US008000000B2

(12) **United States Patent**
Greenberg et al.

(10) **Patent No.: US 8,000,000 B2**
(45) **Date of Patent: *Aug. 16, 2011**

(54) **VISUAL PROSTHESIS**

(75) Inventors: **Robert J. Greenberg**, Los Angeles, CA (US); **Kelly H. McClure**, Simi Valley, CA (US); **Arup Roy**, Valencia, CA (US)

(73) Assignee: **Second Sight Medical Products, Inc.**, Sylmar, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 206 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **11/874,690**

(22) Filed: **Oct. 18, 2007**

(65) **Prior Publication Data**

US 2008/0262568 A1 Oct. 23, 2008

Related U.S. Application Data

(60) Provisional application No. 60/852,875, filed on Oct. 19, 2006.

(51) **Int. Cl.**
A61N 1/372 (2006.01)

(52) **U.S. Cl.** **607/60**; 607/53

(58) **Field of Classification Search** 623/6.63; 607/5, 17, 53–57, 62, 60
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,573,481	A	3/1986	Bullara	
4,612,934	A *	9/1986	Borkan	607/62
4,628,933	A	12/1986	Michelson	
4,837,049	A	6/1989	Byers et al.	
5,109,844	A	5/1992	de Juan, Jr. et al.	
5,215,088	A	6/1993	Normann et al.	
5,569,307	A *	10/1996	Schulman et al.	607/56
5,935,155	A	8/1999	Humayun et al.	
6,400,989	B1	6/2002	Eckmiller	
6,458,157	B1 *	10/2002	Suaning	623/6.63
7,818,061	B1 *	10/2010	Palmer	607/32
2005/0078846	A1 *	4/2005	Single	381/326
2006/0247754	A1	11/2006	Greenberg et al.	

FOREIGN PATENT DOCUMENTS

WO WO 02/40095 A1 5/2002

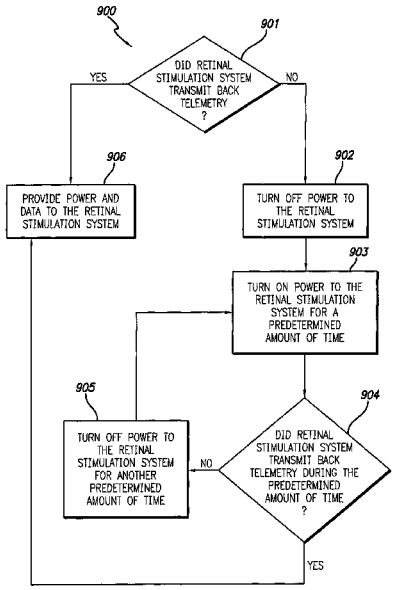
OTHER PUBLICATIONS

Eugene De Juan, Retinal Tacks, American Journal of Ophthalmology 99: pp. 272-274, Mar. 1985.

* cited by examiner

Primary Examiner — Carl H Layno
Assistant Examiner — Luther Behringer
(74) *Attorney, Agent, or Firm* — Scott B. Dunbar; Alessandro Steinfl

(57) **ABSTRACT**

A visual prosthesis apparatus and a method for limiting power consumption in a visual prosthesis apparatus. The visual prosthesis apparatus comprises a camera for capturing a video image, a video processing unit associated with the camera, the video processing unit configured to convert the video image to stimulation patterns, and a retinal stimulation system configured to stop stimulating neural tissue in a subject's eye based on the stimulation patterns when an error is detected in a forward telemetry received from the video processing unit.

12 Claims, 16 Drawing Sheets