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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JOHN STANLEY GLASER and
RAMANUJAM RAMABHADRAN

Appeal 2019-002019
Application 15/628,774
Technology Center 2800

Before DONNA M. PRAISS, CHRISTOPHER L. OGDEN, and
SHELDON M. MCGEE, *Administrative Patent Judges*.

PRAISS, *Administrative Patent Judge*.

DECISION ON APPEAL¹

Appellant² appeals under 35 U.S.C. § 134(a) from the Examiner's decision rejecting claims 1–17. We have jurisdiction over the appeal under 35 U.S.C. § 6(b).

We REVERSE.

¹ Our Decision refers to the Specification (“Spec.”) filed June 21, 2017, the Final Office Action dated Feb. 21, 2018 (“Final Act.”), Appellant’s Appeal Brief (“Appeal Br.”) filed July 16, 2018, the Examiner’s Answer (“Ans.”) dated Nov. 15, 2018, and Appellant’s Reply Brief (“Reply Br.”) filed Jan. 8, 2019.

² We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies General Electric Company as the real party in interest. Appeal Br. 3.

STATEMENT OF THE CASE

The invention relates to a power converter system and method for operating an illumination device. Spec. ¶ 2. Claims 1 and 11, reproduced below from the Claims Appendix to the Appeal Brief, are illustrative (disputed limitations italicized).

1. An illumination device comprising:
 - a light emitting source; and
 - a clamped series resonant converter electrically coupled to the light emitting source, wherein the clamped series resonant converter comprises:
 - a first rectifier configured to generate a direct current (DC) power from an input alternating current (AC) voltage of the first rectifier;
 - an inverter coupled to the first rectifier and configured to receive the DC power from the first rectifier and generate an intermediate AC power, wherein the inverter comprises:
 - a switching leg comprising a plurality of switches coupled in series;
 - a diode leg comprising a plurality of diodes coupled in series, wherein the diode leg is coupled in parallel with the switching leg, wherein the plurality of diodes comprises a first diode and a second diode;*
 - an inductor coupled to the plurality of the switches;
 - a capacitor coupled in parallel with the second diode to facilitate generation of the intermediate AC power, wherein a voltage across the capacitor is clamped at a level equivalent to a level of a DC voltage at an input of the inverter or zero via the first diode and a second diode; and
 - a transformer coupled to the inverter, wherein the

transformer comprises a primary winding and a secondary winding, *wherein the primary winding of the transformer is connected between the inductor and the capacitor*, and wherein *a voltage developed across the primary winding causes automatic power factor correction* by drawing an input current flowing through the damped series resonant converter that is proportional to the AC voltage.

11. A method for operating an illumination device comprising a clamped series resonant converter electrically coupled between a light emitting source and a power source, wherein the clamped series resonant converter comprises an inverter comprising a plurality of switches, the method comprising:

operating the plurality of switches of the inverter of the clamped series resonant converter at a fixed switching frequency for a predetermined time;

drawing an input current by the clamped series resonant converter from a power source in phase with an input voltage supplied by the power source to achieve an automatic power factor correction;

applying a fixed voltage at an output of the clamped series resonant converter by the light emitting source; and

regulating a load current flowing through the light emitting source based on the fixed switching frequency.

Claim 14 is also independent and recites an illumination device “wherein the primary winding of the transformer is connected between the inductor and the capacitor.”

ANALYSIS

We review the appealed rejections for error based upon the issues Appellant identifies. *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential) (*cited with approval in In re Jung*, 637 F.3d 1356, 1365 (Fed.

Cir. 2011) (“[I]t has long been the Board’s practice to require an applicant to identify the alleged error in the examiner’s rejections.”)). After considering the positions of both the Examiner and Appellant, we are persuaded the Examiner reversibly erred for the reasons set forth in Appellant’s briefs and discussed below.

