

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LIBERTY ENERGY, INC. AND LIBERTY OILFIELD SERVICES LLC,
Petitioners,

v.

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

IPR2025-00139
U.S. Patent No. 11,208,878 B2

**DECLARATION OF MICHAEL NIKOLAOU IN SUPPORT OF PATENT
OWNER'S RESPONSE**

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a variable frequency drive (VFD) connected to the at least one electric motor to control the speed of the at least one electric motor;...	30
a transformer for conditioning power to the electric powered pump, the power being received from at least one generator at a voltage higher than an operating voltage of the electric pump; and.....	30
a switchgear, receiving power from at least one generator, configured to distribute power to a plurality of pieces of wellsite equipment, the switchgear having a common load sharing bus and front aligned, shielded cable connections, the switchgear being positioned within an enclosure;	30
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I, Michael Nikolaou, make this declaration in connection with patent owner response submitted by Patent Owner for U.S. Patent No. 11,208,878. All statements made herein of my own knowledge are true, and all statement made herein based on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, under Section 1001 of Title 18 of the United States Code. Although I am being compensated for my time in preparing this declaration, the opinions expressed herein are my own, and I have no stake in the outcome of this proceeding or any related litigation or administrative proceedings.

Date: September 28, 2025

A handwritten signature in dark ink, appearing to read "Michael Nikolaou", is positioned above a horizontal line.

Michael Nikolaou, Ph.D.

I. INTRODUCTION

1. I have been retained as an independent consultant on behalf of U.S. Well Services, LLC in the matter of the *Inter Partes* Review of U.S. Patent No. 11,208,878 (the “878 Patent”) (EX-1001)¹ to Oehring et al. (“Oehring”), assigned to U.S. Well Services, LLC (“Patent Owner” or “USWS”). I am being compensated for the time I spend on this matter, in addition to expenses. My compensation in this case is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of this or any other proceeding. I have no other interest in this proceeding.

2. In the preparation of this declaration, I have reviewed the Parties’ papers and exhibits in this case (IPR2025-00139), including the following documents:

Exhibit No.	Description
1001	U.S. Patent No. 11,208,878 to Jared Oehring <i>et al.</i> , “Modular switchgear system and power distribution for electric oilfield equipment” (the “878 Patent”), filed October 9, 2019, issued on December 28, 2021.
1002	File History for U.S. Patent No. 11,208,878.
1003	Declaration of Dr. Robert Durham

¹ In this Declaration, I reference documents by exhibit numbers that, as I understand, are attached as exhibits in this *Inter Partes* review of the 878 Patent.

1004	U.S. Patent Publication No. 2020/0040705 to Morris <i>et al.</i> , “Switch gear transport that distributes electric power for fracturing operations” (“Morris”), filed July 24, 2019, published on June 14, 2022, and claiming priority to a Morris Provisional filed on August 1, 2018.
1005	U.S. Provisional Application No. 62/713,393 to Morris <i>et al.</i> , “Electric Drive Pump for Well Stimulation,” (“Morris Provisional”) filed August 1, 2018.
1006	U.S. Patent Publication No. 2017/0222409 to Oehring <i>et al.</i> , “Switch gear load sharing for oil field equipment” (“Oehring IV”), filed April 4, 2017, published August 3, 2017.
1007	Schneider Premset Catalog (“ <i>Premset Catalog</i> ”), available May 3, 2017.
1008	Schneider Premset Brochure (“ <i>Premset Brochure</i> ”), available May 4, 2014.
1009	NFPA 70 ®, The National Electric Code®, issued July 16, 2004.
1010	PCT International Patent Publication No. WO 2018/201118 to Orban <i>et al.</i> , “Integrated power and electronics unit for drilling machine” (“Orban”), filed April 30, 2018, published November 1, 2018.
1011	U.S. Patent No. 5,042,756 to Robert Pratt, “Flip-flop cable tray walkway” (“Pratt”), filed March 20, 1990, issued on August 27, 1991.
1012	U.S. Patent Publication No. 2016/0273328 to Jared Oehring, “Cable Management of Electric Powered Hydraulic Fracturing Pump Unit” (“Oehring II”), filed May 3, 2016, and published on September 22, 2016.
1013	U.S. Patent Publication No. 2016/0258267 to Payne <i>et al.</i> , “Well Fracturing Systems with Electrical Motors and Methods of Use,” filed Mar. 3, 2016, published September 8, 2016.
1014	U.S. Patent Publication No. 2016/0105022 to Jared Oehring, “System and Method for Parallel Power and Blackout Protection for Electric Powered Hydraulic Fracturing” (“ <i>Oehring III</i> ”), filed October 13, 2015, and published on April 14, 2016.

1015	U.S. Provisional Patent Application 62/743,360, Jared Oehring <i>et al.</i> , “Automated Fracturing Pump System”, filed October 9, 2018.
1016	U.S. Provisional Patent Application 62/743,299, Jared Oehring <i>et al.</i> , “Modular Switchgear System and Power Distribution for Electric Oilfield Equipment”, filed October 9, 2018.
1017	Complaint, <i>U.S. Well Services, LLC et al. v. Liberty Energy, Inc. et al.</i> , No. 4:24-cv-00839 (S.D. Tex. March 6, 2024)
1018	Plaintiff’s Motion for Leave to File the Second Amended Complaint, <i>U.S. Well Services et al. v. Liberty Energy Inc. et al.</i> , No. 4:24-cv-00839, Dkt. No. 46 (S.D. Tex. Sept. 19, 2024).
1019	<i>Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation</i> (June 21, 2022)
1020	Federal Court Management Statistics (June 30, 2024), available at https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_appprof_ile0630.2024.pdf
1021	NFPA 70 Trademark Specimen filed October 10, 2007, Trademark Reg. No. 78913310.
1022	Michael Eves, <i>SF6 Alternatives: A Literature Review on SF6 Gas Alternatives for use on the Distribution Network</i> , April 11, 2018.
1023	Affidavit of Christopher Butler, Internet Archive regarding EX1007 and EX1008
1024	Affidavit of Christopher Butler, Internet Archive regarding ABB URLs.
1025	Declaration of Michael Eves.
1027	PREMSET Trademark Registration No. 87032738, Statement of Use and Specimen, dated February 14, 2018.
1028	Claim Listing for Claims of U.S. Patent No. 11,208,878 to Jared Oehring <i>et al.</i> , “Modular switchgear system and power distribution for electric oilfield equipment” (the “878 Patent”), filed October 9, 2019, issued on December 28, 2021.

1029	Lionel B. Roe, PRACTICES AND PROCEDURES OF INDUSTRIAL ELECTRICAL DESIGN (McGraw-Hill: 1972), ISBN: 0-07-053390-3 (“Roe”)
1030	John A. Camara, ELECTRICAL ENGINEERING REFERENCE MANUAL FOR THE ELECTRICAL AND COMPUTER PE EXAM, 6th ed. (Professional Publications, Inc.: 2002), ISBN: 1-888577-56-8 (“EE-Reference”)
1031	U.S. Patent No. 1,743,771 to Hall <i>et al.</i> , entitled “System of Electric Distribution” (filed March 25, 1926 and issued January 14, 1930) (“Hall”)
1032	IEEE100: THE AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS, 7th ed. (IEEE Press: 2000), ISBN: 0-7381-2601-2 (“IEEE Standards Dictionary”)
1033	Donald G. Fink, STANDARD HANDBOOK FOR ELECTRICAL ENGINEERS, 13 th ed. (McGraw-Hill, New York: 1993), ISBN: 0-07-020984-7 (“Fink”)
1034	U.S. Patent Publication No. 2011/0241590 to Horikoshi <i>et al.</i> , entitled “Motor Driving Apparatus Having Fault Diagnostic Function” (filed Feb. 11, 2011 and published Oct. 6, 2011) (“Horikoshi”).
1035	U.S. Patent Publication No. 2012/0255734 to Coli <i>et al.</i> , entitled “Mobile, Modular, Electrically Powered System for Use in Fracturing Underground Formations” (filed April 6, 2012 and published Oct. 11, 2012).
1036	U.S. Patent No. 9,410,410 to Broussard <i>et al.</i> , entitled “System for Pumping Hydraulic Fracturing Fluid using Electric Pumps” (filed Nov. 16, 2012 and issued Aug. 9, 2016)
1037	“Adjustable Frequency Drives,” <i>Eaton</i> , archived at https://web.archive.org/web/20171114050055/http://www.eaton.com/ecm/idcplg?IdcService=GET_FILE&allowInterrupt=1&RevisionSelectionMethod=LatestReleased&noSaveAs=0&Rendition=Primary&dDocName=PCT_1317113 (November 14, 2017).

1038	“Header” definition. Norman J. Hyne, <i>Dictionary of Petroleum, Exploration, Drilling, and Production</i> (1991).
1039	U.S. Patent No. 2,533,001 to Everett Eberhard, “Flip-Flop Counter Circuit” (“Eberhard”), filed April 30, 1949, issued December 5, 1950.
1040	C. M. Chang, “An N-P-N high power fast germanium core driver transistor,” <i>1957 International Electron Devices Meeting</i> , Washington, DC, USA, 1957, pp. 114-114, doi: 10.1109/IEDM.1957.187057 (“Chang”).
1041	F. B. Golden, “Liquid Cooling of Power Thyristors,” <i>IEEE Transactions on Industry Applications</i> , vol. IA-8, no. 5, pp. 601-606, Sept. 1972, doi: 10.1109/TIA.1972.349789 (“Golden”).
1042	A. H. Iversen and S. Whitaker, “A uniform temperature, ultra high heat flux liquid cooled, power semiconductor package,” <i>Conference Record of the IEEE Industry Applications Society Annual Meeting</i> , San Diego, CA, USA, 1989, pp. 1340-1347 vol.2, doi: 10.1109/IAS.1989.96817 (“Iverson and Whitaker”).
1043	Hefner, A. R. 1992. “A dynamic electro-thermal model for the IGBT.” In <i>Conference Record of the 1992 IEEE Industry Applications Society Annual Meeting</i> , 1094-104 vol.1 (“Hefner”).
2001	U.S. Patent No. 9,945,365 to Hernandez et al.
2002	Grizzly EnviroFrac Data sheet
2003	Patent Case Scheduling Order, <i>U.S. Well Services, LLC, et al v. Liberty Energy, Inc.</i> , et al, 4:2-cv-008939-KPE (S.D. Tex.), ECF No. 30.
2004	Petitioner’s Invalidity Contentions Cover Pleading, <i>U.S. Well Services, LLC, et al v. Liberty Energy, Inc.</i> , et al, 4:2-cv-008939-KPE (S.D. Tex.).
2005	USPTO Announcement Rescinding Memorandum Addressing Discretionary Denial Procedures and Accompanying Memorandum

2006	Order Denying Stay
2007	Joint Motion to Amend Patent Case Scheduling Order
2008	Amended Patent Case Scheduling Order
2009	Declaration of Richard Quarles ISO Motion for <i>Pro Hac Vice</i>
2010	U.S. Pat. Pub. No. 2019/0203572
2011	U.S. Pat. Pub. No. 2019/0003329
2012	Deposition of Dr. Robert Durham
2013	Declaration of Dr. Michael Nikolaou
2014	C.V. of Dr. Michael Nikolaou

3. In forming my opinions expressed below, I have considered the documents listed in above paragraph 2, along with any other references cited in my declaration, as well as my knowledge and experience based on my work in this area as described below.

4. I have been asked to consider the time of the alleged invention to be around October 9, 2018, to which the '878 Patent claims priority. I understand Petitioners contend that the 878 Patent is not entitled to its October 9, 2018, effective date, but that is not relevant because Petitioners rely on prior art predating October 9, 2018. I am familiar with the technology at issue and am aware of the state of the art around this time. It is my opinion that, as of October 9, 2018, a person of ordinary skill in the art ("POSITA") pertinent to the subject matter of the

'878 Patent would have at least (1) a Bachelor of Science in Mechanical, Electrical, or 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 (2) at least four years of industry experience in the oil and gas industry including well drilling, completion, or production. Further, it is my opinion that someone with additional education but less professional experience, and vice versa, may qualify as a POSITA. Based on this description, I qualified as a POSITA as of October 9, 2018. My analysis and opinions below are given from the perspective of a POSITA in this technological field in the relevant time frame, unless stated otherwise.

II. QUALIFICATIONS AND COMPENSATION

5. I am a Professor and Associate Chair of Chemical and Biomolecular Engineering in the Cullen College of Engineering at the University of Houston.

6. I graduated with a diploma in chemical engineering from the National Technical University in Athens, Greece in 1984. I then earned a Ph.D. in chemical engineering at the University of California, Los Angeles in 1989. Prior to coming to the University of Houston, I was an Assistant (and then (Associate) Professor at Texas A&M University for eight years. After my promotion to Associate Professor and tenure at Texas A&M, I took a sabbatical leave as a Visiting Scientist at MIT. I have taught at the University of Houston for over 20 years.

7. In my role as a professor at the University of Houston I teach both undergraduate and graduate courses every year. At the undergraduate level, these courses include Analytical Methods for Chemical Engineers, Numerical Methods for Chemical Engineers, Plant Economics, Plant Design, Thermodynamics, Statistical Methods in Chemical Engineering, Statistical Quality Control Methods, and Chemical Process Control. At the graduate level, I teach Mathematical Methods in Chemical Engineering, Advanced Process Control, and Natural Gas Engineering. I also routinely advise both undergraduate and graduate (master and Ph.D.) students.

