Title: MULTIBAND HELICAL ANTENNA

Abstract: A multiband antenna including a feed point, a helical radiating element galvanically connected to and fed by the feed point, the helical radiating element resonating in a Very High Frequency range and an elongate radiating element arranged coaxially within the helical radiating element and galvanically connected to and fed by the feed point, the elongate radiating element extending along only a portion of the helical radiating element, the elongate radiating element having a first resonant frequency and a second resonant frequency, the elongate radiating element operating as a quarter-wavelength monopole at the first resonant frequency and as an eighth-wavelength monopole at the second resonant frequency.
**INTERNATIONAL SEARCH REPORT**

**International application No.**
PCT/IL2014/050392

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(8) - H01Q 1/50 (2014.01)
CPC - H01Q 1/243 (2014.09)
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(8) - H01Q 1/50, 1/36 (2014.01)
USPC - 343/660, 864, 885, 715, 718

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

CPC - H01Q 1/243, 1/38, 9/42, 5/0003; H03H 7/38 (2014.09) (keyword delimited)

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

Orbit, Google Patents, Google Scholar, Google.

Search terms used: multiband, antenna, transmitter, receiver, helical, helix, spiral, frequency, resonant, radiate, galvanic, feed, pitch, angle, slope, incline

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>US 201/0267253 A1 (BIT-BABIK et al.) 03 November 2001 (03.1.2001) entire document.</td>
<td>1-5, 15, 16</td>
</tr>
<tr>
<td>A</td>
<td>US 2006/0050009 A1 (HO et al.) 09 March 2006 (09.03.2006) entire document.</td>
<td>1-5, 15, 16</td>
</tr>
</tbody>
</table>

1) Further documents are listed in the continuation of Box C.

- "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 another 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
- "Z" document member of the same patent family

Date of the actual completion of the international search
27 October 2014

Date of mailing of the international search report
13 NOV 2014

Name and mailing address of the ISA/US
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Authorized officer: Blaine R. Copenhaver
PCT Helpdesk: 571-272-4300
PCT OGP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)
INTERNATIONAL SEARCH REPORT

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. E Claims Nos.: 6-14
   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:

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 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.:

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.

Form PCT/ISA/210 (continuation of first sheet (2)) (July 2009)