



(11)

EP 2 521 219 A3

(12)

## EUROPEAN PATENT APPLICATION

(88) Date of publication A3:  
17.04.2013 Bulletin 2013/16

(51) Int Cl.:  
H01Q 1/24 (2006.01) H01Q 15/16 (2006.01)  
H01Q 19/10 (2006.01) H01Q 21/08 (2006.01)  
H01Q 5/00 (2006.01)

(43) Date of publication A2:  
07.11.2012 Bulletin 2012/45

(21) Application number: 12446505.5

(22) Date of filing: 23.04.2012

(84) Designated Contracting States:  
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB  
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO  
PL PT RO RS SE SI SK SM TR  
Designated Extension States:  
BA ME

(30) Priority: 05.05.2011 SE 1150396

(71) Applicant: Powerwave Technologies Sweden AB  
164 40 Kista (SE)  
  
(72) Inventor: Beausang, Michael  
760 10 Bergshamra (SE)  
  
(74) Representative: Gjervaldsæter, Peder  
Ehrner & Delmar Patentbyrå AB  
P.O. Box 10316  
100 55 Stockholm (SE)

## (54) Reflector and multi band antenna

(57) The present invention relates to a reflector for an antenna comprising a first reflector assembly (1) and at least one second reflector assembly (2), said first reflector assembly (1) having a first reflector structure adapted for a first antenna frequency band  $f_1$  and at least one second antenna frequency band  $f_2$ ; said at least one second reflector assembly (2) having a second reflector structure adapted for said first antenna frequency band  $f_1$  and at least one third antenna frequency band  $f_3$ ; and wherein said first reflector assembly (1) and said at least one second reflector assembly (2) are electrically coupled so that said first reflector assembly (1) and said at least one second reflector assembly (2) together form a common reflector structure (R) adapted for said first  $f_1$ , at least one second  $f_2$  and at least one third  $f_3$  antenna frequency bands. Furthermore, the invention also relates to a multi band antenna comprising at least one such reflector.

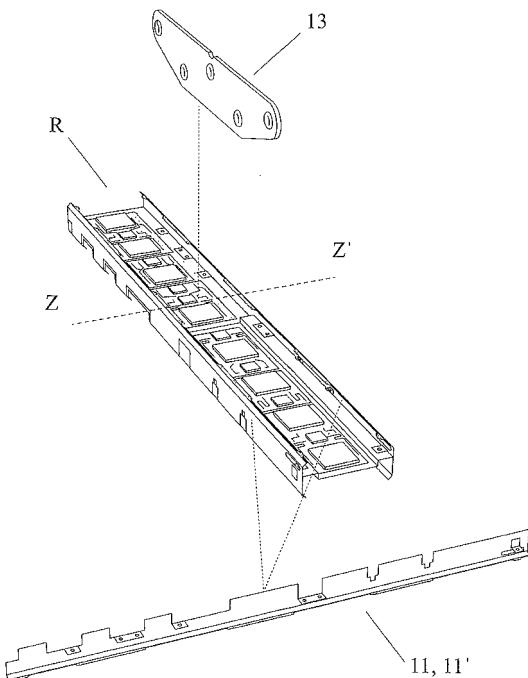


Fig. 4



## EUROPEAN SEARCH REPORT

 Application Number  
 EP 12 44 6505

| DOCUMENTS CONSIDERED TO BE RELEVANT   |  |                                  | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|--|----------------------------------|---|
| Category  | Citation of document with indication, where appropriate, of relevant passages    | Relevant to claim                |   |
| X   | US 2010/265150 A1 (ARVIDSSON PER-ANDERS [SE] ET AL) 21 October 2010 (2010-10-21) | 1-4,8                            | INV.                                    |
| Y   | * paragraphs [0027] - [0049] *<br>* figures 2a,3a,3b,3c *                        | 9                                | H01Q1/24                                |
| Y   | -----  | 9                                | H01Q15/16                               |
| Y   | DE 299 10 570 U1 (ALLGON AB [SE])<br>2 September 1999 (1999-09-02)               | 9                                | H01Q19/10                               |
| A   | * page 3, line 11 - page 9, line 6 *<br>* figures 1,2 *                          | 1                                | H01Q21/08                               |
|   | -----  |                                  | H01Q5/00                                |
|   |  |                                  | TECHNICAL FIELDS SEARCHED (IPC)         |
|   |  |                                  | H01Q                                    |
| The present search report has been drawn up for all claims  |  |                                  |   |
| 2   | Place of search  | Date of completion of the search | Examiner                                |
|   | Munich   | 21 November 2012                 | Kruck, Peter                            |
| <b>CATEGORY OF CITED DOCUMENTS</b><br>X : particularly relevant if taken alone  |  |                                  |   |
| Y : particularly relevant if combined with another document of the same category  |  |                                  |   |
| A : technological background  |  |                                  |   |
| O : non-written disclosure  |  |                                  |   |
| P : intermediate document   |  |                                  |   |
| T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding document |  |                                  |   |



Europäisches  
Patentamt  
European  
Patent Office  
Office européen  
des brevets

Application Number

## **CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing claims for which payment was due.

Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

## LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-9

The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION**  
**SHEET B**

Application Number  
EP 12 44 6505

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-9

relating to a multi band reflector comprising first and second reflector assemblies;  
---

2. claims: 10-15

relating to an antenna array with interleaved single band and dual band antenna elements;  
---

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 44 6505

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

21-11-2012

| Patent document cited in search report |    | Publication date |    | Patent family member(s) |  | Publication date |
|--|----|------------------|----|-------------------------|--|------------------|
| US 2010265150                          | A1 | 21-10-2010       | SE | 0900515 A1              |  | 18-10-2010       |
|  |    |                  | US | 2010265150 A1           |  | 21-10-2010       |
| <hr/>                                  |    |                  |    |                         |  |                  |
| DE 29910570                            | U1 | 02-09-1999       | AU | 5073299 A               |  | 17-01-2000       |
|  |    |                  | BR | 9906841 A               |  | 04-09-2001       |
|  |    |                  | CN | 1286816 A               |  | 07-03-2001       |
|  |    |                  | DE | 1072065 T1              |  | 05-07-2001       |
|  |    |                  | DE | 29910570 U1             |  | 02-09-1999       |
|  |    |                  | DE | 69901026 D1             |  | 18-04-2002       |
|  |    |                  | DE | 69901026 T2             |  | 22-08-2002       |
|  |    |                  | EP | 1072065 A1              |  | 31-01-2001       |
|  |    |                  | ES | 2153342 T1              |  | 01-03-2001       |
|  |    |                  | GR | 20010300001 T1          |  | 28-02-2001       |
|  |    |                  | SE | 512439 C2               |  | 20-03-2000       |
|  |    |                  | SE | 9802301 A               |  | 27-12-1999       |
|  |    |                  | US | 6295028 B1              |  | 25-09-2001       |
|  |    |                  | WO | 0001032 A1              |  | 06-01-2000       |
| <hr/>                                  |    |                  |    |                         |  |                  |