8. I have extensive experience in process systems engineering and mathematical modeling. My research interests are in computer-aided systems engineering, i.e., development and use of computer-based methods for the design, optimization, monitoring, and automatic control of various kinds of systems, in a diverse array of industries, including the oil and gas industry.

9. In my 35 years of academic and industrial consulting experience I have worked on problems in several industries, including the oil and gas industry and oil refining and petrochemicals. Much of my work tackles fundamental research issues and is described in a number of publications, as discussed below. A substantial portion of my work is directed to concrete solutions to problems faced by industrial partners and has resulted in specific commercial products (e.g., for

Lam Research, <https://www.lamresearch.com/>), patents, and the formation (by the corresponding project's managers) of a small company that was eventually bought by Schlumberger, a major global oilfield services company (http://www.slb.com/services/drilling/drilling_services_systems/directional_drilling/slider.aspx).

10. In addition to teaching, I have also served as a consultant for various oil and gas companies over the past 27 years, working with both major companies and smaller, independent companies, both “upstream” (i.e., oil and gas exploration and production) and “downstream” (oil and gas transportation, oil refining, and chemicals). I have consulted on a variety of matters for ENI, Schlumberger, WildHorse / RotoSlide, Synergy Fluid Services, XGas/EPT, IQPC Oil & Gas, Intelligent Agents Corporation, Landmark, ECOPETROL, Lam Research, Shell Global Solutions, Noble Drilling, AspenTech, General Electric, Simulation Sciences, Bryan Research & Engineering, Frito-Lay, Shell Development, and Union Pacific Resources.

11. I have published over 150 peer-reviewed publications in journals and conference proceedings in the area of computer-aided systems engineering. My publications focus on applications to the design, optimization, monitoring, and automatic control of various kinds of systems, in oil and gas, oil refining and petrochemicals, snack food production, semiconductor manufacturing, and

development and administration of antibiotics against resistant infections. Three of my refereed journal publications have been featured on the cover of high-impact journals (*AIChE Journal*, 2011; *IEEE Control Systems Magazine*, 2006; *PLoS Computational Biology*, 2011).

12. I have also presented my work as a speaker at numerous academic conferences, whether in regular sessions, invited sessions, or as a keynote speaker. As an example, I have been invited twice (in 1996 and 2011) to give presentations in the flagship conference on Chemical Process Control, held every five years (CPC-V and CPC-VIII), and was a keynote speaker at the 2017 International Petroleum & Petrochemical Technology Conference (IPPTC) in Beijing, China. I have also published five book chapters on various aspects of computer-aided systems engineering. Finally, I serve regularly as a peer reviewer at several major engineering and scientific journals (including *Automatica*, *PLoS*, *AIChE Journal*, *SPE Journal*, *Journal of Process Control*, *Computers & Chemical Engineering*) as well as at federal and international funding agencies, including National Science Foundation (NSF), Petroleum Research Fund (PRF), National Institutes of Health (NIH), and the Qatar National Research Fund (QNRF).

13. I am a member of the American Institute of Chemical Engineers, the Society of Petroleum Engineers, and Omega Chi Epsilon. I serve as a co-organizer

or co-chair of several major international conferences, including the AIChE Annual Meeting and the AIChE Spring Meeting.

14. I have received numerous teaching awards from both Texas A&M and University of Houston, including the Dow Excellence in Teaching Award, and the Cullen College of Engineering Teaching Award. I have also been named a Top Reviewer by *Automatica*, and, in 2007, I received the Computing & Systems Technology (CAST) Directors Award from the American Institute of Chemical Engineering. In 2017, I received the Abraham E. Dukler Distinguished Engineering Faculty Award at the University of Houston, which is given to faculty members that have made significant contributions to society and whose accomplishments and careers have brought credit to the University of Houston Cullen College of Engineering. In 2019, I received the Fluor Corp. Faculty Excellence Award at the Cullen College of Engineering. This award is the highest distinction bestowed to faculty of this college.

15. My curriculum vitae, which includes a complete list of my publications, is included as EX-2014.

16. I have previously given testimony in the following cases:

a) *Eurecat United States, Inc. v. Soren Marklund, Douglas Wene, and Chem 32 LLC*, Trial Ct. Cause No. 2012-5700, Harris Cty. Ct. (Tex.).

b) *TDE Petroleum Data Solutions, Inc. v. AKM Enterprise, Inc. DBA Mobilize, Inc.*, Case No. 4:15-cv-01821 (S.D. TEX-2015).

c) *Arrona et al. v. Bluestone Natural Resources, LLC*, Case No. 4:15-cv-02680 (S.D. TEX-2017).

d) *Sunoco Partners Marketing & Terminals L.P. v. Powder Springs Logistics, LLC, et al.*, Case No. 1:17-cv-01390 (D. Del. 2017).

e) *Magellan Midstream Partners L.P. v. Sunoco Partners Marketing & Terminals*, Case No. IPR2019-00024 (U.S. Patent No. 9,494,948).

f) *Magellan Midstream Partners L.P. v. Sunoco Partners Marketing & Terminals*, Case No. IPR2019-00025 (U.S. Patent No. 9,606,548).

g) *ProFrac Holding Corporation et al v. Halliburton Energy Services, Inc.*, Case No. IPR2023-01318 (U.S. Patent No. 7,931,082).

h) *ProFrac Holding Corporation et al v. Halliburton Energy Services, Inc.*, Case No. IPR2023-01319 (U.S. Patent No. 7,841,394).

i) *ProFrac Holding Corporation et al v. Halliburton Energy Services, Inc.*, Case No. PGR2023-00023 (U.S. Patent No. 11,373,058).

j) *Halliburton Energy Services, Inc. v. U.S. Well Services, LLC*, Case No. IPR2023-00558 (U.S. Patent No. 11,136,870).

k) *Liberty Energy Inc. and Liberty Energy Services LLC v. U.S. Well Services, LLC*, Case No. IPR2025-00105 (U.S. Patent No. 11,959,533).

1) *Liberty Energy Inc. and Liberty Energy Services LLC v. U.S. Well Services, LLC*, Case No. IPR2025-00066 (U.S. Patent No. 10,598,258).

17. I am being compensated in this matter at my standard consulting hourly rate of \$700 per hour. My compensation is not dependent on the substance of my statements in this declaration.

18. I am over the age of 18 and am competent to write this declaration. I have personal knowledge, or have developed knowledge, of the technologies discussed in this declaration based upon my education, training, or experience with the matters discussed herein. It is my opinion that, in accordance with the above, I am qualified to provide opinions from the perspective of a POSITA.

III. RELEVANT LEGAL STANDARDS

A. Patent Claims

19. Patent claims² describe the invention made by the inventors and describe what the patent owner owns and what the patent owner may prevent others from doing.

² My understanding of the relevant legal standards discussed herein is based on communications with counsel.

20. Claims may describe products, such as machines or chemical solutions, or processes for making or using a product. Claims are usually divided into separate parts or steps called limitations.

21. Claims may be independent or dependent. An independent claim sets forth all the requirements that must be met to be covered by that claim. It is not necessary to look at any other claim to determine what an independent claim covers. A dependent claim does not itself recite all the requirements of the claim, but refers to another claim for some of its requirements. Thus, the dependent claim depends on another claim. It is my understanding that the law considers a dependent claim to incorporate all the requirements of the claims to which it refers and/or depends.

22. It is my understanding that a dependent claim adds its own additional requirements over and above the requirements of the independent claim(s) from which it depends. I understand that to determine what a dependent claims covers, it is necessary to look at both the dependent claim and any other claims to which it refers/depends.

23. It is my understanding that, in that case, the dependent claims incorporate the limitations of the independent claim upon which they depend and, if a reference fails to disclose any of the limitations of an independent claim, the claims which depend on that claim cannot be made invalid by that reference. It is

my understanding that, as a result, any of the references at issue in this proceeding that fail to disclose all the limitations of an independent claim necessarily also fail to disclose all of the limitations of claims which depend on that claim.

A. Burden of Proof for Invalidity

24. It is my understanding that the party challenging the validity of an issued U.S. patent in an IPR proceeding bears the burden of proving invalidity through the facts supported by preponderance of the evidence. It is my understanding that a “preponderance of the evidence” means evidence sufficient to prove that a fact is more likely true than not true.

B. Anticipation

25. I understand that a patent claim can be found invalid as anticipated if each element of that claim, as properly construed, is found either explicitly or inherently in a single prior art reference. It is further my understanding that if the single reference does not disclose any one claim limitation, then that claim is not anticipated. I further understand that the single prior art reference cannot merely disclose each element, but it must disclose all the elements as arranged in the claim. It is my understanding that for a prior art reference to “inherently” disclose something, the reference must necessarily function with, or include the claimed limitations, to anticipate. The missing descriptive matter cannot merely probably or possibly include the claimed limitations. It is my understanding that, with respect to

an anticipation analysis, it is improper to combine separate, distinct embodiments of a single prior art reference.

26. It is my understanding that for a claim to be anticipated, each claim limitation must be disclosed in a single prior art reference, and the claimed arrangement or combination of those limitations must also be disclosed in that same prior art reference. I also understand that for a reference to be anticipatory, it must contain an enabling disclosure. It is further my understanding that merely naming or describing the subject matter is insufficient if it cannot be produced without undue experimentation.

C. Obviousness

27. I understand that obviousness is analyzed from the perspective of a POSITA at the time of the alleged invention. I also understand that a POSITA is presumed to have been aware of all pertinent prior art at the time of the alleged invention.

28. I understand that an obviousness analysis involves comparing a claim to the prior art to determine whether the claimed invention as a whole would have been obvious to a POSITA in view of the prior art and in light of the general knowledge of the art at the time the invention was made. I also understand that the invention may be deemed obvious when a POSITA would have reached the claimed invention through routine experimentation.

29. I understand that obviousness can be established by combining or modifying the disclosures of the prior art to achieve the claimed invention. It is also my understanding that where there is a reason to modify or combine the prior art to achieve the claimed invention, there must also be a reasonable expectation of success in so doing to render the claimed invention obvious. I understand that the reason to combine prior art references can come from a variety of sources, not just the prior art itself or the specific problem the patentee was trying to solve. I also understand that the references themselves need not provide a specific hint or suggestion of the alteration needed to arrive at the claimed invention; the analysis may include recourse to logic, judgment, and common sense available to a POSITA.

30. I understand that when there is some recognized reason to solve a problem, and there are a finite number of identified, predictable solutions, a POSITA has good reason to pursue the known options within his or her technical grasp. If such an approach leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In such a circumstance, when a patent simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, the combination is obvious.

31. I understand that when considering the obviousness of an invention, one should also consider whether there are any objective indicia that support the non-obviousness of the invention. I further understand that objective indicia of non-obviousness, also known as “secondary considerations,” include failure of others, copying, unexpected results, information that “teaches away” from the claimed subject matter, perception in the industry, commercial success, and long-felt but unmet need. I also understand that for objective indicia of non-obviousness to be applicable, the indicia must have some sort of nexus to the subject matter in the claim that was not known in the art. I understand that this nexus includes a factual connection between the patentable subject matter of the claim and the objective indicia alleged. I also understand that an independently made invention that is made within a comparatively short period is evidence that the claimed invention was the product of ordinary skill.

32. Finally, I understand that patent examiners at the U.S. Patent and Trademark Office (“PTO”) rely upon certain exemplary rationales in reviewing patent applications to understand whether the subject matter of the claims is obvious. I understand that the following is the list of exemplary rationales relied upon by patent examiners at the PTO: (i) combining prior art elements according to known methods to yield predictable results; (ii) simple substitution of one known element for another to obtain predictable results; (iii) use of a known technique to

improve similar devices (methods, or products) in the same way; (iv) applying a known technique to a known device (method, or product) ready for improvement to yield predictable results; (v) “obvious to try”—choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and (vi) known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art.

D. Written Description

33. I understand that an original application needs to provide sufficient written description support for the claimed invention. If the patent claims priority to an earlier filed application, I understand that the priority application must also provide sufficient written description support for the claimed invention. I further understand that the test for sufficiency of support in an application is not the presence or absence of literal support in the specification for the claim language, but instead, it is whether the disclosure of the application relied upon reasonably conveys to a person of ordinary skill in the art (“POSITA”) that the inventor had possession of the later claimed subject matter.

34. I understand that the disclosure must be viewed from the perspective of a POSITA and, as such, the disclosure does not need to restate the claims verbatim. I further understand that there is no requirement for an applicant to repeat what is

readily known in the art. Instead, the applicant must adequately describe improvements to the art.

E. Construing the Meaning of Claim Terms

35. I understand that an inter partes review (“IPR”) is a proceeding for evaluating the validity of issued patent claims. I understand that, in an IPR, a claim term is interpreted in a manner consistent with the standard used in patent litigation, as set forth in a case known as *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). That standard generally construes the claims according to their “ordinary and customary” meaning in view of the claim language, specification, file history, and, where applicable, relevant other evidence.

