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Paper 79
Date: January 4, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HALLIBURTON ENERGY SERVICES, INC.,
Petitioner,

v.

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

IPR2021-01032
Patent 9,410,410 B2

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

HOSKINS, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Granting-in-Part and Denying-in-Part
Patent Owner's Revised Non-Contingent Motion to Amend
35 U.S.C. § 318(a)

I. INTRODUCTION

Halliburton Energy Services, Inc. ("Petitioner") filed a Petition (Paper 2, "Pet.") pursuant to 35 U.S.C. §§ 311–319 to institute an *inter partes* review of U.S. Patent No. 9,410,410 B2 (Ex. 1002, "the '410 patent"), claims 1–14 and 17–21. We issued an Institution Decision (Paper 12) instituting the petitioned review.

U.S. Well Services, LLC ("Patent Owner") then filed a Patent Owner Response (Paper 21) to the Petition, defending the challenged '410 patent claims. Petitioner filed a Reply (Paper 38) to the Patent Owner Response. Patent Owner did not file a Sur-reply. *See, e.g.*, Paper 13, at 8, 10 (Scheduling Order permitting Sur-reply to be filed by Aug. 9, 2022).

Patent Owner also filed an initial *contingent* motion to amend the '410 patent (Paper 22), to which Petitioner filed an opposition (Paper 33). We issued Preliminary Guidance (Paper 40) concerning the initial motion to amend. Following the Preliminary Guidance, Patent Owner filed a revised *non-contingent* motion to amend the '410 patent (Paper 43, "Motion to Amend" or "Mot."), replacing the initial motion to amend. Petitioner filed an Opposition to the Motion to Amend (Paper 46, "Mot. Opp."). Patent Owner filed a Reply to Petitioner's Opposition (Paper 54, "Mot. Reply"). Petitioner filed a Sur-reply to Patent Owner's Reply (Paper 68, "Mot. Sur-reply").[1]

[1] Some of the papers relating to the Motion to Amend were filed in two versions: one that is under seal (*see* Papers 47, 53, and 67), and another that is publicly available but redacted to hide sealed information (*see* Papers 46, 54, and 68). In this Decision, for reasons discussed below, we do not reach any of the issues that turn on the sealed information. Therefore, we cite to the publicly available Papers.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 2

Patent Owner also filed a Motion to Exclude Evidence (Papers 58 and 59). Petitioner filed an Opposition to this Motion (Papers 61 and 62). Patent Owner filed a Reply to the Opposition (Papers 64 and 65).

An oral hearing was held on December 7, 2022, for which the transcript was entered into the record (Paper 77, "Tr.").

In summary, we *grant* the Motion to Amend as to cancelling original claims 1–14 and 17–21 of the '410 patent. As a result, we do not reach the grounds of unpatentability asserted in the Petition against these original claims.

We also *deny* the Motion to Amend as to adding proposed substitute claims to the '410 patent, because all of these claims seek to add new matter to the application that issued as the '410 patent. As a result, we do not reach the grounds of unpatentability asserted in the Opposition against the proposed substitute claims. We further do not rule on Patent Owner's Motion to Exclude Evidence, because it seeks to exclude evidence relating to the unpatentability grounds that we do not reach.

II. BACKGROUND

A. Real Parties-in-Interest and Related Proceedings

Petitioner identifies three companies as real parties-in-interest: itself; Halliburton Co.; and Halliburton Holdings LLC. *See* Pet. 1. Patent Owner identifies itself and ProFrac Holding Corporation as real parties-in-interest. *See* Paper 4, 1; Paper 76.

The parties identify three judicial matters as related to this proceeding. *See* Pet. 1; Paper 4, 1. They include *U.S. Well Services, Inc. v. Halliburton Co.*, Case No. 6:21-cv-00367-ADA (W.D. Tex.) ("the Halliburton

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 3

Litigation"), in which Patent Owner has accused Petitioner of infringing the '410 patent and several other patents. *See* Pet. 1–2; Paper 4, 1–2. The Halliburton Litigation is still pending at this time.

Petitioner has also filed several other IPR proceedings to challenge patents owned by Patent Owner. They are:

Proceeding No.	U.S. Patent No.
IPR2021-01032	9,410,410 B2
IPR2021-01033	8,789,601 B2
IPR2021-01034	10,337,308 B2
IPR2021-01035	9,970,278 B2
IPR2021-01036	9,611,728 B2
IPR2021-01037	9,745,840 B2
IPR2021-01038	10,408,030 B2
IPR2021-01065	9,840,901 B2

Proceeding No.	U.S. Patent No.
IPR2021-01066	10,020,711 B2
IPR2021-01238	10,526,882 B2
IPR2021-01315	9,893,500 B2
IPR2021-01316	10,280,724 B2
IPR2021-01538	10,408,031 B2
IPR2021-01539	10,648,311 B2
IPR2022-00074	10,254,732 B2
IPR2022-00610	10,934,824 B2

B. Whether the Motion to Amend is Contingent or Non-Contingent

There was some confusion in the record concerning whether Patent Owner's initial motion to amend (Paper 22) was *contingent* or *non-contingent*. This is an important distinction, because a contingent motion is considered by the Board only in the event that a petitioner's challenge(s) to an original claim is or are first determined to be successful. A non-contingent motion, by contrast, cancels one or more original claims of the challenged patent, thereby mooting a petitioner's challenges to the original claims. After a telephone conference between the Board and the parties, we considered the initial motion to be contingent. *See* Paper 23.

Patent Owner thereafter filed its revised Motion to Amend. The revised Motion to Amend is internally consistent in stating it is *non-contingent*. *See* Mot. Caption ("NON-CONTINGENT"), 1 (stating the

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 4

motion is "Non-Contingent"), 2 ("The claim listing cancels original claims 1–14 and 17–21 . . . ."), App. A (pg. 1) (stating original claims 1–14 and 17–21 are "Cancelled"). Petitioner's Opposition accordingly emphasizes the non-contingent nature of the Motion to Amend. *See* Mot. Opp. 1 ("In its Revised Non-Contingent Motion to Amend . . . ").

Due to the earlier confusion as to the initial motion to amend, we asked Patent Owner's counsel during the hearing whether the revised Motion to Amend was intended to be contingent or non-contingent. *See* Tr. 5:6–6:9. Patent Owner's counsel confirmed it is non-contingent. *See id.*

III. ORIGINAL CLAIMS 1–14 AND 17–21

The Petition relies on six prior art references to challenge original claims 1–14 and 17–21 of the '410 patent. *See* Pet. 15. They are identified here, in alphabetical order:

Name	Reference	Exhibit No.
API Standard	American Petroleum Institute, Standard 541-2003, *Form-wound Squirrel-Cage Induction Motors—500 Horsepower and Larger*, 4th Ed. (June 2004)	1012
Coli	US 2012/0255734 A1	1009
Gardner	Gardner Denver, Inc., *Well Servicing Pump, Model GD-2500Q Quintuplex, Operating and Service Manual*, 300FWF996 Rev. C (Aug. 2005)	1013
Horikoshi	US 2011/0241590 A1	1010
Stark	US 6,116,040	1014

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 5

Name	Reference	Exhibit No.
Vliet[2]	US 2011/0197988 A1	1011

The Petition relies on five grounds of unpatentability, all under 35 U.S.C. § 103, to challenge original claims 1–14 and 17–21 of the '410 patent. *See* Pet. 15. They are identified here:

Ground	Claim(s) Challenged	References
1	1–8, 19–21	Coli, Horikoshi
2	7	Coli, Horikoshi, Vliet
3	9	Coli, Horikoshi, Stark
4	10–14, 17, 18	Coli, Horikoshi, API Standard
5	12[3]	Coli, Horikoshi, API Standard, Gardner

As discussed above, the Motion to Amend includes a non-contingent request to cancel original claims 1–14 and 17–21 of the '410 patent, which are all of the claims challenged in the Petition. *See* Mot. 2, App. A (pg. 1); Pet. 3, 15. Petitioner does not oppose this portion of the Motion to Amend. *See generally* Mot. Opp. Therefore, we grant Patent Owner's request to cancel original claims 1–14 and 17–21. As a result, we do not reach the

[2] Although the first-named inventor is "J. Todd Van Vliet" (Ex. 1011, code (75)), the parties refer to Exhibit 1011 as "Vliet" (*see, e.g.*, Pet. 9; Paper 21, 1). We adopt the parties' nomenclature for consistency and ease of reference.

[3] Petitioner acknowledges "the Petition inadvertently lists claim 13 within Ground 5." Paper 38, 1 n.1.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 6

grounds of unpatentability asserted in the Petition against these original claims.

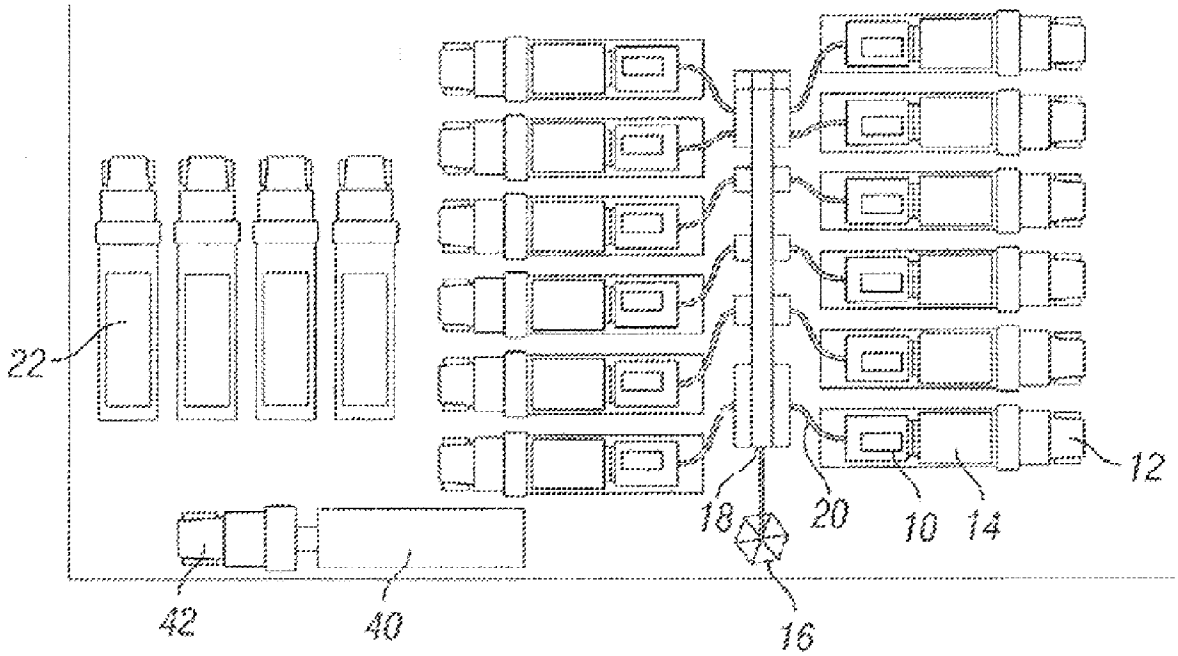
IV. PROPOSED SUBSTITUTE CLAIMS 22–40

A. Introduction

The Motion to Amend proposes to add substitute claims 22–40 to the '410 patent. *See* Mot. 2, App. A. We determine these claims all seek to add new matter to the application that issued as the '410 patent. We therefore deny the Motion to Amend as to these claims. As a result, we do not reach the grounds of unpatentability asserted in the Opposition against these claims.

B. The '410 Patent Disclosure

The '410 patent concerns a system for hydraulically fracturing an underground formation to extract oil or gas from the formation. *See* Ex. 1002, code (57). An excerpt from Figure 1 is reproduced below.



The '410 Patent, Figure 1 (Excerpt).

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 7

Figure 1 is a schematic plan view of equipment used in a hydraulic fracturing operation. *See id.* at 2:65–67, 3:19–20. The excerpt above focuses on twelve pump vehicles 12 (e.g., trucks) each carrying at least one pump 10 powered by electric motor 14, to pump fracturing fluid through lines 20 and missile 18 to be conveyed to wellhead 16. *See id.* at 3:20–30, 5:52–58. This fluid is pumped "at high pressure" or "at very high pressure" so the fluid fractures the formation in the well, which stimulates release of oil and gas from the formation. *Id.* at 1:13–23, 1:41–48, 1:64–67.

Electric motors 14 are powered with electricity from electric generators 22, and variable frequency drives (not shown in Figure 1) control the speed of motors 14, and hence the speed of pumps 10. *See id.* at 1:54–56, 2:2–4, 3:39–42, 4:26–32. The variable frequency drives "can frequently perform electric motor diagnostics to prevent damage to [an] electric motor if it becomes grounded or shorted." *Id.* at 2:19–21, 3:63–4:1.

C. The Proposed Substitute Claims

Patent Owner proposes to amend the '410 patent by adding new claims 22–40, as respective substitutes for original claims 1–14 and 17–21. *See* Mot. 2, App. A.

Illustrative claim 22, which is proposed as a substitute for original claim 1, is reproduced here. Underlined language reflects subject matter added to original claim 1, and struck-through language reflects subject matter omitted from original claim 1:

> 22. A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 8

> passage of fluid from the wellbore into the formation, the system comprising:
>
> a plurality of electric pumps fluidly connected to the well and powered by at least one electric motor, and configured to pump fluid into the wellbore at high pressure of greater than 8,000 psi so that the fluid passes from the wellbore into the formation through a designated orifice to cause cracks in the formation and to fracture the formation; and~~, and fractures the formation; and~~
>
> a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency drive frequently performs electric motor diagnostics to prevent damage to the at least one electric motor.

Mot. App. A (pg. 2).

Proposed independent claim 31, which would substitute for original independent claim 10, would modify the original claim as follows: "the pump capable of pumping the hydraulic fracturing fluid at high pressure of between 5,000 psi and 15,000 psi through a designated orifice to cause cracks in the formation to fracture the formation;~~ to crack the formation;~~." Mot. App. A (pgs. 4–5).

Proposed independent claim 38, which would substitute for original independent claim 19, would modify the original claim as follows: "the electric pumps configured to pump fluid into the wellbore at high pressure of between 8,000 psi and 12,000 psi so that the fluid passes from the wellbore into the formation through a designated orifice to cause cracks in the formation and to fracture the formation;~~, and fractures the formation;~~." Mot. App. A (pgs. 6–7). Proposed substitute claim 38 would also add a further "downhole sensor" limitation to the original claim. *See id.*

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 9

In short, as pertinent here, each of the proposed substitute claims seeks to add that the "high pressure" recited in the original '410 patent claims corresponds to a specified numerical pressure range—greater than 8,000 psi in proposed substitute claim 22 and its dependent claims 23–30; or between 5,000 psi and 15,000 psi in proposed substitute claim 31 and its dependent claims 32–37; or between 8,000 psi and 12,000 psi in proposed substitute claim 38 and its dependent claims 39 and 40.[4]

D. The Pressure Ranges in the Proposed Substitute Claims Would Improperly Add New Matter to the '410 Patent

For the following reasons, we determine proposed substitute claims 22–40 all seek to add new matter to the application that issued as the '410 patent, so we deny the Motion to Amend as to adding these claims to the '410 patent.

1. Statement of Law

A motion to amend "may not . . . introduce new matter." 35 U.S.C. § 316(d)(3).

"*Before considering the patentability* of any substitute claims . . . the Board first must determine *whether the motion to amend meets* the statutory and regulatory requirements set forth in § 316(d) and 37 C.F.R. § 42.121." *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 4 (PTAB Feb. 25, 2019) (precedential, "*Lectrosonics*") (emphases added). This

[4] Patent Owner does not rely on these numerical pressure ranges as a basis to distinguish the prior art cited in Petitioner's Opposition. *See* Mot. 11–17; Mot. Reply 7–12. We are aware, however, that the court in the Halliburton Litigation has determined the "high pressure" term in original claim 1 of the '410 patent is indefinite. *See* Ex. 2033, 1; Ex. 1069, 8–18.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 10

includes the prohibition against new matter in § 316(d)(3). *See Lectrosonics*, at 7–8.

"*[T]he patent owner must satisfy* the Board that the statutory criteria in [35 U.S.C.] § 316(d)(3) are met and that any reasonable procedural obligations imposed by the Director are satisfied." *Aqua Prods., Inc. v. Matal*, 872 F.3d 1290, 1305–06 (Fed. Cir. 2017) (emphasis added) (lead plurality opinion by J. O'Malley); *see also id.* at 1341 ("There is no disagreement that the patent owner bears a burden of production in accordance [with] 35 U.S.C. § 316(d).") (majority opinion by J. Reyna).

Accordingly: "A motion to amend may be denied where . . . [t]he amendment seeks to . . . introduce new subject matter." 37 C.F.R. § 42.121(a)(2)(ii); *see also* PTAB Consolidated Trial Practice Guide (Nov. 2019), 69, 71.[5] Further: "A motion to amend claims must . . . set forth . . . [t]he support in the original disclosure of the patent for each claim that is added or amended." 37 C.F.R. § 42.121(b)(1).

The test for new matter is whether the original application's disclosure "reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter." *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc); *see also Senju Pharm. Co. v. Apotex Inc.*, 746 F.3d 1344, 1352 (Fed. Cir. 2014) (citing *Ariad* as providing the test for determining new matter under 35 U.S.C. § 132(a)). We perform "an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art," to determine

[5] Available at https://www.uspto.gov/TrialPracticeGuideConsolidated.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 11

whether it demonstrates possession of the claimed subject matter. *Ariad*, 598 F.3d at 1351.

2. Level of Ordinary Skill in the Art

Petitioner contends a person having ordinary skill in the art pertaining to the '410 patent would have either: "(1) a Bachelor of Science in Mechanical Engineering, Electrical Engineering, Petroleum Engineering or an equivalent field as well as at least two 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." Pet. 18.

Patent Owner utilizes the same formulation of ordinary skill. *See* Mot. 9.

The parties' agreed-upon formulation of ordinary skill is consistent with the level of skill reflected in the '410 patent and the prior art of record. We therefore apply it in the present Decision.

3. Testimonial Evidence

In relation to the written description issues that are pertinent to the present Decision, Petitioner relies on the proffered expert testimony of Robert A. Durham, Ph.D. (Ex. 1079). Patent Owner relies on the proffered expert testimony of William Marscher, P.E. (Ex. 1059) and Mr. Robert Schaaf (Ex. 1061).[6]

[6] During the hearing, Patent Owner's counsel confirmed that the pertinent testimony of Patent Owner's witnesses is found only in their depositions, not in their declarations. *See* Tr. 44:11–45:3.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 12

4. Proposed Substitute Independent Claims 22, 31, and 38

Patent Owner asserts proposed substitute independent claims 22, 31, and 38 do not introduce new matter into the '410 patent. *See* Mot. 4–9. Patent Owner cites various disclosures of U.S. Patent Application No. 13/679,689 ("the '689 Application"), which issued as the '410 patent, that Patent Owner contends support the numerical pressure ranges recited in these claims. *See* Mot. 4, 6, 7 (collectively citing the '689 Application at Abstract, Figs. 1 and 2, ¶¶ 5, 7, 10, 11, 16–18, 20, 25–28, 31, 33, 35). The '689 Application can be found in the record as part of Exhibit 1005 (the prosecution history of the '410 patent), at pages 19–40.

Patent Owner additionally relies on the deposition testimony of Patent Owner's witnesses, Mr. Marscher and Mr. Schaaf, concerning their understanding of the meaning of "high pressure" as recited in the original claims of the '410 patent. *See* Mot. 8–9. Specifically, Mr. Marscher testified as follows on June 21, 2022:

> Q. In the context of hydraulic fracturing pumps, what does high pressure mean?
>
> A. Well, ***typically a person in the art would say it's between 5,000 and 15,000 psi***. ***Maybe 10,000 psi would be a typical number these days***.
>
> I've also done work from time to time in the waterjet industry where you cut wood and fiberglass and even metal with a very high-pressure waterjet. And they use reciprocating pumps in that industry, too. My old company made some of them. In that case you've got to be up to at least 20,000 psi, and 40,000 is better. So it's very application dependent.
>
> And, you know, in the waterjet industry high pressure would be 20,000 to 40,000. Very high would be over 40,000. ***In the fracking industry,***

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 13

> ***high pressure would be 5,000 to 15,000 in my opinion***. ***Very high would be over 15,000***. I think even today that's unusual. Might be needed from time to time in certain formations.
>
> In other industries, like in many chemical industries, we're using centrifugal pumps, single stage or, you know, two or three stages. High pressure would be considered anything over several hundred psi. So it depends on the application.
>
> But somebody who's a [person of ordinary skill in the art ("POSITA")] in the fracking industry would definitely think ***high pressure is 5,000 to 15,000 psi with an average value of 10 in my opinion***.

Ex. 1059, 2:1–3, 111:1–112:3 (emphases added).

One week later, on June 29, 2022, Mr. Schaaf testified as follows:

> Q. What rates of pressure would you consider high pressure?
>
> A. Well, it's well-known to a person in -- in the industry what "high pressure" would mean.
>
> Q. What does "high pressure" mean?
>
> A. Well, to a POSITA the pressure is what -- they would understand what the "high pressure" is.
>
> Q. I'm asking you was that understanding is.
>
> A. Well, I think, generally, ***a POSITA would agree that 8,000 to 12,000 psi would be considered high pressure***.
>
> Q. Would pressure above 12,000 psi be considered high pressure?
>
> A. It could be considered, yes.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 14

Q. Would pressure below 8,000 psi be considered high pressure?

A. To some people, you know, somewhat below it would be, you know, maybe the 7,500 psi, that would -- that would be considered high pressure. But, in general, it's -- ***it's agreed upon that 8,000 to 12,000 psi is high pressure***.

Q. Is it generally agreed upon that 5,000 to 15,000 psi is high pressure?

A. No.

Q. ***You would not consider 5,000 psi to be high pressure?***

A. ***Not when -- not when we're considering frac jobs, yeah. That is correct.***

. . .

Q. . . . [L]et me know if this is correct. You would consider high pressure to be about 8,000 to 12,000 psi, but that certain fracturing jobs can take place at pressures that are not high pressure.

A. Yes. And it's dependent on the formation itself, when the formation cracks or fractures. So the -- the hydraulic pressure or the pressure on the formations is what determines what it takes to fracture a well.

Ex. 1061, 1:12–14, 43:6–46:1 (emphases added).

Patent Owner argues the foregoing testimony of its witnesses establishes the pressure range recited in proposed substitute claim 22 (greater than 8,000 psi) is "a range that would be understood by a person of ordinary skill in the art (POSITA) as corresponding to high pressure," as disclosed by the '689 Application. Mot. 8. Patent Owner also argues this

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 15

testimony similarly establishes "that high pressure may correspond to a pressure 'of between 5,000 psi and 15,000 psi,'" as recited in proposed substitute claim 31, and "that high pressure may correspond[] to a pressure 'between 8,000 psi and 12,000 psi'" as recited in proposed substitute claim 38. *Id.* at 8–9.

Petitioner argues the numerical pressure ranges specified in proposed substitute independent claims 22, 31, and 38 improperly introduce new matter into the '410 patent. *See* Mot. Opp. 1–3. Petitioner asserts "no pressures (or pressure ranges) are disclosed in the specification" of the '689 Application, because the specification "does not provide any range of measured pressures (e.g., in pounds per square inch, or psi), let alone the specific pressure ranges recited in" the proposed substitute claims. *Id.* at 1–2 (citing Ex. 1005, 20–40; Ex. 1079 ¶¶ 19–24; Ex. 1069, 13).

Concerning the '689 Application's disclosure of "high pressure" pumping, Petitioner asserts this "does not disclose any measured pressures (species) falling within the claimed pressure range (genus)," such as are recited in the proposed substitute claims. *Id.* at 2 (citing *Indivior UK Ltd. v. Dr. Reddy's Labs. S.A.*, 18 F.4th 1323, 1328–1329 (Fed. Cir. 2021)). Petitioner adds that "where a specification discloses a broad range of values and a value within that range is claimed, the disclosure must allow one skilled in the art to 'immediately discern the limitation at issue in the claims,'" which is not the case here. *Id.* (quoting *Gen. Hosp. Corp. v. Sienna Biopharms., Inc.*, 888 F.3d 1368, 1372 (Fed. Cir. 2018); citing Ex. 1079 ¶¶ 20, 22–23).

