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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
95/001,207	08/19/2009	7072190	X42745	6970

7055 7590 08/19/2013
GREENBLUM & BERNSTEIN, P.L.C.
1950 ROLAND CLARKE PLACE
RESTON, VA 20191

RECEIVED

AUG 20 2013

GREENBLUM & BERNSTEIN PLC

EXAMINER

TON, MY TRANG

ART UNIT PAPER NUMBER

3992

MAIL DATE DELIVERY MODE

08/19/2013

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Murata Manufacturing Co., Ltd.
Requester and Respondent

v.

SynQor, Inc.
Patent Owner and Appellant

Appeal 2012-012209
Reexamination Control No. 95/001,207
Patent 7,072,190
Technology Center 3900

Before KARL D. EASTHOM, JUSTIN T. ARBES and GLENN J. PERRY,
Administrative Patent Judges.

PERRY, *Administrative Patent Judge.*

DECISION ON APPEAL

I. BACKGROUND AND SUMMARY

A. Introduction

Murata Manufacturing Co., Ltd. (“Murata”), Third Party Requester (“Requester”) requested *inter partes* reexamination¹ of US Patent No. 7,072,190 (the “’190 patent”), owned by SynQor, Inc. (“SynQor”) (“Patent Owner”). Patent Owner invokes our review under 35 U.S.C. § 134(b) from the Examiner’s Right of Appeal Notice (“RAN”) decision dated September 28, 2011 to reject claims 1-33. We have jurisdiction under 35 U.S.C. § 6(b). We **REVERSE**.

B. Related Proceedings

The ’190 patent was asserted in *SynQor, Inc. v. Artesyn Technologies, Inc. et al.*, Case No. 2:07-cv-497 (E.D. Tex.) (the “’497 litigation”) against Requester and others. PO App. Br., 1. After trial in December 2010, the district court enjoined the defendants from further infringement of the ’190 patent.² *Id.*

Interlocutory appeals against the injunction include United States Court of Appeals for the Federal Circuit (“CAFC”), Appeal Nos. 2011-1191, -1192, -1193, and -1194. PO App. Br., 1.

The ’190 patent is at issue in Federal Circuit Appeal Nos. 2012-1069,

¹ This matter is among those in the “pipeline” of *inter partes* reexaminations that were initiated prior to the cut-off date for filing new *inter partes* reexaminations established by the America Invents Act (“AIA”).

² Post-trial damages were severed into Case No.2:11-cv-444 (E.D. Tex.).

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-1070, -1071 and 1072. PO App. Br., 1. The CAFC issued a decision on March 13, 2013 for its case numbers 2011-1191, -1192, and -1194, and 2012-1070, -1071, and -1072.

The '190 patent is asserted against Cisco Systems, Inc. and Vicor Corporation in the case *SynQor, Inc. v. Ericsson, Inc. et al*, Case No. 2:11-cv-54 (E.D. Tex.) (“the '54 litigation”). *Id.*

The '190 patent is the subject of another pending reexamination styled Reexamination Control No. 95/001,702. *Id.*

The '190 patent belongs to a family of related applications and patents. Pending applications for related technology include: 13/157,439 and 12/907,188. PO App. Br., 2.

Reexaminations involving related patents include: 95/001,207; 95/001,405; 95/001,406; 95/001,491; 95/001,637; and 95/001,853. *Id.*

C. Technical Background and Invention

The '190 patent is directed to DC-DC power converter systems which convert direct current (DC) at one voltage to DC at another voltage. All of the '190 patent claims are directed to converters having separate “isolation” and “regulation” stages. *See, e.g.*, claim 1.

A circuit provides DC “isolation” if its input and output are not directly connected by an electrical conductor. For example, DC isolation can be provided by a transformer or optical isolator. If a transformer provides only magnetic coupling between its primary and secondary winding circuits and if there is no electrical path for current to flow directly (other than current induced in the secondary winding) between primary and secondary sides of the transformer, then the primary and secondary winding

circuits are isolated. Request,³ 6. However, the mere presence of a transformer does not “isolate” the circuit. A wire connection between input and output circuits might defeat the DC isolation provided by the transformer.

A regulator circuit provides regulation by restricting its output to a desired voltage even when an input voltage varies. A “fully regulated” converter monitors its output voltage and modifies its operation to maintain a desired output voltage. A “semi-regulated” converter may have a changing input and/or output voltage sometimes referred to as a “droop” characteristic.⁴

Patent Owner describes the '190 patent claims as being related generally to what is now known as “Unregulated Intermediate Bus Architecture (‘UIBA’)” and often simply “intermediate bus architecture” (“IBA”).⁵ PO App. Br., 2.

³ Revised Request for *Inter Partes* Reexamination filed August 19, 2009.

⁴ Claims 27-29 and 32-33 require a voltage drop with increasing current flow from the isolation stage. Patent Owner refers to claims 27, 28 and 33 as “additionally encompass[ing] what is now known as Semi-regulated IBA (‘SIBA’).” PO App. Brief, 2.

⁵ The '190 patent does not use the phrase “intermediate bus architecture” (IBA) and its variants, such as “unregulated intermediate bus architecture” (UIBA). According to Patent Owner, these terms were adopted by the industry after Dr. Martin F. Schlecht, the named inventor on the '190 patent, disclosed his inventions to Cisco and others in the early 2000's. PO App. Br., 2. Additional descriptors for the described technology or parts of it include “unregulated bus converter (UBC),” which refers to the unregulated isolation stage and “point-of-load (POL) converter,” which refers to the non-isolating regulation stage. PO App. Br., 2-3.

According to an embodiment of the invention, a DC power source (e.g., 36-75 volts)⁶ is first converted to an intermediate voltage (e.g., 12 volts) by a “non-regulating isolation stage.” This stage provides DC isolation and a voltage step-down, but does not regulate. One or more non-isolating regulation stages then convert the intermediate voltage to one or more desired regulated voltages (e.g., 5 volts) for powering portions of electronic equipment.

Patent Owner characterizes UIBA at a high-level as being a “two-stage” DC-DC power converter system that separates isolation and regulation functions into separate stages. PO App. Br., 2. The “non-regulating isolation stage” includes controlled rectifiers synchronized to the voltage waveform of a primary winding of its associated transformer. The two stage configuration allows for improved efficiency, small size and low cost (“ECS benefits”). According to Patent Owner, the non-regulating isolation stage has become known as an “unregulated bus converter” (“UBC”). PO App. Br., 2; *see generally* '190 patent. A UBC provides its output to a plurality of “non-isolating regulation stages,” typically including a switching regulator (claim 2), now commonly referred to as a “point-of-load converter (‘POL’).” PO App. Br., 3; *see, e.g.*, '190 patent, claims 1, 2. POLs are often located in proximity to the loads to which they supply power. Such arrangements are referred to as “distributed” power supplies.⁷ According to Patent Owner, the '190 patent IBA architecture improved upon

⁶ *See, e.g.*, claims 17, 18 and 24.

⁷ The '190 patent claims do not require that the two stages be positioned remotely from one another, although the two stages are functionally separate and distinct.

known power converter systems having integrated isolation and regulation functions (“DBA brick”). PO App. Br., 3.

Claim 1 is illustrative and is reproduced below with added indentations and labels for ease of reference to particular claim limitations.

1. A power converter system comprising:
 - (a) a DC power source;
 - (b) a non-regulating isolation stage comprising:
 - (c) a primary transformer winding circuit having at least one primary winding connected to the source; and
 - (d) a secondary transformer winding circuit
 - (e) having at least one secondary winding coupled to the at least one primary winding and
 - (f) having plural controlled rectifiers, each having a parallel uncontrolled rectifier and each connected to a secondary winding,
 - (g) *each controlled rectifier being turned on and off in synchronization with the voltage waveform across a primary winding to provide an output,*
 - (h) *each primary winding having a voltage waveform with a fixed duty cycle and transition times which are short relative to the on-state and off-state times of the controlled rectifiers; and*
 - (i) a plurality of non-isolating regulation stages, each receiving the output of the isolation stage and regulating a regulation stage output while the fixed duty cycle of the isolation stage is maintained.

Each of independent claims 1 and 20 describes a “non-regulating isolation stage” and a plurality of “non-isolating regulation stages,” each receiving the output of the isolation stage and providing a regulated output. Claims 27, 30 and 33 also describe the same general topology, using similar language. The isolation stage uses a controlled rectifier synchronized to a voltage waveform on a primary winding of a transformer to rectify a

secondary winding current. Claims 1-19, 28 and 31 require the primary winding voltage waveform to have a fixed duty cycle and transitions that are “short” (“short transitions”) relative to on-state and off-state times of the controlled rectifiers. Claims 20-27, 29-30 and 32-33 do not require short transitions. Claims 27-28 and 30-33 do not require the isolation stage to be non-regulating. Claims 27-29 and 32-33 require that the isolation stage provide a voltage output that drops with increasing current flow (“droop”).
PO App. Br., 5.

