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**Nanba et al.**

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(54) **APPARATUS FOR DETECTING VITAL FUNCTIONS, CONTROL UNIT AND PULSE WAVE SENSOR**

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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1342 days.

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(21) Appl. No.: **11/802,607**

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(22) Filed: **May 24, 2007**

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**Int. Cl.**

**A61B 5/02** (2006.01)

(52) **U.S. Cl.** ..... **600/483; 600/484**

(58) **Field of Classification Search** ..... **600/483, 600/486, 500-504**

See application file for complete search history.

**ABSTRACT**

An apparatus for detecting vital functions has a pulse wave sensor attachable to a body and a control unit. The control unit checks if amplitude of pulse wave signals produced from the pulse wave sensor varies. The control unit further checks if a large change in the amplitude during a systolic phase of a pulse wave corresponding to the systolic phase of the heart. If a first large change in the amplitude during a diastolic phase of a pulse wave corresponding to the diastolic phase of the heart, it is highly probable that a motion artifact has occurred. Therefore, a motion artifact flag is set. Next, it is checked if the amplitude in the next diastole is changing by more than 30%. if it is presumed that the occurrence of cough is highly probable, a cough flag is set. if it is neither the motion artifact nor the cough, then a yawn flag is set.

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**26 Claims, 10 Drawing Sheets**