Concerning the deposition testimony of Mr. Marscher and Mr. Schaaf quoted above, Petitioner asserts "those experts cannot even agree with each

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 16

other as to the pressures possibly encompassed within the 'high pressure' term." *Id.* at 2–3. Petitioner particularly cites, as being contradictory, Mr. Marscher's testimony that "high pressure" means between 5,000 psi and 15,000 psi, and Mr. Schaaf's testimony that "high pressure" means no less than 8,000 psi. *Id.* (citing Ex. 1059, 111:1–112:21; Ex. 1061, 44:7–13). In Petitioner's view: "The inconsistency between [Patent Owner's] own experts confirms that the '410 Patent specification does not allow a POSITA to 'immediately discern the limitation at issue in the claims.'" *Id.* at 3 (citing *Gen. Hosp.*, 888 F.3d at 1372–73). Petitioner moreover asserts that expert testimony "cannot manufacture written-description support, because the support must be 'in the original disclosure (i.e., the application as originally filed).'" *Id.* (quoting *Lectrosonics*, at 7; citing *Indivior*, 18 F.4th at 1329).

Patent Owner replies that the deposition testimony of Mr. Marscher and Mr. Schaaf quoted above establishes that the numerical pressure ranges in proposed substitute claims 22, 31, and 38 "are an inherent property" of the "high pressure" disclosures in the '689 Application, so they "are not prohibited new matter." Mot. Reply 1–2 (citing *Yeda Research & Dev. Co. v. Abbott GMBH & Co. KG*, 837 F.3d 1341, 1345 (Fed. Cir. 2016); *Kennecott Corp. v. Kyocera Int'l, Inc.*, 835 F.2d 1419, 1423 (Fed. Cir. 1987)). In particular, according to Patent Owner, the "high pressure" disclosures of the '689 Application make clear that the numerical pressure ranges are necessarily present in the '689 Application, as would have been recognized by a person of ordinary skill in the art, according to Mr. Marscher and Mr. Schaaf. *See id.* at 2–3 (citing Ex. 1059, 111:3–5, 111:25–112:3; Ex. 1061, 43:17–18; *In re Robertson*, 169 F.3d 743, 745

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 17

(Fed. Cir. 1999); *Continental Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991)).

In response, Petitioner reiterates arguments previously made in the Opposition. *See* Mot. Sur-reply 1–2. Petitioner further contends the *Yeda* decision cited by Patent Owner is distinguished from the facts presented here, because in *Yeda* "inherency was undisputed." *Id.* at 2 (citing *Yeda*, 837 F.3d at 1344–45). Petitioner further asserts Patent Owner has not established that the '689 Application's disclosure of "high pressure" *necessarily* discloses the numerical pressure ranges, as is required for inherency. *Id.* at 2–3 (citations omitted).

Upon review of the foregoing, we agree with Petitioner's position that the numerical pressure ranges recited in proposed substitute claims 22, 31, and 38 each introduce new matter into the '689 Application. We have reviewed the '689 Application disclosures cited by Patent Owner. *See* Ex. 1005, 19–40 (¶¶ 5, 7, 10, 11, 16–18, 20, 25–28, 31, 33, 35, Abstract, Figs. 1–2). These disclosures pertinently demonstrate possession only of "a system for hydraulically fracturing an underground formation" that is "configured to *pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the formation, and fractures the formation*." Ex. 1005, 22 (¶ 5) (emphases added); *see also id.* at 22–23 (¶ 7) ("pumping the hydraulic fracturing fluid at *high pressure* to crack the formation" (emphasis added)); *id.* at 24 (¶ 11) ("pumping fracturing fluid into the well with an electrically powered pump *at a high pressure so that the fracturing fluid enters and cracks the formation*" (emphasis added)); *id.* at 32–33 (¶ 33) ("The fracturing fluid can be pumped into the wellbore *at a high enough pressure that the fracturing fluid cracks the formation*, and enters into the

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 18

cracks." (emphasis added)). Thus, the '689 Application demonstrates possession of pumping fluid at a "high pressure" to fracture an underground formation, but does not specify any particular numerical ranges of pressures that might correspond to the "high pressure," including the three ranges specified in proposed substitute claims 22, 31, and 38. *See, e.g.*, Tr. 44:11–22.

Patent Owner's attempt to leverage the "high pressure" disclosures of the '689 Application into demonstrating possession of the numerical pressure ranges recited in proposed substitute claims 22, 31, and 38 is unavailing, for several reasons. First, as seen from the deposition testimony quoted above, Patent Owner's own witnesses cannot agree on a numerical definition of "high pressure." Mr. Marscher says high pressure is between 5,000 psi and 15,000 psi (*see* Ex. 1059, 111:1–112:3), whereas Mr. Schaaf says high pressure is between 8,000 psi and 12,000 psi and specifically disagrees with Mr. Marscher's testimony that high pressure can be below 8,000 psi (*see* Ex. 1060, 43:6–44:13). Thus, the testimony of Patent Owner's own witnesses is contrary to Patent Owner's position that a person of ordinary skill in the art would have understood that the '689 Application's disclosure of "high pressure" pumping demonstrates possession of a specific numerical range of pumping pressures.

Second, neither Mr. Marscher nor Mr. Schaaf cites any objective evidence to support their respective notions of what "high pressure" might be, in the context of hydraulic fracturing. For example, neither cites to any published industry standards to support their respective opinions. This lack of objective evidentiary support weakens the persuasiveness of both witness's testimony on this issue, especially because their opinions conflict

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 19

with each other. We are instead persuaded by the testimony of Petitioner's witness Dr. Durham that "[t]he mere disclosure of 'high pressure' in the ['689 Application] specification[] . . . does not allow a [person of ordinary skill in the art] to recognize the ranges of pressures in" proposed substitute claims 22, 31, and 38. Ex. 1079 ¶ 24. Further according to Dr. Durham: "What might be 'high' pressure according to one POSITA may *not* be 'high' pressure to another POSITA" and "[t]here is no universally accepted definition of 'high pressure,'" as demonstrated by the testimony of Mr. Marscher and Mr. Schaaf and the lack of objective evidentiary support for their respective opinions. *Id.*

Third is the fact that the three independent claims specify materially different numerical pressure ranges, each of which Patent Owner asserts is supported by the simple disclosure of "high pressure" in the '689 Application. Patent Owner's position appears to be that the "high pressure" disclosure in the '689 Application permits Patent Owner to claim *any* numerical range of pressures, so long as the range does not fall below 5,000 psi (Mr. Marscher's lower bound for high pressure). *See, e.g.*, Tr. 45:13–46:8. This is inconsistent with controlling authority cited by Petitioner and not discussed by Patent Owner. In particular, the Federal Circuit in the *Indivior* decision determined that a claim directed to a film comprising "about 40 wt % to about 60 wt % of a water-soluble polymetric matrix" did not have written description support in a specification that did not expressly claim that range, did not state either of the two end values (40% and 60%), and did not disclose the range (40–60%). *Indivior*, 18 F.4th at 1325 (claim 1), 1327–30 (discussing claim 1). In particular: "In the case of a claimed range, a skilled artisan must be able to reasonably discern a

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 20

disclosure of that range" in the specification at issue. *Id.* at 1328. We conclude Patent Owner's reliance on the testimony of Mr. Marscher and Mr. Schaaf that a skilled artisan could reasonably discern each of the three numerical pressure ranges at issue here, based on the bare disclosure in the '689 Application of "high pressure" pumping, is not persuasive for the reasons provided above.

The *Indivior* decision also considered a narrower claim directed to a film comprising "about 48.2 wt % to about 58.6 wt % of the water-soluble polymetric matrix," and concluded that it also did not have written description support in the specification at issue, even though the specification provided examples of films having the two end point values of the range (48.2% and 58.6%). *See id.* at 1325 (claim 7), 1329–30 (discussing claim 7). The Court concluded that finding written description support on those facts would "amount[] to cobbling together numbers after the fact" whereas "[a] written description sufficient to satisfy the requirement of the law requires a statement of an invention, not an invitation to go on a hunting expedition to patch together after the fact a synthetic definition of an invention." *Id.* at 1329. We conclude in the present case that Patent Owner's witnesses went on a hunting expedition which conflicts with the *Indivior* decision.

We acknowledge the *Indivior* decision was a 2–1 panel decision, over a vigorous dissent. However, the principal disagreement between the majority and dissenting opinions was whether the disclosure of *specific numerical percentages* in the specification might demonstrate possession of *a range of percentages*. In this respect, the facts of the case before us present an easier issue to decide, because the '689 Application demonstrates

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 21

possession of only the vaguely-stated "high pressure" or "very high pressure," rather than specific numerical pressures. *See* Ex. 1005, 22 (¶ 5), 22–23 (¶ 7), 24 (¶ 11) ("high pressure"); *id.* at 20 (¶ 3) ("very high pressure").

Fourth, when one looks at each claim separately, there are inconsistencies between the claim and Mr. Marscher's or Mr. Schaaf's testimony. For example, proposed substitute claim 22 recites a pressure of greater than 8,000 psi. This is inconsistent with Mr. Marscher's testimony that high pressure can be as low as 5,000 psi, and that high pressure cannot be higher than 15,000 psi because such pressures are instead "very high." Ex. 1059, 111:1–112:3. The range of proposed substitute claim 22 also is inconsistent with Mr. Schaaf's testimony that high pressure cannot be very much higher than 12,000 psi, although he does recognize that high pressure "could" be above 12,000 psi. Ex. 1061, 43:6–44:3.

Proposed substitute claim 31 recites a pressure of between 5,000 psi and 15,000 psi. This is supported by Mr. Marscher's testimony. *See* Ex. 1059, 111:1–112:3. However, it is inconsistent with Mr. Schaaf's testimony that high pressure is between 8,000 psi and 12,000 psi, and that high pressure cannot be below 8,000 psi. *See* Ex. 1060, 43:6–44:13. Patent Owner does not explain persuasively how or why we should credit Mr. Marscher's testimony over Mr. Schaaf's testimony to conclude proposed substitute claim 31 has written description support in the '689 Application.

Proposed substitute claim 38 recites a pressure between 8,000 psi and 12,000 psi. This is supported by Mr. Schaaf's testimony. *See* Ex. 1060, 43:6–44:13. However, it is inconsistent with Mr. Marscher's testimony that high pressure is between 5,000 psi and 15,000 psi. *See* Ex. 1059, 111:1–

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 22

112:3. Patent Owner does not explain persuasively how or why we should credit Mr. Schaaf's testimony over Mr. Marscher's testimony to conclude proposed substitute claim 38 has written description support in the '689 Application.

Fifth, we have considered Patent Owner's belated argument in reply to Petitioner's opposition, relying on an alleged *inherent* disclosure of pressure ranges in the '689 Application on the basis that "high pressure" *necessarily* demonstrates possession of the numerical pressure ranges recited in proposed substitute claims 22, 31, and 38. The *Yeda* and *Kennecott* decisions cited by Patent Owner stand for the proposition that written description support may be established by an inherent disclosure, as opposed to an express disclosure. *See Yeda*, 837 F.3d at 1344–45; *Kennecott*, 835 F.2d at 1422–23. We are not persuaded by Patent Owner's position that the '689 Application necessarily demonstrates possession of proposed substitute claims 22, 31, and 38, for all the reasons provided above. The *Robertson* and *Continental Can* decisions cited by Patent Owner stand for the proposition that inherency is determined from the viewpoint of a person of ordinary skill in the art, which may be established via witness testimony. *See Robertson*, 169 F.3d at 745; *Continental Can*, 948 F.2d at 1268–69. We conclude Patent Owner's witness testimony as to written description support is not persuasive, for all the reasons provided above.

Finally, we have reviewed the district court's opinion in the Halliburton Litigation, holding that the "high pressure" term in original claim 1 of the '410 patent (and, by extension, original claims 10 and 19) is fatally indefinite. *See* Ex. 1069, 8–18. Our determination that the disclosure of "high pressure" in the '689 Application fails to provide written

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 23

description support for the numerical pressure ranges recited in proposed substitute claims 22, 31, and 38 is not inconsistent with the district court's opinion.

For the foregoing reasons, we conclude that adding proposed substitute independent claims 22, 31, and 38 would introduce new matter to the application that issued as the '410 patent, and we accordingly deny the Motion to Amend the '410 patent as to these claims.

5. Proposed Substitute Dependent Claims 23–30, 32–37, 39, and 40

The remaining proposed substitute claims 23–30, 32–37, 39, and 40 each depend from one of the independent claims 22, 31, and 38, and therefore incorporate the numerical pressure ranges recited in those independent claims. *See* Mot. App. A. Therefore, for the reasons provided in Section IV.D.4 above, we conclude that adding the proposed substitute dependent claims would introduce new matter to the application that issued as the '410 patent, and we accordingly deny the Motion to Amend the '410 patent as to these claims.

E. Petitioner's Unpatentability Grounds

In light of our determination above that proposed substitute claims 22–40 lack written description support in the application that issued as the '410 patent, we do not reach the grounds of unpatentability set forth in Petitioner's Opposition for these claims. *See* Mot. Opp. 7–8 (listing the grounds).

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 24

V. PATENT OWNER'S MOTION TO EXCLUDE EVIDENCE

Patent Owner's Motion to Exclude Evidence seeks to exclude evidence relating to Petitioner's reliance on the S&S Proposal[7] as a prior art reference to challenge the patentability of proposed substitute claims 22–40 under 35 U.S.C. § 103. *See* Papers 58 and 59 (moving to exclude Exs. 1071–1073). As discussed above, we do not reach these grounds of unpatentability, so we do not need to rule on the Motion to Exclude.

VI. SUMMARY OF CONCLUSIONS

We *grant* Patent Owner's non-contingent request to cancel original claims 1–14 and 17–21 of the '410 patent, and we *deny* Patent Owner's request to add proposed substitute claims 22–40 to the '410 patent.[8] Thus, the result of this Decision is summarized by the following two tables.

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[7] Stewart & Stevenson, *Electric Fracturing Pump: Commercial Proposal*, Quotation No., Rev. 4 (July 31, 2012) (Ex. 1056).

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

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 25

Claim(s)	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–8, 19–21	103	Coli, Horikoshi[9]		
7	103	Coli, Horikoshi, Vliet[9]		
9	103	Coli, Horikoshi, Stark[9]		
10–14, 17, 18	103	Coli, Horikoshi, API Standard[9]		
12	103	Coli, Horikoshi, API Standard, Gardner[9]		
Overall Outcome				

Motion to Amend Outcome	Claim(s)
Original Claims Canceled by Amendment	1–14, 17–21
Substitute Claims Proposed in the Amendment	22–40
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	22–40
Substitute Claims: Not Reached	

[9] We do not reach these asserted grounds because Patent Owner filed a non-contingent motion to amend in which these claims were cancelled. *See supra* Section III.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 26

VII. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Patent Owner's Motion to Amend is *granted* as to the non-contingent request to cancel original claims 1–14 and 17–21 of the '410 patent;

FURTHER ORDERED that Patent Owner's Motion to Amend is *denied* as to the request to add proposed substitute claims 22–40 to the '410 patent; and

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

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 27

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HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 28

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Paper 12
Entered: January 11, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HALLIBURTON ENERGY SERVICES, INC.,
Petitioner,

v.

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

IPR2021-01032
Patent 9,410,410 B2

Before MEREDITH C. PETRAVICK, LYNNE H. BROWNE, and SEAN P. O'HANLON, *Administrative Patent Judges.*

PETRAVICK, *Administrative Patent Judge.*

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Petitioner Halliburton Energy Services filed a Petition (Paper 2, "Pet.") requesting *inter partes* review of claims 1–14 and 17–21 of U.S. Patent No. 9,410,410 B2 (Ex. 1002, "the '410 patent"). Patent Owner U.S. Wells Services, LLC filed a Preliminary Response (Paper 6, "Prelim. Resp."). With our authorization, Petitioner filed a Reply to Patent Owner's Preliminary Response (Paper 7, "Reply") and Patent Owner filed a Sur-Reply (Paper 9, "Sur-Reply").

Under 35 U.S.C. § 314(a), an *inter partes* review may not be instituted unless the information presented in the Petition and any response thereto shows "there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." Having considered the Petition, the arguments presented in the Preliminary Response, as well as all supporting evidence, we determine that Petitioner shows a reasonable likelihood that at least one of the challenged claims is unpatentable. Accordingly, we institute *inter partes* review.

A. Related Matters

The parties identify the following related matters in which the '410 patent has been asserted:

- *U.S. Well Services, Inc. v. Halliburton Company*, Case No. 6:21-cv-00367 (W.D. Tex.). Pet. 1; Paper 4, 1;
- *U.S. Well Services, LLC v. Tops Well Services, LLC*, Case No. 3-19-cv-00225 (S.D. Tex.), which was filed on July 3, 2019 and dismissed without prejudice on July 23, 2019. Pet. 1; Paper 4, 1; and
- *U.S. Wells Services, LLC v. Tops Well Services, LLC*, Case No. 3-19-cv-00237 (S.D. Tex.), which was filed on July 22, 2019, and which is stayed pending settlement discussions.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 30

Pet. 1; Paper 4, 1.

The parties further identify the following petitions for *inter partes* review that Petitioner filed against other patents held by Patent Owner:

- IPR2021-01033 against U.S. Pat. No. 8,789,601;
- IPR2021-01034 against U.S. Pat. No. 10,337,308;
- IPR2021-01035 against U.S. Pat. No. 9,970,278;
- IPR2021-01036 against U.S. Pat. No. 9,611,728;
- IPR2021-01037 against U.S. Pat. No. 9,745,840;
- IPR2021-01038 against U.S. Pat. No. 10,408,030; and
- IPR2021-01065 against U.S. Pat. No. 9,840,901.

Pet. 1–2; Paper 4, 2.

B. The '410 Patent

The '410 patent is titled "System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps" and issued on August 9, 2016. Ex. 1002, codes (54), (45).

The '410 patent describes a system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, where the oil or gas well has a wellbore that permits passage of fluid from the wellbore into the formation. *Id.*, code (57). Figure 1 of the '410 patent is reproduced below.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 31

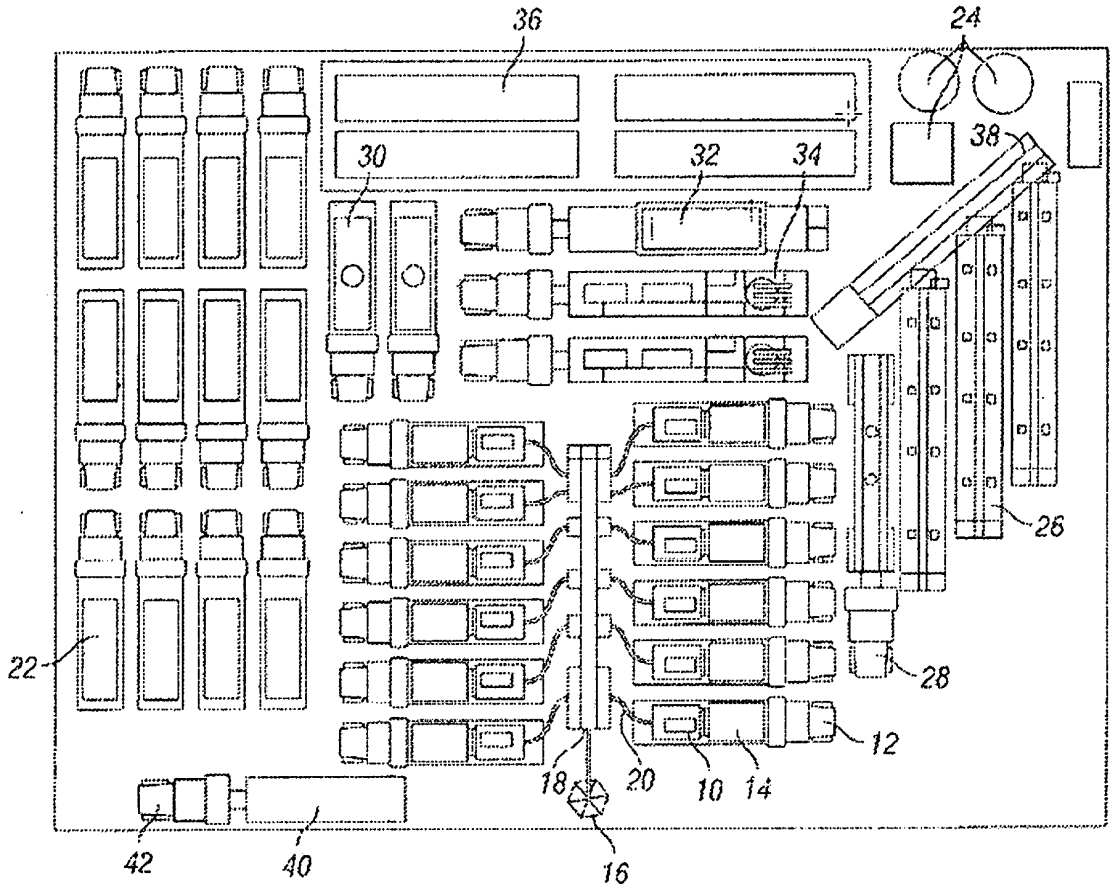


FIG. 1

Figure 1 shows a plan view of equipment used in a hydraulic fracturing operation. *Id.* at 3:19–20. Specifically, Figure 1 illustrates a plurality of pumps 10 and electric motors 14 mounted to pump vehicles 12. *Id.* at 3:20–24. The pumps 10 are fluidly connected to the wellhead 16 via the missile 18 and are powered by motor 14. *Id.* at 3:20–26. The pump vehicles 12 are positioned near enough to the missile 18 to connect fracturing fluid lines 20 between the pumps 10 and the missile 18. *Id.* at 3:26–28. The missile 18 is then connected to the wellhead 16 and configured to deliver fracturing fluid provided by the pumps 10 to the wellhead 16. *Id.* at 3:28–30.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 32

C. Challenged Claims

Petitioner challenges claims 1–14 and 17–21. Claims 1, 10, and 19 are independent claims. Claims 2–9 depend from claim 1. Claims 11–14, 17, and 18 depend from claim 10. Claims 20 and 21 depend from claim 19.

Claims 1 and 10 are illustrative and are reproduced below.

> 1. A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation, the system comprising:
>
> a plurality of electric pumps fluidly connected to the well and powered by at least one electric motor, and configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the formation, and fractures the formation; and
>
> a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency drive frequently performs electric motor diagnostics to prevent damage to the at least one electric motor.
>
> 10. A system for fracturing a rock formation in an oil or gas well by pumping hydraulic fracturing fluid into the well, the system comprising:
>
> a pump for pumping the hydraulic fracturing fluid into the well, and then from the well into the formation, the pump capable of pumping the hydraulic fracturing fluid at high pressure to crack the formation;
>
> an electric motor having a high-strength steel or steel alloy shaft attached to the pump and configured to drive the pump; and
>
> a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 33

drive frequently performs electric motor diagnostics to prevent damage to the electric motor.

Ex. 1002, 7:19–33, 7:57–8:10.

D. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–8, 19–21	103(a)	Coli[1], Horikoshi[2]
7	103(a)	Coli, Horikoshi, Vliet[3]
9	103(a)	Coli, Horikoshi, Stark[4]
10–14, 17, 18	103(a)	Coli, Horikoshi, API Standard[5]
12[6]	103(a)	Coli, Horikoshi, API Standard, Gardner[7]

Pet. 15. In addition to the references listed above, Petitioner relies on the Declaration of Dr. Robert Durham (Ex. 1007, "Durham Declaration"). Patent Owner submits a declaration of Mr. Robert Schaaf (Ex. 2005, "Schaaf Declaration") in support of its preliminary responses.