Although the term “intermediate bus” is not used in the claims, the parties do not dispute that the “intermediate bus” referred to in the briefs and evidence describes the connections between the output of the isolation stage and the inputs of the regulation stages.

D. Evidence Considered

The Examiner relies on the following prior art in rejecting the claims:

JP '446	JP H5-64446	Mar. 12, 1993
Steigerwald '539	US 5,274,539	Dec. 28, 1993
Steigerwald '090	US 5,377,090	Dec. 27, 1994

J.A. Cobos & J. Uceda, “Low Output Voltage DC/DC Conversion,” IEEE 1676-81 (1994) (“Cobos”).

Abraham I. Pressman, Switching and Linear Power Supply, Power Converter Design (Hayden Book Co., Inc. 1977) (“Pressman”).

Bob Mammano, Unitrode Corp., Distributed Power Systems (April 1993) (“Mammano”).

Enrique de la Cruz *et al.*, “Analysis Of Suitable PWM Topologies To Meet Very High Efficiency Requirements For On Board Dc/Dc Converters In

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Future Telecom Systems,” 15th International Telecommunications Energy Conference (INTELEC) 207-214 (1993) (“de la Cruz”).

John G. Kassakian & Martin F. Schlecht, “High-Frequency High-Density Converters for Distributed Power Supply Systems,” 76(4) Proceedings of the IEEE 362-376 (April 1988) (“Kassakian”).

Patent Owner submitted the following documents into the record of the reexamination.

Reexamination Record	Description
A1 ⁸	Schlecht Declaration Under 1.132
A2	Pellikaan Declaration Under 1.132
A3	SynQor Response to Non-Final Office Action
A7-A39	Patent and non-patent literature
A40-A82	Defendant data sheets describing products including those found to infringe claims of the '190 patent
A83-A91	Examiner-cited prior art references
R1-R49	Documents from parallel litigations
R50-R57 ⁹	Orders and briefs filed in the Court of Appeals for the Federal Circuit related to appeals from district court parallel litigations

Requester submitted evidence with its Respondent Brief ("Resp. Br.") filed Feb. 1, 2012, including an article by inventor Schlecht and the deposition of Ohannes Wanes.

⁸ Patent Owner submitted A1-A91 and R1-R49 in June 2010 in response to Examiner rejections.

⁹ Patent Owner submitted R50-R57 with its rebuttal brief filed July 16, 2012.

E. Rejections and Examiner's Position

The rejections made by the Examiner and now on appeal are as follows:

1. Claims 1, 5-8, 11-13, 17-18, 20-24 and 27-33 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Steigerwald '090 and Cobos.
2. Claims 2-4 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Steigerwald '090 and Cobos in view of Pressman.
3. Claims 9-10, 14-16, 19 and 25-26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Steigerwald '090 and Cobos in view of Mammano.
4. Claims 1, 5-8, 11-13, 20, 22-23 and 27-33 are rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '446 in view of Steigerwald '539.
5. Claims 2-4 and 21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '446 and Steigerwald '539 in view of Kassakian.
6. Claims 9, 10, 14-19 and 24-26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '446 and Steigerwald '539 in view of de la Cruz.

The Examiner found the Declaration of Martin F. Schlecht, Sc.D. under Rule 1.132 (A1) to be insufficient to establish a nexus between the claims and the Patent Owner-submitted objective evidence of non-obviousness. *See, e.g.*, Right of Appeal Notice dated Sept. 28, 2011 ("RAN"), 12.

F. Patent Owner Contentions

Patent Owner advances technical arguments against the various obviousness rejections under 35 U.S.C. § 103. Patent Owner further argues objective evidence of non-obviousness (“secondary indicia” of non-obviousness), primarily from the ‘497 litigation, submitted in the reexamination.

In the ‘497 litigation, Patent Owner asserted claims for patent infringement against various defendants including Murata (Requester). Patent Owner asserted claims for induced and contributory infringement under 35 U.S.C. §§ 271(b) and (c), alleging that the defendants sold power supply components with knowledge that they would be used in, or were especially made to be used in, infringing systems imported into the United States. Patent Owner also asserted direct infringement under 35 U.S.C. § 271(a) with respect to U.S. sales. *See* R1-R57.

Patent Owner argues that data sheets (A40-A82) describing the defendant’s products and other court documents, including the jury verdict and judgment, which were submitted into the reexamination record, constitute objective evidence of non-obviousness and support Patent Owner’s contention that the ‘190 patent claims are not obvious under 35 USC § 103. Patent Owner argues, for example, that the objective evidence establishes commercial success (PO App. Br., 15), acting against conventional wisdom (PO App. Br., 31), copying (PO App. Br., 34), long-felt need (PO App. Br., 27), and the invention having been met with disbelief/surprise/skepticism (PO App. Br., 38), in accordance with the so called “Graham factors” set forth in *Graham v. John Deere*, 383 U.S. 1 (1966) and followed in *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007).

G. Requester Contentions

Requester contends that (1) Patent Owner improperly relies upon evidence from the '497 litigation (Resp. Br., 9); (2) Patent Owner's secondary consideration (objective) evidence is not convincing (Resp. Br., 11); and (3) the Examiner's rejections are proper (Resp. Br., 18).

H. Issue

The issue before us is whether claims 1-33 would have been obvious to one of ordinary skill in the relevant art at the time of the '190 patent invention. In reaching our conclusions as to each of the obviousness rejections made by the Examiner, we consider the technical arguments made with respect to the prior art along with the submitted objective evidence of non-obviousness. For convenience, we first discuss the technical arguments made by the parties and then the objective evidence of non-obviousness. However, as to each rejection, all of the evidence, including the prior art and the objective evidence of non-obviousness, is weighed in reaching our conclusion.

II. CLAIM CONSTRUCTION

The only claim construction issue to be resolved relates to a term that first appears in claim 1, limitation (h). This limitation requires "each primary winding having a voltage waveform with a fixed duty cycle and transition times which are *short relative to the on-state and off-state times of the controlled rectifiers.*" Other claims include identical or similar language.

No explicit definition is provided in the Specification of the '190 patent for this claim term. The only portion of the specification assigning a measurable quantity to the word "short" is reproduced below.

The nearly lossless delivery and recovery of energy is achieved because the circuit topology permits the synchronous rectifier switch transitions to proceed as oscillations between inductors and capacitors. These transitions are short compared to the overall on-state and off-state portions of the switching cycle (e.g. less than 20% of the time is taken up by the transition). This characteristic of nearly lossless and relatively short transitions, which we will call soft switching, is distinct from that used in full resonant, quasi-resonant, or multi-resonant converters where the oscillations last for a large portion, if not all, of the on-state and/or off-state time.

'190 patent, 8:8-19.

The Examiner adopted the district court construction:

Thus, the examiner is in agreement with the Requester's and the Court's construction with the interpretation of "*transition times which are short relative to the on-state and off-state times of the controlled rectifiers*" in the broadest reasonable interpretation to mean "*transition times which are less than 20% of the overall on-state and off-state times of the controlled rectifiers,*" which is consistent with the specification (Requester's response, pages 8-9; Court Order, Appendix A, pages 30-32).

RAN, 11. We see no reason to adopt a construction different from the one adopted by the district court and the Examiner. Thus, "short transitions" are those less than 20% of the overall "on-state" time and "off-state" time of a synchronized controlled rectifier.

The Steigerwald '090 system generates current pulses through linear regulators (50, 51, 60, 61) for powering radar. Steigerwald '090, Abstract and Figure. Currents flowing in primary windings (e.g., 22, 26) of transformers (T1, T2) are switched by respective switching transistors (e.g., Qa, Qb). Currents induced in secondary windings (24, 28, 40, 42) are rectified by diodes CRap, CRbp, CRan and CRbn to provide power at output buses (+DC bus and -DC bus). Transformers T1 and T2 provide isolation between a Main DC Power Bus 12 and the output buses. Plural regulator stages use controlled semiconductors 50, 51, 60 and 61 to regulate current on the output buses to produce current pulses at voltages $V_1 \dots V_n$ and $-V_1 \dots -V_m$.

Steigerwald '090 does not use controlled rectifiers in its isolation stage. Nor does it teach synchronizing controlled rectifiers to a primary winding voltage waveform having “short” transitions.

2. Cobos

Cobos is an IEEE article published in 1994 that describes circuits including controlled rectifiers for small DC/DC “On Board Converters” (“OBC”) in “Distributed Power Systems” (“DPS”) operating at low output voltage (3.3 V). Cobos, 1676, Abstract. Cobos Fig. 6 is illustrative and is reproduced below.

