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(54) **EMG ELECTRODE APPARATUS AND POSITIONING SYSTEM**

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This patent is subject to a terminal disclaimer.

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**A61B 5/0492** (2006.01)

(52) **U.S. Cl.** ..... **600/393; 600/391; 600/392; 600/546**

(58) **Field of Classification Search** ..... 600/392, 600/393  
See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

3,387,608 A	6/1968	Figar	
3,612,061 A	10/1971	Collins et al.	
3,774,592 A *	11/1973	Lahr	600/392
4,082,086 A	4/1978	Page et al.	
4,583,549 A	4/1986	Manoli	
4,763,660 A	8/1988	Kroll et al.	
4,957,109 A	9/1990	Groeger et al.	
5,163,440 A	11/1992	DeLuca et al.	
5,224,479 A	7/1993	Sekine	

(Continued)

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(57) **ABSTRACT**

A system for detecting and analyzing electrical activity in the anatomy of an organism underlying an electrode array provides signals corresponding to electrical activity adjacent each electrode. Such signals are correlated to the underlying anatomy of the organism and representative outputs presented through various types of output devices. Such outputs may include variations in coloration or other qualities in correspondence with representations of underlying anatomical structures. The system includes novel electrode structures (200, 224, and 284) and methods for producing and attaching electrode arrays (240 and 280) to the organism. The exemplary form of the invention is used in connection with the diagnosis of muscle activity in the lower lumbar regions of humans. Levels of muscle activity detected are analyzed by correlation with the muscular structures underlying the electrode array. Forms of the invention may be used in other applications.

**17 Claims, 35 Drawing Sheets**