The Examiner rejects claims 1–17 under 35 U.S.C. § 103 as being unpatentable over the combination of King³ and Nijhof.⁴ Final Act. 2–17. We address each of the claims below.

Claim 1

Appellant argues that the Examiner’s rejection fails to disclose or suggest three limitations recited in claim 1. First, Appellant contends the Examiner erred in finding that King discloses or suggests “the primary winding of the transformer . . . is connected between the inductor and the capacitor.” Appeal Br. 12. Second, Appellant contends that the Examiner erred in finding Nijhof discloses the coupling pattern of a series of diodes connected in parallel with a series of connection of switches. *Id.* at 15. Third, Appellant contends that the Examiner erred in finding that modification of King with Nijhof’s circuit would achieve power factor correction. *Id.* at 16–17. We need only address the first and third asserted errors to decide this Appeal.

Regarding King, Appellant directs us to King’s Figures 4 and 5 below.

³ US 2009/0295300 A1, published Dec. 3, 2009.

⁴ US 2009/0115341 A1, published May 7, 2009.

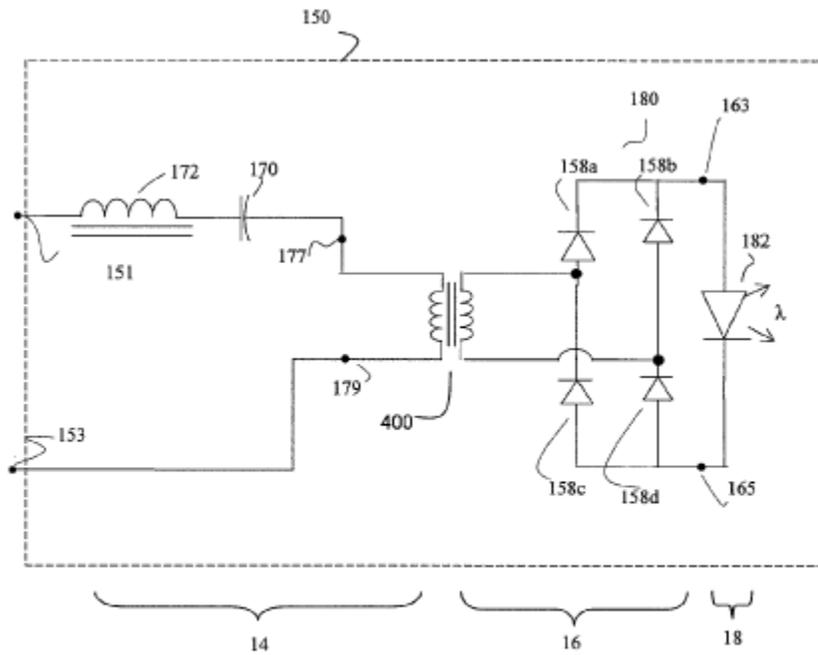


Fig. 4

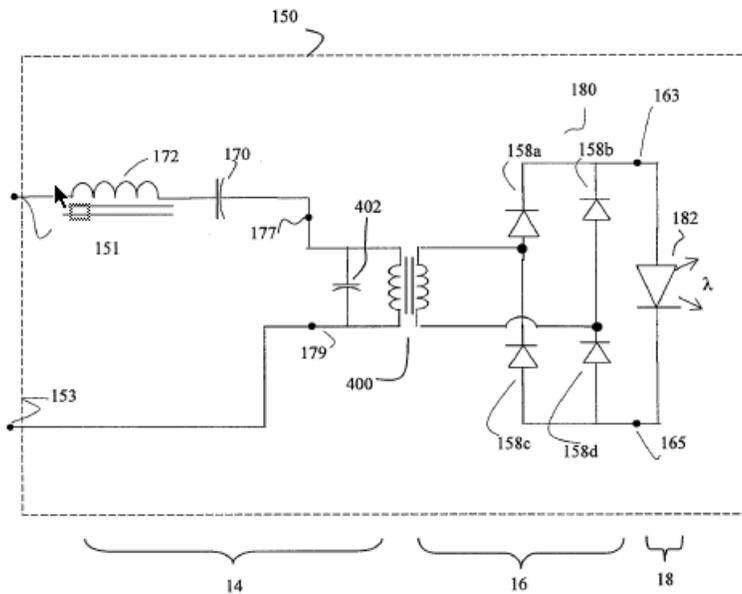
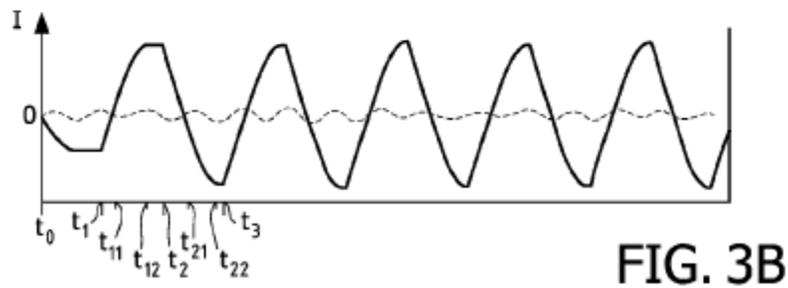
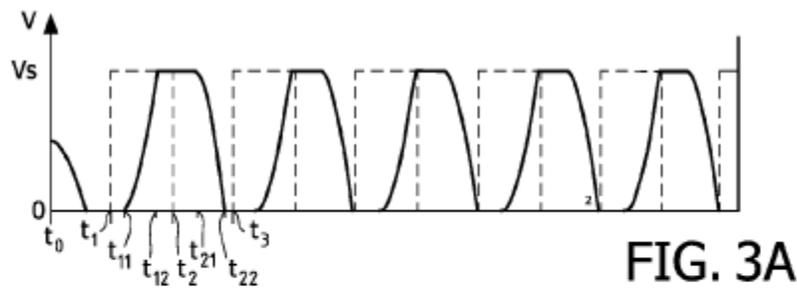


Fig. 5

Figures 4 and 5 illustrate tank circuits for a lighting ballast using LED 182. King ¶¶ 19, 20. Figure 4 includes inductor 172, capacitor 170, and transformer 400, which steps down the relatively higher alternating

