

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HALLIBURTON ENERGY SERVICES, INC.,
Petitioner,

v.

U.S. WELL SERVICES, LLC,
Patent Owner.

IPR2021-01238
Patent 10,526,882 B2

Before LYNNE H. BROWNE, GEORGE R. HOSKINS, and
SEAN P. O'HANLON, *Administrative Patent Judges*.

O'HANLON, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Denying Patent Owner's Revised Motion to Amend
35 U.S.C. § 318(a)

I. INTRODUCTION

A. Background

Halliburton Energy Services, Inc. (“Petitioner”) filed a Petition for *inter partes* review of claims 1–14 (“the challenged claims”) of U.S. Patent No. 10,526,882 B2 (Ex. 1001, “the ’882 patent”). Paper 2 (“Pet.”). U.S. Well Services, LLC (“Patent Owner”) filed a Preliminary Response. Paper 6. On February 16, 2022, we instituted an *inter partes* review of the challenged claims on all grounds raised in the Petition. Paper 9 (“Institution Decision” or “Inst. Dec.”), 66.

Subsequent to institution, Patent Owner filed a Patent Owner Response (Paper 22, “PO Resp.”), Petitioner filed a Reply to the Patent Owner Response (Paper 29, “Pet. Reply”), and Patent Owner filed a Sur-reply to Petitioner’s Reply (Paper 32, “PO Sur-reply”). An oral hearing was held on December 8, 2022. A transcript of the hearing has been entered into the record. Paper 49.

Patent Owner also filed an initial Motion to Amend (Paper 23), to which Petitioner filed an opposition (Paper 30). We issued Preliminary Guidance (Paper 31) concerning the initial Motion to Amend. Following the Preliminary Guidance, Patent Owner filed a Revised Motion to Amend (Paper 33, “Motion” or “RMTA”), replacing the initial Motion to Amend. Petitioner filed an Opposition to the Revised Motion to Amend (Paper 36, “RMTA Opp.”), Patent Owner filed a Reply to Petitioner’s Opposition (Paper 40, “RMTA Reply”), and Petitioner filed a Sur-reply to Patent Owner’s Reply (Paper 48, “RMTA Sur-reply”).

In our Scheduling Order, we notified the parties that “any arguments not raised in the [Patent Owner] response may be deemed waived.” *See*

Paper 10, 8; *see also* Patent Trial and Appeal Board Consolidated Trial Practice Guide 66 (Nov. 2019) (“The patent owner response . . . should identify all the involved claims that are believed to be patentable and state the basis for that belief.”).¹

For the reasons that follow, we conclude that Petitioner has proven by a preponderance of the evidence that claims 1–14 of the ’882 patent are unpatentable. We further conclude that Petitioner has proven by a preponderance of the evidence that proposed substitute claims 15–28 are unpatentable.

B. Real Parties in Interest

Petitioner identifies itself, Halliburton Co., and Halliburton Holdings LLC as the real parties in interest. Pet. 1.

Patent Owner identifies itself and ProFrac Holding Corporation as real parties in interest. Paper 4, 1; Paper 47, 1.

C. Related Matters

The parties indicate that the ’882 patent has not been the subject of any district court proceeding. Pet. 1; Paper 4, 1. However, the parties note that the ’882 patent claims priority as a continuation-in-part to the application resulting in U.S. Patent No. 9,410,410 (“the ’410 patent”), which Patent Owner has asserted against Petitioner in district court litigation. Pet. 1; PO Resp. 3; Paper 4, 1. The parties also note other petitions for *inter partes* review filed by Petitioner and challenging patents owned by Patent Owner. Pet. 2; Paper 4, 2.

¹ Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

D. The Challenged Patent

1. Summary

The '882 patent relates to hydraulic fracturing in oil and gas wells, which entails pumping fluid into underground formations at high pressure. Ex. 1001, 1:20–43. Typically, this pumping is performed by large diesel-powered pumps and associated engines and other equipment located at the well site. *Id.* at 1:44–2:5. This conventional equipment causes large amounts of harmful vibrations. *Id.* The '882 patent acknowledges that “electrical motors have been introduced to replace the diesel motors, which greatly reduces the noise generated by the equipment during operation.” *Id.* at 2:5–8. However, due to the high pressures generated by reciprocating pumps, harmful vibrations are still present. *Id.* at 2:8–16.

The '882 patent discloses a hydraulic fracturing system, an embodiment of which is illustrated in Figure 1, reproduced below.

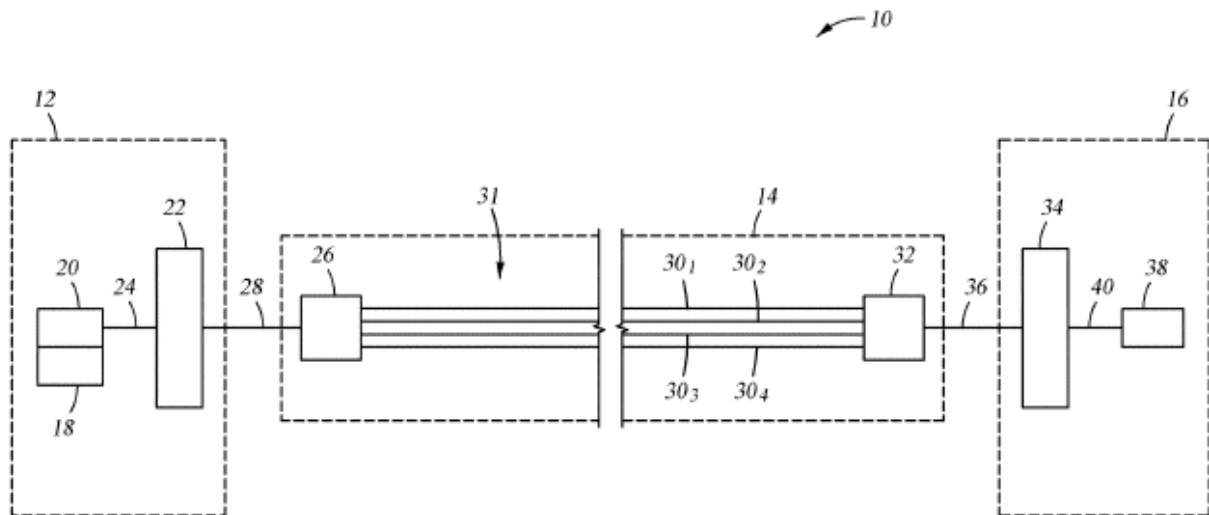


Fig. 1

Figure 1 is a schematic diagram of hydraulic fracturing system 10, which includes power generation section 12, transmission section 14, and equipment load section 16. Ex. 1001, 4:29–32. The power generation section includes an electricity source 18 that provides electricity to the equipment load section. *Id.* at 4:32–34. The electricity source can be a utility outlet, generator, natural gas-powered turbine generator, or a diesel-powered motor coupled with a generator. *Id.* at 4:34–41, 5:46–57, Fig. 2. The transmission section includes transmission line set 31 comprising several transmission lines 30₁₋₄ spanning the distance between two cutouts 26, 32. *Id.* at 4:61–5:2. “Cutout 26 . . . is selectively opened to electrically isolate power generation section 12 from transmission section 14,” and “[t]ransmission section 14 can be selectively isolated from equipment load section 16 by activating switching components in cutout 32.” *Id.* at 4:58–61, 5:2–4. The equipment load section includes a motor that drives a pump that pumps fracturing fluid to create fractures in a subterranean formation. *Id.* at 6:21–29, Fig. 3. The motor can be controlled by a variable frequency drive (“VFD”). *Id.* at 6:31–33. “Switch gear 22 provides electrical isolation between the electrical output of electricity source 18 and transmission section 14,” and “[s]witch gear 34 provides electrical isolation between line 36 and equipment load 38.” *Id.* at 4:54–56, 5:6–7.

The power generation section is positioned a long distance from the equipment load section. Ex. 1001, 5:13–26. The ’882 patent purports that this spacing of the components advantageously overcomes physical conditions that are present at the fracturing site, such as insufficient space, noise and emissions restrictions local to the area being fractured, and other

restrictions. *Id.* at 5:26–38. Additionally, a single power generation section can be used with multiple equipment load sections by moving the transmission section. *Id.* at 8:8–12, Fig. 5. A transformer can be positioned between the power generation section and the transmission section to increase the transmitted voltage to reduce electrical losses across the long distance of the transmission section. *Id.* at 7:12–28, Fig. 4. A transformer positioned between the transmission section and the equipment load section reduces the voltage as needed by the equipment in the equipment load section. *Id.* at 7:28–36, Fig. 4.

2. Effective Filing Date

The '882 patent claims priority as a continuation-in-part (“CIP”) to application no. 13/679,689 (“the '689 application”), which was filed on November 16, 2012, and issued as the '410 patent, and claims priority to provisional patent application no. 62/802,289 filed on June 16, 2015. Ex. 1001, codes (60), (63); Ex. 1003, 810. Petitioner argues that “[t]he '882 Patent has priority to no earlier than June 16, 2015,” because “the '689 Application fails to provide written-description support for the Challenged Claims.” Pet. 5. Petitioner argues that the '689 application does not provide support for the switch gear recitations of independent claims 1 and 8 or the transformer recitations of dependent claims 2, 3, 6, and 11. *Id.* at 6. Petitioner also argues that “the '882 Patent is not a proper CIP, as it *does not share any* common inventors with the '689 Application.” *Id.* at 6.

Patent Owner asserts that it submitted “a Petition to correct inventorship [of the '882 patent] and to perfect its priority claim as a [CIP of the '410 patent].” PO Resp. 6 (citing Ex. 2014 (petition to add Joel

Broussard as an inventor)). Patent Owner nonetheless “agrees that the ’882 patent is subject to AIA-examination based on its filing date of June 15, 2016.” *Id.*

In order to claim priority to an earlier-filed U.S. patent application, the earlier-filed application must disclose the invention claimed in the later-filed application “in the manner provided by section 112(a) (other than the requirement to disclose the best mode)” and the later-filed application must “name[] an inventor or joint inventor in the previously filed application.” 35 U.S.C. § 120. For the reasons discussed below, we agree with Petitioner that the ’882 patent is not entitled to claim priority to the filing date of the ’689 application.

Each of the independent claims of the ’882 patent recites a first switch gear positioned between a source of electricity and a transmission line and a second switch gear positioned between the transmission line and an electric motor. Ex. 1001, 8:55–57, 9:19–22. “Switchgear” is “[a] general term covering switching and interrupting devices and their combination with associated control, instrumentation, metering, protective and regulating devices.” Ex. 1029,² 7. The ’689 application does not disclose a switch gear. *See generally* Ex. 1004.³ Nor does the ’689 application disclose any switching or interrupting devices or any transformers. *See generally id.* Therefore, we agree that the ’689 application does not disclose the invention claimed in the ’882 patent in the manner required by 35 U.S.C. § 112(a).

² IEEE 100: *The Authoritative Dictionary of IEEE Standards Terms*, 7th ed. (IEEE Press, 2000) (Ex. 1029).

³ Exhibit 1004 is the publication of the ’689 application. Ex. 1004, code (21).

Additionally, we noted in the Institution Decision that the '882 patent does not name an inventor or joint inventor of the '689 application. Inst. Dec. 7–8. Even if Patent Owner's petition to add Mr. Broussard as an inventor is granted, Patent Owner still will not have satisfied the requirements for claiming priority to the '689 application for the reasons set forth above.

Accordingly, for the foregoing reasons, we agree with Petitioner that the '882 patent is not entitled to claim priority to the filing date of the '689 application.

E. The Challenged Claims

Petitioner challenges claims 1–14 of the '882 patent. Pet. 34. Claims 1 and 8 are independent. Claim 1 is illustrative of the challenged claims and is reproduced below.

1. A hydraulic fracturing system for fracturing a subterranean formation comprising:
 - an electric motor;
 - a pump coupled to the motor, and that has a discharge in fluid communication with a wellbore that intersects the formation, so that when the motor is activated and drives the pump, pressurized fluid from the pump pressurizes the wellbore to fracture the formation;
 - a variable frequency drive in communication with the electric motor, and that controls the speed of the motor, and performs electric motor diagnostics to prevent damage to the electric motor;
 - a source of electricity that is disposed a long distance from the electric motor[;]

transmission lines that connect the source of electricity to the electric motor and that span the long distance between the source of electricity and the electric motor; and

a switch gear between the transmission line and the source of electricity, and another switch gear between the transmission line and the electric motor.

Ex. 1001, 8:37–57.

F. Instituted Grounds of Unpatentability

The Petition relies on the following prior art references:

Name	Reference	Exhibit
Broussard	US 2014/0138079 A1, published May 22, 2014	1004
Sanborn	US 2013/0306322 A1, published November 21, 2013	1006
Clarke	US 2014/0077607 A1, published March 20, 2014	1007
Cryer	US 8,997,904 B2, issued April 7, 2015	1008
EE Reference	John A. Camara, PE, <i>Electrical Engineering Reference Manual for the Electrical and Computer PE Exam</i> (6th ed. 2002)	1009

We instituted trial based on all asserted claims and grounds of unpatentability as follows:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–14	103 ⁴	Sanborn
1–14	103	Sanborn, Clarke
1–14	103	Sanborn, EE Reference

⁴ The application resulting in the '882 patent was filed on June 15, 2016, and is subject to the Leahy-Smith American Invents Act's ("AIA"), Pub. L. No. 112–29, 125 Stat. 284 (2011), revisions to 35 U.S.C. § 100 *et seq.*

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–14	103	Cryer, Clarke
1–14	103	Cryer, EE Reference
1–7, 9, 10	103	Sanborn, Broussard
1–7, 9, 10	103	Sanborn, Clarke, Broussard
1–7, 9, 10	103	Sanborn, EE Reference, Broussard
1–7, 9, 10	103	Cryer, Clarke, Broussard
1–7, 9, 10	103	Cryer, EE Reference, Broussard

Pet. 34. Petitioner submits three declarations of Robert A. Durham, Ph.D. (Ex. 1002, “the Durham Declaration”; Ex. 1037; Ex. 1041) in support of its contentions. Patent Owner submitted a declaration of Mr. Robert Schaaf (Ex. 2001) in support of its preliminary responses. Patent Owner also submits a declaration of William D. Marscher, P.E. (Ex. 2015).

II. ANALYSIS

A. Principles of Law

1. *Inter Partes Review*

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). Petitioner bears the burden of persuasion to prove unpatentability of each challenged claim by a preponderance of the evidence. 35 U.S.C. § 316(e). This burden never

shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

2. Obviousness

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious before the effective filing date to a person having ordinary skill in the art to which the subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) when in evidence, any objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). “While the sequence of these questions might be reordered in any particular case” (*KSR*, 550 U.S. at 407), the Federal Circuit has explained that an obviousness determination can be made only after consideration of all of the *Graham* factors. *See, e.g., Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1360 (Fed. Cir. 2012).

B. Level of Ordinary Skill in the Art

The level of ordinary skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). The person of ordinary skill in the art is a hypothetical person presumed to have known the relevant art at the time of the invention. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). In determining the level of ordinary skill in the art, we may consider certain

factors, including: “(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field.” *Best Med. Int’l, Inc. v. Elekta Inc.*, 46 F.4th 1346, 1353 (Fed. Cir. 2022) (citations omitted). “The patent’s purpose can also be informative.” *Id.* (citation omitted).

Petitioner contends that a person having ordinary skill in the art at the time of the invention (“POSITA”) would have either “a Bachelor of Science in Mechanical Engineering, Electrical Engineering, Petroleum Engineering or an equivalent field as well as at least 2 years of academic or industry experience in the oil and gas industry, including well drilling, completion, or production,” or “at least four years of industry experience in the oil and gas industry, including well drilling, completion, or production.” Pet. 15–16 (citing Ex. 1002 ¶ 61).

Patent Owner asserts that it “uses Petitioners’ proposed definition of a person of ordinary skill in the art.” PO Resp. 5.

Based on the arguments presented and the cited references, we find Petitioner’s uncontested definition of the level of ordinary skill reasonable and for purposes of this Decision adopt it as our own.

C. Claim Construction

In an *inter partes* review, claims are construed using the same claim construction standard that would be used to construe the claims in a civil action under 35 U.S.C. § 282(b), including construing the claims in accordance with the ordinary and customary meaning of such claims as

understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100(b). “[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention” and “after reading the entire patent.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313, 1321 (Fed. Cir. 2005) (en banc). In addition to the specification and prosecution history, we also consider use of the terms in other claims and extrinsic evidence including expert and inventor testimony, dictionaries, and learned treatises, although extrinsic evidence is less significant than the intrinsic record. *Id.* at 1312–17. Usually, the specification is dispositive, and it is the single best guide to the meaning of a disputed term. *Id.* at 1315.

The specification may reveal a special definition given to a claim term by the patentee, or the specification may reveal an intentional disclaimer or disavowal of claim scope by the inventor. *Phillips*, 415 F.3d at 1316. If an inventor acts as his or her own lexicographer, the definition must be set forth in the specification with reasonable clarity, deliberateness, and precision. *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998).

“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (alteration in original) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Petitioner argues that “long distance,” as used in claims 1 and 8 should be interpreted to mean “at least one half of a mile.” Pet. 16 (citing Ex. 1001, 5:24–26).

Claim 1 recites “a source of electricity that is disposed a long distance from the electric motor.” Ex. 1001, 8:49–50. Claim 8 similarly recites “a power source that is a long distance from the electric motor.” *Id.* at 9:18–19. The ’882 patent states,

Example distances between power generation system 12 and equipment load section 16 include up to about one mile, up to about five miles, up to about 20 miles, up to about 50 miles, up to about 100 miles, up to about 300 miles, up to about all distances between the cited distances, and about one mile, five miles, 20 miles, 50 miles, 100 miles, 300 miles, and all distances there between. For the purposes of discussion herein, a long distance between a power generation system 12 and equipment load section 16 is at least one half of a mile.

Id. at 5:17–26. The ’882 patent discloses that the equipment load section includes a motor powering a hydraulic fracturing pump. *Id.* at 5:58–6:29, Fig. 2.

Accordingly, we interpret “long distance” as used in the claims to mean “at least one half of a mile.” “Patent Owner agrees with such an interpretation” PO Resp. 6.

We do not expressly construe any additional claims terms, except to the extent we explain how we interpret the claims in the analysis below.