36. I understand that a patent’s “specification” includes all the figures, written descriptions, and claims within the patent. I understand that the PTO will look to the specification and prosecution history to see if there is a definition for a given claim term and, if not, will apply the ordinary and customary meaning from the perspective of a POSITA at the time in which the alleged invention was made.

37. As discussed above and detailed in my curriculum vitae, I was very familiar with hydraulic fracturing processes at both the individual well and oil-field level, as well as control systems for such processes and well treatment methods, technologies and was aware of the state of the art as of the earliest claimed priority date of the ’992 Patent. I believe that I would qualify as understanding the

knowledge and skill of a POSITA as of October 15, 2015, and I have a sufficient level of knowledge, experience, and expertise to provide an expert opinion in the field of the '992 Patent.

F. Person of Ordinary Skill in the Art

38. I understand that a person having ordinary skill in the art ("POSITA") may be defined by factors such as: (a) the levels of education and experience of the inventor and other persons actively involved in the field; (b) the types of problems encountered in the field; (c) prior art solutions to those problems; (d) rapidity which innovations are made; and (e) the sophistication of the technology.

G. Prior Art

39. I understand that a patent cannot be invalidated based on one person's testimony alone without corroborating evidence, particularly documentary evidence. I also understand that corroboration is require of any witness whose testimony alone is asserted to invalidate a patent, regardless of his or her level of interest in relation to that patent. Thus, even if the testifying individual has no interest in the litigation, I understand that collaboration is still required.

40. In this declaration, I may use the term "prior art" when describing specific references. My use of this term should not be interpreted as agreement that the item(s) described qualify as prior art under the patent laws. I merely use this phrase to address the items labeled as "prior art" by Petitioners and their expert.

IV. BACKGROUND OF THE TECHNOLOGY

41. The following paragraphs regarding hydraulic fracturing are based on the '878 Patent. For purposes of this declaration, I have been asked to assume that the earliest priority date of the 878 Patent is October 9, 2018.

42. The 878 Patent regards hydraulic fracturing (fracking) of underground formations in an oil or gas well to extract oil or gas from the formation. EX-1001, Abstract 1:36–38. Typically, fracturing systems run on diesel-generated mechanical power or other combustion engines. *Id.*, 1:44–46. Such engines have certain disadvantages, including that diesel is a more expensive, less environmentally friendly, less safe and heavier to transport than natural gas. *Id.*, 1:47–49. It is therefore desirable to implement a natural gas powered fracturing system to improve safety, save costs, and be more environmentally friendly than diesel powered engines. *Id.*, 1:64–67. While the use of turbines as a power source is well known, they are not conventionally used due to their own limitations, including that they are most efficient when operated steadily at 98% to 99% of their maximum potential. *Id.*, 2:5–10. While this may not create a problem for power plants, which typically require a steady power demand that does not fluctuate or where there is sufficient warning if a load requirement changes. *Id.*, 2:7–14. It is thus desirable to implement a turbine power generation system that can be managed at an output level that is usable by fracturing equipment. *Id.*, 2:25–27.

V. U.S. PATENT NO. 11,208,878

43. In this Section, I consider the disclosure in the 878 Patent along with relevant information from the prosecution history of the 878 Patent.

A. Background

44. To overcome these problems in the background technology, the 878 Patent discloses a modular switchgear system and power distribution system for hydraulic fracturing (fracking) of underground formations in an oil or gas well to extract oil or gas from the formation. EX-1001, Abstract; 1:36–38; 2:35–37. The system includes a common support structure that includes a switchgear—that includes front-aligned, shielded cable connections (*Id.*, 16:37–40), an electric powered pump, at least one electric motor to power the pump, a variable frequency drive to control the speed of the electric pump, and a transformer. *Id.*, Abstract, 3:12–17. The transformer distributes power to the electric powered pump, where the power is received from at least one generator at a higher voltage than an operating voltage of the electric powered pump. *Id.*, Abstract, 3:12–17. The switchgear also includes front-aligned, shielded cable connections. *Id.*, 16:37–40.

B. The Prosecution History

45. The Examiner allowed the challenged claims over the prior art of record because the claims were distinguished from the prior art—including substantially the same or substantially like disclosures from Morris (EX-1004) and

the same disclosures of Oehring IV because of the following claim feature:

“wherein the electric powered pump, the VFD, the switchgear, and the transformer are mounted on a common support structure and a single cable couples the switchgear to the transformer.” See EX-1002, 467 (stating claims “would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims” to recite “that each of the pump, VFD, transformer, and switchgear are mounted on a common support structure”), 39 (Notice of Allowance issued after Patent Owner amended the claims to include the common support structure limitation). As I explain in the sections below, it is my opinion that none of the prior art identified in the Petition, alone or in combination, discloses or renders obvious the challenged claims for the reasons I discuss below.

C. The Challenged Claims

46. I understand that for purposes of this proceeding, Petitioner is challenging the validity of claims 1–10 of the 878 Patent.

47. Claim 1 of the 878 Patent is shown below:

1. A hydraulic fracturing system for fracturing a subterranean formation, comprising:

an electric powered pump coupled to a well associated with the subterranean formation and powered by at least one electric motor, the electric powered pump configured to pump fluid into a wellbore associated with the well;

a variable frequency drive (VFD) connected to the at least one electric motor to control the speed of the at least one electric motor;

a transformer for conditioning power to the electric powered pump, the power being received from at least one generator at a voltage higher than an operating voltage of the electric pump; and

a switchgear, receiving power from at least one generator, configured to distribute power to a plurality of pieces of wellsite equipment, the switchgear having a common load sharing bus and front aligned, shielded cable connections, the switchgear being positioned within an enclosure;

wherein the electric powered pump, the VFD, the switchgear, and the transformer are mounted on a common support structure and a single cable couples the switchgear to the transformer.

EX-1001, 16:58–17:14. The claims depending from claim 1 add further limitations including the common load sharing bus configured to synchronize three-phase power of a similar voltage and frequency from different sources (claim 2), the common load sharing bus configured to isolate the electric powered pump, the at least one generator, and the switchgear (claim 3), a second single cable that couples the switchgear to the common support structure (claim 4), a cooling system providing cooling fluid to the VFD via one or more headers (claim 5), the switchgear comprising integrated core units configured to operate in a connected position, an open position, or a grounded position (claim 6), the switchgear further comprising an isolating ground switch (claim 7), the common support structure is at least one of a trailer, a skid, a pad, a truck bed, or a combination thereof (claim 8), cable trays (claim 9), and a human machine interface (claim 10). *Id.*, 17:15–18:25.

VI. CLAIM CONSTRUCTION

48. It is my understanding that claim terms are typically given their plain and ordinary meaning, as would have been understood by a person of ordinary skill in the art at the time of the alleged invention. Regarding the meaning of the claims, it is my understanding that one must consider the claim language, specification, prosecution history, and the knowledge of a person of ordinary skill in the art at the relevant time.

49. For purposes of this declaration, I will apply the plain and ordinary meaning for every term to all terms. However, I reserve the right to supplement my opinions if Petitioner offers a construction of any term in the 878 Patent, or if the Board decides to apply a construction of any term in the 878 Patent.

VII. OVERVIEW OF ALLEGED PRIOR ART REFERENCES

50. In this Petition (Paper 1), Petitioners present twenty grounds challenging claims 1–10 using various combinations of Morris, Oehring IV, Premset Catalog, Premset Brochure, NEC, Orban, Pratt, Payne, and Oehring II. I provide brief summaries of pertinent prior art below.

A. Morris (EX-1004)

51. U.S. Patent Application Publication 2020/0040705 to Morris et al. (Morris) is directed to an electric power distribution system and method for powering fracturing operations in oil and/or gas wells. EX-1004, Abstract, [0002].

Morris's distribution system for use in "fracturing fleet (103) includes a "switch gear transport" (108) with "circuit breaker connector[s]" (40) that connect an electric power source (102) to a "fracturing pump transport" (104) as shown in Fig. 1 and reproduced below. *Id.*, [0035], Fig. 1.

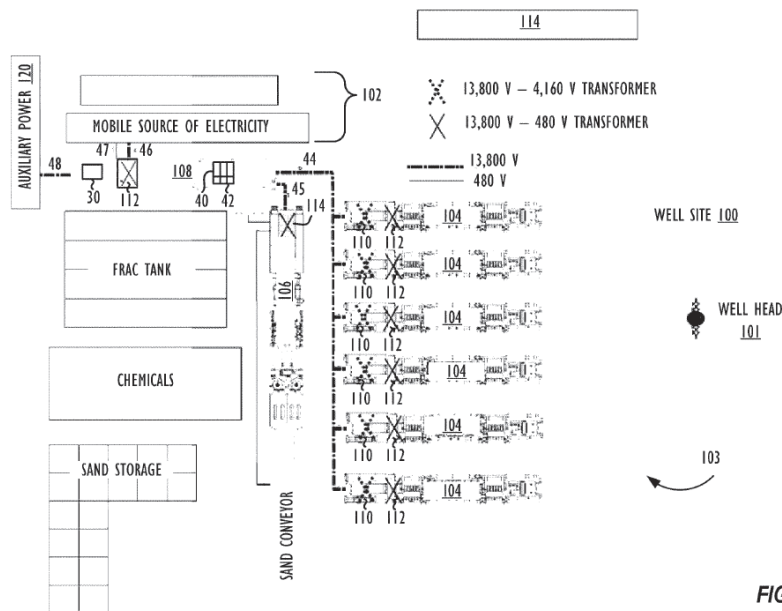


FIG.1

Morris, Fig. 1 (EX-1004)

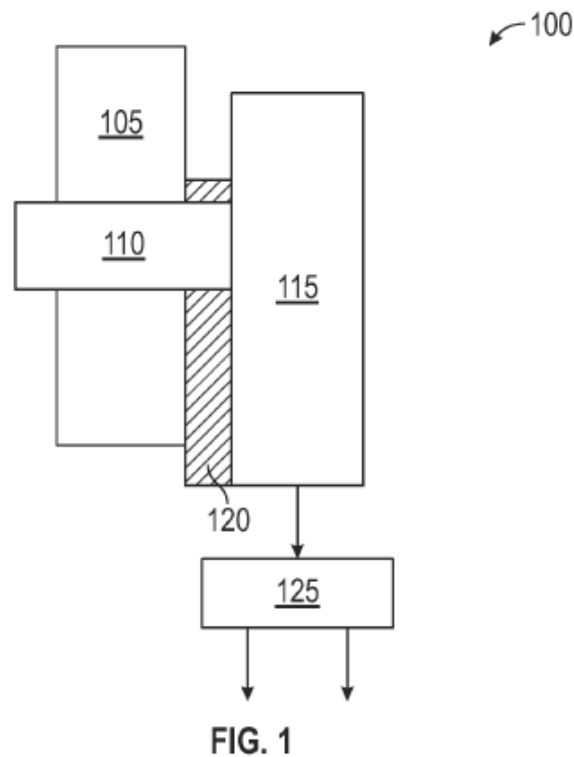
EX-1004, Fig. 1. Morris explains that its fracturing pump transport comprises one or more "transformers" (110) configured to receive electric power at a first voltage level and step down the voltage to one or more second voltage levels to power "prime movers, drivers, and/or other control instrumentation" in the oil and/or gas fracking system. *Id.*, [0030], [0031]. Morris's switchgear is mounted to switch gear transport 108, which is a separate transport from Morris's fracturing pump transport

108, where the pumps are located. *Id.*, [0021], [0022], [0025], [0035], Fig. 1.

Though Morris mentions that its system may include “drives,” Morris does not provide any further details regarding such drives. *See id.*, [0031], [0032], [0034], Fig. 1. Without doing so, Morris does not disclose the claimed “variable frequency drive.”

B. Oehring IV (EX-1006)

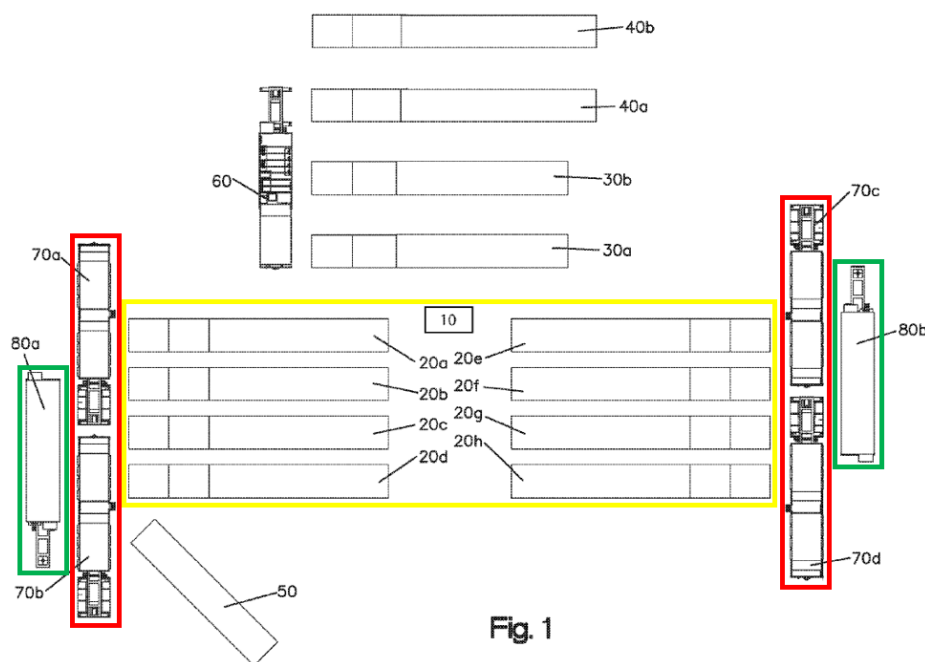
52. U.S. Patent Application Publication No. 2017/0222409 to Oehring et al. (“Oehring IV”) is directed to a hydraulic fracturing system for fracturing a subterranean formation. EX-1006, Abstract. Oehring IV’s hydraulic fracturing system further includes a “hydraulic fracturing well site power generation system 100” that provides electrical load sharing using one or more generators (105) for generating electricity that are electrically coupled to one or more electric motors, which power one or more electric pumps for pumping fracking fluid at high pressure down a wellbore as shown in Fig. 1 and reproduced below. *Id.*, [0015], Fig. 1. Oehring IV’s system also includes one or more switchgears located on switchgear trailer 125, for distributing an electrical load from its generators to the electric pumps. *Id.* Oehring IV further teaches that step-down transformers be located on a separate support structure from the fracturing equipment. *Id.*, [0092].



