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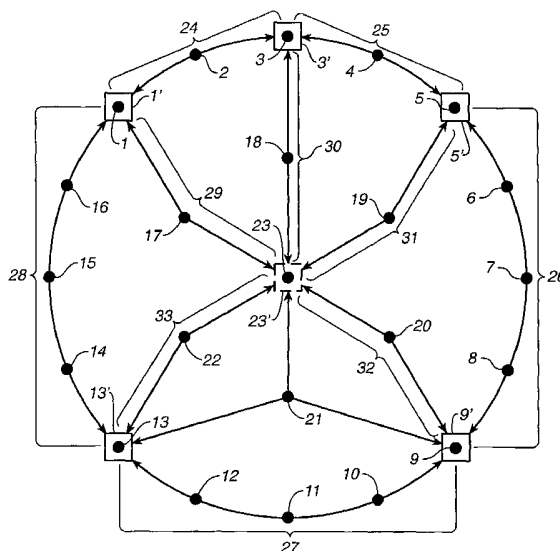
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- (71) Applicant (for all designated States except US): DOLBY LABORATORIES LICENSING CORPORATION [US/US]; 100 Potrero Avenue, San Francisco, CA 94103-4813 (US).
- (72) Inventor; and  
(75) Inventor/Applicant (for US only): DAVIS, Mark, Franklin [US/US]; 100 Potrero Avenue, San Francisco, CA 94103-4813 (US).
- (74) Agents: GALLAGHER, Thomas, A. et al.; Gallagher & Lathrop, A Professional Corporation, Suite 1111, 601 California Street, San Francisco, CA 94108-2805 (US).
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[Continued on next page]

(54) Title: AUDIO CHANNEL SPATIAL TRANSLATION



(57) Abstract: Using an M:N variable matrix, M audio input signals, each associated with a direction, are translated to N audio output signals, each associated with a direction, wherein N is larger than M, M is two or more and N is a positive integer equal to three or more. The variable matrix is controlled in response to measures of: (1) the relative levels of the input signals, and (2) the cross-correlation of the input signals so that a soundfield generated by the output signals has a compact sound image in the nominal ongoing primary direction of the input signals when the input signals are highly correlated, the image spreading from compact to broad as the correlation decreases and progressively splitting into multiple compact sound images, each in a direction associated with an input signal, as the correlation continues to decrease to highly uncorrelated.

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ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,  
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,  
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# INTERNATIONAL SEARCH REPORT

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PCT/US 03/24570

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 H04S3/00 H04S5/02

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 H04S

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, WPI Data, PAJ, INSPEC

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 054 575 A (BOSE CORP) 22 November 2000 (2000-11-22) the whole document ---	1, 25, 29
A	WO 99 51063 A (DICKINS GLENN NORMAN ; LAKE DSP PTY LTD (AU)) 7 October 1999 (1999-10-07) page 3, line 4 -page 4, line 12 page 5, line 26 -page 6, line 29; figures ---	1, 25, 29
A	US 6 009 179 A (EMBREE PAUL ET AL) 28 December 1999 (1999-12-28) column 1, line 62 -column 2, line 41 column 3, line 41 -column 4, line 35 column 5, line 36 -column 8, line 55; figures -----	1, 25, 29

Further documents are listed in the continuation of box C.       Patent family members are listed in annex.

\* Special categories of cited documents:

<p>*A* document defining the general state of the art which is not considered to be of particular relevance</p> <p>*E* earlier document but published on or after the international filing date</p> <p>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>*O* document referring to an oral disclosure, use, exhibition or other means</p> <p>*P* document published prior to the international filing date but later than the priority date claimed</p>	<p>*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</p> <p>*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</p> <p>*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.</p> <p>*&amp;* document member of the same patent family</p>
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Date of the actual completion of the international search  <b>31 March 2004</b>	Date of mailing of the international search report  <b>07/04/2004</b>
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Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer  <b>Tsapelis, A</b>
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No PCT/US 03/24570
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