[54] **ACTIVITY MONITORING APPARATUS WITH CONFIGURABLE FILTERS**

[75] Inventor: **Robert W. Conlan,** Niceville, Fla.

[73] Assignee: **Precision Control Design, Inc.,** Fort Walton Beach, Fla.

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[52] U.S. Cl. **128/782;** 128/670; 128/671; 128/690; 128/721
[58] Field of Search .... 128/782, 774, 690, 721, 128/722, 670, 671, 687, 713, 714, 419 PG, 419 PT; 340/573

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,807,388	4/1974	Orr et al.	128/690
4,088,139	5/1978	Auerbach	128/419 PT
4,117,834	10/1978	McPartland et al.	128/782
4,202,350	5/1980	Walton	128/690
4,353,375	10/1982	Colburn et al.	128/782
4,425,921	1/1984	Fujisaki et al.	128/690
4,428,378	1/1984	Anderson et al.	128/419 PG
4,819,652	4/1989	Micco	128/661.09
4,830,021	5/1989	Thornton	128/707
4,945,916	8/1990	Kretschmer et al.	128/671
4,989,612	2/1991	Fore	128/721
5,010,887	4/1991	Thornander	128/696
5,010,893	4/1991	Sholder	128/782
5,025,791	6/1991	Niwa	128/670
5,031,614	7/1991	Alt	128/419 OPG
5,036,856	8/1991	Thornton	128/670
5,044,365	9/1991	Webb et al.	128/419 PG
5,074,303	12/1991	Hauck	128/419 PG

OTHER PUBLICATIONS

Experimental Prototype (AM–16) Block Diagram.
Redmond, D. and Hegge, F., Observations on the design and specification of a wrist–worn human activity monitoring system Behavior Res. Methods, Instruments & Computer 1985 17(6), 659–669.

Primary Examiner—Max Hindenburg
Assistant Examiner—Guy V. Tucker
Attorney, Agent, or Firm—Lockwood, Alex, Fitzgibbon & Cummings

[57] **ABSTRACT**

An activity monitor adapted to be worn on the non-dominant wrist of a subject includes a bimorphous beam motion sensor. The output signal of the sensor is amplified in an amplifier circuit having a selectable amplification factor, and filtered by highpass and lowpass filter circuits having individually selectable cut-off frequencies to obtain an analog signal for processing having a bandpass and amplitude characteristic corresponding to a particular body activity under observation. A control and processing circuit within the monitor includes a microprocessor which responds to either resident internal operating instructions or to externally supplied operating instructions, or to designated data signal parameters, to provide configuration control signals to the amplifier and filter circuits, and processing of the collected data, appropriate to the particular activity being monitored. The processed data is digitally stored in an internal memory for subsequent transfer through a data port to an associated computer for display or further processing.

33 Claims, 8 Drawing Sheets

FIG.1

FIG. 2

ACTIVITY MONITOR

FIG.3

FIG.4

13 PC ⟷ 14 Interface Unit ⟷ 15 Actigraph

FIG.5

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ACTIVITY   MONITOR

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FIG.6

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FIG. 7

① 16-2 Hz
② 16-3 Hz
③ 16-9 Hz
④ 2-3 Hz
⑤ 2-9 Hz

Gain

Frequency Hz.