operating voltage in the tank circuit in its primary winding to a lower alternating operating voltage to diodes 158a–158c connected to its secondary winding. *Id.* ¶ 86. Figure 5 also includes capacitor 402, which allows the voltage across the LED to exceed the threshold faster, creates a voltage divider between capacitor 170 and 402, and increases a threshold voltage on the primary winding faster than without capacitor 402. *Id.* ¶ 88. According to Appellant, Figure 4 depicts a series combination of capacitor 170 and inductor 172 that is connected to a primary winding of transformer 400. Appeal Br. 12. Regarding Figure 5, Appellant asserts that the primary winding of transformer 400 is connected in parallel with capacitor 402. *Id.*

Regarding achieving a power factor correction as required by claim 1, Appellant argues that the inverter inductor current must be in phase with the rail voltage and follow the shape of the rail voltage, however, the current flowing through Nijhof’s inverter inductor L1 is not in phase with the rail voltage and does not follow the shape of the rail voltage to cause the power factor correction required by the claims. Appeal Br. 17 (citing Nijhof, Figs. 3A, 3B). Nijhof’s Figures 3A and 3B are shown below.



Nijhof's Figure 3A depicts a timing diagram of the rail voltage (V), and Figure 3B depicts a timing diagram of the inverter inductor current flowing through inverter inductor L1 (solid line). *Id.*; Nijhof ¶¶ 25, 26, 39.

The Examiner responds that King's Figure 5 discloses primary winding of transformer 400 is connected between inductor 172 and capacitor 402. *Id.* at 9 (citing King, Fig. 5).