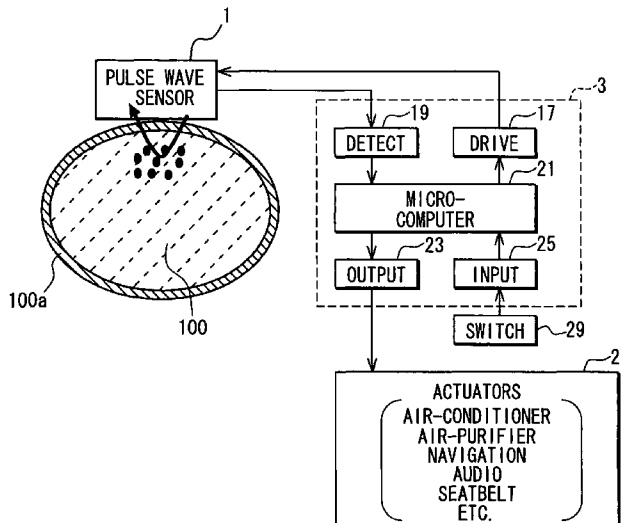


FIG. 1A

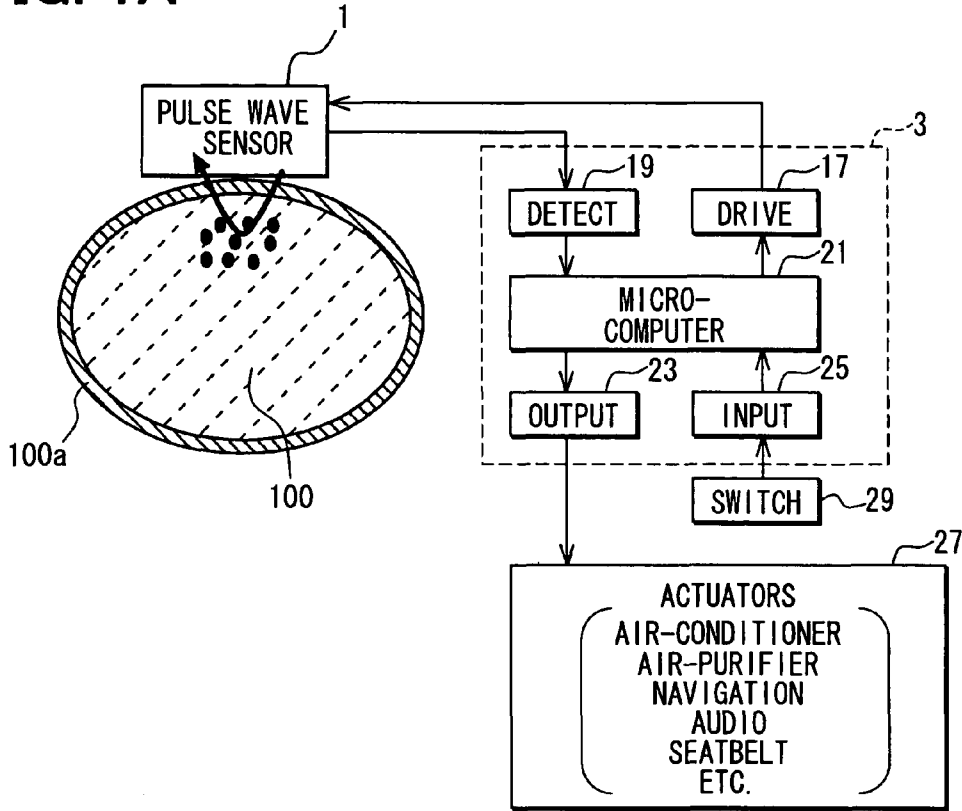
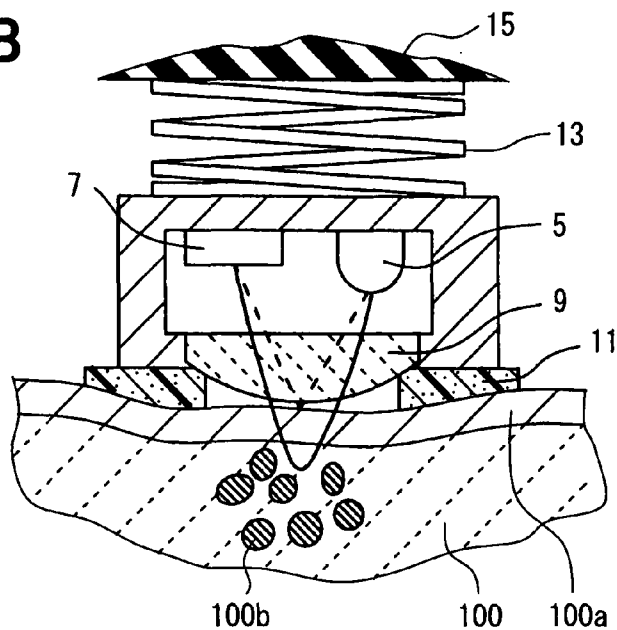
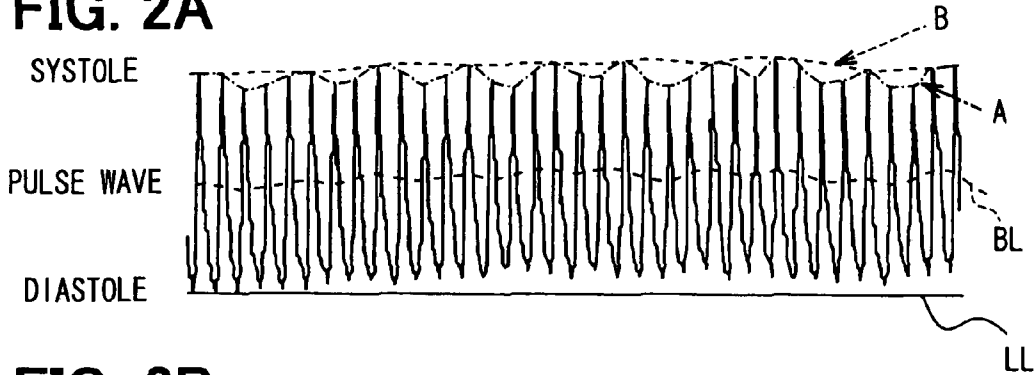