D. Overview of the Asserted Prior Art

1. Broussard

Broussard relates to hydraulic fracturing in oil and gas wells. Ex. 1004 ¶ 2. The system includes pumps powered by electric motors. *Id.*

¶ 18. Generators, such as natural gas turbine generators, are used to power the motors. *Id.* ¶ 24. A control system controls the speed of the motor via a variable frequency drive. *Id.* ¶ 27. The variable frequency drive also provides protection by frequently performing motor diagnostics to prevent damage to a grounded or shorted motor. *Id.* ¶ 21. Broussard purports that its system provides several advantages over systems that use diesel-powered pumps, including lighter weight, increased efficiency, lower cost, and reduced emissions. *Id.* ¶¶ 33–34.

2. Sanborn

Sanborn discloses a system for hydraulically fracturing a rock formation to extract hydrocarbons. Ex. 1006 ¶ 2. Sanborn recognizes that traditional hydraulic fracturing systems comprising diesel engines to power fracturing pumps can be inefficient, can require extra safeguards to address potential safety, noise, and environmental issues, and can have an undesirably large footprint. *Id.* ¶¶ 4–7. Sanborn purports to improve upon such known systems by using electric motors to power the pumps. *Id.* ¶¶ 10–11. Figure 1 is a schematic representation of the hydraulic fracturing system and is reproduced below.

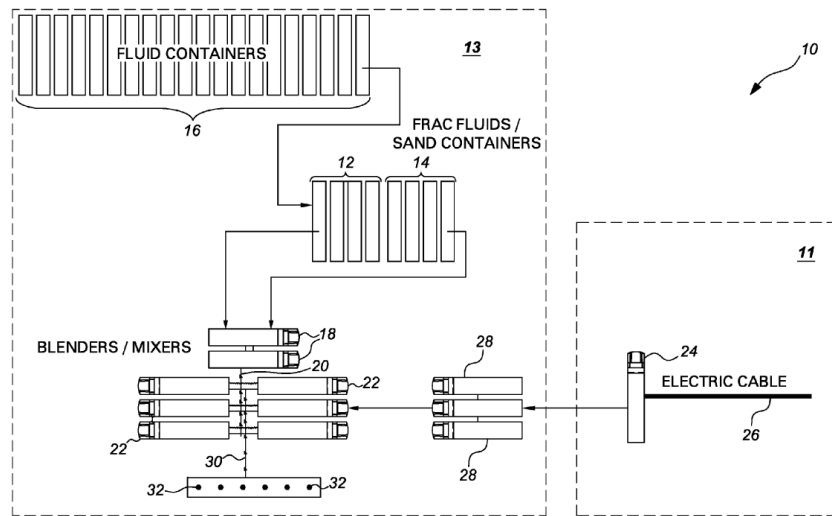


Fig. 1

Figure 1 is a schematic representation of the hydraulic fracturing system, including pumping sub-system 13 and power sub-system 11 that provides energy to the pumping sub-system. *Id.* ¶¶ 17, 33. The power sub-system includes electrical feed source 24, which may include a natural gas turbine engine and which may “be situated in a location remote from the pumping system.” *Id.* ¶¶ 19, 39. The feed source includes a power distribution unit that may use a transformer to reduce the supplied voltage. *Id.* ¶ 39.

Switchgears may be provided to “control multiple lines of power flow, such that faults or failures in individual components or units do not cause secondary damage to other components or units.” *Id.* ¶ 32. The pumping sub-system includes a plurality of pumps 22, each pumper including at least one pump and one or more electric motors to drive the pump(s). *Id.* ¶¶ 21, 38. The pumping sub-system includes variable frequency drives 28 to control the current supplied to the pumps. *Id.* ¶¶ 40–41.

3. *Clarke*

Clarke discloses a power distribution system with a backup generator. Ex. 1007 ¶ 1. Clarke describes typical power generation systems as including a plurality of generators connected to a busbar to provide power to electrical loads, such as the propulsion motors of a marine vessel. *Id.* ¶¶ 3–4, Fig. 1. The motors are connected to the busbar via power converters. *Id.* ¶ 4, Fig. 1. A second busbar, carrying a lower voltage, can be connected to the main busbar to provide power to distribution equipment such as pumps, motors, and fans. *Id.* ¶ 18. The main and secondary busbars can be provided with protective switchgear including circuit breakers and associated controls. *Id.* ¶¶ 17–18, 56–58. Clarke purports to improve upon known power distribution systems by providing a variety of power sources to selectively provide power to the busbar. *Id.* ¶¶ 12, 15, Fig. 2. The additional power sources provide redundancy, which is important for marine vessels. *Id.* ¶ 19.

4. *Cryer*

Cryer discloses a system for powering a pump used in hydraulic fracturing operations. Ex. 1008, 1:6–7, 1:11–15, 2:11–13. Figure 1 is a schematic view of the system and is reproduced below.

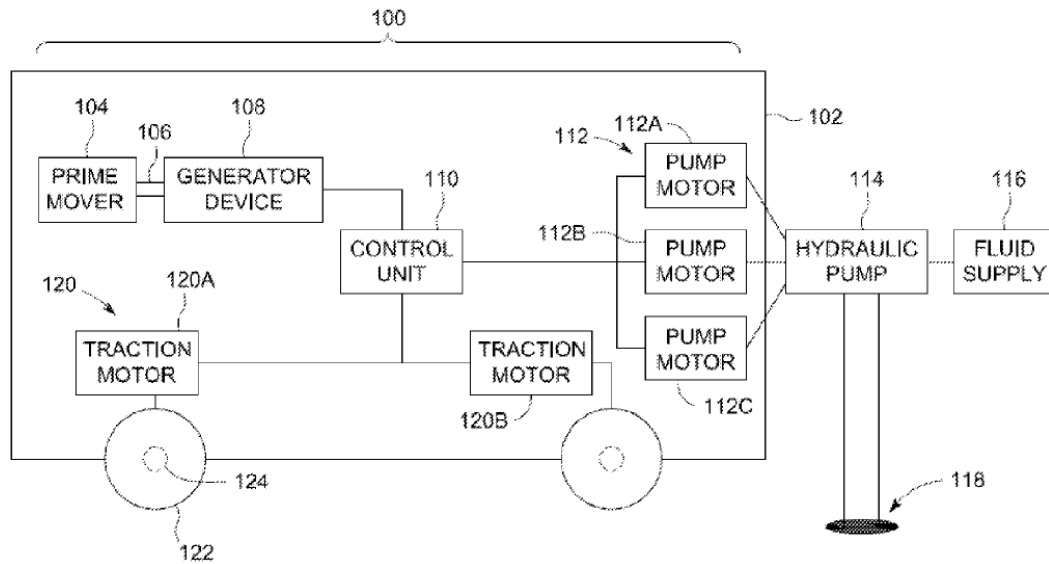


FIG. 1

Figure 1 is a schematic view of hydraulic pump powering system 100, which may be disposed onboard mobile vehicle 102. *Id.* at 5:1–5. The system includes prime mover 104, which may be a turbine powered by natural gas. *Id.* at 5:20–26. The prime mover drives electric current generator device 108. *Id.* at 5:38–45. The current produced by the generator is supplied to control unit 110, which modifies the current. *Id.* at 5:53–54, 5:63–64. The modified current is supplied to pump motors 112, which power hydraulic pumps 114. *Id.* at 7:10–16. The control unit may include a variable frequency drive to control the speed at which the motor operates. *Id.* at 7:5–9, 9:24–32, 9:50–58, 16:46–48.

5. EE Reference

EE Reference is excerpts from a reference book for use in preparing for the Principles and Practice of Engineering (PE) examination in electrical

and computer engineering, as well as for practicing engineers. Ex. 1009, 7.⁵ It includes excerpted information regarding alternating current circuit fundamentals (*id.* at 13–14), transformers (*id.* at 15–20), generation systems (*id.* at 21–23), three-phase electricity and power (*id.* at 24–25), power distribution (*id.* at 26–37), and power transmission lines (*id.* at 38–49).

E. Asserted Obviousness Based on Sanborn

Petitioner argues that claims 1–14 would have been obvious over Sanborn. Pet. 34–58. In support of its showing, Petitioner relies upon the Durham Declaration. *Id.* (citing Ex. 1002). We have reviewed the parties’ briefs and the evidence of record and determine that, for the reasons explained below, Petitioner has shown, by a preponderance of the evidence, that the limitations of claims 1–14 are disclosed or taught by Sanborn and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to modify Sanborn’s system to arrive at the claimed subject matter.⁶

1. Independent Claim 1

a. The Preamble

Claim 1 recites “[a] hydraulic fracturing system for fracturing a subterranean formation.” Ex. 1001, 8:37–38. Petitioner argues that Sanborn

⁵ We note that Exhibit 1009 contains two sets of pagination: the exhibit pagination added by Petitioner and the pagination of the reference itself. We refer to the exhibit pagination.

⁶ For convenience, we address the alleged objective evidence of nonobviousness in a single section (§ II.K) below. To be clear, no ultimate conclusion of obviousness was reached prior to weighing all the pertinent evidence (including the asserted objective indicia), consistent with *Graham*.

discloses such a system. Pet. 35 (citing Ex. 1006, code (57), ¶ 12; Ex. 1002 ¶ 154).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Sanborn discloses a system for hydraulically fracturing a rock formation to extract hydrocarbons. Ex. 1006 ¶¶ 2–3, 10.

Accordingly, for the foregoing reasons, to the extent the preamble is limiting, Sanborn supports Petitioner’s contentions.

b. The Motor Recitation

Claim 1 recites “an electric motor.” Ex. 1001, 8:39. Petitioner argues that Sanborn’s pumping sub-system includes “a multitude of *electric motors*.” Pet. 35 (citing Ex. 1006 ¶¶ 11, 18; Ex. 1002 ¶ 155).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Sanborn discloses that its system includes a pumping sub-system that includes a plurality of pumpers, each pumper including at least one pump and one or more electric motors to drive the pump(s). Ex. 1006 ¶¶ 21, 33, 38.

Accordingly, for the foregoing reasons, Sanborn supports Petitioner’s contentions.

c. The Pump Recitation

Claim 1 recites “a pump coupled to the motor, and that has a discharge in fluid communication with a wellbore that intersects the formation, so that when the motor is activated and drives the pump, pressurized fluid from the pump pressurizes the wellbore to fracture the

formation.” Ex. 1001, 8:40–44. Petitioner argues that each of Sanborn’s pumpers includes one or more pumps. Pet. 35–36 (citing Ex. 1006 ¶¶ 12, 17, 21, 37–38, 42, Figs. 1, 2; Ex. 1002 ¶¶ 156–157). Petitioner argues that Sanborn’s pumps pump pressurized fracturing fluid into a wellbore to fracture a subterranean formation. *Id.* at 37 (citing Ex. 1006, code (57), ¶¶ 10, 17, 44, Figs. 1, 2; Ex. 1002 ¶ 158).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Sanborn discloses that its system includes a pumping sub-system that includes a plurality of pumpers, each pumper including at least one pump and one or more electric motors to drive the pump(s). Ex. 1006 ¶¶ 21, 33, 38. Sanborn discloses that its pumping sub-system is configured to pump pressurized fracturing fluid into a wellbore to fracture solid matter surrounding the wellbore. *Id.* ¶ 10.

Accordingly, for the foregoing reasons, Sanborn supports Petitioner’s contentions.

d. The Variable Frequency Drive Recitation

Claim 1 recites “a variable frequency drive in communication with the electric motor, and that controls the speed of the motor, and performs electric motor diagnostics to prevent damage to the electric motor.” Ex. 1001, 8:45–48. Petitioner argues that Sanborn’s system includes variable frequency drives. Pet. 38–39 (citing Ex. 1006 ¶¶ 40–41, 51, Figs. 1, 2; Ex. 1002 ¶¶ 159–160). Petitioner argues that by controlling the electrical power supplied to the motor “according to desired parameters,” Sanborn’s variable frequency drives perform “electric-motor diagnostics to

reduce strain and prevent motor damage.” *Id.* at 39 (citing Ex. 1006 ¶ 40; Ex. 1002 ¶ 161). Petitioner further argues that it would have been obvious for Sanborn’s variable frequency drives to perform electric motor diagnostics to ensure the desired parameters were achieved. *Id.* Petitioner argues that “standards existing more than a decade before the ’882 Patent directed VFDs to perform electric-motor diagnostics to prevent damage to electric motors” and performing such diagnostics using Sanborn’s variable frequency drive would “merely [be] using known techniques to yield predictable results.” *Id.* at 39–40 (citing Ex. 1006 ¶ 40; Ex. 1002 ¶¶ 162–163; Ex. 1012, 73–74).

Patent Owner interprets Petitioner’s challenge based on Sanborn alone to be an anticipation challenge and argues that Sanborn’s use of its variable frequency drive to control motor voltage is not “an express teaching” of performing electric motor diagnostics because “control can be applied using, for example, manufacturer ratings, without any requirements for *diagnostics* to be performed.” PO Resp. 12; PO Sur-reply 2. Patent Owner also argues that Petitioner’s “cited extrinsic evidence” is “directed to a Power Drive System (PDS)” rather than a variable frequency drive. PO Resp. 13 (citing Ex. 1012, 1–2); PO Sur-reply 4.

Petitioner replies that Patent Owner’s arguments apply “the wrong standard” because “[Patent Owner] argues against anticipation, but [Petitioner’s challenge] is an obviousness challenge.” Pet. Reply 2. Thus, Petitioner argues, Patent Owner’s assertions that Sanborn does not explicitly, implicitly, or inherently disclose performing diagnostics are irrelevant to the challenges presented in the Petition. *Id.* at 3. Continuing, Petitioner argues that the prosecution history of the ’882 patent supports its interpretation of

“electric motor diagnostics.” *Id.* at 5–6 (citing Ex. 1003, 700; Ex. 1002 ¶¶ 47, 108). Petitioner argues that an ordinarily skilled artisan would have understood “that Sanborn’s drive system is, in fact, a PDS, at least because Sanborn’s system *includes* the motor (and would also include sensors and control logic), which is electrically coupled to, and controlled by, the VFD.” *Id.* at 6–7 (citing Ex. 1002 ¶¶ 155, 159; Ex. 1037 ¶¶ 18–19).

Patent Owner replies that, during prosecution of the application resulting in the ’882 patent, “[Patent Owner] did not make responsive arguments or representations during prosecution because such distinction [between preventing damage to the motor by maintaining the variable frequency drive power in the range of the motor input power limits and the recited electric motor diagnostics] is apparent.” PO Sur-reply 3 (citing Ex. 2015 ¶ 32). Patent Owner also includes new arguments in its Sur-reply. *See, e.g., id.* at 3–4.

Rather than asserting anticipation, as suggested by Patent Owner, Petitioner’s challenge based on Sanborn alone asserts that claims 1–14 would have been *obvious* over Sanborn. Pet. 34 (“There is a reasonable likelihood that Claims 1-14 of the ’882 Patent are unpatentable as obvious under 35 U.S.C. §103, as follows.”; “Claims 1-14 of the ’882 Patent are obvious over Sanborn.”); *see also* Inst. Dec. 32 (“Petitioner argues that claims 1–14 would have been obvious over Sanborn. Pet. 34–58.”). Thus, Patent Owner’s arguments directed to anticipation are unavailing.

Furthermore, we agree with Petitioner’s assertions that the prosecution history supports its interpretation that, by controlling the electrical power supplied to the motor according to desired parameters, Sanborn’s variable frequency drives perform electric motor diagnostics.

During prosecution, the Examiner found that Rusnak⁷ taught the “use of a variable frequency drive that performs electric motor (40) diagnostics to prevent damage to the electric motor . . . *by maintaining the variable frequency drive power [in] the range of the motor input power limits.*”

Ex. 1003, 700 (emphasis added) (citations omitted). The Applicant did not oppose the Examiner’s interpretation; rather, the Applicant acquiesced with the interpretation by amending the claims and arguing that such amendments overcame the Examiner’s rejections. *Id.* at 600–05. Patent Owner’s attempt to discount the Applicant’s acceptance of the Examiner’s interpretation by suggesting that the Examiner’s position was so clearly incorrect so as not to warrant response (PO Sur-reply 3 (citing Ex. 2015 ¶ 32)) is unreasoned, unsupported by the cited testimony of Mr. Marscher, and unavailing.

To the extent Patent Owner contends that we should disregard the prosecution history in our interpretation of “electric motor diagnostics,” such contention is improper. Our reviewing court has repeatedly and consistently instructed that the prosecution history should be considered when interpreting claim terms. *E.g.*, *Phillips*, 415 F.3d at 1317 (“we have held that a court ‘should also consider the patent’s prosecution history, if it is in evidence’”); *DeMarini Sports, Inc. v. Worth, Inc.*, 239 F.3d 1314, 1324 (Fed. Cir. 2001) (“We cannot look at the ordinary meaning of [a] term . . . in a vacuum. Rather, we must look at the ordinary meaning in the context of the written description and the prosecution history”); *Multiform Desiccants, Inc. v. Medzam, Ltd.*, 133 F.3d 1473, 1478 (Fed. Cir. 1998) (“The best source for understanding a technical term is the specification

⁷ US 8,774,972 B2, issued July 8, 2014.

from which it arose, informed, as needed, by the prosecution history.”); *see also Graham*, 383 U.S. at 33 (“[A]n invention is construed not only in the light of the claims, but also with reference to the file wrapper or prosecution history in the Patent Office.”).

Additionally, Sanborn discloses,

In some embodiments, at least one variable-frequency drive (VFD) 28 is employed to control the current from electrical feed source 24, according to desired parameters. . . . As those skilled in the art understand, the VFD’s control the frequency of the electrical power supplied to motors, as well as controlling current and voltage. This “controllability” allows energy savings, and reduced strain on each motor, during variable demand in pumping power. The general design and use of VFD’s for an application like that described herein can be carried out by those familiar with electric motor technology and electric power system technology, without undue effort.

Ex. 1006 ¶ 40. Petitioner’s declarant testifies that an ordinarily skilled artisan would have understood this control of motor input according to desired parameters “is an example of performing electric motor diagnostics to prevent damage to the motor.” Ex. 1002 ¶ 161. Petitioner’s declarant also supports Petitioner’s assertions of obviousness. *Id.* ¶¶ 162–163. We credit this testimony, which neither Patent Owner nor its declarant address squarely. *See* PO Resp. 11–14 (citing Ex. 2015 ¶¶ 32, 37–42).

