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Paper 22
Date: August 3, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

OMNI MEDSCI, INC.,
Patent Owner.

IPR2021-00453
Patent 10,517,484 B2

Before GRACE KARAFFA OBERMANN, BRIAN J. McNAMARA, and SHARON FENICK, *Administrative Patent Judges.*

McNAMARA, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. BACKGROUND

On August 6, 2021 we instituted an *inter partes* review of claims 1–23 of U. S. Patent No. 10,517,484 B2 ("the '484 Patent"). Paper 7 ("Dec. to Inst."). Omni MedSci, Inc. ("Patent Owner') filed a Patent Owner Response (Paper 10, "PO Resp."), Apple, Inc. ("Petitioner") filed a Petitioner Reply (Paper 11, "Pet. Reply") and Patent Owner filed a Sur-reply (Paper 13, "PO Sur-reply"). A transcript of an oral hearing held on May 5, 2022 (Paper 20, "Hr'g. Tr.") has been entered into the record.

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). We base our decision on the preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).

Having reviewed the arguments of the parties and the supporting evidence, we conclude that Petitioner has demonstrated by a preponderance of the evidence that challenged claims 1, 2, 7, and 15–23 are unpatentable and that Petitioner has not demonstrated challenged claims 3–6 and 8–14 to be unpatentable.

II. THE '484 PATENT

The '484 patent concerns a device that can be placed on a user's ear or wrist to measure a physiological parameter. Ex. 1001 (code 57). A plurality of light emitting diodes generate light at an initial intensity and a receiver with spatially placed detectors receiving reflected light provides analog signals to an analog-to-digital converter ("A/D"). *Id.* Signal-to-noise ratio is improved by increasing light intensity relative to initial light intensity and increasing a pulse rate. *Id.* The system inspects a sample "by comparing different features, such as wavelength (or frequency), spatial location, transmission, absorption, reflectivity, scattering, refractive index, or opacity" of the sample. *Id.* at 10:2–7.

Figure 24 of the ’484 patent is reproduced below.

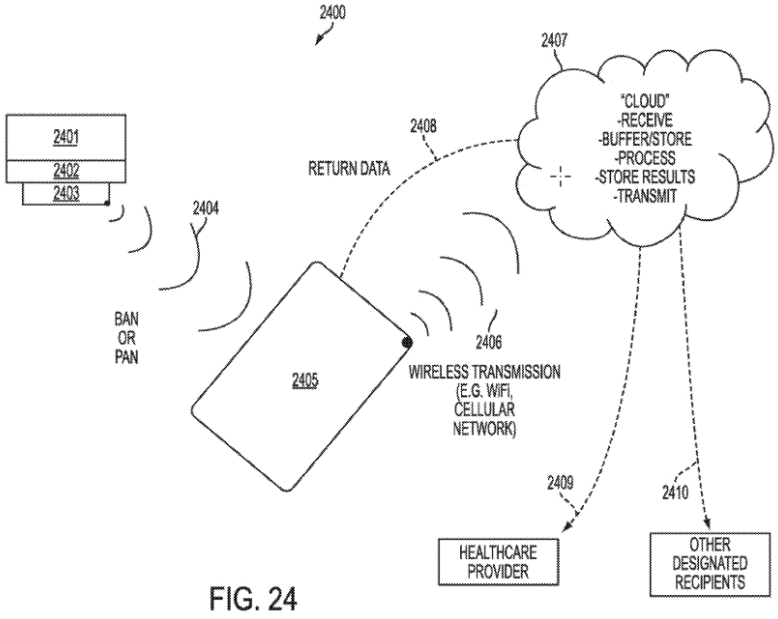

Figure 24 of the ’484 patent

Figure 24 is a high level overview of physiological measurement system 2400, in which wearable measurement device 2401 with processor 2402 and transmitter 2403 communicates measurements over link 2404 to smart phone or tablet 2405. *Id.* at 32:45–33:4. An application program in smart phone or tablet 2405 communicates some or all of its processed data over link 2406 to cloud based server 2407, which can augment the data with additional value-added processing, e.g., historical processing and pattern matching algorithms. *See id.* at 33:5–34:21.