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[1] Coli et al., U.S. Patent Application Publication No. 2012/0255734 A1, published Oct. 11, 2012 (Ex. 1009) ("Coli").
[2] Horikoshi et al., U.S. Patent Application Publication No. 2011/0241590 A1, published Oct. 6, 2011 (Ex. 1010) ("Horikoshi").
[3] Van Vliet et al., U.S. Patent Application Publication No. 2011/0197988 A1, published Aug. 18, 2011 (Ex. 1011) ("Vliet").
[4] Stark, U.S. Patent No. 6,116,040 A, issued Sept. 12, 2000 (Ex. 1014) ("Stark").
[5] American Petroleum Institute, *Form-wound Squirrel-Cage Induction Motors – 500 Horsepower and Larger*, ANSI/API Standard 541-2003, fourth edition, June 2004 (Ex. 1012) ("API Standard").
[6] Petitioner also asserts claim 13 as being unpatentable over Coli, Horikoshi, API Standard, and Gardner but fails to provide any substantive arguments addressing this claim. *See* Pet. 15, 57–58.
[7] Gardner Denver Inc., Well Servicing Pump, Model GD-2500Q Quintuplex, Operating and Service Manual, 300FWF996 Rev 6, August 2005 (Ex. 1013) ("Gardner").

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 34

II. ANALYSIS

A. Discretionary Denial Under 35 U.S.C. § 314(a)

Patent Owner requests that we exercise discretion under 35 U.S.C. § 314(a) to deny institution. Prelim. Resp. 10–22 (citing, *e.g.*, *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential) ("*Fintiv*")).

Fintiv sets forth the factors that we weigh in determining whether to exercise our discretion to deny institution of the *inter partes* review proceeding here under 35 U.S.C. § 314(a). *See Fintiv*, Paper 11 at 5–6. These factors are:

> 1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
>
> 2. proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;
>
> 3. investment in the parallel proceeding by the court and the parties;
>
> 4. overlap between issues raised in the petition and in the parallel proceeding;
>
> 5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
>
> 6. other circumstances that impact the Board's exercise of discretion, including the merits.

Id. "These factors relate to whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in the parallel proceeding." *Id.* at 6. "[T]he Board takes a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review." *Id.*

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 35

For the reasons discussed below, we decline to exercise our discretion to deny institution under 35 U.S.C. § 314(a).

1. Whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted.

Fintiv Factor 1 recognizes that a stay of litigation pending resolution of a PTAB trial allays concerns about inefficiency and duplication of efforts, which strongly weighs against exercising the authority to deny institution. *Fintiv*, Paper 11 at 6.

Patent Owner contends this factor weighs in favor of discretionary denial because Petitioner has not requested a stay of the parallel district court proceeding, nor is there any evidence of record that a later-filed request for stay would be granted. Prelim. Resp. 12–13. Petitioner contends this factor favors institution because Petitioner intends to file a stay motion in the event that the present *inter partes* review proceeding is instituted. Pet. 15–16. In its Reply, Petitioner argues precedent exists to support a stay as the judge in the parallel district court proceeding has stayed at least one prior case pending the resolution of a related *inter partes* review. Reply 3–4.

On this record, it is unclear how the judge in the district court would proceed, and we decline to speculate regarding whether the district court will grant a stay if this proceeding is instituted. Accordingly, this factor is neutral.

2. Proximity of the court's trial date to the Board's projected statutory deadline for a final written decision.

Fintiv Factor 2 looks to the "proximity of the court's trial date to the Board's projected statutory deadline." *Fintiv*, Paper 11 at 9. "If the court's trial date is earlier than the projected statutory deadline, the Board generally

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 36

has weighed this fact in favor of exercising authority to deny institution under *NHK*." *Id.*

Patent Owner contends that this factor favors denial because the parallel district court proceeding, scheduled for December 19, 2022, will conclude before a final written decision is issued if we institute. Prelim. Resp. 14. Patent Owner further contends that there is no reason to believe the trial date will change. Sur-Reply 3.

In its Reply, Petitioner contends that the trial date is only a few weeks earlier than the projected deadline for a final written decision, and an "early trial date" is "non-dispositive" and simply means that "the decision whether to institute will likely implicate other factors." Reply 2 (citing *Fintiv*, Paper 11 at 5, 9). Petitioner further contends that recent data shows that district court trial dates are often delayed by several months, that the trial is likely to be rescheduled because another earlier-scheduled trial is supposed to take place on the same day as the parallel district court proceeding, and that the uncertainty of the trial date combined with the close proximity of the current trial date to the projected final written decision deadline weigh against discretionary denial. *Id.* at 3

Given the statutory deadlines, our latest possible date for issuance of a final written decision in this proceeding is January 13, 2023, one year and three months after the filing date of Patent Owner's Preliminary Response. 35 U.S.C. §§ 314(b) (2018), 316(a)(11); *see also* 37 C.F.R. § 42.100(c). Thus, the time period from the district court's default trial date to our projected statutory deadline for á final written decision is approximately one month. In general, if the district court's trial date is earlier than our projected statutory deadline for a final written decision, the Board usually has weighed this fact in favor of exercising authority to deny institution

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 37

under *NHK*. *Fintiv*, Paper 11 at 9. Where the trial date and the projected date of our final written decision are at or around the same time, however, as they are here, the efficiency and fairness concerns that underlie the *Fintiv* analysis are not as strong, and the decision whether to institute will instead implicate other factors. *See Fintiv*, Paper 11 at 9 ("If the court's trial date is at or around the same time as the projected statutory deadline, . . . the decision whether to institute will likely implicate other factors discussed herein, such as the resources that have been invested in the parallel proceeding.").

Further, the "Agreed Scheduling Order" states that the trial date is "TBD by the Court (default date under [Standing Order Governing Proceedings] is December 19, 2022)" and "[52 weeks after *Markman* hearing (12/20/21)]." Ex. 2002, 5. This indicates that the December 19, 2022 is a default date that was calculated as being 52 weeks after the *Markman* hearing, then scheduled for December 20, 2021. *Id.* We note, however, that the *Markman* hearing has since been rescheduled to occur on January 4, 2022. Ex. 1053.

Under these circumstances and especially the closeness of the trial date and projected final written decision deadline, we find that this factor is neutral.

3. Investment in the parallel proceeding by the court and the parties.

Fintiv Factor 3 considers the "investment in the parallel proceeding by the court and parties," including "the amount and type of work already completed in the parallel litigation by the court and the parties at the time of the institution decision." *Fintiv,* Paper 11 at 9.

Patent Owner contends this factor favors denial because instituting the Petition would waste the considerable investment made by the parties and

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 38

the district court in the parallel district court proceeding. Prelim. Resp. 15–16. Petitioner contends this factor favors institution because, at the time of the Petition, discovery had not commenced in the parallel district court proceeding, and Patent Owner had not served infringement contentions. Pet. 15. In its Reply, Petitioner further contends that "very limited discovery only related to claim construction" is permitted until a claim construction hearing is complete, and "it is unclear whether the parties will have received a claim construction order by the time an institution decision is due." Reply 4.

Fintiv states that, "[i]f, at the time of the institution decision, the district court has not issued orders related to the patent at issue in the petition, this fact weighs against exercising discretion to deny institution." *Fintiv*, Paper 11 at 10. Here, although some exchanges have taken place and some of the issues will have been briefed prior to institution, the district court has not issued any substantive orders addressing claim construction, validity, or infringement of the '410 patent. Accordingly, this factor weighs against exercising our discretion to deny institution.

4. *Overlap between issues raised in the petition and in the parallel proceeding.*

Fintiv Factor 4 considers whether "the petition includes the same or substantially the same claims, grounds, arguments, and evidence as presented in the parallel proceeding." *Fintiv*, Paper 11 at 12. If the issues in the Petition overlap substantially with those raised in the parallel proceeding, "this fact has favored denial." *Id.* "Conversely, if the petition includes materially different grounds, arguments, and/or evidence . . . this fact has tended to weigh against exercising discretion to deny institution." *Id.* at 12–13.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 39

Concerns about the degree of overlap may be mitigated where a petitioner agrees not to pursue in the parallel district court litigation the grounds advanced in the petition. *Sand Revolution II, LLC v. Continental Intermodal Grp. – Trucking LLC*, IPR2019-01393, Paper 24 at 11–12, 12 n.5 (PTAB June 16, 2020) (informative). A petitioner stipulating not to pursue "any ground raised or that could have been reasonably raised" weighs strongly in favor of not exercising discretionary denial. *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 at 18–19 (PTAB Dec. 1, 2020) (precedential as to § II.A) ("*Sotera*")).

Patent Owner contends this factor favors denial because Petitioner's challenges to the '410 patent are substantially the same as the invalidity challenges presented in the parallel district court proceeding as Petitioner relies on substantially the same invalidity arguments for each independent claim, the same primary reference, and substantially the same secondary references. Prelim. Resp. 16–17. Patent Owner also contends that the presence of additional claims do not weigh against discretionary denial because: "(i) Petitioner has failed to show evidence of harm; and (ii) the resolution of independent claim 1 at the district court will necessarily resolve key issues in the Petition because Petitioner relies on substantially the same arguments for independent claims 1, 10, and 19." *Id.* at 17–18. Patent Owner further contends there is also an overlap in the art cited in the present proceeding and the parallel district court proceeding, as Petitioner challenges claims 1–9 as obvious under the same primary reference, Coli, in combination with substantially the same secondary references, Horikoshi, Vliet, Stark, and/or Gardner. *Id.* at 18–20.

In its Reply, Petitioner submits that this factor weighs against the Board's discretion to deny because there is not complete overlap between

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 40

the claims at issue in the Petition and the parallel proceeding. Reply 1. To mitigate concerns of overlap, Petitioner also stipulates that it "will not purse the same invalidity grounds in the district court proceeding as those asserted in the corresponding IPR petition" if the Board institutes an *inter partes* review. *Id.* at 11. Patent Owner contends that if the Board credits the stipulation that "the stipulation should weigh only 'marginally' against discretionary denial because it is not as encompassing as the stipulation in *Sotera*. Sur-Reply 2 (citing *Verizon Bus. Network Svs., LLC v. Huawei Tech. Co.*, IPR2020-01278, Paper 12 at 13 (PTAB Jan. 26, 2021)).

Petitioner's stipulation is not a broad stipulation that includes "any ground raised or that *could have been reasonably raised*." *See Sotera*, Paper 12 at 19 (emphasis omitted); *see also Sand Revolution*, Paper 24 at 12 n.5 (noting that a broad stipulation better addresses concerns of duplicative efforts and potentially conflicting decisions in a much more substantial way). The stipulation does, however, mitigate the concerns of inefficiency and the possibility of conflicting decisions. Therefore, we find that this factor weighs marginally against denying institution.

5. *Whether the petitioner and the defendant in the parallel proceeding are the same party.*

Fintiv Factor 5 looks to "whether the petitioner and the defendant in the parallel proceeding are the same party." *Fintiv*, Paper 11 at 13. "If a petitioner is unrelated to a defendant in an earlier court proceeding, the Board has weighed this fact against exercising discretion to deny institution." *Id.* at 13–14.

Patent Owner contends this factor weighs strongly in favor of denial because Petitioner is the named defendant in the parallel district court

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 41

proceeding. Here, it is undisputed that Petitioner is a defendant in the parallel litigation. Pet. 1.

As noted above, it is unclear on this record when the trial in the district court proceeding will occur and whether the trial will take place prior to a final written decision being issued in this proceeding. Thus, it is unclear on this record whether any estoppel will be implicated. *See* 35 U.S.C. § 315(e). Under these circumstances and especially the closeness of the default trial date and the projected final written decision deadline, the facts underlying this factor are neutral.

6. *Other circumstances that impact the Board's exercise of discretion, including the merits.*

Fintiv Factor 6 looks to whether "other circumstances" exist that might "impact the Board's exercise of discretion, including the merits." *Fintiv*, Paper 11 at 14.

Patent Owner argues this factor favors denial because: there is a weakness in Petitioner's merits (i.e., Petitioner has improperly relied on hindsight bias and conclusory statements to support its obviousness contentions); the Office previously considered the primary reference in each of Petitioner's grounds (i.e., Coli); and Petitioner has weaponized the *inter partes* review process, as evidenced by Petitioner's filing of fourteen separate petitions challenging Patent Owner's patents. Prelim. Resp. 20–22. Petitioner does not address this factor. *See generally* Pet.

We have reviewed the prior art references and the arguments of both Petitioner and Patent Owner. As discussed in more detail below, we find the evidence and arguments presented by Petitioner persuasive on this preliminary record and sufficient to meet our standard for instituting *inter partes* review. Accordingly, we find that factor 6 is neutral.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 42

7. Conclusion on Discretionary Denial under 35 U.S.C. § 314(a)

Based on a holistic review of the *Fintiv* factors, we decline to exercise our discretion under § 314(a) to deny institution.

B. Discretionary Denial Under 35 U.S.C. § 325(d)

Section 325(d) provides that the Director may elect not to institute a proceeding if the challenge to the patent is based on matters previously presented to the Office. 35 U.S.C. § 325(d) states, in pertinent part, that "[i]n determining whether to institute or order a proceeding under this chapter, chapter 30, or chapter 31, the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office."

The Board uses a two-part framework for evaluating arguments under § 325(d):

> (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and
>
> (2) if either condition of first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.

Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential) ("*Advanced Bionics*"). "[T]he *Becton, Dickinson* factors provide useful insight into how to apply the framework under 35 U.S.C. § 325(d)." *Id.* at 9 (footnote omitted). The non-exclusive *Becton, Dickinson* factors are:

> (a) the similarities and material differences between the asserted art and the prior art involved during examination;
>
> (b) the cumulative nature of the asserted art and the prior art evaluated during examination;

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 43

> (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection;
>
> (d) the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art;
>
> (e) whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art; and
>
> (f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments.

Becton, Dickinson & Co. v. B. Braun Melsungen AG, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (precedential as to § III.C.5, first paragraph) ("*Becton, Dickinson*"). *Becton, Dickinson* factors (a), (b), and (d) relate to the first part of the *Advanced Bionics* framework (whether the same or substantially the same art or arguments previously were presented to the Office), and *Becton, Dickinson* factors (c), (e), and (f) relate to the second part of that framework (previous Office error). *Advanced Bionics*, Paper 6 at 9–11. Only if the same or substantially the same art or arguments were previously presented to the Office do we then consider whether the petitioner has demonstrated a material error by the Office. *Id.*

Under § 325(d), the art or arguments must have been previously presented to the Office during proceedings, such as examination of the underlying patent application, pertaining to the challenged patent. *Advanced Bionics*, Paper 6 at 7. Previously presented art includes art made of record by the Examiner, and art provided to the Office by an applicant, such as on an Information Disclosure Statement ("IDS"), in the prosecution history of the challenged patent. *Id.* at 7–8.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 44

Patent Owner contends that the same or substantially the same art and arguments cited by Petitioner were already considered by the Office, and Petitioner failed to show or even suggest how the Office may have erred. Prelim. Resp. 23–24. Specifically, Patent Owner contends that Petitioner relies on Coli, a reference that Examiners have previously considered, and accepted arguments distinguishing it, multiple times during prosecution of the '410 patent and its family. *Id.* at 24.

Petitioner contends that, although Coli is listed on the face of the '410 patent, there is no evidence in the record that Coli was substantively considered at any depth by the Examiner. Pet. 17–18 (citing *Oticon Med.l AB et al. v. Cochlear Ltd.*, IPR2019-00975, Paper 15 at 9–20 (PTAB Oct. 16, 2019) (precedential)). Petitioner further contends the grounds relied upon in the Petition cite Horikoshi, which was not before the Patent Office during examination. *Id.* at 18.

1. Analysis

Although Coli is cited on the face of the patent, we find that the first part of the *Advanced Bionics* framework is not satisfied because the particular combinations set forth in the petition were not considered by the Examiner.

Coli was disclosed on an Information Disclosure Statement, but neither the Examiner nor the Applicant substantively discussed Coli during prosecution. *See generally* Ex. 1005. The Examiner indicted that Coli was considered during prosecution of the application resulting in the '410 patent by annotating the IDS. Ex. 1005, 73. Our precedent establishes that "[p]reviously presented art includes . . . art provided to the Office by an applicant, such as on an Information Disclosure Statement (IDS), in the prosecution history of the challenged patent." *Advanced Bionics*, Paper 6

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 45

at 7–8. Thus, we agree with Patent Owner that Coli previously was presented to the Office.

However, the Petition does not assert Coli alone, but in combination with additional prior art references and, in particular, with Horikoshi. *See* Pet. 15. None of the other prior art references, including Horikoshi, were presented to the Office during prosecution and Patent Owner does not assert that the additional references are cumulative to references considered during prosecution. *See generally* Ex. 1005; Ex. 1002, code (56); Prelim. Resp. 23–24. Thus, the combination of references asserted in the Petition was not presented previously to the Office. Based on this alone, we determine that denying the Petition under § 325(d) is unwarranted.

C. Level of Ordinary Skill in the Art

In determining the level of skill in the art, we consider the type of problems encountered in the art, the prior art solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level of active workers in the field. *Custom Accessories, Inc. v. Jeffrey-Allan Indus. Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986); *Orthopedic Equip. Co. v. U.S.*, 702 F.2d 1005, 1011 (Fed. Cir. 1983).

Petitioner contends that a person of ordinary skill in the art at the time of the invention of the '410 patent would have had the following education and experience:

> either (1) a Bachelor of Science in Mechanical Engineering, Electrical Engineering, Petroleum Engineering or an equivalent field as well as at least two 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.

Pet. 18.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 46

Patent Owner does not dispute this level of skill. Prelim. Resp. 7.

For purposes of this Decision, we adopt Petitioner's proposal as reasonable and consistent with the prior art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (the prior art may reflect an appropriate level of skill in the art).

D. Claim Construction

For petitions filed on or after November 13, 2018, the "broadest reasonable interpretation" standard has been replaced with the federal court claim construction standard that is used to construe a claim in a civil action under 35 U.S.C. § 282(b). This is the same claim construction standard articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), and its progeny.

Neither Petitioner nor Patent Owner provide any explicit construction of any claim terms. However, in its Reply, Petitioner contends Patent Owner effectively argues that the claim language "to prevent damage to the at least one electric motor" is limiting, and further contends the claim language "to prevent damage to the electric motors if they become grounded or shorted" merely recites an intended function and should be given no patentable weight." Reply 6–7 (citing Prelim. Resp. 3, 27, 32; Pet. 23 n.4).

Except to the extent we explain how we interpret the claims in the analysis below, we decline to otherwise expressly construe any claim terms at this time. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Matal*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs* in the context of an *inter partes* review).

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 47

E. Overview of the Asserted Prior art

1. Coli

Coli is a U.S. Patent Application Publication titled "Mobile, Modular, Electrically Powered System for Use in Fracturing Underground Formations," and published on October 11, 2012. Ex. 1009, codes (45), (54).

Coli describes an electrically powered fracturing system and a system and method for providing on-site electrical power and delivering fracturing fluid to a wellbore at a fracturing operation. *Id.* ¶ 34. Coli further describes that natural gas (either supplied to the site or produced on-site) is used to drive a dedicated source of electrical power, such as a turbine generator, for hydrocarbon-producing wellborn completions. *Id.* ¶ 36.

Coli's Figure 3 is reproduced below.

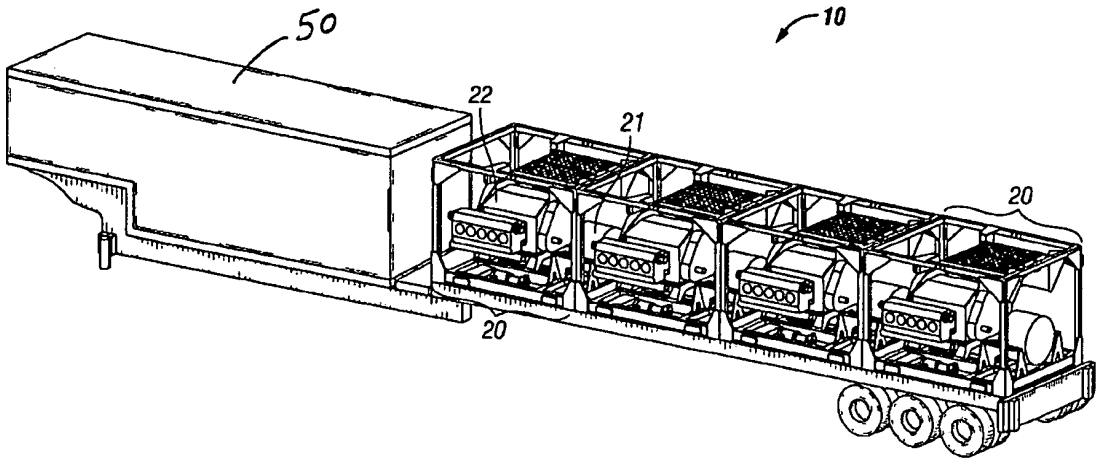


FIG. 3

Figure 3 depicts a schematic perspective view of a fracturing trailer 10 for housing fracturing modules 20 along with a transformer and driver unit 50. *Id.* ¶¶ 24, 40, 49. Each fracturing module 20 includes an electric motor 21 and a fluid pump 22 coupled thereto. *Id.* ¶ 40. Fracturing modules 20 utilize electric power from turbine generator 30 (not shown) to pump

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 48

fracturing fluid directly to a wellbore. *Id.* Coli discloses that the system can deliver a 2500 horsepower ("hp") directly to each pump because pump 22 is directly coupled to electric motor 21. *Id.* ¶ 49. Coli further discloses that each fracturing module 20 weighs approximately 28,000 pounds ("lbs."), which allows for placement of four pumps 22 in the same physical dimension (*i.e.*, size and weight) as the spacing needed for a simple pump in conventional diesel systems, as well as allowing for up to 10,000 hp total to the pumps. *Id.*

2. Horikoshi

Horikoshi is a U.S. Patent Application Publication titled "Motor Driving Apparatus Having Fault Diagnostic Function," and published on October 6, 2011. Ex. 1010, codes (43), (54).

Horikoshi describes a motor driving apparatus having a fault diagnostic function capable of detecting during operation a ground fault and a phase-to-phase short circuit by distinguishing one from another. *Id.* ¶ 11. Horikoshi discloses that the motor driving apparatus comprises an AC/DC converter for converting three-phase AC power supplied from a three-phase AC power supply into DC power and a DC/AC converter for converting the DC power output from the AC/DC converter into three-phase AC power for supply to a motor. *Id.* ¶ 12. The motor driving apparatus further comprises a sum current detector that detects the sum of currents flowing from the three-phase AC power supply through the AC/DC converter to the DC/AC converter. *Id.* The motor driving apparatus includes an overcurrent detector which detects overcurrent on an output current of the DC/AC converter. *Id.* The motor driving apparatus further comprises a determining unit which, when an overcurrent is detected by the overcurrent detector, determines

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 49

whether a ground fault or a phase-to-phase short circuit has occurred based on the sum current detector. *Id.* ¶¶ 12–13.

3. Vliet

Vliet is a U.S. Patent Application Publication titled "Fuel Delivery System and Method," and published on August 18, 2011. Ex. 1011, codes (54), (43).

Vliet describes a fuel delivery system including pumps, electrical equipment, and generators mounted on a trailer. *Id.* ¶ 27. The trailer makes the system portable/transportable and facilitates system operation at various fracturing well sites. *Id.* ¶¶ 3, 14.

4. Stark

Stark is a U.S. patent titled "Apparatus for Cooling the Power Electronics of a Refrigeration Compressor Drive," and issued on Sept. 12, 2000. Ex. 1014, codes (45), (54).

