US005715816A

United States Patent [19]

Mainiero et al.

[11] Patent Number: 5,715,816

[45] Date of Patent: Feb. 10, 1998

[54] **OXIMETER PROBES AND METHODS FOR THE INVASIVE USE THEREOF**

[75] Inventors: **Louis M. Mainiero**, Delafield; **Robert L. Young**, Waukesha; **Stephen H. Gorski**, Eagle, all of Wis.

[73] Assignee: **Sensor Devices, Inc.**, Waukesha, Wis.

[21] Appl. No.: **546,246**

[22] Filed: **Oct. 20, 1995**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 412,287, Mar. 28, 1995, which is a continuation-in-part of Ser. No. 163,052, Dec. 6, 1993, Pat. No. 5,417,207.

[51] **Int. Cl.**[6] **A61B 5/00**

[52] **U.S. Cl.** **128/633**

[58] **Field of Search** 128/632, 633, 128/634, 637, 664, 665, 666, 667, 207.15, 204.23, 205.23, 200.26; 604/93, 264; 356/39, 40, 41

[56] **References Cited**

U.S. PATENT DOCUMENTS

Re. 31,377	9/1983	Mylrea et al. .	
3,734,094	5/1973	Calinog .	
3,951,136	4/1976	Wall .	
4,090,518	5/1978	Elam .	
4,176,660	12/1979	Mylrea et al. .	
4,301,809	11/1981	Pinchak et al. .	
4,349,031	9/1982	Perlin .	
4,475,555	10/1984	Linder .	
4,476,872	10/1984	Perlin .	
4,484,583	11/1984	Graham .	
4,574,807	3/1986	Hewson et al. .	
4,619,268	10/1986	Uphold et al. .	
4,640,298	2/1987	Pless et al. .	
4,671,296	6/1987	Aitken	128/671
4,672,971	6/1987	Otten .	
4,763,663	8/1988	Uphold et al. .	
4,848,352	7/1989	Pohndorf et al. .	
4,930,521	6/1990	Metzger et al. .	
4,960,133	10/1990	Hewson .	
4,967,759	11/1990	Teves .	
4,981,470	1/1991	Bombeck .	
5,005,573	4/1991	Buchanan .	
5,052,390	10/1991	Hewson .	
5,154,387	10/1992	Trailer .	
5,191,892	3/1993	Blikken .	
5,193,544	3/1993	Jaffe .	
5,247,932	9/1993	Chung et al.	128/633
5,282,464	2/1994	Brain	128/633
5,329,922	7/1994	Atlee .	
5,357,954	10/1994	Shigezawa et al. .	
5,411,024	5/1995	Thomas et al. .	
5,417,207	5/1995	Young et al. .	

FOREIGN PATENT DOCUMENTS

WO 91/15151	4/1991	European Pat. Off. .
0 484 547 A1	5/1991	European Pat. Off. .
0 575 737 A1	5/1993	European Pat. Off. .
29 42 178 A1	10/1979	Germany .

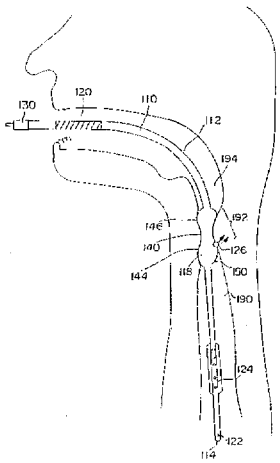
OTHER PUBLICATIONS

Sexual Instrumentaion, by John L. Semmlow and Jack Lubowsky, IEEE Transactions on Bomedical Engineering, vol. BME-30 (1983) Jun., No. 6, New York, USA.

H.R. Andersen and P. Pless, *Trans-Esophageal Pacing,* PACE, vol. 6, Jul.-Aug. 1983.

Primary Examiner—Jennifer Bahr
Assistant Examiner—Eric F. Winakur
Attorney, Agent, or Firm—Snell & Wilmer

[57] **ABSTRACT**

A probe useful for invasively monitoring the oxygen saturation level of blood in the tissue walls of an anatomical cavity generally comprises a chassis with an electrical connector extending from the proximal end of the chassis and terminating at a plug configured for connection to a pulse oximeter box. The probe further includes an optics assembly configured to generate and transmit electrical signals that are indicative of the dynamic oxygen saturation level of blood in the wall tissue. The probe further includes a deployment device attached to the chassis for biasing the optics assembly into the tissue wall of the anatomical canal and stabilizing the probe within the canal. Further, the oximetry sensing assembly may be configured as part of an esophageal stethoscope having other sensing devices, for example, a temperature sensor, a pacing assembly, and an acoustic monitor.

34 Claims, 12 Drawing Sheets