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(54) Loudspeaker

(57) A loudspeaker containing an improved voice drive structure including a convex diaphragm adhered with a voice coil before being mounted to a modified

damper integrated with a surround to increase directivity of output of sound effects and effectively expand sound field of the loudspeaker.

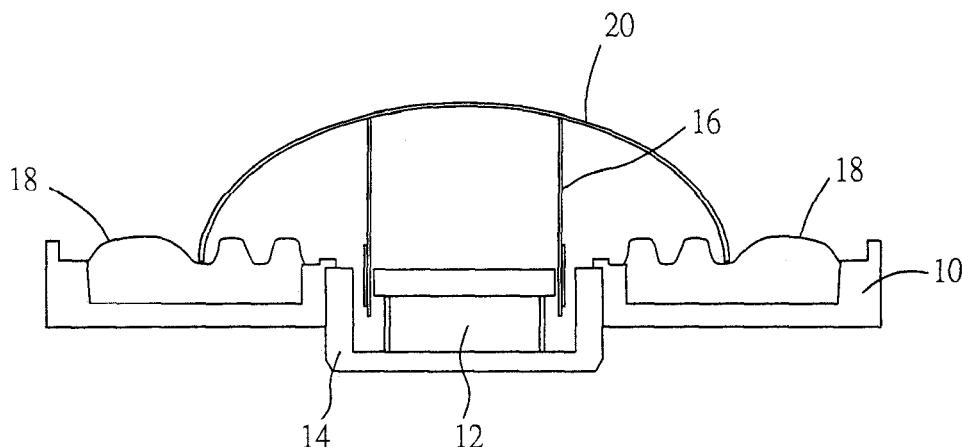


FIG. 2

Description

FIELD OF THE INVENTION

[0001] The present invention is related to a loudspeaker, and more particularly, to an improved structure of voice drive materials of the loudspeaker. 5

BACKGROUND OF THE INVENTION

[0002] Whereas an electrodynamics loudspeaker of the prior art is essentially of magnetic circuit materials including magnet, U-shaped iron (yoke), washer, and frame; and moving system including damper, cone-paper (cone and surround), voice coil, and dust cap. According to an equation of force, $F = BLI$, wherein B relates to density of magnetic flux in a magnetic gap; L , length of voice coil conductor; and I , electric current flowing through voice coil, a working principle of the loudspeaker involves an electro-magnetic force F that varies when both of strength and direction of electric current flowing through the coil voice change for the voice coil to vibrate back and forth thus to drive the cone-paper to propel the air, and the air in turn serving as a medium to radiate sound waves. 10

[0003] Referring to Fig. 1 for a schematic view of a loudspeaker of the prior art, a magnetic circuit including a frame of basket 1, and a U-shaped iron (yoke) 2 containing a magnet 3 and a washer 4 disposed beneath the frame of basket 1 is assembled first, and then moving system including a damper 5, a voice coil 6, a cone-paper 7, and a dust cap 8 are glued to the frame of basket 1. 15

[0004] In the prior art, the output of sound is achieved by relying upon the cone-paper and the dust cap 8 to drive the air; however, the prior art is found with a major flaw in meeting requirements of certain sound field because that the conventional cone-paper has a poor directivity property. 20

SUMMARY OF THE INVENTION

[0005] The primary purpose of the present invention is to provide an improved structure of voice drive materials in a loudspeaker that is capable of increasing directivity of sound effects, expanding sound field, and allowing flatter and thinner construction of the entire loudspeaker through mounting a convex diaphragm glued with a voice coil to a modified damper (integrated damper and surround). 25

BRIEF DESCRIPTION OF THE DRAWINGS

[0006]

Fig. 1 is a schematic view showing a loudspeaker of the prior art. 30

Fig. 2 is a sectional view showing an improved struc- 35

ture of voice drive material of a loudspeaker of the present invention.

Fig. 3 is a schematic view showing a circular dia- 40 phragm and an oval diaphragm of the present invention.