Accordingly, for the foregoing reasons, Sanborn and Dr. Durham’s testimony support Petitioner’s contentions. We further determine that Petitioner has set forth reasoning with rational underpinning explaining why it would have been obvious to use Sanborn’s variable frequency drive to perform electric motor diagnostics. *See, e.g.*, Pet. 39–40; Ex. 1002 ¶¶ 162–163.

e. The Source Recitation

Claim 1 recites “a source of electricity that is disposed a long distance from the electric motor.” Ex. 1001, 8:49–50. Petitioner argues Sanborn discloses that its electrical feed source 24 may be fed by an electrical transmission cable 26 originating from a power sub-station, a power generation facility, or a dedicated power generation subsystem, all of which, Petitioner argues, are exemplary sources of electricity. Pet. 40 (citing Ex. 1006 ¶ 39, claims 5, 16). Petitioner argues that Sanborn discloses that the source of electricity can also be a gas turbine engine located off-site. *Id.* at 41 (citing Ex. 1006 ¶¶ 18–19; Ex. 1002 ¶¶ 164–165). Petitioner argues that an ordinarily skilled artisan would have recognized that a power substation would be several miles from the electric motors. *Id.* at 42.

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Sanborn discloses that its motors can be powered by “a transmission line, sub-station, power generation facility, or a dedicated power generation sub-system,” and that “the power generation system or sub-system may be located on-site or off-site.” Ex. 1006 ¶ 18. Sanborn also discloses that “the electrical feed source may comprise at least one gas turbine engine” that is fueled by natural gas and that “could be situated in a location remote from the pumping system.” *Id.* ¶ 19.

Accordingly, for the foregoing reasons, Sanborn supports Petitioner’s contentions.

f. The Transmission Lines Recitation

Claim 1 recites “transmission lines that connect the source of electricity to the electric motor and that span the long distance between the source of electricity and the electric motor.” Ex. 1001, 8:51–54. Petitioner argues that Sanborn discloses electrical transmission cable 26 and a high-voltage transmission line, and argues that “[i]t was general engineering knowledge that the purpose of high-voltage transmission lines ‘is to span long distances.’” Pet. 43 (citing Ex. 1006 ¶ 39; Ex. 1010, 11–12). Petitioner also maps lines between Sanborn’s electrical feed source and the variable frequency drives and lines between the variable frequency drives and the pumpers to the recited transmission lines. *Id.* Petitioner argues that Sanborn distributes 15–30 MW of power and an ordinarily skilled artisan would have recognized that such a system would be a three-phase system. *Id.* at 45 (citing Ex. 1006 ¶ 46; Ex. 1002 ¶¶ 177–178). Petitioner argues that the ’882 patent refers to each wire in a three-phase system as a transmission line. *Id.* (citing Ex. 1001, 3:1–9).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Sanborn discloses that its large generator unit 50 “can be one capable of providing about 15 MW to about 30 MW of power.” Ex. 1006 ¶ 46. Petitioner’s declarant testifies that “such a power system would be a three-phase system (with multiple conductors), due to the inherent efficiencies and advantages of a three-phase system over single-phase systems at such levels of power.” Ex. 1002 ¶ 178. We agree that the ’882 patent refers to each line within a three-phase transmission system as a separate line. Ex. 1001, 3:6–9.

Accordingly, for the foregoing reasons, Sanborn supports Petitioner's contentions.

g. The Switch Gear Recitation

Claim 1 recites "a switch gear between the transmission line and the source of electricity, and another switch gear between the transmission line and the electric motor." Ex. 1001, 8:55–57. Petitioner argues that Sanborn discloses the use of switchgear and indicates that skilled artisans would have known the way in which it should have been deployed. Pet. 46 (citing Ex. 1006 ¶¶ 31–32). Petitioner argues that "Sanborn teaches that switchgear would be located in electrical feed source 24 . . . , which is between the transmission line . . . and electric motors." *Id.* (citing Ex. 1006, Figs. 1, 2). Petitioner argues that "Sanborn also teaches switchgear located between the transmission line and sources of electricity." *Id.* at 48. According to Petitioner, "[s]uch switchgear would allow operators to connect and disconnect individual generators and motors, such as in response to fault or to perform maintenance or relocate the component." *Id.* at 49 (citing Ex. 1009, Fig. 35.1; Ex. 1010, Fig. 2.1; Ex. 1002 ¶¶ 186–187).

Patent Owner contests Petitioner's showing. PO Resp. 15–21. First, Patent Owner argues that Sanborn does not explicitly disclose switchgear as recited in claim 1. *Id.* at 15. Patent Owner interprets Sanborn as disclosing a single switchgear. *Id.* (citing Ex. 1006 ¶¶ 31–32).

Petitioner argues that its challenge is based on obviousness, which does not require an explicit disclosure. Pet. Reply 7–8. Petitioner also argues that "switchgear" is used in the relevant art in both singular and

plural contexts. *Id.* at 8 (citing Ex. 1002 ¶ 43;⁸ Ex. 1037 ¶ 22; Ex. 1036, 30:16–22).

We agree with Petitioner that Patent Owner again misinterprets the challenge as being an anticipation assertion, and its arguments are unavailing. We further agree with Petitioner that the record indicates that “switchgear” is used in the art in both singular and plural contexts. *See* Ex. 1002, 26 n. 1 (Petitioner’s declarant testifying, “I note that engineers typically refer to ‘switchgear’ in both the singular (e.g., one switchgear) and plural (e.g., two switchgear, a set of switchgear, two switchgear units, etc.)”); Ex. 1036, 30:16–22 (Patent Owner’s declarant, Mr. Marscher, testifying that “the plural form of the word switchgear” is “switchgear”).

Next, Patent Owner acknowledges that Sanborn teaches positioning switchgear between the electricity source and the transmission lines, but argues that Sanborn does not explicitly or inherently disclose switchgear positioned between the transmission lines and the electrical load. PO Resp. 16–19. Patent Owner again interprets Sanborn as disclosing a singular switchgear. *Id.* at 16. Patent Owner argues that Petitioner relies only on common sense to teach the second switchgear. PO Resp. 19–21; PO Sur-reply 4.

Petitioner replies by reiterating the arguments advanced in the Petition. Pet. Reply 8–10. Petitioner argues that Patent Owner’s declarants, Messrs. Schaaf and Marscher, agree that it was known in the art to place switchgear on both sides of the transmission line when multiple generators provide power to multiple loads. *Id.* at 11–13 (citing Ex. 1035, 15:2–17,

⁸ Although Petitioner cites to paragraph 143, the quoted language appears in a footnote referenced in paragraph 43.

16:1–9, 17:16–18:19, 33:24–34:11; Ex. 1036, 136:21–137:18, 148:19–149:12).

Patent Owner replies that Petitioner mischaracterizes Sanborn’s disclosure. PO Sur-reply 5–6. According to Patent Owner, an ordinarily skilled artisan would have understood Sanborn to suggest “one switchgear between the single electrical feed source and the transmission line to the electric motors.” *Id.* at 6–7 (citing Ex. 1006 ¶ 11; Ex. 2015 ¶¶ 40–43). Patent Owner also disagrees with Petitioner’s interpretation of the testimony of Patent Owner’s declarants. *Id.* at 7–8.

Patent Owner’s arguments directed to anticipation do not address Petitioner’s challenge and are unavailing. Furthermore, as noted above, the record indicates that “switchgear” is used in both the singular and plural contexts. In paragraph 31, Sanborn discusses pluralities of pieces of equipment: “transformers, power distribution components, . . . cables, hoses, . . . cranes, [and] fluid pumps.” Ex. 1006 ¶ 31. Thus, we understand Sanborn’s use of “switchgear” in the same paragraph also to be in the plural context, and we disagree with Patent Owner’s interpretation that Sanborn “merely . . . disclos[es a] singular switchgear.” PO Resp. 16.

Additionally, Sanborn discloses that its fracturing system can include other equipment such as switchgear and that “[t]hose familiar with drilling and fracturing operations understand the purpose of this other equipment, as well as the way in which it is deployed at the site.” Ex. 1006 ¶ 31. Sanborn further discloses that its “switchgear and power distribution components provide a number of important attributes to the fracturing operation,” including “provid[ing] distribution and sharing of the total power from the generation sub-system, to and among the units of the pumping sub-system.”

Id. ¶ 32; *see also* Pet. 47 (citing same). Petitioner's declarant, Dr. Durham, interprets this disclosure as indicating the placement of switchgear between the transmission lines and the electric motors. Ex. 1002 ¶ 182. Dr. Durham further testifies,

a POSITA would have known to place switchgear in multiple locations in the power distribution system, particularly at locations where portions of the power system need to be disconnected either manually or automatically. For example, a POSITA would have known to deploy switchgear between the transmission line and the source of electricity (e.g., generators) in order to disconnect individual generators, such as if there were a fault or to relocate or test the generator. A POSITA would have also known to deploy switchgear between the transmission line and the electric motors, such as to disconnect motors in case of a fault or in case the motors needed to be moved to another location or tested.

Id. ¶ 187. We credit this uncontested testimony of Dr. Durham.

Accordingly, for the foregoing reasons, Sanborn and Dr. Durham's testimony support Petitioner's contentions. We further determine that Petitioner has set forth reasoning with rational underpinning explaining why it would have been obvious to place switchgear between the source of electricity and the transmission lines and between the electric motors and the transmission lines. *See, e.g.*, Pet. 48–49; Ex. 1002 ¶¶ 187–188.

h. Conclusion

For the foregoing reasons, we conclude that Petitioner has shown, by a preponderance of the evidence, that the limitations of claim 1 are disclosed, taught, or suggested by Sanborn, and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to modify Sanborn's system to arrive at the claimed subject matter.

2. Independent Claim 8

Claim 8 recites a method comprising driving a pump with an electric motor, transmitting electricity to the motor from a power source spaced from the motor via a transmission line with switchgear positioned between the transmission line and the source of electricity and between the transmission line and the motor, pressurizing a fluid with the pump, and fracturing a subterranean formation with the pressurized fluid. Ex. 1001, 9:14–27. In large part, Petitioner refers to its contentions regarding claim 1 in arguing that claim 8 would have been obvious over Sanborn. *See* Pet. 54–55.

Patent Owner does not contest Petitioner’s contentions regarding claim 8 apart from its arguments discussed in § II.E.1 above. PO Resp. 38.

For the reasons set forth in § II.E.1 above, we conclude that Petitioner has shown, by a preponderance of the evidence, that the limitations of claim 8 are disclosed, taught, or suggested by Sanborn, and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to modify Sanborn’s system to arrive at the claimed subject matter.

3. Dependent Claims 2–7 and 9–14

Claim 2 depends directly from claim 1 and further recites “a transformer between the transmission line and the source of electricity.” Ex. 1001, 8:58–60. Claim 3 depends directly from claim 1 and further recites “a transformer between the transmission line and the electric motor.” *Id.* at 8:61–63. Petitioner notes that Sanborn discloses that its electrical feed source can include multiple transformers and argues that placement of such transformers, such as a “step-up” transformer between the transmission line and the source of electricity “[t]o prepare the electricity for transmission

over long distances” and a “step-down” transformer between the transmission line and the electric motor “to reduce voltage to be safe ‘for industrial, commercial, and household use,’” would have been “merely the application of general engineering knowledge.” Pet. 49–50 (citing Ex. 1006 ¶¶ 31, 39; Ex. 1009, 28-1, 36-1; Ex. 1010, 8, 10, 12; Ex. 1002 ¶¶ 189–190).

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.E.1 above. PO Resp. 38.

Sanborn discloses a transformer between its high-voltage transmission line and its system equipment, including the electric motor, to reduce the voltage coming from the electrical cable. Ex. 1006 ¶ 39. Petitioner’s declarant testifies that it would have been obvious to include a “step-up” transformer between the source of electricity, which “produces electricity at a relatively low voltage,” and the transmission line to “prepare the electricity for transmission over long distances.” Ex. 1002 ¶ 190. We credit this uncontested testimony of Dr. Durham.

Accordingly, on this record, Sanborn and Dr. Durham’s testimony support Petitioner’s contentions.

Claim 4 depends directly from claim 1 and further recites “wherein the source of electricity is selected from the group consisting of a utility outlet, a turbine generator, and a reciprocating engine generator.” Ex. 1001, 8:64–67. Petitioner argues that Sanborn discloses a gas turbine generator, an internal combustion engine, and utility outlets as the source of electricity. Pet. 51 (citing Ex. 1006 ¶¶ 18–19, 46, 48; Ex. 1002 ¶ 195).

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.E.1 above. PO Resp. 38.

For the reasons set forth in § II.E.1.e above, Sanborn supports Petitioner’s contentions.

Claim 5 depends from claim 1 through claim 4 and further recites “an electric equipment room in communication with the turbine generator and which controls operation of the turbine generator.” Ex. 1001, 9:1–4. Petitioner maps Sanborn’s tractor trailers to the recited electric equipment room and argues that the tractor trailers “include a control system in communication with, and controlling operation, of the turbine generator.” Pet. 51 (citing Ex. 1006 ¶¶ 25, 30, 40, 50). Petitioner also argues that it would have been obvious “to control the turbine generator from an electrical equipment room to protect operators (and the control equipment) from exposure to dirty and dangerous environments.” *Id.* at 52 (citing Ex. 1002 ¶¶ 196–198).

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.E.1 above. PO Resp. 38.

Sanborn discloses that hydraulic fracturing operations include a number of different types of equipment and operational units on-site, including “an operations and control unit,” which is “usually computer-based, and contain[s] monitoring, data-recording, and communication equipment, as well as remote pumper controls to monitor and control each stage of the fracturing process, and to record data for each phase.” Ex. 1006 ¶¶ 25–30. Sanborn also discloses that hydraulic fracturing operations also

include “at least one platform . . . , such as a tractor trailer bed[,] to support motors, generators, pumps[,] and blenders.” *Id.* ¶ 29. Sanborn further discloses that its “components . . . can be deployed on tractor trailers or other suitable platforms.” *Id.* ¶ 40. Additionally, the testimony of Petitioner’s declarant supports Petitioner’s obviousness contentions. *See* Ex. 1002 ¶ 198.

Accordingly, on this record, Sanborn and Dr. Durham’s testimony support Petitioner’s contentions.

Claim 6 depends directly from claim 1 and further recites “a transformer between the switch gear and the electric motor.” Ex. 1001, 9:5–7. Petitioner references its arguments made regarding claims 2 and 3 and argues that “Sanborn motivates a POSITA to have placed a transformer between switchgear and the motor in order to allow the transformer and motor to be disconnected (e.g., for repair or testing).” Pet. 52 (citing Ex. 1006 ¶ 32). Petitioner argues that the recited placement of a transformer “is merely the application of basic engineering principles.” *Id.* at 52–53 (citing Ex. 1002 ¶¶ 199–200).

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.E.1 above. PO Resp. 38.

Sanborn discloses that its “switchgear and power distribution components provide a number of important attributes to the fracturing operation,” including interrupting “selected power flow . . . for the purpose of maintenance and other field operations,” which “allows other units in the power generation or pumping sub-systems to be employed as appropriate, while such maintenance and field operations are being carried out.”

Ex. 1006 ¶ 32. Petitioner’s declarant testifies that “[i]t was generally known to place switchgear in multiple locations in the power distribution system, particularly at locations where voltage changes or where portions of the power system need to be disconnected either manually or automatically” and that an ordinarily skilled artisan “would be motivated to include a transformer between the switchgear and electric motor to allow the transformer to be disconnected, such as for purposes of maintenance.”

Ex. 1002 ¶ 199. We credit this uncontested testimony of Dr. Durham.

Accordingly, on this record, Sanborn and Dr. Durham’s testimony support Petitioner’s contentions.

Claim 7 depends directly from claim 1 and further recites “wherein the electric motor comprises a first electric motor, the system further comprising a multiplicity of electric motors, and wherein the transmission lines are selectively moveable at different times to provide electrical communication between the source of electricity and the multiplicity of motors.” Ex. 1001, 9:8–13. Petitioner argues that Sanborn discloses “a multitude of electric motors” and that it would have been obvious for the transmission lines to be selectively movable “because the electric motors to which they connect are located on movable vehicles.” Pet. 53 (citing Ex. 1006 ¶¶ 11, 18, 25, 40, Figs. 1–2; Ex. 1002 ¶¶ 202–203).

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.E.1 above. PO Resp. 38.

As noted above, Sanborn discloses that its system includes a pumping sub-system that includes a plurality of pumpers, each pumper including at least one pump and one or more electric motors to drive the pump(s).

Ex. 1006 ¶¶ 21, 33, 38. The motors are supported on mobile platforms, such as tractor trailer beds. *Id.* ¶¶ 23, 29. The motors are powered by the electrical feed source, which can receive power from a high-voltage transmission line. *Id.* ¶¶ 18, 24, 39.

Accordingly, on this record, Sanborn supports Petitioner's contentions.

Claim 9 depends directly from claim 8 and further recites "controlling a speed of the motor with a variable frequency drive." Ex. 1001, 9:28–29. Petitioner relies on its showing made for the Variable Frequency Drive Recitation of claim 1. Pet. 55.

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.E.1 above. PO Resp. 38.

For the reasons set forth in § II.E.1.d above, Sanborn supports Petitioner's contentions.

Claim 10 depends from claim 8 through claim 9 and further recites "comprising performing diagnostics on the electric motor with the variable frequency drive." Ex. 1001, 9:30–32. Petitioner relies on its showing made for the Variable Frequency Drive Recitation of claim 1. Pet. 55.

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.E.1 above. PO Resp. 38.

For the reasons set forth in § II.E.1.d above, Sanborn supports Petitioner's contentions.

Claim 11 depends directly from claim 8 and further recites “increasing a voltage of the electricity proximate the power source with a transformer, and decreasing the voltage of the electricity proximate the electric motor.” Ex. 1001, 10:1–4. Petitioner relies on its showing made for claims 2 and 3. Pet. 55.

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.E.1 above. PO Resp. 38.

For the reasons set forth regarding claims 2 and 3 above, Sanborn supports Petitioner’s contentions.

