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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte RICHARD Y. TSENG

Appeal 2017-011838
Application 15/056,994
Technology Center 2800

Before ADRIENE LEPIANE HANLON, MONTÉ T. SQUIRE, and
JEFFREY R. SNAY, *Administrative Patent Judges*.

HANLON, *Administrative Patent Judge*.

DECISION ON APPEAL

A. STATEMENT OF THE CASE

The Appellant¹ filed an appeal under 35 U.S.C. § 134(a) from an Examiner's decision finally rejecting claims 33–52, which are all of the pending claims. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE and enter a new ground of rejection.

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as Intel Corporation. Appeal Brief dated April 26, 2017 (“App. Br.”), at 1.

The claimed invention is directed to a low-impedance reference voltage generator which consumes substantially less power compared to traditional reference generators. Spec. ¶ 9. The Appellant discloses that the low-impedance voltage generator may be used for wireless circuits and analog circuits, in general, where noise is a concern on bias lines, for example. Spec. ¶ 69.

Claims 33 and 51 are reproduced below from the Claims Appendix to the Appeal Brief.

33. An apparatus comprising:

a first amplifier having a first input node and a second input node, wherein the first input node is to receive a reference voltage, and wherein the second input node is to provide a low impedance reference;

a first capacitive device coupled to an output of the first amplifier and a first supply node;

a first transistor having a gate terminal coupled to the output of the first amplifier, *a source terminal connected to the second input node*; and a drain terminal coupled to a first resistive device;

a second amplifier having a first node coupled to the drain terminal of the first transistor, and a second node coupled to a second resistive device;

a second capacitive device coupled to an output of the second amplifier and the second input node; and

a second transistor having a gate terminal coupled to the output of the second amplifier, a source terminal coupled to a second supply node; and a drain terminal coupled to the second input node.

App. Br. 19 (emphasis added).

51. An apparatus comprising:

means for applying transconductance of output transistors of a reference generator; and

means for decreasing quiescent current in the output transistors.

App. Br. 22.

The claims on appeal stand rejected as follows:

(1) claims 51 and 52 under 35 U.S.C. § 102(b) as anticipated by Connell et al.;²

(2) claims 33–35, 37, 38, 42, 43, and 48 under 35 U.S.C. § 103(a) as unpatentable over Connell in view of Zlatkovic;³

(3) claim 39 under 35 U.S.C. § 103(a) as unpatentable over Connell in view of Zlatkovic and further in view of Chow et al.;⁴

(4) claims 36, 40, 41, 46, 47, 49, and 50 under 35 U.S.C. § 103(a) as unpatentable over Connell in view of Zlatkovic and further in view of Song et al.;^{5,6}

(5) claims 43, 44, 45, and 48 under 35 U.S.C. § 103(a) as unpatentable over Kammerer et al.⁷ in view of Connell and further in view of Zlatkovic;⁸ and

(6) claims 46 and 47 under 35 U.S.C. § 103(a) as unpatentable over Kammerer in view of Connell and further in view of Song.

² US 6,441,594 B1, issued August 27, 2002 (“Connell”).

³ US 7,402,985 B2, issued July 22, 2008 (“Zlatkovic”).

⁴ US 2009/0315624 A1, published December 24, 2009 (“Chow”).

⁵ US 2011/0291759 A1, published December 1, 2011 (“Song”).

⁶ Claim 40 was omitted from the statement of the rejection in the Final Office Action. Final Office Action dated January 4, 2017 (“Final Act.”), at 12. The Examiner, however, addresses claim 40 in the body of the rejection. Final Act. 13. The statement of the rejection has been corrected to include claim 40.

⁷ US 2013/0127492 A1, published May 23, 2013 (“Kammerer”).

⁸ Claim 45 was omitted from the statement of the rejection in the Final Office Action. Final Act. 15. The Examiner, however, addresses claim 45 in the body of the rejection. Final Act. 20. The statement of the rejection has been corrected to include claim 45.

B. DISCUSSION

1. Rejections (2)–(6)

There is no dispute in this appeal that the voltage regulator disclosed in Connell does not comprise a first transistor having “a source terminal *connected to*^{9]} the second input node”¹⁰ of the first amplifier as recited in claim 33.¹¹ Rather, the Examiner finds that the source terminal of Connell’s first transistor 120 is coupled to the second input node of first amplifier 114 via resistor 116 of voltage divider 116, 118. Final Act. 5; *see also* Connell Fig. 2.

Nonetheless, the Examiner finds that “[i]t is old and well-known to connect the amplifiers of a voltage regulator directly to the regulated output voltage.” Final Act. 5. The Examiner relies on Zlatkovic to support that finding.¹² Final Act. 5. Thus, the Examiner concludes:

[I]t would have been obvious to one of ordinary skill in the art to remove the voltage divider of 116 and 118 of Connell et al. and

⁹ *See* Spec. ¶ 22 (disclosing that “the term ‘connected’ means a direct electrical connection between the things that are connected, without any intermediary devices”).

¹⁰ App. Br. 19 (emphasis added).

¹¹ Similarly, claim 43 recites a first transistor having “a source terminal connected to the second input node” of the first amplifier (App. Br. 21), and claim 49 recites a first transistor having “a source terminal connected to the second input node” of the folded-cascode amplifier (App. Br. 22).