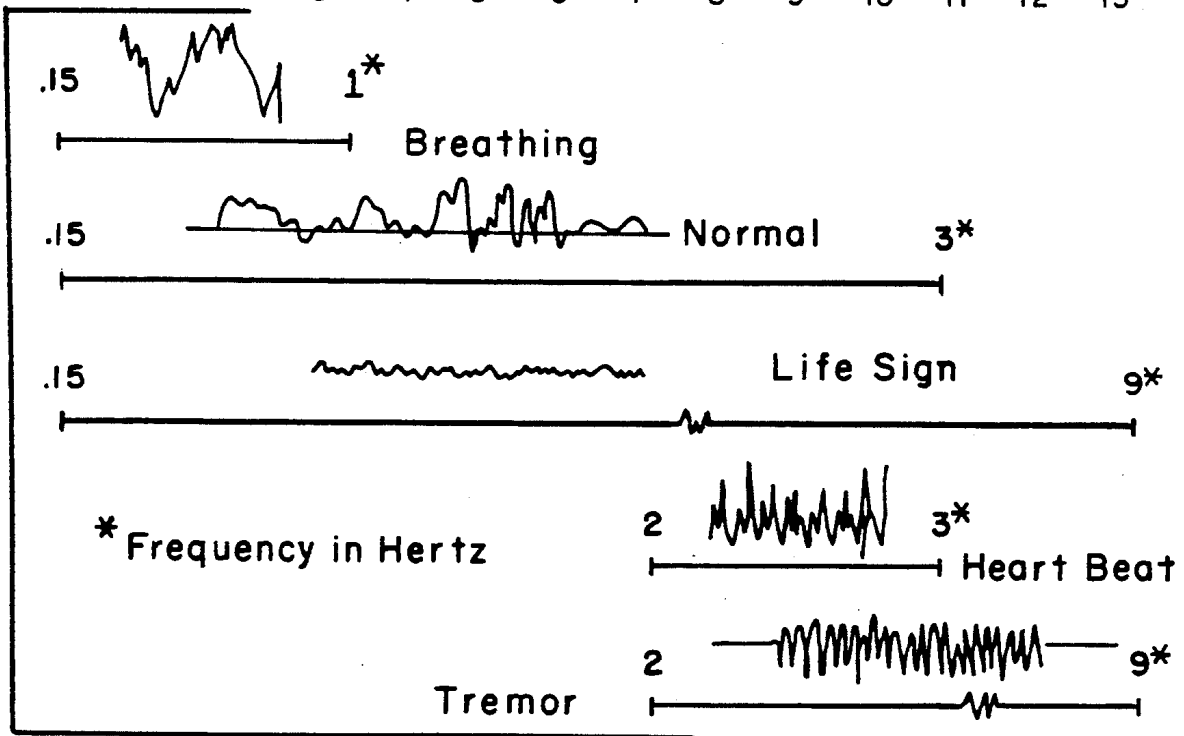FIG. 10

Breathing

Normal

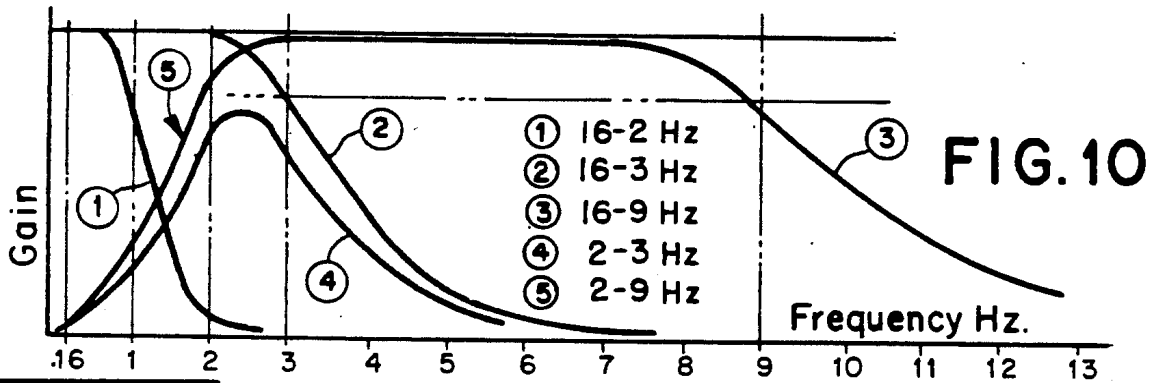