Claim 12 depends directly from claim 8 and further recites “suspending electrical communication between the power source and the electric motor with one of a cutout or a switch gear.” Ex. 1001, 10:5–7. Petitioner relies on its showing made for the Switch Gear Recitation of claim 1 and argues that, “[b]y disconnecting the power source from the motor using switchgear, that suspends electrical communication.” Pet. 56 (citing Ex. 1006 ¶ 32).

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.E.1 above. PO Resp. 38.

For the reasons set forth in § II.E.1.g above, Sanborn supports Petitioner’s contentions.

Claim 13 depends directly from claim 8 and further recites, wherein the electric motor comprises a first electric motor, the pump comprises a first pump, the wellbore comprises a first wellbore, and the subterranean formation comprises a first subterranean formation, and wherein the step of transmitting

electricity to the electric motor comprises transmitting electricity across a transmission section that has an end in electrical communication with the power source, and another end that is in electrical communication with the first electric motor, the method further comprising,

disconnecting the end of the transmission section that is in communication with the first electric motor and reconnecting that end to a second electric motor is a long distance from the power supply and that is connected to a second pump, and pressurizing fluid with the second pump and directing the pressurized fluid to a second wellbore for fracturing a second subterranean formation.

Ex. 1001, 10:8–25. Petitioner relies on its showing made for the Pump and Variable Frequency Drive Recitations of claim 1 and its showing made for claim 7. Pet. 56–57.

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.E.1 above. PO Resp. 38.

For the reasons set forth in §§ II.E.1.c and II.E.1.d and regarding claim 7 above, Sanborn supports Petitioner’s contentions.

Claim 14 depends directly from claim 8 and further recites “wherein the power source comprises a power generation section that includes devices selected from the group consisting of a utility outlet, a turbine generator, and an electrical equipment room.” Ex. 1001, 10:25–28. Petitioner relies on its showing made for claims 4 and 5. Pet. 58.

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.E.1 above. PO Resp. 38.

For the reasons set forth in § II.E.1.e above, Sanborn supports Petitioner’s contentions.

For the foregoing reasons, we conclude that Petitioner has shown, by a preponderance of the evidence, that the limitations of claims 2–7 and 9–14 are disclosed, taught, or suggested by Sanborn, and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to modify Sanborn’s system to arrive at the claimed subject matter.

F. Asserted Obviousness Based on Sanborn and Clarke

Petitioner argues that claims 1–14 would have been obvious over Sanborn and Clarke. Pet. 58–77. In support of its showing, Petitioner relies upon the Durham Declaration. *Id.* (citing Ex. 1002). We have reviewed the parties’ briefs and the evidence of record and determine that, for the reasons explained below, Petitioner has shown, by a preponderance of the evidence, that the limitations of claims 1–14 are disclosed by the combination of Sanborn and Clarke and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to combine the teachings of these references to arrive at the claimed subject matter.

1. Independent Claims 1 and 8

Petitioner relies on Sanborn as set forth in § II.E.1 above and relies on Clarke to teach locations where switchgear would be positioned. Pet. 62–63. Petitioner argues that Clarke discloses two busbars, each of which being equipped with protective switchgear. *Id.* (citing Ex. 1007 ¶¶ 8, 17–19, 56, 58; Ex. 1002 ¶¶ 233–236). Petitioner argues that Sanborn discloses “an ‘islanded operation’” and that an ordinarily skilled artisan would “look to other islanded power systems in the oil-and-gas space to provide load-sharing among generators, increase reliability through redundancy, and operate motors at a desired voltage.” *Id.* at 60 (citing Ex. 1006 ¶ 18;

Ex. 1029, 591; Ex. 1002 ¶ 226). Petitioner argues that Clarke discloses such a system. *Id.* (citing Ex. 1007 ¶¶ 1–2; Ex. 1002 ¶ 227).

Patent Owner contests Petitioner’s showing. PO Resp. 21–27. First, Patent Owner reiterates its arguments advanced for the challenge based on Sanborn alone (*id.* at 21–23), which we find unavailing for the reasons explained above.

Next, Patent Owner argues that “Petitioner’s motivations to combine are arbitrary” because Clarke’s arrangement of busbars and switchgear is not the same as the recited arrangement, which includes transmission lines. PO Resp. 23–24 (citing Ex. 2015 ¶¶ 34, 36). Patent Owner also argues that Clarke discloses only redundant busbars. *Id.*

Petitioner argues that Clarke discloses two, non-redundant busbars: high voltage busbar 2 and low voltage busbar LV, with each busbar having its own switchgear. Pet. Reply 14–17 (citing Ex. 1007 ¶¶ 8, 18–19, 58, Fig. 1).

Patent Owner replies that Petitioner mischaracterizes Clarke’s disclosure. PO Sur-reply 9–10.

Sanborn states that its system may include other equipment, such as power distribution equipment and switchgear, and that an ordinarily skilled artisan would understand the purpose of this equipment and the way in which it is deployed. Ex. 1006 ¶ 31. Clarke discusses power distribution equipment that may be used in drilling rigs. Ex. 1007 ¶¶ 1–2. Clarke discloses the use of busbars to provide power to electrical loads. *Id.* ¶¶ 3–4, Fig. 1. The vessel propulsion motors are connected to a main busbar via power converters. *Id.* ¶ 4, Fig. 1. A second busbar, carrying a lower voltage, can be connected to the main busbar to provide power to

distribution equipment such as pumps, motors, and fans. *Id.* ¶ 18. The main and secondary busbars can be provided with protective switchgear including circuit breakers and associated controls. *Id.* ¶¶ 17–18, 56–58. Clarke purports to improve upon known power distribution systems by providing a variety of power sources to selectively provide power to the busbar. *Id.* ¶¶ 12, 15, Fig. 2. The additional power sources provide redundancy. *Id.* ¶ 19. Thus, Sanborn and Clarke support Petitioner’s contentions.

We further note that both Sanborn (*see, e.g.*, Ex. 1006, Fig. 2) and Clarke (*see, e.g.*, Ex. 1007, Figs. 1, 2) disclose the use of multiple generators. Petitioner’s declarant testifies that “[t]he arrangement of switchgear, transformers and loads disclosed by Clarke is a well-known arrangement of such equipment” and that “[i]t would have been obvious for a POSITA to improve the power distribution system of Sanborn according to the arrangement of equipment disclosed by Clarke in order to provide for load sharing among generators, increase reliability through redundancy and allow for operation of motors at a desired voltage.” Ex. 1002 ¶ 228. We credit this testimony, which neither Patent Owner nor its declarant address squarely. *See* PO Resp. 24 (citing Ex. 2015 ¶¶ 34, 36).

Next, Patent Owner argues that the Petition does not set forth adequate reasoning to combine Sanborn and Clarke because Clarke “is directed to marine propulsion systems for marine vessels” and Sanborn does not disclose an islanded operation. PO Resp. 24–26; PO Sur-reply 11–13.

Petitioner argues that Patent Owner’s declarant, Mr. Marscher, agreed that a dedicated power generation system that is located on site at a fracturing site is an example of an islanded operation. Pet. Reply 18–19 (citing Ex. 1036, 134:16–135:1). Petitioner argues that Sanborn discloses

such an on-site power generation system and, thus, discloses an islanded operation. *Id.* at 19 (citing Ex. 1006, ¶¶ 18–19; Ex. 1002 ¶¶ 226–227; Ex. 1037 ¶ 33).

Patent Owner’s arguments are unavailing. Sanborn discloses that its motors can be powered by a dedicated on-site power generation sub-system. Ex. 1006 ¶ 18. As noted by Petitioner, Patent Owner’s declarant concedes that such an arrangement is an islanded operation. Ex. 1036, 134:2–20.

Next, Patent Owner argues that Petitioner’s reasoning to combine the asserted references is based on hindsight because Petitioner has not shown the asserted references address the same problem that is addressed by the ’882 patent. PO Resp. 26–27 (citing *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998)); PO Sur-reply 13–14.

Petitioner argues that Patent Owner’s reliance on *In re Rouffet* is misplaced because that case was overruled by *KSR*. Pet. Reply 20 (citing *In re Conrad*, 759 Fed. App’x 982, 985 (Fed. Cir. 2019)). Moreover, Petitioner argues, Sanborn discloses the same problem of the ’882 patent of reducing the use of diesel engines. *Id.* (citing Ex. 1006 ¶¶ 7–8).

We disagree with Patent Owner’s assertion that, in an obviousness combination, the rationale to combine references must be based on a problem identified in the challenged patent. Patent Owner’s arguments appear to require that a teaching, suggestion, or motivation (“TSM”) be disclosed expressly by the references. However, the Supreme Court has “reject[ed] th[is] rigid approach.” *KSR*, 550 U.S. at 415; *see also id.* at 419 (“There is no necessary inconsistency between the idea underlying the TSM test and the *Graham* analysis. But when a court transforms the general principle into a rigid rule that limits the obviousness inquiry, . . . it errs.”).

Although TSM is one manner in which a rationale supporting obviousness can be established, it is not the only manner. Rather, the rationale for modifying or combining reference teachings may arise from a number of sources, including the interrelated teachings of multiple prior art references. *See id.* at 415–21. As discussed above, the Petition sufficiently sets forth reasoning why an ordinarily skilled artisan would have looked to the teachings of Clarke and combined those teachings with Sanborn.

Accordingly, for the foregoing reasons and those set forth in § II.E.1 above, we conclude that Petitioner has shown, by a preponderance of the evidence, that the limitations of claims 1 and 8 are disclosed by the combination of Sanborn and Clarke, and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to combine the teachings of these references to arrive at the claimed subject matter. *See, e.g.*, Pet. 60; *see also* Ex. 1002 ¶ 228.

2. Dependent Claims 2, 3, and 6

Petitioner relies on Sanborn as set forth in § II.E and relies on Clarke to teach locations where transformers would be positioned. Pet. 66–71. Petitioner argues that Clarke discloses transformers positioned as recited in claims 2, 3, and 6,⁹ reproducing and annotating copies of Clarke Figure 1 to illustrate its contentions. *Id.* at 67–70 (citing Ex. 1007, Figs. 1–3, ¶¶ 8, 10, 17–18, 56, 58; Ex. 1002 ¶¶ 239–246). Petitioner argues that positioning transformers in this manner would be “merely the application of basic

⁹ Although Petitioner discusses claim 11 in this challenge, Petitioner relies only on its arguments advanced for the challenge based on Sanborn alone. *See* Pet. 70–71. Thus, we understand claim 11 not to be challenged based on the teachings of Clarke in combination with Sanborn.

engineering principles to yield predictable results, results which were known decades before the '882 Patent. Such results (increasing voltage before transmission and decreasing voltage after transmission) were readily calculable and predictable.” Pet. 66 (citing Ex. 1002 ¶¶ 238, 242, 246, 260–261).

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.F.1 above. PO Resp. 38.

We find the cited portions of Clarke and Dr. Durham’s testimony to establish, by a preponderance of the evidence, that the limitations of claim 2, 3, and 6 are disclosed by the combination of Sanborn and Clarke, and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to combine the teachings of these references to arrive at the claimed subject matter. *See* Pet. 66.

3. Dependent Claims 4, 5, 7, and 9–14

Petitioner does not rely on the specific teachings of Clarke in its challenge to claims 4, 5, 7, and 9–14, instead relying on its arguments presented above regarding the challenge based on Sanborn alone. *See* Pet. 58 (“Elements and claims not mentioned below are disclosed or rendered obvious for the reasons stated in [the challenge based on Sanborn alone], incorporated herein by reference in its entirety.”).

For the reasons set forth in § II.E.3 above, we conclude that Petitioner has shown, by a preponderance of the evidence, that the limitations of these claims are disclosed or taught by Sanborn, and that Petitioner has set forth

reasoning with rational underpinning why it would have been obvious to modify Sanborn's system to arrive at the claimed subject matter.

G. Asserted Obviousness Based on Sanborn and EE Reference

Petitioner argues that claims 1–14 would have been obvious over Sanborn and EE Reference. Pet. 58–77. In support of its showing, Petitioner relies upon the Durham Declaration. *Id.* (citing Ex. 1002). We have reviewed the parties' briefs and the evidence of record and determine that, for the reasons explained below, Petitioner has shown, by a preponderance of the evidence, that the limitations of claims 1–14 are disclosed by the combination of Sanborn and EE Reference and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to combine the teachings of these references to arrive at the claimed subject matter.

1. Independent Claims 1 and 8

Petitioner relies on Sanborn as set forth in § II.E.1 above and relies on EE Reference to teach locations where switchgear would be positioned. Pet. 64–65. Petitioner argues that Sanborn discloses use of a conventional distribution circuit that includes switchgear and transformers, and an ordinarily skilled artisan would place the switchgear at the locations disclosed by EE Reference. *Id.* at 60–61 (citing Ex. 1006 ¶¶ 31–32, 39). Petitioner argues that EE Reference discloses conventional locations for switchgear, including between a transmission line and a source of electricity and between the transmission line and electric loads. *Id.* at 64–65 (citing

Ex. 1009, 26–27,¹⁰ Fig. 35-1). Petitioner reproduces copies of EE Reference Figure 35-1 annotated with green boxes to illustrate its identification of switchgear. *Id.* Petitioner argues that an ordinarily skilled artisan would have relied upon the teachings of EE Reference regarding switchgear and transformer placement because “EE-Reference ‘presents a thorough review of the fundamentals of electrical engineering’ to ‘PE candidates, practicing engineers, and engineering students.’” *Id.* at 61 (citing Ex. 1009, Preface); *see also id.* at 32 (“EE-Reference provides ‘a broad review of electrical engineering design, analysis, and operational fundamentals.’” (citing Ex. 1009, Preface)).

Patent Owner contests Petitioner’s showing. PO Resp. 27–32. First, Patent Owner reiterates its arguments advanced for the challenge based on Sanborn alone (*id.* at 28), which we find unavailing for the reasons explained above.

Next, Patent Owner argues that the equipment in EE Reference Figure 35.1 identified by Petitioner with green blocks are several breakers rather than switchgear. PO Resp. 28. Patent Owner argues that Petitioner does not explain adequately why an ordinarily skilled artisan would choose a particular one of the several transmission layers disclosed by EE Reference. *Id.*; PO Sur-reply 14–15.

Petitioner argues that its declarant, Dr. Durham, “provides ample background facts describing switchgear placement.” Pet. Reply 21 (citing Ex. 1002 ¶¶ 78–81, 248–259; Ex. 1037 ¶ 35).

¹⁰ When referencing EE Reference, Petitioner cites to the pagination of the reference itself. *See, e.g.*, Pet. 65. We convert Petitioner’s citations to the exhibit pagination.

Sanborn states that its system may include other equipment, such as power distribution equipment and switchgear, and that an ordinarily skilled artisan would understand the purpose of this equipment and the way in which it is deployed. Ex. 1006 ¶ 31. EE Reference is a reference manual for electrical engineers and describes a typical electrical distribution system from an electric utility to a consumer that includes generators, transmission lines, circuit breaker switchgear, and transformers. Ex. 1009, 26–28, Fig. 35.1; *see also* Ex. 1029, 7 (defining “switchgear” as “[a] general term covering switching and interrupting devices and their combination with associated control, instrumentation, metering, protective and regulating devices”). Thus, we are persuaded that an ordinarily skilled artisan would look to EE Reference when implementing Sanborn’s power distribution equipment. *See* Pet. 60–61. We further agree that the circuit breakers identified by Petitioner are switchgear. We further determine that Petitioner has set forth reasoning with rational underpinning explaining why it would have been obvious to position switchgear in Sanborn’s system as described in EE Reference. *See, e.g.*, Pet. 61; Ex. 1002 ¶¶ 252–253.

Next, Patent Owner repeats its hindsight arguments based on *In re Rouffet* (PO Resp. 30–31), which we find unavailing for the reasons explained above.

Accordingly, for the foregoing reasons and those set forth in § II.E.1 above, we conclude that Petitioner has shown, by a preponderance of the evidence, that the limitations of claims 1 and 8 are disclosed by the combination of Sanborn and EE Reference, and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to

combine the teachings of these references to arrive at the claimed subject matter. *See, e.g.*, Pet. 61; Ex. 1002 ¶¶ 252–253.

2. Dependent Claims 2, 3, 6, and 11

Petitioner relies on Sanborn as set forth in § II.E and relies on EE Reference to teach locations where transformers would be positioned. Pet. 71–77. Petitioner argues that EE Reference discloses transformers positioned as recited in claims 2, 3, 6, and 11, reproducing and annotating copies of EE Reference Figure 35-1 to illustrate its contentions. *Id.* (citing Ex. 1009, Fig. 35-1; Ex. 1002 ¶¶ 260–265). Petitioner argues that positioning transformers in this manner would be “merely the application of basic engineering principles to yield predictable results, results which were known decades before the ’882 Patent. Such results (increasing voltage before transmission and decreasing voltage after transmission) were readily calculable and predictable.” Pet. 66 (citing Ex. 1002 ¶¶ 238, 242, 246, 260–261); *see also* Ex. 1009, 15 (explaining that a transformer “enables the efficient transmission of electrical energy at high voltage over great distances, and then is used to lower the voltage to safe values for industrial, commercial, and household use”).

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.G.1 above. PO Resp. 38.

We find the cited portions of EE Reference and Dr. Durham’s testimony to establish, by a preponderance of the evidence, that the limitations of claims 2, 3, 6, and 11 are disclosed by the combination of Sanborn and EE Reference, and that Petitioner has set forth reasoning with

rational underpinning why it would have been obvious to combine the teachings of these references to arrive at the claimed subject matter. *See* Pet. 66.

3. Dependent Claims 4, 5, 7, 9, 10, and 12–14

Petitioner does not rely on the specific teachings of EE Reference in its challenge to claims 4, 5, 7, 9, 10, and 12–14, instead relying on its arguments presented above regarding the challenge based on Sanborn alone. *See* Pet. 58 (“Elements and claims not mentioned below are disclosed or rendered obvious for the reasons stated in [the challenge based on Sanborn alone], incorporated herein by reference in its entirety.”).

For the reasons set forth in § II.E.3 above, we conclude that Petitioner has shown, by a preponderance of the evidence, that the limitations of these claims are disclosed or taught by Sanborn, and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to modify Sanborn’s system to arrive at the claimed subject matter.