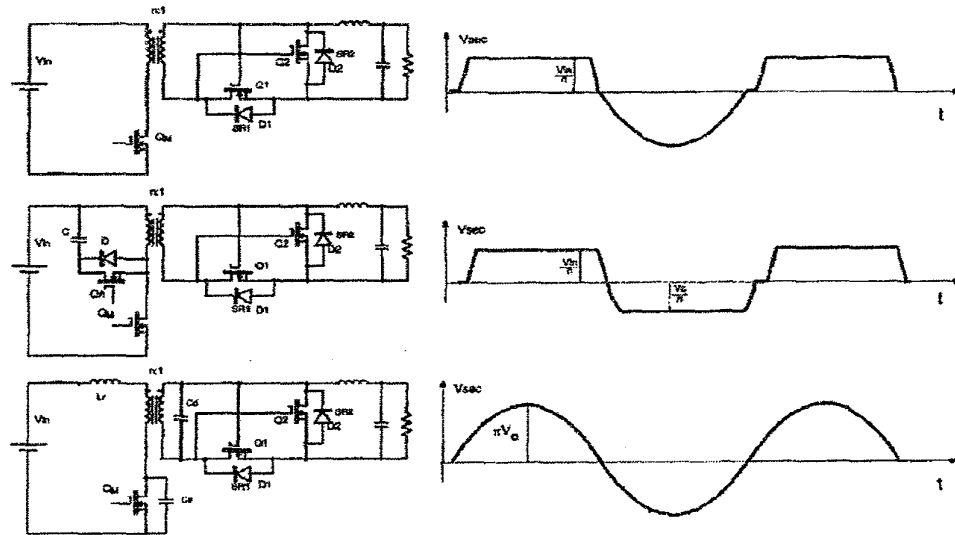


Figure 6. Forward topologies with SR and characteristic driving waveform.
FRR (a), FAC (b) and ZVS-MRC (c)

Cobos Fig. 6

Each of the transformer secondary winding circuits shown in Fig. 6 includes a controlled rectifier with a parallel diode. Driving waveforms for the controlled rectifiers are shown to the right of associated circuits. Cobos, Fig. 6.

3. The Steigerwald '090 and Cobos Combination

The Examiner adopted Requester's position that it would have been obvious to one of ordinary skill to provide the '190 patent invention from Steigerwald '090 and Cobos. According to Patent Owner, there are numerous incompatibilities between Steigerwald '090 and Cobos that, at the time of the '190 patent invention, would have rendered the claimed invention unobvious and presented significant barriers to one of only ordinary skill to overcome. These incompatibilities include the Steigerwald '090 prohibition

on introducing inductance into its conduction path, frequency incompatibility, voltage incompatibility, design efficiencies, and driving waveform incompatibilities. According to Patent Owner, it would have taken more than ordinary skill to achieve the '190 invention from Steigerwald '090 and Cobos.

4. Efficiency

Patent Owner argues that one of ordinary skill in the art would not have attempted substitution of the Cobos synchronous rectifiers into the isolation stage of Steigerwald '090 because it would not have increased overall efficiency of Steigerwald '090 (PO App. Br. 46), contrary to one of the Examiner's stated rationale of "simple substitution" for combining the references. RAN, 21. The linear regulators of Steigerwald '090 would have dissipated whatever energy might have been saved by using the controlled rectifiers. PO App. Br., 45-46. Patent Owner notes that it is overall efficiency that is important and that linear regulators are usually quite inefficient. PO App. Br., 46. Patent Owner explains that linear regulators have low efficiency because they function by making the voltage across a transistor operate in its linear mode and that efficiency is determined by the ratio of input and output voltages.

Requester counters that it is not possible to tell from the Steigerwald '090 reference whether the linear regulators are "series" regulators or "series pass" regulators, which have different efficiency characteristics. Resp. Br, 22. Also, one of ordinary skill in the art would have recognized ways to improve efficiency, such as, for example, replacing the series regulators with switching regulators (claim 2). Resp. Br. 22. However, Patent Owner

argues that switching regulators are not appropriate for use in the Steigerwald '090 topology because their use would frustrate the design purpose of Steigerwald '090 in providing current pulses.

5. Conventional Wisdom

The '190 patent invention replaced DPA¹⁰ “bricks” (a single stage performing both isolation and regulation functions) with a two stage solution having separate isolation and regulation stages. Patent Owner argues that this fundamental change was counter-intuitive based on an expected increased size, weight and complexity and loss of efficiency. PO App. Br. 31-33 and 47-48. The Examiner dismissed SynQor’s evidence that Dr. Schlecht proceeded against conventional wisdom. RAN, 19.

Patent Owner argues that the Cobos substitution of controlled rectifiers into the Steigerwald '090 topology would have been expected to add significant size and complexity to the circuit, and, therefore, doing so would have been against conventional wisdom at the time of the '190 patent invention. Making the substitution would require extra control circuitry to create an appropriate driving waveform for the gates of the controlled rectifiers or a self-driven arrangement. PO. App. Br., 47. Patent Owner points to Cobos itself, which states that external control circuitry would be expected to generate additional power losses, take up added space and cost more. PO App. Br., 47, citing Cobos, 1678.

Furthermore, according to Patent Owner, two stages would be expected to decrease efficiency because each stage would have its own attendant loss. Weight, cost and size are related adversely to efficiency. PO

¹⁰ Distributed Power Architecture.

App. Br., 32. Patent Owner finds support in the Pressman reference, which notes significant efficiency losses in multi-stage designs. PO App. Br., 32, citing Pressman at 84, Tables 3-1, 3-2.

Patent Owner argues that there was no objective evidence that a multi-stage design could realistically approach the same efficiency as a single stage design while also providing cost and size reductions. PO App. Br., 33.

Cobos suggests the use of synchronous diodes to improve efficiency. In fact, the '190 patent background acknowledges that synchronous rectification was known. Yet, we agree with Patent Owner and find that neither Requester nor the Examiner set forth persuasive evidence that ordinarily skilled artisans contemplated, with a reasonable degree of success producing a multi-stage DC/DC power converter using synchronous rectifiers in its isolation stage prior to the effective filing date of the '190 patent.

6. Simple Substitution

The Examiner finds that Steigerwald '090 is an appropriate starting point for modification because Steigerwald '090 is directed to a power converter. RAN, 22. According to the Examiner, the substitution of Cobos' controlled rectifiers for the non-controlled diodes of the Steigerwald '090 isolation stage would have been simple, obvious and well-known in the art. Furthermore, the "simple substitution" of one known element for another would obtain "predictable results." RAN, 21.

Patent Owner disagrees and argues that at the time of the '190 patent invention, the substitution proposed by the Examiner was not so simple.

Patent Owner argues legal deficiencies in the Examiner's rejection. In particular, Patent Owner argues that the Examiner applied improperly the "simple substitution" rationale because the Examiner found that substitution of the Cobos controlled rectifiers into Steigerwald '090 would have been well-known to those of ordinary skill in the art. According to Patent Owner, the Examiner's findings do not clearly resolve the Graham factual inquiries. PO App. Br., 41-43.

Patent Owner argues that the Examiner never resolved the level of ordinary skill in the relevant art in 1997.¹¹ PO App. Br., 43. According to Patent Owner, the level of ordinary skill in the art was low. Patent Owner represents that according to the SynQor expert at trial, Dr. Leeb, such a person "likely would have something like a bachelor's degree in electrical engineering and a couple of years of additional experience possibly in grad school or industry." PO App. Br., 37-38. Requester correctly notes that at the time of the '190 patent invention, the substitution of synchronous rectifiers for ordinary diodes, in general, was known. Resp. Brief, 19-20. Patent Owner does not dispute this. However, the background section of the '190 patent describes various technical challenges to implementing synchronous rectifiers in high frequency switching converters like the '190 patent architecture. Although the Examiner did not resolve explicitly the applicable level of ordinary skill (*see* PO App. Br., 43), the level of skill is impliedly resolved by the level of sophistication expressed in the various references of record. That level appears to be on par with Dr. Leeb's objective criteria outlined *supra*, even if the ordinary skill was "low" as

¹¹ The '190 patent traces its domestic priority to provisional application 60/036,245 filed on Jan. 24, 1997.

compared to higher skilled artisans possessing a doctorate and several more years in the industry.

7. Inductor in Conduction Path

Patent Owner argues (PO App. Br., 39) that Steigerwald '090 teaches away from combination with Cobos because the Cobos secondary winding circuits with controlled rectifiers have inductors in their respective conduction paths. *See, e.g.*, Cobos, Fig. 6. According to Patent Owner, the use of inductors in the conduction path of Steigerwald '090 would frustrate its purpose.

