-6 *	7,8	
A	* page 2, line 32 - page 3, line 32 *	3,4	
	* page 4, line 4 - page 5, line 30 *		

X	US 1 935 404 A (LEOPOLD)	1,2,5,6	
Y	* page 1, line 1-31 *	7,8	
A	* page 1, line 49 - page 2, line 14 *	3,4	

X	US 5 027 412 A (HAYASHI ET AL.)	1,2,6,8	TECHNICAL FIELDS SEARCHED (Int.Cl.6) H04R
Y	* column 1, line 23-30 *	7	
A	* column 3, line 13-39 *	3-5,9	
	* column 4, line 7-20 *		
	* column 5, line 6-40 *		

Y	FR 968 234 A (LE MATERIEL TELEPHONIQUE)	7,8	
	* figure 1 *		

Y	DE 38 30 461 A (DEUTSCHE THOMSON BRANDT)	7	
	* figure 1 *		

The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 3 February 1998	Examiner Zanti, P
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