H. Asserted Obviousness Based on Cryer and Clarke

Petitioner argues that claims 1–14 would have been obvious over Cryer and Clarke. Pet. 77–101. In support of its showing, Petitioner relies upon the Durham Declaration. *Id.* (citing Ex. 1002). We have reviewed the parties’ briefs and the evidence of record and determine that, for the reasons explained below, Petitioner has shown, by a preponderance of the evidence, that the limitations of claims 1–14 are disclosed by the combination of Cryer and Clarke and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to combine the teachings of these references to arrive at the claimed subject matter.

1. Independent Claim 1

a. The Preamble

Claim 1 recites “A hydraulic fracturing system for fracturing a subterranean formation.” Ex. 1001, 8:37–38. Petitioner argues that Cryer discloses such a system. Pet. 77–78 (citing Ex. 1008, 3:65–67, Fig. 3; Ex. 1003, 580; Ex. 1002 ¶¶ 273–274).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Cryer discloses a hydraulic pump powering system for powering a pump used in hydraulic fracturing operations. Ex. 1008, 1:6–7, 1:11–15, 2:11–13, Fig. 1.

Accordingly, for the foregoing reasons, to the extent the preamble is limiting, Cryer supports Petitioner’s contentions.

b. The Motor Recitation

Claim 1 recites “an electric motor.” Ex. 1001, 8:39. Petitioner argues that Cryer discloses multiple electric pump motors. Pet. 78–81 (citing Ex. 1008, 2:61–66, 5:41–42, Figs. 1–4, 6–8; Ex. 1003, 580; Ex. 1002 ¶¶ 275–276).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Cryer discloses that its system includes one or more electric pump motors. Ex. 1008, 5:38–42, 7:10–11.

Accordingly, for the foregoing reasons, Cryer supports Petitioner’s contentions.

c. The Pump Recitation

Claim 1 recites “a pump coupled to the motor, and that has a discharge in fluid communication with a wellbore that intersects the formation, so that when the motor is activated and drives the pump, pressurized fluid from the pump pressurizes the wellbore to fracture the formation.” Ex. 1001, 8:40–44. Petitioner argues that Cryer’s pump motors are coupled to hydraulic pumps. Pet. 81–82 (citing Ex. 1008, 2:62–66, 16:56–59, 17:7–11, 17:38–40, 20:41–44, code (57), Figs. 1, 3, 4–8; Ex. 1003, 580; Ex. 1002 ¶ 277). Petitioner argues that Cryer’s pumps pump pressurized fracturing fluid into a wellbore to fracture a subterranean formation. *Id.* at 82–83 (citing Ex. 1008, 3:65–67, Figs. 1, 3, 5, 6, 8; Ex. 1003, 580–81; Ex. 1002 ¶ 278).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Cryer discloses that its electric pump motors power a hydraulic pump to pump a fluid into a pumping location for hydraulic fracturing and well stimulation. Ex. 1008, 2:62–66, 3:57–67.

Accordingly, for the foregoing reasons, Cryer supports Petitioner’s contentions.

d. The Variable Frequency Drive Recitation

Claim 1 recites “a variable frequency drive in communication with the electric motor, and that controls the speed of the motor, and performs electric motor diagnostics to prevent damage to the electric motor.” Ex. 1001, 8:45–48. Petitioner argues that Cryer’s system includes a variable frequency drive that controls the speed of the electric pump motor.

Pet. 83–84 (citing Ex. 1008, 7:7–9, 9:50–58, 18:7–13, Figs. 2, 7; Ex. 1003, 580–81; Ex. 1002 ¶ 279). Petitioner argues that by controlling the speed of the electric pump motor, Cryer’s variable frequency drives perform motor diagnostics. *Id.* at 85. Petitioner also argues that it would have been obvious “to perform additional motor diagnostics to ensure that speed was in fact being controlled and to check other electrical parameters.” *Id.* (citing Ex. 1002 ¶¶ 280–283).

Patent Owner argues that Cryer does not discuss over-speeding. PO Resp. 33–34. Patent Owner argues that Cryer does not explicitly or inherently disclose its variable frequency drive performing electric motor diagnostics. *Id.* at 34–35; PO Sur-reply 15. Patent Owner repeats its argument that Petitioner’s cited extrinsic evidence is directed to a Power Drive System rather than a variable frequency drive. PO Resp. 35.

Petitioner argues that an ordinarily skilled artisan “would have recognized that modifying frequency ‘in order to control speed’ is an example of performing electric motor diagnostics to prevent damage to the motor.” Pet. Reply 22 (citing Ex. 1002 ¶¶ 280–284; Ex. 1037 ¶¶ 36–37).

Patent Owner’s arguments that Cryer does not explicitly or inherently disclose its variable frequency drive performing electric motor diagnostics are again directed to an anticipation analysis, and are unavailing to the obviousness challenge asserted by Petitioner. Moreover, Cryer discloses that its control unit may include a variable frequency drive to control the speed at which the motor operates. Ex. 1008, 7:5–9 (“The VFD controls the frequency of the alternating current that is then supplied to the pump motors 112.”), 7:63–66 (“The speed at which the pump motors 112 operate may be controlled by the frequency of the alternating current that powers the

pump motors 112.”), 9:24–32 (disclosing that variable frequency device 210 includes a variable frequency drive), 9:50–58 (“The speed at which the motor 218 operates can be controlled by changing the frequency of the alternating current 212 that powers the motor 218”), 16:46–48 (“In one aspect, the VFD device is configured to modify the frequency of the alternating current in order to control a speed at which the one or more electric pump motors operate.”). Petitioner’s declarant testifies that this control of motor speed is an example of performing electric motor diagnostics to prevent damage to the motor. Ex. 1002 ¶ 282. Petitioner’s declarant also supports Petitioner’s assertions of obviousness. *Id.*

¶¶ 283–284. We credit this testimony, which neither Patent Owner nor its declarant address squarely. *See* PO Resp. 33–34; Ex. 2015 ¶¶ 49–51. Petitioner’s interpretation of “electric motor diagnostics” is supported by the prosecution history as discussed in § II.E.1.d above.

Accordingly, for the foregoing reasons, Cryer and Dr. Durham’s testimony support Petitioner’s contentions. We further determine that Petitioner has set forth reasoning with rational underpinning explaining why it would have been obvious to use Cryer’s variable frequency drive to perform electric motor diagnostics. *See, e.g.*, Pet. 85; Ex. 1002 ¶¶ 283–284.

e. The Source Recitation

Claim 1 recites “a source of electricity that is disposed a long distance from the electric motor.” Ex. 1001, 8:49–50. Petitioner argues that Cryer discloses a generator as the source of electricity and the generator may be on a vehicle that is separated by a significant distance from the vehicle on

which the pump motors are located. Pet. 85–86 (citing Ex. 1008, 14:33–62, Fig. 6; Ex. 1003, 581; Ex. 1002 ¶ 285).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Cryer discloses that its hydraulic pump powering system includes an electric current generator device that converts movement of a prime mover into electric current. Ex. 1008, 5:38–45. Cryer discloses that its hydraulic pump powering system can be a distributed system in which the components are positioned on separate vehicles. *Id.* at 14:19–32. Cryer discloses that the generator may be disposed on a first vehicle, the control unit may be disposed on a second vehicle, and the pump motors may be disposed on a third vehicle. *Id.* at 14:33–50. The vehicles “may be located relatively far from” each other, with the first vehicle “located between two or more pumping locations separated by a significant distance, such as a mile (or 1.6 kilometers) or more from each other” and the second and third vehicles “located at [one of] these separated pumping locations.” *Id.* at 14:51–61.

Accordingly, for the foregoing reasons, Cryer supports Petitioner’s contentions.

f. The Transmission Lines Recitation

Claim 1 recites “transmission lines that connect the source of electricity to the electric motor and that span the long distance between the source of electricity and the electric motor.” Ex. 1001, 8:51–54. Petitioner argues that, in addition to its mapping for the Source Recitation, Cryer discloses that its variable frequency drive supplies multi-phase electricity to the motors, which requires the use of multiple transmission lines. Pet. 87

(citing Ex. 1008, 6:1–10; Ex. 1003, 581; Ex. 1002 ¶¶ 286–287). Petitioner argues that the ’882 patent refers to each wire in a three-phase system as a transmission line. *Id.* (citing Ex. 1001, 3:1–9).

Patent Owner does not contest this aspect of the Petition. *See generally* PO Resp.

Cryer discloses that “the control unit 110 may receive a direct current (e.g., having zero frequency) from the generator device 108” and may “convert the direct current into an alternating current having a designated number of phases, a designated frequency, and/or a designated power.” Ex. 1008, 6:1–7. Petitioner’s declarant testifies that supplying multi-phase electricity to electric motors would require the use of multiple transmission lines. Ex. 1002 ¶ 286. By referring to its mapping regarding the Source Recitation (Pet. 87), we understand Petitioner to include the transmission line(s) spanning the distance between the generator and the motors in this mapping.

Accordingly, for the foregoing reasons, Cryer supports Petitioner’s contentions.

g. The Switch Gear Recitation

Claim 1 recites “a switch gear between the transmission line and the source of electricity, and another switch gear between the transmission line and the electric motor.” Ex. 1001, 8:55–57. Relying on its showing made regarding the challenge based on Sanborn and Clarke, Petitioner argues that “Clarke describes locations where conventional switchgear would be placed, including between a generator and transmission lines, and between transmission lines and electric motors.” Pet. 89 (citing Ex. 1002

¶¶ 289–292). Petitioner argues that Cryer discloses “an ‘islanded operation’” and that an ordinarily skilled artisan would “look to other islanded power systems in the oil-and-gas space to provide load-sharing among generators, increase reliability through redundancy, and operate motors at a desired voltage.” *Id.* at 88–89 (citing Ex. 1008, 14:35–62; Ex. 1029, 591). Petitioner argues that Clarke discloses such a system. *Id.* (citing Ex. 1007 ¶¶ 1–2; Ex. 1002 ¶¶ 269–271).

Patent Owner argues that Petitioner has not shown the asserted references address the same problem that is addressed by the ’882 patent. PO Resp. 36 (citing *In re Rouffet*, 149 F.3d at 1357). This argument is unavailing for the reasons explained above.

Additionally, Cryer discloses that its generator and motors may be located “relatively far” from each other. Ex. 1008, 14:51–61. Clarke discusses power distribution equipment that may be used in drilling rigs. Ex. 1007 ¶¶ 1–2. We further note that both Cryer (*see, e.g.*, Ex. 1008, 4:6–12) and Clarke (*see, e.g.*, Ex. 1007, Figs. 1, 2) disclose the use of multiple generators. Petitioner’s declarant testifies that “[t]he arrangement of switchgear, transformers and loads disclosed by Clarke is a well-known arrangement of such equipment” and that “[i]t would have been obvious for a POSITA to improve the power distribution system of Cryer according to the arrangement of equipment disclosed by Clarke in order to provide for load sharing among generators, increase reliability through redundancy and allow for operation of motors at a desired voltage.” Ex. 1002 ¶ 271. We credit this testimony, which neither Patent Owner nor its declarant address squarely. *See* PO Resp. 35–36; Ex. 2015 ¶¶ 49–51.

Accordingly, for the foregoing reasons, Cryer, Clarke, and Dr. Durham's testimony support Petitioner's contentions. We further determine that Petitioner has set forth reasoning with rational underpinning explaining why it would have been obvious to position switchgear in Cryer's system as described in Clarke. *See, e.g.,* Pet. 89; *see also* Ex. 1002 ¶ 271.

h. Conclusion

For the foregoing reasons, we conclude that Petitioner has shown, by a preponderance of the evidence, that the limitations of claim 1 are disclosed by the combination of Cryer and Clarke, and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to combine the teachings of these references to arrive at the claimed subject matter.

2. *Independent Claim 8*

Claim 8 recites a method comprising driving a pump with an electric motor, transmitting electricity to the motor from a power source spaced from the motor via a transmission line with switchgears positioned between the transmission line and the source of electricity and between the transmission line and the motor, pressurizing a fluid with the pump, and fracturing a subterranean formation with the pressurized fluid. Ex. 1001, 9:14–27. In large part, Petitioner refers to its contentions regarding claim 1 in arguing that claim 8 would have been obvious over Cryer and Clarke. *See* Pet. 97–98.

Patent Owner does not contest Petitioner's contentions regarding claim 8 apart from its arguments discussed in § II.H.1 above. *See* PO Resp. 38.

For the reasons set forth in § II.H.1 above, we conclude that Petitioner has shown, by a preponderance of the evidence, that the limitations of claim 8 are disclosed by the combination of Cryer and Clarke, and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to combine the teachings of these references to arrive at the claimed subject matter.

3. Dependent Claims 2–7 and 9–14

Claim 2 depends directly from claim 1 and further recites “a transformer between the transmission line and the source of electricity.” Ex. 1001, 8:58–60. Claim 3 depends directly from claim 1 and further recites “a transformer between the transmission line and the electric motor.” *Id.* at 8:61–63. Petitioner notes that Cryer discloses stepping-up and stepping-down voltages and argues that it was general engineering knowledge to use transformers to modify voltage in the manner disclosed by Cryer. Pet. 91–92 (citing Ex. 1008, 15:21–29; Ex. 1002 ¶¶ 294–301).

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.H.1 above. PO Resp. 38.

Cryer discloses that current produced by a generator is supplied to control unit 110, which modifies the current. Ex. 1008, 5:53–54, 5:63–64. “The control unit 110 may increase or decrease the voltage of the direct current (e.g., using one or more transformers and the like) . . .” *Id.* at 6:3–5. As noted by Petitioner, Cryer further discloses that “the voltage of the current may be increased (e.g., stepped up) or decreased (e.g., stepped down).” *Id.* at 15:22–24. The record establishes that such voltage

modification is beneficial for transmitting electricity over long distances and is typically performed via transformers. *See, e.g.*, Ex. 1009, 15 (explaining that a transformer “enables the efficient transmission of electrical energy at high voltage over great distances, and then is used to lower the voltage to safe values for industrial, commercial, and household use”).

Accordingly, on this record, Cryer supports Petitioner’s contentions.

Claim 4 depends directly from claim 1 and further recites “wherein the source of electricity is selected from the group consisting of a utility outlet, a turbine generator, and a reciprocating engine generator.” Ex. 1001, 8:64–67. Petitioner argues that Cryer discloses a natural gas-powered turbine generator and a reciprocating engine as the source of electricity. Pet. 93 (citing Ex. 1008, 5:20–23; Ex. 1002 ¶¶ 302–303).

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.H.1 above. PO Resp. 38.

Cryer discloses that its system includes prime mover 104, which may be a turbine powered by natural gas. Ex. 1008, 5:20–26.

Accordingly, on this record, Cryer supports Petitioner’s contentions.

Claim 5 depends from claim 1 through claim 4 and further recites “an electric equipment room in communication with the turbine generator and which controls operation of the turbine generator.” Ex. 1001, 9:1–4. Petitioner notes that Cryer discloses the use of an input device to control the variable frequency drive and argues that “[s]uch items requiring human input corroborate the presence of an electric equipment room (e.g., vehicle 102), in which the operator sits and communicates with the prime mover and generator (104, 106).” Pet. 93–94 (citing Ex. 1008, 9:37–49, Fig. 1).

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.H.1 above. PO Resp. 38.

Cryer discloses that the variable frequency device can be controlled using an input device such as “a keyboard, touch screen, stylus, electronic mouse, microphone, wireless device, or other device that receives input from a human operator.” Ex. 1008, 9:37–43. Cryer further discloses that “the input device 214 may be disposed onboard the vehicle 102 and receive the input from the operator disposed onboard the vehicle 102.” *Id.* at 9:42–46. We agree that this disclosure at least suggests the presence of an electric equipment control room. *See* Pet. 93; Ex. 1002 ¶ 304.

Accordingly, on this record, Cryer supports Petitioner’s contentions.

Claim 6 depends directly from claim 1 and further recites “a transformer between the switch gear and the electric motor.” Ex. 1001, 9:5–7. Petitioner relies on its showing made for the Switch Gear Recitation of claim 1 and for its challenge to claim 6 based on the combination of Sanborn and Clarke. Pet. 94–95. Petitioner argues that it would have been obvious “to place the switchgear to include a transformer between the switchgear and electric motor, in order allow the transformer to be disconnected.” *Id.* at 95.

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.H.1 above. PO Resp. 38.

For the reasons set forth in § II.H.1.g above, Cryer, Clarke, and Dr. Durham’s testimony support Petitioner’s contentions.

Claim 7 depends directly from claim 1 and further recites “wherein the electric motor comprises a first electric motor, the system further comprising a multiplicity of electric motors, and wherein the transmission lines are selectively moveable at different times to provide electrical communication between the source of electricity and the multiplicity of motors.” Ex. 1001, 9:8–13. Petitioner argues that Cryer discloses the use of multiple pump motors and moveable transmission lines. Pet. 95–97 (citing Ex. 1008, 5:1–5, 5:40–42, 14:19–62, 14:47–50, Figs. 1, 6; Ex. 1002 ¶¶ 308–312).

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.H.1 above. PO Resp. 38.

Cryer discloses multiple pump motors. Ex. 1008, 7:10–19, Fig. 1. The pumps and motors are positioned on mobile vehicles that “can be moved between a variety of different locations.” *Id.* at 5:1–5; *see also id.* at 8:19–27. The pumps and motors can be positioned on separate vehicles that are positioned a mile apart. *Id.* at 14:33–56. Thus, Cryer indicates that its transmission lines are selectively moveable.

Accordingly, on this record, Cryer supports Petitioner’s contentions.

Claim 9 depends directly from claim 8 and further recites “controlling a speed of the motor with a variable frequency drive.” Ex. 1001, 9:28–29. Petitioner relies on its showing made for the Variable Frequency Drive Recitation of claim 1. Pet. 99.

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.H.1 above. PO Resp. 38.

For the reasons set forth in § II.H.1.d above, Cryer supports Petitioner's contentions.

Claim 10 depends from claim 8 through claim 9 and further recites "comprising performing diagnostics on the electric motor with the variable frequency drive." Ex. 1001, 9:30–32. Petitioner relies on its showing made for the Variable Frequency Drive Recitation of claim 1. Pet. 99.

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.H.1 above. PO Resp. 38.

For the reasons set forth in § II.H.1.d above, Cryer supports Petitioner's contentions.

Claim 11 depends directly from claim 8 and further recites "increasing a voltage of the electricity proximate the power source with a transformer, and decreasing the voltage of the electricity proximate the electric motor." Ex. 1001, 10:1–4. Petitioner relies on its showing made for claims 2 and 3. Pet. 99.