The topology of Steigerwald '090 is that of a “capacitance-multiplying converter.” Steigerwald '090, Abstract. Energy stored in a capacitor (Ce) in the primary circuit is transformed into pulses in the secondary winding circuit. According to Patent Owner, Steigerwald '090 prohibits the use of an inductor in its conduction path because doing so would prevent effectively the delivery of a pulsed output.¹² Because the Cobos secondary winding circuits using controlled rectifiers all include inductors, Patent Owner maintains that Steigerwald '090 effectively teaches away from the Examiner’s proposed combination.

The “capacitance-multiplying effect” topology used in Steigerwald '090 is not well explained in the Steigerwald '090 reference itself. Patent Owner explains that the Steigerwald '090 purpose of providing pulsed current (delivering energy stored in capacitor Ce to the load) would be frustrated by the use of a secondary winding circuit having an inductor in its conduction path. PO App. Br., 39-40.

¹² This argument was elaborated on during the reexamination in Patent Owner’s Response at pages 30-31, 33 and 42-44.

The Steigerwald '090 prohibition on an inductors in its conduction path is supported by its claim 1, limitations (a), (d), (e), (h), (j) and (k), each of which specifically requires a “path lacking inductors.” Patent Owner refers to Steigerwald '539, which explains this requirement. PO App. Br., 39, citing Steigerwald '539, 3:55-4:4. Because the Cobos secondary winding circuits using controlled rectifiers each have an inductor in the conduction path, the use of Cobos controlled rectifiers would be prohibited in Steigerwald '090. According to Patent Owner's expert, using inductors would destroy the operation of Steigerwald '090, which must provide current pulses at its output. See Dickens Declaration, Ex. R49 at ¶¶ 10, 23. Based on the evidence of record, including Steigerwald '090, the use of any inductor in the conduction path of Steigerwald '090 would impede current pulses needed to power the radar, thereby frustrating its purpose. We agree with Patent Owner.

The Examiner dismissed Patent Owner's inductor argument by saying that the '190 patent claims do not require “no series inductors.” RAN, 23. The Examiner's observation is correct. However, that does not resolve the question of whether one of ordinary skill in the art at the time of the '090 patent invention would have combined Steigerwald '090 and Cobos.

The Examiner states that Steigerwald '090 must be considered in its entirety:

. . . Steigerwald '090's mere disclosure of more than one alternative (i.e, the use of high-voltage energy storage capacitor, lack of series inductors and high switching frequencies) does not constitute a teaching away from any of these alternatives because such disclosure does not criticize,

discredit, or otherwise discourage the solution claimed.

RAN, 23. However, there is only one embodiment illustrated in Steigerwald '090 and as noted, Steigerwald '090's claims specifically exclude inductors. *See* sole figure of Steigerwald '090 above. Moreover, the Examiner does not address Patent Owner's arguments and the expert declaration explaining why a skilled artisan would have been discouraged from using any inductors in the Steigerwald '090 circuit.

Requester argues that Steigerwald '090 does not teach away from including an inductor in the conduction path. Resp. Br., 21. In support, Requester notes that not all of the output voltages of the Steigerwald '090 isolation stage are pulsed voltages. Patent Owner maintains that the outputs that are not pulsed are bias voltages that do not draw substantial power. PO Rebut. Br., 18-19. Our review of Steigerwald '090 suggests that Patent Owner is correct. Thus, even though there are bias voltages output from the Steigerwald '090 isolation stage, the inductor prohibition on the power delivery buses would have discouraged one of ordinary skill from substituting any circuits that would place an inductance in the conduction path.

Requester further argues that Cobos does not require an inductor in its conduction path, urging that the inductors shown in Cobos Figures 4-6, 9 and 10 include an inductor arranged with a capacitor as a filter even though Cobos Figure 4 uses diodes and Cobos Figures 5, 6, 9 and 10 use synchronous rectification. Resp. Br., 21. Nevertheless, the Cobos drawings show an inductor. Requester's point is not clear. Apparently, Requester might be asserting that the asserted "filter" would have equal energies in the capacitor and inductor so as somehow to cancel the series inductance in

Cobos, thereby somehow suggesting not using an inductor in the Steigerwald '090 circuit. However, Requester neither sets forth persuasive evidence nor a clear argument that the inductor and capacitor in Cobos act as a filter so as to effectively lower the inductive impedance. Based on the evidence presented, one of ordinary skill in the art would have been discouraged from attempting to use the Cobos arrangement of controlled rectifiers, with inductors in the conduction path, to replace the rectifiers in Steigerwald '090.

Patent Owner further argues that one of ordinary skill in the art would not have used synchronous rectifiers in the Steigerwald '090 arrangement because any efficiencies gained by the use of such synchronous rectifiers would be dissipated by the linear regulators following the Steigerwald '090 isolation stage. Thus, the ECS benefits would not be achieved. PO Rebut. Br., 19. However, we need not address these benefits because the record indicates that skilled artisans would have been discouraged from attempting to modify Steigerwald '090 with Cobos because Cobos only suggests, if at all, a modification using inductors, while Steigerwald '090 teaches away from using inductors.

8. Frequency Incompatibility

Patent Owner also argues, relying on the Casey article, that a frequency incompatibility exists between Steigerwald '090 and Cobos. PO App. Br., 49. Patent Owner represents that the Casey article explains that the Steigerwald '090 isolation stage operates at a switching frequency in the

range of 3-10 MHz. *See* Casey article,¹³ Steigerwald '090, 3:23-29. According to Patent Owner, Cobos' self-driven synchronous rectification operates at an upper frequency limit of 1 MHz, and its external driven scheme has an upper limit of 200 kHz. The frequency incompatibility is described in detail in Patent Owner's response to non-final office action dated July 12, 2010 ("Response") at 36-37. PO App. Br., 49. According to Patent Owner, lowering the Steigerwald '090 frequency to be compatible with the Cobos circuit arrangement would render it unfit by making the power supply too big. PO App. Br., 49. The frequency incompatibility would have discouraged making the proposed substitution. Patent Owner argues that the Cobos circuits cannot be made to operate efficiently at 3-10 MHz, the range at which Steigerwald '090 would have to operate in order to achieve its objective of small size.

The Examiner's answer to this conundrum is that the ordinarily skilled artisan would know that frequency changes would have to be made. RAN, 28. The Examiner's assertion is unsupported. Requester does not argue this point in the Respondent Brief. The very point we must decide is whether one of only ordinary skill in the art would have overcome the various incompatibilities or whether they would only have been overcome by one of greater than ordinary skill. In the absence of any persuasive evidence or argument as to how one would have dealt with the frequency incompatibility, Patent Owner's argument is persuasive.

¹³ L. F. Casey and M. F. Schlecht, Massachusetts Institute of Technology, A High-Frequency, Low Volume, Point-of-Load Power Supply For Distributed Power Systems, Laboratory for Electromagnetic and Electronic Systems 439-450 (1987) ("Casey"). Steigerwald '090 incorporated Steigerwald '539, which further incorporated Casey, et al.

9. Short Transitions

Claims 1, 5-8, 11-13, 17-18, 28 and 31 require a controlled rectifier to be synchronized to a primary winding voltage waveform having “short” transitions relative to the on-state and off-state of the controlled rectifier.

It is undisputed that Steigerwald '090 does not teach short transitions in the voltage waveform of the primary winding. The only short transition topology taught by Cobos is the isolation stage shown in Cobos Figure 9. This topology has a series inductor in its output, which is incompatible with Steigerwald '090 for the reasons explained above. Furthermore, according to Patent Owner, the Cobos Figure 9 topology cannot be made to operate efficiently in the 3-10 MHz range of Steigerwald '090. PO App. Br., 50. Patent Owner argues that the circuit substitutions ignore the difficulties associated with them and the Examiner has not explained how those difficulties would be overcome. We agree. The Examiner stated:

One of ordinary skill in the art would have acknowledged how, not only to alternate the diodes of Steigerwald '090 with the controlled rectifiers of Cobos, but also to select the suitable waveforms for driving those controlled rectifiers. Cobos clearly teaches that in some circumstances that waveforms with “fast transitions” or “short transitions,” are preferred. Furthermore, one of ordinary skilled in the art would have known to substitute the diodes of Steigerwald '090 with the controlled rectifiers of Cobos et al.

RAN, 30.

The argument regarding “short” transitions applies only to the claims reciting that limitation (claims 1-19, 28 and 31). As to those claims, we find it to be supportive of non-obviousness.

B. Claims 2-4 obvious in view of Steigerwald '090, Cobos and Pressman

Claims 2-4 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Steigerwald '090, Cobos, and Pressman. Claims 2-4 depend directly or indirectly from claim 1. These claims further require that the non-isolating regulating stages are switching regulators. In rejecting claims 2-4, the Examiner relies, in addition to Steigerwald '090 and Cobos, on Pressman. The Pressman book, entitled "Switching and Linear Power Supply, Power Converter Design" purports to be "an all-embracing treatment of the design of modern power supply systems." Pressman, cover page. It teaches numerous switching regulator circuits.