FIG. 1B



**FIG. 2A**

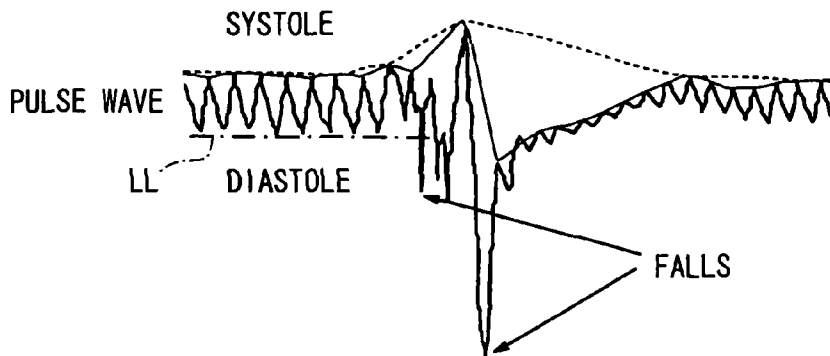


**FIG. 2B**



**FIG. 3A**

MOTION ARTIFACT



**FIG. 3B**

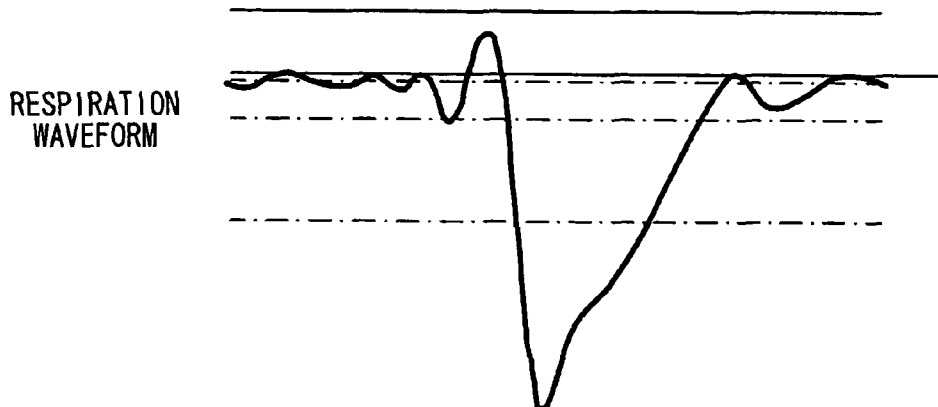


FIG. 4E

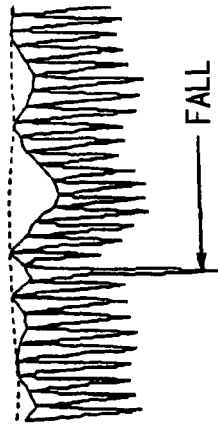


FIG. 4F

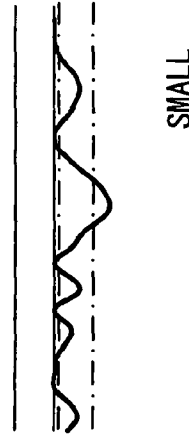


FIG. 4C

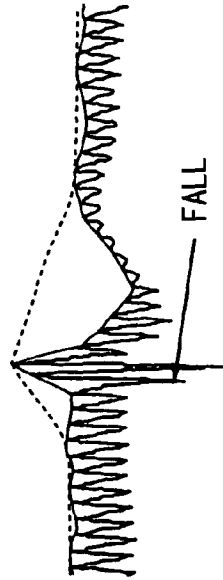