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.H.1 above. PO Resp. 38.

For the reasons set forth regarding claims 2 and 3 above, Cryer supports Petitioner's contentions.

Claim 12 depends directly from claim 8 and further recites "suspending electrical communication between the power source and the electric motor with one of a cutout or a switch gear." Ex. 1001, 10:5–7. Petitioner relies on its showing made for the Switch Gear Recitation of

claim 1 and argues that, “[b]y disconnecting the power source from the motor using switchgear, that suspends electrical communication.”

Pet. 99–100 (citing Ex. 1002 ¶¶ 323, 342).

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.H.1 above. PO Resp. 38.

For the reasons set forth in § II.H.1.g above, Cryer supports Petitioner’s contentions.

Claim 13 depends directly from claim 8 and further recites, wherein the electric motor comprises a first electric motor, the pump comprises a first pump, the wellbore comprises a first wellbore, and the subterranean formation comprises a first subterranean formation, and wherein the step of transmitting electricity to the electric motor comprises transmitting electricity across a transmission section that has an end in electrical communication with the power source, and another end that is in electrical communication with the first electric motor, the method further comprising, disconnecting the end of the transmission section that is in communication with the first electric motor and reconnecting that end to a second electric motor is a long distance from the power supply and that is connected to a second pump, and pressurizing fluid with the second pump and directing the pressurized fluid to a second wellbore for fracturing a second subterranean formation.

Ex. 1001, 10:8–25. Petitioner relies on its showing made for the Motor, Pump, and Transmission Lines Recitations of claim 1 and its showing made for claim 7. Pet. 100–01.

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.H.1 above. PO Resp. 38.

For the reasons set forth in §§ II.H.1.b, II.H.1.c, and II.H.1.e and regarding claim 7 above, Cryer supports Petitioner’s contentions.

Claim 14 depends directly from claim 8 and further recites “wherein the power source comprises a power generation section that includes devices selected from the group consisting of a utility outlet, a turbine generator, and an electrical equipment room.” Ex. 1001, 10:25–28. Petitioner relies on its showing made for claim 4. Pet. 101.

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.H.1 above. PO Resp. 38.

For the reasons set forth regarding claim 4 above, Cryer supports Petitioner’s contentions.

For the foregoing reasons, we conclude that Petitioner has shown, by a preponderance of the evidence, that the limitations of claims 2–7 and 9–14 are disclosed by the combination of Cryer and Clarke, and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to combine the teachings of these references to arrive at the claimed subject matter.

I. Asserted Obviousness Based on Cryer and EE Reference

Petitioner argues that claims 1–14 would have been obvious over Cryer and EE Reference. Pet. 77–101. In support of its showing, Petitioner relies upon the Durham Declaration. *Id.* (citing Ex. 1002). We have reviewed the parties’ briefs and the evidence of record and determine that, for the reasons explained below, Petitioner has shown, by a preponderance of the evidence, that the limitations of claims 1–14 are disclosed by the

combination of Cryer and EE Reference and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to combine the teachings of these references to arrive at the claimed subject matter.

1. Independent Claims 1 and 8

Petitioner relies on Cryer as set forth in § II.H.1 above and relies on EE Reference to teach locations where switchgear would be positioned. Pet. 77–90. Relying on its showing made regarding the challenge based on Sanborn and EE Reference, Petitioner argues that “EE-Reference describes locations where conventional switchgear would be placed, including between a generator and transmission lines, and between transmission lines and electric motors.” *Id.* at 90 (citing Ex. 1002 ¶¶ 337–339). Petitioner argues that Cryer discloses “a ‘distributed hydraulic pump powering system,’ with generators and motors on separate vehicles separated by a long distance,” and an ordinarily skilled artisan would place the switchgear at the locations disclosed by EE Reference. *Id.* at 89–90 (citing Ex. 1008, 14:19–15:7, Fig. 6). Petitioner argues that an ordinarily skilled artisan would have relied upon the teachings of EE Reference regarding switchgear placement because “EE-Reference ‘presents a thorough review of the fundamentals of electrical engineering’ to ‘PE candidates, practicing engineers, and engineering students.’” *Id.* at 90 (citing Ex. 1009, Preface); *see also id.* at 32 (“EE-Reference provides ‘a broad review of electrical engineering design, analysis, and operational fundamentals.’” (citing Ex. 1009, Preface)).

Patent Owner relies on the same arguments advanced for the challenge based on the combination of Cryer and Clarke. PO Resp. 32–36. These arguments are unavailing for the reasons set forth in § II.H above.

Additionally, Cryer discloses a hydraulic pump powering system that includes an electric current generator device that converts movement of a prime mover into electric current. Ex. 1008, 5:38–45. The current produced by the generator is supplied to control unit 110, which modifies the current. *Id.* at 5:53–55, 5:63–64. The modified current is supplied to pump motors 112, which power hydraulic pumps 114. *Id.* at 7:10–16. Cryer discloses that its hydraulic pump powering system can be a distributed system in which the components are positioned on separate vehicles that “may be located relatively far from” each other. *Id.* at 14:19–61.

EE Reference is a reference manual for electrical engineers and describes a typical electrical distribution system from an electric utility to a consumer that includes generators, transmission lines, circuit breaker switchgear, and transformers. Ex. 1009, 26–28, Fig. 35.1; *see also* Ex. 1029, 7 (defining “switchgear” as “[a] general term covering switching and interrupting devices and their combination with associated control, instrumentation, metering, protective and regulating devices”). Thus, we are persuaded that an ordinarily skilled artisan would look to EE Reference when modifying Cryer’s power distribution equipment. *See* Pet. 89–90; Ex. 1002 ¶¶ 333–334.

Accordingly, for the foregoing reasons, Cryer and EE Reference support Petitioner’s contentions. We further determine that Petitioner has set forth reasoning with rational underpinning explaining why it would have

been obvious to position switchgear in Cryer's system as described in EE Reference. *See, e.g.*, Pet. 89–90; Ex. 1002 ¶¶ 334–335.

For the foregoing reasons, we conclude that Petitioner has shown, by a preponderance of the evidence, that the limitations of claims 1 and 8 are disclosed by the combination of Cryer and EE Reference, and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to combine the teachings of these references to arrive at the claimed subject matter.

2. Dependent Claims 2–7 and 9–14

Petitioner relies on Cryer as set forth in § II.H.3 above and, regarding claim 6, Petitioner also relies on its challenge to claim 6 based on the combination of Sanborn and EE Reference. Pet. 91–97, 99–101.

Patent Owner does not present arguments for the dependent claims apart from its contentions regarding claim 1 discussed in § II.H.1 above. PO Resp. 38.

For the reasons set forth in §§ II.G.2 and II.H.3 above, we conclude that Petitioner has shown, by a preponderance of the evidence, that the limitations of claims 2–7 and 9–14 are disclosed by the combination of Cryer and EE Reference, and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to combine the teachings of these references to arrive at the claimed subject matter.

J. Asserted Obviousness Based on Combinations Including Broussard

Petitioner argues that the main references (Sanborn and Cryer) used in the previously discussed challenge grounds each disclose a variable frequency drive that modifies power provided to electric motors.

Pet. 101–02. Petitioner relies on Broussard to provide additional disclosure that the variable frequency drives of Sanborn and Cryer would control the speed of the electric motor and perform motor diagnostics. *Id.* at 102.

Petitioner argues that Broussard discloses a variable frequency drive that controls the speed of a motor and performs motor diagnostics to prevent damage to a grounded or shorted electric motor. *Id.* (citing Ex. 1004 ¶¶ 9, 21; Ex. 1002 ¶¶ 345–346). Petitioner argues that it would have been obvious to incorporate these features into Sanborn’s and Cryer’s variable frequency drives “to control speed of the motor and perform motor diagnostics in order to test that current, voltage, and frequency were, in fact, being properly controlled.” *Id.* at 103. Continuing, Petitioner argues that “[p]roper control would help prevent damage from overspeed and save wear and tear on the motor and on the pump.” *Id.* (citing Ex. 1004 ¶ 19; Ex. 1002 ¶¶ 349–350).

Patent Owner does not present arguments separate from those advanced for the previously discussed challenge grounds and discussed above. *See* PO Resp. 31–32, 37; PO Sur-reply 15.

Broussard discloses a system for hydraulic fracturing in oil and gas wells, the system including a control system that controls the speed of the motor via a variable frequency drive. Ex. 1004 ¶¶ 9, 27. The variable frequency drive also provides protection by frequently performing motor diagnostics to prevent damage to a grounded or shorted motor. *Id.* ¶ 21.

Accordingly, for the foregoing reasons, Broussard supports Petitioner’s contentions. We further determine that Petitioner has set forth reasoning with rational underpinning explaining why it would have been

obvious to include Broussard's teachings in the variable frequency drives of Sanborn and Cryer. *See, e.g.*, Pet. 103–04; Ex. 1002 ¶¶ 350–351.

For the foregoing reasons, we conclude that Petitioner has shown, by a preponderance of the evidence, that the limitations of claims 1–7, 9, and 10¹¹ are disclosed by the combinations of references discussed above with the additional teachings of Broussard, and that Petitioner has set forth reasoning with rational underpinning why it would have been obvious to combine the teachings of these references to arrive at the claimed subject matter.

K. Alleged Objective Evidence of Nonobviousness

Notwithstanding what the teachings of the prior art would have suggested to one skilled in the art, objective evidence of nonobviousness (so called “secondary considerations”) may lead to a conclusion that the challenged claims would not have been obvious. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984). Objective evidence of nonobviousness “may often be the most probative and cogent evidence in the record” and “may often establish that an invention appearing to have been obvious in light of the prior art was not.” *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012) (citing *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983)).

¹¹ Although Petitioner does not here challenge independent claim 8, by referencing its showings regarding the previously discussed challenges to claim 8 (*see* Pet. 102), we understand Petitioner to rely on those challenges to address the recitations of claim 8 as incorporated into its dependent claims 9 and 10.

1. Petitioner's Asserted Failure to Address Evidence of Nonobviousness in the Petition

Patent Owner argues that it presented objective evidence of nonobviousness during prosecution of the related '410 patent. PO Resp. 39. Patent Owner argues that Petitioner was aware of this evidence, but “failed to address the critical evidence of the objective indicia of nonobviousness presented during prosecution of the '410 Patent.” *Id.* Continuing, Patent Owner argues that because “Petitioner has failed to address evidence of nonobviousness of which Petitioner was clearly aware[,] Petitioner has failed to state a *prima facie* case of obviousness.” *Id.* at 40–41.

In this proceeding, we determined there was good cause to allow additional pre-institution briefing to address Patent Owner's asserted objective indicia of nonobviousness. *See* Ex. 1031 (Board email authorizing additional preliminary briefing); Paper 7, 6–10 (Petitioner presenting arguments regarding a lack of nexus); Paper 8, 6–10 (Patent Owner presenting additional arguments regarding objective evidence of nonobviousness). To the extent that Patent Owner requests that we reconsider our determination that good cause existed to allow the additional briefing, we decline to consider such an untimely request. *See* 37 C.F.R. § 42.71(d) (setting a request for rehearing time limit of 14 days after entry of a non-final decision or a decision to institute a trial).

Furthermore, to the extent Patent Owner argues for a per se rule that a Petitioner's failure to address known secondary considerations in a petition is unconditionally fatal to the petition (*see* PO Resp. 39–41), we decline to adopt such a rule. Notably, Patent Owner has cited no authority supporting such an interpretation. *See id.* And, as noted below, objective evidence is

only relevant to the obviousness inquiry if there is a nexus between it and the claimed invention, and Patent Owner bears the burden on the nexus inquiry. This suggests that it is not necessarily true that a petition is defective for not preempting argument on matters not yet made of record in the proceeding by Patent Owner.

2. Nexus

“In order to accord substantial weight to secondary considerations in an obviousness analysis, ‘the evidence of secondary considerations must have a “nexus” to the claims, *i.e.*, there must be “a legally and factually sufficient connection” between the evidence and the patented invention.’” *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (citing *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019)). “The patentee bears the burden of showing that a nexus exists” *WMS Gaming Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999). Nexus is a legally and factually sufficient connection between the objective evidence and the claimed invention, such that the objective evidence should be considered in determining nonobviousness. *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988). A nexus is presumed when “the patentee shows that the asserted objective evidence is tied to a specific product and that product ‘embodies the claimed features, and is coextensive with them.’” *Fox Factory*, 944 F.3d at 1373 (quoting *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018)). “A finding that a presumption of nexus is inappropriate does not end the inquiry into secondary considerations,” as “the patent owner is still afforded an opportunity to

prove nexus by showing that the evidence of secondary considerations is the ‘direct result of the unique characteristics of the claimed invention.’” *Id.* at 1373–74 (citing *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996)).

Patent Owner argues that a nexus should be presumed because its “Clean Fleet® technology embodies the features of the Challenged Claims of the ’882 Patent.” PO Resp. 50. Continuing, Patent Owner argues that there is a nexus between the asserted evidence of copying and the invention claimed in the ’882 patent “because there is evidence that VoltaGrid copied the claimed invention.” *Id.* at 47. Patent Owner also argues that “the claimed combination as a whole serves as a nexus for the objective evidence of commercial success.” *Id.* at 50. Patent Owner cites to the prosecution history of the ’410 patent in support of its contentions. *Id.* at 38–51 (citing Ex. 2005).

Petitioner argues that a presumption of nexus is not warranted in this proceeding because “[Patent Owner] merely asserts in conclusory fashion that Clean Fleet® ‘embodies the Challenged Claims of the ’882 Patent,’” but “offers no evidence (e.g., claim chart)” to support its assertions. Pet. Reply 24. Continuing, Petitioner argues that “[Patent Owner] points to the *same* Clean Fleet® product for non-obviousness across *sixteen* patents.” *Id.* at 25 (citing *Fox Factory*, 944 F.3d at 1377). Petitioner argues that the Clean Fleet product cannot be coextensive with the ’882 patent because Patent Owner’s other patents include features not recited in the ’882 patent claims, including a heater, a pump down pump, capturing real-time images, and a weight monitoring system. *Id.*

Petitioner also argues that Patent Owner has not established a nexus because “[Patent Owner] does not tie the secondary considerations to the

'882 Patent or show . . . that Clean Fleet[®] embodies the claimed combination.” Pet. Reply 26. Petitioner argues that Patent Owner’s declarants, Messrs. Schaaf and Marscher, “concede that the placement of multiple switchgear was well-known in the art” and that “[t]here is no nexus when the claimed feature tied to secondary evidence was ‘indisputably known in the prior art.’” *Id.* (citing *id.* § II.C.d; *Norvatis AG v. Torrent Pharm. Ltd.*, 853 F.3d 1316, 1331 (Fed. Cir. 2017); *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 33 at 33 (PTAB Jan. 24, 2020) (designated precedential)).

Finally, Petitioner argues that the '410 patent “is prior art to the '882 Patent under [35 U.S.C.] § 102(a)(1)-(a)(2)” and, thus, any objective indicia of nonobviousness presented during prosecution of the '410 patent is attributable to the prior art rather than to the '882 patent. Pet. Reply 24 n.2.

Patent Owner bears the burden of showing that a nexus exists. *WMS Gaming*, 184 F.3d at 1359. Patent Owner has not established persuasively that it is entitled to a presumption of nexus. Patent Owner fails to establish that the Clean Fleet product had variable frequency drives performing electric motor diagnostics, as discussed further below. Moreover, to the extent Patent Owner asserts that it is simply the use of VFD-controlled electric motors in hydraulic fracturing that corresponds to objective indicia of nonobviousness, the evidence of record establishes that the prior art disclosed such use of electric motors. *See* Ex. 1006 ¶ 40; Ex. 1008, 7:5–9, 7:63–66, 9:24–32, 9:50–58, 16:46–48; *In re Kao*, 639 F.3d at 1069 (“there must be a nexus to some aspect of the claim not already in the prior art”).

Patent Owner also has not satisfied its burden to establish a nexus, absent a presumption, between the claims of the '882 patent and the asserted

evidence of nonobviousness. To establish nexus, Patent Owner argues that its

Clean Fleet® technology embodies the features of the Challenged Claims of the '882 Patent including, but not limited to pumps driven by electric motors, transmission lines that connect the source of electricity to the electric motor and that span the long distance between the source of electricity and the electric motor, and a switch gear between the transmission line and the source of electricity, and another switch gear between the transmission line and the electric motor (PowerPath®).

PO Resp. 50 (citing Ex. 2016, 3). However, Patent Owner does not provide details regarding its Clean Fleet product, and, thus, fails to establish persuasively that the asserted evidence of secondary considerations is the “direct result of the unique characteristics of the claimed invention.” *Fox Factory*, 944 F.3d at 1373–74. The cited page of Exhibit 2016 provides a few assertions regarding a “Clean Fleet® PowerPath®” product that seem to address the Transmission Lines Recitation, but does not address the other recitations of the '882 patent claims. Patent Owner’s conclusory assertions regarding its Clean Fleet product fail to satisfy Patent Owner’s burden to establish a nexus between the asserted evidence and the patented invention.

Nor has Patent Owner addressed meaningfully the fact that it asserts that the same Clean Fleet product is embodied by several of its patents. *See Fox Factory*, 944 F.3d at 1378 (“The same evidence of secondary considerations cannot be presumed to be attributable to two different combinations of features.”). Patent Owner does not address in any manner the other patents for which it asserts its Clean Fleet product embodies the claims. Notably, Patent Owner does not address the components noted by Petitioner as being claimed in others of Patent Owner’s patents that are not

recited in the '882 patent. *See* Pet. Reply 25. We additionally note that, in other proceedings, Patent Owner ascribed commercial success to features unrecited in the '882 patent. *See, e.g.*, IPR2021-01316, Paper 19 at 25 (touting “the electric blenders of the '724 Patent”).

Thus, for at least the foregoing reasons, Patent Owner fails to establish a nexus between its Clean Fleet product and the claims of the '882 patent.