Patent Owner argues (PO App. Br., 40-41, 50-51) that one of ordinary skill would not have utilized Pressman's switching regulators in the Steigerwald '090 topology. The design concept of Steigerwald '090 is that of a capacitance multiplier that includes a large capacitor ("Ce" in the Steigerwald '090 Figure) at the main input bus. This design supports the Steigerwald '090 intended purpose of providing current pulses to radar. The design arrangement chosen prohibits the use of an inductor in the conductive path to a load as explained above. However, the substitution of a Pressman switching regulator in place of the Steigerwald '090 linear regulator would do just that. We agree with Patent Owner's position that the use of a circuit path inductor would defeat the intended purpose of Steigerwald '090 and discourage such substitution.

Pressman does not provide additional evidence helpful in determining the obviousness of combining Steigerwald '090 and Cobos as discussed above.

C. Claims 9-10, 14-16, 19 and 25-26 obvious in view of Steigerwald '090, Cobos and Mammano

Claims 9-10, 14-16, 19 and 25-26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Steigerwald '090, Cobos, and Mammano. Claims 9, 10 and 25-26 require that the “output of the isolation stage is about 12 volts,” and claims 17-19 and 24 require that the “DC power source” provide an input voltage related to the “range of 36 to 75 volts.”

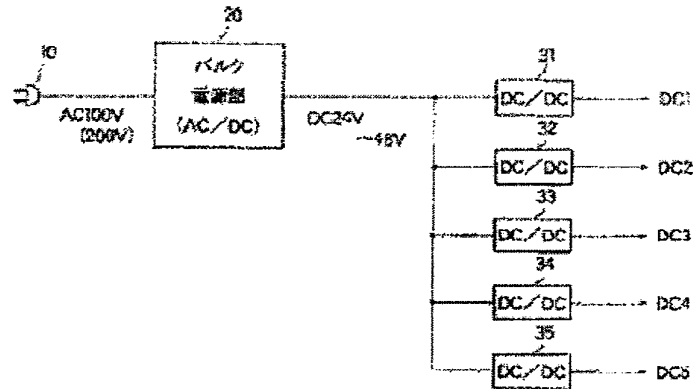
Patent Owner argues separately that there is no basis other than the roadmap provided by the '090 patent claims to make the further modifications required by these claims. PO App. Br., 51-52. Regardless of whether this is true, Mammano does not alter our views with respect to the combination of Steigerwald '090 and Cobos.

Mammano does not provide additional evidence helpful in determining the obviousness of combining Steigerwald '090 and Cobos as discussed above.

D. Claims 1, 5-8, 11-13, 20, 22-23 and 27-33 obvious in view of JP '446 and Steigerwald '539

The Examiner rejected claims 1, 5-8, 11-13, 20, 22, 23 and 27-33 based on JP '446 and Steigerwald '539. Among these claims, 1, 5-8, 11-13, 28 and 31 require “short” transitions and claims 20, 22, 23, 27, 29, 30, 32, and 33 do not require “short” transitions.

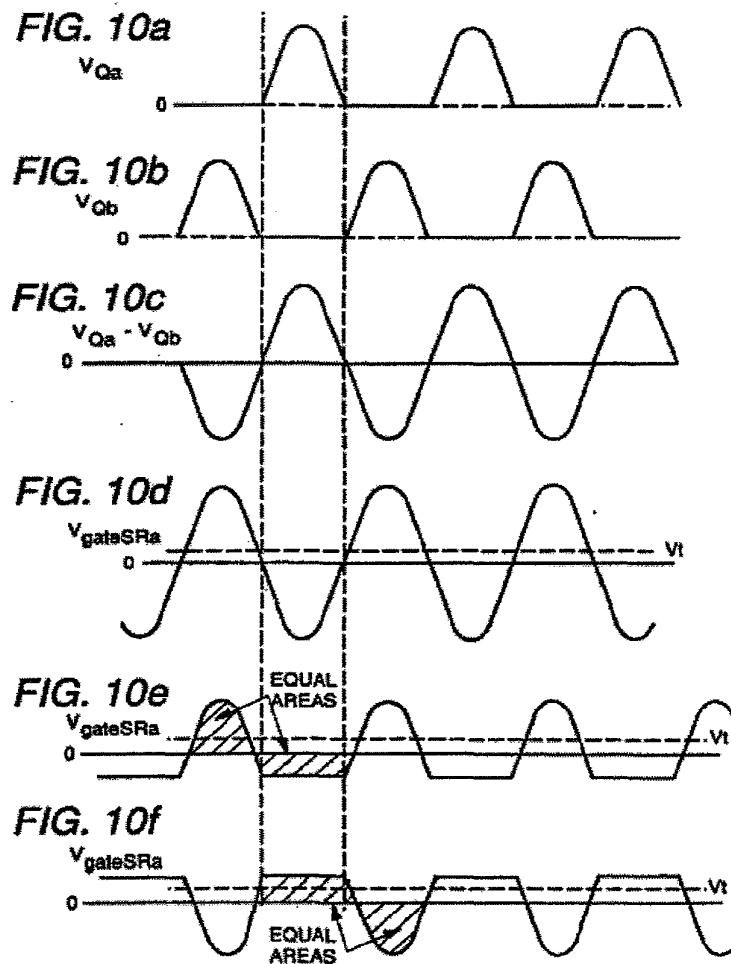
Figure 1 of JP '446 is reproduced below.



JP '446 Fig. 1

JP '446 discloses an AC/DC power supply including a non-regulating isolation stage (Fig. 1, circuit 20) coupled to plural non-isolating regulation stages (Fig. 1, circuits 31-35) through an intermediate bus.

Steigerwald '539 discloses a capacitance-multiplying converter for supplying distributed pulsed loads. Steigerwald '539, Title. Steigerwald '539 embodiments shown in Figures 7, 8 and 9 include controlled rectifiers, albeit without parallel diodes, which rectify current flowing in a secondary winding of a transformer. Steigerwald '539 Figures 10a – 10f are reproduced below.



Steigerwald '539 Figs. 10a-10f

Steigerwald '539 explains that "FIGS 10d, 10e and 10f illustrate the gate voltage for synchronous rectifier SRa for the embodiments of Figs. 7-9, respectively. In Figs. 10d-10f, the voltage V_t represents the threshold voltage that must be reached before the device SRa turns on." Steigerwald '539, 5:25-30.

Patent Owner argues against the combination of JP '446 and Steigerwald '539 because the combination would introduce noise into JP '446 that would render it unsuitable for its intended purpose. The reason for this is that JP '446 operates in “resonance” mode requiring sine waves at approximately the same frequency. PO App. Br., 53, citing JP '446 ¶ 12. We do not find this argument to be persuasive as to claims 20, 22-23, 27, 29-30 and 32-33.

As to the claims requiring “short” transitions (1, 5-8, 11-13, 28 and 31), however, this argument is persuasive. Neither Requester nor the Examiner contends that JP '446 satisfies the “short” transitions limitation. JP '446 operation depends on the use of sine waves allowing its topology to operate in “resonance” modes. *See* JP '446 Abstract, ¶ 12.

The Examiner finds that:

In this case, the claims were rejected based on the combination of JP' 446 in view of Steigerwald '539, the “approximate square wave” waveform shown [in] Fig. 10f of Steigerwald '539 shows shorter transition times than those in Figs. 10d and 10e, satisfying the slightly more narrower interpretation of **“transition times which are less than 20,% of the overall on-state and off –state times of the controlled rectifiers”** adopted by the U.S. District Court in the Litigation.

RAN, 45.

We do not subscribe to the Examiner’s “eye-ball” conclusions based on Figure 10f. As Patent Owner contends, Figures 10a-10f are not represented as being drawn to scale. *See* PO App. Br., 60. Our review of Steigerwald '539 reveals no explanation that would lead us to believe that the transitions come within our claim construction of short transitions (i.e.,

transitions that are less than 20% of the overall “on-state” time and “off-state” time of a synchronized controlled rectifier).

We glean from Figure 10f that the gate waveform is a truncated sine or cosine wave. In the absence of any explanation in the Steigerwald '539 specification, it is difficult to draw the conclusion that the transition from an off-state to an on-state and vice versa takes less than 20% of the overall time of the off and on states.

Patent Owner argues that the voltage across the primary winding in Steigerwald '539's Figures 4 and 6 embodiments follows a sinusoidal shape as it gradually drops from V_o to a negative peak value and then gradually rises back to V_o at the end of a half cycle. PO App. Br. 58. There is no persuasive evidence to the contrary.

In the absence of persuasive evidence, the Examiner's conclusion is speculative. We cannot conclude that claims requiring a “short” transition per claim 1 are obvious based on such speculation. Therefore, we conclude that the claims requiring “short” transitions (claims 1, 5-8, 11-13, 28 and 31) are not obvious based on JP '446 and Steigerwald '539.

