



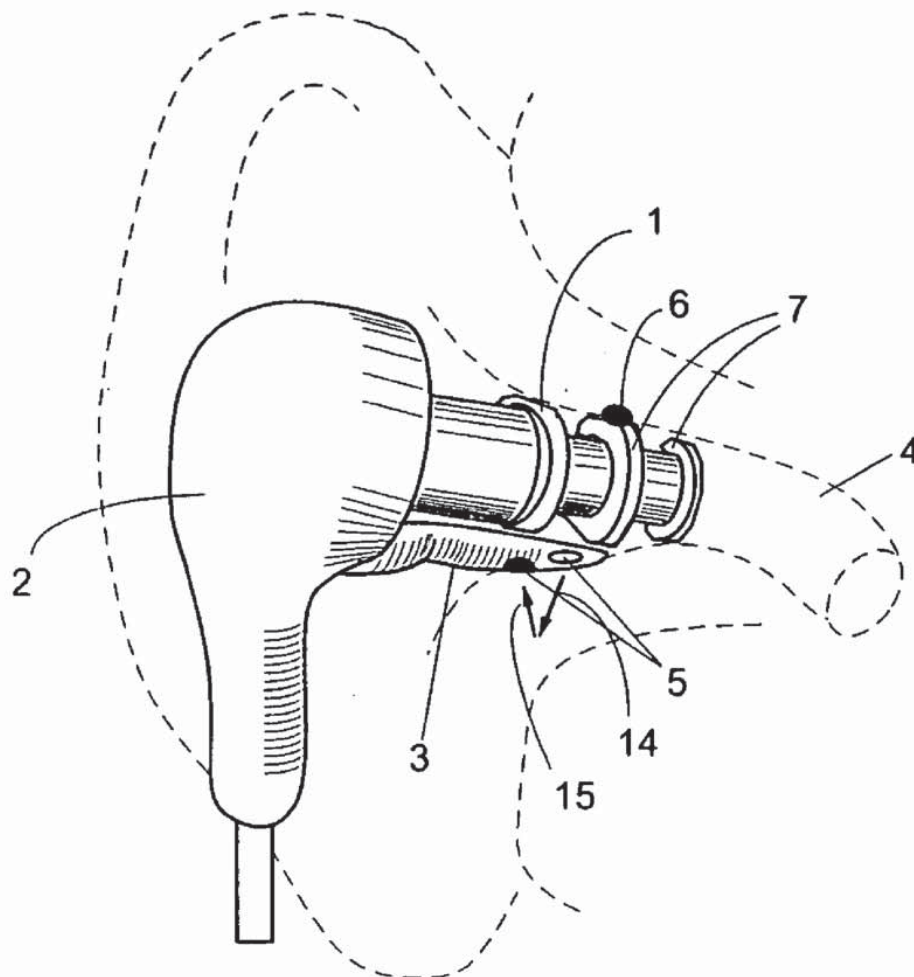
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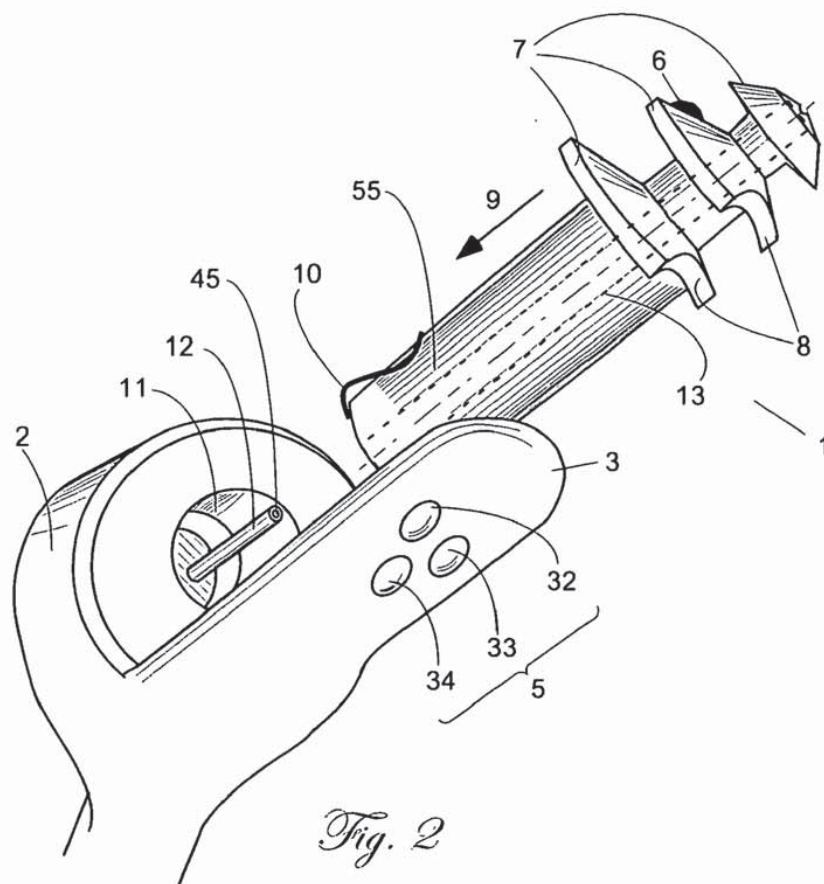
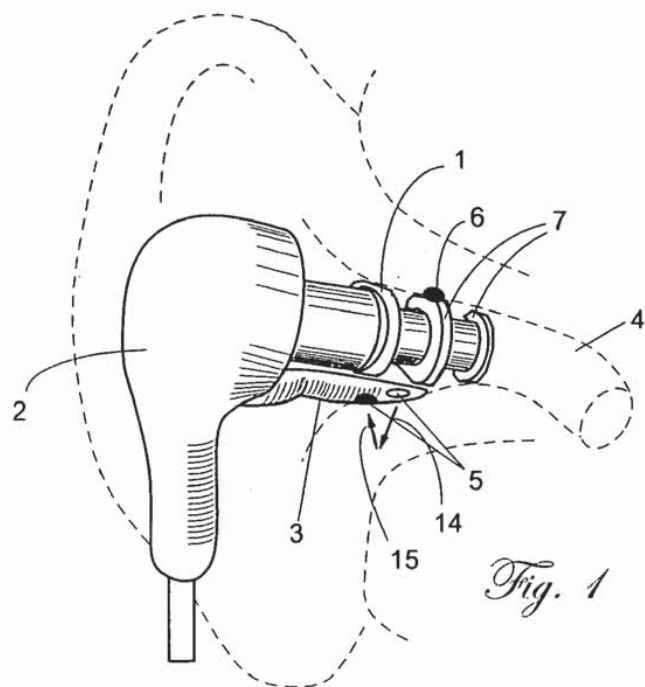
(19) **United States**(12) **Patent Application Publication** (10) **Pub. No.: US 2005/0209516 A1****Fraden**(43) **Pub. Date:****Sep. 22, 2005**(54) **VITAL SIGNS PROBE**(76) **Inventor: Jacob Fraden, Ja Jolla, CA (US)**

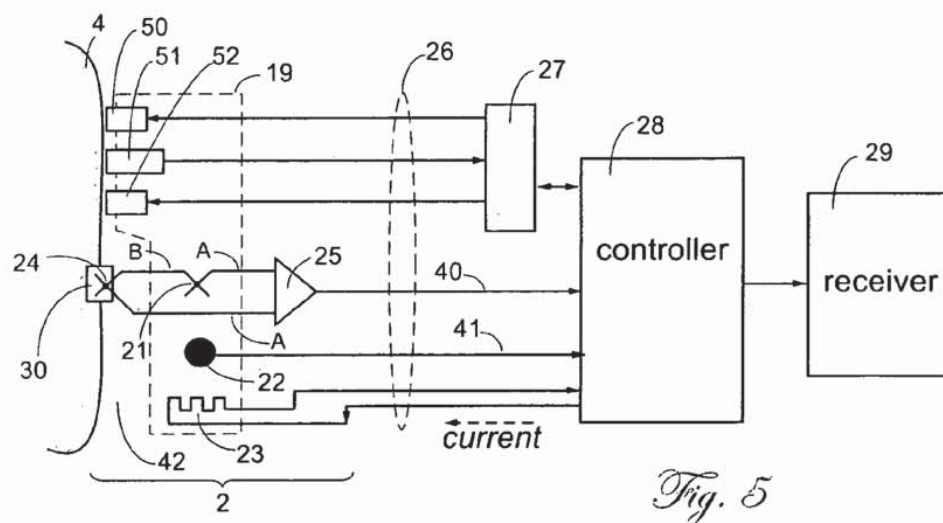
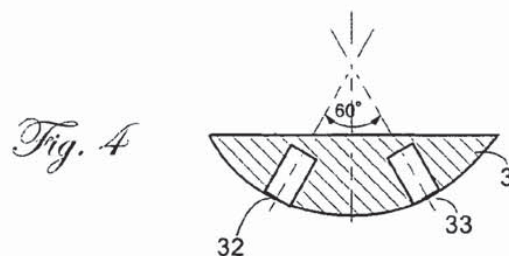
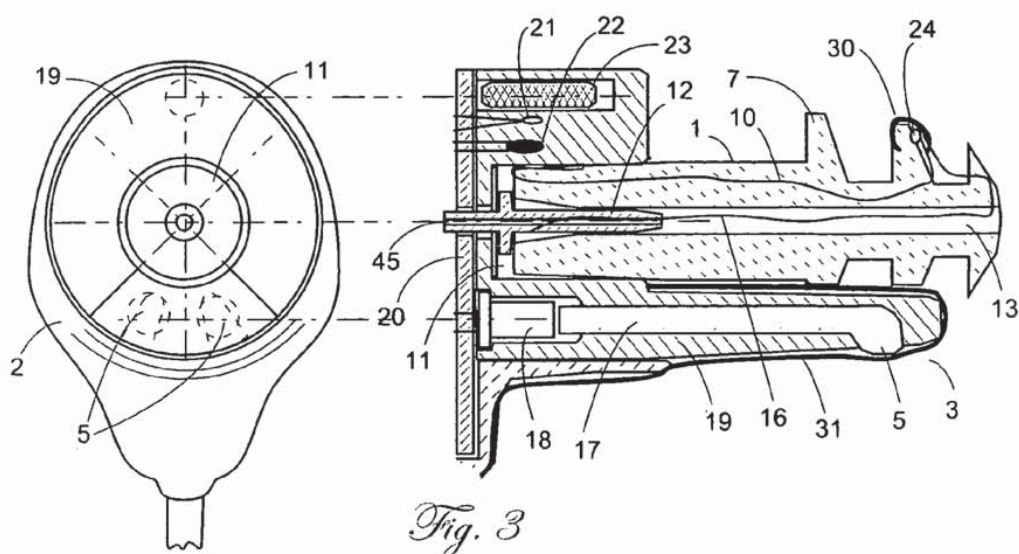