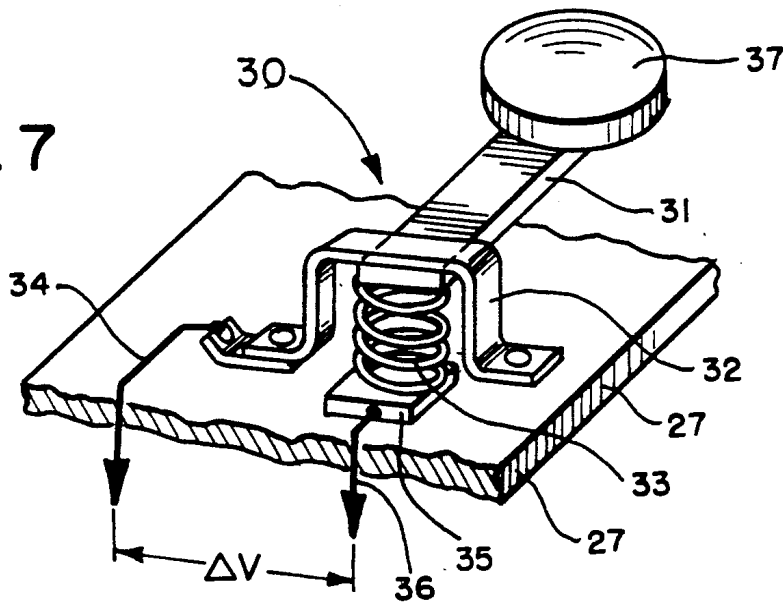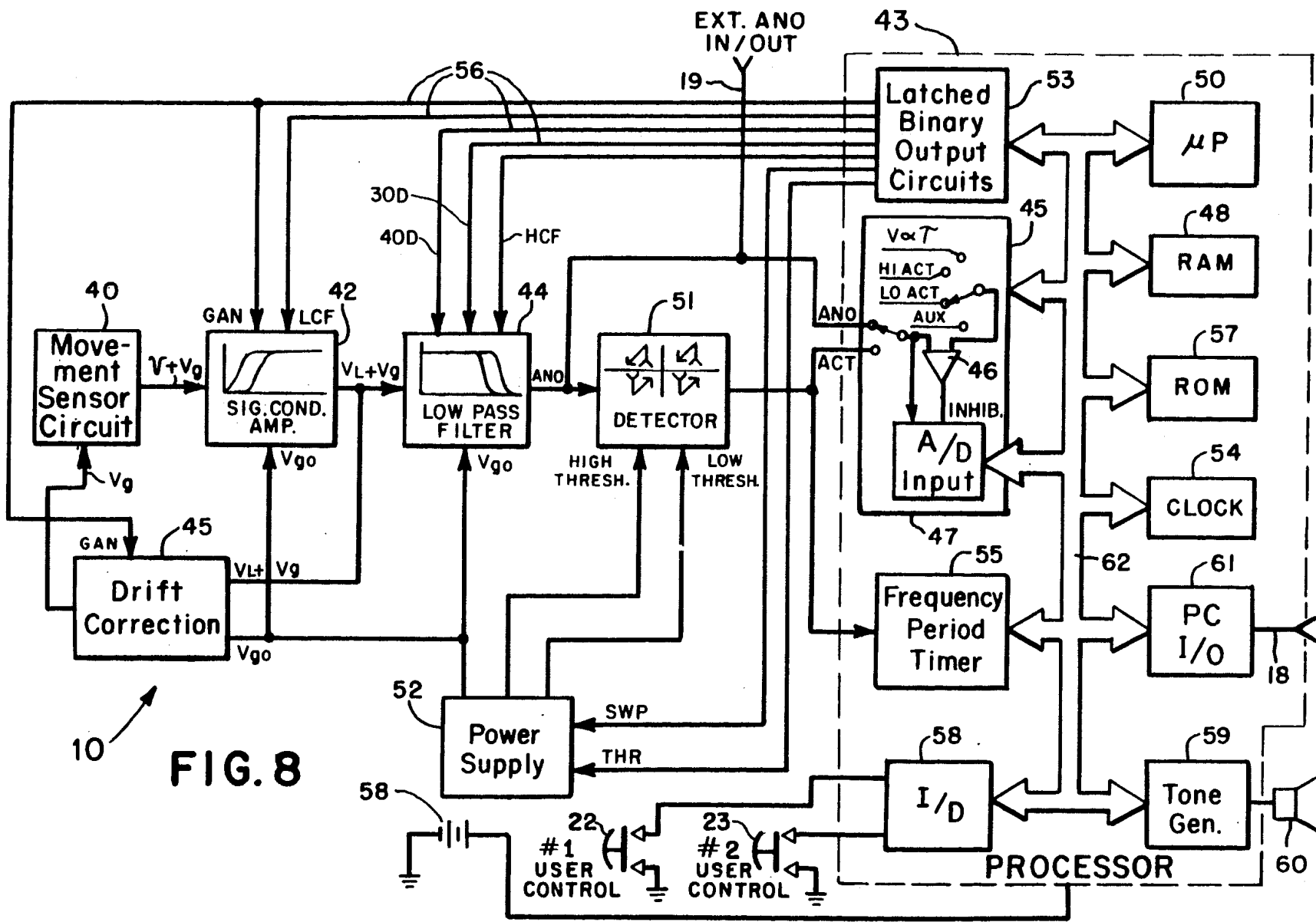Life Sign