FIG. 4D

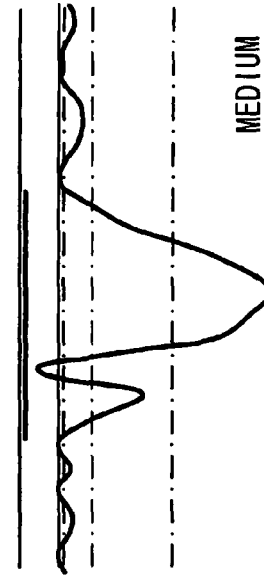


FIG. 4A

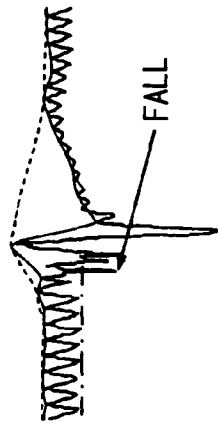
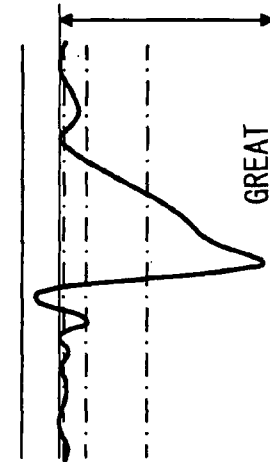
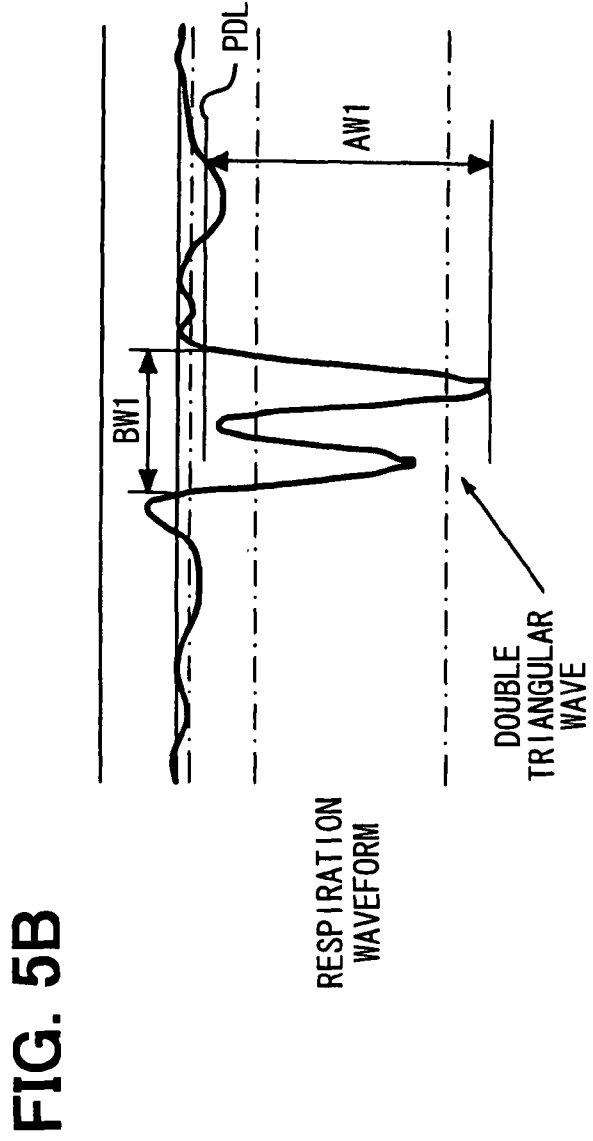
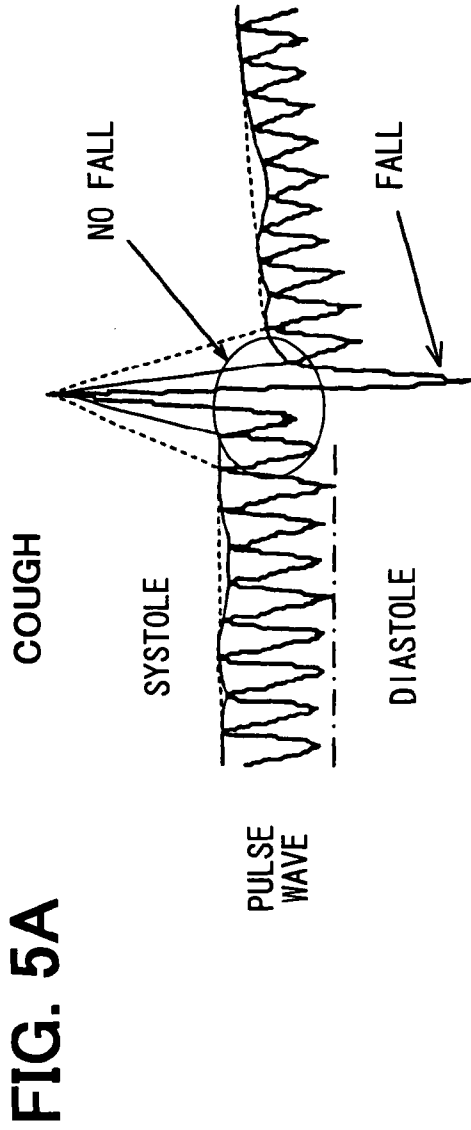


FIG. 4B





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