The wearable device includes a light source having a plurality of LEDs, electronically driven to operate in a continuous or pulsed mode, that generate an output beam at one or more optical wavelengths between 700 and 2500 nanometers. Ex. 1001, 3:34–49, 11:3–9, 28:19–21, 26:29–34, Fig. 20. The ’484 patent describes several techniques to improve signal processing to select the constituents of interest. *See, e.g., id.* at 15:49–17:15. According to the ’484 patent, “using a wider wavelength range and using

more sampling wavelengths may improve the ability to discriminate one signal from another." *Id.* at 15:64–66. In addition, "a higher light level or intensity may improve the signal-to-noise ratio for the measurement." *Id.* at 15:53–55. The '484 patent notes that

> it may be advantageous to pulse the light source with a particular pulse width and pulse repetition rate, and then the detection system can measure the pulsed light returned from or transmitted through the tissue. Using a lock-in type technique (e.g., detecting at the same frequency as the pulsed light source and also possibly phase locked to the same signal), the detection system may be able to reject background or spurious signals and increase the signal-to-noise ratio of the measurement.

Id. at 15:67–16:8. The '484 patent further explains that variations due to sunlight, time of day, and weather may also be reduced to improve the signal-to-noise ratio using a lock-in technique. *Id.* at 16:61–67.

> Higher signal-to-noise ratios may be achieved. For example, one way to improve the signal-to-noise ratio would be to use modulation and lock-in techniques. In one embodiment, the light source may be modulated, and then the detection system would be synchronized with the light source. In a particular embodiment, the techniques from lock-in detection may be used, where narrow band filtering around the modulation frequency may be used to reject noise outside the modulation, frequency. In an alternate embodiment, change detection schemes may be used, where the detection system captures the signal with the light source on and with the light source off. Again, for this system the light source may be modulated. Then, the signal with and without the light source is differenced. This may enable the sun light changes to be subtracted out. In addition, change detection may help to identify objects that change in the field of view.

Id. at 16:64–17:13. Patent Owner also notes that the '484 patent incorporates by reference PCT Application Serial No. PCT/US2013/075767 (Publication No. WO/2014/143276) (Ex. 2120), which describes the use of

an active illuminator to achieve higher signal-to-noise ratios despite variations due to sunlight and weather, and U.S. Patent Application Serial No. 14/109,007, which discloses the modulation frequency of the light source can range between 0.1–100 kHz. *See* Paper 6, Preliminary Response 5 (citing Ex. 1001, 2:26–29, 2:36–39; Ex. 2120 ¶ 79; Ex. 2021 ¶ 45).

III. ILLUSTRATIVE CLAIM

Claim 1, reproduced below using the paragraph designations in the Petition, is illustrative of the subject matter of the challenged claims.

> 1(a). A system for measuring one or more physiological parameters and for use with a smart phone or tablet, the system comprising:
> (b) a wearable device adapted to be placed on a wrist or an ear of a user,
> (c) including a light source comprising a plurality of semiconductor sources that are light emitting diodes, each of the light emitting diodes configured to generate an output optical light having one or more optical wavelengths;
> (d) the wearable device comprising one or more lenses configured to receive a portion of at least one of the output optical lights and to direct a lens output light to tissue;
> (e) the wearable device further comprising a detection system configured to receive at least a portion of the lens output light reflected from the tissue and to generate an output signal having a signal-to-noise ratio,
> (f) wherein the detection system is configured to be synchronized to the light source;
> (g) wherein the detection system comprises a plurality of spatially separated detectors, and wherein at least one analog to digital converter is coupled to at least one of the spatially separated detectors;
> (h) wherein a detector output from the at least one of the plurality of spatially separated detectors is coupled to an amplifier having a gain configured to improve detection sensitivity;
> (i) the smart phone or tablet comprising a wireless receiver, a wireless transmitter, a display, a speaker, a voice input module, one or more buttons or knobs, a microprocessor and

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