C. Payne (EX-1013)

53. Payne is directed to a system for stimulating oil or gas production from a wellbore, which includes one or more hydraulic pumps, one or more hydraulic motors to drive the hydraulic pumps, a variable frequency drive (VFD) and switchgear. EX-1013, Abstract, ¶ [0021]. Payne discloses that its “fracturing pump unit trailers, trucks, or skids [(“fracturing pump trailers”)] 20a, 20b, 20c, 20d, 20e, 20f, 20g, and 20h” (yellow) are separate from its “transformer trailers, trucks, or skids [(“transformer trailers”)] 70a-70d” (red) as illustrated in Figure 1 and reproduced below. EX-1013, ¶ [0043], Fig. 1.

54. Payne’s transformer trailers “include[] a pair of the eight fracturing transformer units” 300a–300h. EX-1013, ¶ [0043]. Payne further discloses that its “switchgear trailers, trucks, or skids [(“switchgear trailers”)] 80a, 80b” (green) are separate and distinct from both its fracturing pump trailers and transformer trailers as also illustrated in Figure 1. *Id.*, ¶ [0044], Fig. 1.



EX-1013, Fig. 1 (annotated).

VIII. THE PRIOR ART DOES NOT ANTICIPATE OR RENDER OBVIOUS THE CLAIMS OF THE '878 PATENT

- A. A POSITA would not agree that the Prior Art Discloses or Renders Obvious “wherein the electric powered pump, the VFD, the switchgear, and the transformer are mounted on a common support structure.”

1. A POSITA Would Agree That The ***Common Support Structure Limitation is a Point of Novelty*** Identified by the Examiner During Prosecution of the 878 Patent

55. I have reviewed the prosecution history and determined that the Examiner identified the novelty of the Common Support Structure Limitation and notified Patent Owner that the 878 Patent claims would be allowable if the Patent Owner were to amend the claims to include the Common Support Structure limitation. EX-1002, 467. I agree with the Examiner that the claims of the 878 Patent are novel at least because of the addition of the Common Support Structure limitation. I note that in an office communication dated Feb. 4, 2021, the Examiner rejected then-claim 20 as being unpatentable over U.S. Pat. Pub. No. 2019/0203572 (“Morris572”) in view of U.S. Pat. Pub. No. 2020/0194976 (“Benussi”) in view of U.S. Pat. Pub. No. 2018/0090914 (“Johnson”). *Id.*, 459. I further note that the examiner objected to then-claim 21 as “dependent upon a rejected base claim” (i.e., claim 20), but advised that it “would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.” *Id.*, 467. The Examiner explained and I agree with the following:

Claim 21 recites that each of the pump, VFD, transformer, and switchgear are mounted on a ***common support structure***. The combined limitations of claims 20-21 are ***not taught by the prior art***, that is a fracturing system including a pump driven by an

electric motor, a transformer, a VFD, and a switch gear *on a common platform*. Wherein the switchgear includes a common bus and front-aligned cable connections within an enclosure so that a single cable is needed to connect the switchgear and the transformer on the common transport.

Id. (emphasis added). Patent Owner responded in an August 3, 2021 response by cancelling original claims 1–16 and 21 and amending then-claim 17 to include the Common Support Structure limitation that the examiner identified as a point of novelty. *Id.*, 72–73. I note that the Examiner issued a Notice of Allowance on Aug. 20, 2021 after Patent Owner amended the claims to include the Common Support Structure limitation, allowing then-claim 17—current-claim 1—and other dependent claims 18–20 and 22–27—current-claims 2–10. *Id.*, 39.

56. I note that the examiner originally identified the Common Support Structure limitation for its novelty. I agree with the examiner that the Common Support Structure, when combined with the additional claim 1 limitations, is not disclosed, taught, or rendered obvious by any of the prior art or any combinations thereof. I also that that the Examiner already evaluated the primary prior art

disclosures asserted by Petitioners, as I discuss *infra*, Section VI.A.2.³ I agree with the Examiner that the Common Support Structure is a novel innovation over the prior art disclosures evaluated during prosecution.

2. A POSITA Would Agree That The *Examiner Already Considered the Disclosures* of Petitioners' Primary Asserted References and Determined That They Independently and Collectively Do Not Disclose or Render Obvious the Common Support Structure Limitation"

57. I have evaluated the disclosures of the prior art considered during prosecution. It is my opinion that the examiner already considered the disclosures of Morris, Oehring IV, and Payne. I agree with the Examiner that these disclosures fail to disclose or render obvious the Common Support Structure limitation.

58. I first note that the Petitioners' asserted Morris disclosures were already considered by the examiner. As I discussed *supra*, Section VI.A.1, the examiner considered U.S. Pat. Pub. No. 2019/0203572 to Morris, et al, (i.e., Morris572"). It is my opinion that the Examiner fully considered Morris572 at least because the examiner issued rejections based on Morris572 before later withdrawing all prior rejections and issuing a claim allowance notice after Patent

³ Petitioners also assert Premset Catalog (EX-1007) and Premset Brochure (EX-1008), both of which address only switchgear and thus do not disclose or render obvious the Common Support Structure limitation.

Owner added the Common Support Structure limitation. *See supra*, Section VI.A.1.

I have evaluated Morris572 and determined that Morris572 discloses numerous disclosures that Petitioners rely on for their obviousness grounds as I illustrate in the below summary table.

59. I further evaluated Morris329, also cited and considered by the Examiner, and determined that Morris329 discloses numerous content upon which Petitioners rely regarding the Common Support Structure limitation as I illustrate in the below table. In this table, I identify Petitioners' citations to Morris and illustrate how Morris329 disclosures are substantially the same as the Morris disclosures asserted by Petitioners

Petition Citation	Morris572/Morris329 Citation
First, <i>Morris</i> expressly discloses an electric-powered pump, a VFD, and a transformer mounted on a common support structure, a pump transport. <i>Morris</i>'s "fracturing pump transport 104 may include one or more transformers." EX1004, [0030], Fig. 1; EX1005, [0024], Fig. 1. <i>Morris</i> also explains the one or more Pet., 37.	systems 708. The fracturing pump trailer power and control system 708 may comprise one or more electric drives, transformers, controls (e.g., a programmable logic controller (PLC) located on the fracturing pump transport 700), and Morris572 (i.e., Morris II), ¶ [0078]. Dr. Durham admits that Morris572 discloses its fracturing pump trailer may include electric drives and transformers. EX-2012, 44:3–5 ("Q: So Morris 572 discloses its fracturing pump trailer may include transformers. Right? A: Yes"), 44:6–8 ("Q: Morris 572 discloses its fracturing pump trailer may include electric drives. Right? A: Yes, sir.") (discussing Morris572, ¶ [0078]).

[0056] Each fracturing pump transport 304 may include one or more transformers to step down the voltage received from the switch gear transport 308 to different voltage levels. Using FIG. 3 as an example, each fracturing pump transport 304 may include two separate and independent transformers, a first transformer 310 to step down to a voltage level of 4.2 kV and a second transformer 312 to step down to a voltage level of 480 V. In other examples, each fracturing pump transport 304 could include a single transformer that produces multiple voltages levels. For example, the fracturing pump transport 304 may mount a three phase or three winding transformer to step down the voltage to two different voltage levels. Recall that the 4.2 kV voltage level supplies electric power to one or more electric prime movers that drive one or more pumps and the 480 V supplies electric power to the drives and/or other control instrumentation mounted on the fracturing pump transport 304. Transformers 310 and 312 are configured to supply enough electric current to power the prime movers, drivers, and/or other control instrumentation.

Morris329, ¶ [0056]. Durham admits that Morris329 discloses its fracturing pump trailer may include electric drives and transformers. EX-2012, 46:12–15 (“Q: So a POSITA would understand that Morris329 discloses drives mounted on the fracturing pump transport 304. Right? A: Yes, sir.”), 46:16–19 (“Q: A POSITA would understand that Morris329 discloses fracturing pump transport 304 may include a transformer, right? A: Yes.”).

[0030], Fig. 1; EX1005, [0024], Fig. 1. *Morris* also explains the one or more transformers supply power to “drives”—that a POSITA would have understood to be a VFD—and describes this VFD as “mounted on the fracturing pump transport.”

EX1004, [0031], EX1005, [0024]. It would also have been obvious to a POSITA, *Pet.*, 37.

[0078] A “lay-down” trailer 710 design may provide mobility, improved safety, and enhanced ergonomics for crew members to perform routine maintenance and operations of the pumps as the “lay-down” arrangement positions the pumps lower to the ground as the main trailer beams are resting on the ground for operational mode. As shown in FIGS. 7A and 7B, the “lay-down” trailer 710 has an upper section above the trailer axles that could hold or have mounted the fracturing pump trailer power and control systems 708. The fracturing pump trailer power and control system 708 may comprise one or more electric drives, transformers, controls (e.g., a programmable logic controller (PLC) located on the fracturing pump transport 700), and cables for connection to the drive power trailers and/or a separate electric pumper system. The electric drives may provide control, monitoring, and reliability functionality, such as preventing damage to a grounded or shorted prime mover 704 and/or preventing overheating of components (e.g., semiconductor chips) within the electric drives. The lower section, which may be positioned lower than the trailer axles, may hold or have mounted the prime mover 704 and the pumps 702A and 702B attached on opposite sides of each other.

Morris 572, ¶ [0078]. Dr. Durham admits that *Morris* 572 discloses its fracturing pump trailer may include electric drives and transformers. EX-2012, 44:3–5 (“Q: So *Morris* 572 discloses its fracturing pump trailer may include transformers. Right? A: Yes”), 44:6–8 (“Q: *Morris* 572 discloses its fracturing pump trailer may include electric drives. Right? A: Yes, sir.”) (discussing *Morris* 572, ¶ [0078]).

[0056] Each fracturing pump transport 304 may include one or more transformers to step down the voltage received from the switch gear transport 308 to different voltage levels. Using FIG. 3 as an example, each fracturing pump transport 304 may include two separate and independent transformers, a first transformer 310 to step down to a voltage level of 4.2 kV and a second transformer 312 to step down to a voltage level of 480 V. In other examples, each fracturing pump transport 304 could include a single transformer that produces multiple voltages levels. For example, the fracturing pump transport 304 may mount a three phase or three winding transformer to step down the voltage to two different voltage levels. Recall that the 4.2 kV voltage level supplies electric power to one or more electric prime movers that drive one or more pumps and the 480 V supplies electric power to the drives and/or other control instrumentation mounted on the fracturing pump transport 304. Transformers 310 and 312 are configured to supply enough electric current to power the prime movers, drivers, and/or other control instrumentation.

Morris329, ¶ [0056].

Dr. Durham admits that Morris329 discloses its fracturing pump trailer may include drives mounted on the fracturing pump transport. EX-2012, 46:12–15 (“Q: So a POSITA would understand that Morris329 discloses drives mounted on the fracturing pump transport 304, right? A: Yes, sir.”), 46:16–18 (“Q: A POSITA would understand that Morris329 discloses fracturing pump transport 304 may include a transformer, right? A: Yes.”).

EX1004, [0031], EX1005, [0024]. It would also have been obvious to a POSITA, based on *Morris*'s and *Oehring IV*'s disclosure of a VFD for motor control and common knowledge, to provide a VFD mounted on the same transport as the electric motor. EX1006, [0028], [0043]; EX1003, ¶¶101-08, 199-200. The transformer also Pet., 37.

motor. EX1006, [0028], [0043]; EX1003, ¶¶101-08, 199-200. The transformer also supplies power to "electric prime movers" and "pumps." EX1004, [0031], EX1005, [0024]. A POSITA would have understood that a "pump transport" would contain Pet., 37.

fracturing pump transport 104. Transformers 110 and 112 are able to supply enough electric current to power the prime movers, drivers, and/or other control instrumentation. Morris, ¶ [0031].

Not so, as the examiner already determined after evaluating substantially the same *Morris* disclosure in *Morris II* and *Oehring IV*, which was already considered and listed on the face of the 878 Patent.