*Frequency in Hertz

Heart Beat

Tremor
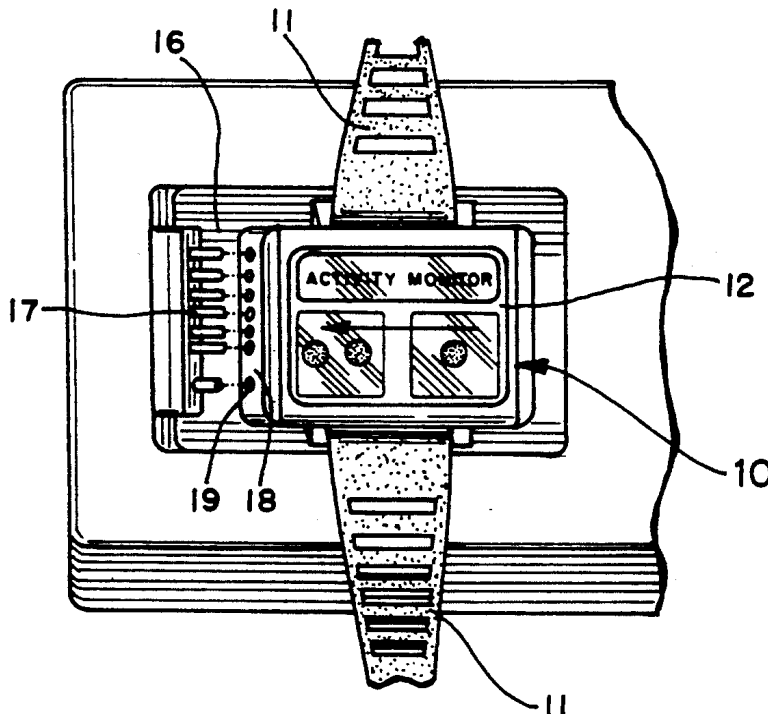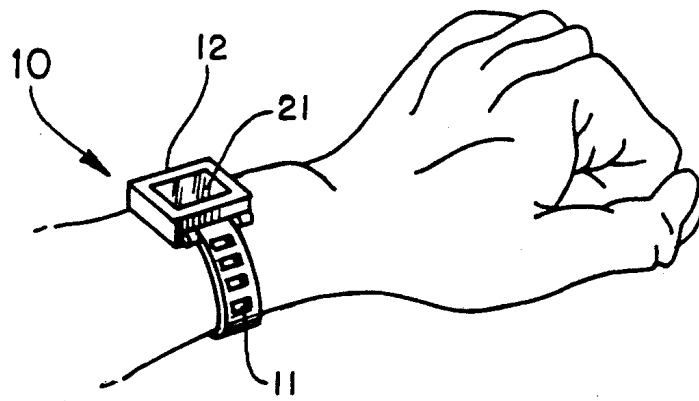