Stark describes a closed loop refrigeration system that includes a condenser, an evaporator, and a compressor connected in series by refrigerant lines and an expansion means in one of the refrigerant lines for throttling refrigerant moving between the condenser and the evaporator from a high pressure to a lower pressure. *Id.* at 1:60–65. "A variable frequency drive is associated with the compressor that contains heat producing power electronic components in the form of insulated gate bipolar transistors that require cooling." *Id.* at 1:65–2:1. The power electronic components are mounted in heat transfer relation with a block of material having good heat transfer characteristics, where the block acts as a heat sink to draw heat away from the power electronic components. *Id.* at 2:1–5.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 50

5. API Standard

API Standard describes the minimum requirements for form-wound squirrel-cage induction motors 500 horsepower ("hp") and larger for use in petroleum industry services. Ex. 1012, 1. API Standard describes that heat-treated forged steel shafts shall be used for machines driving reciprocating loads, and that heat-treated forged steel shafts shall be A4000 series. *Id.* at 11.

6. Gardner

Gardner is an operating manual that describes the Gardner Denver GD-2500Q, a high horsepower, high rod load multi-purpose pump for oil and gas well fracturing. Ex. 1013, 9. Gardner further discloses that the GD-2500Q has a rated brake horsepower of 2500 bhp. *Id.* at 14.

F. Obviousness under 35 U.S.C. § 103

1. Principles of Law

Petitioner contends that claims 1–14 and 17–21 are unpatentable over combinations of Coli, Horikoshi. Vliet, Stark, API Standard and Gardner. Pet. 15. Patent Owner disputes Petitioner's contentions. Prelim. Resp. 25–61.

A petition must show how the construed claims are unpatentable under the statutory grounds it identifies. 37 C.F.R. § 42.104(b)(4). Petitioner bears the burden of demonstrating a reasonable likelihood that it would prevail with respect to at least one challenged claim for a petition to be granted. 35 U.S.C. § 314(a).

A claim is unpatentable under § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 51

KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) when in evidence, objective indicia of non-obviousness (i.e., secondary considerations). *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Secondary considerations may include long felt but unsolved need, failure of others, unexpected results, commercial success, copying, licensing, and praise. *See Graham*, 383 U.S. at 17–18; *Leapfrog Enters., Inc. v. Fisher–Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007).

We analyze the asserted grounds with these principles in mind.

2. Ground 1: Alleged Obviousness of Claims 1–8 and 19–21 over Coli and Horikoshi

Petitioner asserts that Coli and Horikoshi render obvious claims 1–8 and 19–21.

a) Claim 1

Regarding the preamble, Petitioner contends that Coli discloses it because Coli discloses a "system...for hydraulic stimulation of underground hydrocarbon-bearing formations" wherein "hydraulic stimulation" corresponds to "fracturing operations" in which "pressurized fluid" is delivered to a wellbore. Pet. 22–23 (citing Ex. 1009 ¶¶ 6, 9, 13).

Patent Owner does not dispute Petitioner's assertion.

The first limitation of claim 1 recites "a plurality of electric pumps fluidly connected to the well and powered by at least one electric motor, and configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the formation, and fractures the formation." Petitioner contends that Coli discloses this limitation because Coli discloses

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 52

one or more fracturing modules containing an electric motor and fluid pump, whereby the modules use electric power "to pump the fracturing fluid directly to the wellbore" and the fluid is "delivered to the wellbore under pressure and injected into the wellbore" using "high pressure" equipment. Pet. 23–24 (citing Ex. 1009 ¶¶ 5, 6, 35, 40, 46, 77, 83, claim 12) (emphasis omitted).

Patent Owner does not dispute Petitioner's assertion.

The last limitation of claim 1 recites "a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency drive frequently performs electric motor diagnostics to prevent damage to the at least one electric motor." Petitioner submits that this limitation is obvious over Coli and Horikoshi.

Specifically, Petitioner submits that Coli discloses that the system includes variable frequency drives (VFDs) that "essentially 'tell' the motors what they are allowed to do" (Pet. 25 (citing Ex. 1009¶¶ 11, 65)) while Horikoshi teaches using a "motor driving apparatus" for converting and supplying three-phase AC power to a motor (*id.* at 25 (citing Ex. 1010 ¶¶ 12, 27)), and detecting/identifying the cause of motor overcurrent. *Id.* at 25–26 (citing Ex. 1010 ¶¶ 4, 6). Petitioner contends that a POSITA would have understood that the motor driving apparatus disclosed in Horikoshi is a VFD because it (1) supplies power to a motor, thus controlling its speed, and (2) detects overcurrent associated with the motor and distinguishes ground faults from shorts, and thus performs motor diagnostics. *Id.* Petitioner also contends that this reading of Horikoshi is "[c]onsistent with the plain language of the claims (e.g., 'a variable frequency drive connected to the electric motor to control the speed of the motor,' as recited in claim 1 of the '410 Patent)." *Id.* at 25.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 53

Petitioner further contends that "[a] POSITA would have understood that 'overcurrent' is a potential source of damage to an electric motor, and detecting overcurrent associated with 'a ground fault or a phase-to-phase short circuit' is a way to protect the electric motor from damage" (Pet. 20–21 (citing Ex. 1007 ¶ 243)) and that it would have been obvious based on the teachings of Horikoshi that having the diagnostic capability to detect a ground fault or a phase-to-phase short is desirable to prevent damage to the motors (*id.*). Lastly, Petitioner argues that it would have been obvious, based on the teachings of Horikoshi, to substitute the VFD of Coli with the VFD of Horikoshi or to enhance the VFD of Coli with the diagnostic functionality of Horikoshi. *Id.* at 22, 27.

Patent Owner disputes these assertions. Specifically, Patent Owner contends that Petitioner relies on impermissible hindsight and conclusory statements to craft its motivation to combine because the motivation is gleaned from patentee's specification, and neither Coli nor Horikoshi is concerned with performing motor diagnostics to prevent damage to a motor. Prelim Resp. 26–33. Patent Owner further contends that Petitioner failed to establish how the motor driving apparatus of Horikoshi is a VFD (*id.* at 33–35) and how a POSITA would have combined the teachings of Coli and Horikoshi (*id.* at 35–39).

We find on this record that Petitioner has made a sufficient showing for purposes of institution that claim 1 is obvious over Coli and Horikoshi. We now turn to the disputed limitation of claim 1.

Although Petitioner concludes that it would have been obvious to substitute or modify the VFD of Coli with the motor driving apparatus of Horikoshi for the purpose of preventing damage to the motors of Coli, and motor damage prevention is a desired outcome recited in the claims and

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 54

disclosed in the specification of the '410 patent, we are unpersuaded that Petitioner's rationale is grounded in impermissible hindsight.

As Petitioner notes, Horikoshi expressly teaches that it is desirable to detect and identify sources of overcurrent such as ground faults and phase-to-phase short circuits (Ex.1010 ¶ 11) and that it is known in the art to use fault detection to "protect[]" against ground faults (*id.* ¶ 8).
Patent Owner does not dispute that overcurrent may cause motor damage or that detection of overcurrent, specifically by ground faults or short circuits, would prevent such damage. Indeed, the '410 patent acknowledges that grounding and shorting are two causes of motor damage. Ex. 1002, 2:19–21. Accordingly, we find on this preliminary record, that Petitioner's rationale for combining is properly derived from the asserted prior and not the product of impermissible hindsight.

We further note that the '410 patent does not explain, and Patent Owner does not suggest, that motor damage protection require anything but "perform[ing] electric motor diagnostics." Thus, it appears on this record, that the functional recitation "to prevent damage to the at least one motor" is satisfied by VFDs that perform such diagnostics.

Regarding Patent Owner's argument that Petitioner failed to establish that Horikoshi's motor drive apparatus is a VFD, Patent Owner is correct that Horikoshi does not use the term "variable frequency device." Petitioner contends that the motor drive apparatus is "quintessentially" a VFD because its description is "[c]onsistent with the plain language of the claims." Pet. 25. Patent Owner does not dispute that the motor drive apparatus, like the claimed VFD, controls motor speed or performs motor diagnostics; instead, Patent Owner relies on Horikoshi's non-use of the term as evidence of non-disclosure. We find this argument unpersuasive, and on this record, agree

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 55

that Petitioner has sufficiently established that Horikoshi's motor drive apparatus corresponds to the variable frequency device as claimed.

As to Patent Owner's argument that Petitioner failed to show how a POSITA would have combined the teachings of Coli and Horikoshi, we find that this argument is tantamount to a bodily incorporation argument. "The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference. . . . Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). Any modification of a prior art device will result in changes thereto, as a matter of course; the question, rather, is whether there existed sufficient motivation for a person of ordinary skill to make the proposed modifications in light of the evidence of record. We find that Petitioner's evidence of the benefits resulting from the combination, i.e., overcurrent detection and motor damage prevention, provide sufficient motivation to make these changes, and that Patent Owner's arguments regarding ambiguity as to which elements of Horikoshi Petitioner believes could be combined with the VFD of Coli without affecting the other functionalities in Coli (Prelim Resp. 38), are insufficient to defeat the evidence of motivation to combine.

b) Independent Claim 19

Petitioner relies on substantially the same arguments provided for claim 1 to establish that claim 19 is obvious over Coli and Horikoshi. Pet. 34–36. Patent Owner does not address Petitioner's arguments with any particularity, but appears instead to rest on its arguments provided for claim 1. Prelim. Resp. 25–39.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 56

We determine, for the same reasons articulated above with respect to claim 1, that Petitioner has demonstrated a reasonable likelihood of prevailing in demonstrating that claim 19 of the '410 patent is obvious over Coli and Horikoshi.

c) Dependent Claims 2–8, 20, and 21

Petitioner asserts that dependent claims 2–8, 20, and 21 are unpatentable over Coli and Horikoshi. Pet. 28–33, 36–37. Patent Owner does not address the additional elements of these dependent claims, but appears instead to rely on its arguments provided for claim 1. Prelim. Resp. 25–39. On this record, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing in demonstrating that claims 2–8, 20, and 21 are obvious over Coli and Horikoshi.

d) Secondary Considerations

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

"In order to accord substantial weight to secondary considerations in an obviousness analysis, 'the evidence of secondary considerations must have a "nexus" to the claims, i.e., there must be "a legally and factually

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 57

sufficient connection" between the evidence and the patented invention.'" *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (citing *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019)). "The patentee bears the burden of showing that a nexus exists . . . ." *WMS Gaming Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999). Nexus is a legally and factually sufficient connection between the objective evidence and the claimed invention, such that the objective evidence should be considered in determining nonobviousness. *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988). A nexus is presumed when "the patentee shows that the asserted objective evidence is tied to a specific product and that product 'embodies the claimed features, and is coextensive with them.'" *Fox Factory*, 944 F.3d at 1373 (quoting *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018)). "A finding that a presumption of nexus is inappropriate does not end the inquiry into secondary considerations," as "the patent owner is still afforded an opportunity to prove nexus by showing that the evidence of secondary considerations is the 'direct result of the unique characteristics of the claimed invention.'" *Id.* at 1373–74 (citing *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996)).

Patent Owner contends that Petitioner has failed to rebut the objective evidence of non-obviousness raised during the prosecution of the '410 patent. Prelim. Resp. 39–41. Specifically, Patent Owner contends that the objective evidence: (i) corresponds to its Clean Fleet® product, which embodies the challenged claimed features and is coextensive with the challenged claims; and (ii) strongly supports the non-obviousness of the challenged claims, including: meeting a long-felt, unmet need; failure of

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 58

others to meet this need; industry praise; copying of the claimed invention; and commercial success of the claimed invention. *Id.* at 39.

Patent Owner contends it is entitled to a presumption of nexus because its objective evidence corresponds to its Clean Fleet® product, which embodies the challenged claimed features and is coextensive with the challenged claims. Prelim. Resp. 42 (citing *Fox Factory*, 944 F.3d at 1373). Specifically, Patent Owner contends that independent claim 1 recites "a plurality of electric pumps . . . powered by at least one electric motor . . . and a variable frequency drive," where the Clean Fleet® product has electric pumps, electric motors, and a variable frequency drive. *Id.* at 43 (emphasis omitted).

Notwithstanding whether Patent Owner is entitled to a presumption of nexus, Patent Owner contends there is a strong nexus between the claimed invention and the secondary considerations evidence. *Id.* at 44. Specifically, Patent Owner contends the independent claims are directed to a system for fracturing a formation at high pressure comprising at least a pump, motor, and variable frequency drive. *Id.* Patent Owner further contends that there is evidence that: (i) the commercial success of the present invention is due to the "pumps" that are powered by the electric motor; (ii) others in the industry copied the claimed product by introducing competing fleets with electric pumps, electric motors; and a variable frequency drive; (iii) the claimed invention (*i.e.*, the Clean Fleet® product) received widespread industry praise and recognition due to the electric pumps powered by the electric motor; and (iv) the claimed invention succeeded where others had failed. *Id.* at 44–45.

Petitioner contends that Patent Owner's secondary considerations arguments advanced during the prosecution of the '410 patent do not

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 59

establish non-obviousness of the challenged claims because they lack the requisite "nexus." Pet. 58–59. In its Reply, Petitioner contends Patent Owner is not entitled to a presumption of nexus under step one of *Fox Factory* because Patent Owner has not demonstrated that its Clean Fleet® product is coextensive with the '410 patent. Reply, 9–11. Petitioner further contends Patent Owner also has not demonstrated an actual nexus exists under step two of *Fox Factory* because: (i) Patent Owner relies largely on its declarant, yet its declarant has a significant interest in the proceeding, and its declarant's testimony has not been tested; and (ii) even taking the testimony of Patent Owner's declarant at face value, it does not demonstrate nexus because it does not demonstrate that the "offered second consideration actually results from something other than what is both claimed and novel in the claim." *Id.* at 11–12 (emphasis omitted).

Patent Owner bears the burden of showing that a nexus exists. *WMS Gaming*, 184 F.3d at 1359. On this record, Patent Owner does not sufficiently demonstrate that it is entitled to a presumption of nexus. To establish nexus Patent Owner cites to arguments and evidence of objective indicia of nonobviousness submitted during prosecution of the application resulting in the '410 patent. Prelim. Resp. 42–43 (citing Ex. 1005). Citing to the testimony of Mr. Schaaf, Patent Owner contends that "the objective evidence that corresponds to the Clean Fleet® product, which embodies the challenged claimed features and is coextensive with the Challenged Claims." Prelim. Resp. 42 (citing Ex. 2005 ¶ 26).

On this record, Patent Owner does not sufficiently demonstrate that it is entitled to a presumption of nexus. During prosecution of the '410 patent, the Applicant touted the "electric motors . . . powered by natural gas" or "a power grid" as being the reason for the asserted commercial success of the

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 60

"Clean Fleet" product. Ex. 1005, 151–53. Some of claims of the '411 patent, for example independent claim 1, do not include this limitation. Ex. 1002, 7:19–33; *see also id.* at 7:44–45 (dependent claim 5 reciting "at least some of the plurality of generators powered by natural gas"). Thus, on this record, Patent Owner has not sufficiently shown that the claims of the '410 patent are coextensive with the Clean Fleet product and, thus, has not sufficiently shown that it is entitled to a presumption of nexus.

Further, in as much as, Patent Owner largely relies upon the declarations of Messrs. Broussard (Ex. 2016) and Schaaf (Ex. 2005) to supports its arguments of nexus, we do not find their testimony sufficient to establish nexus as it is untested at this stage of the proceeding. We also note that Mr. Broussard is Patent Owner's President and Chief Executive Officer (Ex. 2016 ¶ 2) and Mr. Schaaf relies on the Broussard Declaration (*see, e.g.*, Ex. 2005 ¶ 91). A final determination as to the veracity of Patent Owner's evidence and arguments is best reserved for trial.

For the same reasons, on this record, Patent Owner has not sufficiently shown that the alleged commercial success is a "direct result of the unique characteristics of the claimed invention" (*see Fox Factory*, 944 F.3d at 1373–74). At this stage of the proceeding, and on this record, Patent Owner has not sufficiently established a nexus between the asserted objective indicia of nonobviousness and the claimed invention of the '410 patent.

e) Conclusion

For the foregoing reasons, and on the record presently before us, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing in demonstrating that claims 1–8 and 19–21 of the '410 patent are obvious over Coli and Horikoshi.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 61

3. Ground 2: Alleged Obviousness of Claim 7 over Coli, Horikoshi, and Vliet

Petitioner asserts that claim 7 is obvious over Coli, Horikoshi, and Vliet. Pet. 37–40. Patent Owner does not address Petitioner's arguments with any particularity, but appears instead to rest on its arguments provided for claim 1. Prelim. Resp. 25–39. On this record, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing in demonstrating that claim 7 is obvious over Coli, Horikoshi, and Vliet.

4. Ground 3: Alleged Obviousness of Claim 9 over Coli, Horikoshi, and Stark

Petitioner asserts that dependent claim 9 is obvious over Coli, Horikoshi, and Stark. Pet. 40–45. Patent Owner does not address Petitioner's arguments with any particularity, but instead appears to rest on its arguments provided for claim 1. Prelim. Resp. 25–39. On this record, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing in demonstrating that claim 9 is obvious over Coli, Horikoshi, and Stark.

5. Ground 4: Alleged Obviousness of Claims 10–14, 17, and 18 over Coli, Horikoshi, and API Standard

Petitioner contends that claims 10–14, 17, and 18 are obvious over Coli, Horikoshi, and API Standard. Pet. 46–56. Patent Owner does not address Petitioner's arguments with any particularity, but appears instead to rest on its arguments provided for claim 1. Prelim. Resp. 25–39. On this record, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing in demonstrating that claim claims 10–14, 17, and 18 are obvious over Coli, Horikoshi, and API Standard.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 62

6. Ground 5: Alleged Obviousness of Claims 12 and 13 over Coli, Horikoshi, API Standard, and Gardner

Petitioner asserts that dependent claims 12 and 13 are obvious over Coli, Horikoshi, API Standard, and Gardner. Pet. 57–58. Patent Owner does not address Petitioner's arguments with any particularity, and appears instead to rest on its arguments provided for claim 1. Prelim. Resp. 25–39. On this record, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing in demonstrating that claims 12 and 13 are obvious over Coli, Horikoshi, API Standard, and Gardner.

III. CONCLUSION

After considering the evidence and arguments presented in the Petition and the Preliminary Response, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing with respect to at least one of the challenged claims, and thus, we institute an *inter partes* review of all challenged claims on all presented challenges. *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018); *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (interpreting the statute to require "a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition").

At this stage of the proceeding, the Board has not made a final determination as to the patentability of any challenged claim or any underlying factual and legal issues.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–14 and 17–21 of U.S. Patent No. 9,410,410 B2 is instituted with respect to all grounds set forth in the Petition; and

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 63

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), *inter partes* review of U.S. Patent No. 9,410,410 B2 shall commence on the entry date of this Order, and notice is hereby given of the institution of a trial.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 64

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HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 65

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Western District of Texas - Waco Division on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
6:21-cv-00367	4/15/2021	Western District of Texas - Waco Division

PLAINTIFF	DEFENDANT
U.S. Well Services, Inc. and U.S. Well Services, LLC	Halliburton Company and Cimarex Energy Co.

PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 SEE ATTACHED		
2		
3		
4		
5		

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

Patent No.	Date of Patent	Holder of Patent
8,789,601	07/29/2014	U.S. Well Services, LLC
9,410,410	08/09/2016	U.S. Well Services, LLC
9,611,728	04/04/2017	U.S. Well Services, LLC
9,745,840	08/29/2017	U.S. Well Services, LLC
9,970,278	05/18/2018	U.S. Well Services, LLC
10,337,308	07/02/2019	U.S. Well Services, LLC
10,408,030	09/10/2019	U.S. Well Services, LLC

AO 120

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 **Director of the U.S. Patent and Trademark Office** **P.O. Box 1450** **Alexandria, VA 22313–1450**	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Southern District of Texas on the following Trademarks or Patents.

Docket No. 3:19–cv–00225	Date Filed: 7/3/2019	U.S District Court SOUTHERN DISTRICT OF TEXAS
Plaintiff(s) U.S. Well Services, Inc.		Defendant(s) TOPS Well Services, LLC:, et al.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
A copy of the complaint is being mailed with this form.		
1. 8,789,601		
2. 9,410,410		
3. 9,611,728		
4. 9,650,871		
5. 9,650,879		
In the above–entitled case, the following patent(s)/trademark(s) have been included:		
DATE INCLUDED	INCLUDED BY Amendment Answer Cross Bill Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1. 9,970,278		
2. 10,337,308		
3.		
4.		
5.		
In the above–entitled case, the following decision has been rendered or judgment issued:		
DECISION/JUDGMENT		

Clerk: David J. Bradley, Clerk	By Deputy Clerk: Andy Gould	Date: 7/5/2019

TRUE COPY I CERTIFY
ATTEST:
DAVID J. BRADLEY, Clerk of Court
By Andy Gould Deputy Clerk

AO 120

TO:	
Mail Stop 8 **Director of the U.S. Patent and Trademark Office** **P.O. Box 1450** **Alexandria, VA 22313–1450**	**REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK**

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Southern District of Texas on the following Trademarks or Patents.

Docket No. 3:19–cv–00237	Date Filed: 7/22/2019	U.S District Court SOUTHERN DISTRICT OF TEXAS
Plaintiff(s) U.S. Well Services, LLC		Defendant(s) TOPS Well Services, LLC, et al.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
A copy of the complaint is being mailed with this form.		
1. 8789601	9970278	
2. 9410410	10337308	
3. 9611728		
4. 9650871		
5. 9650879		
In the above–entitled case, the following patent(s)/trademark(s) have been included:		
DATE INCLUDED	INCLUDED BY Amendment Answer Cross Bill Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1.		
2.		
3.		
4.		
5.		
In the above–entitled case, the following decision has been rendered or judgment issued:		
DECISION/JUDGMENT		

Clerk: David J. Bradley, Clerk	By Deputy Clerk: Andrew Gould	Date: 7/23/2019

TRUE COPY I CERTIFY
ATTEST:
DAVID J. BRADLEY, Clerk of Court
By Andrew Gould
Deputy Clerk

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/679,689	11/16/2012	Joel N. Broussard	085055.000003

CONFIRMATION NO. 5345

132858
Hogan Lovells US LLP
609 Main Street
Suite 4200
Houston, TX 77002

POA ACCEPTANCE LETTER

OC000000099728966

Date Mailed: 05/23/2018

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 05/11/2018.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/dtdinh/

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 70

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/679,689	11/16/2012	Joel N. Broussard	085055.000003

CONFIRMATION NO. 5345

POWER OF ATTORNEY NOTICE

143960
Taylor Evans
Hogan Lovells US LLP
700 Louisiana Street
Suite 4300
Houston, TX 77002

OC000000099728947

Date Mailed: 05/23/2018

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 05/11/2018.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/dtdinh/

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 71

PTO/SB/47 (03-09)
Approved for use through 07/31/2018. OMB 0651-0016
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INSTRUCTIONS: The issue fee must have been paid for application(s) listed on this form. In addition, only an address represented by a Customer Number can be established as the fee address for maintenance fee purposes (hereafter, fee address). A fee address should be established when correspondence related to maintenance fees should be mailed to a different address than the correspondence address for the application. **When to check the first box below**: If you have a Customer Number to represent the fee address. **When to check the second box below**: If you have no Customer Number representing the desired fee address, in which case a completed Request for Customer Number (PTO/SB/125) must be attached to this form. For more information on Customer Numbers, see the Manual of Patent Examining Procedure (MPEP) § 403.

For the following listed application(s), please recognize as the "Fee Address" under the provisions of 37 CFR 1.363 the address associated with:

☒ Customer Number: 197

OR

☐ The attached Request for Customer Number (PTO/SB/125) form.

PATENT NUMBER (if known)	APPLICATION NUMBER
9,410,410	13/679,689

Completed by (check one):

☐ Applicant/Inventor

☒ Attorney or Agent of record 60506 (Reg. No.)

☐ Assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

☐ Assignee recorded at Reel Frame

/Taylor P. Evans/
Signature

Taylor P. Evans
Typed or printed name

713-632-1400
Requester's telephone number

May 22, 2018
Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more that one signature is required, see below*.

☐ * Total of forms are submitted.

