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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ALEXANDRE PONS

Appeal 2015-006321
Application 13/383,941
Technology Center 2800

Before MAHSHID D. SAADAT, JOHNNY A. KUMAR, and JON M. JURGOVAN, *Administrative Patent Judges*.

JURGOVAN, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant¹ seeks review under 35 U.S.C. § 134(a) from the Final Rejection of claims 8, 9, and 13–15.² We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.³

¹ Appellant identifies Ericsson Modems SA as the real party in interest. (App. Br. 2.)

² Claims 10–12 were indicated as containing allowable subject matter. (Final Act. 12.) Claims 1–7 were canceled. (App. Br. 24.)

³ Our Decision refers to the Specification filed Jan. 13, 2012 (“Spec.”), the Final Office Action mailed Sept. 23, 2014 (“Final Act.”), the Appeal Brief filed Feb. 6, 2015 (“App. Br.”), the Examiner’s Answer mailed May 1, 2015 (“Ans.”), and the Reply Brief filed June 8, 2015 (“Reply Br.”).

CLAIMED SUBJECT MATTER

The claims are directed to limiting short-circuit current in low-dropout voltage regulators. (Spec. 1:1–5.) Claim 8, reproduced below, is illustrative of the claimed subject matter:

8. A low-dropout voltage regulator comprising:
 - an output terminal to provide an output voltage regulated as a function of a reference voltage and to provide an output current; and
 - an output current limiting unit comprising:
 - an output current replication module to provide a mirror current of the output current,
 - a comparison module to compare the mirror current with a reference current,
 - a feedback module to limit the output current when the mirror current is greater than the reference current;wherein the mirror current is injected into the output terminal.

(App. Br. 24, Claims App'x.)

REJECTIONS⁴

Claims 8, 13, and 14 stand rejected under 35 U.S.C. § 103(a) based on Gicquel et al. (US 2007/0268008 A1; published Nov. 22, 2007) and Al-Shyoukh et al. (US 2007/0216383 A1; published Sept. 20, 2007). (Final Act. 7–11.)

⁴ The Examiner's rejection under 35 U.S.C. § 112, first paragraph, has been withdrawn. (See Adv. Act. mailed Dec. 12, 2014.)

Claims 9 and 15 stand rejected under 35 U.S.C. § 103(a) based on Gicquel, Al-Shyoukh, and Aizawa (US 7,855,537 B2; issued Dec. 21, 2010). (Final Act. 11–12.)

APPELLANT’S CONTENTIONS

Regarding independent claims 8, 13, and 14, Appellant contends the Examiner’s proffered combination of Gicquel and Al-Shyoukh is improper for the following reasons:

1. The voltage-mode current limiting circuit of Al-Shyoukh cannot be combined with the current-mode current limiting circuit of Gicquel, because the two circuits operate on fundamentally different electrical principles, and components from one cannot simply be substituted into the other without a compelling reason to suffer the design complexity, proliferation of components, and additional power consumption necessary for such inter-modal operation. (App. Br. 6–10; Reply Br. 2–5.) Al-Shyoukh limits current by monitoring voltage at a node where a mirror current runs through a sense resistor, and whether the mirror current is then directed to ground or the output is irrelevant. (App. Br. 8.) In Gicquel’s circuit, mirror current is directly compared to a reference current at a transistor that is turned on by raising its gate voltage above ground, a result that is achieved by the mirror current flowing to ground. (*Id.*) The Examiner has not explained how modifying Gicquel to inject the mirror current into the output would be possible, and has not provided a reason for one of ordinary skill in the art to overcome the complexities of incorporating a sub-section of Al-Shyoukh’s voltage-mode circuit into Gicquel’s current-mode circuit. (App. Br. 9; Reply Br. 4–5.)

2. Modifying Gicquel to incorporate Al-Shyoukh's current monitoring circuit, which injects mirror current into the output, would create an inoperative device. (App. Br. 10–13.) Gicquel's mirror current flows from a mirror transistor, and then either bypasses a current monitoring transistor or flows through that transistor to ground when voltage between the source and gate becomes positive. (*Id.*) Changing the current monitoring transistor's source node from ground to the output node, as suggested by the Examiner, would prevent Gicquel's current monitoring transistor from turning on, thus destroying the current comparison mechanism and rendering the circuit inoperative. (*Id.*)

3. Gicquel's emphasis on near-complete separation of the voltage regulating circuit and the current limiting circuit teaches away from injecting mirror current into the output terminal. (App. Br. 13–15; Reply Br. 2–3.) The current limiting circuit of Gicquel is largely inactive most of the time and has minimal interaction with the voltage regulating circuit, whereas Al-Shyoukh's voltage-mode current measuring circuit is an integral part of the voltage regulating function and always has current flowing through it. (*Id.*) The Examiner has provided no explanation why one of skill in the art would, *inter alia*, increase power consumption in Gicquel's current limiting circuit by more tightly integrating it with the voltage regulating circuit or its output. (App. Br. 15.)