Fig. 4 is a schematic view showing two modified 45 dampers of the present invention respectively provided in a circular and an oval forms.

Fig. 5 is a schematic view showing a preferred em- 50 bodiment of the present invention.

Fig. 6 is a schematic view showing another preferred 55 embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EM- 60 BODIMENTS

[0007] Referring to Fig. 2 for a sectional view of an improved structure of a loudspeaker of the present invention, a frame of basket 10 containing at its center a magnet 12 and enclosed by a U-shape iron (yoke) 14. 65

Wherein the frame of basket 10, the magnet 12, and the U-shape iron (yoke) 14 are referred to magnetic circuit materials. A modified damper 18 (an integrated part of the damper and a surround) is adhered to where inside the frame of basket 10, and a convex diaphragm 20 ad- 70hered to a voice coil 16 is mounted to where above the modified damper 18 (damper + surround). Wherein, the voice coil 16, the modified damper 18 (damper + surround) and the convex diaphragm 20 are referred to voice drive materials. Accordingly, with the improved structure, 75 the loudspeaker of the present invention is generally reduced in thickness and provided with expanded directivity. 80

[0008] Now referring to Fig. 3 for an oval and a circular diaphragm of the present invention, the diaphragm 20 is 85 made in an over, circular, or rectangular (not illustrated) shape to cope with changed style of a speaker system. 90

[0009] As illustrated in Fig. 4, the modified damper 18 may be made in an oval, circular, or rectangular (not il- 95 lustrated) shape to cope with changed style of a speaker system. 100

[0010] In a preferred embodiment of the loudspeaker of the present invention as illustrated in Fig. 5, the modified damper 18 has its both ends as two adhesion locations 22, 24 to be adhered to where inside the frame of basket 10 before mounting the diaphragm 20 already ad- 105hered with the voice coil 16 to the modified damper 18 for achieving the purpose of supporting those voice drive materials. 110

[0011] In another preferred embodiment as illustrated in Fig. 6, the modified damper 18 is adhered to the frame of basket 10 by means of three adhesion locations 22, 24, 26 before mounting the convex diaphragm 20 already ad- 115hered with the voice coil 16 to the modified damper 18. 120

to achieve the same purpose of supporting those voice drive materials.

[0012] The modified damper 18 may be made of a single type of material (e.g., fabric, jute, plastic, etc.), or a combination of different materials to attain various properties, e.g., consistence, softness, and suitability.

[0013] A loudspeaker according to the invention comprises a rigid basket forming a frame, a damper integrally formed by a damper portion and a surround, a voice coil, and a convex diaphragm. The damper is mounted inside the frame. The convex diaphragm is adhered to the voice coil, extends over said damper and is mounted on said damper. This loudspeaker may be modified as described before or indicated in the claims. Preferably, it is made by adhering the damper to the inside of the frame of basket and separately adhering the convex diaphragm to the voice coil. Subsequently the convex diaphragm on which the voice coil is already fixed is mounted on the damper.

Claims

1. An improved structure of a loudspeaker comprising a loudspeaker provided with a voice drive assembly containing a modified damper (18); the modified damper (18) being made in an integral part with a surround; the modified damper (18) being mounted inside a frame of a basket (10); and a convex diaphragm (20) being adhered with a voice coil (16) being mounted over the modified damper (18).
2. The improved structure of a loudspeaker as claimed in Claim 1, wherein the convex diaphragm (20) contains the voice coil (16).
3. The improved structure of a loudspeaker as claimed in Claim 1 or 2, wherein both of the modified damper (18) and the convex diaphragm (20) are each made in a circular form.
4. The improved structure of a loudspeaker as claimed in Claim 1 or 2, wherein both of the modified damper (18) and the convex diaphragm (20) are each made in an oval form.
5. The improved structure of a loudspeaker as claimed in Claim 1 or 2, wherein both of the modified damper (18) and the convex diaphragm (20) are each made in a rectangular form.
6. The improved structure of a loudspeaker as claimed in any of Claims 1 to 5, wherein the modified damper (18) is made in an integral part of a same type of material.
7. The improved structure of a loudspeaker as claimed in any of Claims 1 to 5, wherein the modified damper (18) is made of two different types of materials.