Patent Owner's argument regarding “short” transitions does not apply to claims 20, 22-23, 27, 29-30 and 32-33:

E. Claims 2-4 and 21 obvious in view of JP '446, Steigerwald '539 and Kassakian

Kassakian discloses a square wave converter. PO App. Br., 63, citing Kassakian, 4, Fig. 3. It is not helpful in addressing the shortcomings of JP '446 and Steigerwald '539 discussed above.

F. Claims 9-10, 14-19 and 24-26 obvious in view of JP '446, Steigerwald '539 and de la Cruz

Claims 9-10 and 25-26 require that the “output of the isolation stage is about 12 volts.” The Examiner relies on de la Cruz as teaching the required voltage ranges. Although de la Cruz may specify particular voltage ranges that are recited in dependent claims, it is not helpful in resolving obviousness based on the JP '446 and Steigerwald '539 references as discussed above.

IV. OBJECTIVE EVIDENCE OF NON-OBVIOUSNESS

A. Introduction

In deciding questions of obviousness, we must consider all four Graham factors including objective evidence of so-called “secondary considerations.” A prima facie case made by the Examiner is not a conclusion on the ultimate issue of obviousness. The ultimate conclusion of obviousness is a legal conclusion to be reached after weighing all of the evidence on both sides. *Apple Inc. v. ITC*, Fed. Cir. 2012-1338, Aug. 7, 2013, slip op. at 15.

In addition to the technical arguments discussed above, Patent Owner contends that documents and activities related to the '497 litigation¹⁴ involving the '190 patent and introduced into the reexamination constitute objective evidence of non-obviousness. Arguments based on these documents relate to copying, commercial success, long-felt need, industry praise, acting against conventional wisdom and achieving unexpected results. PO App. Br., 8-39 and 66-72.

¹⁴ Requester was a defendant in the '497 litigation.

Notwithstanding Patent Owner's Seventh Amendment argument¹⁵ (PO App. Br., 66-67), we do not blindly accept the determinations of the district court. We consider the arguments presented and evaluate all of evidence of record in the reexamination.

The Examiner discounted Patent Owner's objective evidence of non-obviousness based on a lack of legally sufficient nexus between the claims and the argued merits of the invention established based on the trial evidence. It is typical in a patent examination or reexamination to establish nexus using one or more declarations. In this case, the Examiner found that the Schlecht Declaration was legally insufficient to establish the necessary nexus. *See, e.g.*, RAN, 14. However, a declaration is not the only evidentiary vehicle for establishing non-obviousness based on objective evidence. We must look beyond the boundaries of the Schlecht Declaration.

In the '497 litigation, Patent Owner asserted claims for induced and contributory infringement under 35 U.S.C. §§ 271(b) and (c), alleging that the defendants sold power supply components with knowledge that they would be used in, or were especially made to be used in, infringing systems imported into the United States. Patent Owner also asserted direct infringement under 35 U.S.C. § 271(a) with respect to certain U.S. sales. It is undisputed that the defendants in the litigation manufactured and sold various products described by the data sheets set forth as appendix items A40-A82 of Patent Owner's Appeal Brief. Claims 2, 8, 10 and 19 were tried to a jury, which found infringement and awarded damages based on lost

¹⁵ *See In re Construction Equipment*, Appeal No. 2010-1507 (Fed. Cir. Dec. 8, 2010) in which the majority did not adopt the dissent view that reexamination was constitutionally barred by res judicata or issue preclusion.

profits. Although these jury findings are not controlling,¹⁶ we find them to be informative. The United States District Court for the Eastern District of Texas entered judgment, which was upheld by the CAFC on appeal.¹⁷

The timing between the reexamination and the district court litigation became awkward for Patent Owner. In the reexamination in June 2010, SynQor responded to Examiner rejections (“Response”),¹⁸ attaching various documents gleaned from public sources.¹⁹ Requester submitted comments in August 2010 (“Comments”). It was not until December 2010, that issues of infringement and invalidity were tried to a jury. According to Patent Owner, it was then that time that SynQor learned of defendants’ testimony and internal documents that had been previously shielded from SynQor by operation of a protective order. *See* PO Resp. Br., 3.

The ‘497 litigation jury determined that the defendants’ (including Requester) products infringed claims 2, 8, 10, and 19 of the ‘190 patent. *See* R6, 9-27. The district court entered judgment on the jury verdict. *See* R7. The jury awarded lost profits, which, according to Patent Owner, indicates that it determined that there were no suitable non-infringing alternatives for the many infringing UIBA systems.²⁰ Thereafter, the court entered a permanent injunction listing the defendants’ products.²¹ Patent Owner

¹⁶ *Ethicon, Inc. v. Quigg*, 849 F.2d 1422 (Fed. Cir. 1988)

¹⁷ CAFC decision dated March 13, 2013 in 2011-1191, -1192, and -1194, and 2012-1070, -1071, and -1072.

¹⁸ SynQor’s response to non-final office action dated July 13, 2010, set forth in the Evidence Appendix of the PO App. Brief, A3.

¹⁹ PO App. Br. Evidence Appendix, A1-A2 and A8-A82.

²⁰ PO App. Br. Related Proceedings Appendix, R6, R8.

²¹ PO App. Br. Related Proceedings Appendix, R9, 3-5, and Evidence Appendix A40-82.

submitted trial transcripts and exhibits from trial to the Office as attachments associated with Notices of Concurrent Proceedings in March 2011.

B. Procedural Matters

Requester argues that at least some of the litigation documents submitted by Patent Owner were not properly introduced into the reexamination. Notwithstanding Requester's argument that we should disregard and not consider much of the court evidence because it was not procedurally properly placed before the Office (Resp. Brief, 9-11), we do not accept the view that evidence in the record is unavailable to us for consideration.

Requester argues that Patent Owner relies improperly upon evidence from the '497 litigation in that Patent Owner exceeded the notice provisions of 37 C.F.R. § 1.985, which only provides for notice of prior or concurrent proceedings. Resp. Br., 9. Requester argues that documents R17-R49 in particular should not be relied upon because they were not "rendered by a court." Resp. Br., 9. In reexamination practice in the Office, the Examiner has discretion as to whether to expunge documents from the reexamination record.²² The record before us does not reflect any petition from Requester to expunge documents. Nor does it reflect that any documents were expunged. The substance of the documents of record has not been challenged. We consider them and assign evidentiary value to each document as appropriate.

²² See, e.g., MPEP § 2207 regarding "Entry of Court Decision in Patent File."

C. Nexus

The Examiner relied heavily upon shortcomings of the Schlecht Declaration (A1) in finding a lack of nexus. For example, in connection with the Examiner's discussion of commercial success, the Examiner stated:

The Examiner is in agreement with the Patent Owner that as the rejections were based on obviousness, the issue of commercial success is relevant to those rejections. The establishment of commercial success of the invention may be a sufficient secondary consideration to rebut a prima facie case of obviousness. MPEP 716.01 and 716.03. Declaration of Martin F. Schlecht ("Dr. Schlecht's Declaration") has been carefully reviewed; however, found to be lacking in showing secondary considerations.

RAN, 12.

Patent Owner argues that a legally sufficient nexus has been established by the Schlecht Declaration (A1), the data sheets (A40-A82) describing products found to infringe and other documents (e.g., A11 and A33), including the jury verdict form and district court judgment (R6-R9). PO App. Br., 11.

The Schlecht Declaration ties the claims to data sheet descriptions at paragraph 8, which explains that a UBC is used to drive multiple POL's.

The Examiner concluded that the data sheets do not include providing an output from a UBC to a plurality of non-isolating regulation stages (RAN, 20) and that there was "no nexus between the merits of the claimed invention [and the data sheets]." *Id.* We have reviewed the data sheets including A-40 and, notwithstanding the Examiner's position, disagree. *See,*

e.g., Murata's QBC data sheet, A40, 1, two portions of which are reproduced below.²³

FEATURES	The QBC-12/22-L48 DC/DC converter is one of DATEL's new generation, fully isolated, Intermediate Bus Converters, designed and optimized for total on-board solutions in combination with our non-isolated point of load converters of the HEN, LEN, LON, LSM and LSN series.
■ 254 Watts total output power	
■ 96% Ultra-high efficiency @ full load	
■ 48V input (40.5 to 57V range)	
■ 12V/22A Output for Intermediate Bus Architectures with POL converters	

Excerpt from A40

We find that data sheet A40 describes a UBC corresponding to the claimed "non-regulating isolation stage." It explicitly suggests combining a UBC with a POL to create a UIBA. Furthermore, data sheet A40 touts the efficiency, size, and cost benefits resulting from using the UBCs in an IBA power system. Thus, we disagree with the Examiner's finding (RAN, 20).

