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(54) Title: THIN PROFILE USER INTERFACE DEVICE AND METHOD PROVIDING LOCALIZED HAPTIC RESPONSE

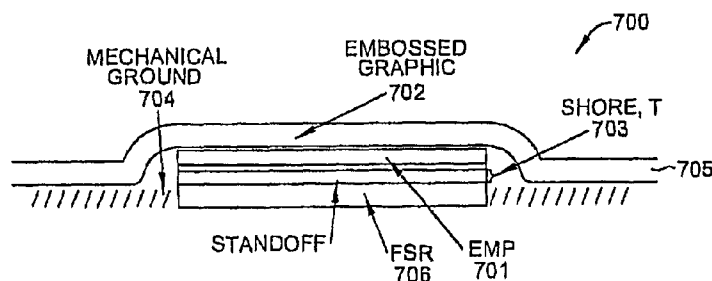


Fig. 7

(57) Abstract: Electromechanical polymer (EMP) actuators are used to create haptic effects on a user interface deface, such as a keyboard. The keys of the keyboard may be embossed in a top layer to provide better key definition and to house the EMP actuator. Specifically, an EMP actuator is housed inside an embossed graphic layer that covers a key of the keyboard. Such a keyboard has a significant user interface value. For example, the embossed key provides the tactile effect of the presence of a key with edges, while allowing for the localized control of haptic vibrations. For such applications, an EMP transducer provides high strains, vibrations or both under control of an electric field. Furthermore, the EMP transducer can generate strong vibrations. When the frequency of the vibrations falls within the acoustic range, the EMP transducer can generate audible sound, thereby functioning as an audio speaker.



INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2013/003212**A. CLASSIFICATION OF SUBJECT MATTER****H01L 41/113(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)

H01L 41/113; H01L 41/04; G03B 13/34; H01L 41/08; H05K 7/00; H03K 17/94; G02B 7/02; G08B 6/00; G06F 3/041

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

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

eKOMPASS(KIPO internal) & Keywords: force sensing, haptic, electromechanical polymer (EMP), transducer and keyboard

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009-0002205 A1 (GUNNAR KLINGHULT et al.) 01 January 2009 See paragraphs [0034]–[0046]; claims 1, 7–19; and figures 1, 2.	1–14, 17, 23–43, 46
Y		, 52–58, 75–87, 90–92
Y	US 2012-0126959 A1 (ALIREZA ZARRABI et al.) 24 May 2012 See paragraphs [0040]–[0092], [0141]–[0143]; and figure 13.	15, 16, 18–22, 44, 45
Y	US 2005-0040733 A1 (ANDREW, A. GOLDENBERG et al.) 24 February 2005 See paragraphs [0035]–[0045]; and claims 1–11.	, 47–51, 59–74, 88, 89
Y	US 2012-0194448 A1 (FLETCHER R. ROTHKOPF) 02 August 2012 See paragraph [0019]; claims 6, 14; and figure 4B.	15, 16, 18, 19, 44, 45
A	US 2011-0038625 A1 (BRIAN ZELLERS et al.) 17 February 2011 See paragraphs [0083]–[0090]; claims 1–13; and figures 3A–4.	, 47, 48, 72, 73, 88, 89
		20–22, 49–51
		59–74
		1–92



Further documents are listed in the continuation of Box C.



See patent family annex.

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"&" document member of the same patent family

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