



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
08.10.2003 Bulletin 2003/41

(51) Int Cl.7: **H01Q 1/24**, H01Q 1/36,
H01Q 5/00

(43) Date of publication A2:
08.11.2000 Bulletin 2000/45

(21) Application number: **00660083.7**

(22) Date of filing: **05.05.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(72) Inventors:
• **Ojantakainen, Seppo**
90100 Oulu (FI)
• **Leppäluoto, Timo**
90120 Oulu (FI)

(30) Priority: **06.05.1999 FI 991043**

(74) Representative: **Brax, Matti Juhani et al**
Oulun Patenttitoimisto
Berggren Oy Ab
Lentokatu 2
90460 Oulunsalo (FI)

(71) Applicant: **Filtronic LK Oy**
90440 Kempele (FI)

(54) **Antenna arrangement with two operating frequency bands**

(57) An antenna arrangement comprises a radiating antenna element (101), feed point (304, 703, 804) for connecting the radiating antenna element to a radio apparatus, and a ground plane (303, 705, 808). There is between the feed point and ground plane a certain shortest distance which is substantially greater than 1.5 mm. The antenna arrangement has two different operating frequency bands. Preferably the construction comprises an electrically conductive connecting component (105, 603, 801) for connecting the radiating antenna element to the feed point, a functional part (110, 809) in the radio apparatus for transmitting and receiving electromagnetic radiation through an antenna, and a transmission line (306, 604, 605) for providing an electrical connection between the connecting component and the functional part in the radio apparatus. The transmission line comprises in succession a first portion (307, 604) and a second portion (308, 605) such that the longer the distance between a given reference point in the first portion and the interface between the first portion and second portion, the greater the shortest distance between the reference point and the ground plane, and the shortest distance between a given reference point in the second portion and the ground plane is independent of the distance between the reference point and said interface.

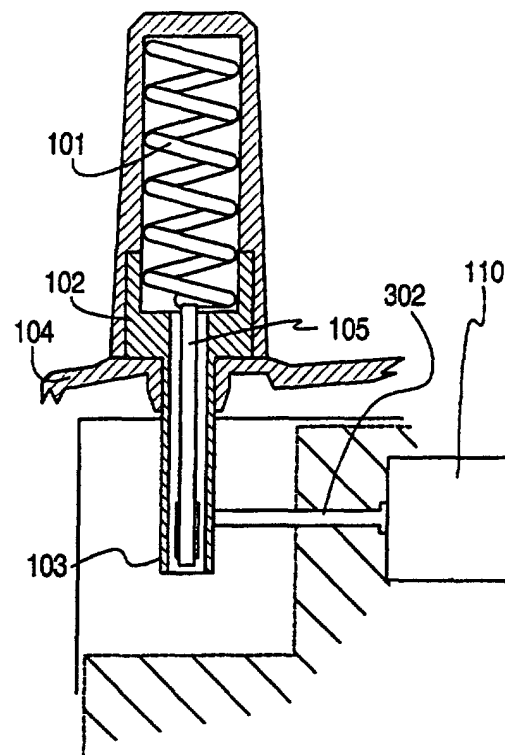


Fig. 4



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 66 0083

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	WO 98 02936 A (QUALCOMM INC) 22 January 1998 (1998-01-22) * abstract * * page 17, line 30 - page 18, line 9 * * figure 7C *	1,2,8	H01Q1/24 H01Q1/36 H01Q5/00
X	EP 0 635 898 A (ERICSSON GE MOBILE COMMUNICAT) 25 January 1995 (1995-01-25) * abstract * * page 2, line 48 - page 4, line 34 * * figures 2,5 *	1,2	
X	WO 98 44588 A (QUALCOMM INC) 8 October 1998 (1998-10-08) * abstract * * figures 1-3 *	1,2	
A	US 5 563 615 A (TAY YEW S ET AL) 8 October 1996 (1996-10-08) * abstract * * table 1 * * figure 1 *	1-9	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			H01Q H04B
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 21 August 2003	Examiner van Norel, J
CATEGORY OF CITED DOCUMENTS 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 E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03 82 (P04C01)

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

EP 00 66 0083

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.

21-08-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9802936 A	22-01-1998	AU 3883697 A WO 9802936 A1	09-02-1998 22-01-1998
EP 0635898 A	25-01-1995	SE 512062 C2 CN 1102509 A ,B DE 69428404 D1 DE 69428404 T2 EP 0635898 A1 FI 943339 A JP 7154121 A SE 9302420 A US 5805112 A	17-01-2000 10-05-1995 31-10-2001 29-05-2002 25-01-1995 15-01-1995 16-06-1995 15-01-1995 08-09-1998
WO 9844588 A	08-10-1998	AU 6584698 A TW 439322 B WO 9844588 A1	22-10-1998 07-06-2001 08-10-1998
US 5563615 A	08-10-1996	NONE	