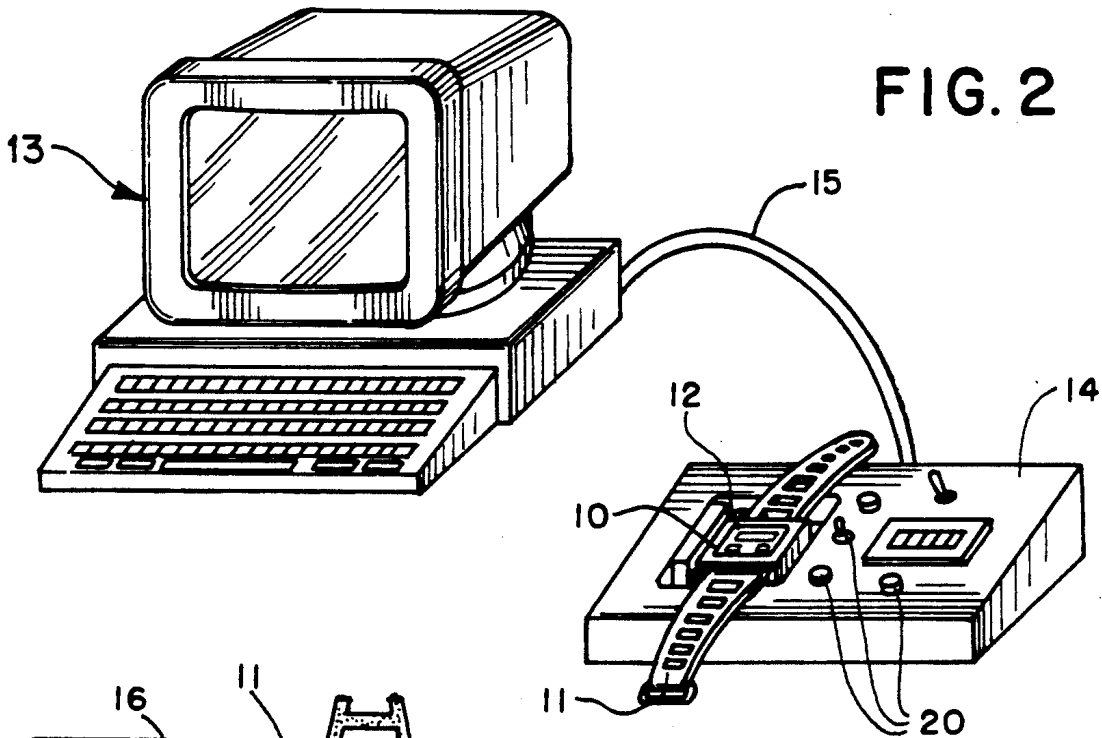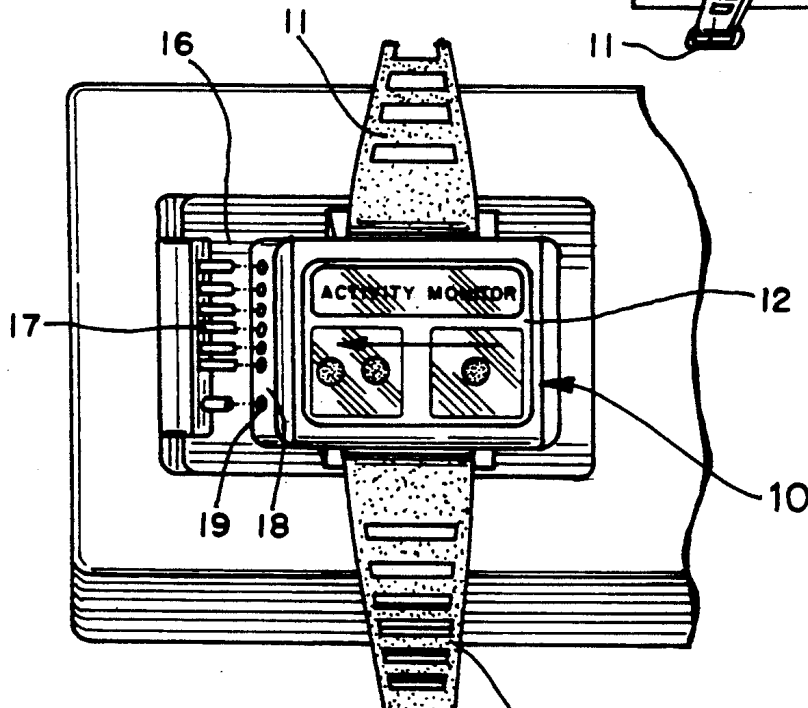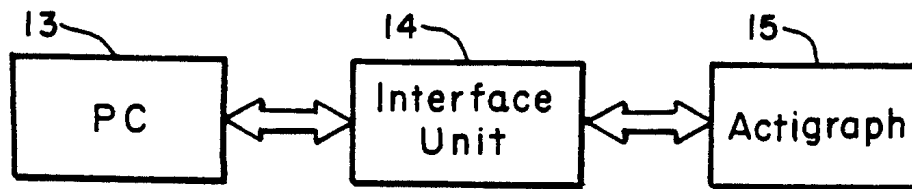