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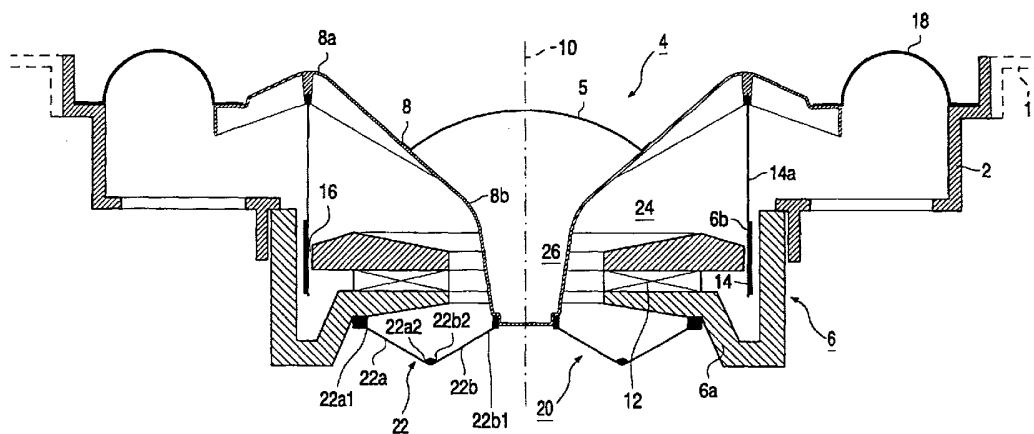
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- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: LOUDSPEAKER WITH A THREE-DIMENSIONAL DIAPHRAGM



(57) Abstract: An electrodynamic loudspeaker comprising a chassis (2), a three-dimensional diaphragm (8) and an electromagnetic actuator (6). The diaphragm is connected to the chassis by a first flexible connecting means (18) provided near a front part (8a) of the diaphragm and by a second flexible connecting means (20) provided near a back part (8b) of the diaphragm. The actuator includes a stationary actuator element (6a) fixed to the chassis and a translatable actuator element (6b) fixed to the diaphragm. When energized, both actuator elements magnetically co-operate with one another over an air gap (16). In order to realize a flat but powerful speaker, the device as such and the air gap are outside the area (26) enclosed by the diaphragm but within the space (24) between both connecting means.

INTERNATIONAL SEARCH REPORT

In national Application No

PCT/US 01/29070

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 G02B26/08 B81B3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 686 863 A (NIPPON SIGNAL CO LTD ;ESASHI MASAYOSHI (JP)) 13 December 1995 (1995-12-13) figures 1,2,10-12,14,15 page 3 page 5, line 43 -page 6, line 19 ---	1-4, 6-11, 13-15, 17-27
X	EP 0 774 681 A (NIHON SHINGO KABUSHIKI KAISHA) 21 May 1997 (1997-05-21) the whole document --- -/--	1-4, 6-11, 13-15, 17-27

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

20 December 2002

Date of mailing of the international search report

14.05.2003

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

Int. Patent Application No

PCT/US 01/29070

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 778 657 A (NIPPON SIGNAL CO LTD) 11 June 1997 (1997-06-11) the whole document ---	1-4, 6-11, 13-15, 17-27
X	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 10, 31 October 1996 (1996-10-31) -& JP 08 166289 A (NIPPON SIGNAL CO LTD:THE), 25 June 1996 (1996-06-25) abstract; figure 5 ---	1-4, 6-11, 13-15, 17-27
A	US 5 579 148 A (NISHIKAWA HIDEAKI ET AL) 26 November 1996 (1996-11-26) column 10, line 30 - line 47 -----	1,21, 24-27

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 01/29070**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-4, 6-11, 13-15, 17-27

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-4,6-11,13-15,17-27

Magnetically actuated device comprising two rotational members mounted by torsional flexures, whereby the torsional flexures comprise a material from the group consisting of silicon, polysilicon, silicon-on-insulator, silicon nitride, silicon carbide and nickel.

2. Claim : 5

Magnetically actuated device comprising torsional flexures, wherein the torsional flexures comprise a polymer coating

3. Claims: 12,16

Magnetically actuated device comprising rotational members, wherein the rotational members comprise a special metal layer or a silicone rubber layer

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. Application No
PCT/US 01/29070

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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