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*Apple Inc. v. Masimo Corporation*

*IPR2020-01526*

# U.S. Patent 6,771,999

**(12) United States Patent**  
**Kiani et al.**

**(10) Patent No.: US 6,771,994 B2**  
**(45) Date of Patent: Aug. 3, 2004**

**(54) PULSE OXIMETER PROBE-OFF DETECTION SYSTEM**

**(75) Inventors:** Masel E. Kiani, Laguna Niguel, CA (US); Mohamed K. Diab, Mission Viejo, CA (US)

**(73) Assignee:** Masimo Corporation, Irvine, CA (US)

**(\*) Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

**(21) Appl. No.: 10/374,303**  
**(22) Filed: Feb. 24, 2003**  
**(65) Prior Publication Data**  
 US 2003/0139656 A1 Jul. 24, 2003

**Related U.S. Application Data**

**(62)** Division of application No. 09/595,081, filed on Jun. 16, 2000, now Pat. No. 6,526,300.  
**(60)** Provisional application No. 60/140,000, filed on Jun. 18, 1999.

**(51) Int. Cl.<sup>7</sup> A61B 5/00**  
**(52) U.S. Cl. 600/323; 600/344**  
**(58) Field of Search 600/309-310, 600/322-324, 316, 344, 473, 476**

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**(57) ABSTRACT**

The present invention provides a number of improvements that can be incorporated into a pulse oximeter probe to detect when a probe has become dislodged from a patient and/or to prevent a probe-off condition. A probe-off condition occurs when the optical probe becomes partially or completely dislodged from the patient, but continues to detect an AC signal within the operating region of the pulse oximeter. In one aspect, the present invention provides electrical contacts that contact the skin of a patient when the probe is properly attached. In another aspect, the present invention provides a number of louvers placed in front of the sensor's photodetector to filter out oblique light rays that do not originate from a point in front of the detector. Accordingly, if the emitter and photodetector are not properly aligned, the photodetector will not produce a signal within the valid operating range of the pulse oximeter. In accordance with a method of the present invention the pulse oximeter can sound an alarm or display a warning if it determines that the probe is not properly attached to the patient.

**18 Claims, 15 Drawing Sheets**

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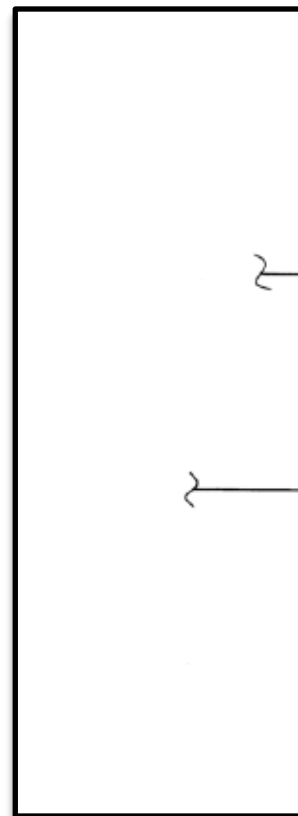
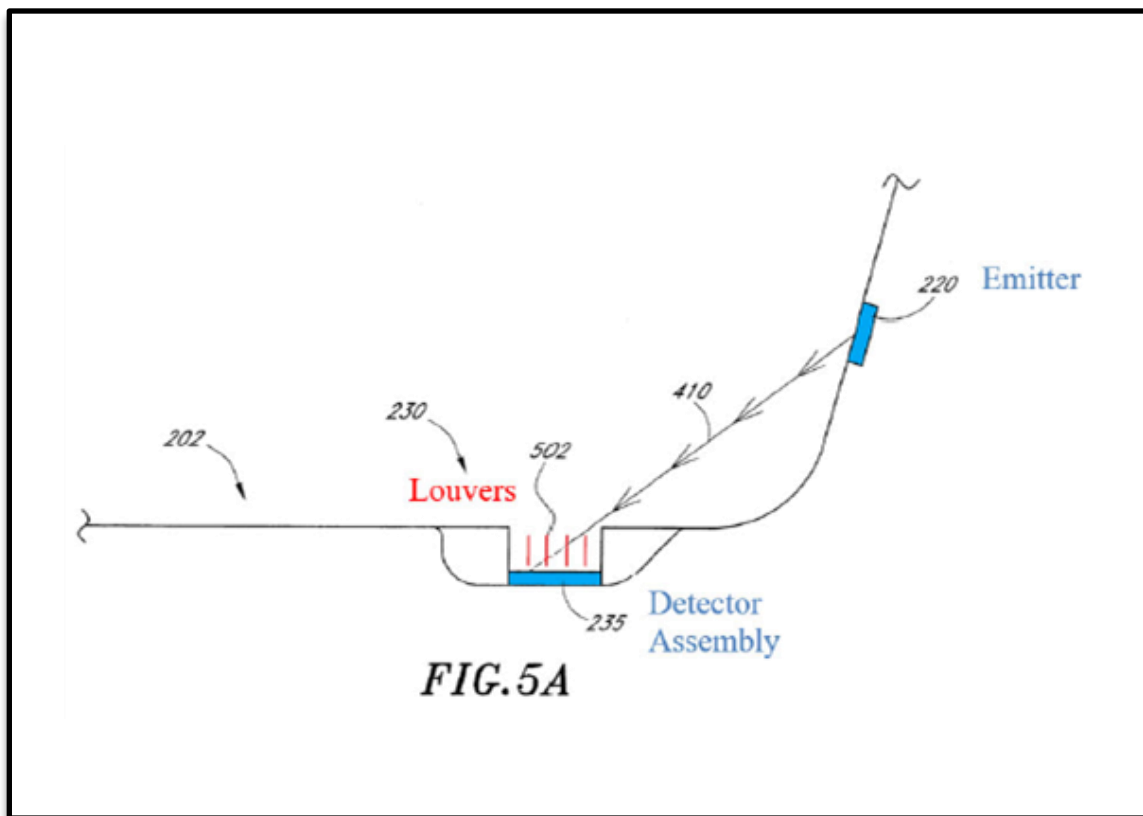
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# '994 Patent



## Claim 15

15. A sensor which generates at least first intensity signals from a light-sensitive detector which detects light of at least first and second wavelengths emitted through body tissue carrying pulsing light, the sensor comprising:

at least one light emission device;

a light sensitive detector; and

a plurality of louvers positioned over the light sensitive detector to accept light from the at least one light emission device originating from a generator of the at least one light emission device and emitting through body tissue carrying pulsing light, wherein the louvers accept the light when the sensor is properly applied to tissue of a patient.

## Petitioner's Asserted Level Of Ordina

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A POSITA would have been a person with a physiological monitoring technologies. The had a Bachelor of Science degree in an academic emphasizing the design of electrical, computer technologies, in combination with training or years of related work experience with capturing data or information, including but not limited to monitoring technologies.

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