

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
10 August 2000 (10.08.2000)

PCT

(10) International Publication Number
WO 00/47017 A3

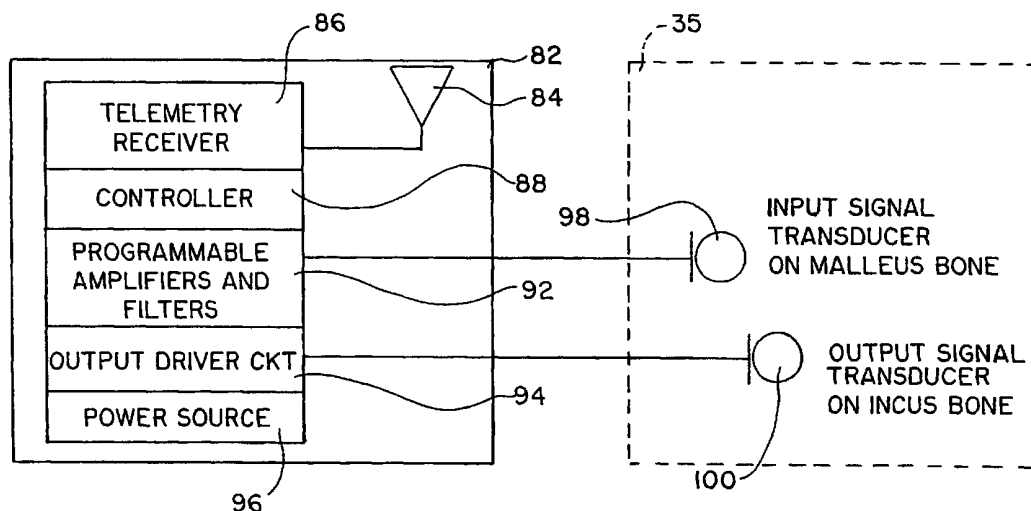
- (51) International Patent Classification⁷: **H04R 25/00** (74) Agents: **KEOUGH, Steven, J.** et al.; Patterson & Keough, P.A., 4800 IDS Center, 80 South 8th Street, Minneapolis, MN 55402-2100 (US).
- (21) International Application Number: **PCT/US00/02973**
- (22) International Filing Date: 4 February 2000 (04.02.2000) (81) Designated States (*national*): AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/118,857 5 February 1999 (05.02.1999) US (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- (71) Applicant: **ST. CROIX MEDICAL, INC.** [US/US]; Suite 113, 5301 East River Road, Minneapolis, MN 55421 (US).
- (72) Inventors: **ADAMS, Theodore, P.**; St. Croix Medical, Inc., Suite 113, 5301 East River Road, Minneapolis, MN 55421 (US). **BRILLHART, Bruce, A.**; St. Croix Medical, Inc., Suite 113, 5301 East River Road, Minneapolis, MN 55421 (US). **MEYERSON, Scott, C.**; St. Croix Medical, Inc., Suite 113, 5301 East River Road, Minneapolis, MN 55421 (US).

Published:

- With international search report.
- Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR A PROGRAMMABLE IMPLANTABLE HEARING AID



(57) Abstract: The invention discloses a programmable implantable hearing aid including built-in electronics being in wireless communications with a hand-held programmer. The programmer transmits digital code signals of the type including RF, infrared and ultrasonic, based on selected parameter settings. A receiver accepts the signal for transmission to an input transducer in the middle ear. The input transducer collects the middle ear's response to the signals and transmits it to a circuit in the implanted hearing aid. The circuit searches for specific programming patterns and decodes the signals to effectuate the desired adjustment in the hearing aid. The conditioned signals are then transferred to an output transducer to operate the device at the adjusted signal level and condition. The invention enable both a patient and doctor to make unlimited number of adjustments in the implanted hearing aid without invasive surgery.

WO 00/47017 A3



(88) Date of publication of the international search report:
28 December 2000

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/02973

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04R25/00

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 7 H04R A61F A61N

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)

WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 340 594 A (SIEMENS AG) 8 November 1989 (1989-11-08)	1,4-6
Y	column 2, line 51 -column 3, line 40	7-10, 14-21
A	column 4, line 1 -column 5, line 30 column 6, line 44 -column 7, line 33	2,3
X	US 5 569 307 A (SCHULMAN JOSEPH H ET AL) 29 October 1996 (1996-10-29)	11-13
Y	column 3, line 9-38 column 4, line 25 -column 8, line 50 column 9, line 7-63	7-10, 14-21
Y	DE 195 41 648 A (SIEMENS AUDIOLOGISCHE TECHNIK) 15 May 1997 (1997-05-15) column 2, line 32-64 column 3, line 15 -column 5, line 22	1-21
	--- -/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document 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.

"&" document member of the same patent family

Date of the actual completion of the international search

16 October 2000

Date of mailing of the international search report

23/10/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Zanti, P

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/02973

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>WO 98 06237 A (ST CROIX MEDICAL INC) 12 February 1998 (1998-02-12) page 12, line 23 -page 14, line 3 figure 7</p> <p>-----</p>	1-21

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/02973

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0340594 A	08-11-1989	AT 91057 T	15-07-1993
		DE 8816422 U	10-08-1989
		DE 58904772 D	29-07-1993
		JP 1318500 A	22-12-1989
		US 5012520 A	30-04-1991
US 5569307 A	29-10-1996	US 5603726 A	18-02-1997
		US 5938691 A	17-08-1999
		US 5531774 A	02-07-1996
		US 5522865 A	04-06-1996
		US 5609616 A	11-03-1997
		US 5776172 A	07-07-1998
		US 5876425 A	02-03-1999
DE 19541648 A	15-05-1997	DE 29522130 U	03-02-2000
WO 9806237 A	12-02-1998	US 5836863 A	17-11-1998
		EP 0920786 A	09-06-1999
		US 6050933 A	18-04-2000
		US 6001129 A	14-12-1999