This collection of information is required by 37 CFR 1.363. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1. 11 and 1.14. This collection is estimated to take 5 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313- 1450. DO NOT SEND COMPLETED FORMS TO THIS ADDRESS.
SEND TO: Mail Stop M Correspondence, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	32687891
Application Number:	13679689
International Application Number:	
Confirmation Number:	5345
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Customer Number:	132858
Filer:	Taylor P. Evans/Jennifer Tilley
Filer Authorized By:	Taylor P. Evans
Attorney Docket Number:	047158.100008
Receipt Date:	22-MAY-2018
Filing Date:	16-NOV-2012
Time Stamp:	11:56:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Maintenance Fee Address Change	410_Maintenance_Fee_Address_Change.pdf	110426 a5c36a8f8ee3343f3abcd7ce87136ba69fa84384	no	2

Warnings:

Information:	
Total Files Size (in bytes):	110426

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/80 (07-12)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office; U.S DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

☐ Practitioners associated with Customer Number: 132858

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

☐ The address associated with Customer Number: 132858

OR

☐	Firm or Individual Name		
	Address		
	City	State	Zip
	Country		
	Telephone	Email	

Assignee Name and Address: U.S. Well Services LLC
770 Post Oak Ln. #405
Houston, TX 77056

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record
The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	10/12/2016
Name	Jared Oehring	Telephone	281-685-7529
Title	Vice President of Technology		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: US Well Services LLC

Application No./Patent No.: 13/679,689 Filed/Issue Date: November 16, 2012

Titled: System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps

US Well Services LLC, a company

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☑ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 029315, Frame 0577, or for which a copy thereof is attached.

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

   1. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

   2. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Taylor P. Evans/	May 11, 2018
Signature	Date
Taylor P. Evans	60506
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ASSIGNMENT

WHEREAS, I, Jared Oehring, a citizen of the United States of America, am the sole inventor of a **SYSTEM FOR REDUCING NOISE IN A HYDRAULIC FRACTURING FLEET**, for which an application for United States Letters Patent was filed on **January 14, 2015** and assigned U.S. Application No. **62/103,414**; and

WHEREAS, US WELL SERVICES LLC, a Company of Limited Liability in Texas, with a business address of 770 South Post Oak Lane, Suite 405, Houston, Texas 77056, hereafter "US WELL", is desirous of acquiring the entire right, title and interest in and to the aforesaid invention throughout the world, and all right, title and interest in, to and under any and all Letters Patent of the United States and all other countries throughout the world;

NOW, THEREFORE, for and in consideration of the sum of One Dollar ($1.00) to me in hand paid by US WELL and for other good and valuable considerations, the receipt of which is hereby acknowledged, I hereby sell, assign, transfer and set over to US WELL, all right, title and interest in and to the said invention throughout the world, and said application for U.S. Letters Patent, and any and all divisions, continuations, reexaminations and reissues thereof, and any and all Letters Patent of the United States and foreign countries which may be granted therefor, the same to be held and enjoyed by them for their own use and benefit, and for the use and benefit of their successors, assigns, or other legal representatives, to the end of the term or terms for which said Letters Patent of the United States or foreign countries are or may be granted, reexamined or reissued, as fully and entirely as the same would have been held and enjoyed by me if this assignment and sale had not been made.

And I hereby authorize and request the Commissioner of Patents and Trademarks to issue any and all Letters Patent of the United States on said invention or resulting from said application and from any and all divisions, continuations, and reissues thereof, to US WELL, as assignee of my entire interest, and hereby covenant that I have the full right to convey the entire interest herein assigned, and that I have not executed and will not execute any agreement in conflict herewith.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 80

And I further hereby covenant and agree that I will, at any time, upon request, execute and deliver any and all papers that may be necessary or desirable to perfect the title of said invention and to such Letters Patent as may be granted therefor, to US WELL, its successors, assigns, or other legal representatives and that if US WELL shall desire to file any divisional or continuation applications or to secure a reexamination or reissue of such Letters Patent, or to file a disclaimer relating thereto, will upon request, sign all papers, make all rightful oaths and do all lawful acts requisite for the filing of such divisional or continuation application, or such application for reissue and the procuring thereof, and for the filing of such disclaimer, without further compensation but at the expense of said assignee, its successors, or other legal representatives.

And I do further covenant and agree that I will, at any time upon request, communicate to US WELL, its successors, assigns or other legal representatives, such facts relating to said invention and Letters Patent or the file history thereof as may be known to me, and testify as to the same in any interference or other litigation when requested so to do, without further compensation but at the expense of said assignee, its successors, or other legal representatives.

EXECUTED THIS 19 day of February, 2015.

Jared Oehring

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 81

ASSIGNMENT

WHEREAS, I, Jared Oehring, a citizen of the United States of America, am the sole inventor of a **SYSTEM FOR REDUCING NOISE IN A HYDRAULIC FRACTURING FLEET**, for which an application for United States Letters Patent was filed on **November 11, 2015** and assigned U.S. Application No. **62/253,948**; and

WHEREAS, US WELL SERVICES LLC, a Company of Limited Liability in Texas, with a business address of 770 South Post Oak Lane, Suite 405, Houston, Texas 77056, hereafter "US WELL", is desirous of acquiring the entire right, title and interest in and to the aforesaid invention throughout the world, and all right, title and interest in, to and under any and all Letters Patent of the United States and all other countries throughout the world;

NOW, THEREFORE, for and in consideration of the sum of One Dollar ($1.00) to me in hand paid by US WELL and for other good and valuable considerations, the receipt of which is hereby acknowledged, I hereby sell, assign, transfer and set over to US WELL, all right, title and interest in and to the said invention throughout the world, and said application for U.S. Letters Patent, and any and all divisions, continuations, reexaminations and reissues thereof, and any and all Letters Patent of the United States and foreign countries which may be granted therefor, the same to be held and enjoyed by them for their own use and benefit, and for the use and benefit of their successors, assigns, or other legal representatives, to the end of the term or terms for which said Letters Patent of the United States or foreign countries are or may be granted, reexamined or reissued, as fully and entirely as the same would have been held and enjoyed by me if this assignment and sale had not been made.

And I hereby authorize and request the Commissioner of Patents and Trademarks to issue any and all Letters Patent of the United States on said invention or resulting from said application and from any and all divisions, continuations, and reissues thereof, to US WELL, as assignee of my entire interest, and hereby covenant that I have the full right to convey the entire interest herein assigned, and that I have not executed and will not execute any agreement in conflict herewith.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 82

And I further hereby covenant and agree that I will, at any time, upon request, execute and deliver any and all papers that may be necessary or desirable to perfect the title of said invention and to such Letters Patent as may be granted therefor, to US WELL, its successors, assigns, or other legal representatives and that if US WELL shall desire to file any divisional or continuation applications or to secure a reexamination or reissue of such Letters Patent, or to file a disclaimer relating thereto, will upon request, sign all papers, make all rightful oaths and do all lawful acts requisite for the filing of such divisional or continuation application, or such application for reissue and the procuring thereof, and for the filing of such disclaimer, without further compensation but at the expense of said assignee, its successors, or other legal representatives.

And I do further covenant and agree that I will, at any time upon request, communicate to US WELL, its successors, assigns or other legal representatives, such facts relating to said invention and Letters Patent or the file history thereof as may be known to me, and testify as to the same in any interference or other litigation when requested so to do, without further compensation but at the expense of said assignee, its successors, or other legal representatives.

EXECUTED THIS 15 day of June, ~~2015~~ 2016

Jared Oehring

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 83

ASSIGNMENT

WHEREAS, I, Jared Oehring, a citizen of the United States of America, am the sole inventor of a **SYSTEM FOR REDUCING NOISE IN A HYDRAULIC FRACTURING FLEET**, for which an application for United States Letters Patent was filed on **December 8, 2015** and assigned U.S. Application No. **62/264,699**; and

WHEREAS, US WELL SERVICES LLC, a Company of Limited Liability in Texas, with a business address of 770 South Post Oak Lane, Suite 405, Houston, Texas 77056, hereafter "US WELL", is desirous of acquiring the entire right, title and interest in and to the aforesaid invention throughout the world, and all right, title and interest in, to and under any and all Letters Patent of the United States and all other countries throughout the world;

NOW, THEREFORE, for and in consideration of the sum of One Dollar ($1.00) to me in hand paid by US WELL and for other good and valuable considerations, the receipt of which is hereby acknowledged, I hereby sell, assign, transfer and set over to US WELL, all right, title and interest in and to the said invention throughout the world, and said application for U.S. Letters Patent, and any and all divisions, continuations, reexaminations and reissues thereof, and any and all Letters Patent of the United States and foreign countries which may be granted therefor, the same to be held and enjoyed by them for their own use and benefit, and for the use and benefit of their successors, assigns, or other legal representatives, to the end of the term or terms for which said Letters Patent of the United States or foreign countries are or may be granted, reexamined or reissued, as fully and entirely as the same would have been held and enjoyed by me if this assignment and sale had not been made.

And I hereby authorize and request the Commissioner of Patents and Trademarks to issue any and all Letters Patent of the United States on said invention or resulting from said application and from any and all divisions, continuations, and reissues thereof, to US WELL, as assignee of my entire interest, and hereby covenant that I have the full right to convey the entire interest herein assigned, and that I have not executed and will not execute any agreement in conflict herewith.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 84

And I further hereby covenant and agree that I will, at any time, upon request, execute and deliver any and all papers that may be necessary or desirable to perfect the title of said invention and to such Letters Patent as may be granted therefor, to US WELL, its successors, assigns, or other legal representatives and that if US WELL shall desire to file any divisional or continuation applications or to secure a reexamination or reissue of such Letters Patent, or to file a disclaimer relating thereto, will upon request, sign all papers, make all rightful oaths and do all lawful acts requisite for the filing of such divisional or continuation application, or such application for reissue and the procuring thereof, and for the filing of such disclaimer, without further compensation but at the expense of said assignee, its successors, or other legal representatives.

And I do further covenant and agree that I will, at any time upon request, communicate to US WELL, its successors, assigns or other legal representatives, such facts relating to said invention and Letters Patent or the file history thereof as may be known to me, and testify as to the same in any interference or other litigation when requested so to do, without further compensation but at the expense of said assignee, its successors, or other legal representatives.

EXECUTED THIS 15 day of June, 2015.

Jared Oehring

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 85

Electronic Acknowledgement Receipt

EFS ID:	32597898
Application Number:	13679689
International Application Number:	
Confirmation Number:	5345
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Customer Number:	143960
Filer:	Taylor P. Evans/Jennifer Tilley
Filer Authorized By:	Taylor P. Evans
Attorney Docket Number:	085055.000003
Receipt Date:	11-MAY-2018
Filing Date:	16-NOV-2012
Time Stamp:	11:42:32
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	POA.pdf	55810 f5bc101a79ad6f20b3d2ac1775c2990cb685f3b2	no	1

Warnings:

Information:					
2	Assignee showing of ownership per 37 CFR 3.73	13679689-37CFR.pdf	1109806 ca2b10d0fe0d24f67a0dee67ec6521caba1ec999	no	9
Warnings:					
Information:					
			Total Files Size (in bytes):	1165616	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO.	: 9,410,410 B2
APPLICATION NO.	: 13/679689
DATED	: August 9, 2016
INVENTOR(S)	: Joel N. Broussard, Jeff McPherson and Robert Kurtz

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the claims,

In Claim 2, Column 7, line 35 the word appears as "AIC" and should read: -- A/C --

In Claim 10, Column 8, line 7, the word appears as "Wherein" and should read: -- wherein --

Signed and Sealed this
Eighteenth Day of October, 2016

Michelle K. Lee

Michelle K. Lee
Director of the United States Patent and Trademark Office

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	PATENT NUMBER	GROUP ART UNIT	REQUEST ID
13/679,689	9410410	3676	26462

PAIR Correspondence Address/Fee Address Change

The following fields have been changed to Customer Number 143960 on 10/11/2016 via Private PAIR in view of the certification copied below that authorized the change.

- Maintenance Fee Address

The address for Customer Number 143960 is:
143960
Taylor Evans
Hogan Lovells US LLP
700 Louisiana Street
Suite 4300
Houston, TX 77002

I certify, in accordance with 37 CFR 1.4(d)(4) that I am:

An attorney or Agent of Record registered to practice before the Patent and Trademark Office who has been given power of attorney in this application

Signature:	/Constance Rhebergen/
Name:	Constance Rhebergen
Registration Number:	41267

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	PATENT NUMBER	GROUP ART UNIT	REQUEST ID
13/679,689	9410410	3676	26462

PAIR Correspondence Address/Fee Address Change

The following fields have been changed to Customer Number 143960 on 10/11/2016 via Private PAIR in view of the certification copied below that authorized the change.

- Correspondence Address

The address for Customer Number 143960 is:
143960
Taylor Evans
Hogan Lovells US LLP
700 Louisiana Street
Suite 4300
Houston, TX 77002

I certify, in accordance with 37 CFR 1.4(d)(4) that I am:

An attorney or Agent of Record registered to practice before the Patent and Trademark Office who has been given power of attorney in this application

Signature:	/Constance Rhebergen/
Name:	Constance Rhebergen
Registration Number:	41267

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

In re Patent Application of: Joel N. Broussard	Confirmation No.: 5345
Application No.: 13/679,689 Filed: November 16, 2012	Examiner: Thompson, K.
Patent No.: 9,410,410 Grant Date: August 9, 2016	Group Art Unit: 3676
For: System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps	Attorney Docket No. 085055.000003

REQUEST FOR CERTIFICATE OF CORRECTION FOR PTO MISTAKE UNDER 37 CFR 1.322

Certificate of Corrections Branch
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam/Sir:

Patentee respectfully requests a Certificate of Correction for the above referenced patent, and to attach the Certificate of Correction to the above-identified patent. Attached is PTO/SB/44 in a form suitable for printing which identifies the exact page and line number where the error is appearing the patent document. The typographical error was made by the Patent Office and therefore Patentee believes no fee is due. However, in the event additional fees are due, the Commissioner is authorized to charge any additional fees or provide any refunds to the deposit account of Deposit Account No. 50-0259 (085055.000003).

Respectfully submitted,



K. Ron Derrington
Registration No. 44,061

Date: September 20, 2016

Bracewell LLP
P. O. Box 61389
Houston, Texas 77208-1389
Tel: (713) 221-1515
Fax: (713) 437-5320
docketing@bracewelllaw.com

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 91

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 92

PTO/SB/44 (09-07)
Approved for use through 08/31/2013. OMB 0651-0033
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.
(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 9,410,410

APPLICATION NO.: 13/679,689

ISSUE DATE : August 9, 2016

INVENTOR(S) : Joel N. Broussard, Jeff McPherson, Robert Kurtz

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In Claim 2, Column 7, line 35 the word appears as "AIC" and should read: -- A/C --

In Claim 10, Column 8, line 7, the word appears as "Wherein" and should read: -- wherein --

MAILING ADDRESS OF SENDER (Please do not use customer number below):

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	26984202
Application Number:	13679689
International Application Number:	
Confirmation Number:	5345
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Customer Number:	35979
Filer:	Keith Ronald Derrington/Theresa M. Evenbly paralegal to K. Ron Derrington
Filer Authorized By:	Keith Ronald Derrington
Attorney Docket Number:	085055.000003
Receipt Date:	20-SEP-2016
Filing Date:	16-NOV-2012
Time Stamp:	18:38:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Certificate of Correction	085055_000003___Request_for_Certificate_of_Correction.pdf	112247 82712fafa3f2d4ee3d1a6ce9771a906425e45f6f	no	2

Warnings:

Information:					
2	Request for Certificate of Correction	085055_000003__Certificate_of_Correction_Form.pdf	163212 987850752205aae2e1ff7672f2a3cbeba96d4c76	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	275459	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/47 (03-09)
Approved for use through 03/31/2012. OMB 0651-0016
U.S. Patent and Trademark Office; U. S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

"FEE ADDRESS" INDICATION FORM

Address to:
Mail Stop M Correspondence
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

- OR -

Fax to:
571-273-6500

INSTRUCTIONS: The issue fee must have been paid for application(s) listed on this form. In addition, only an address represented by a Customer Number can be established as the fee address for maintenance fee purposes (hereafter, fee address). A fee address should be established when correspondence related to maintenance fees should be mailed to a different address than the correspondence address for the application. **When to check the first box below**: If you have a Customer Number to represent the fee address. **When to check the second box below**: If you have no Customer Number representing the desired fee address, in which case a completed Request for Customer Number (PTO/SB/125) must be attached to this form. For more information on Customer Numbers, see the Manual of Patent Examining Procedure (MPEP) § 403.

For the following listed application(s), please recognize as the "Fee Address" under the provisions of 37 CFR 1.363 the address associated with:

☐ Customer Number: _____

OR

☑ The attached Request for Customer Number (PTO/SB/125) form.

PATENT NUMBER (if known)	APPLICATION NUMBER
8,789,601 9,410,410	14/190,982 13/679,689

Completed by (check one):

☐ Applicant/Inventor — /Taylor P. Evans/ (Signature)

☑ Attorney or Agent of record 60,506 (Reg. No.) — Taylor P. Evans (Typed or printed name)

☐ Assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96) — 713/221-1482 (Requester's telephone number)

☐ Assignee recorded at Reel _____ Frame_____ — 09/14/2016 (Date)

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more that one signature is required, see below*.

☑ * Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.363. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1. 11 and 1.14. This collection is estimated to take 5 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313- 1450. DO NOT SEND COMPLETED FORMS TO THIS ADDRESS.
SEND TO: Mail Stop M Correspondence, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/SB/125A (11-08)
Approved for use through 11/30/2011. OMB 0651-0035
U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE
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Request for Customer Number

Address to:

Mail Stop CN
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

☐ Although the Requester acknowledges that Internet communications are not secure, the Requester hereby authorizes the USPTO to send the assigned customer number by e-mail to the email address listed below.

To the Commissioner for Patents:
Please assign a Customer Number to the address indicated below:

Firm *or* Individual Name	U.S. Well Services LLC				
Address	770 South Post Oak Lane				
City	Houston	State	TX	Zip	77056
Country	US				
Telephone	832-562-3996	Email	joehring@uswellservices.com		

Please associate the following practitioner registration number(s) with the Customer Number assigned to the address cited above.

☐ Additional practitioner registration numbers are listed on supplemental sheet(s) attached hereto.

Request Submitted by:

Firm Name (if applicable)	Bracewell LLP		
Signature	/Taylor P. Evans/		
Name of person submitting request	Taylor P. Evans	Date	2016-09-14
Registration Number, if applicable	60506	Telephone Number	713/221-1418

This collection of information is required by 37 CFR 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop CN, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	26920372
Application Number:	13679689
International Application Number:	
Confirmation Number:	5345
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Customer Number:	35979
Filer:	Taylor P. Evans/Theresa M. Evenbly paralegal to Taylor P. Evans
Filer Authorized By:	Taylor P. Evans
Attorney Docket Number:	085055.000003
Receipt Date:	14-SEP-2016
Filing Date:	16-NOV-2012
Time Stamp:	12:14:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Maintenance Fee Address Change	085055_000003_Change_Fee_Address_.PDF	312619 d94e073651b501f0d8f72c25ed88e6de4e8e48a1	no	2

Warnings:

Information:					
2	Miscellaneous Incoming Letter	085055_000007___Customer_No__Request.PDF	121572 2b98edaec86f9c89376cbedf53829342bf1598d7	no	1
Warnings:					
Information:					
			Total Files Size (in bytes):	434191	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/679,689	08/09/2016	9410410	085055.000003	5345

35979 7590 07/20/2016

Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 229 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Joel N. Broussard, Lafayette, LA;
Jeff McPherson, Spring, TX;
Robert Kurtz, Fairmont, WV;
US WELL SERVICES LLC, Houston, TX

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

35979 7590 04/06/2016
Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

Theresa M. Evenbly	(Depositor's name)
/Theresa M. Evenbly/	(Signature)
July 6, 2016	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/679,689	11/16/2012	Joel N. Broussard	085055.000003	5345

TITLE OF INVENTION: System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	~~SMALL~~ Large	$480	$0	$0	$480	07/06/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
THOMPSON, KENNETH L	3676	166-066400

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Bracewell LLP
2 Taylor P. Evans
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: US Well Services LLC

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Houston, Texas

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
- XX Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies .....

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ☐ A check is enclosed.
- ☒ Payment by credit card. Form PTO-2038 is attached.
- XX ☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 50-0259 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
  NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
  NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- XX ☒ Applicant changing to regular undiscounted fee status.
  NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Taylor P. Evans/ Date July 6, 2016

Typed or printed name Taylor P. Evans Registration No. 60,506

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 103

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: Joel N. Broussard	Confirmation No.: 5345
Application No.: 13/679,689	Examiner: Thompson, K.
Filed: November 16, 2012	Group Art Unit: 3676
For: System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps	Attorney Docket No. 085055.000003

ENTITY STATUS CHANGE AND SUBMISSION OF CORRECTIVE FEE

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

In connection with the above-captioned patent application, this letter shall serve as notification of loss of entitlement to small entity status. The assignee of the present application does not qualify for small entity status.

Effective August 2014, Applicant learned it no longer qualifies for small entity status. A review of the fee payment history in connection with the subject application, indicates that the March 2, 2015 excess claim fee was inadvertently paid at a small entity rate of $40 instead of the large entity fee of $80, thus creating an outstanding shortage of $40 as evidenced by the attached Fee Payment History . Applicant hereby submits the additional excess claims fees required as a large entity.

Respectfully submitted,

Date: July 6, 2016

/Taylor P. Evans/
Taylor P. Evans
Reg. No. 60,506
Attorneys for Applicant

BRACEWELL L.L.P.
P. O. Box 61389
Houston, Texas 77208-1389
713-221-1482
800-404-3970 (Facsimile)

13/679,689	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps	085055.000003	07-06-2016::18:40:03

Fee Payment History Table

Accounting Date	Fee Code	Fee Amount	Mailroom Date	Payment Method	
02-04-2016	1253	$1,400.00	02-03-2016	CC	Pd as Large
06-17-2015	1801	$1,200.00	06-16-2015	CC	Pd as Large
03-02-2015	2202	$40.00	02-26-2015	DA 500259	Pd as Small
11-19-2012	4011	$98.00	11-16-2012	CC	
11-19-2012	2111	$310.00	11-16-2012	CC	
11-19-2012	2311	$125.00	11-16-2012	CC	
11-19-2012	8021	$40.00	11-16-2012	CC	

Close Window

2015 fee for 1202 (1.16(i) - Each claim in excess of 20 - Large rate $80; remaining shortage is $40.

Electronic Patent Application Fee Transmittal

Application Number:	13679689
Filing Date:	16-Nov-2012
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Filer:	Taylor P. Evans/Theresa M. Evenbly paralegal to Taylor P. Evans
Attorney Docket Number:	085055.000003

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	960	960

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**960**

Electronic Acknowledgement Receipt

EFS ID:	26275427
Application Number:	13679689
International Application Number:	
Confirmation Number:	5345
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Customer Number:	35979
Filer:	Taylor P. Evans/Theresa M. Evenbly paralegal to Taylor P. Evans
Filer Authorized By:	Taylor P. Evans
Attorney Docket Number:	085055.000003
Receipt Date:	06-JUL-2016
Filing Date:	16-NOV-2012
Time Stamp:	19:31:22
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$960
RAM confirmation Number	5494
Deposit Account	500259
Authorized User	EVANS, TAYLOR P.