Regarding automatic power factor correction by coupling primary winding 90 of transformer 70 between inductor 69 and capacitor 67 in Appellant's disclosure, the Examiner finds this "does not seem to amount [to] very strong evidence" of unexpected results because an input current flowing through the clamped series resonant converter 50 is proportional to the AC voltage at an input of converter 60. *Id.* at 11.

In the Reply Brief, Appellant maintains that the primary winding of King's transformer 400 is merely connected to resonator inductor 172 and capacitor 402 rather than "between the inductor and the capacitor" as recited in claim 1. *Id.* at 4. Regarding the automatic power factor correction required

by claim 1, Appellant asserts that the completely different circuit configuration/coupling pattern of the transformer, inductor, and capacitor in King's circuit cannot achieve power factor correction. *Id.* at 5.

Appellant's arguments are persuasive of harmful error. The Examiner's rejection does not adequately explain how King's device discloses a primary winding that is "between the inductor and the capacitor" as recited in claim 1. Appellant's position that the primary winding of King's transformer 400 is connected to but not "between" King's resonator inductor 172 and capacitor 402 is supported by the record. King, Figs. 4, 5. Even if claim 1 does not require that the inductor and capacitor are connected in series (Ans. 8), the Examiner does not adequately explain how King's primary winding can be said to be "between the inductor and the capacitor" as recited in the claim.

Similarly, the Examiner does not adequately explain why the configuration differences between King's circuit as modified by Nijhof would provide the automatic power factor correction required by claim 1. According to Appellant, the prior art circuit would not cause the power factor correction required by claim 1 because Nijhof shows the inverter inductor current is not in phase with the rail voltage and does not follow the shape of the rail voltage. Appeal Br. 17. The Examiner does not respond to Appellant's argument regarding whether Nijhof's Figures 3A and 3B suggest that the modified circuit does not receive an input current from the power source in phase with an input voltage to achieve automatic power factor correction. Nor does the Examiner direct us to any evidence in the record to show a reasonable expectation of success in achieving automatic power factor correction in the absence of an input current being in phase

with an input voltage. Appellant's argument that the input voltage must be in phase with an input voltage to achieve an automatic power factor correction is supported by the Specification. Spec. ¶ 46; Fig. 4. Therefore, we are persuaded of error in the rejection of claim 1 based on the preponderance of the evidence in the cited Appeal record.

In view of the above, we reverse the Examiner's rejection of independent claim 1 over King and Nijhof.

Independent Claims 11 and 14

Appellant relies on the same arguments presented with respect to claim 1 in asserting that independent claims 11 and 14 are patentable over the combination of King and Nijhof. Appeal Br. 18. Because claim 11 requires an automatic power factor correction as discussed above in connection with claim 1, we reverse the Examiner's rejection of claim 11 for the same reason. Moreover, claim 11 explicitly recites "drawing an input current by the clamped series resonant converter from a power source *in phase* with an input voltage supplied by the power source to achieve an automatic power correction factor." Appeal Br. 23 (Claims Appendix) (emphasis added). Similarly, because claim 14 requires the primary winding of the transformer to be connected *between* the inductor and the capacitor as discussed above in connection with claim 1, we reverse the Examiner's rejection of claim 14 for the same reason.

Dependent Claims

The Examiner's additional findings regarding the dependent claims do not cure the deficiencies discussed above with regard to independent claims

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1, 11, and 14. Therefore, we do not sustain the Examiner's rejection of dependent claims 2–10, 12, 13, and 15–17 under § 103 over the combination of King and Nijhof.

CONCLUSION

For these reasons, we reverse the Examiner's rejection of claims 1–17 under 35 U.S.C. § 103.

DECISION SUMMARY

In summary:

| Claim(s) Rejected | 35 U.S.C. § | Reference(s)/Basis | Affirmed | Reversed |
|------------------------------|------------------------|---------------------------|-----------------|-----------------|
| 1–17 | 103 | King, Nijhof | | 1–17 |

REVERSED