8. The improved structure of a loudspeaker as claimed in any of Claims 1 to 7, wherein the modified damper (18) is incorporated to where inside the frame of basket (10) with both ends (22, 24) of the modified damper (18).

9. The improved structure of a loudspeaker as claimed in any of Claims 1 to 7, wherein the modified damper (18) is incorporated to the inside of the frame of basket (10) and to the voice coil (16) by means of multiple ends (22, 24, 26) of the modified damper (18).

10. Method of making a loudspeaker having a rigid basket (10) forming a frame; a damper (18) integrally formed by a damper portion and a surround; a voice coil (16); and a convex diaphragm (20) extending over said damper (18); said method comprising:

adhering the damper (18) to the inside of the frame of basket (10),
adhering the convex diaphragm (20) to the voice coil (16),
and subsequently mounting the convex dia-
phragm (20) already fitted with the voice coil (16)
on the damper (18).

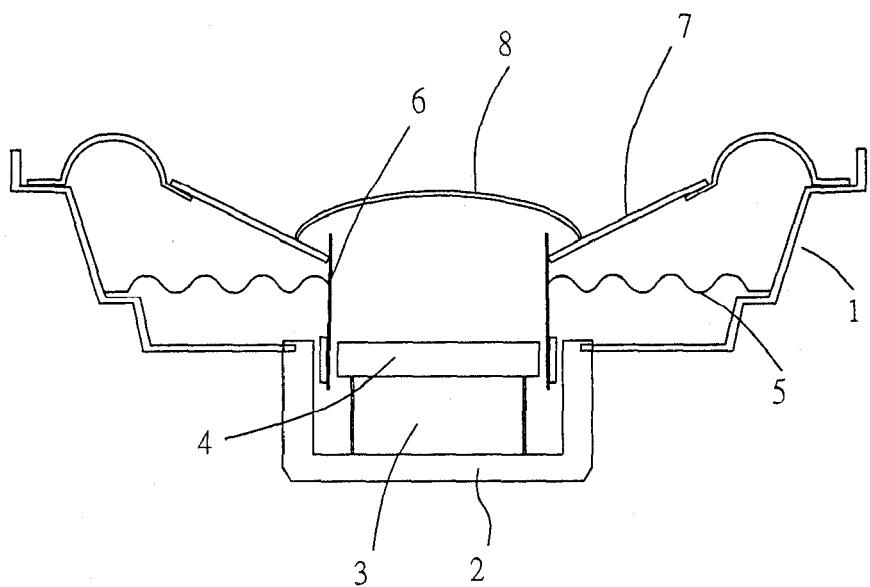


FIG. 1(prior art)

