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[Continued on next page]

(54) Title: METHODS AND SYSTEMS FOR IMPROVED ACOUSTIC ENVIRONMENT CHARACTERIZATION

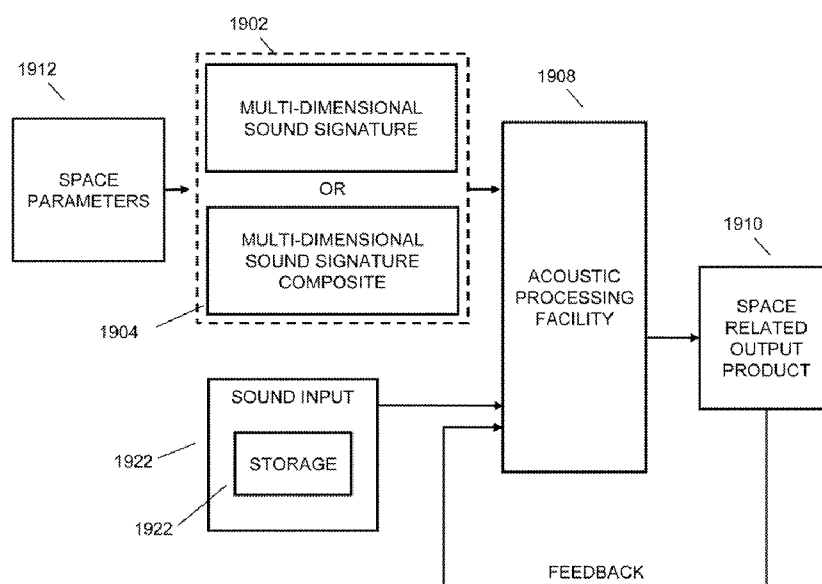


FIG. 19

(57) Abstract: In embodiments of the present invention improved capabilities are described for determining a multi-dimensional sound signature for a location within a hypothetical space, comparing the multi-dimensional sound signature to a known multi-dimensional sound signature, and modifying the hypothetical space such that the similarity between the multi-dimensional sound signature for the location within the modified hypothetical space and the known multi-dimensional sound signature is increased.

**Published:****(88) Date of publication of the international search report:**

8 April 2010

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/049243**A. CLASSIFICATION OF SUBJECT MATTER*****G10K 11/18(2006.01)i, G10K 11/20(2006.01)i, G10K 11/28(2006.01)i, G10K 11/36(2006.01)i***

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)

G10K 11/18; A63J 1/02; A63J 5/04; E03B 7/07; E04B 1/99; E04H 3/30; G06F 15/46; G06K 9/46; G06K 9/66; G10K 15/00

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

(Chinese Patents and application for patent)

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

eKOMPASS(KIPO internal) & Keywords: "reflection", "sound", "time delay", "sound signature", "hypothetical space", "scenery change", "stage"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2002-070211 A (SONY CORP.) 08 March 2002 See claims 1-7 and figures 1-5	1-4
A	JP 2624890 B2 (NIKKEN SEKKEI CO., LTD. et al.) 11 April 1997 See claim 1 and figures 1-8	1-4
A	US 6173074 B1 (RUSSO, A. P.) 09 January 2001 See claims 1-19 and figures 1-6	5-32
A	US 5521840 A (BEDNAR, F. H.) 28 May 1996 See claims 1-12 and figures 1-9	5-32
A	WO 97/36662 A1 (BIRCH & KROGBOE A/S) 09 October 1997 See claims 1-13 and figures 1-9	33-50
A	US 5388042 A (SCHILTZ, J. M.) 07 February 1995 See claims 1-6 and figures 1-3	33-50

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"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

17 FEBRUARY 2010 (17.02.2010)

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18 FEBRUARY 2010 (18.02.2010)

Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2009/049243**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 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 No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

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

I. Claims 1-4 directed to a method for modifying the design of a great hall according to the reflection of sound from a sound initiation location at a location within a great hall.

II. Claims 5-32 directed to a method for modifying a hypothetical space according to the similarity of multi-dimensional sound signature.

III. Claims 33-50 directed to a method providing rapid scenery changes in a performance space.

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.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2009/049243

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		EP 0538180 B1	31.05.1995