The district court decisions (R6-R9) based on the jury verdict corroborate Patent Owner's argument that the UBC's described in the defendants' data sheets fall within the scope of the patent claims. Prior to trial, the district court reviewed extensive, confidential expert evidence and concluded on summary judgment that most claim limitations were present in the accused products. *See* R2-R5. The jury resolved the remaining issues at trial, concluding that the accused UBCs and the UIBA systems incorporating them infringe claims 2, 8, 10 and 19. R6, 9-27. In addition to entering a judgment (R7) of infringement based on the jury verdict, the district court issued a permanent injunction identifying product numbers corresponding to the data sheets. R8, R9, 3-5; *cf.* A40-A82. We conclude from these actions that the trial defendants' UBCs, described in the data sheets A40-A82, fall

²³ *See also* A40-A41, A55-A60, A72-A76, A78, A81-A82, 1; R46, 68-74 (highlighting specific language in the defendants' data sheets).

within the scope of the “non-regulating isolation stage” limitations of the claims at issue. These conclusions support the establishment of a legally sufficient nexus.

According to Requester, Patent Owner’s arguments based on objective evidence of non-obviousness fail because they rely upon limitations taught by the prior art, namely separate isolation and regulation stages. Resp. Br., 11. Requester demonstrates that it was known to use separate isolation and regulation stages using a marked-up Figure 4 from Miftakhutdinov.²⁴ See A8. Requester is correct that these references demonstrate that it was known to connect an isolation stage with regulation stages. Steigerwald '090 and JP '446 also demonstrate that is true. However, the mere use of isolation and regulation stages was not enough to make a practical solution required by the computer and telecom industries.

The Schlecht Declaration and other evidence suggest that it was not until Dr. Schlecht taught how to make a practical power system (based on the use of controlled rectifiers in a UBC) and disclosed his solution to manufacturers that the computer and telecom industries adopted his approach. That is when the industry adopted the language of UIBA, SIBA, POL, etc. as the popular nomenclature describing power systems using that approach.

Requester draws a distinction between Patent Owner’s definition of UIBA and “actual” UIBA, noting that claims 1-33 at issue do not require a distributed architecture in which the regulator stages must be remotely positioned with respect to the isolation stage. Resp. Br., 11-14. The claims

²⁴ Requester compares a mark-up of Miftakhutdinov (A8), Figure 4, with marked-up drawings from Steigerwald '090 and JP '446.

are not limited to any particular positional relationship between the isolating and regulating stages. Rather, the claims are directed to a particular implementation (using rectifiers controlled in a particular manner) that made it practical (ECS benefits) to provide a power system for major industries that could replace their use of integrated power systems in which these two functions were performed by the same circuit. Key to that practical implementation is the use of controlled rectifiers in the isolation stage operated in the manner described by the claims. Indeed, there are examples of systems in which plural regulation stages are connected to the output of an isolation stage, such as the Steigerwald '090 and JP '446 references. The Schlecht Declaration and other evidence suggest to us that UIBA as discussed neither requires nor prohibits any particular positional relationship between isolation and regulation stages. It only requires that their functions be carried out in separate and distinct circuit modules.

Requester argues that the trial evidence is not appropriately considered in the reexamination because the terms “IBA,” “UIBA,” etc. are not found in the '190 patent claims. *See* Resp. Br., 14. Requester's reasoning does not persuade us that the trial evidence should be disregarded. The Schlecht Declaration explains that the industry adopted new language to describe the inventions set forth in the SynQor patent family, including those described by the '190 patent claims. We are persuaded that this is so.

In SynQor's Appeal Brief and Response to Non-Final Office Action filed July 13, 2010 (“Resp.”), Patent Owner explains that the '190 patent inventions have become known (since the writing of the application for patent) as UIBA and SIBA, collectively “IBA concepts,” developed by Dr. Martin F. Schlecht. Resp., 1; *see also* PO App. Br., 2. The Schlecht

Declaration (A1) explains the SynQor introduction of UIBA and SIBA to the market. Schlecht Decl. ¶¶ 5-9. The Declaration further explains that the claimed non-isolated switching regulators are now commonly known as “Point-of-Loads” (“POL”) that are used in implementing UIBA and SIBA. Schlecht Decl. ¶ 8. We find the language shift to be explained adequately.

Requester argues, and the Examiner adopts, the position that the claims at issue are not limited to UIBA or SIBA, and, thus, the evidence provided is not commensurate in scope with the claims. RAN, 13-14. We disagree. It is true that the terms “UIBA” and “SIBA” do not appear in the claims. Each of the independent claims describes a combination of a non-regulating isolation stage with a non-isolating regulation stage.

The Schlecht Declaration, paragraphs 6-7, state that SynQor introduced the claimed architectures (later to become known as UIBA and SIBA) to manufacturers as early as the winter of 2000/2001 and they began to introduce these concepts into products. The data sheets and testimony using these terms and the jury finding of infringement of products described by the data sheets suggest that this is the case.

Each independent claim describes that the isolation stage includes controlled rectifiers and that the stage is operated in a certain manner. The independent claims do not require much more than that. Thus, they are reasonably commensurate in scope with the products described by the data sheets. Four claims of the '190 patent were found to have been infringed. The jury was able to find all of the claim elements of at least four of the claims in a plurality of the defendants' products described by the data sheets. We find that the data sheet descriptions are reasonably commensurate in scope with the infringed claims. We are not persuaded of a lack of nexus

and to disregard the objective evidence of non-obviousness because the language adopted by the industry subsequent to the Schlecht invention does not appear *ipsis verbis* in the claims of the '190 patent.

The Examiner finds that there is insufficient evidence to show how the allegedly successful product “embodies the claims.” RAN, 13.

However, Patent Owner has submitted evidence to the contrary. The Schlecht Declaration (A1), data sheets for the infringing UBCs (A40-A82), and other documents (e.g., A11, A33) demonstrate that a number of products (both UBCs and UIBAs) fall within the scope of the claims. A jury found that claims 2, 8, 10 and 19 were infringed.

UBC data sheets disclose the “non-regulating isolation stage” (A40-A82) of the patent claims and teach that these components are combined with POLs to create UIBAs, thereby meeting the remaining claim requirements. *See* A1, A11, A33, A40-A82. As Dr. Schlecht explained, a UBC is used to drive multiple POLs. A1 ¶ 8.

We agree with the Examiner that the Schlecht Declaration does not, by itself without any other evidence, establish nexus, commercial success, etc. However, the declaration does not stand alone. In our view, the Examiner placed too much burden on the Schlecht Declaration itself, as if it were the only manner of proving nexus from the claims to the objective evidence of non-obviousness. The Examiner brushed aside the trial evidence too easily by placing too much emphasis on the Schlecht Declaration.

We conclude that Patent Owner has established a legally sufficient nexus despite the noted shortcomings of the Schlecht Declaration.

D. Commercial Success

Patent Owner argues that objective evidence establishes commercial success of the claimed invention.

The Examiner finds the Schlecht Declaration insufficient to establish commercial success:

However, the Declaration fails to provide adequate evidence of commercial success relying on sales numbers; and sales numbers absent market share fail to establish commercial success. The Declaration states that Dr. Schlecht believes that two million unregulated bus converters have been purchased for use in Unregulated IBA, and only provides estimated gross sales figures. The Declaration fails to provide any information relating to market share and clearly evidence attributable to the scope of the claims, therefore, the Declaration is not sufficient to establish commercial success.

Patent Owner also has failed to provide any evidence that establishes that any commercial success of the Unregulated IBA is not because of other, unclaimed features, Patent Owner's advertising, or factors not related to the limitations recited in the claims of the '190 patent. See MPEP 716.03(b).

RAN, 14-15.

Patent Owner argues that the Schlecht Declaration together with evidence from trial establishes commercial success of the claimed invention. The Schlecht Declaration describes unit sales of infringing UBCs based on market analysis. A1, ¶¶ 7, 8, 11. Damages at trial were based on 2 million infringing UBCs. Patent Owner points to the testimony of a Lineage (a co-defendant with Requester) witness who testified that "hundreds of thousands" of bus converter shipments would be considered "quite commercially successful." PO App. Br., 16, citing R28 at 63:1-12.

The trial evidence demonstrates that more than 2 million units were sold in the U.S. and more than 5 million units were sold worldwide from December 2006 through trial. PO App. Br., 17, citing R24 at 196:5-198:15; R47.

Patent Owner argues that the infringing products constitute substantially the entire market for devices of the type claimed. PO App. Br., 17. According to Patent Owner, documents A13 and A23 demonstrate market penetration. According to Patent Owner, Cisco employees confirmed that the ECS benefits are the reasons why UIBA replaced its prior designs. PO App. Br., 23, citing R22; *see* PO App. Br., footnote 18. Patent Owner presented and argued that the commercial success of the defendants' products flowed from the invention as claimed. PO App. Br., 22.

