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(54) Title: PATCH ANTENNA WITH CAPACITIVE ELEMENTS

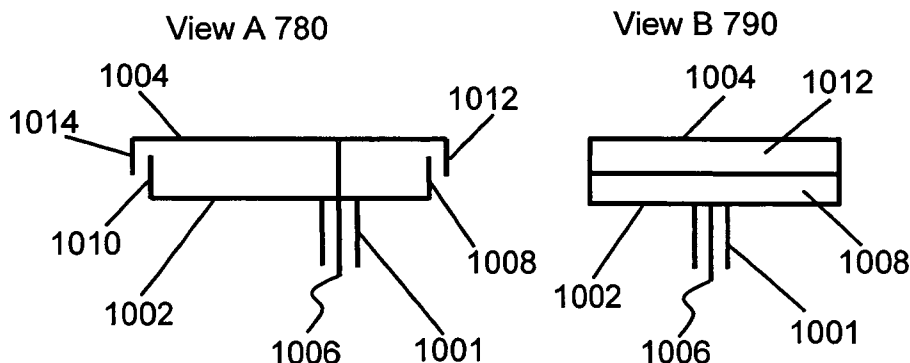


Fig. 10

(57) Abstract: Disclosed is a micropatch antenna comprising a radiating element and a ground plane separated by an air gap. Small size, light weight, wide bandwidth, and wide directional pattern are achieved without the introduction of a high-permittivity dielectric substrate. Capacitive elements are configured along the perimeter of at least one of the radiating element and ground plane. Capacitive elements may comprise extended continuous structures or a series of localized structures. The geometry of the radiating element, ground plane, and capacitive elements may be varied to suit specific applications, such as linearly-polarized or circularly-polarized electromagnetic radiation.

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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2008/013071A. CLASSIFICATION OF SUBJECT MATTER  
INV. H01Q9/04

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)  
H01Q

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

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2003/058175 A1 (AKIYAMA HISASHI [JP] ET AL) 27 March 2003 (2003-03-27) abstract; figures 1a,1b  paragraphs [0046] - [0053] -----	1-9, 14-18 10-13, 24-27, 29
X	US 2001/015701 A1 (ITO SHIGEKAZU [JP] ET AL) 23 August 2001 (2001-08-23)  figures 1a,1b,12 paragraphs [0046] - [0056], [0098] -----	1-9, 14-18, 30-33, 39, 40
X Y	EP 1 536 511 A (ALPS ELECTRIC CO LTD [JP]) 1 June 2005 (2005-06-01) figures 1,2,9  paragraphs [0039] - [0057] -----	1-3, 14, 15, 34-36 10-13, 24-27, 29
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 Further documents are listed in the continuation of Box C. See patent family annex.

\* Special categories of cited documents :

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- \*E\* earlier document but published on or after the international filing date
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- \*&\* document member of the same patent family

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International application No  
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/038721 A1 (OZKAR METE [US] ET AL) 23 February 2006 (2006-02-23) figure 7 paragraph [0053] -----	1-3
A	US 2007/268188 A1 (GUHA DEBATOSH [IN] ET AL) 22 November 2007 (2007-11-22) figures 1,7a,7b paragraphs [0022], [0023], [0030] - [0032] -----	1-36,39, 40
A	WO 01/57952 A (RANGESTAR WIRELESS INC [US]) 9 August 2001 (2001-08-09) figures 1-4 page 4, line 21 - line 24 -----	1-36,39, 40

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2008/013071

## 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:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
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.:

1-36, 39, 40

### 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.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

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

1. claims: 1-36,39,40

patch antenna comprising capacitive extensions  
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2. claims: 37,38

patch antenna comprising an electronic assembly mounted on  
the patch  
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2008/013071

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
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US 2007268188	A1	22-11-2007	NONE	
WO 0157952	A	09-08-2001	NONE	