4. The Examiner's stated motivation to modify Gicquel, specifically that injecting the mirror current into the output terminal would enable slow charging of an external load, allow more precise current control in the voltage regulator during startup, and provide an extra current source that allows a more amplified current output, fails to explain why one of skill in

the art would attempt such a modification. (App. Br. 15–22; Reply Br. 5–7.) Gicquel’s voltage regulator already enables slow charging of an external load with precise current control, while Al-Shyoukh is completely silent regarding the utility or desirability of injecting mirror current to the output node; regardless, one of ordinary skill would understand that injecting mirror current into the output would not provide the charging function as stated by the Examiner. (App. Br. 15–22.) Further, Al-Shyoukh does not suggest the mirror current comprises any significant part of the output current, and one of skill in the art can use Gicquel’s circuit alone to match any total current that could be output by Al-Shyoukh’s circuit, thus the combination does not provide a more amplified current output compared to Gicquel’s circuit (App. Br. 19–20; Reply Br. 6–7.) Therefore, having failed to provide a rational motivation to combine the teachings of Gicquel and Al-Shyoukh, the Examiner relies upon improper hindsight reconstruction using Appellant’s disclosure to reject the claims. (App. Br. 22; Reply Br. 7.)

ANALYSIS

We have reviewed the Examiner’s rejections in light of Appellant’s arguments (App. Br. 5–22; Reply Br. 2–7) that the Examiner erred. We disagree with Appellant’s above contentions 1–4. We adopt as our own (1) the findings and reasons set forth by the Examiner in the action from which this appeal is taken (Final Act. 7–12) and (2) the reasons set forth by the Examiner in the Examiner’s Answer (Ans. 3–11) in response to Appellant’s Appeal Brief. We concur with the conclusions reached by the Examiner. We highlight and address specific findings and arguments for emphasis as follows.

Independent Claims 8, 13, and 14

Regarding Appellant's contention 1 that the complexity of combining voltage-mode and current-mode current limiter circuits renders the Examiner's combination improper, Appellant has provided no factual evidence to support this assertion. (*See* App. Br. 9–10.) As attorney argument alone is not evidence, we are not persuaded of Examiner error by Appellant's argument. (*See In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997); *In re Pearson*, 494 F.2d 1399, 1405 (CCPA 1974).)

As to Appellant's contention 2 that modifying Gicquel to incorporate Al-Shyoukh's current monitoring circuit would create an inoperative device, the Examiner properly relies on *In re Keller* and states the “test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.” (Ans. 4; *In re Keller*, 642 F.2d 413, 425 (CCPA 1981).) Further, when combining references, “a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” (*KSR Int'l v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007).) We agree with the Examiner's finding that the combined teachings of Gicquel and Al-Shyoukh suggest to one of ordinary skill the concepts of a current limiter having a mirror current that is compared with a reference current and a mirror current that is injected into the output terminal. (Final Act. 7–8; Ans. 4–5 (citing Gicquel Fig. 2 and Al-Shyoukh Fig. 2).) We further agree that a skilled artisan, in light of the combined teachings of the references and the creative steps that would be employed, would be able to fit the known elements of the references

together like pieces of a puzzle to arrive at the claimed voltage regulator, and, as such, the device would not be inoperative. (*See KSR*, 550 U.S. at 420.)

We are unpersuaded of Examiner error by Appellant's contention 3 that Gicquel teaches away from injecting mirror current into the output terminal. Appellant argues power consumption would be increased in Gicquel's circuit by such an arrangement, but Appellant has not identified a teaching in Gicquel that criticizes, discredits or otherwise discourages connecting the mirror current to an output node. (*See In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004).) Thus, we do not agree that Gicquel teaches away from a combination with Al-Shyoukh.

Appellant's contention 4 that the combination of Gicquel and Al-Shyoukh is based on improper hindsight reasoning does not present persuasive evidence that the Examiner's rejection is based on knowledge gleaned only from Appellant's disclosure, or based on knowledge which was beyond the level of ordinary skill in the art at the time. (*See In re McLaughlin*, 443 F.2d 1392, 1395 (CCPA 1971)). We are satisfied that the Examiner has provided "some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness," which is based on knowledge available to one of ordinary skill in the art. (*See KSR*, 550 U.S. at 417–18 (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).) Specifically, we agree with the Examiner's conclusion that comparison modules using a reference current or reference voltage are well known in the art, and the simple substitution of one known comparison module for another is obvious. (Final Act. 3; Ans. 11) (*See KSR*, 550 U.S. at

416: “The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.”)

Accordingly, we sustain the Examiner’s rejection of independent claims 8, 13, and 14 under 35 U.S.C. § 103(a) as unpatentable over Gicquel and Al-Shyoukh.⁵

Remaining Claims

No separate arguments are presented for remaining dependent claims 9 and 15. (*See* App. Br. 23.) Thus, for reasons stated with respect to independent claims 8 and 14, we sustain the Examiner’s rejection of the dependent claims under 35 U.S.C. § 103(a). (*See* 37 C.F.R. § 41.37(c)(1)(iv); *In re King*, 801 F.2d 1324, 1325 (Fed. Cir. 1986); *In re Sernaker*, 702 F.2d 989, 991 (Fed. Cir. 1983).)

DECISION

We affirm the rejection of claims 8, 9, and 13–15 under 35 U.S.C. § 103(a).

⁵ Should there be further prosecution of this application, the Examiner may wish to consider whether Al-Shyoukh anticipates at least claim 8 under 35 U.S.C. § 102(b). Claim 8 does not require the comparison module to “directly” compare the mirror current with a reference current, thus the claim may be anticipated by Al-Shyoukh’s current limiter circuit that *indirectly* involves the comparison of a mirror current to other currents in the circuit (i.e., “reference currents”) through the various connections to the reference voltage source. (*See* Al-Shyoukh ¶¶ 17–19.) Although the Board is authorized to reject claims under 37 C.F.R. § 41.50(b), no inference should be drawn when the Board elects not to do so. (*See Manual of Patent Examining Procedure* (MPEP) § 1213.02 (9th Ed., Rev. 07.2015, Nov. 2015).)

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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).

AFFIRMED