¹² Although not included in the obviousness rejection on appeal, the Examiner also finds Aisu (US 8,531,237) shows that “it was old and well-known that voltage divider resistors in a feedback loop of a voltage regulator may be removed.” Ans. 7. Aisu is said to disclose that “a scaling device [may be] used at the reference voltage input, RA of Fig. 9, instead of the voltage dividers.” Ans. 9; *see also id.* (finding that Aisu Fig. 9 is the equivalent to Aisu Fig. 8 with the voltage divider resistors R11 and R12 removed). The Examiner, however, fails to explain why it would have been obvious to one of ordinary skill in the art to add Aisu’s scaling device to Connell’s voltage regulator.

directly connect the second terminal to the regulated voltage (i.e., the source of the first transistor) for the purpose of setting a desired output voltage/current level of the regulator (e.g., remove the proportional scaling [provided by 116 and 118] such that the regulated voltage is directly compared to V_{ref}), since it has been held that omission of an element and its function in a combination where the remaining elements perform the same functions as before involves only routine skill in the art.

Final Act. 5–6.

The Appellant argues, *inter alia*, that “[t]he voltage divider formed by resistors 116 and 118 is important to Connell and the removal thereof would frustrate the purpose of the system discussed therein.” App. Br. 9. In particular, the Appellant directs our attention to the following disclosure in Connell:

A voltage divider 116, 118 connected between the regulator voltage 108 and ground provides a sense voltage to the output sense amplifier 114 so that the output sense amplifier compares the sense voltage against a reference voltage (V_{REF}) to determine whether the regulator device is providing too much, not enough or just the right output current level.

App. Br. 10 (citing Connell, Abstract) (emphasis omitted); *see also* Connell, col. 3, ll. 6–12.

The Appellant argues that “removing the resistor 116 would result in the circuit of Connell not being able to determine whether the regulator device is providing too much, not enough or just the right output current level.” App. Br 11.

The issue raised by the Appellant’s argument is: Would the combination of Connell and Zlatkovic have suggested the desirability of removing voltage divider 116, 118 from Connell’s voltage regulator? *See In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984) (“The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification.”).

Referring to Connell Figure 2, the Examiner finds:

[T]he voltage divider is . . . used to set a desired input voltage level for the inverting terminal of 114. The amplifier 114 operates by generating an output that is proportional to (or a comparison of) the difference of the voltages at the input terminals (i.e., the inverting and non-inverting terminals). The output of 114 control the gate voltage of 120 which in turn controls the current through 120. The output of 120 will set output voltage/current to a desired level (note the current through 120 sets the input at the non-inverting terminal of 110 which controls the output of 106). Therefore, it can be seen that the *voltage divider . . . sets a desired voltage value at the inverting terminal of 114 which sets the desired output voltage/current value.*

Ans. 8 (emphasis added);¹³ *see also* Ans. 13 (finding that Connell's voltage divider provides the specific value at which the output signal is to be regulated);

The Examiner finds:

The only difference between a direct connection and a voltage divider connection is the voltage divider sets a further proportional reduction at the gate of N146/inverting terminal of [amplifier] 114. Whereas a direct connection creates a direct proportionality between the voltage dropped at 108 and the voltage at the gate of N146/inverting terminal. Thus, it can be seen the same operation will be provided when 116 and 118 are removed. However, *the amount of current/voltages will be changed due [to] the removal of the voltage divider 116 and 118.*

Ans. 16 (emphasis added).

Based on the foregoing, a preponderance of the evidence of record supports a finding that the *desired* output voltage/current value could not be set in Connell when voltage divider 116, 118 is removed from Connell's voltage regulator. For that reason, the obviousness rejection of claims 33–50 is not sustained.

¹³ Examiner's Answer dated July 27, 2017.

2. Rejection (1)

The Examiner concludes that claim 51 is written in means-plus-function format, thereby invoking 35 U.S.C. § 112, sixth paragraph. Ans. 2. The Examiner's conclusion is supported by the record.

In construing a means-plus-function claim, an Examiner must determine what structure, if any, disclosed in the specification corresponds to the claimed function. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1351 (Fed. Cir. 2015). If an Appellant fails to disclose adequate corresponding structure, the claim is indefinite under 35 U.S.C. § 112, second paragraph. *Id.* at 1352.

In this case, the Examiner finds “the specification fails to provide a definition of a ‘means for applying transconductance of output transistors of a reference generator’ and/or a ‘means for decreasing quiescent current in the output transistors.’” Ans. 2–3. In other words, the Examiner finds that the Specification does not describe any structure corresponding to the claimed functions. The Appellant does not direct us to any portion of the Specification establishing otherwise. Therefore, we enter a new ground of rejection under 35 U.S.C. § 112, second paragraph.

Because claim 51 is indefinite, it is not possible to apply the prior art to the claim. *In re Steele*, 305 F.2d 859, 862 (CCPA 1962). Therefore, the anticipation rejection of claims 51 and 52 is not sustained.¹⁴

C. DECISION

The Examiner's decision is reversed.

¹⁴ We note that the reversal of the anticipation rejection is not a reversal on the merits of the rejection but rather is a procedural reversal based on the indefiniteness of claim 51.

A new ground of rejection of claims 51 and 52 under 35 U.S.C. § 112, second paragraph, is entered pursuant to 37 C.F.R. § 41.50(b).

37 C.F.R. § 41.50(b) provides that an Appellant, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new grounds of rejection to avoid termination of the appeal as to the rejected claims:

(1) *Reopen prosecution.* Submit an appropriate amendment of the claims so rejected or new Evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the prosecution will be remanded to the examiner. . . .

(2) *Request rehearing.* Request that the proceeding be reheard under § 41.52 by the Board upon the same Record. . . .

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

REVERSED; 37 C.F.R. § 41.50(b)