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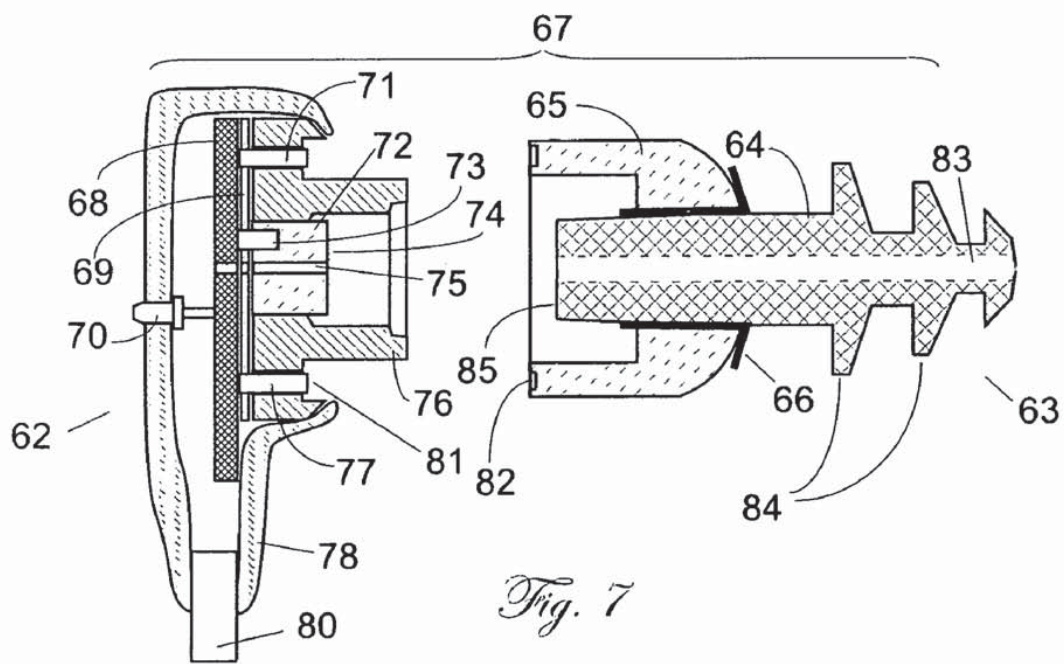
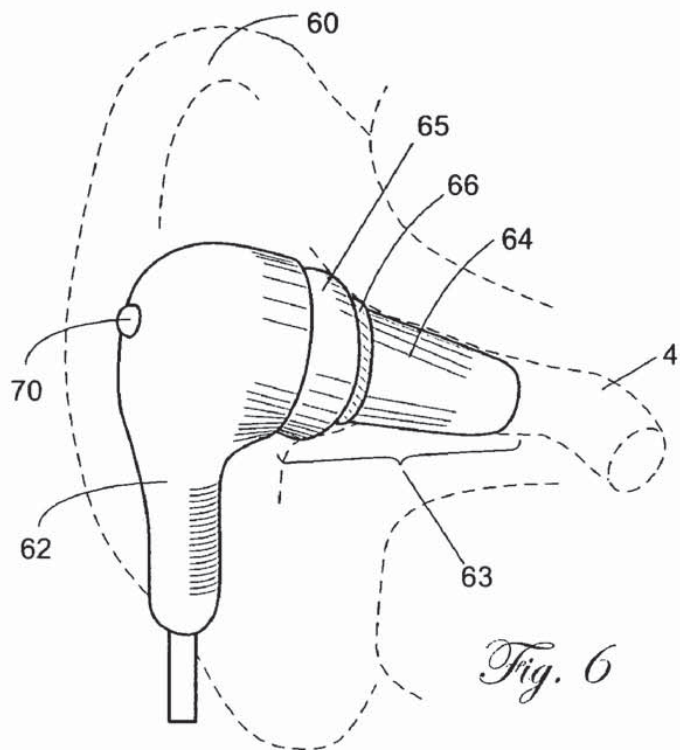
**Jacob Fraden****Suite M****6266 Ferris Sq.****San Diego, CA 92121 (US)**(21) **Appl. No.: 10/806,766**(22) **Filed: Mar. 22, 2004****Publication Classification**(51) **Int. Cl.<sup>7</sup> ..... A61B 5/00**(52) **U.S. Cl. .... 600/323; 600/549**(57) **ABSTRACT**

A combination of a patient core temperature sensor and the dual-wavelength optical sensors in an ear probe or a body surface probe improves performance and allows for accurate computation of various vital signs from the photo-plethysmographic signal, such as arterial blood oxygenation (pulse oximetry), blood pressure, and others. A core body temperature is measured by two sensors, where the first contact sensor is positioned on a resilient ear plug and the second sensor is on the external portion of the probe. The ear plug changes its geometry after being inserted into an ear canal and compress both the first temperature sensor and the optical assembly against ear canal walls. The second temperature sensor provides a reference signal to a heater that is warmed up close to the body core temperature. The heater is connected to a common heat equalizer for the temperature sensor and the pulse oximeter. Temperature of the heat equalizer enhances the tissue perfusion to improve the optical sensors response. A pilot light is conducted to the ear canal via a contact illuminator, while a light transparent ear plug conducts the reflected lights back to the light detector.

