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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte TORU DAN

Appeal 2018-005770
Application 14/864,135
Technology Center 2600

Before MAHSHID D. SAADAT, JOHNNY A. KUMAR, and
STEVEN M. AMUNDSON, *Administrative Patent Judges*.

AMUNDSON, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant¹ seeks our review under 35 U.S.C. § 134(a) from a final rejection of claims 1–20, i.e., all pending claims. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

¹ Appellant identifies the real party in interest as Semiconductor Components Industries, LLC. App. Br. 3.

STATEMENT OF THE CASE

The Invention

According to the Specification, the invention “relates generally to clock generator circuits, and more particularly to spread spectrum clock generator circuits.” Spec. ¶ 1.² The Specification explains that (1) “a spread spectrum clock generator includes a clock generator and a modulator”; (2) “[t]he clock generator modulates a frequency of a reference clock signal using a modulation signal to provide a spread spectrum clock signal”; and (3) “[t]he modulator generates the modulation signal according to a desired profile conditioned by an inverse of” the clock generator’s “characteristic transfer function.” *Id.* Abstract; *see id.* ¶¶ 34–38.

Exemplary Claim

Independent claim 1 exemplifies the claims at issue and reads as follows (with formatting added for clarity):

1. A spread spectrum clock signal generator comprising:
a clock generator for modulating a frequency of a reference clock signal using a modulation signal to provide a spread spectrum clock signal, said clock generator having a characteristic transfer function that varies with values of a frequency of said reference clock signal and a nominal frequency of said reference clock signal can vary over a range of frequencies; and

² This decision uses the following abbreviations: “Spec.” for the Specification, filed September 24, 2015; “Final Act.” for the Final Office Action, mailed June 22, 2017; “App. Br.” for the Appeal Brief, filed November 15, 2017; “Ans.” for the Examiner’s Answer, mailed February 28, 2018; and “Reply Br.” for the Reply Brief, filed April 26, 2018.

a modulator for generating said modulation signal according to a desired profile conditioned by an inverse of said characteristic transfer function of said clock generator at a current nominal value of said frequency of said reference clock signal,

wherein said modulator comprises an inverse transfer function filter and said modulator changes coefficients of said inverse transfer function filter according to said current nominal value of said frequency of said reference clock signal.

App. Br. 21 (Claims App.).

The Prior Art Supporting the Rejections on Appeal

As evidence of unpatentability under 35 U.S.C. § 103, the Examiner relies on the following prior art:

| | | |
|---|--------------------|---------------|
| Zhang et al. (“Zhang”) | US 6,442,188 B1 | Aug. 27, 2002 |
| Castiglione et al. (“Castiglione”) | US 2003/0039330 A1 | Feb. 27, 2003 |
| Yellin et al. (“Yellin”) | US 2005/0129142 A1 | June 16, 2005 |
| Chen | US 2008/0063130 A1 | Mar. 13, 2008 |
| Bellaouar et al. (“Bellaouar”) | US 2011/0163815 A1 | July 7, 2011 |
| S.T. Lee et al., <i>A Quad-Band GSM-GPRS Transmitter with Digital Auto-Calibration</i> , 39 IEEE JOURNAL OF SOLID-STATE CIRCUITS 2200–14 (Dec. 2004) (“Lee”) | | |
| D.B.Y. Nguyen et al., <i>A High-Precision Spread Spectrum Clock Generator Based on a Fractional-N Phase Locked Loop</i> , 74 ANALOG INTEGRATED CIRCUITS & SIGNAL PROCESSING 661–65 (Mar. 2013) (“Nguyen”) | | |

The Rejections on Appeal

Claims 1, 15, and 17–19 stand rejected under 35 U.S.C. § 103 as unpatentable over Nguyen and Zhang. Final Act. 3–5.

Claims 2–4, 6, and 7 stand rejected under 35 U.S.C. § 103 as unpatentable over Nguyen, Zhang, and Bellaouar. Final Act. 6–9.

Claim 5 stands rejected under 35 U.S.C. § 103 as unpatentable over Nguyen, Zhang, Bellaouar, and Yellin. Final Act. 9.

Claims 8 and 14 stand rejected under 35 U.S.C. § 103 as unpatentable over Nguyen, Zhang, and Castiglione. Final Act. 10–13.

Claims 9–11 stand rejected under 35 U.S.C. § 103 as unpatentable over Nguyen, Zhang, Castiglione, and Bellaouar. Final Act. 13–14.

Claims 12 and 13 stand rejected under 35 U.S.C. § 103 as unpatentable over Nguyen, Zhang, Castiglione, Bellaouar, and Yellin. Final Act. 15–16.

Claim 16 stands rejected under 35 U.S.C. § 103 as unpatentable over Nguyen, Zhang, and Lee. Final Act. 5–6.

Claim 20 stands rejected under 35 U.S.C. § 103 as unpatentable over Nguyen, Zhang, and Chen. Final Act. 9–10.

ANALYSIS

We have reviewed the rejections of claims 1–20 in light of Appellant’s arguments that the Examiner erred. Based on the record before us and for the reasons explained below, we concur with Appellant’s contentions that the Examiner erred in finding that the cited portions of the references teach or suggest a modulator with filter coefficients that vary according to frequency variations in an input “reference clock signal.”