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 CFR 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 CFR 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	IssueFeeTransmittal.pdf	294181 c2a631557301939b0a6eb84b7e979709ba4c2f59	no	1
Warnings:					
Information:					
2		085055_000003Transmittal-Corrective_Fee_at_Large_Entity_Rate.pdf	142433 93c33845e34f7d83a28dc6e01a9d44d0fbbcc0d0	yes	2

Multipart Description/PDF files in .zip description

Document Description	Start	End
Notification of loss of entitlement to small entity status	1	1
Fee Worksheet (SB06)	2	2

Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30462 6ee6a280e27781cc0d0e0d0ffc218259e5cfa49f	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	467076		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

35979 7590 04/06/2016

Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

EXAMINER
THOMPSON, KENNETH L

ART UNIT	PAPER NUMBER
3676	

DATE MAILED: 04/06/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/679,689	11/16/2012	Joel N. Broussard	085055.000003	5345

TITLE OF INVENTION: System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	07/06/2016

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 111

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

35979 7590 04/06/2016
Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/679,689	11/16/2012	Joel N. Broussard	085055.000003	5345

TITLE OF INVENTION: System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0	$0	$480	07/06/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
THOMPSON, KENNETH L	3676	166-066400

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 112

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/679,689	11/16/2012	Joel N. Broussard	085055.000003	5345

35979 7590 04/06/2016

Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

EXAMINER	
THOMPSON, KENNETH L	

ART UNIT	PAPER NUMBER
3676	

DATE MAILED: 04/06/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 113

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 13/679,689	Applicant(s) BROUSSARD ET AL.	
	Examiner KENNETH L. THOMPSON	Art Unit 3676	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the amendment filed 3 February 2016*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1,4,5,8-14,18 and 20-29*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/KENNETH L THOMPSON/
Primary Examiner, Art Unit 3676

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Response to Arguments

Applicant's arguments, see page 21, lines 4-13, filed 3 February 2016, with respect to claims 1, 8 and 18 have been fully considered and are persuasive. The 103(a) rejection of claims 1, 8 and 18 has been withdrawn.

Terminal Disclaimer

The terminal disclaimer filed on 9 May 2014 disclaiming the terminal portion of any patent granted on the continuation in part application number 14/190,982 which would extend beyond the expiration date of this application has been reviewed and is accepted. The terminal disclaimer has been recorded in the continuation in part application 14/190,982, now U.S. 8,789,601.

Allowable Subject Matter

Claims 1, 4, 5, 8-14, 18 and 20-29 are allowed.

The following is an examiner's statement of reasons for allowance:

The prior art of record does not disclose or suggest all the claimed subject matter including the hydraulic fracturing system incorporating the variable frequency drive

performing diagnostics for the electrical motors; and the combination of references applied in the non-final rejection do not render the claims obvious.

Conclusion

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KENNETH L. THOMPSON whose telephone number is (571)272-7037. The examiner can normally be reached on 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Waseem Moorad can be reached on 571-270-3436. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

30 March 2016

/KENNETH L THOMPSON/
Primary Examiner, Art Unit 3676

Notice of References Cited	Application/Control No. 13/679,689	Applicant(s)/Patent Under Reexamination BROUSSARD ET AL.	
	Examiner KENNETH L. THOMPSON	Art Unit 3676	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-8,789,601 B2	07-2014	Broussard; Joel N.	E21B43/26	166/177.5
*	B	US-2013/0306322 A1	11-2013	Sanborn; Stephen Duane	E21B43/26	166/308.1
	C	US-				
	D	US-				
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13679689	BROUSSARD ET AL.
	Examiner	Art Unit
	KENNETH L THOMPSON	3676

CPC- SEARCHED		
Symbol	Date	Examiner
E21B 43/26	3/30/2016	KT

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
166	308.1, 177.5	3/30/2016	KT

SEARCH NOTES		
Search Notes	Date	Examiner
See attached interference text search	3/30/2016	KT

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
Same as above		3/30/2016	KT

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 120

EAST Search History

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L8	3	(hydraulic$4 fractur$3 formation electric motor diagnostic).clm.	US-PGPUB; USPAT	AND	ON	2016/03/30 12:09

3/30/2016 12:10:11 PM
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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13679689	BROUSSARD ET AL.
	Examiner	**Art Unit**
	KENNETH L THOMPSON	3676

CPC						
Symbol					**Type**	**Version**
E21B		43	/	26	F	2013-01-01
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CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
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NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	21	
/KENNETH L THOMPSON/ Primary Examiner.Art Unit 3676	03/30/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13679689	BROUSSARD ET AL.
	Examiner	**Art Unit**
	KENNETH L THOMPSON	3676

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
166	308.1	E	2	1	B	43 / 26 (2006.01.01)						

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
166	177.5				

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	21	
/KENNETH L THOMPSON/ Primary Examiner.Art Unit 3676	03/30/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13679689	BROUSSARD ET AL.
	Examiner	**Art Unit**
	KENNETH L THOMPSON	3676

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
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NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	21	
/KENNETH L THOMPSON/ Primary Examiner.Art Unit 3676	03/30/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/679,689	Filing Date 11/16/2012	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **02/03/2016**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 21	Minus	** 21	= 0	X $40 =	0
Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $210 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/TAMARA DARKO/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

CERTIFICATE OF ELECTRONIC TRANSMISSION

I hereby certify that this correspondence is being filed electronically with the Office of the Commissioner for Patents, Alexandria, VA 22313-1450, on the date indicated below.

Date: February 3, 2016 /Abby Derrickson/

Abby Derrickson

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of: **Broussard et al.**	§	Attorney Docket No: **085055.000003**
Serial No.: **13/679,689**	§	Examiner: **Thompson, Kenneth L.**
Filed: **November 16, 2012**	§	Art Unit: **3676**
For: **SYSTEM FOR PUMPING HYDRAULIC FRACTURING FLUID USING ELECTRIC PUMPS**	§	Confirmation No.: **5345**

RESPONSE TO NON-FINAL OFFICE ACTION DATED AUGUST 3, 2015

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

In response to the Non-Final Office Action dated August 3, 2015, Applicants respectfully request reconsideration of the objections and rejections in view of the following arguments and amendments. If any additional fees are necessary for continued prosecution of this application, the Commissioner is authorized to charge those fees to Bracewell LLP's Deposit Account Number 50-0259 (085055.000003/TPE/ad).

Amended Claims begin on page 2.

Remarks begin on page 6.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 126

AMENDMENTS TO THE CLAIMS

Applicants provide the following complete listing of all the claims in the application that shows the status of all pending claims and markings to show current changes:

THAT CLAIMED IS:

1. (Currently Amended) A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation, the system comprising:

a plurality of electric pumps fluidly connected to the well and powered by at least one electric motor, and configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the formation, and fractures the formation; and

a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency drive frequently performs electric motor diagnostics to prevent damage to the at least one electric motor ~~if it becomes grounded or shorted~~.

2-3. (Cancelled)

4. (Original) The system of claim 1, further comprising:

an A/C console and a variable frequency drive that controls the speed of the pumps.

5. (Original) The system of claim 1, wherein the electric pumps are mounted on vehicles, and can be ported from one well to another.

6-7. (Cancelled)

8. (Currently Amended) A system for fracturing a rock formation in an oil or gas well by pumping hydraulic fracturing fluid into the well, the system comprising:

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 127

a pump for pumping the hydraulic fracturing fluid into the well, and then from the well into the formation, the pump capable of pumping the hydraulic fracturing fluid at high pressure to crack the formation;

an electric motor having a high-strength steel or steel alloy shaft attached to the pump and configured to drive the pump; and

a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency drive frequently performs electric motor diagnostics to prevent damage to the electric motor ~~if it becomes grounded or shorted~~.

9. (Original) The system of claim 8, wherein the pump is a triplex or a quinteplex pump rated at about 2250 hydraulic horsepower or more.

10. (Original) The system of claim 9, wherein the pump has 4.5 inch diameter plungers with an eight inch stroke.

11. (Original) The system of claim 8, wherein the electric motor has a maximum continuous power output of about 1750 brake horsepower or more.

12. (Original) The system of claim 11, wherein the electric motor has a maximum continuous torque of about 8750 lb-ft or more.

13. (Currently Amended) The system of 12, wherein the electric motor has a high temperature rating of about ~~1100~~ 400 degrees C or more.

14. (Original) The system of 13, wherein the shaft of the electric motor is composed of 4340 alloy steel.

15-17. (Cancelled)

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 128

18. (Currently Amended) A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation, the system comprising:

a trailer for attachment to a truck;

two or more electric pumps attached to the trailer and fluidly connected to the well, the electric pumps configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the formation, and fractures the formation;

one or more electric motors attached to the electric pumps to drive the pumps, the electric motors attached to the trailer; and

a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency drive frequently performs electric motor diagnostics to prevent damage to the one or more electric motors ~~if they become grounded or shorted~~.

19. (Cancelled)

20. (Original) The system of claim 18, further comprising:

a skid to which at least one of the electric pumps, the one or more electric motors, and the variable frequency drives are attached.

21. (Previously Presented) The system of claim 1, further comprising:

a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps.

22. (Previously Presented) The system of claim 21, wherein at least some of the plurality of generators are powered by natural gas.

23. (Previously Presented) The system of claim 21, wherein at least some of the plurality of generators are turbine generators.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 129

24. (Previously Presented) The system of claim 21, wherein the electric pumps and generators are mounted on vehicles, and can be ported from one well to another.

25. (Previously Presented) The system of claim 21, wherein the vehicles are trucks having at least five axles.

26. (Previously Presented) The system of claim 8, further comprising:

a natural gas powered generator connected to the electric motor that provides electric power to the electric motor.

27. (Previously Presented) The system of claim 26, wherein the natural gas powered generator is a turbine generator.

28. (Previously Presented) The system of claim 18, further comprising:

a natural gas powered generator for connection to the electric motor that provides electric power to the electric motor.

29. (Previously Presented) The system of claim 1, wherein the variable frequency drive has one or more power semiconductor heat sinks having thermal sensors monitored by a microprocessor to prevent damage caused by excessive heat.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 130

REMARKS

This is in response to the Non-Final Office Action mailed August 3, 2015. The shortened statutory period for reply having expired on November 3, 2015, Applicants submit herewith a request for a three month extension of time, thereby extending the due date to and including February 3, 2016. Applicants and the undersigned thank the Examiner for providing a thorough review of the pending application. Claims 1, 4, 5, 8-14, 18, and 20-29 are pending in the application. Claims 1, 8, 13, and 18 have been amended. Claims 2, 3, 6, 7, 15-17, and 19 have been cancelled. No new claims are added. No new matter has been introduced in the amendments.

In the Office Action, the Examiner objected to claims 1, 4, 5, 18, and 20-29 under 35 U.S.C. 112, second paragraph and MPEP § 2173.05(d), because "the term 'if' in the independent claims renders the claim indefinite because it is unclear whether the limitations following the term are part of the claimed invention." (Non-Final Office Action, page 2). Applicants have amended claims 1, 8, and 18 to not include the "if" limitation. Accordingly, Applicants respectfully submit that the 112 rejections are overcome.

Next, the Examiner rejected claims 1, 4, 5, 8, 13-14, 18, 20, 21, 23, 24, 25 and 29 under 35 U.S.C. 103(a) as being obvious over U.S. Patent No. 5,865,247 to Paterson et al. ("*Paterson*") in view of U.S. Patent No. 3,722,595 to Kiel ("*Kiel*") in view of U.S. Patent No. 6,271,637 to Kushion ("*Kushion*") and further in view of U.S. Patent No. 7,312,593 to Streicher et al. ("*Streicher*"). The Examiner further rejected claims 9-12 under 35 U.S.C. 103(a) as obvious over *Kiel* in view of *Paterson* in view of *Kushion* and further in view of *Streicher* and U.S. Patent No. 7,845,413 to Shampine et al. ("*Shampine*"). In addition, the Examiner rejected claims 22, 26, 27, and 28 under 35 U.S.C. 103(a) as obvious over *Kiel*, in view of *Paterson* in view of

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 131

Kushion, and further in view of *Streicher* and U.S. Patent Pub. No. 2007/0201305 to Heilman et al. ("*Heilman*").

I. Claims 1, 8, and 18 are non-obvious because of secondary indicia of non-obviousness.

Applicants offer extensive evidence of the secondary factors that establish the claimed invention as non-obvious, including: (1) commercial success in a relevant market, (2) long-felt but unsolved need, (3) failure of others, (4) attempts at copying, and (5) industry praise. MPEP 2141. The Supreme Court in *KSR Int'l Co. v. Teleflex Inc*, 550 U.S. 398, 406 (2007), reaffirmed the applicability of secondary considerations, first codified in *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). Secondary considerations can shed light on the circumstances surrounding the origin of the invention, and can establish that an invention is non-obvious in light of the prior art. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983). Importantly, "[t]his evidence is not just a cumulative or confirmatory part of the obviousness calculus but constitutes independent evidence of nonobviousness." *See Crocs, Inc. v. ITC*, No. 08-1596, at 23 (Fed. Cir. 2010). The Declaration of Jared Oehring, Vice President of Technology at U.S. Well Services, is included herewith (Exhibit A) to help establish the facts upon which these arguments are based.

A. The Commercial Success of the Applicants' Invention in the Relevant Market

Commercial success is an indicator that an invention is not obvious, especially where, as here, such commercial success is (1) directly derived from the claimed invention, (2) in a marketplace where the consumer is free to choose on the basis of objective principles, and (3) the success is not the result of heavy promotion or advertising, shift in advertising, consumption by purchaser normally tied to applicant or assignees, or other business events extraneous to the merits of the claimed invention. See, e.g., MPEP 716.03(b).

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 132

1. **The Commercial Success of the Invention is Directly Derived from the Claimed Invention**

In the present invention there is a strong nexus between the claimed invention and its commercial success. For example, Claim 1 recites:

> A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation, the system comprising: (1) a plurality of electric pumps fluidly connected to the well and powered by at least one electric motor, and configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the formation, and fractures the formation; and (2) a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency drive frequently performs electric motor diagnostics to prevent damage to the at least one electric motor.

The commercial success of the present invention is due to the "electric pumps" that are powered by the "at least one electric motor." The addition of an all-electric motor and electric pumps in the current invention is what has enabled the product to be successful in the market. Because of the addition of electric pumps, the invention has helped to solve the problems normally associated with diesel-run hydraulic fracturing systems, such as providing reduced emissions and environmental impact, reduced fuel costs, reduced fire risks, reduced truck traffic, reduced noise pollution, and increased operational efficiency. Exhibit A at ¶ 4. This saves on the costs associated with using diesel engines to power the fracturing equipment.

Significantly, the claimed technology has demonstrated strong commercial success, and has been the driver of assignee's 22% growth in a time when most hydraulic fracturing companies are struggling to survive. Unlike other hydraulic fracturing systems, where average utilization in 2015 was around 50% (achieved only after significant price cuts), the claimed

technology has been 100% utilized (without price cuts) in multiple basins with multiple customers during the current historically low commodity prices. Exhibit A at ¶ 9.

Additionally, some embodiments of the invention include natural gas powered turbines to power the electric motors. In such embodiments, the use of the claimed technology has led to reduced emissions as a result of the use of all electric equipment powered by natural gas, as shown in the table below (note: in the table below and elsewhere in this paper, the claimed technology is referred to by its trade name of Clean Fleet®).

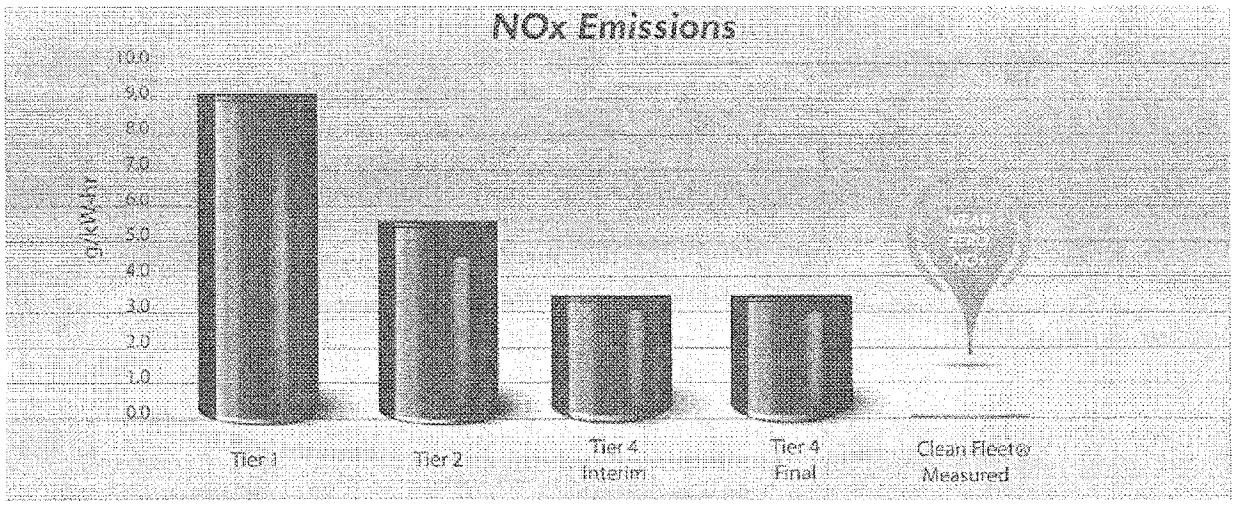


Figure 1: Clean Fleet® reduces emissions by 99% compared to diesel powered fleets

Further, the claimed technology provides substantial cost reduction in the cost per hour to generate energy to power the hydraulic fracturing technology, provides more operational efficiency, and provides a large reduction in noise from traditional diesel powered fracturing equipment due to its all-electric components. These are all benefits that have caused the invention to be commercially successful. Two charts are shown below indicating the improvement in cost per hour that the natural gas turbine powered electric motor embodiments of the technology provide over diesel, and the noise reduction of the technology over diesel powered systems:

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 134

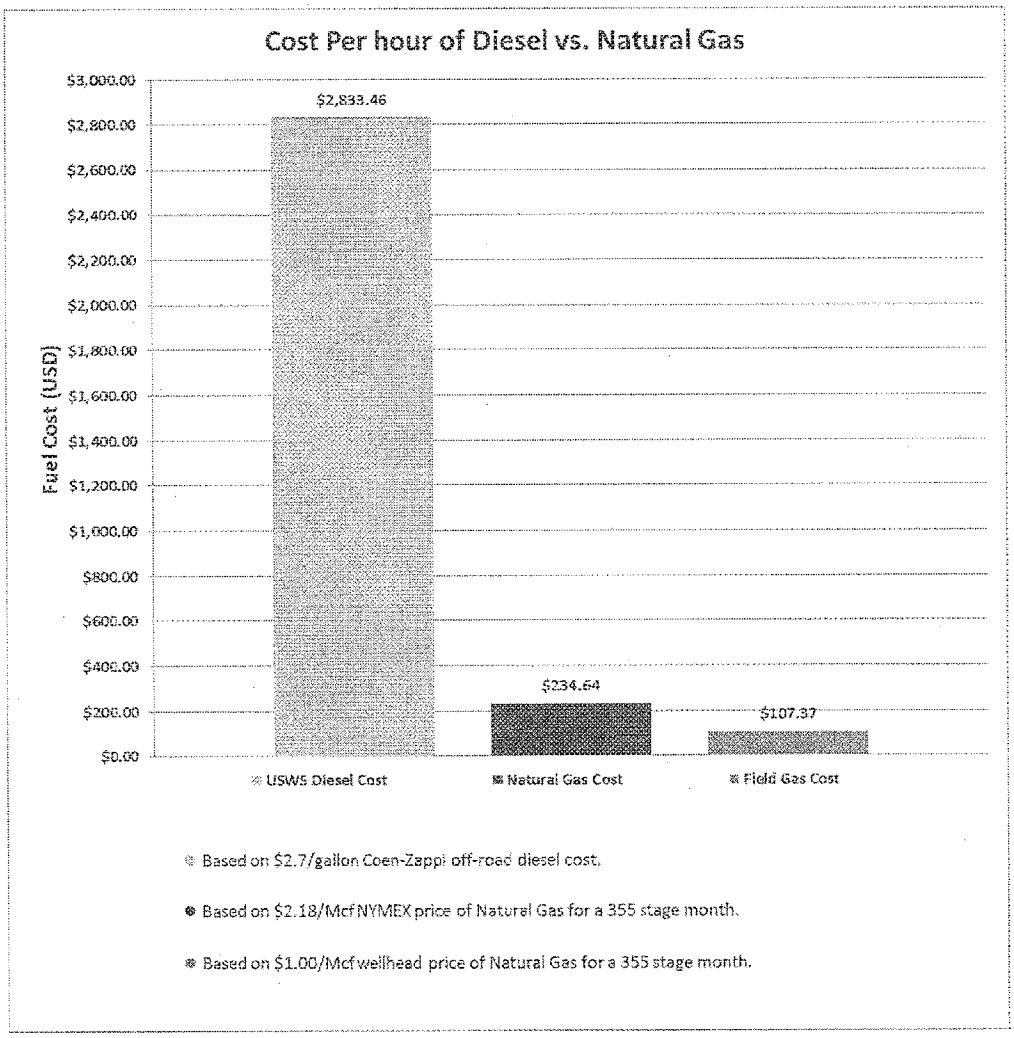


Figure 2: Significant fuel savings from Clean Fleet® electric natural gas fueled fleet

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 135

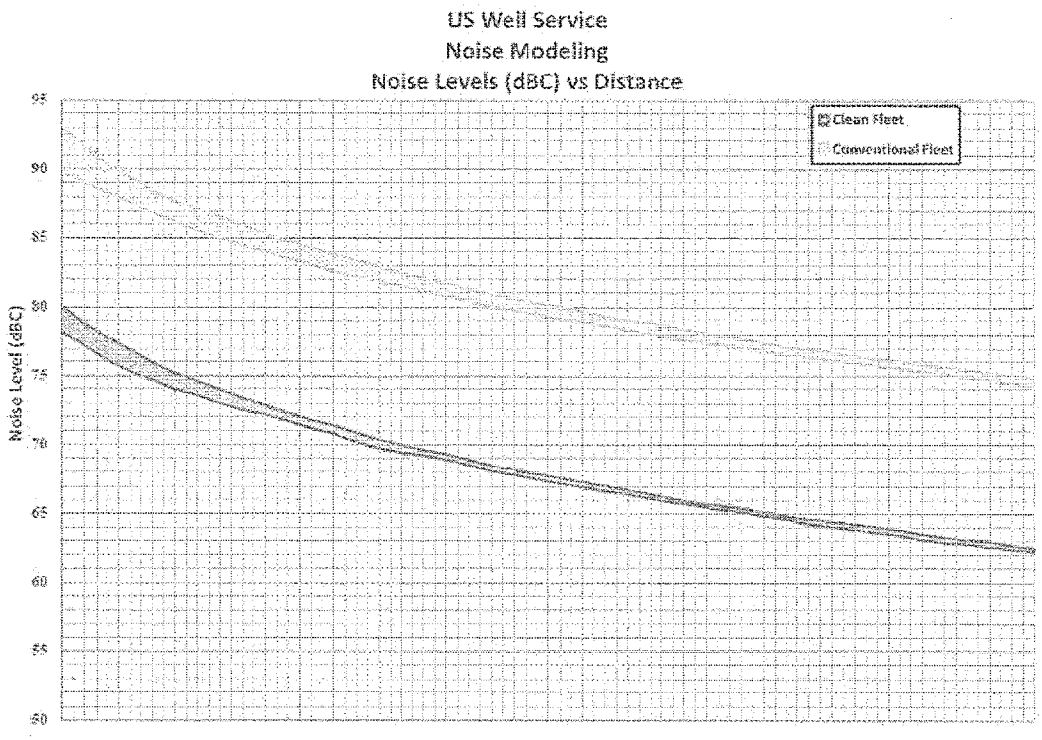


Figure 3: dBC Levels decaying with distance, showing electric fleet has a 95% reduction of C-weighted noise

As discussed above, the figures and charts provided in this section correspond particularly to embodiments of the technology where the electric motors are powered by natural gas. In other embodiments, such as that claimed in claim 1, the motors may be powered by other means, including directly from a power grid. In such a case, the benefits are compounded even more, because even the small amount of emissions and low cost of the natural gas are eliminated.