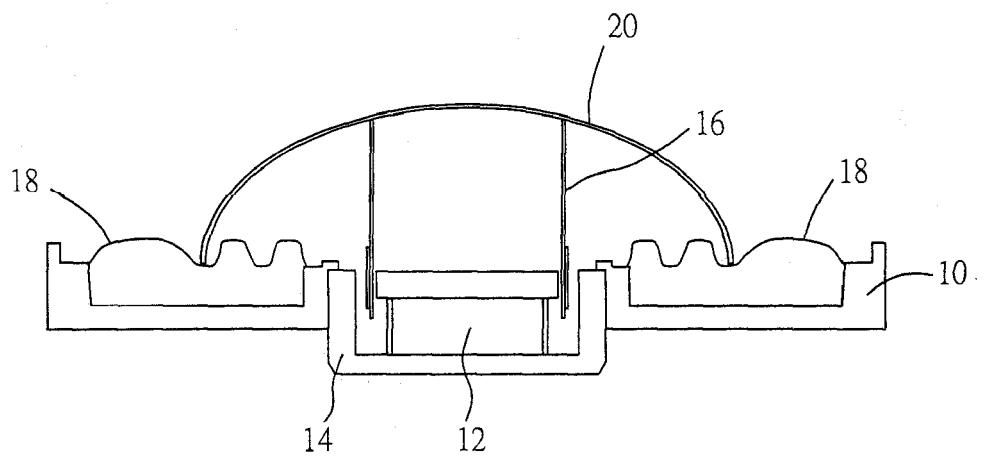


FIG. 2

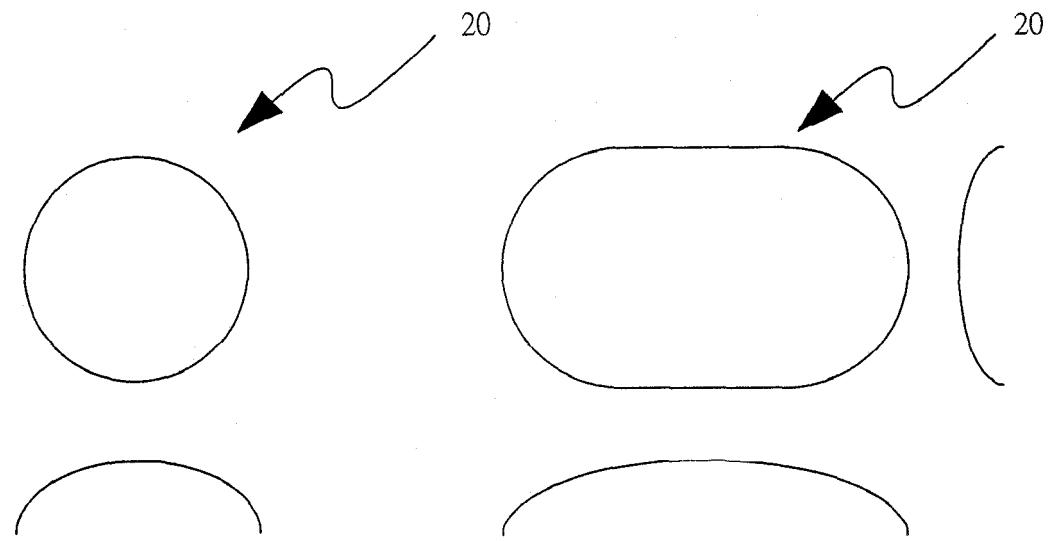


FIG. 3

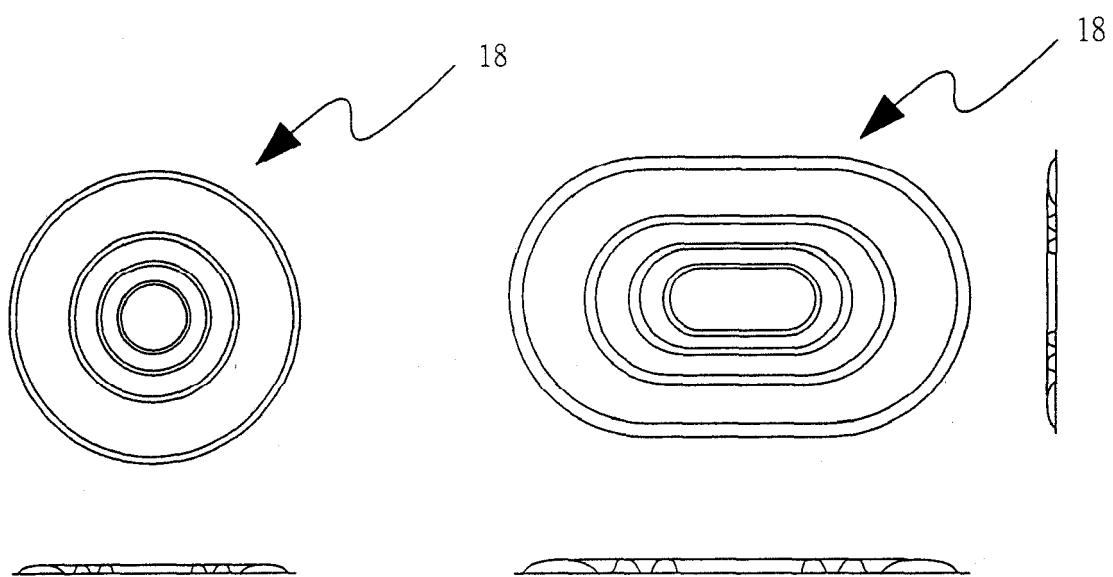


FIG. 4

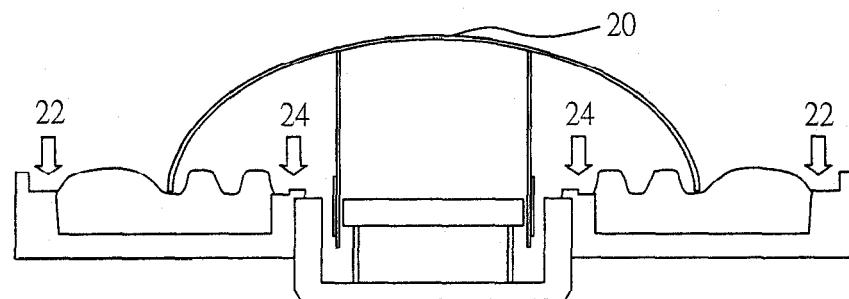


FIG. 5

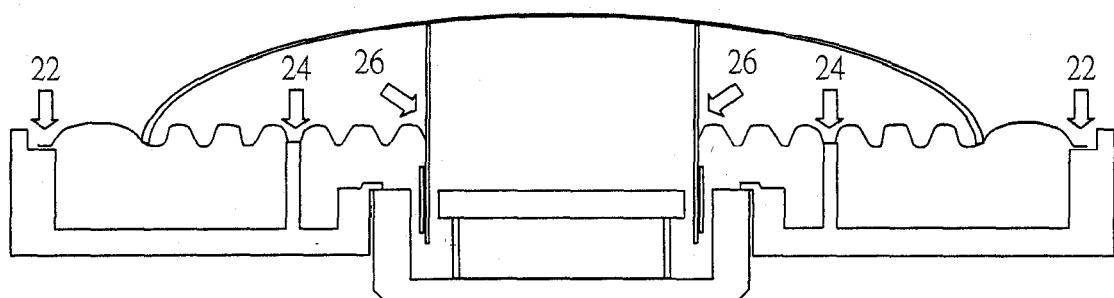


FIG. 6



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (IPC)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	US 5 701 358 A (LARSEN JOHN T [US] ET AL) 23 December 1997 (1997-12-23)	1-3,6-10	INV. H04R7/12 H04R7/16 H04R9/06
Y	* column 2, line 55 - column 4, line 17 * * column 5, line 5 - column 7, line 14 * -----	4,5	
Y	US 3 935 400 A (KOGA SIGEYUKI) 27 January 1976 (1976-01-27) * the whole document * -----	4	
Y	JP 10 285692 A (SHARP KK) 23 October 1998 (1998-10-23) * abstract * -----	5	
A	US 2003/156731 A1 (SATO EIJI [JP]) 21 August 2003 (2003-08-21) * page 2, paragraph 33 - page 4, paragraph 48 * -----	1-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			H04R
The present search report has been drawn up for all claims			
2	Place of search	Date of completion of the search	Examiner
	Munich	17 October 2007	Coda, Ruggero
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 07 11 3924

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

17-10-2007

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
US 5701358	A	23-12-1997	NONE			
US 3935400	A	27-01-1976	JP 50130421 A		15-10-1975	
JP 10285692	A	23-10-1998	NONE			
US 2003156731	A1	21-08-2003	JP 3600983 B2 JP 2003244789 A US 2006078153 A1		15-12-2004 29-08-2003 13-04-2006	