[0056] Each fracturing pump transport 304 may include one or more transformers to step down the voltage received from the switch gear transport 308 to different voltage levels. Using FIG. 3 as an example, each fracturing pump transport 304 may include two separate and independent transformers, a first transformer 310 to step down to a voltage level of 4.2 kV and a second transformer 312 to step down to a voltage level of 480 V. In other examples, each fracturing pump transport 304 could include a single transformer that produces multiple voltages levels. For example, the fracturing pump transport 304 may mount a three phase or three winding transformer to step down the voltage to two different voltage levels. Recall that the 4.2 kV voltage level supplies electric power to one or more electric prime movers that drive one or more pumps and the 480 V supplies electric power to the drives and/or other control instrumentation mounted on the fracturing pump transport 304. Transformers 310 and 312 are configured to supply enough electric current to power the prime movers, drivers, and/or other control instrumentation.

Morris329, ¶ [0056].

Dr. Durham admits that Morris329 discloses its transformer supplies power to its prime movers and drives. EX-2012, XX:XX-XX

	(“Q: So a POSITA would understand that Morris 329 discloses its transformer supplies power to its prime movers, right? A: Yes, sir. Q: A POSITA would understand that Morris 329 discloses its transformer supplies power to its drives, right? A: Yes.”).
distribution using switchgear with generators and transformers). <i>Morris</i> also motivates switchgear on the pump transport by teaching a POSITA to mount electrical equipment on the pump transport so that it is “individually autonomous.” EX1004, [0034]; EX1005, [0026]. “Having autonomous trailers allows the fracturing fleet [] to become scalable and flexible.” EX1004, [0034]; EX1005, Pet., 38. [0026]. <i>Morris</i> further teaches avoiding “additional support-based transports,” such as the switchgear transport trailer, when scaling the fracturing fleet. EX1004, [0034]; Pet., 38. [0034] By mounting the drives and transformers 110 and/or 112 onto the fracturing pump transport 104 and the	[0058] By mounting the drives and transformers 310 and/or 312 onto the fracturing pump transport 304 and hydration-blender transport 306, the transports become individually autonomous by removing the need for other separate support-based trailers, such as the auxiliary unit transport and drive power transports that provide power conversion and/or drive control. Having autonomous trailers allows the mobile fracturing system 302 to become scalable and flexible, where each fracturing pump transport may be interchangeable with each other. For example, if the well is Morris329, ¶ [0058]. Dr. Durham admits that Morris329 discloses that having autonomous trailers allows the mobile fracturing system to become scalable and flexible. EX-2012, XX:XX–XX (“Q: So a POSITA would understand that Morris 329 discloses that having autonomous trailers allows the mobile fracturing system to become scalable and flexible, right? A: Yes. It says that.”).

transformer 114 on the hydration-blender transport 106, the transports 104, 106 become individually autonomous by removing the need for other separate support-based trailers, such as the auxiliary unit transport and drive power transports that provide power conversion and/or drive control. Having autonomous trailers allows the fracturing fleet 103 to become scalable and flexible, where each fracturing pump transport may be interchangeable with each other and allow for a reduced physical foot print of the fracturing fleet 103. For example, if the well is relatively small, the fracturing fleet 103 may have a reduced number of fracturing pump transports 104 (e.g., four transports instead of six transports). Conversely, if the well is large, more fracturing pump transports 104 can be stacked to increase pumping capacity without utilizing additional support-based transports.

Morris, ¶ [0034] (showing Petitioners' cite to Morris paragraph

[0034] does not list "switchgear transport trailer" as one of the trailers to be avoided).

[0058] By mounting the drives and transformers 310 and/or 312 onto the fracturing pump transport 304 and hydration-blender transport 306, the transports become individually autonomous by removing the need for other separate support-based trailers, such as the auxiliary unit transport and drive power transports that provide power conversion and/or drive control. Having autonomous trailers allows the mobile fracturing system 302 to become scalable and flexible, where each fracturing pump transport may be interchangeable with each other. For example, if the well is relatively small, the mobile fracturing system 302 may have a reduced number of fracturing pump transports 304 (e.g., four transports instead of six transports). Conversely, if the well is large and/or the well site is located at high elevations and/or high temperatures, more fracturing pump transports 304 can be stacked to increase pumping capacity without utilizing additional support-based transports (e.g., drive power transports 104 shown in FIGS. 1 and 2).

Morris329, ¶ [0058].

Dr. Durham admits that Morris329 discloses more fracturing pump transports can be stacked to increase pumping capacity without utilizing additional support-based transports such as drive power transports. EX-2012, 49:11–16 (Q: So a POSITA would understand that Morris 329 discloses more fracturing pump transports can be stacked to increase pumping capacity without utilizing additional support base transports such as drive power transports 104. Right? A: Yes, sir.”).

transformer. *Morris* states “each fracturing pump transport 104 is directly connected to the switch gear transport 108 with a single medium voltage (e.g., 13.8 kV) cable connection 44.” EX1004, [0027]; EX1005, [0022]. Similarly, “[t]o output and Pet., 40.

[0054] FIG. 3 illustrates that switch gear transport 308 connects to a mobile source of electricity 102 with six medium voltage (e.g., 13.8 kV) cable connections. The switch gear transport also connects to an auxiliary power transport 120 with one medium voltage (e.g., 13.8 kV) cable connection. The switch gear transport 308 also includes a transformer 312 that steps down electric power received at a medium voltage level (e.g., 13.8 kV) from the auxiliary power transport 120 to a low voltage level (e.g., 480 V). The low voltage level (e.g., 480 V) connection may provide electric power to ignite, start, or power on the mobile source of electricity 102. In contrast to FIG. 2, the switch gear transport 308 does not output or provide low voltage (e.g., 480 V) electrical connections to other transports. Specifically, the switch gear transport 308 outputs and supplies medium voltage (e.g., 13.8 kV) cable connections directly to the hydration-blender transport 306 and the fracturing pump transport 304 without connecting to any intermediate transports (e.g., drive power transport 104 and auxiliary unit transport 106 in FIG. 2). FIG. 3 depicts that the switch gear transport 308 generates a total seven medium voltage (e.g., 13.8 kV) cable connection, where each fracturing pump transports 304 is directly connected to the switch gear transport 308 with a single medium voltage (e.g., 13.8 kV) cable connection. The switch gear transport 308 also directly connects to the hydration-blender transport 306 using a single medium voltage (e.g., 13.8 kV) cable connection. Morris329, ¶ [0054].

Dr. Durham admits that Morris329 discloses that each fracturing pump transports 304 is directly connected to the switch gear transport 308 with a single medium voltage (e.g., 13.8 kV) cable connection. EX-2012, 50:6–12 (“Q: So a POSITA would understand that Morris

	329 discloses that each of its fracturing pump transports 304 is directly connected to the switch gear transport 308 with a single medium voltage, for example, 13.8-kilovolt cable connection. Right? A: Yes.”).
(emphasis added); EX1005, [0019]. <i>Morris</i> further explains the benefit of a single, medium-voltage cable connecting switchgear to the transformer in reducing cabling and promoting safety. EX1004, [0028]-[0029]; EX1005, [0022]-[0023]. Pet., 40.	[0055] The medium voltage power distribution system shown in FIG. 3 is able to reduce the number of electrical cables used to supply electric power to the fracturing pump transport 304 and hydration-blender transport 306 when compared to the medium-low power distribution system shown in FIG. 2. Specifically, when compared to the medium-low power distribution system shown in FIG. 2, the medium voltage power distribution system in FIG. 3 is able to reduce the number of electrical cables that provide power to each fracturing pump transport 304. As shown in FIG. 3, the mobile fracturing system 302 reduces the number of electrical cables from three electrical cables to one electrical cable for each fracturing pump transport 304. A further reduction of electrical cables is shown by supplying one electrical cable to the hydration-blender transport 306 instead of the ten electrical cables used to power both the blender transport 110 and hydration transport 118. One reason the medium voltage power distribution system is able to utilize less electrical cables is that each electrical cable does not need to supply a relatively high current (e.g., 600 A) to each of the fracturing pump transports 304 and hydration-blender transport 306. Supplying electric power at relatively lower current levels avoids the safety concerns and/or connection/disconnection issues associated with using a single electrical cable that supplies relatively high current (e.g., 600 A). Morris329, ¶ [0055]. Dr. Durham admits that Morris329 discloses the medium voltage

power distribution system is able to reduce the number of electrical cables used to supply power to the pump transport. EX-2012, 51:7–14 (“Q. So Morris 329 discloses the medium voltage power distribution system is able to reduce the number of electrical cables used to supply power to the pump transport. Right? A: That's what it says, yes, sir. As compared to the medium low power distribution system shown in Figure 2, to complete the sentence.”).

Dr. Durham further admits that Morris 329 discloses a benefit of supplying electric power at relatively lower current levels avoids the safety concerns and connection issues associated with using a single electrical cable that supplies relatively high current. EX-2012, 52:2–7 (“Q: So Morris 329 discloses a benefit of supplying electric power at relatively lower current levels avoids the safety concerns associated with using a single electrical cable that supplies relatively high current. Right? A: Correct, it says that.”), 52:8–14 (“Q: And Morris 329 discloses a benefit of supplying electric power at relatively lower current levels avoids connection issues relative to using a single electrical cable that supplies

relatively high current. Right? A: Correct. Safety concerns and/or connection/disconnection issues.”).

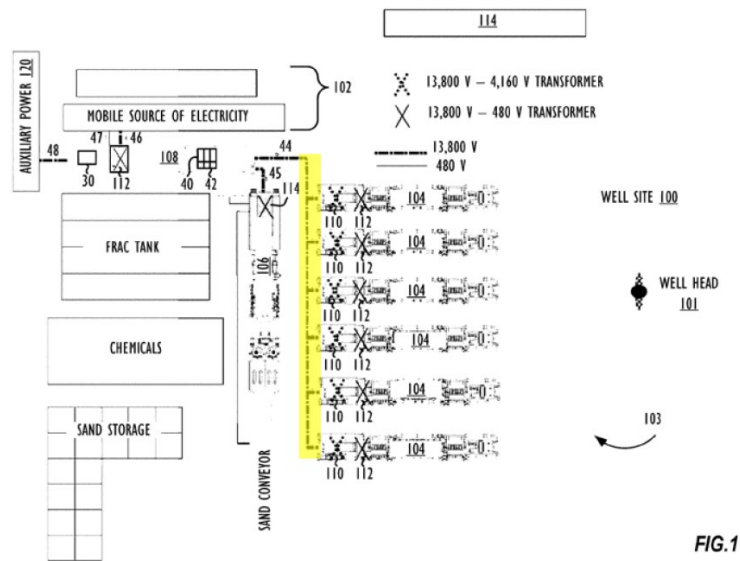


FIG. 1

Pet., 41.

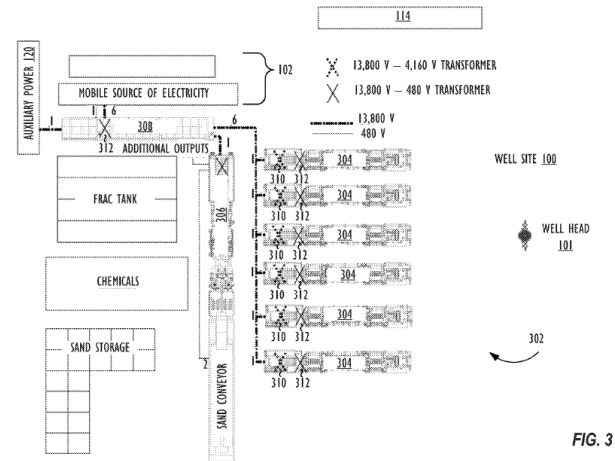


FIG. 3

Morris329, Fig. 3.

Dr. Durham admits Morris329, Figure 3 shows the connection between switch gear 308 and transformer 310. EX-2012, 51:2–5 (Q: In Figure 3 there's a connection between switch gear 308 and transformer 310. Right? A: There would be.”) (objections omitted).

60. As my analysis results above show, Morris572 was considered by the examiner, the basis of a rejection, listed as “cited by Examiner” (*see* EX-1001, 5, 7), and determined not to disclose or render obvious the 878 Patent claims. *See supra*, Section VI.A.1. It is my opinion that the Morris disclosures listed in the above table have already been considered by the examiner because they are the same or substantially the same as Morris572 disclosures.

61. My analysis of the 878 Patent prosecution also shows that U.S. Pat. Pub. No. 2019/0003329 to Morris et. al. (“Morris329”) was also considered during examination and listed as “cited by Examiner” on the face of the 878 Patent. *See* EX-1001, 5, 7. It is my opinion that the Morris disclosures listed in the above table have already been considered by the examiner because they are the same or substantially the same as Morris329 disclosures.

62. My analysis further shows that Oehring IV was already considered by the examiner, and listed as “cited by Examiner” on the 878 Patent. *See* EX-1001, 5, 7. It is therefore my opinion that all Oehring IV disclosures relied upon by Petitioners have already been considered by the examiner. I agree with the Examiner that Oehring IV does not disclose or render obvious the 878 Patent claims, which include the Common Support Structure limitation, either alone or when combined with the prior art considered during examination. It is further my opinion that Oehring IV does not disclose or render obvious the 878 Patent claims,

which include the Common Support Structure limitation, either alone or when combined with the prior art asserted by Petitioners.