The above factors have led to market success and an increasing market share for the assignee of the present application. The utilization of the claimed technology is much higher than all diesel systems currently on the market, and contracts with customers (2 contracts with one customer and 12 well starts with another) indicate further commercial success. Exhibit A at ¶7. Significantly, these new contracts and well starts are occurring while competitors of assignee are substantially idle due to market conditions.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 136

2. The Success of the Invention is in a Marketplace where the Consumer is Free to Choose on the Basis of Objective Principle

The Vice President of Technology for assignee has experience in the relevant industry, and his declaration is attached in Exhibit A. Such experience has taught that consumers of hydraulic fracturing services, which are typically sophisticated oil and gas production companies, routinely choose the Applicants claimed technology over other hydraulic fracturing options on the objective principle that it provides substantial benefits to their operations. Such benefits include, for example, reduced emissions and environmental impact, reduced fuel costs, reduced fire risks, reduced truck traffic, reduced noise pollution, reduced surface vibrations at the wellbore, and increased operational efficiency. Exhibit A at ¶¶ 4 and 7.

3. The Success of the Claimed Invention is Not Derived from Abnormally Heavy Marketing or Undercutting Prices

When considering commercial success as an indicia of non-obviousness, it is helpful to consider the type and extent of advertising or promotion of the service. *See* Pentec, Inc. v. Graphic Controls Corp., 776 F.2d 309, 316 (Fed. Cir. 1985). In the case of the claimed technology, the services are selling not because of any abnormally heavy marketing efforts, but because of the merits of the technology itself, including the great cost savings (up to $40,000 per day) and the many other benefits discussed above. This is evidenced by the fact that the advertising of the hydraulic fracturing services of the claims has been limited. Exhibit A at ¶¶ 4 and 7. In addition, the success of the invention has led to potential new markets, which itself leads to the presumption that "the commercial success is due to the patented invention." *Ormco*, 463 F.3d at 1312; *see also J.T. Eaton & Co., Inc., v. Atlantic paste & Glue co.*, 106 F.3d 1563, 1571 (Fed. Cir. 1997). Exhibit A at ¶ 7.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 137

B. **Long Felt But Unsolved Need**

At the time of the Applicants' invention, the invention would not have been obvious to one of ordinary skill in the art, as evidenced by the long-felt and unsolved need for Applicants' invention. The below arguments establish that 1) those of ordinary skill in the art recognized persistent problems involving the use of diesel engines to power hydraulic fracturing equipment, 2) prior attempts at solving such problems were ineffective, and 3) Applicants' invention satisfies the problem. *See* MPEP 716.04.

1. **Persistent and Recognized Need**

Those of ordinary skill in the art recognized a persistent need in the hydraulic fracturing industry to power equipment without using diesel engines. Diesel engines and pumps are costly to operate, and excessively noisy. Exhibit A at ¶¶ 8-9. In addition, diesel engines produce too much air pollution, pose a fire risk (brought about, for example, by the need for continuously running the diesel engines, thereby requiring hot fueling while the engine is running), and lead to a great volume of truck traffic and noise pollution at well sites due to refueling requirements and the added weight and size of the engines. Accordingly, a need existed for a system that reduced emissions and environmental impact, reduced fuel costs, reduced fire risks, reduced truck traffic, reduced noise pollution, and increased operational efficiency. Exhibit A at ¶¶ 8-9. Applicants recognized this need, and invented the claimed technology to address the need.

2. **Prior Attempts**

No successful hydraulic fracturing system that avoids or reduces reliance on diesel engines had been invented before the instant invention, but there were prior attempts. For example, a prior attempt at a system run with electric motors that could potentially run on natural gas began in 2012, when Evolution Well Services announced that it was developing "a new

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 138

system and method of providing onsite electrical power to fracturing operations along with an electrically powered frac spread." The news release associated with this announcement is included in Exhibit B, submitted herewith. Since this announcement, however, Evolution Well Services has been unable to produce a satisfactory working system, at least in part because of its reliance on permanent magnet motors, as well as other design flaws. After a string of failures, including failure of its motors to adequately perform the required functions, Evolution Well Services has not been able to develop a commercially viable electric powered hydraulic fracturing fleet to sell to customers. Exhibit A at ¶ 8. As a result, assignee has 100% of the mobile electric powered hydraulic fracturing commercial market.

Another example of a prior attempt to solve the problems associated with diesel powered hydraulic fracturing is Green Field Energy Services, Inc. ("Greenfield"), which, beginning in 2013 tried to create a natural gas powered hydraulic fracturing system, but failed. Greenfield employed small natural gas turbine engines to drive gear reduction boxes, which in turn drove the hydraulic fracturing pumps, but its fleet had fundamental design flaws that resulted in significant maintenance issues. Specifically, the turbine engines spun at very high speeds, and relied on the gear boxes to regulate the speed and drive the pumps. In part because of the excessive speed of the turbine engines, however, the gear boxes regularly broke down and needed repair. Exhibit A at ¶ 8. In addition, high vibrations associated with the operation of the Greenfield system caused significantly higher than normal repair and maintenance costs. Finally, the Greenfield turbines used such large quantities of natural gas that commercial fuel costs became problematic.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 139

3. Invention Satisfies Need

The Applicants' all-electric natural gas powered fracturing system solves the problem associated with relying on diesel engines to power hydraulic fracturing systems. Exhibit A at ¶¶ 7-8. There is no diesel used in the present invention. Rather, some embodiments rely on natural gas to power the electric motors, and others contemplate that the motors are attached directly to a power grid. Because of this, the invention provides operational savings and reduces the environmental impact of fracturing operations. (See Figures 1-2 above). Further, the fire risks associated with fracturing operations are reduced because hot fueling a fracturing pump engine while the diesel engine is running is a fire hazard that is completely removed. Furthermore, because the electric fleet does not have a diesel engine, it also does not have a turbo charger, which further reduces the risk of fire. The invention also reduces traffic associated with refueling fracturing operations, is the quietest fracturing fleet currently on the market, and reduces the noise associated with the site. Such noise reduction is shown by the graph below:

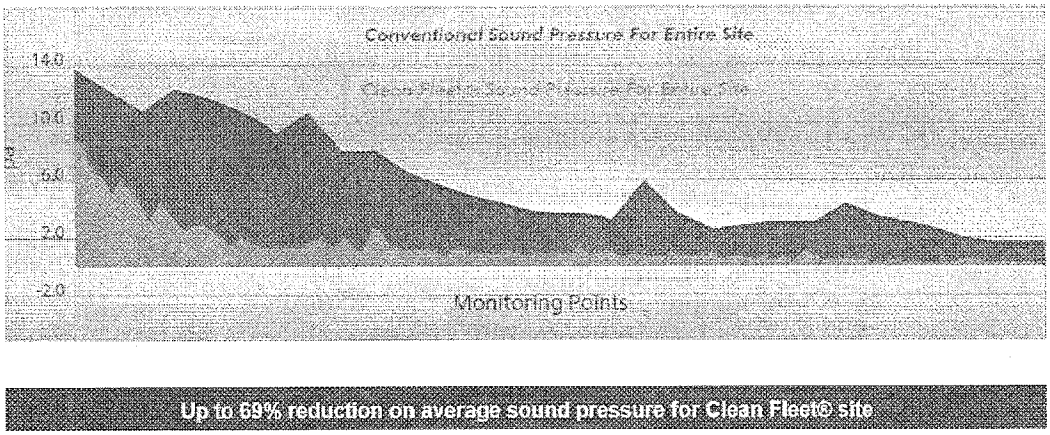


Figure 5: Sound Pressure Comparison of Invention with other Fracturing Systems

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 140

C. **Failure of Others MPEP 716.04**

According to MPEP 2141 and MPEP 716.04, failure of others can be considered by the Examiner when determining if the invention is nonobvious. As discussed above in the context of the long felt, but unsolved need, Evolution Well Services and Green Field Energy Services fracturing companies failed at making a viable non-diesel system.

D. **Copying MPEP 716.06**

MPEP 716.06 states "Another form of secondary evidence which may be presented by applicants during prosecution of an application . . . is evidence that competitors in the marketplace are copying the invention." In the Federal Circuit, evidence of copying was persuasive of nonobviousness, for instance, when an alleged infringer tried for a substantial length of time to design a product or process similar to the claimed invention, but failed, only to then attempt to copy the claimed invention instead. *Dow Chem. Co. v. American Cyanamid Co.*, 816 F.2d 617, 2 USPQ2d 1350 (Fed. Cir. 1987).

In the present case, the Applicants have observed numerous instances of competitors trying to copy the invention. For instance, in May 2015, the assignee of the present application partnered with the manufacturer of the electric units of the present technology to display the technology, including an electric powered hydraulic fracturing pump unit, at the Off-Shore Technology Conference (OTC) in Houston, TX. At this conference, an employee of one of Evolution's partners in the development of its next generation hydraulic fracturing fleet was caught taking unauthorized pictures of detail areas on the fracturing rig. Although the incident was reported to security and stopped, it serves as an indicator that the assignee's competitors, including Evolution, are trying to copy the claimed technology.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 141

Below is a list of other competitor attempts to copy the specific product that embodies the claimed technology:

- On October 15, 2015, a competitor of assignee asked for access to assignee's electric powered hydraulic fracturing fleet site just north of Denver, CO, and assignee personnel repeatedly witnessed the competitor's trucks driving slowly on nearby road attempting to see the technology.

- In 2015 one of assignee's competitors and others inquired directly to the manufacturer of assignee's equipment about the possibility of the manufacturer building a copy of the electric fleet of the claimed technology for the competitor.

- In October 2015 in Colorado, one potential customer of assignee flew a private plane over the hydraulic fracturing fleet of the present technology to take aerial pictures of the guarded electric powered hydraulic fracturing fleet.

E. Industry Praise and Awards

In *Vulcan Eng'g Co. v. FATA Aluminum, Inc.*, 278 F.3d 1366, 1373 (Fed. Cir. 2002), the Federal Circuit held that "[a]ppreciation by contemporaries skilled in the field of the invention is a useful indicator of whether the invention would have been obvious to such persons at the time it was made." (citing Stratoflex, Inc. v. Aeroquip Corp., 713 F.2d at 1538). Applicants' invention has been recognized numerous times and appreciated by contemporaries, thereby indicating that it is not obvious. For instance, in 2015, the claimed technology was chosen as a finalist in the new technology of the year category for an Oil & Gas Awards, a peer-judged award regarding industry-leading fracturing technology in their Northeast category for electric hydraulic fracturing technology. This appreciation by contemporaries indicates that the invention was in fact non-obvious at the time it was invented.

Further, in Jan 2016, the Oil & Gas Awards for the Rocky Mountain region announced that the claimed technology was a finalist for the Health and Safety award, Well Completion Company of the year award, and the Environmental Stewardship award. All three of these

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 142

nominations were based on the innovative electric powered hydraulic fracturing technology of the present claims.

Additionally, below are listed events that highlight the appreciation of the claimed technology by others skilled in the field:

- On December 3, 2014, the American Society of Mechanical Engineers (ASME) invited assignee personnel to speak about how electric powered hydraulic fracturing is cleaner, more efficient, and more productive.

- On March 18, 2015, ASME featured a talk from assignee on "Electric Powered Hydraulic Fracturing," in ASME's Hydraulic Fracturing Conference, Power Systems for Fracturing session.

- On March 25, 2015, assignee presented at the Oil & Gas Awards Industry Summit in Pittsburgh, PA focusing on the benefits of electric powered hydraulic fracturing.

- On September 16-17, 2015, Shale Insight 2015 held their Marcellus Shale Coalition Conference in Philadelphia, PA. Assignee spoke at the technology showcase sharing with conference attendees about electric powered hydraulic fracturing technology.

- In October 2015, assignee presented in at the Society of Petroleum Engineer (SPE) Regional Meeting, presenting on the "Environmental Benefits of Electric Powered Hydraulic Fracturing."

- In Canada on October 21, 2015, for the SPE Unconventional Resources Conference, assignee was invited to present a talk entitled, "Electric Powered Hydraulic Fracturing."

- The Environmentally Friendly Drilling Systems (EFD) Program held a workshop on October 22, 2015 in Houston, Texas on Electrification for Oil & Gas Operations. Assignee was featured as the luncheon keynote speaker.

- The High Horse Power Summit 2015 was held in Dallas, Texas. Assignee representatives spoke at the technical session titled, "Staying Profitable by Reducing E&P Operating Costs in a Tight Market," with a talk called, "Mobile Gas Turbine Power Units: The Solution to Increasing Power Demand in the Growing Well Stimulation Market."

- In March 2016, assignee has been invited back to the ASME 2016 Hydraulic Fracturing Conference, and will speak again about Electric Powered Hydraulic Fracturing.

- Also in March 2016, assignee has been invited to participate in a panel at the Rocky Mountain's Oil & Gas Awards Industry Summit to focus on the quiet electric powered hydraulic fracturing that assignee has done in Colorado.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 143

Furthermore, below are listed publications that highlight the appreciation of the claimed technology by others skilled in the field:

- Deutser, Brad. "Game-changing hydraulic fracturing technology, reduces emissions by 99%." Globe News Wire. https://globenewswire.com/news-release/2014/10/01/670029/10100696/en/Game-changing-hydraulic-fracturing-technology-reduces-emissions-by-99.html (1 Oct 2014).

- Piellisch, Rich. "U.S. Well Services Clean Fleet." HHP Insight. http://hhpinsight.com/tag/u-s-well-services-clean-fleet/ (3 Oct 2014).

- Kosowatz, John. "Hydraulic Fracturing's Greener Tint." ASME. https://www.asme.org/engineering-topics/articles/energy/hydraulic-fracturings-greener-tint (Nov 2014).

- Fluid Power Journal. "Clean Fleet Reduces Emissions by 99% at Hydraulic Fracturing Sites." http://fluidpowerjournal.com/2015/01/clean-fleet-reduces-emissions/ (11 Jan 2015).

- Gates, John. "ASME Hydraulic Fracturing Conference, Tesla of Shale? US Well Services." http://www.otrglobal.com/newsroom/cnotes/128720 (24 March 2015).

- Pater, Erica. "Petroleum Alumnus and Team Develop Mobile Fracturing Unit that Alleviates Environmental Impact." LSU. https://www.pete.lsu.edu/news/2015/7/petroleum-alumnus-and-team-develop-mobile-fracturing-unit-that-alleviates-environmental-impact/ (13 July 2015).

- Kane, Linda. "Energy Pipelines: US Well Services brings clean fleet to Weld County." Greeley Tribune. http://www.greeleytribune.com/news/feature2/18446795-113/energy-pipeline-us-well-services-brings-clean-fleet (4 Nov 2015).

- Hart Energy. "Hydraulic Fracturing Key Players." http://yearbook.epmag.com/i/559874-hydraulic-fracturing-techbook-2015/49 (Sept 2015).

A copy of each of these presentations is included in Exhibit C, submitted herewith.

Secondary considerations such as industry praise and recognition, commercial success, long-felt but unsolved need, and attempts to copy the invention mentioned above, all weigh in favor of finding the present invention and the commercial embodiments of the present invention nonobvious.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 144

II. Claims 1, 8, and 18 are patentable because it would not be obvious to combine references that are non-analogous

Claims 1, 8, and 18 are rejected on the grounds that they are obvious over *Paterson* in view of *Kiel* in view of *Kushion*, further in view of *Streicher*. Particularly, the Non-Final Office Action finds that *Paterson* does not state fracturing for the system for injecting into a formation, but that *Kiel* solves this deficiency because *Kiel* teaches using a system for hydraulic fracturing and that it would have been obvious to substitute "one known method of injection disclosed by *Paterson* for another as taught by *Kiel* to fracture a particular formation to achieve predictable results." (Non-Final Office Action, page 3). *Paterson* discloses a system for improving "water flood techniques," which uses pumps in column 2, lines 46-59 and column 8, lines 30-65 and *Kiel* discloses a system for hydraulically fracturing using pumps in column 1, lines 10-15.

Applicants respectfully submit that *Paterson* does not qualify as prior art under 35 U.S.C. § 103 because it is not analogous to the recited invention. Applicants maintain it would not have been obvious to modify the partially electric water flood system of *Paterson* by substituting the fracturing system of *Kiel* to achieve an all-electric fracturing system. MPEP 2141.01(a) requires that to be obvious the references cited must be analogous. *In re Bigio,* 381 F.3d 1320, 1325 (Fed. Cir. 2004). A reference is analogous art to the claimed invention if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). *See Bigio,* 381 F.3d at 1325. In the instant case, the references are not from the same field of endeavor, as *Paterson* is from the water flood field and *Kiel* is from the fracturing field of invention.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 145

Further, in order for a reference to be "reasonably pertinent" to the problem, it must "logically have commended itself to an inventor's attention in considering his problem." *In re Icon Health and Fitness, Inc.*, 496 F.3d 1374, 1379-80 (Fed. Cir. 2007) (quoting *In re Clay*, 966 F.2d 656,658 (Fed. Cir. 1992)). See generally MPEP 2141.01(a). However, water flood and fracturing are two entirely different fields of invention with very different pressure requirements and at the time of the invention it would not have been obvious to one of ordinary skill in the art to look to such a different field of invention such as water flood systems to improve fracturing systems. Further, because the pressure requirements of each field of invention are drastically different, one of ordinary skill in the art at the time of the invention would not have modified the system of *Paterson*. Further, the added reference of *Kiel* would not have been 'reasonably pertinent' to an inventor looking to solve the problem because *Kiel* is aimed at improving the continuous preparation of emulsion and injecting it into the formation without specialized agitators or blenders. See column 2, lines 49-67 and column 3, lines 1-8. Therefore it would not have been obvious to modify *Paterson* with the fracturing system of *Kiel*.

III. Dependent Claims

Dependent claims 4, 5, 9-14, and 20-29 are allowable by virtue of their dependency on at least one of the independent claims, as well as for other patentable features recited therein.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 146

CONCLUSION

The foregoing remarks are intended to assist the Examiner in re-examining the application and in the course of explanation may employ shortened or more specific or variant descriptions of some of the claim language. Such descriptions are not intended to limit the scope of the claims; the actual claim language should be considered in each case. Furthermore, the remarks are not to be considered to be exhaustive of the facets of the invention, which render it patentable, being only examples of certain advantageous features and differences that Applicants' attorney chooses to mention at this time. It is respectfully submitted that the claims are now in condition for allowance and favorable action is respectfully requested.

Respectfully submitted,

Date: 2/3/16

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HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 147

EXHIBIT A

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

In re Application of: Broussard et al.	§	Group Art Unit: 3676
Serial No.: 13/679,689	§	Examiner: Thompson, Kenneth L.
Filed: November 16, 2012	§	Confirmation No.: 5345
Title: SYSTEM FOR PUMPING HYDRAULIC FRACTURING FLUID USING ELECTRIC PUMPS	§	Docket No.: 085055.000003

DECLARATION OF JARED OEHRING

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I, Jared Oehring, hereby declare that:

1. I am the Vice President of Technology for U.S. Well Services LLC, a Texas corporation located at 770 South Post Oak Lane, Suite 405, Houston, Texas 77056.
2. U.S. Well Services' products include Clean Fleet® technology, the first fully electric powered, mobile hydraulic fracturing system. Based in Houston, Texas, U.S. Well Services is an experienced provider of hydraulic fracturing services in unconventional oil and natural gas basins. My responsibilities include tracking the sales of our hydraulic fracturing systems, and having a working knowledge of all of the technology that is involved in our systems.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 149

30

3. As the Vice President of Technology, I have working knowledge of all the technology we employ at U.S. Well Services. I also have working knowledge of other commercially available hydraulic fracturing systems that are widely available in the United States, including those of our competitors Green Field Energy Services Inc. and Evolution Well Services.

4. The electric powered hydraulic fracturing system developed by U.S. Well Services is proven, by U.S. Well Services' own testing and analysis, to successfully reduce emissions by 99% compared to traditional diesel powered hydraulic fracturing systems, dramatically decrease sound pollution, and generate operational cost savings upwards of $40,000/day over other diesel systems. Prior to development of U.S. Well Services' electric powered hydraulic fracturing system, there was a need in the industry for a hydraulic fracturing system that reduced emissions and environmental impact, reduced fuel costs, reduced fire risks, reduced truck traffic, reduced noise pollution, and increased operational efficiency. U.S. Well Services' electric powered hydraulic fracturing system accomplishes each of these features and benefits, and, in my experience selling the U.S. Well Services system, these features and benefits are directly related to the commercial success of the technology.

5. U.S. Well Services invested years and millions of dollars in the development and refinement of the all-electric fracturing technology.

6. U.S. Well Services' electric powered hydraulic fracturing system has been successfully sold, marketed and used in the United States. Substantial contracts with Antero Resources and Anadarko Petroleum Corp. are two examples of the commercial success of the technology described in the pending U.S. Patent Application No. 13/679,689.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 150

7. The oil and gas industry in general, and the hydraulic fracturing industry in particular, has a significant, demonstrable, and ongoing need to move beyond using diesel engines. There have been multiple attempts to solve this problem that have resulted in failures by Green Field Energy Services Inc. and Evolution Well Services.

8. U.S. Well Services all-electric fracturing technology fulfills important market needs in a way that no other technology ever has. At the time of the invention, the fracturing industry needed a fracturing system that provided reduced air pollution, fuel costs, fire risks and noise pollution. The U.S. Well Services technology has demonstrated strong commercial success in a time when most hydraulic fracturing companies are struggling to survive. Only the U.S. Well Services electric fleets have managed to stay 100% utilized in multiple basins with multiple customers during the current historically low commodity prices.

9. I understand the pending application 13/679,689 assigned to U.S. Well Services claims the invention of U.S. Well Services electric powered hydraulic fracturing system.

10. All statements made herein to my own knowledge are true, and all statements made on information and belief are true. Further, all statements herein were made with the knowledge that willful and false statements and the like are punishable under Section 1001 of Title XVIII of the United States Code, and such willful false statements may jeopardize the validity of any patent which may issue from the present application.

Executed: Feb 2, 2016

Jared Oehring

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 151

EXHIBIT B

Evolution Well Services Advances Fracturing Operations with an Electrically Powered System

Share 0 +1

CALGARY, June 4, 2012 /PRNewswire/ - **EVOLUTION WELL SERVICES** offers a new system and method of providing on-site electrical power along with a totally electrically powered frac spread. A patent pending technology allows for the use of electrical power to deliver fracturing fluids to the wellbore during fracturing operations. This process technology eliminates the use of conventional diesel engines, transmissions along with their associated emissions, eco-footprint, maintenance issues and manpower.

Eldon Schelske, President, says, " A natural gas turbine generator provides the source of electrical power. This process allows us to power the entire system electrically, including our blenders and auxiliary equipment, giving us unprecedented levels of control during the fracturing process as well as enhanced safety features."

Todd Coli, Senior Vice President adds, "Natural gas is considered to be the cleanest, most efficient fuel source available. By designing and constructing "fit for purpose equipment", using a system that is powered by natural gas, it is expected that the fracturing footprint, manpower, and maintenance requirements can be reduced by over 60% when compared with traditional diesel-powered operations."

The advantages of electrically driven equipment become readily apparent when compared to conventional diesel powered fracturing assets. Safety concerns such as the need to "Hot Fuel" equipment are eliminated, manpower requirements are reduced dramatically, the overall footprint of the equipment package is reduced dramatically and the efficiency of the operation is increased exponentially. These advantages and others, along with an eco-friendly fuel source, give Evolution Well Services the ability to provide our customers an economical solution to the issues associated with large scale Fracturing operations worldwide.

About Evolution Well Services

Evolution Well Services is an oilfield technology company that provides the industry with state-of-the-art mobile, modular, electrically powered systems for use in hydraulic fracturing.

