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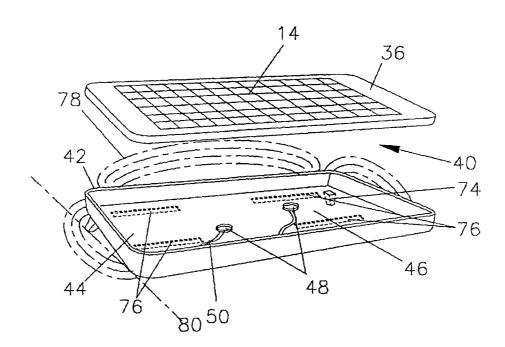
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(54) Title: KEYBOARD COMPRISING A LOUDSPEAKER



(57) Abstract: A keyboard (40) comprising a bending wave resonant mode loudspeaker (46) each comprising an acoustic radiator capable of supporting resonant bending wave modes and a transducer (48) mounted on the acoustic radiator to excite resonant bending wave modes in the acoustic radiator to produce an acoustic output. The keyboard comprises a housing (38) having a lid (36) supporting individual keys (14). The loudspeaker (46) is integrally formed with the base (42) of the housing of the loudspeaker.



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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.

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In' stional Application No

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 H04R1/02 H04R H04R7/06 G06F3/023 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 H04R G06F 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) PAJ C. DOCUMENTS CONSIDERED TO BE RELEVANT Category ° Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No. WO 98 43464 A (NEW TRANSDUCERS LTD ; AZIMA 1-16HENRY (GB); COLLOMS MARTIN (GB); CROCKE) 1 October 1998 (1998-10-01) page 2, line 19 -page 3, line 9; figures Α US 5 828 768 A (EATWELL GRAHAM P ET AL) 1-16 27 October 1998 (1998-10-27) column 2, line 16 -column 3, line 29; figures EP 0 886 457 A (COMPAQ COMPUTER CORP) Α 1 - 1623 December 1998 (1998-12-23) column 2A, line 55 -column 3, line 24; figures Further documents are listed in the continuation of box C. Patent family members are listed in annex. Special categories of cited documents: *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 "A" document defining the general state of the art which is not considered to be of particular relevance invention "E" earlier document but published on or after the international "X" document of particular relevance; the claimed invention filing date cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "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) "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 docu-"O" document referring to an oral disclosure, use, exhibition or ments, such combination being obvious to a person skilled document published prior to the international filing date but later than the priority date claimed "&" document member of the same patent family Date of the actual completion of the international search Date of mailing of the international search report 26 April 2001 07/05/2001 Authorized officer 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 Gastaldi, G

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INTERNATIONAL SEARCH REPORT

In tional Application No
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	S CONSIDERED TO BE RELEVANT	
Category ° Citation of docume	ent, with indication, where appropriate, of the relevant passages	Relevant to claim No.
27 July	376 A (MARKOW MITCHELL A ET AL) 1999 (1999-07-27) 2, line 14 -column 3, line 9;	1-16
A US 5 732 24 March	2 140 A (THAYER KEITH) 1 1998 (1998-03-24) 2, line 9 -column 3, line 5;	1-16

INTERNATIONAL SEARCH REPORT

information on patent family members

Int tional Application No PCT/GB 00/04052

Patent document cited in search report		Publication date	Publication Patent family date member(s)		Publication date
WO 9843464	Α	01-10-1998	AU	729915 B	15-02-2001
			AU	6511198 A	20-10-1998 31-05-2000
			BG	103732 A 9807880 A	22-02-2000
			BR CN	1250586 T	12-04-2000
			EP	0988772 A	29-03-2000
			NO	994589 A	21-09-1999
			PL	335804 A	22-05-2000
			SK	128599 A	14-08-2000
			TR	9902310 T	21-01-2000
			TW	378300 B	01-01-2000
			ZA	9802331 A	23-09-1998
US 5828768		27-10-1998	CA	2188536 A	23-11-1995
			ΕP	0760996 A	12-03-1997
			JP	9506189 T	17-06-1997
			WO	9531805 A	23-11-1995
EP 0886457	A	23-12-1998	JP	11053056 A	26-02-1999
			TW	380357 B	21-01-2000
US 5930376	Α	27-07-1999	NONE	-	
US 5732140		24-03-1998	NONE		