

[54] **MULTIMODE SYSTEM FOR MONITORING AND TREATING A MALFUNCTIONING HEART**

[75] Inventor: **Todd J. Cohen**, Port Washington, N.Y.

[73] Assignee: **Leonard Bloom**, Towson, Md.; a part interest

[21] Appl. No.: **963,113**

[22] Filed: **Oct. 19, 1992**

**Related U.S. Application Data**

[63] Continuation-in-part of Ser. No. 699,472, May 13, 1991, Pat. No. 5,156,148, which is a continuation-in-part of Ser. No. 416,024, Oct. 2, 1989, Pat. No. 5,014,698, which is a continuation-in-part of Ser. No. 385,544, Jul. 27, 1989, Pat. No. 4,984,572, which is a continuation of Ser. No. 233,367, Aug. 18, 1988, Pat. No. 4,967,749, which is a continuation-in-part of Ser. No. 105,030, Oct. 6, 1987, Pat. No. 4,774,950.

[51] Int. Cl.<sup>5</sup> ..... **A61N 1/36**

[52] U.S. Cl. .... **607/6; 607/18; 607/25; 604/66**

[58] Field of Search ..... **128/419 PG, 419 D, 697, 128/709, 419 P**

[56] **References Cited**

**U.S. PATENT DOCUMENTS**

4,785,812 11/1988 Pihl et al. .... 128/419 D  
 4,870,341 9/1989 Pihl et al. .... 128/419 D  
 5,097,830 3/1992 Eikefjord et al. .... 128/419 D

Primary Examiner—**Kyle L. Howell**  
 Assistant Examiner—**George Manuel**  
 Attorney, Agent, or Firm—**Leonard Bloom**

[57] **ABSTRACT**

A system for monitoring a patient and treating the malfunctioning heart of the patient, either in an automatic mode or in a semiautomatic mode, includes means which derive at least one electrical signal resulting from action of the patient's heart and means which derive at least one physiologic signal from or related to the patient's circulatory system. A central processing unit, which may be a programmable microprocessor, with a RAM and a ROM, receives and responds to the at least one electrical signal and to the at least one physiologic signal. Output means, which may include a heart assist pump, pacers, drug delivery devices and cardioverting/-defibrillating apparatuses, controlled by the central processing unit provides corrective measure(s) to the patient. Adjustable or variable baselines, against which a representation of the current, short-term magnitude of the selected physiologic parameter or parameters are provided. The variable baseline(s) is (are) a representation of the selected physiologic parameter(s) determined over a long term of greater duration than the short term over which the current magnitude(s) of the parameter(s) is (are) measured. In its monitoring only mode, the system monitors vital signs and/or the like, including the above-mentioned electrical signal and the physiologic signal and displays them on a monitor.

43 Claims, 14 Drawing Sheets