The Examiner agrees with Patent Owner that the issue of commercial success of the invention may be a sufficient "secondary consideration" to rebut a *prima facie* case of obviousness. However, the Examiner finds that the "Declaration of Martin F. Schlecht ('Dr. Schlecht's Declaration') has been carefully reviewed; however, found to be lacking in showing secondary considerations." RAN, 12. The Examiner correctly notes that objective evidence of non-obviousness, including commercial success, must be commensurate in scope with the claims. According to the Examiner:

The Declaration must show a legally sufficient relationship between the claimed feature and the commercial success. However, Dr. Schlecht's Declaration fails to establish the required Nexus between the commercial success and the featured of the claims; there is no adequate supporting evidence to show how the product embodies the claims and how the success is a result of the claimed feature. There is no verification linking the product of the claimed feature and no nexus has been

shown between the evidence and the subject matter of the claims. The claims are not limited to Unregulated or Semi-regulated IBA, thus, the evidence provided is not commensurate with the claims. Without the detail illustration to explain how the required nexus is corresponding with the scope of the claims, the commercial success fails to provide sufficient supporting evidence.

All the evidence in the declaration does stating the advantages of the product such as higher efficiency, smaller device footprint and lower overall cost of its devices. However, the declaration fails to clearly provide facts of how the invention is embodied in the product or how the commercial success is attributable to the invention as claimed. Patent Owner fails to link the alleged commercial success with these alleged advantages and fails to link any of these advantages to any specific claim limitation.

RAN, 13-14. The Examiner also finds that the Schlecht Declaration does not provide sales numbers and market share. RAN, 14. According to the Examiner, the declaration fails to provide sufficient facts related to how the invention is embodied in the product or how the commercial success is attributable to the claimed invention. RAN, 14. According to the Examiner, without a “detail[ed] illustration to explain how the required nexus is corresponding with the scope of the claims, the commercial success fails to provide sufficient supporting evidence.” RAN, 14.

As discussed above, we find a nexus between the claims and the '497 litigation documents. We do not subscribe to the view that commercial success must be established solely by a declaration. In our view, the Examiner placed too much emphasis on the shortcomings of the Schlecht Declaration and failed to consider the other evidence argued by Patent Owner.

The district court damage award and its underlying established facts are helpful, particularly in view of SynQor's status as a start-up and the established industry in which the defendants were major players. PO App. Br., 24.

Requester notes correctly that Patent Owner has not identified feature for feature what is shown in each data sheet. Resp. Br., 25. Patent Owner admits that "some" data sheets describe using controlled rectification. PO App. Br., 21. Patent Owner identifies only one data sheet (A40) in its Appeal Brief that describes a POL. Our review of the data sheets does not readily reveal any that describe the "droop" voltage characteristic of claims 27-29 and 32-33. Thus, we attribute little weight to Patent Owner's evidence of commercial success to this particular feature. Nevertheless, the data sheets describe products related to Patent Owner's claims and IBA as it became known after the Schlecht invention.

Based on the evidence submitted at trial, it was established that the UBCs described in the defendants' data sheets have no substantial non-infringing use other than to create infringing UIBA systems and that there are no suitable non-infringing alternatives to the infringing UIBA systems. On this basis, the jury awarded lost profits. R23, 171:6 -187:21; R24, 4:4-15:7, 165:3 - 165:18.

Based on the above, we find that the commercial success described by the Declaration and trial documents is at least somewhat persuasive of the non-obviousness of making the claimed invention.

E. Long-Felt Need

The Examiner found that there was no long-felt need in the industry for the '190 patent invention. The Examiner relied upon the alleged inadequacy of the Schlecht Declaration regarding Patent Owner's long felt need argument:

The declaration does not show that there was a constant need recognized by those of ordinary skill in the art and fails to clearly define the claimed subject matter solved a problem that was long standing in the art.

Dr. Schlecht's Declaration merely states the alleged advantages a variety of stable output voltages, efficiency, cost, performance, size, reliability, and time to market are long-felt needs but fails to explain how any of the specific limitations of the claims satisfy any of these needs.

RAN, 17 .

Patent Owner argues that there was a long-felt need in the computer and telecom industry for a power supply of the type described by the '190 patent claims that had gone unmet. According to Patent Owner, SynQor established that, as early as 1991, it was recognized that DPA (distributed power adapter) was becoming more unsuitable for applications requiring multiple "ultra low voltages" at "ultra high currents." PO App. Br., 27-29, quoting A14, A17, A29. Other contemporaneous publications confirmed that the need increased as lower voltage loads emerged, leading to more voltage rails that increased costs and reduced space for end-components. See A17.

According to Requester, Narveson (A29) provided a solution (albeit a different solution) to the same problem addressed by the '190 patent. Resp. Br., 17. However, given how the industry flocked to the Schlecht invention, we find that was not the case. Narveson (A29) acknowledged the problem,

but he did not solve it. He provided a multi-stage design that was inefficient due to the “double conversion.” PO App. Br., 27, citing A29, 1, and A28, 3.

It is impressive that the high-end computer market and telecom equipment market turned to the Schlecht solution and adopted it. Patent Owner points to evidence that even two years after the '190 patent invention, Requester's engineers still believed that it “will cost effectively fill a growing need currently addressed with rather expensive [DPA] ‘bricks.’” PO Brief, 28, citing R39, 1. DPA “bricks” that dominated the switch market (A 7, 22; R39, 1) were swept aside by Dr. Schlecht's design, which Cisco and others widely adopted after Dr. Schlecht demonstrated its value.

At least some weight must be given to the reasonable inference from the evidence that other designs failed to answer a need that the '190 patent invention answered.

F. Industry Praise

The Examiner finds that evidence points to praise for IBA but that the claims are not limited to IBA. They do not require a distributed architecture. RAN, 18-19. However, the claims encompass IBA. *See In re Glatt Air Techniques, Inc.*, 630 F.3d 1026, 1030 (Fed.Cir.2011) (“Under the [Office's] logic, there would never be commercial success evidence for a claim that covers more than one embodiment.”) Moreover, the record shows that implicit in the praise for IBA is praise for the specific type of IBA required by claim 1 and other claims, the controlled synchronous rectifiers. As discussed above, we do not equate IBA to a simple distributed architecture which lacks controlled synchronous rectifiers, and, therefore, disagree with

the Examiner's conclusion as to lack of nexus. The industry praise found by the Examiner is helpful as objective evidence of non-obviousness. *See Apple Inc. v. ITC*, No. 2012-1338, 2013 WL 4007535, at *8, n.4 (Fed. Cir. Aug. 7, 2013) ("Apple's evidence of industry copying of the multitouch screen and industry praise of this feature are strong evidence of nexus.")

G. Copying

Patent Owner argued, based on access and substantial similarity, that Requester and others copied the '190 patent claimed arrangements. PO App. Br., 34. Patent Owner points to documents that became public at trial including certain allegedly "smoking gun" emails showing that Cisco/HP provided SynQor confidential technology to the defendants. PO App. Br., 34, citing R31-R38. Patent Owner argues that documents show that some manufacturers changed their designs to "chase SynQor." PO App. Br., 35; R10 at 5-6, 9-11, 13-14 and 16-17; trial transcripts R20-R29. Patent Owner argues substantial similarity based on a comparison of R44-R45 with A40-A82. PO App. Br., 35.

According to Requester, Patent Owner failed to establish copying. Resp. Br., 17. Requester relies on the distinction between UIBA as defined by Patent Owner and "actual" UIBA. Requester's argument is that because UIBA was known prior to the '190 patent invention, it was not copied from Schlecht.

However, the evidence suggests that the industry adopted devices made in accordance with “UIBA” as claimed in the '190 patent after Schlecht disclosed his circuits to various power system manufacturers.²⁵

Requester correctly notes (Resp. Br., 17) that Patent Owner did not address the question of at least one litigation defendant’s alleged independent development of UIBA.

We conclude from our review of the evidence cited by Patent Owner that there is evidence of copying and give it at least some weight.

IV. CONCLUSION

We conclude based on the evidence presented (including the Schlecht Declaration and the trial documents) that a legally sufficient nexus exists between the claims under reexamination and the objective evidence of non-obviousness presented by the data sheets and other documents related to the '497 litigation that were introduced in the reexamination record.

Based on our analysis of the technical arguments presented and the objective evidence of non-obviousness, we are persuaded from the record before us that claims 1-33 would not have been obvious to one of ordinary skill in the art at the time of the '190 patent invention. We, therefore, do not sustain the obviousness rejections of these claims.

²⁵ See also table summarizing models of UBCs and SIBAs offered for sale in the Response (to non-final office action) at 25.

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V. ORDER

For the reasons given, it is

ORDERED that the Examiner's rejections of claims 1-33 are reversed.

peb

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