63. My analysis shows that U.S. Pat. Pub. No. 2016/0105022 to Oehring et al (Oehring III) (EX-1014) was considered by the Examiner, the basis of a rejection (EX-1002, 2136), listed as “cited by Examiner” (*see* EX-1001, 4, 7), and determined not to disclose or render obvious the 878 Patent claims as amended to include the Common Support Structure limitation. *See supra*, Section VI.A.1. It is my opinion that Oehring III discloses additional Oehring IV content that Petitioners assert, including the Common Support Structure limitation as I illustrate in the below comprehensive comparison table. Petitioners’ citations to Oehring IV are shown in the left column and I illustrate additional Oehring III disclosures that are substantially the same as—or substantially like—the Oehring IV disclosure relied upon by Petitioners

Petition Citation	Oehring IV and Oehring II Citations
EX1004, [0031], EX1005, [0024]. It would also have been obvious to a POSITA, based on <i>Morris</i>'s and <i>Oehring IV</i>'s disclosure of a VFD for motor control and common knowledge, to provide a VFD mounted on the same transport as the electric motor. EX1006, [0028], [0043]; EX1003, ¶¶101-08, 199-200. The transformer also Pet., 37. [0028] In an embodiment, the system can further include a variable frequency drive connected to the at least one electric motor to control the speed of the at least one electric motor. In an embodiment, the variable frequency drive can frequently perform electric motor diagnostics to prevent damage to the at least one electric motor. Oehring IV, ¶ [0028]. [0043] In an embodiment, a variable frequency drive (VFD)—and in some cases, an A/C console used to keep the VFD from overheating—can be utilized to control the speed of an electric motor associated with a pump powered by the turbine(s). Oehring IV, ¶ [0043].	[0021] Each pump 10 can optionally be rated for about 2250 horsepower (HP) or more. In addition, the components of the system, including the pumps 10 and the electric motors 14, can be capable of operating during prolonged pumping operations, and in temperature in a range of about -20 degrees C. or less to about 55 degrees C. or more. In addition, each electric motor 14 can be equipped with a variable frequency drive (VFD) 15, and an A/C console, that controls the speed of the electric motor 14, and hence the speed of the pump 10. Oehring III, ¶ [0021]. Dr. Durham admits that Oehring III discloses a VFD that controls the speed of the electric motor 14. EX-2012, 53:15–19 (“Q: So in paragraph 0021, it discloses electric motor 14 can be equipped with a variable frequency drive, for example, a VFD. Right? A: Correct. It -- yeah, uses the VFD acronym for variable frequency drive), 53:20–22 (“Q: And in paragraph 0021, it discloses a VFD that controls the speed of the electric motor 14. Right?”).

	[0024] The VFD 15 can be designed to maximize the flexibility, robustness, serviceability, and reliability required by oilfield applications, such as hydraulic fracturing. For example, as far as hardware is concerned, the VFD 15 can include packaging receiving a high rating by the National Electrical Manufacturers Association (such as nema 1 packaging), and power semiconductor heat sinks having one or more thermal sensors monitored by a microprocessor to prevent semiconductor damage caused by excessive heat. Furthermore, with respect to control capabilities, the VFD 15 can provide complete monitoring and protection of drive internal operations while communicating with an operator via one or more user interfaces. For example, motor diagnostics can be performed frequently (e.g., on the application of power, or with each start), to prevent damage to a grounded or shorted electric motor 14. The electric motor diagnostics can be disabled, if desired, when using, for example, a low impedance or high-speed electric motor. Oehring III, ¶ [0024].
mount switchgear on the pump transport. Moreover, <i>Oehring IV</i> teaches that “switchgear [] can distribute power to other switchgear units.” EX1006, [0055]. A POSITA would thus have understood to mount switchgear on pump transports, in addition to <i>Morris</i>’s switchgear transport, which could distribute power to switchgear located on pump transports. <i>See</i> EX1003, ¶198 (explaining multiple sets Pet., 39.	Oehring IV was previously considered by the Examiner. <i>See infra</i>.

[0055] For the sake of discussion herein, certain types of switchgear units have nomenclature based on their application; for example a switchgear “A” can distribute power to other switchgear units, a switchgear “B” can transmit power	
Oehring IV, ¶ [0055]. of switchgear on pump transport). A POSITA would have understood that a “hierarchy of switchgear units” supports load sharing and isolation, as taught by <i>Oehring IV</i>. EX1006, [0055]-[0056], [0085], [0090]; <i>see also</i> EX1003, §IX.F. Pet., 39.	Oehring IV was previously considered by the Examiner. <i>See infra</i>.

64. As I illustrate above, the Examiner already considered the Oehring IV disclosures during prosecution. I agree with the Examiner that Oehring IV does not disclose or render obvious, alone or in combination with the prior art considered during examination, the 878 Patent claims. It is further my opinion that Oehring IV does not disclose or render obvious, alone or in combination with the prior art asserted by Petitioners, the 878 Patent claims.

65. Based on my analysis of the 878 Patent prosecution history, Payne was considered by the examiner during prosecution and is listed on the face of the 878 Patent. *See* EX-1001, 4. I further note that Payne is listed in the 878 Patent file history in an International Search Report as relevant to PCT/US 20/00017. EX-1002, 618. Based on my analysis, all Payne disclosures upon which Petitioners rely were already considered by the examiner and determined to not disclose or render obvious—alone or in combination with all other references—the Common Support Structure limitation. *See supra*, Section VI.A.1.

3. A POSITA Would Agree That All Primary References Explicitly Disclose Mounting One or More Components of the Common Support Structure Limitation on Separate Support Structures

66. It is my opinion that Morris, Oehring IV, and Payne all disclose one or more components of the Common Support Structure limitation to be mounted on separate support structures. I agree with Petitioners' admission that "Morris

discloses a switchgear transport that is *separate* from Morris's fracturing pump transport". Pet., 39 (emphasis added). I further note Dr. Durham's admission as much:

Q: So Morris discloses that switch gear transport 108 is a separate transport from fracturing transport pump 104. Right?

A: Yes, that's correct.

Q: So the switch gear that are on switch gear transport 108 are not on the same transport as the pumps on fracturing pump 104. Right?

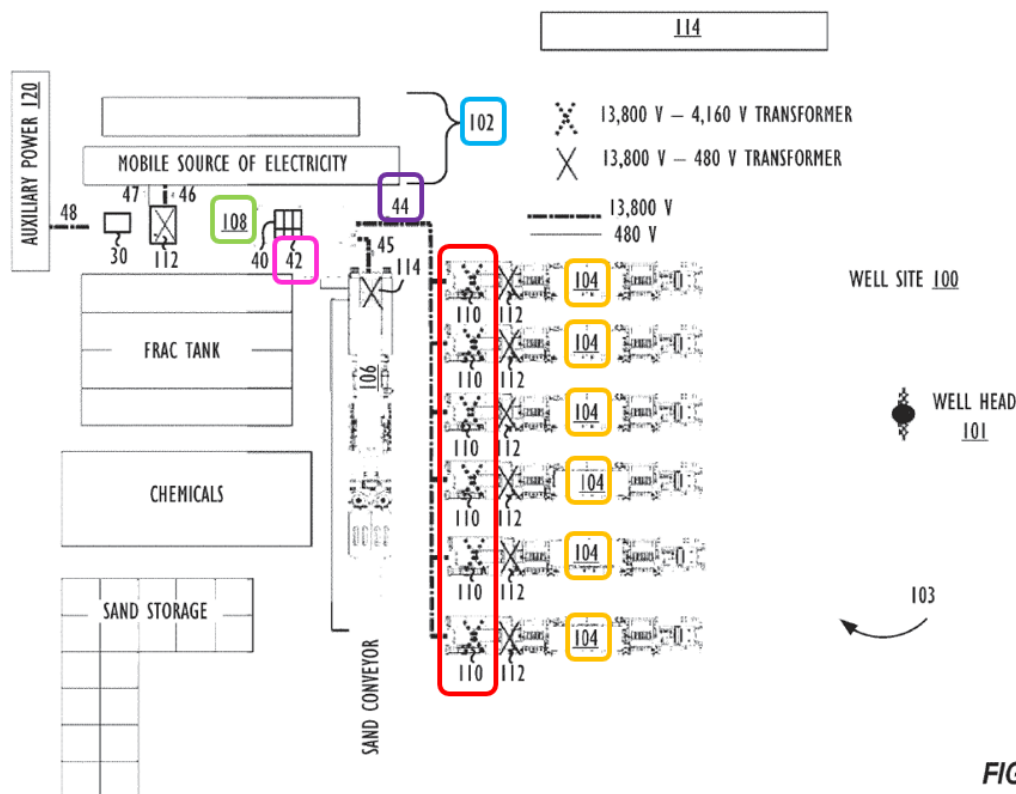
A: Correct. In this embodiment, that's correct.

Q: And the switch gear that are on switch gear transport 108 are not on the same transport as the transformers 110. Right?

A: Yes. That's correct in this embodiment.

EX-2012, 14:17–15:7. As I illustrate below in annotated Fig. 1, Morris discloses switch gear transport 108 (green) connected via cable connections 44 (purple) to separate fracturing pump transports 104 (yellow). EX-1004, ¶ [0027], Fig. 1 (annotated). I further note that Morris's switch gear transport 108 does not include "front-aligned, shielded cable connections."

67. It is also my opinion that Morris does not explicitly disclose the claimed VFD or mounting a VFD on a Common Support Structure as I discuss *infra* in Section VI.B. It is my opinion that Morris does not expressly disclose mounting the claimed VFD on switch gear transport or fracturing pump transport.



EX-1004, Fig. 1 (annotated).

68. It is also my opinion that Oehring IV discloses a separate switchgear trailer 300-a from pump trailer 425, as illustrated in Figures 3A and 4 and as I reproduced below. I understand that, and agree with, Dr. Durham admitted as much:

Q: So Oehring 4 discloses that the fracturing pumps on fracturing pump trailer 425 are not on the same trailer as the switch gear that is located on switch gear trailer 325. Right?

A: Yes. I could agree with that.

EX-2012, 18:8–13.

69. It is further my opinion that Oehring IV discloses that its 13.8-kilowatt transformer is on a different trailer from fracturing pump trailer 425. EX-1006,

¶ [0053]; I understand that, and agree with, Dr. Durham admitted as much:

Q: So a POSITA would understand that Oehring 4 discloses that its 13.8-kilovolt to its 600-volt transformer described in paragraph 0053 is not on the same trailer as fracturing pump trailer 425, right?

A: Correct.

EX-2012, 19:8–13.

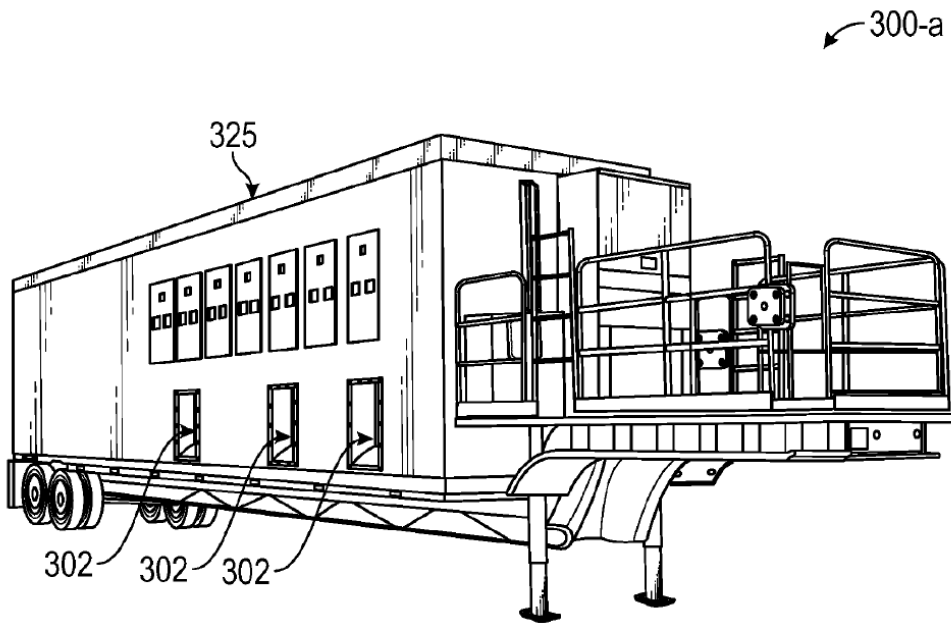


FIG. 3A

EX-1006, Fig. 3A.