3. Patent Owner's Asserted Evidence

Even if we were to find that Patent Owner had proven nexus, we find that Patent Owner's evidence of objective indicia is entitled to little weight, as discussed below.

a. Copying

“Copying may indeed be another form of flattering praise for inventive features.” *Crocs, Inc. v. ITC*, 598 F.3d 1294, 1311 (Fed. Cir. 2010). Copying “requires evidence of efforts to replicate a specific product.” *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010). “This may be demonstrated either through internal documents; direct evidence such as disassembling a patented prototype, photographing its features, and using the photograph as a blueprint to build a virtually identical replica; or access to, and substantial similarity to, the patented product (as opposed to the patent).” *Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004) (internal citations omitted). “We note, however, that a showing of copying is only equivocal evidence of nonobviousness in the absence of more compelling objective indicia of other secondary considerations.” *Ecolochem, Inc. v. S. Cal. Edison Co.*, 227 F.3d 1361, 1380

(Fed. Cir. 2000); *see also In re GPAC*, 57 F.3d at 1580 (“[M]ore than the mere fact of copying by an accused infringer is needed to make that action significant to a determination of the obviousness issue.” (quoting *Cable Elec. Prods. v. Genmark, Inc.*, 770 F.2d 1015, 1028 (Fed. Cir. 1985))).

Patent Owner argues that there is evidence that VoltaGrid “copied [Patent Owner’s] inventions and misappropriated [Patent Owner’s] trade secrets, including inventions and trade secrets incorporating [Patent Owner’s] switchgear systems.” PO Resp. 41. Patent Owner relies heavily of the declaration of Jared Oehring prepared as part of a lawsuit Patent Owner filed against VoltaGrid alleging misappropriation of trade secrets. *Id.* at 43–47 (citing, *inter alia*, Ex. 2008, 34–37 (Plaintiff’s/Patent Owner’s Motion for Preliminary Injunction)). Patent Owner asserts that Mr. Oehring is “a former employee of [Patent Owner] and the named inventor of the ’882 Patent.” *Id.* at 42.

Petitioner argues that “[Patent Owner’s] alleged evidence of copying is . . . insufficient” because “[Patent Owner’s] copying allegations are not tied to the Challenged Claims.” Pet. Reply 27. Petitioner argues that Patent Owner’s “purported trade secrets include items completely unrelated to the ’882 Patent claims, such as: ‘power consumption data,’ ‘purchase prices,’ and ‘emissions data,’” and that, because “the ’882 Patent published . . . years before the alleged trade-secret misappropriation began[,] . . . either the publication of the ’882 Patent destroyed [Patent Owner’s] alleged trade secrets, or the trade-secret allegations are unmoored from the ’882 Patent.” *Id.* at 27–28 (citing PO Resp. 42; *Water Techs. Corp. v. Calco, Ltd.*, 850 F.2d 660, 670 (Fed. Cir. 1988)). Petitioner asserts that Patent Owner’s

reliance on the testimony of Mr. Marscher is misplaced because Mr. Marscher admitted that he:

(i) did not know any of VoltaGrid's products and could only guess at what type of business they are engaged in; (ii) did not compare any VoltaGrid product to PO's product to determine if they are the same; (iii) did not do any analysis of whether any VoltaGrid product practices the claims of any of [Patent Owner's] patents; and (iv) the only basis for his opinions on copying is [Patent Owner's] preliminary response in this proceeding.

Id. at 28 (citing Ex. 1036, 32:18–37:3).

Mr. Oehring's declaration appears to address cable connections, power generation and other pricing information, an emissions calculator, and personnel information. *See* Ex. 2008, 34–36. Patent Owner does not explain how this information is relevant to the claims of the '882 patent, nor do we perceive any such relevance. Furthermore, Mr. Oehring states that the proposed new company that is the subject of his declaration is a "turbine power generation company" that "us[es] natural gas generator sets." *Id.* at 34. Thus, the asserted evidence may be relevant to the Source Recitation, but it is not clear how the asserted evidence addresses or is relevant to the other recitations of the '882 patent claims. The asserted evidence does not appear to address motors, pumps, or variable frequency drives, and Patent Owner similarly fails to address these claimed components in any meaningful way.

Accordingly, for at least the foregoing reasons, we find Patent Owner's evidence of copying to be weak.

b. Commercial Success

“When a patentee can demonstrate commercial success, usually shown by significant sales in a relevant market, and that the successful product is the invention disclosed and claimed in the patent, it is presumed that the commercial success is due to the patented invention.” *J.T. Eaton & Co. v. Atl. Paste & Glue Co.*, 106 F.3d 1563, 1571 (Fed. Cir. 1997) (citing *Demaco*, 851 F.2d at 1392–93). However, “the asserted commercial success of the product must be due to the merits of the claimed invention beyond what was readily available in the prior art.” *Id.* (citing *Richdel, Inc. v. Sunspool Corp.*, 714 F.2d 1573, 1580 (Fed. Cir. 1983)).

Patent Owner argues that its Clean Fleet product is commercially successful due to its use of its “PowerPath® features and diagnostic features.” PO Resp. 48–49 (citing Ex. 2016, 3). Patent Owner contends that its “all-electric fleets comprise approximately 33% of the current [electric fleet] market.” *Id.* at 49 (citing Ex. 2006; Ex. 2007). Patent Owner asserts that it has licensed its technology. *Id.* at 49–50 (citing Ex. 2007).

Petitioner argues that “[Patent Owner’s] purported evidence of commercial success is insufficient” because “[Patent Owner] presents no sales or revenue information indicating any actual commercial success.” Pet. Reply 27 (citing Ex. 1036, 45:5–11, 46:24–47:13, 163:16–164:20).

Patent Owner relies primarily on Exhibits 2006, 2007, and 2016 in support of its contentions. PO Resp. 48–50. We discuss each reference in turn.

Exhibit 2006 appears to be a printout of a Daniel Energy Partners website post contending that the electric fracturing market would experience growth. While the post identifies Patent Owner as one of approximately 16

electric fleet producers (Ex. 2006, 6), Patent Owner does not explain clearly how the post relates to its assertions of commercial success. For at least this reason, we do not find Exhibit 2006 persuasive of commercial success.

Exhibit 2007 is a Yahoo News press release that purports that Patent Owner sold PIK Notes that ProFrac converted into licenses. Ex. 2007, 1–2. However, Patent Owner has not entered the asserted license(s) into the record in this proceeding. Therefore, we are unable to evaluate the veracity of Exhibit 2007 or determine if the ’882 patent is included in the asserted license. Moreover, Patent Owner’s attempt to establish that the purported license includes the ’882 patent without making the license of record in this proceeding violates the best evidence rule. *See* Fed. R. Evid. 1002 (“An original writing, recording, or photograph is required in order to prove its content unless these rules or a federal statute provides otherwise.”); 37 C.F.R. § 41.152(a) (“Except as otherwise provided in this subpart, the Federal Rules of Evidence shall apply to contested cases.”). For at least these reasons, we do not find Exhibit 2007 persuasive of commercial success.

Exhibit 2016 appears to be a printout of Patent Owner’s website regarding “Technology & Innovation.” Ex. 2016, 1. As discussed above, this exhibit provides a few assertions regarding a “Clean Fleet® PowerPath®” product that seem to address the Transmission Lines Recitation, but does not address the other recitations of the ’882 patent claims. *See* Ex. 2016, 3. For at least this reason, we do not find Exhibit 2016 persuasive of commercial success.

We additionally note that Patent Owner does not define the relevant market or present sales figures in support of its assertions of commercial

success. *See J.T. Eaton & Co.*, 106 F.3d at 1571 (noting that commercial success is “usually shown by significant sales in a relevant market, and that the successful product is the invention disclosed and claimed in the patent”).

Accordingly, for at least the foregoing reasons, we find Patent Owner’s evidence of commercial success to be weak.

4. Conclusion

For at least the reasons explained above, Patent Owner’s asserted objective evidence of nonobviousness is weak and lacks a nexus to the claims of the ’882 patent.

L. Ultimate Conclusion of Obviousness

Petitioner has shown that the individual limitations of claims 1–14 of the ’882 patent are disclosed by various combinations of prior art references, and Petitioner provides persuasive arguments regarding why a person of ordinary skill in the art would have modified and combined those teachings. Patent Owner’s objective indicia is comparatively weak. When considering all of the evidence of obviousness and nonobviousness together (*see In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1079 (Fed. Cir. 2012)), we conclude Petitioner has demonstrated by a preponderance of the evidence that these challenged claims would have been obvious over the prior art in each of the Petition’s challenges.

III. PATENT OWNER’S REVISED MOTION TO AMEND

Patent Owner’s Revised Motion to Amend is contingent on a determination of unpatentability of one or more challenged patent claims.

RM TA, 1. Having determined that Petitioner has shown by a preponderance of the evidence that original claims 1–14 of the ’882 patent are unpatentable, we proceed to address Patent Owner’s Motion. Patent Owner proposes substitute claims 15–28 to replace challenged patent claims 1–14. *Id.* A listing of the proposed substitute claims is provided by Patent Owner in Appendix A of the Motion.

For the reasons discussed below, Patent Owner has shown that proposed substitute claims 15–28 meet the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. However, for the reasons discussed below, Petitioner has proven by a preponderance of the evidence that proposed substitute claims 15–28 are either unpatentable as indefinite or unpatentable over prior art.

Therefore, we *deny* Patent Owner’s Revised Motion to Amend.

A. Principles of Law

In an *inter partes* review, amended claims are not added to a patent as of right, but rather must be proposed as a part of a motion to amend claims. 35 U.S.C. § 316(d). Ordinarily, the petitioner “bears the burden of persuasion to show, by a preponderance of the evidence, that any proposed substitute claims are unpatentable.” 37 C.F.R. § 42.121(d)(2); *Lectrosonics*, Paper 15, 3–4 (PTAB Feb. 25, 2019) (designated precedential); *Bosch Auto. Serv. Sols. LLC v. Matal*, 878 F.3d 1027, 1040 (Fed. Cir. 2017).

But before considering the patentability of the substitute claims, we first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. *Lectrosonics*, Paper 15 at 4. In that regard, Patent Owner bears

the burden of persuasion to show that: (1) the amendment proposes a reasonable number of substitute claims; (2) the amendment responds to a ground of unpatentability involved in the trial; (3) the amendment does not seek to enlarge the scope of the claims of the patent or introduce new subject matter; and (4) the original disclosure sets forth written description support for each proposed substitute claim. *Id.*; 35 U.S.C. § 316(d); 37 C.F.R. § 42.121(d)(1).

B. The Proposed Substitute Claims

Patent Owner proposes to amend the '882 patent by adding new claims 15–28 as respective substitutes for original claims 1–14. *See* RMTA 2, App. A. Claim 15 is proposed as a substitute for original claim 1, and is reproduced below. Underlined language reflects subject matter added to original claim 1.

15. A hydraulic fracturing system for fracturing a subterranean formation comprising:
 - an electric motor;
 - a pump coupled to the motor, and that has a discharge in fluid communication with a wellbore that intersects the formation, so that when the motor is activated and drives the pump, pressurized fluid from the pump pressurizes the wellbore to fracture the formation;
 - a variable frequency drive in communication with the electric motor, and that controls the speed of the motor, and performs electric motor diagnostics to prevent damage to the electric motor;
 - a source of electricity that is disposed a long distance from the electric motor;

transmission lines that connect the source of electricity to the electric motor and that span the long distance between the source of electricity and the electric motor wherein the transmission lines are reconfigurable and movable to connect to one or more alternate equipment load systems associated with one or more alternate wellbores without moving the source of electricity; and

a switch gear between the transmission line and the source of electricity, and another switch gear between the transmission line and the electric motor.

RMTA App. A (pgs. 1–2). Claim 22 is proposed as a substitute for original claim 8, and is reproduced below. Underlined language reflects subject matter added to original claim 8, and double-bracketed language reflects subject matter omitted from original claim 8.

22. A method of fracturing a subterranean formation comprising:

driving a plurality of equipment loads including a pump with an electric motor;

transmitting electricity via a transmission line to the plurality of equipment loads including the electric motor from a power source that is a long distance from the plurality of equipment loads including the electric motor, wherein a first switchgear is positioned between the power source and the transmission line, [[and]] a second switchgear is positioned between the transmission line and the plurality of equipment loads including the electric motor, wherein a plurality of transformers are positioned between the second switchgear and the plurality of equipment loads such that each equipment load of the plurality of equipment loads is associated with an individual transformer of the plurality of transformers, and wherein the transmission line is reconfigurable and movable to connect to one or more alternate equipment load systems associated with one or more alternate wellbores without moving the power source;

pressurizing a fluid with the pump to form a pressurized fluid;
and

fracturing the subterranean formation by directing the
pressurized fluid to a wellbore that intersects the
subterranean formation.

RMTA App. A (pgs. 3–4). Proposed substitute claims 16–21, 23–26 and 28 correspond to original claims 2–7, 9–12, and 14, respectively, and are amended only to change their dependencies to one of proposed substitute claims 15 or 22. RMTA App. A (pgs. 2–6). Proposed substitute claim 27 corresponds to original claim 13 and is amended to change its dependency to proposed substitute claim 22 and to change one instance of “a” to “the.” *Id.* (pgs. 5–6).

C. Statutory and Regulatory Requirements

A motion to amend must “propose a reasonable number of substitute claims.” 35 U.S.C. § 316(d)(1)(B); *see also* 37 C.F.R. § 42.121(a)(3) (“A motion to amend may cancel a challenged claim or propose a reasonable number of substitute claims.”). “There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1) substitute claim.” *Lectrosonics*, Paper 15 at 4; *see also* 37 C.F.R. § 42.121(a)(3). Patent Owner proposes no more than one substitute claim for each challenged claim. RMTA 2, App. A. Petitioner does not contend that Patent Owner proposed more than a reasonable number of substitute claims. *See generally* RMTA Opp. We determine that Patent Owner has proposed a reasonable number of substitute claims.

“A motion to amend may be denied where . . . [t]he amendment does not respond to a ground of unpatentability involved in the trial.” 37 C.F.R.

§ 42.121(a)(2)(i). The Petition asserts that claims 1–14 are unpatentable over prior art. As shown above, through the Revised Motion to Amend, Patent Owner has sought to change the substantive features of both challenged independent claims (claims 1 and 8). The proposed amendments to the other challenged dependent claims make them depend, directly or indirectly, on the proposed substitute independent claims. Petitioner does not contend that the proposed amendments fail to respond to a ground of unpatentability in this trial. *See generally* RMTA Opp. We determine that the proposed amendments are responsive to a ground of unpatentability involved in this trial.

An amendment may not enlarge the scope of the claims of the patent. 35 U.S.C. § 316(d)(3); 37 C.F.R. §§ 42.121(b)(1), 42.121(b)(2). Patent Owner asserts that proposed substitute independent claims 15 and 22 each recite additional limitations relative to the claims they substitute and therefore do not enlarge the scope of the challenged claims. RMTA 3–4. Petitioner does not contend that any proposed substitute claim enlarges the scope of any challenged patent claim. *See generally* RMTA Opp. We determine that each proposed substitute claim includes narrowing limitations and does not violate the statutory and regulatory prohibition of enlarging the scope of patent claims.

An amendment may not introduce new matter. 35 U.S.C. § 316(d)(3); 37 C.F.R. §§ 42.121(b)(1), 42.121(b)(2). New subject matter is any addition to the claims that lacks sufficient support in the subject patent’s original disclosure. *See TurboCare Div. of Demag Delaval Turbomach. v. Gen. Elec. Co.*, 264 F.3d 1111, 1118 (Fed. Cir. 2001) (“When [an] applicant adds a claim . . . , the new claim[] must find support in the original

specification.”). Patent Owner also is required to show written description support in “the original disclosure of the patent for each claim that is . . . amended,” and in “an earlier-filed disclosure for each claim for which benefit of the filing date of the earlier filed disclosure is sought.” 37 C.F.R. § 42.121(b).

For the recitation that the transmission lines be “reconfigurable and movable to connect to one or more alternate equipment load systems associated with one or more alternate wellbores without moving the source of electricity” added via proposed substitute claims 15 and 22, Patent Owner cites to, *inter alia*, paragraphs 5 and 26 of the original specification filed as Application No. 15/183,387 (“the ’387 application”), which matured into the ’882 patent. RMTA 5–6, 8–9. For the recitation that “a plurality of transformers are positioned between the second switchgear and the plurality of equipment loads such that each equipment load of the plurality of equipment loads is associated with an individual transformer of the plurality of transformers” added via proposed substitute claim 22, Patent Owner cites to, *inter alia*, paragraph 25 of the ’387 application. *Id.* at 6, 9–10; *see also* Ex. 1003, 840 (Fig. 4). Petitioner does not contend that any proposed substitute claim introduces new matter. *See generally* RMTA Opp. We determine that each proposed substitute claim is supported by the ’387 application and does not introduce new matter.

Accordingly, we determine that Patent Owner has shown that proposed substitute claims 15–28 meet the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121.

D. Petitioner's Assertions of Unpatentability

Petitioner contends that the proposed substitute claims are unpatentable under 35 U.S.C § 103 as being obvious in view of the following combinations of references:

Claim(s) Challenged	Reference(s)
15–28	Sanborn
15–28	Sanborn, Clarke
15-28	Sanborn, EE Reference
15-28	Sanborn, Kaarstad ¹²
15-28	Sanborn, Payne ¹³
15–21, 23, 24	Sanborn, Broussard
15–21, 23, 24	Sanborn, Clarke, Broussard
15–21, 23, 24	Sanborn, EE Reference, Broussard
15–21, 23, 24	Sanborn, Kaarstad, Broussard
15–21, 23, 24	Sanborn, Payne, Broussard

RMTA Opp. 3–4. Petitioner additionally challenges the proposed substitute claims as being obvious in view of each of these grounds further in combination with Gilliam.¹⁴ *Id.* at 4.

¹² WO 2014/177346 A1, published November 6, 2014 (Ex. 1038, “Kaarstad”).

¹³ US 2016/0258267 A1, published September 8, 2016 (Ex. 1040, “Payne”).

¹⁴ US 2015/0038021 A1, published February 5, 2015 (Ex. 1039, “Gilliam”).

1. Asserted Obviousness Based on Sanborn

a. Proposed Substitute Claim 15

Petitioner argues that Sanborn's transmission lines are movable because they are connected to pumpers positioned on movable trucks. RMTA Opp. 4.

Patent Owner acknowledges that Sanborn's pumps and motors are movable, but argues that this movability does not mean Sanborn's transmission lines are movable. RMTA Reply 2. Rather, Patent Owner argues that an ordinarily skilled artisan would understand Sanborn's transmission line to be "a fixed feed source." *Id.* (citing Ex. 1006 ¶ 18); *see also id.* at 4–5 (presenting similar arguments).

