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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte HIROFUMI TSUCHIMOTO, TAKANORI HAYASHI, KENGO SAITO, and HIROYUKI NAKAJI

Appeal 2018-007972[1]
Application 15/012,958[2]
Technology Center 3700

Before BIBHU R. MOHANTY, BRUCE T. WIEDER, and KENNETH G. SCHOPFER, *Administrative Patent Judges*.

SCHOPFER, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the rejection of claims 1 and 4–10. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

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[1] Our decision references the Appeal Brief ("Appeal Br.," filed Mar. 23, 2018), the Reply Brief ("Reply Br.," filed July 30, 2018), the Examiner's Answer ("Ans.," mailed June 8, 2018), and the Final Office Action ("Final Act.," mailed Oct. 25, 2017).

[2] According to Appellant, the real party in interest is "MURATA MANUFACTURING CO., LTD." Appeal Br. 2.

BACKGROUND

The Specification discloses that "[t]he present invention relates to biological sensors that detect biological information." Spec. ¶ 2.

ILLUSTRATIVE CLAIM

Claim 1 is the only independent claim on appeal and recites:

1. A biological sensor comprising:

a light-emitting element that emits light based on a driving signal;

a light-receiving element that outputs a current detection signal based on an intensity of received light including light emitted by the light-emitting element;

an amplifying circuit configured to convert the current detection signal into a voltage detection signal, amplify an alternating current component of the voltage detection signal, and output an amplified detection signal; and

a microcontroller configured to:

generate the driving signal as a pulse-form driving signal,

generate an offset signal as a pulse-form offset voltage that is synchronized with the pulse-form driving signal,

apply the pulse-form offset voltage to an offset circuit coupled to the amplifying circuit to offset a direct current component of the voltage detection signal, and

obtain biological information based on the amplified detection signal.

Appeal Br. 12 (emphasis added).

REJECTION

The Examiner rejects claims 1 and 4–10 under 35 U.S.C. § 102(a)(1) as anticipated by Cheung.[3]

DISCUSSION

We are persuaded of reversible error in the rejection of claim 1 because the Examiner has not established that Cheung discloses a microcontroller configured to generate an offset signal that is synchronized with a pulse-form driving signal.

With respect to claim 1, the Examiner finds that Cheung discloses a biological sensor as claimed. *See* Final Act. 4–5 (citing Cheung col. 4, l. 38–col. 5, l. 5; col. 13, l. 54–col. 14, l. 2; col. 15, ll. 7–16; col. 16, ll. 5–18; col. 24, ll. 3–39). Regarding the claimed microcontroller, the Examiner specifically relies upon Cheung at column 13, line 54 to column 14, line 2, and the Examiner also finds that "Cheung describes outputting two different wavelengths intermixed within each other." *Id.* at 3, 5. Further regarding the claimed microcontroller, the Examiner finds that "Cheung discloses removing an offset of the signal, gaining up another portion of the signal, and then feeding both into the output in real time. Therefore, these signals are synchronized with each other by definition since they are 'in step' with one another." Ans. 5 (citing Cheung col. 16, ll. 5–18). The Examiner further finds,

> Cheung discloses (col. 14, lines 22–39; col. 14, line 58-col. 15, line 6) specifically that this arrangement is used for cancellation of interference noise. It is noted that the open-ended language of the claim (a "biological sensor comprising") merely requires that an offset signal is provided that is synchronized with driving

[3] Cheung et al., US 5,259,381, iss. Nov. 9, 1993.

> signal, not that the offset signal can't be first removed and then added into the signal, as in Cheung.

Id. at 7.

We are persuaded of error because we agree with Appellant that the Examiner has failed to explain how Cheung discloses a microcontroller configured to provide a driving signal that is synchronized with an offset signal. Reply Br. 4.

Cheung discloses a microcomputer 16 that is used "to produce current pulses at a 960 Hz repetition rate" to drive LEDs 40 and 42. Cheung col. 13, ll. 54–57. The LEDs "respond to the current pulses by producing corresponding light pulses transmitted through the finger to detector 38[, which] produces a signal that includes information about the pulsatile response of the finger to the red and infrared wavelength light, intermixed at the 960 Hz LED pulse repetition rate." *Id.* at col. 13, l. 64–col. 14, l. 2. Cheung then describes that the signal from the detector 38 passes through an I/O circuit in which the signal is amplified. *Id.* at col. 14, ll. 22–39. These amplified signals are input to lowpass filters to remove high-frequency noise. *Id.* at col. 14, ll. 58–60. The filtered signals "are next prepared for conversion and transmission of the microcomputer 16." *Id.* at col. 15, ll. 7–9. Cheung discloses that:

> Accordingly, an input signal received from each filter 96 and 98 includes both the AC and DC components discussed above. The programmable subtractors 100 remove a substantial offset portion of the baseline component of each signal and the programmable gain amplifiers 102 gain-up the remaining signal for conversion by A/D converter 106. A digital reconstruction of the original signal is then produced by the microcomputer, which through the use of digital feedback information removes the gain and adds the offset voltages back to the signal.

Id. at col. 16, ll. 7–18. Cheung discloses that "the values for the offset subtraction voltage, gain, and driver currents" are maintained "at levels appropriate to produce optimal A/D converter 106 resolution." *Id.* at col. 16, ll. 19–22. Finally, Cheung discloses that the offset voltage is increased or decreased based on "an offset code" that is related to "the level of the signal received from convertor 106." *Id.* at col. 16, ll. 45–52.

Absent from the aforementioned disclosure in Cheung is any express disclosure of the relationship between the driving signals for the LEDs 40 and 42 and the offset voltage. Regarding this relationship, the Final Action indicates only that "Cheung describes outputting two different wavelengths intermixed with each other." Final Act. 3. But these intermixed signals are the detection signals, and the Examiner does not explain how the intermixing of these detection signals shows that the driving signal and offset signal are synchronized. In the Answer, the Examiner finds that "Cheung discloses removing an offset of the signal, gaining up another portion of the signal, and then feeding both into the output in real time." Ans. 5 (citing Cheung col. 16, ll. 5–18). However, the Examiner does not explain adequately how this provides the claimed relationship between the driving signal and the offset signal. Rather, this portion of Cheung discusses removing offsets from the detection signals after they have been filtered.

Based on the foregoing, we agree with Appellant that the Examiner has failed to establish that Cheung's driving signals are synchronized with Cheung's offset signals. Accordingly, we are persuaded of reversible error and we do not sustain the rejection of claim 1. For the same reasons, we do not sustain the rejection of dependent claims 4–10.

CONCLUSION

We REVERSE the rejection of claims 1 and 4–10.

REVERSED