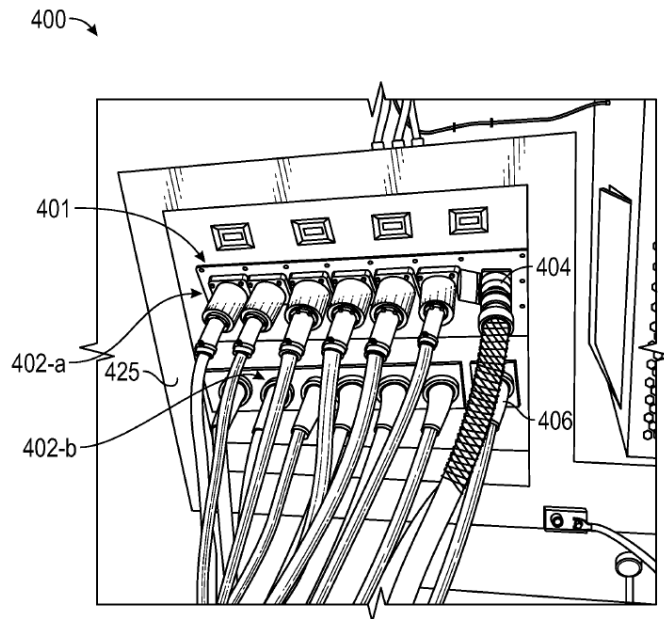


FIG. 4

EX-1006, Fig. 4.

70. It is also my opinion that Payne discloses that its “fracturing pump unit trailers, trucks, or skids [(“fracturing pump trailers”)] 20a, 20b, 20c, 20d, 20e, 20f, 20g, and 20h” (yellow) are separate trailers from its “transformer trailers, trucks, or skids [(“transformer trailers”)] 70a-70d” (red) as shown in Figure 1 and as I reproduced below. EX-1013, ¶ [0043], Fig. 1. I understand that, and agree with, Dr. Durham admitted as much:

Q: So the transformer units on transformer trailers 70a through 70d are on a separate trailer from fracturing pump unit trailers 20a through 20h. Right?

A: Yes, they are.

EX-2012, 21:19–22:2 (objections omitted).

71. I also note that Payne’s transformer trailers each “include[] a pair of the eight fracturing transformer units” 300a–300h. EX-1013, ¶ [0043]. Payne’s “switchgear trailers, trucks, or skids [(“switchgear trailers”)] 80a, 80b”, which I annotate in green below, are separate trailers from fracturing pump trailers and transformer trailers Figure 1 confirms. *Id.*, ¶ [0044], Fig. 1. I understand that, and agree with, Dr. Durham admits as much:

Q: So switch gear module 200a on switch gear trailer 80a is on a different trailer than fracturing pump trailer 20a. Right?

A: Yes.

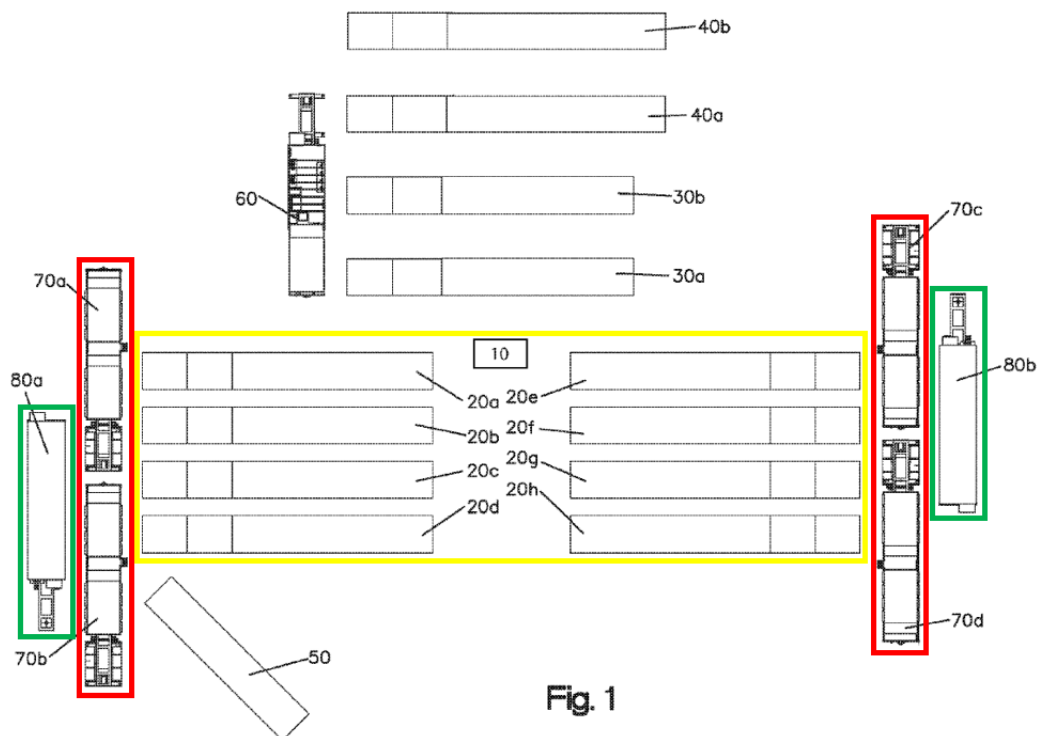
Q: And switch gear module 200a on switch gear trailer 80a is on a different trailer than transformer 300a on transformer trailer 70a. Right?

A: Yes, I agree with that.

EX-2012, 22:12–20. I further note that Payne’s switch gear trailers 80a and 80b do not include “front-aligned, shielded cable connections”.

72. As my analysis confirms, Payne’s switchgear trailers “include two switchgear modules 200a, 200b that are electrically connected to four turbine generators.” EX-1013, ¶ [0044]. It is thus my opinion that Payne’s electric

powered pump, switchgear, and transformer are on different support structures and not on a common support structure. *Id.*, ¶¶ [[0043]–[0044], Fig. 1.



EX-1013, Fig. 1 (annotated).

4. A POSITA Would Agree That The *Asserted References Teach Against* Mounting the Electric Powered Pump, the VFD, the Switchgear, and/or the Transformer on a Common Support Structure

73. It is my opinion that Morris, Oehring IV, and Payne all teach against the Common Support Structure limitation. Morris, Oehring IV, and Payne disclose one or more advantages of mounting the equipment on separate trailers and/or one or more disadvantages of implementing the Common Support Structure limitation.

74. For example, Morris discloses a “*switch gear transport* that distributes electric power for fracturing operations.” EX-1004, Abstract (emphasis added). It is my opinion that Morris teaches the advantages of implementing a master/slave configuration using a standalone switch gear transport—not a switchgear on a pump transport—where:

The switch gear transport 108 could also be setup to *act as a hub* for receiving control and monitoring information for fracturing fleet 103.

...

Specifically, the switch gear transport 108 could house control and monitoring equipment to communicate with other transports and fracturing equipment.

...

The switch gear transport 108 could also provide data received from transports and fracturing equipment to data van 114. The data van 114 remotely controls the switch gear transport 108.”

EX-1004, ¶ [0037] (emphasis added).

75. I understand that, and agree with, Dr. Durham admits there are multiple advantages to this master/slave hub configuration:

Q: What would be the advantages of the switch gear transport being set up to act as a hub?

A: Well, I think it goes on in that paragraph to explain those advantages. It would allow the switch gear transport 108 to communicate, monitor and provide control signals to other transports, such as fracturing pump transport 104 and hydration blender transport 106. And it also says that switch gear transport 108 could house control of monitoring equipment to communicate with other transports. And then goes on to list different data or control functions. I guess data that would be -- could be monitored from transport 108, including power measurements, power management equipment, safety circuits, safety logic, and communicate those back to data van 114.

EX-2012, 36:10–37:5.

76. It is thus my opinion that Morris teaches the advantages of implementing a standalone switch gear transport as a centralized communications hub instead of a distributed switchgear structure. A POSITA would understand that these advantages include enhanced communications achieved through the ability to monitor and control other transports. In my opinion, Morris discloses the additional advantage that its dedicated switchgear “may also be able to power a second fracturing fleet located at an adjacent well site or for the purposes of fracturing multiple well heads 101.” *Id.*, [0038]. For example, Morris discloses multiple

power source connections, that supply its switchgear with “additional electric power to power two or more fracturing fleets (e.g., about 16 fracturing pump transports 104 and two or more electric blender transports 106).” *Id.*, [0043].

77. It is also my opinion that Oehring IV discloses a transformer mounted on a separate support structure from fracturing pump trailer 425 as shown in Figure 4. It is my opinion that mounting the transformer on a separate trailer from the fracturing pump trailer 425 leaves room for a second pump on fracturing pump trailer 425. *Id.*, ¶¶ [0052–53]. Oehring IV’s fracturing pump trailer has “[a]n upper row of plugs 402-a [that] can be used to power one fracturing pump, while a lower row of plugs 402-b can be used to power ***a second fracturing pump on the same fracturing pump trailer 425***, as illustrated in Figure 4 and reproduced below. *Id.*, Fig. 4 (emphasis added).

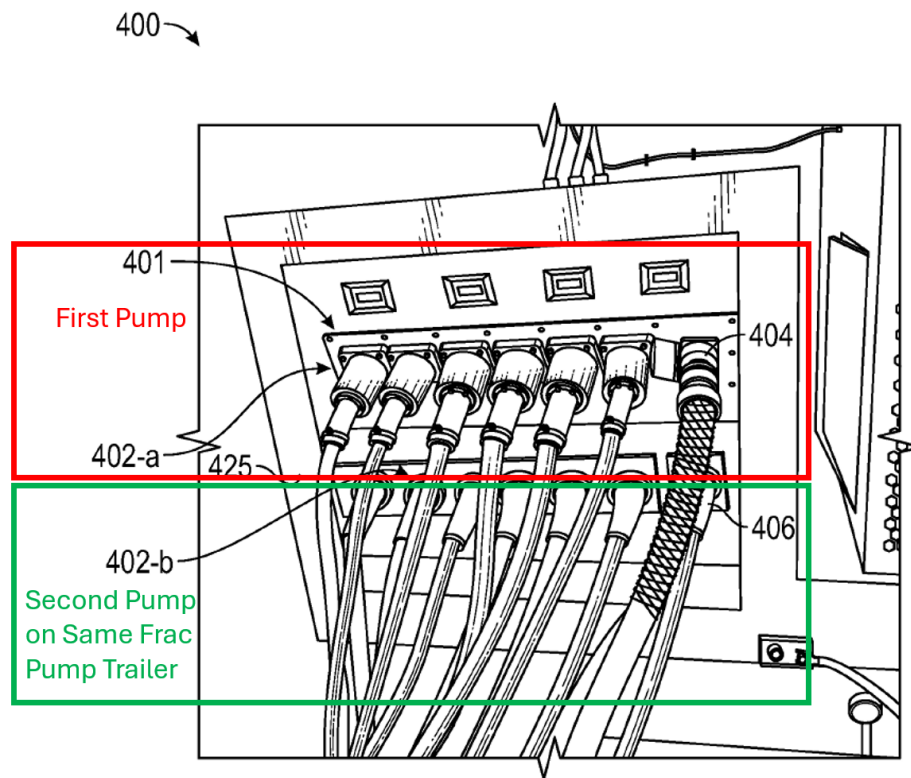


FIG. 4

Fig. 4 (annotated). Oehring IV thus teaches the advantages of its split system that leaves room for multiple pumps on the same fracking pump trailer, and as does not disclose or render obvious combining transformers and electric pumps on a common support structure.

78. It is my opinion that Payne teaches against the Common Support Structure limitation by disclosing that its fracturing pump units, transformers, and switchgear are all mounted on separate support structures (e.g., pump unit trailers 20a–20h, transformer trailers 70a–70d, switchgear trailers 80a–80b). It is further

my opinion that Payne provides a POSITA no teaching, suggestion, or motivation for combining its fracturing pump units, transformers, and switchgear onto a common support structure.

B. A POSITA Would Disagree That the Prior Art Discloses or Renders Obvious a “Variable Frequency Drive Connected To At Least One Motor.”

1. A POSITA Would Disagree That Morris Discloses a Variable Frequency Drive

79. It is my opinion that Morris does not disclose, expressly or inherently, a variable frequency drive.

80. I note that Petitioners rely on two disclosures from Morris to show the claimed “variable frequency drive”, but neither discloses a variable frequency drive at least because neither mentions “variable” or “frequency”:

The 4.2 kV or 2.1 kV voltage level supplies electric power to one or more electric prime movers (not shown) that drive one or more pumps (not shown) and the 480 V, 240 V and 110 V supplies electric power to the drives and/or other control instrumentation mounted on the fracturing pump transport 104. Transformers 110 and 112 are able to supply enough electric current to power the prime movers, drivers, and/or other control instrumentation. . . .

EX-1004, [0031].

By mounting the drives
and transformers 110 and/or 112 onto the
fracturing pump transport 104 and the transformer 114 on
the hydration-blender transport 106,
the transports 104, 106 become individually autonomous
by removing the need for other separate support-based
trailers, such as the auxiliary unit transport and drive
power transports that provide power conversion and/or
drive control.

Id., [0034].

81. I further notes that Morris does not use the terms “variable,”
“frequency,” or “VFD”, and Morris does not disclose a drive that uses a “variable
frequency”. I understand that, and agree with, Dr. Durham admits as much.

Q: Morris does not expressly describe his drive as a
variable frequency drive. Right?

A: I would agree with that.

Q: And Morris does not expressly use the term “variable”
in describing his drive. Right?

A: Yes, I can agree with that.

Q: Does Morris expressly use the term “VFD” anywhere
in its specification?

A: No. It does not use that term.

EX-2012, 28:5–13. I agree with Dr. Durham that Morris does not explicitly disclose a “variable frequency drive.”