The § 103 Rejections of Claims 1, 8, 14, 15, and 17–19

INDEPENDENT CLAIMS 1 AND 15

Appellant argues that the Examiner erred in rejecting independent claims 1 and 15 because (1) each claim requires an input “reference clock signal” with a nominal frequency that can vary over a range and a modulator with filter coefficients that vary according to frequency variations in the

input “reference clock signal” and (2) the references do not disclose or suggest the claimed modulator. *See* App. Br. 9–17; Reply Br. 2–7. Based on the “the plain meaning of the words of the claims themselves” and the Specification, Appellant asserts that “it is the frequency of the reference clock signal of the clock generator that can vary, and the modulator adjusts its coefficients in response to the current value of the frequency of the reference clock signal.” App. Br. 11–15; *see* Reply Br. 2–4. Appellant also asserts that “[t]he signal that varies in frequency in Zhang is the output of the spread spectrum clock generator, not the input.” App. Br. 16.

In response, the Examiner notes that “[t]he claim does not specifically recite whether the frequency variation occurs at the input or the output” of the spread-spectrum clock generator. Ans. 3. The Examiner interprets the nominal frequency that can vary over a range “to occur at the output” of the spread-spectrum clock generator. *Id.* The Examiner finds that Zhang discloses a spread-spectrum clock generator with a nominal frequency f_{NOM} from reference generator 13 that “can vary over a range of frequencies.” *Id.* at 4 (emphasis omitted).

We agree with Appellant that the Examiner misinterprets claims 1 and 15. As Appellant asserts, each claim requires an input “reference clock signal” with a nominal frequency that can vary over a range. App. Br. 21, 23–24 (Claims App.); *see* Spec. ¶¶ 54, 67. For instance, in claim 1 “a spread spectrum clock signal” output results from “modulating a frequency of a reference clock signal” input. App. Br. 21 (Claims App.).

Further, the Specification explains that “[i]n order to compensate for frequency changes in systems in which the REFERENCE CLOCK FREQUENCY may vary, the inventor has discovered that the spread

spectrum clock generator can be modified to include a calibration of FIR filter coefficients for the particular REFERENCE CLOCK FREQUENCY that is being used.” Spec. ¶ 54; *see* Reply Br. 6. The Specification repeatedly describes and depicts the REFERENCE CLOCK SIGNAL as an input to the spread-spectrum clock generator. *See, e.g.*, Spec. ¶¶ 34–35, 45–46, 49, 51–52, 62–63, Figs. 7, 10–12, 14, 16. The broadest reasonable interpretation must “correspond[] with what and how the inventor describes his invention in the specification.” *In re Smith Int’l, Inc.*, 871 F.3d 1375, 1382–83 (Fed. Cir. 2017).

Based on the record before us, we are persuaded by Appellant’s contention that the Examiner has not adequately explained how the cited portions of Nguyen and Zhang teach or suggest a modulator with filter coefficients that vary according to frequency variations in an input “reference clock signal.” For instance, Zhang’s Figure 3 depicts an input frequency f_{NOM} that remains constant and an output frequency that varies between a high frequency f_{H} and a low frequency f_{L} . Zhang 1:24–2:16, 2:61–62, Fig. 3. Zhang describes frequency f_{NOM} as “a constant fundamental frequency.” *Id.* at 1:32–35. Hence, we do not sustain the § 103 rejection of claims 1 and 15.

INDEPENDENT CLAIM 8

Appellant contends that independent claim 8 contains language corresponding to the other independent claims and requires an input “reference clock signal” with a nominal frequency that can vary over a range and a modulator with filter coefficients that vary according to frequency variations in the input “reference clock signal.” App. Br. 10–15, 19. More specifically, Appellant asserts that claim 8 “is similar to claim 1 in that the

reference divider at the front end [input] of the clock generator receives the reference clock signal, and the voltage controlled oscillator at the back end [output] of the clock generator provides the spread spectrum clock signal.” *Id.* at 19. Appellant also asserts that the Examiner “applied Castiglione to show the details of the clock generator that can be used in a spread spectrum clock generator, but Castiglione does not disclose or otherwise render obvious the elements missing from the combination of Nguyen and Zhang.” *Id.* We agree.

On this record, we are persuaded by Appellant’s contention that the Examiner has not shown how Castiglione overcomes the deficiency in Nguyen and Zhang concerning a modulator with filter coefficients that vary according to frequency variations in an input “reference clock signal.” Hence, we do not sustain the § 103 rejection of claim 8.

DEPENDENT CLAIMS 14 AND 17–19

Claim 14 depends directly from claim 8, and claims 17–19 depend directly or indirectly from claim 15. For the reasons discussed regarding the independent claims, we do not sustain the § 103 rejection of claims 14 and 17–19.

The § 103 Rejections of Claims 2–7, 9–13, 16, and 20

Claims 2–7 depend directly or indirectly from claim 1; claims 9–13 depend directly or indirectly from claim 8; and claims 16 and 20 depend directly from claim 15. On this record, the Examiner has not shown how the additionally cited secondary references—Bellaouar, Yellin, Lee, and Chen—overcome the deficiency in the references cited against the independent claims. Hence, we do not sustain the § 103 rejections of claims 2–7, 9–13, 16, and 20.

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Because this determination resolves the appeal with respect to claims 1–20, we need not address Appellant’s other arguments regarding Examiner error. *See, e.g., Beloit Corp. v. Valmet Oy*, 742 F.2d 1421, 1423 (Fed. Cir. 1984) (explaining that an administrative agency may render a decision based on “a single dispositive issue”).

DECISION

We reverse the Examiner’s decision to reject claims 1–20.

REVERSED