Sanborn discloses that its pumps and other equipment that are connected to the transmission lines are mounted on mobile platforms. *E.g.*, Ex. 1006 ¶¶ 21, 29, 40. Thus, Sanborn supports Petitioner's contentions. Patent Owner's suggestion that Sanborn's transmission lines are fixed is unsupported by Sanborn's disclosure and unavailing.

Petitioner argues that Sanborn's transmission lines are reconfigurable because they are movable. RMTA Opp. 5. Petitioner argues that the '882 patent uses "reconfigurable" and "movable" as synonyms. *Id.* (citing Ex. 1001, 8:21–22; Ex. 1041 ¶ 27). Petitioner argues that it would have been obvious to make Sanborn's transmission lines reconfigurable in order to deliver power to other units in the pumping sub-system and to further Sanborn's goal of a flexible system. *Id.* at 5–6 (citing Ex. 1041 ¶¶ 28–32).

Patent Owner argues that "the transmission lines [of the '882 patent] are movable, but are also switched as part of the moving to reflect a reconfiguring aspect." RMTA Reply 4 (citing Ex. 1001, 8:21–24). Patent

Owner acknowledges that Petitioner’s arguments are supported by Petitioner’s expert, yet Patent Owner characterizes Petitioner’s arguments as mere attorney argument. *Id.* Patent Owner repeats its assertions that Sanborn discloses only a fixed system. *Id.* at 5.

Patent Owner’s discussion of the ’882 patent does not identify a special definition of “reconfigurable” that would preclude Petitioner’s showing. Moreover, Petitioner persuasively argues that Sanborn’s transmission lines are connectable to multiple units in the power generation or pumping subsystems, which complies with Patent Owner’s interpretation of “reconfigurable.” Thus, Sanborn supports Petitioner’s contentions.

Petitioner maps other pumps and other wellbores at the same site to the “one or more alternate equipment load systems associated with one or more alternate wellbores.” RMTA Opp. 6–7 (citing Ex. 1006 ¶¶ 21, 24, 37–38, Figs. 1–2; Ex. 1041 ¶¶ 33–36).

Patent Owner does not contest this aspect of the Opposition, which we find supported by the cited portions of Sanborn.

Patent Owner argues that Petitioner takes inconsistent positions in addressing the “without moving the source of electricity” recitation of proposed substitute claim 15. RMTA Reply 5–6 (citing RMTA Opp. 5–7).

Petitioner relies on Sanborn to disclose a power source that does not move via its disclosure of a sub-station, power generation facility, and dedicated power generation sub-system. RMTA Opp. 7 (citing Ex. 1006 ¶¶ 18, 46). We see no inconsistency in Petitioner’s reliance on Sanborn.

Accordingly, for the foregoing reasons and those set forth in § II.E above, we conclude that Petitioner has shown, by a preponderance of the

evidence, that the limitations of proposed substitute claim 15 are disclosed or taught by Sanborn.

b. Proposed Substitute Claim 22

In addition to the contentions discussed above regarding proposed substitute claim 15, Petitioner argues that Sanborn discloses multiple transformers and that it would have been obvious to use individual transformers for each piece of driven equipment because the transformers would be smaller and the use of multiple transformers provides redundancy. RMTA Opp. 8–10 (citing Ex. 1006 ¶¶ 22, 24, 31, 39, Fig. 1; Ex. 1041 ¶¶ 43–47).

Patent Owner notes that, in one paragraph cited by Petitioner, Sanborn discloses “two electric motors energized by the same single electrical feed source.” RMTA Reply 6 (citing Ex. 1006 ¶ 24). Patent Owner asserts that “this discussion is not a basis to allege individual transformers in the reference where ‘each equipment load of the plurality of equipment loads is associated with an individual transformer,’ as in [proposed] substitute claim 22.” *Id.* at 7. Patent Owner argues that Petitioner’s rationale of providing redundancy in the event that one transformer fails is misplaced because “*Sanborn* expressly addresses such failure potential by ‘multiple lines of power flow’ to ‘not cause secondary damage to other components or units.’” *Id.* (quoting Ex. 1006 ¶ 32).

That Sanborn discloses using a single electrical feed source with multiple equipment loads does not persuasively counter Petitioner’s arguments for why it would have been beneficial and obvious to include an individual transformer for each piece of powered equipment. For example,

we agree with Petitioner’s contention that the power delivered by the single source may need to be stepped-down to distinct levels as required by the various pieces of equipment. RMTA Opp. 9 (citing Ex. 1041 ¶ 45).

Providing the transformers in the manner suggested by Petitioner also comports with Sanborn’s teaching of allowing the pumping sub-systems to operate while maintenance operations, such as transformer maintenance, “are being carried out.” Ex. 1006 ¶ 32; *see also* RMTA Opp. 10 (citing Ex. 1041 ¶¶ 46–47).

Accordingly, for the foregoing reasons and those set forth in §§ II.E and III.D.1.a above, we conclude that Petitioner has shown, by a preponderance of the evidence, that the limitations of proposed substitute claim 22 are disclosed or taught by Sanborn.

Petitioner also argues that “driving a plurality of equipment loads including a pump with an electric motor” recited in proposed substitute claim 22 is unclear. RMTA Opp. 7–8. Petitioner interprets the claim language as either “refer[ring] to one motor driving ‘a plurality of equipment loads including a pump’” or “refer[ring] to driving an electric motor and a pump, as well as other equipment loads.” *Id.*

Patent Owner notes that one of Petitioner’s interpretations of proposed substitute claim 22 is that “the claim requires ‘one motor driving “a plurality of equipment loads including a pump,”’” and, thus, Patent Owner argues the claim is not indefinite. RMTA Reply 6.

We agree that the language of proposed substitute claim 22 is open to multiple interpretations. The relevant claim language could be read as “driving a plurality of equipment loads, including a pump, with an electric motor,” meaning that a single electric motor drives a plurality of equipment

loads, one such load being a pump. Or the relevant claim language could be read as “driving a plurality of equipment loads, including a pump with an electric motor,” meaning that a pump is driven with an electric motor and other equipment loads are driven in an unspecified manner. Thus, proposed substitute claim 22 contains language that is unclear and, thus, it is indefinite. *See Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014).

c. Proposed Substitute Claims 16–21 and 23–28

Patent Owner does not propose amendments to the dependent claims other than to alter their dependency and, for proposed substitute claim 27, to change a definite article to an indefinite article. RMTA App. A. Proposed substitute claims 16–21 and 23–28 are unpatentable for at least the reasons discussed regarding their parent claims and the reasons set forth in § II.E.3 above.

2. Asserted Obviousness Based on Sanborn and Clarke

Petitioner relies on Sanborn to teach the “new limitations” as in the challenge to the proposed substitute claims based on Sanborn alone and states that “[t]he remaining limitations were addressed for [the challenge to the original claims based on Sanborn and Clarke]” in the Petition and Reply Brief. RMTA Opp. 10 (citing Pet. 58–76; Pet. Reply 13–19).

Patent Owner does not contest this challenge apart from its contentions regarding the challenge to the proposed substitute claims based on Sanborn alone (RMTA Reply 8), which we find unavailing for the reasons set forth above.

For the reasons set forth in §§ II.F and III.D.1 above, we conclude that Petitioner has shown, by a preponderance of the evidence, that proposed substitute claims 15–28 would have been obvious in view of Sanborn and Clarke.

3. Asserted Obviousness Based on Sanborn and EE-Reference

Petitioner relies on Sanborn to teach the “new limitations” as in the challenge to the proposed substitute claims based on Sanborn alone and states that “[t]he remaining limitations were addressed for [the challenge to the original claims based on Sanborn and EE Reference]” in the Petition and Reply Brief. RMTA Opp. 10 (citing Pet. 58–76; Pet. Reply 20–21).

Patent Owner contests this challenge by referencing its contentions regarding the challenge to the proposed substitute claims based on Sanborn alone (RMTA Reply 8), which we find unavailing for the reasons set forth above. Patent Owner also argues that Petitioner’s showing “addresses the use of individual transformers, which does nothing to allege that such an individual transformer is used with *each equipment load* of the plurality of equipment loads as in [proposed substitute] claim 22.” RMTA Reply 8.

Patent Owner’s arguments attack the EE Reference individually outside of its combination with Sanborn. RMTA Reply 8. As explained in § III.D.1 above, we are persuaded by Petitioner’s contentions that Sanborn discloses or suggests associating individual switchgear with the separate pieces of driven equipment.

Accordingly, for the reasons set forth in §§ II.G and III.D.1 above, we conclude that Petitioner has shown, by a preponderance of the evidence, that

proposed substitute claims 15–28 would have been obvious in view of Sanborn and EE Reference.

4. Asserted Obviousness Based on Sanborn and Kaarstad

a. Proposed Substitute Claims 15 and 22

Petitioner relies on Sanborn as set forth in the challenge to the proposed substitute claims based on Sanborn alone and argues that “[i]t would have been obvious to place the switchgear and transformers of *Sanborn* in accordance with the locations described by *Kaarstad*.” RMTA Opp. 11. Petitioner argues that Kaarstad disclose multiple switchgear, including in each location recited in the proposed substitute claims. *Id.* at 15–16. Petitioner argues that Kaarstad discloses driving multiple equipment loads and providing a transformer for each load. *Id.* at 17–18. Petitioner argues that it would have been obvious “to place the switchgear and transformers of *Sanborn* in accordance with the locations described by *Kaarstad*” in order “to provide safe and redundant power distribution from *Sanborn*’s electrical feed to the VFDs driving *Sanborn*’s electric pump motors as well as to other auxiliary equipment disclosed in *Sanborn*.” *Id.* at 11–15.

Patent Owner argues that Kaarstad’s switchgear relied upon by Petitioner connect to different power sources, one being an external power source and the other being an onboard power source. RMTA Reply 9. Patent Owner interprets Petitioner as touting Sanborn’s use of a single electrical feed source. *Id.* (citing RMTA Opp. 9). According to Patent Owner, “[t]he switchgear arrangement, as well as the transformer and the

load arrangements of *Kaarstad* would not exist in a single electrical feed source based on the combined teachings.” *Id.* at 9–10.

Petitioner replies that “Patent Owner misreads the single electrical feed source of *Sanborn*.” RMTA Sur-reply 10. Petitioner argues that power for Sanborn’s electrical feed source “comes from multiple generators, including power generation units 52 and 54 . . . and generator 50.” *Id.* According to Petitioner, “[p]lacing the switchgear and transformers of *Sanborn* at the locations described by *Kaarstad* is perfectly compatible with the disclosure of *Sanborn*.” *Id.* at 11.

Patent Owner’s arguments regarding Sanborn having a single electrical feed source are unavailing for the reasons set forth in § III.D.1.b above.

Kaarstad describes “a method of operating a power system of a floating vessel.” Ex. 1038, 1:10–11. In Kaarstad’s method, power can be supplied by a plurality of gas turbines coupled to generators. *Id.* at 1:35–37. Kaarstad also describes the use of variable frequency drives in its power system. *Id.* at 6:20–22. Kaarstad further describes the use of generator sets coupled with a switchgear and tie breaker to enhance safety by providing redundancy to allow the power system to operate even if one of the generators fails. *Id.* at 11:30–12:2. Petitioner identifies switchgear, transmission lines, and transformers in Kaarstad’s system. RMTA Opp. 15 (reproducing and annotating Kaarstad Figure 2). Petitioner’s contentions are supported by the testimony of its declarant. *See* Ex. 1041 ¶¶ 69, 78–81. We credit this uncontested testimony of Dr. Durham.

Accordingly, for the foregoing reasons and those set forth in § II.E above, we conclude that Petitioner has shown, by a preponderance of the

evidence, that proposed substitute claims 15 and 22 would have been obvious in view of Sanborn and Kaarstad.

b. Proposed Substitute Claims 16–21 and 23–28

Patent Owner does not propose amendments to the dependent claims other than to alter their dependency and, for proposed substitute claim 27, to change a definite article to an indefinite article. RMTA App. A. Proposed substitute claims 16–21 and 23–28 are unpatentable for at least the reasons set forth in §§ II.E and III.D.4.a above.

5. *Asserted Obviousness Based on Sanborn and Payne*

a. Proposed Substitute Claims 15 and 22

Petitioner relies on Sanborn as set forth in the challenge to the proposed substitute claims based on Sanborn alone and argues that “[i]t would have been obvious to place the switchgear and transformers of *Sanborn* in accordance with the locations described by *Payne*.” RMTA Opp. 18. Petitioner argues that Payne discloses multiple switchgear, including in each location recited in the proposed substitute claims. *Id.* at 20–22. Petitioner argues that Payne drives multiple equipment loads and provides a transformer for each load. *Id.* at 23. Petitioner argues that it would have been obvious to “plac[e] the switchgear and transformers of *Sanborn* in accordance with the locations described by *Payne*.” *Id.* at 19.

Patent Owner argues that Payne’s switchgear relied upon by Petitioner connect to different power sources, so the teaching of multiple switchgear is inapplicable to Sanborn’s system, which, according to Patent Owner, Petitioner interprets as having a single electrical feed source. RMTA Reply 10.

Petitioner replies that Patent Owner’s argument “is a repeat of Patent Owner’s argument regarding *Kaarstad* and misreads the ‘feed source’ of *Sanborn*.” RMTA Sur-reply 11–12.

Patent Owner’s arguments regarding Sanborn having a single electrical feed source are unavailing for the reasons set forth in § III.D.1.b above.

Payne discloses a fracturing system having fracturing pump trailers, transformer trailers, switchgear trailers, a blender unit trailer, a hydration unit trailer, and a system control center. Ex. 1040 ¶¶ 43–44, Fig. 1. Both the blender unit and hydration unit include electric motors, motor-drives, and programmable automation controllers that communicate with variable frequency drives. *Id.* ¶¶ 39–40, 71–72, 88–90. Petitioner identifies switchgear, transmission lines, and transformers in Payne’s system. RMTA Opp. 21 (reproducing and annotating Payne Figure 2A). Petitioner’s contentions are supported by the testimony of its declarant. *See* Ex. 1041 ¶¶ 98, 102–106. We credit this uncontested testimony of Dr. Durham.

Accordingly, for the foregoing reasons and those set forth in § II.E above, we conclude that Petitioner has shown, by a preponderance of the evidence, that proposed substitute claims 15 and 22 would have been obvious in view of Sanborn and Payne.

b. Proposed Substitute Claims 16–21 and 23–28

Patent Owner does not propose amendments to the dependent claims other than to alter their dependency and, for proposed substitute claim 27, to change a definite article to an indefinite article. RMTA App. A. Proposed

substitute claims 16–21 and 23–28 are unpatentable for at least the reasons set forth in §§ II.E and III.D.4.a above.

6. Asserted Obviousness Based on Combinations Including Broussard

Petitioner challenges proposed substitute claims 15–21, 23, and 24 in view of the prior art combinations discussed in the previous five challenges to the proposed substitute claims further in view of Broussard. RMTA Opp. 23–24. Petitioner relies on Broussard to provide additional disclosure that the variable frequency drives of Sanborn would control the speed of the electric motor and perform motor diagnostics as discussed in § II.J above.

Id.

Patent Owner relies on the arguments advanced for the previous five challenges to the proposed substitute claims (RMTA Reply 12), which we find unavailing for the reasons discussed above.

Accordingly, for the reasons set forth in § II.J above, we conclude that Petitioner has shown, by a preponderance of the evidence, that proposed substitute claims 15–21, 23, and 24 would have been obvious in view of the combinations of references discussed above regarding the proposed substitute claims with the additional teachings of Broussard.

7. Asserted Obviousness Based on Combinations Including Gilliam

Petitioner challenges proposed substitute claims 15–28 in view of the prior art combinations discussed in the previous ten challenges to the proposed substitute claims further in view of Gilliam “to provide additional disclosure of transmission lines that ‘are reconfigurable and movable to connect to one or more alternate equipment load systems.’” RMTA Opp. 24–25. We have already determined that proposed substitute

claims 15–28 would have been unpatentable based on Petitioner’s prior ten challenges. Therefore, we need not, and to conserve the Board’s resources we do not, reach these additional challenges to the proposed substitute claims.

IV. CONCLUSION¹⁵

Based on the evidence presented with the Petition, the evidence introduced during the trial, and the parties’ respective arguments, Petitioner has shown, by a preponderance of the evidence, that claims 1–14 of the ’882 patent are unpatentable. Petitioner has also shown, by a preponderance of the evidence, that proposed substitute claims 15–28 are unpatentable. In summary,

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–14	103	Sanborn	1–14	
1–14	103	Sanborn, Clarke	1–14	
1–14	103	Sanborn, EE Reference	1–14	
1–14	103	Cryer, Clarke	1–14	

¹⁵ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. §§ 42.8(a)(3), (b)(2).

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–14	103	Cryer, EE Reference	1–14	
1–7, 9, 10	103	Sanborn, Broussard	1–7, 9, 10	
1–7, 9, 10	103	Sanborn, Clarke, Broussard	1–7, 9, 10	
1–7, 9, 10	103	Sanborn, EE Reference, Broussard	1–7, 9, 10	
1–7, 9, 10	103	Cryer, Clarke, Broussard	1–7, 9, 10	
1–7, 9, 10	103	Cryer, EE Reference, Broussard	1–7, 9, 10	
Overall Outcome			1–14	

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	15–28
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	15–28
Substitute Claims: Not Reached	

V. ORDER

Accordingly, it is:

ORDERED that claims 1–14 of the '882 patent have been shown to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Amend is *denied* as to the request to add proposed substitute claims 15–28 to the '882 patent; and

FURTHER ORDERED that, because this is a final written decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2021-01238
Patent 10,526,882 B2

For PETITIONER:

Chad C. Walters
David J. Tobin
Brandon Chen
Clarke Stavinoha
BAKER BOTTS L.L.P
chad.walters@bakerbotts.com
david.tobin@bakerbotts.com
brandon.chen@bakerbotts.com
clarke.stavinoha@bakerbotts.com

For PATENT OWNER:

Taylor Evans
Gurtej Singh
Scott Hughes
Corey Leggett
Melissa Schwaller
HOGAN LOVELLS US LLP
taylor.evans@hoganlovells.com
tej.singh@hoganlovells.com
scott.hughes@hoganlovells.com
corey.leggett@hoganlovells.com
melissa.schwaller@hoganlovells.com