82. I further disagree with Dr. Durham that Morris implicitly or inherently discloses a VFD. Dr. Durham claims that “Morris at least suggests the use of VFDs.” EX-1003, ¶ 169. I disagree. I also disagree with Dr. Durham’s opinion that the general term ‘drives’ as referring to VFDs has been common in the electric industry since at least the 1990s.” EX-1003, ¶ 169. Not only is this statement unsupported, it ignores the fact that fixed frequency drives were common in the oil fracking industry at the time of invention of the 878 Patent.

83. A POSITA would understand that the industry used various drives for electric motors that are *not* variable frequency. I understand that, and agree with, Dr. Durham admitted as much:

Q: So a POSITA would recognize that, for example, fixed frequency drives were known in the art at the time of the '878 patent invention. Right?

A: Oh, certainly. I can agree with that for sure.

Q: And fixed frequency drives for use in hydraulic fracturing were known in the art at the time of the '878 patent invention. Right?

A: Yes, I agree with that.

EX-2012, 30:14–31:1.

84. For example, U.S. Patent No. 9,945,365 to Hernandez et al. (“Hernandez”) discloses a *fixed* frequency drive for an electric motor used in hydraulic fracturing operations. EX-2001, Abstract (“A motor control center is configured to apply an alternating electrical voltage having a fixed - frequency to the stator in order to power the electric motor, wherein the apparatus and motor control center do not have a variable frequency drive.”). I further note that Hernandez discloses multiple advantages of implementing a fixed-frequency drive rather than a variable frequency drive. EX-2001, 4:9–30 (explaining advantages include “eliminat[ing] electrical current harmonics ... and their potentially damaging effects in the electric motor”, “no maintenance requirement for the VFD and no associated costs of a technician trained to maintain the VFD”, and elimination of a VFD’s “associated cooling components” and the associated reduction in “weight loading on a trailer”). I agree that fixed frequency drives offer these advantages over variable frequency drives.

85. I understand that, and agree with, Dr. Durham admits to multiple advantages of implementing a fixed frequency drive rather than a variable frequency drive:

Q: Based on the Hernandez disclosures, a POSITA would recognize that one of the benefits of using a fixed frequency drive instead of a VFD is that not using a VFD

eliminates electrical current harmonics due to semiconductor switching that may occur in the VFD. Right?

A: Yes.

Q: And a POSITA would recognize that such electrical current harmonics may have potentially damaging effects in the electric motor. Right?

A: Yes. It can.

...

Q: Based on the Hernandez disclosures, a POSITA would recognize that one advantage of a fixed frequency drive over a variable frequency drive is that a variable frequency drive may have more cooling requirement than a fixed frequency drive. Right?

A: Yeah, I can agree with that. It may have more cooling requirements.

EX-2012, 33:4–34:12.

86. I further note another example, the EnviroFrac electric motor by Grizzly, which does not use a variable frequency drive. EX-2002, 2, Grizzley EnviroFrac data sheet (“No complicated/ fragile VFD control unit required.”); *id.*, 3, (“Simpler and easier to use than VFD-based electrical drive trains with automation to overcome startup issues.”). It is my opinion that these references

show that Morris’s generic reference to a “drive” does not disclose explicitly or inherently a VFD. For at least this reason, I disagree with Dr. Durham’s opinion that “drive” means VFD. It is also my opinion that the multiple advantages of using a fixed-frequency drive over a variable frequency drive in fracking operations, which I discussed above, show that Morris does not disclose a VFD.

87. I further note that Morris does not mention the terms “variable” or “frequency.” In my opinion, Morris does not disclose—expressly, implicitly, or inherently—a “variable frequency drive.”

2. A POSITA Would Disagree That The Petition Provides Any Motivation to Combine Oehring IV’s VFDs with Morris’s System

88. While I agree that Oehring IV discloses a VFD, I disagree that a POSITA would be motivated to combine Oehring IV and Morris. I note that Petitioners provide evidence that a POSITA *could* combine Oehring’s VFDs with Morris’s system, but provide no reason or explanation as to how or why a POSITA *would* have been motivated to combine the prior art:

As taught in Oehring IV, “a variable frequency drive (VFD)” *can* “control the speed of an electric motor.” EX1006, [0043]. Fracturing systems have varying flow rates and the “electrical load constantly changes,” requiring “more or less torque from a variable frequency drive.” EX1006, [0009]. A POSITA would have known

to use VFDs, as taught in Oehring IV, to control motor speeds in Morris for varying loads.

Pet., 22 (emphasis added); *see id.*, 30. I understand that Dr. Durham's declaration likewise does not specify how or why a POSITA *would* have been motivated to combine the prior art:

Oehring IV teaches that discloses [sic] "a variable frequency drive (VFD) [] *can be utilized* to control the speed of an electric motor associated with a pump powered by the turbine(s) [generators]." Accordingly, a POSITA would have been motivated to combine the teachings of Morris and Oehring IV to further explain that the use of the "drives" of Morris would have been used to control the speed of the electrical motors and further, the fracturing pumps.

EX-1003, ¶ 153 (emphasis added). I understand that, and agree with, Dr. Durham admitted that fixed frequency drives were known in the art for use in fracking operations at the time of the '878 invention:

Q: So a POSITA would recognize that, for example, fixed frequency drives were known in the art at the time of the '878 patent invention. Right?

A: Oh, certainly. I can agree with that for sure.

Q: And fixed frequency drives for use in hydraulic fracturing were known in the art at the time of the '878 patent invention. Right?

A: Yes, I agree with that.

EX-2012, 30:14–31:1.

89. I further note that, as explained in Hernandez, systems implementing fixed frequency drives were capable of controlling the speed of an electric motor where power is “supplied by an on-site power source, such as on-site diesel generators or **gas turbine generators**.” EX-2001, 2:26–32 (“Motor operations may include starting and stopping the motor, **changing rotational motor speeds**, and dynamically braking the motor and thus the pump.”) (emphasis added). I also note that the EnviroFrac product is yet another fixed frequency drive design choice a POSITA would consider at the time of the 878 Patent invention. EX-2002. It is thus my opinion that a POSITA would have multiple design choices when selecting a drive to implement in a fracking system in which controlling electrical motor speed is required to address varying loads.

90. I further note that, as I illustrate using the Hernandez and EnviroFrac examples, non-VFD type drives existed at the time of the 878 Patent invention that can be used to control an electric motor during fracturing operation. *See supra* Section VIII.B.1; *see also* EX-2001, Abstract, *and* EX-2002. It is thus my opinion

that the Morris and Oehring IV combination does not render the 878 Patent claims obvious.

C. A POSITA Would Disagree That the Prior Art Discloses or Renders Obvious the Dependent Claim 9 Limitation “Cable Trays Positioned Below a Walking Surface of the Common Support Structure, the Cable Trays Being Covered by a Hinged Cover That Pivots to Provide Access to One or More Cable Trays.”

91. It is my opinion that Pratt (EX-1011) is not analogous art to the 878 Patent.

1. A POSITA Would Not Be Motivated to Combine Pratt’s Cable Tray with Morris’s System Because Pratt is Not in the Same Field of Endeavor and Reasonably Pertinent to the Problem the Inventors Were Trying to Solve

92. It is my opinion that Pratt is not in the field of art as the 878 Patent. The 878 Patent is directed to the field of switchgear and power distribution systems mounted on a transport trailer for use in hydraulic fracturing operations. *See* EX-1001, 1:24-26, 2:38–39. It is my opinion that Pratt is instead directed to cable racks and walkways for accessing cable trays. EX-1011, 1:6–7. I note that Pratt does not mention fracking operations or transport trailers. *See generally* EX-1011. I understand that, and agree with, Dr. Durham admits as much:

Q: That’s correct. Pratt does not expressly discuss usage of cable trays in fracking operations. Right?

A: I agree with that.

Q: Pratt does not expressly discuss usage of cable trays on a transport trailer. Right?

A: I don't know the answer to that question without reviewing Pratt again with that in mind.

Q: Please take a few moments and review.

A: Sure. Yes, I can agree that Pratt does not mention transport trailers.

EX-2012, 38:22–39:14. It is thus my opinion that Pratt is not in the same field of endeavor as the 878 Patent.

93. It is further my opinion that an inventor considering any problem regarding the 878 Patent would not be motivated to turn to Pratt, at least because Pratt does not mention or reference hydraulic fracturing, transport trailers, or hydraulic fracking equipment on a single transport trailer. *See generally* EX-1016. It is my opinion that Pratt is not directed to multiple-pump fracturing operations and I note that Pratt does not mention fracking operations. For at least this reason, it is my opinion that Pratt would not have garnered the attention of the 878 Patent's inventor.

2. A POSITA Would Not Have Been Motivated to Combine Pratt's Cable Tray with Morris's System Because the Cited Morris Disclosures Would Not Have Led a POSITA to Apply Pratt's Intra-Transport Cabling

94. Petitioners claim that the “[e]xpress teachings in Morris and Pratt would have led a POSITA to apply Pratt’s cable tray walkway in Morris’s pump transport.” Pet., 60; *see id.*, 63, 75 (relying on same theory for Grounds 4B, 9A, 9B). I disagree, at least because Pratt’s disclosures are not directed to fracking operations or transport trailers. I note that Petitioners claim the “[e]xpress teachings in Morris and Pratt would have led a POSITA to apply Pratt’s cable tray walkway in Morris’s pump transport.” Pet., 60. I disagree, at least because the Morris teachings are directed to inter-transport cabling and not intra-transport cabling.

95. For example, I note that Petitioners’ cited Morris teachings are directed at cable connections *between* transports, instead of cable connections *within* a transport. I first note that Petitioners claim that “Morris describes numerous cable connections at various voltages—for AC power, DC power, and communications—at an electric-powered drilling site. Pet. 60–61 (citing EX-1004, ¶¶ [0019], [0031]. Yet Morris’s paragraph [0019] is directed to electrical connections from “one transport to another” and expressly defines “electrical

connection” as referring to “connecting one transport to another transport using one or more electrical cables.” EX-1004, ¶ [0019].

I understand that, and agree with, Dr. Durham admits as much:

Q: So here in paragraph 0019, it's describing electrical cables from one transport to another transport. Right?

A: Well, it's referring to that as an electrical connection. I don't think it describes it, per se. But it does refer -- that electrical connection term refers to that, connecting one transport to another transport using one or more electrical cables.

EX-2012, 24:7–15.

96. I also note that Morris’s paragraph [0031] does not pertain to cable connections but is instead directed to transformers that may be included on the fracturing pump transport, but contain no references to internal transport cabling. *See Id.*, ¶ [0031]. I further note that Petitioners cites to Morris’s disclosures of “‘reduc[ing] the number of electrical cables’ by supplying power at medium voltage.” Pet., 61 (citing EX-1004, ¶¶ [0027]–[0029]). But a POSITA would understand that paragraphs [0027]–[0029] instead pertain to cables from one transport to another instead of cabling within a single transport. EX-1004, ¶ [0027] (regarding “switch gear transport 108 generate[ing] a total of seven medium voltage (e.g. , 13.8 kV) cable connections 44, 45, where *each fracturing pump*

transport 104 is directly connected to the switch gear transport 108 [(i.e., inter-transport cabling)] with a single medium voltage (e.g. , 13.8 kV) cable connection 44”, ¶ [0028] (describing how Morris’s “medium voltage power distribution system ... is able to reduce the number of *electrical cables used to supply electric power to the fracturing pump transport 104* and hydration - blender transport 106”), ¶ [0029] (“One reason the medium voltage power distribution system is able to utilize less electrical cables is that each electrical cable 44, 45 does not need to supply a relatively high current (e.g., equal to or more than 600 A) *to each fracturing pump transport 104 and hydration - blender transport 106.*”). I understand that, and agree with, Dr. Durham admits as much:

Q: So here in paragraph 0027, Morris is describing cable connections between the switch gear transport 108 and the fracturing pump transport 104. Right?

A: Yes, sir, along with the blender. But yes.

...

Q: So here in paragraph 0028, Morris is explaining how it reduces the number of electrical cables *to* fracturing pump transport 104. Right?

A: Yes.

Q: So here in Morris paragraph 0028, Morris is not expressly discussing electrical cables between

components that are all located on the same fracturing pump transport 104. Right?

A: I would agree with that.

...

Q: So here in paragraph 0029, Morris is discussing electrical cables to fracturing pump transport 104, right?

A: Yes. He does discuss that in that paragraph.

EX-2012, 25:4–27:5 (emphasis added) (objections omitted).

97. I also note Petitioners' claim that Morris "identifies 'reduc[ing] physical footprint' as a logistical challenge in fracturing operations" while citing to Morris disclosures of inter transport cable connections as opposed to intra transport cable connections. Pet., 62; *see* EX-1004, ¶ [0003] (discussing "minimizing the on-site area or 'footprint' [(e.g., number of transports)] of the fracturing operations"), ¶ [0034] (discussing ability to "remov[e] the need for other separate support - based trailers"). It is my opinion that the Morris disclosures cited by Petitioners would thus not have motivated a POSITA to seek Pratt.

IX. CONCLUSION

98. This declaration represents my opinions that I have formed to date based on material currently available to me. I reserve the right to revise, supplement, and/or amend my opinions stated in this declaration based on new

information that becomes available to me and on my continuing analysis of the materials available to me.