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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/931,195	11/03/2015	Peter Singerl	INFAP504US	8123

51092 7590 11/23/2018
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EXAMINER

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ART UNIT	PAPER NUMBER
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2632

NOTIFICATION DATE	DELIVERY MODE
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11/23/2018

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte PETER SINGERL, THOMAS MAGESACHER,
and MARTIN MATALN

Appeal 2018-003776
Application 14/931,195¹
Technology Center 2600

Before JAMES R. HUGHES, ERIC S. FRAHM, and
MATTHEW J. McNEILL, *Administrative Patent Judges*.

FRAHM, *Administrative Patent Judge*.

DECISION ON APPEAL

¹ According to the Appeal Brief, the real party in interest is Infineon Technologies AG. App. Br. 1.

STATEMENT OF THE CASE

Introduction

Appellant appeals under 35 U.S.C. § 134(a) from a rejection of claims 1–7, 9, and 11–20. Claims 8 and 10 have been canceled. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

Exemplary Claim

Appellant’s disclosed invention relates to an analog pre-distorter for a power amplifier. Spec. ¶ 17. Specifically, the pre-distorter is a non-linear system block that modifies or pre-distorts an original input signal so that a non-linear power amplifier produces a linear or substantially linear output. Spec. ¶ 19. Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. An RF transmitter arrangement using analog pre-distortion, the arrangement comprising:

an analog IQ processor configured to apply a non-linear distortion to an analog original signal based on one or more non-linear splines to generate an RF output signal;

a spline generator configured to generate the one or more non-linear splines based on an envelope of the analog original signal and one or more pre-distortion parameters;

a parameter generator configured to generate the one or more pre-distortion parameters based on the envelope and a coupled feedback signal; and

a non-linear amplifier chain configured to amplify the RF output signal to generate a transmission signal relative to the

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analog original signal, wherein the coupled feedback signal is derived from the transmission signal.

App. Br. 12 (Claims Appendix).

The Examiner's Rejections

Claims 1, 2, 4, 6, 7, 9, 11, 13, and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Briffa et al. (US 6,075,411; June 13, 2000), Kenington (US 2011/0151806 A1; June 23, 2011), and DeBruyn et al. (US 2004/0136470 A1; July 15, 2004).

Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Briffa, Kenington, DeBruyn, and Thron et al. (US 6,477,477 B1; Nov. 5, 2002).

Claim 5 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Briffa, Kenington, DeBruyn, and Keerthi (US 2008/0008263 A1; Jan. 10, 2008).

Claims 12 and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Briffa and DeBruyn.

Claim 15 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Briffa, DeBruyn, and Thron.

Claim 16 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Briffa, DeBruyn, Thron, and Kenington.

Claims 18–20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Briffa and Kenington.

ANALYSIS

The Examiner finds the combination of Briffa, Kenington, and DeBruyn discloses all the limitations of representative independent claim 1,

including that Briffa teaches “a parameter generator configured to generate the one or more pre-distortion parameters based on the envelope and a coupled feedback signal.” Final Act. 6–8; Ans. 4. Appellant contends Briffa fails to teach generating pre-distortion parameters based on an envelope and a coupled feedback signal. App. Br. 5–6, Reply Br. 3.² We agree with Appellant.

Briffa describes a pre-distortion system 100 that includes a pre-distortion circuit 37 that generates an analog pre-distortion signal to be applied to an RF input signal for a power amplifier. Briffa, col. 5, ll. 60–65. Briffa’s pre-distortion circuit 37 generates the pre-distortion signal based on a signal “x,” which is an RF input signal, and certain coefficients provided by a controller 40. Briffa, col. 6, ll. 13–36; Fig. 3. Briffa’s controller 40 receives as input an error signal “e” representing the difference between a scaled output signal and a delayed input signal of the pre-distortion system 100 and “adjusts the predistortion signal coefficients . . . to minimize the error signal e.” Briffa, col. 6, l. 67–col. 7, l. 6. In short, the controller 40 receives an error signal and provides coefficients to the pre-distortion circuit 37, and the pre-distortion circuit 37 receives the coefficients and an RF input signal and generates a pre-distortion signal. *See* Briffa, col. 6, l. 13–col. 7, l. 6; Fig. 3.

The Examiner finds Briffa teaches “a controller (40 in figure 3 or 16 in figure 2) generating one or more predistortion parameters/coefficients based on envelope detector (inside preD) and a coupled feedback (from item 45).” Ans. 4. The Examiner relies on Briffa’s controller 40 in Figure 3 (or

² Although Appellant’s detailed argument on the generation of pre-distortion parameters is presented with respect to independent claim 18, Appellant indicates this argument also applies to independent claim 1. *See* App. Br. 7.

similar controller 16 in Figure 2) for meeting the claimed “parameter generator,” where the coefficients provided by the controller meet the claimed “pre-distortion parameters.” *See* Ans. 4. As discussed above, however, Briffa’s controller 40 receives only the error signal “e” as input, which the Examiner appears to rely upon for teaching the claimed “coupled feedback signal.” *See id.*; Briffa, col. 6, l. 67–col. 7, l. 6; Fig. 3. But claim 1 requires the “parameter generator” be configured to generate “pre-distortion parameters based on the envelope *and* a coupled feedback signal.” The Examiner has not shown Briffa’s controller 40 receives an “envelope” in addition to a “coupled feedback signal” such that the coefficients—the claimed “pre-distortion parameters”—are based on both an “envelope” *and* a “coupled feedback signal.” Rather, the Examiner relies on an alleged envelope detection that occurs in Briffa’s pre-distortion circuit 37 for teaching “pre-distortion parameters” based in part on an “envelope.” *See* Ans. 4.

We agree with Appellant that the Examiner’s findings are in error (App. Br. 5–6; Reply Br. 3) because Briffa’s controller 40 (or similar controller 16) cannot generate “pre-distortion parameters based on the envelope” when envelope detection occurs, according to the Examiner (*see* Ans. 4), in Briffa’s pre-distortion circuit 37. That is, Briffa’s coefficients have already been generated by the time they are provided to the pre-distortion circuit 37, and therefore cannot be generated based on an envelope detected in the pre-distortion circuit 37. *See* Briffa, Fig. 3. The Examiner has not shown Briffa teaches any input into controller 40 that includes an envelope on which the coefficients may be based.

We are, therefore, constrained by the record to find the Examiner erred in rejecting independent claim 1, independent claims 12 and 18 which

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recite commensurate limitations, and dependent claims 2–7, 9, 11, 13–17, 19, and 20 for the same reasons.

CONCLUSION

The Examiner erred in rejecting claims 1–7, 9, and 11–20 under 35 U.S.C. § 103(a).

DECISION

We reverse the Examiner’s decision to reject claims 1–7, 9, and 11–20.

REVERSED