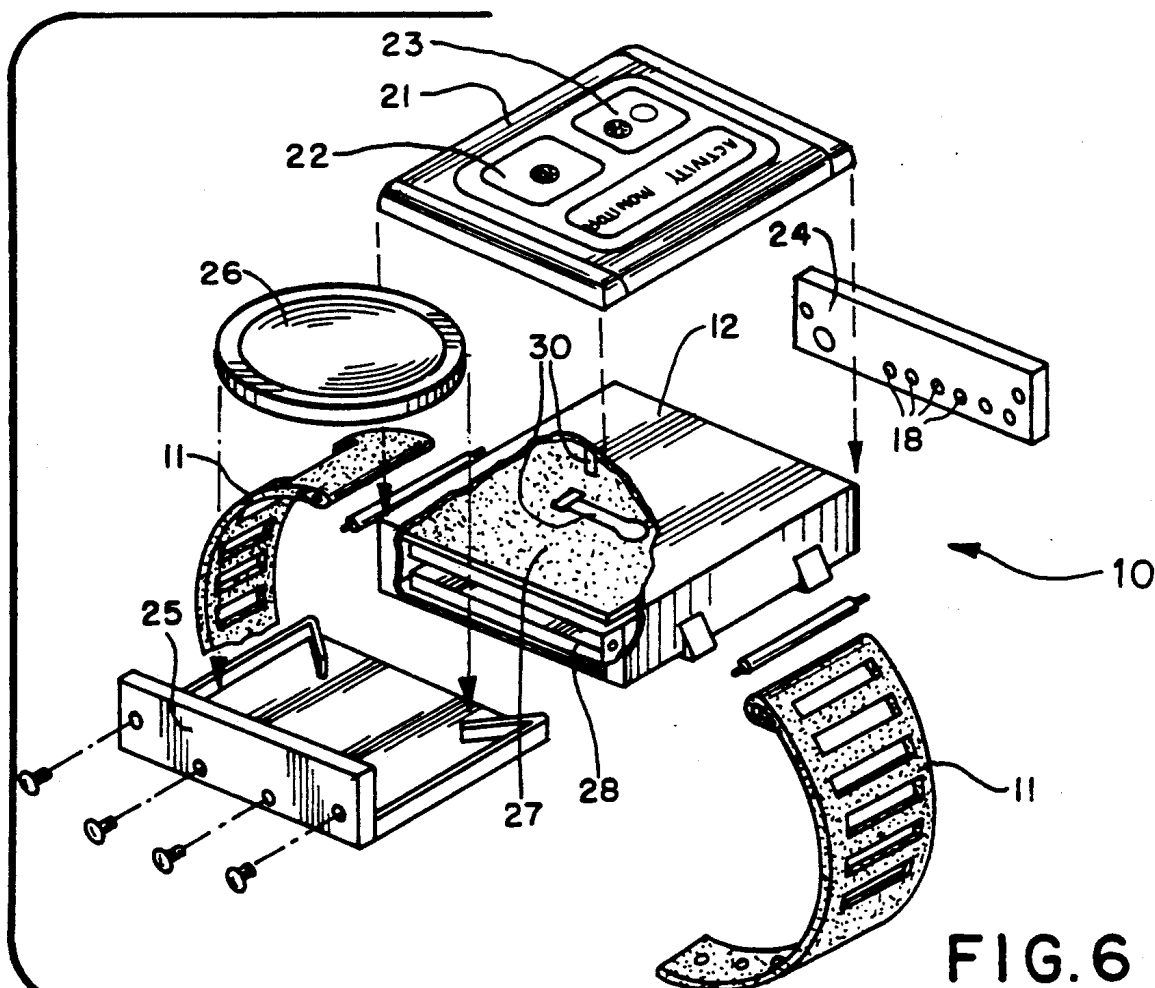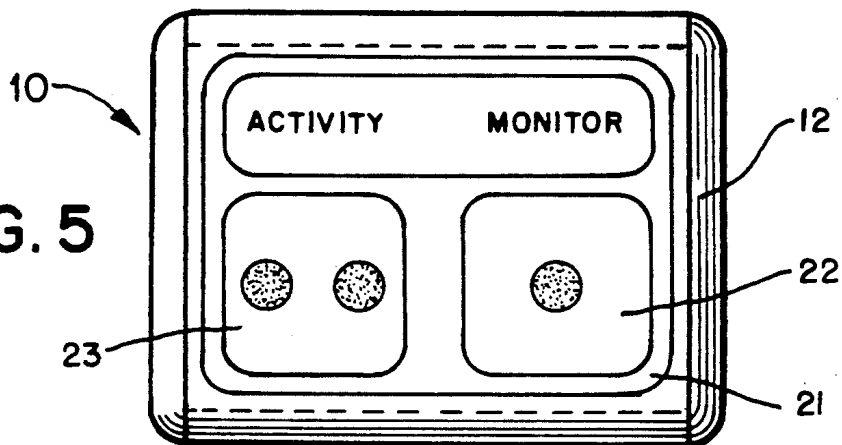
FIG. 11

FIG.8

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