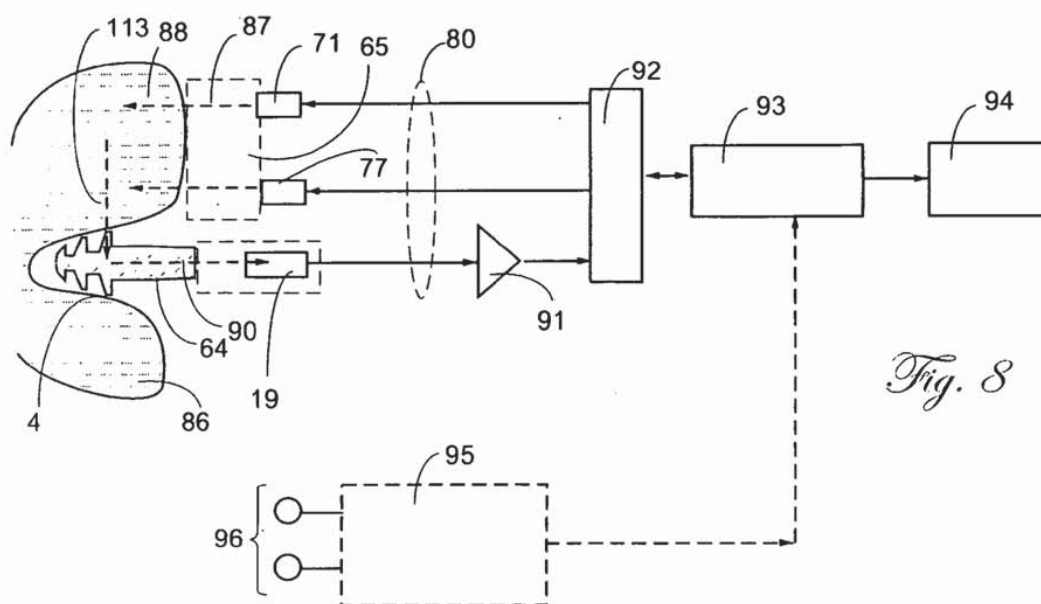
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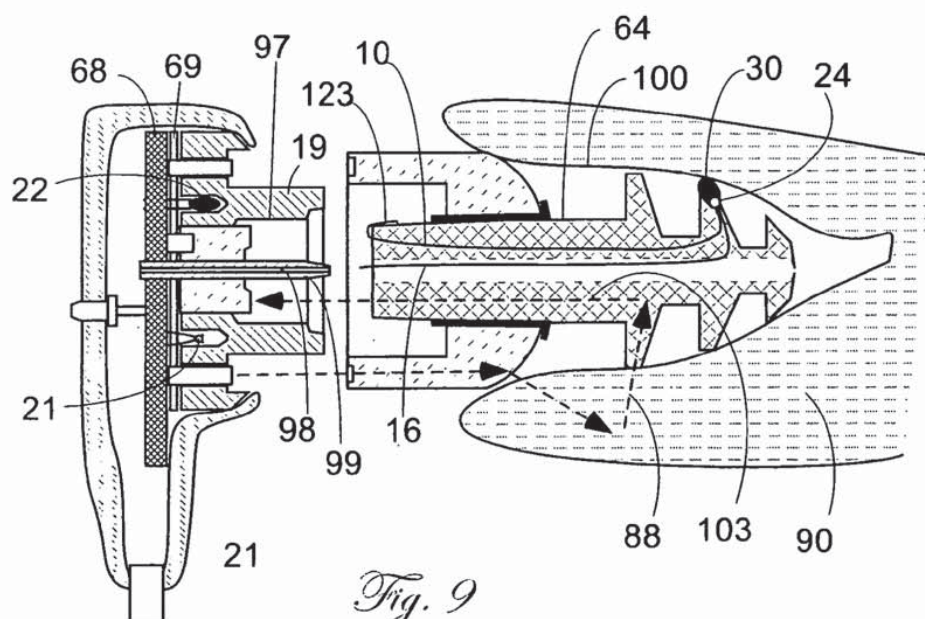








*Fig. 8*



*Fig. 9*

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