SOURCE Evolution Well Services

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 153

Image with caption: "Evolution Well Services advances fracturing operations with an electrically powered system (CNW Group/Evolution Well Services)". Image available at: http://photos.newswire.ca/images/download/20120604_C5530_PHOTO_EN_14585.jpg (http://photos.newswire.ca/images/download/20120604_C5530_PHOTO_EN_14585.jpg)

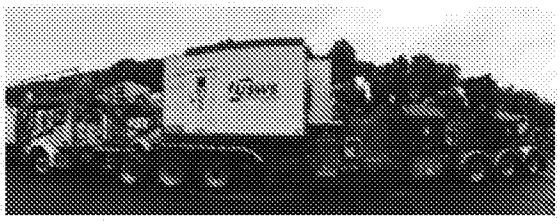
HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 154

EXHIBIT C

Game-changing hydraulic fracturing technology, reduces emissions by 99%

U.S. Well Services's patented Clean Fleet(R) technology proven to cut emissions, save fuel and allow for quieter operations on site

October 01, 2014 10:31 ET | Source: US Well Services



HOUSTON, Oct. 1, 2014 (GLOBE NEWSWIRE) -- U.S. Well Services unveiled historic results from its newly patented Clean Fleet® technology (US Patent No. 8,789,601). The hydraulic fracturing technology, recently implemented by Antero Resources (NYSE: AR), has demonstrated dramatic environmental gains as well as significant cost savings for oil and gas exploration companies. Clean Fleet® is proven to successfully decrease emissions by 99%, dramatic decrease in sound pollution, in addition to operational cost savings of upwards of $40,000/day.

The U.S. Well Services Clean Fleet® has been in use in the Marcellus Shale Play in West Virginia at sites operated by Antero Resources. The results experienced both validate and exceed performance and environmental expectations. In a release to its shareholders, Antero Resources noted the company's usage of the Clean Fleet® technology. Further validating the performance of the patented technology, Antero Resources has committed to its continued future use of Clean Fleet® with additional long-term contracts.

U.S. Well Services CEO, Brian Stewart shared, "We share Antero Resources' excitement over the results of the Clean Fleet® technology. The performance of the new, patented technology is right in line with what we had promised, especially as it relates to fuel savings, emissions reductions, vibration and noise decreases as well as increased reliability. This is a breakthrough for them, but more, it is one for the industry and each of the communities that support hydraulic fracturing. We are especially encouraged that this technology is being embraced by so many leading operators around the country. Its adoption and results further validate the importance of conducting hydraulic

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2025-00558, Page 156

fracturing in a more environmentally responsible manner."

Clean Fleet® Technology

Clean Fleet® is a proprietary, patented system developed by U.S. Well Services that incorporates existing industry equipment configured to provide fracturing services with enhanced safety features, smaller physical and environmental footprints, and reduced noise levels at a lower cost relative to traditional fracturing equipment. The Clean Fleet® is the industry's first fully mobile, fully electric hydraulic fracturing system that is powered entirely by natural gas whereby conventional diesel engines are totally replaced with electric motors. Clean Fleet® has demonstrated results:

- Clean Fleet® uses electricity produced by on site turbine generators fueled by field gas, reducing fuel operating costs by 80%.
- Clean Fleet® mitigates environmental exposure by reducing NO_x and CO emissions by 99%.
- Clean Fleet® eliminates 25 diesel truck deliveries to the well site for an average horizontal well completion, reducing traffic within communities while also mitigating associated fire hazards.
- Clean Fleet® significantly reduces noise pollution emanating from the well site making the workplace safer and communities undisturbed.
- Clean Fleet® incorporates advanced technology that reduces equipment and discharge iron vibrations by 80%, resulting in fewer failures and safer operations.

The Clean Fleet® offered by U.S. Well Services consists of 14,500 psi technologically advanced hydraulic fracturing fleets manufactured by Stewart & Stevenson Manufacturing Technologies to U.S. Well Services specifications. The fracturing fleets are equipped to perform all aspects of pressure pumping operations.

Antero Resources has announced that it will engage U.S. Well Services into a second long-term contract and expand its use of the Clean Fleet® technology at more of its well sites. Antero Resources' commitment to Clean Fleet® has been followed by many other industry leaders looking for new, proven, environmentally friendly solutions.

Stewart continued, "While we are pleased with the performance of the technology, we are equally excited with the collaboration we experienced with Antero Resources as we worked together to introduce this game changing technology. We view this new contract as a testament to the success of the technology."

About US Well Services

U.S. Well Services, LLC is a Houston, Texas based oilfield services provider of well stimulation services to the upstream oil and gas industry. The company currently engages in high-pressure

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 157

hydraulic fracturing in unconventional oil and natural gas basins. The company is currently under contract to perform services in the Marcellus and Utica shale regions in Ohio, West Virginia and Pennsylvania and is also evaluating opportunities with existing and new customers to expand our operations into new areas throughout the United States, including the Bakken Shale in North Dakota and Montana, Haynesville Shale in northwestern Louisiana and eastern Texas, the Eagle Ford Shale in southern Texas, the Permian Basin in western Texas and southeastern New Mexico, the Niobrara Shale in Colorado, Wyoming and Nebraska and the Granite Wash formation in Oklahoma. For more information, please visit www.uswellservices.com

A photo accompanying this release is available at: http://www.globenewswire.com/newsroom/prs/?pkgid=28057

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SUMMIT October 11-13, 2016 McCormick Place | Chicago, Illinois

U.S. Well Services for Antero Fracking

October 3, 2014 in E&P Operations, Technology by Pete Pistorio | No Comments

Patented 'Clean Fleet' Uses Field Gas to Power Machinery;
'Operational Cost Savings of Upwards Of $40,000 Per Day'

U.S. Well Services has taken the wraps off of its patented "Clean Fleet" package for power frack spreads. Clean Fleet allows the use of natural gas, including field gas, to power heavy machinery. It's been put to work by Antero Resources in the Marcellus Shale in West Virginia.



Antero Resources is expanding its use of U.S. Well Services' natural gas-powered, traffic- and money-saving Clean Fleet system for hydraulic fracturing from the Marcellus Shale to other locations. Clean Fleet rigs employ a 'plurality' of pumps and natural gas-powered generators.

"Clean Fleet is proven to successfully decrease by 99%, a dramatic decrease in sound pollution, in addition to operational cost savings of upwards of $40,000 per day," states a release.

The results experienced by Antero in West Virginia "both validate and exceed performance and environmental expectations," USWS says. Thus, under a second long-term contract, Clean Fleet will be used at additional Antero Sites.

More Responsible Hydraulic Fracturing

"The performance of this new, patented technology is right in line with what we had promised, especially as it relates to fuel savings, emissions reductions, vibration and noise decreases as well as increased reliability," U.S. Well Services CEO Brian Stewart says in the firm's Antero announcement.

"This is a breakthrough for them, but more, it is one for the industry and each of the communities that support hydraulic fracturing," Stewart said. "We are especially encouraged that this technology is being embraced by so many leading operators around the country.

"Its adoption and results further validate the importance of conducting hydraulic fracturing in a more environmentally responsible manner."

'Fully Mobile, Fully Electric'

USWS describes Clean Fleet as a proprietary, patented system "that incorporates existing industry equipment configured to provide fracturing services with enhanced safety features, smaller physical and environmental footprints, and reduced noise levels at a lower cost relative to traditional fracturing equipment."

It is said to be the industry's "first fully mobile, fully electric hydraulic fracturing system that is powered entirely by natural gas whereby conventional diesel engines are totally replaced with electric motors."

Truck Traffic Reduced

Clean Fleet, USWS adds,

- uses electricity produced by on-site turbine generators fueled by field gas, reducing fuel operating costs by 80%;
- mitigates environmental exposure by reducing NO_x and CO emissions by 99%;
- eliminates 25 diesel truck deliveries to the well site for an average horizontal well completion, reducing traffic within communities while also mitigating associated fire hazards;
- significantly reduces noise pollution emanating from the well site making the workplace safer and communities undisturbed; and
- incorporates advanced technology that reduces equipment and discharge iron vibrations by 80%, resulting in fewer failures and safer operations.

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The system includes 14,500 psi hydraulic fracturing units manufactured by Stewart & Stevenson to USWS specs.

Engines by Cat's Solar Turbines

Caterpillar's Solar Turbines unit supplies the electricity for Clean Fleet via its Taurus 60 mobile power units – each capable of producing 5.67 megawatts of electricity.

"The generator packages are rugged, highly mobile, and provide significant fuel options ranging from various liquids to natural gas," a USWS spokesman told HHP Insight. They employ Solar Turbines' proprietary "SoLoNox" dry emissions reduction technology, "which dramatically improves emissions relative to conventional diesel engines," he said.

USWS's U.S. Patent 8,789,601 describes "a plurality of pumps powered by electric induction motors and fluidly connected to the well, the pumps configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the, and fractures the formation."

'Plurality'

"The system can also includes a plurality of natural gas powered generators electrically connected to the plurality of pumps to provide electrical power to the pumps," states a patent summary.

U.S. Well Services says it's under contract for frack services in the Marcellus and Utica shale regions in Ohio, West Virginia and Pennsylvania, and is "evaluating opportunities with existing and new customers to expand our operations into new areas throughout the United States, including the Bakken Shale in North Dakota and Montana, Haynesville Shale in northwestern Louisiana and eastern Texas, the Eagle Ford Shale in southern Texas, the Permian Basin in western Texas and southeastern New Mexico, the Niobrara Shale in Colorado, Wyoming and Nebraska and the Granite Wash formation in Oklahoma."

Contact information is only available to premium subscribers. Click here to purchase a premium subscription.

Source: U.S. Well Services with HHP Insight follow-up

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Hydraulic Fracturing's Greener Tint

The overwhelming success of hydraulic fracturing for oil and gas in the U.S. is proven in the results. U.S. crude oil production is at its highest level in three decades, reports the U.S. Energy Information Administration, with output rising to 8.97 million barrels per day largely because of fracking in the Bakken field in North Dakota and the northern Great Plains. Natural gas production from the Marcellus formation in Ohio, Pennsylvania, and West Virginia pushed U.S. output to an all-time high this summer, numbers solely attributed to fracking and horizontal drilling. But the heavy industrial footprint put down by fracking rigs continues to draw opposition, despite the technology's track record in tapping previously inaccessible sources of fossil fuel.

Developers now may have an answer to some of the environmental issues, as one well-driller has developed cleaner technology to power fracking rigs. U.S. Well Services LLC, Houston, claims its patented Clean Fleet technology has already decreased air emissions by 99%, significantly reduced noise pollution, and saved operational costs of $40,000 per day at sites in the Marcellus Shale Play in West Virginia. The performance is based on equipment using field gas as a fuel, rather than commonly used diesel generators.

"If you run on natural gas, you save quite a bit on fuel costs," says Jared Oehring, director of technology for U.S. Well Services. "And there's a lot less noise," about a 70% to 75% reduction from a typical diesel operation, he notes.

A First

Oehring says the equipment is the industry's first fully mobile, fully electric hydraulic fracturing system powered entirely by natural gas. Diesel engines are replaced with electric motors and turbine-generators.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 162

Because natural gas is a much cleaner-burning fuel, nitrogen and carbon emissions are reduced by 99%. Fuel costs plummet using field gas, reducing operating costs by 80%, according to the company.

The first of the new equipment is being used by Antero Resources in West Virginia and company officials say they have signed long-term contracts with U.S. Well Services for another unit. Oehring says the equipment has been in development for about two years. "We had to start from scratch," he says. "This is not a retrofit."

Typically, each fracking unit has been powered by a 2,250-hhp diesel engine, notes Oehring. "Basically, we've pulled the engine off and the transmission...and put on an electric motor with variable frequency drive," he says. "We mounted the motor differently. There's a longer drive shaft. We've crammed a lot more [equipment] into a smaller space."

The 14,500-psi fracking units are built to U.S. Well Services specifications by Stewart & Stevenson, Houston. The first of the units has been operating since July and the second is to be delivered in the first quarter of 2015, according to the company.

The equipment's reduced emissions are noteworthy although Oehring points out that mobile off-highway power generators fall in between the cracks of federal and state regulatory rules. "We're in a unique position," he says. "We're a generation ahead of where they're at." But he believes that Clean Fleet's operations will go a long way to satisfy critics.

Opposition

Still, hydraulic fracturing continues to meet sometimes stiff opposition, and in some places where it is unexpected. Voters in Denton, TX, where the technology was first tested and proven in the Barnett shale formation, on Nov. 5 approved a ban on fracking. Opponents were largely residents upset that their homes were being encroached on by noisy, dirty industrial work, and its associated heavy truck traffic.

According to official results, the ban passed with more than 58% of more than 25,000 ballots cast. The Texas Oil & Gas Association has filed for an injunction, claiming a ban is inconsistent with state law, according to published reports. There are about 270 wells in Denton, some 30 miles north of Dallas, most of

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Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 163

which produce natural gas. Most Texas crude is produced through hydraulic fracturing in the Eagle Ford and Permian fields.

Quieter

What could give the Clean Fleet equipment a further boost is its quieter operations. "There are regulations on noise control and a traditional fleet cannot meet them without building sound walls. We can operate without disturbing neighbors," Oehring claims. He also points to reduced truck traffic because natural-gas powered equipment eliminates the need for diesel shipments. In West Virginia, the company boasts 25 diesel truck deliveries to the well site were eliminated for an average horizontal well completion, reducing traffic within communities while mitigating associated fire hazards.

Oehring says Clean Fleet is the first fully mobile, fully electric hydraulic fracturing system powered by natural gas, but other firms have developed other innovative equipment. In 2013, Halliburton and Apache Corp. announced a dual-fuel system to power hydraulic fracturing pumps using a blend of liquefied or compressed natural gas and diesel. They teamed with Caterpillar to adapt the manufacturer's Dynamic Gas Blending engine technology to the fracking system. Caterpillar's Solar Turbines unit also supplies Clean Fleet rigs with electricity using Taurus 60 mobile power units, each of which can produce upward of 5 MW of power.

Learn more at ASME's Hydraulic Fracturing Conference 2015.

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A Conference Note From Jon Gates

MARCH 24, 2015

ASME Hydraulic Fracturing Conference

BHI, CRR, EMES, EXP, FMSA, HAL, HCLP, SLB, SLCA, WFT

By Jon Gates

Last week's ASME Hydraulic Fracturing Conference in Houston cast a sobering but proactive outlook for the sector as scores of industry leaders cited the slowdown as a time to explore innovation and advance new technological developments.

Houston, Texas - March 16-19

Background: Attendees included several hundred representatives from oil and gas companies, oil field service companies and technology suppliers engaged in the North America and international shale oil and gas industry. The conference featured 14 thematic panel presentations with more than 40 speakers from a mix of global, as well as regional, companies. The event also included an exhibitors display hall and more than 30 ePoster sessions, featuring new studies and technologies from industry experts. The OTR Global notes on the event are a combination of presentations and numerous off-mike conversations during the event.

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Shale Oil 2015: Back to the Future

As the shale industry slows, experts at the ASME conference predict a new round of innovation to begin reshaping the shale sector. Panel presentations pressed for more integrated operations between drilling and completions/production departments, rejuvenation of older wells (re-fracs), and advancing new high-tech solutions to drive efficiency and improve accuracy in shale operations.

One of the key areas mentioned in presentations and off-mike conversations was the expected move to re-frac older wells. Two participants -- a major oil company's head of completions and a completions service company executive -- noted that there are 4,500 to 5,000 wells that have been drilled with the initial completion stage of liners and cemented well casings in place but no later-stage completion or pressure pumping initiated. Those plans are increasingly on hold as operators and service companies re-evaluate alternative spending targets that have greater relative payback in the current sub-$50 oil world.

Some conversations focused on the more than 100,000 existing wells, especially those completed beyond three years ago. The industry left a lot of untapped resource in those early fracs, and today's technology and recovery capability is much greater than the early frac days. Companies are finding they can get more bang for their buck in re-frac. A **Halliburton Co.** presenter talked about going after older assets with a more integrated technology driven feedback loop instead of just brute force. He expects a move toward more re-fracs through merging surface data, geomechanics and subsurface micro seismic information because "we left 60% of the target behind."

Some rough estimates at ASME showed re-frac jobs may run $2 million or less per well, with a much faster relative payback from increased IP rates versus more expensive new well completions. An ASME presentation by **Southwestern Energy Co.** showed a video shot inside a horizontal well, identifying along the lateral where the operator could improve production. The video and well corrections (non-frac) cost about $300,000, but the resulting IP rate nearly doubled, recovering $1 million quickly.

A major service group completions engineer said the industry is quickly moving to identify which older wells would be the best targets for rejuvenation. He said, "Some [operators] are contacting us, and we're looking at public data and approaching some E&Ps." Another source from an unconventional completions

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side of a major oil company told OTR that new businesses are popping up and coming to owners of older wells and saying, "We'll give you $1 million for access to these 50 wells, and we'll split the profit in the end."

More Integration of Technologies and Processes

ASME presentations focused on more integration of Big Data and real-time analytics, linking surface and subsurface micro seismic data and predictive analytics. The move toward integrating real-time data across the operation is up against a legacy of silo-type communications, in which drilling does not communicate with completions and vice versa. A **Schlumberger Ltd.** presenter said that the company is addressing the silo problem by moving production and completion design back into the drilling phase with an increasing number of clients. Another engineer said at the closing of the ASME event, "[We need] more automation. Removing people from operations is the only way we will reduce costs."

The **Xact Downhole Telemetry Inc.** presentation -- well received by ASME attendees -- targeted the point from which industry sources think the next step in efficiency gains will come: automation. The company's Acoustic Telemetry Network product registers downhole data measurements via a sophisticated string of nodes and transmits it to the surface in real time, linking wirelessly to surface computers and data centers.

Improved Fracturing Accuracy

Schlumberger and **NCS Multistage** highlighted their own designs for more efficient completion technology, which in both cases, significantly reduced the need for pressure pumping horsepower, frac sand and water.

Schlumberger's HiWAY product is evolving with new technical capabilities and was used in 25% of the company's completions globally in 2014 (40,000 treatments in 3,000 wells). Production increased 20%, with 25% less water, 40% less proppant (23 billion pounds of proppant saved).

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NCS Multistage's presentation

Photo: OTR Global

NCS Multistage's product pinpoints frac accuracy by using coil tubing in a cemented lateral to activate sliding sleeves in isolated segments. This technology makes re-frac attempts less costly, as well as allows the operator to re-enter and service an existing well.

Other ASME Spotlights

- **Well Design Proppant Reduction:** According to a pressure pumping executive, some E&Ps are starting to reduce the volume of frac sand per stage in order to cut well production costs (an Area to Watch in OTR's Jan. 28 (http://www.otrglobal.com/plsql/otrclient.CLN_MAP.Mee_Display_Frame?cert_id=127507&v_cntxt_id=&v_user_id=&v_link_source=3&link_cert_id=128720 Pressure Pumping and Completions report).
- **Frac sand volumes may be down 35% yy in 2015,** according to three participants at ASME: an oil company head of unconventional completions, a completions service company and a pressure pumping group. Those estimates align with the Jan. 28 (http://www.otrglobal.com/plsql/otrclient.CLN_MAP.Mee_Display_Frame?cert_id=127507&v_cntxt_id=&v_user_id=&v_link_source=3&link_cert_id=12

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8720) Pressure Pumping and Completions report, in which 17 E&Ps estimated 2015 frac sand volumes would be down 33%-38%.

- **Tesla or Shale? US Well Services LLC** introduced Clean Fleet Technology at the ASME, a radical electric power step away from diesel frac fleets. Clean Fleet frac fleet technology features onsite turbines powered by field gas, which replace over 20 diesel frac truck units. The turbines power electric frac pumps. The system lowers emissions by 99%, cuts noise pollution by 69% (crickets are louder), reduces energy costs by 80%, as well as eliminates scores of truck deliveries and lowers maintenance costs. It was estimated that the turbine service life is 30,000 hours. USWS has run 500 stages with its electric turbine fleet with zero maintenance so far. It has one Clean Fleet operating at **Antero Resources Corp.** (AR) with another about to come on line.
- A **Jereh Oil Field Services** group subsidiary, American Jereh International Corporation -- a China-based shale fracturing equipment manufacturer -- made an entry splash at ASME with a sizable booth and media display of equipment. A Jereh sales rep said the company is establishing a second headquarters in Houston, Texas to serve the Western Hemisphere and will import their top-selling hydra frac equipment -- frac pumps, blenders, coil tubing units, cementing equipment and data vans -- to launch their sales effort. (Also see OTR's Jan. 7 (http://www.otrglobal.com/elsa/otrclient/OTR_CLIENT_CLN_MAP_Main_Display_Frame?cont_id=127511&v_univ_id=&v_user_id=&v_link_source=3&link_cont_id=128720) China Shale Oil and Gas Services report.)
- **Frac Facts**

  The end life of frac fluid ends averages about 350 hours -- **Baker Hughes Inc.** study at ASME

  Caterpillar Inc. frac fleet engine telemetry data presented shows the impact of pressure pumpers moving to 24/7 pad operations; as of 2015, frac fleets are averaging 2,500-3,600 hours run rate (up to 5,000 hours in some cases), a major increase from 500-1,000 hours in 2005. Fleets now operating 55% on load, 45% at idle versus 70% idle and 30% on load in 2005.

  Operators save $500,000 per well using onsite field gas versus diesel delivered; there were 16 million gallons of diesel and gas displaced by natural gas in 2014.

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- ESP (**electric submersible pumps**) and artificial lift technologies got a lot of attention as lower cost ways of rejuvenating well productions. Baker Hughes highlighted its ESP as the first design to sustain a 22-25 degree turn to enable the ESP to enter the lateral section of a well.
- **Emphasis on Water:** A Baker Hughes well completion executive noted that the shale oil industry creates more water than oil, with 24 billion gallons of fluid generated in 2014 (5 million truck loads). Southwestern Energy Co., **Pioneer Natural Resources Co.**'s Pioneer Water Management LLC and Antero Resources Corp. all highlighted large shale water infrastructure developments ranging from 150 miles of pipelines to over 500 miles, including major storage.
- **Methane Gas:** A presentation by Ohio State University Prof. Thomas Darrah showed solid scientific evidence that methane gas leaks in the atmosphere and water supplies in a research-targeted Pennsylvania region are likely not due to hydraulic fracturing but more to a natural leaching process from shale formations, much like gas and oil that migrates upward in conventional pools.

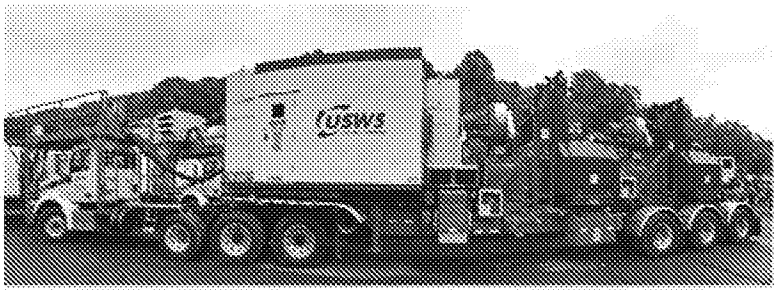
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Clean Fleet® Reduces Emissions by 99% at Hydraulic Fracturing Sites

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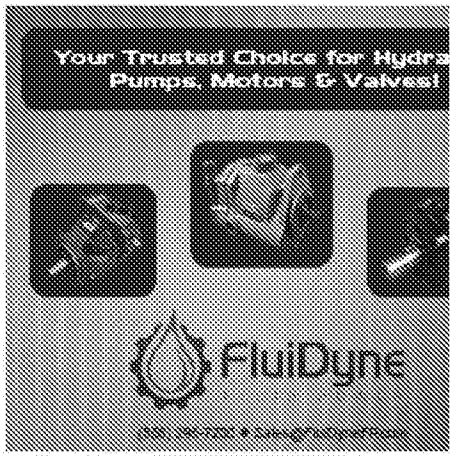
U.S. Well Services unveiled historic results from its newly patented Clean Fleet® technology (U.S. Patent No. 8,789,601). The hydraulic fracturing technology, recently implemented by Antero Resources, has demonstrated environmental gains, as well as significant cost savings for oil and gas exploration companies. The technology is proven to successfully decrease emissions by 99%, decrease sound pollution, and show operational cost savings to upwards of $40,000/day. The technology has been in use in the Marcellus Shale Play in West Virginia at sites operated by Antero Resources.

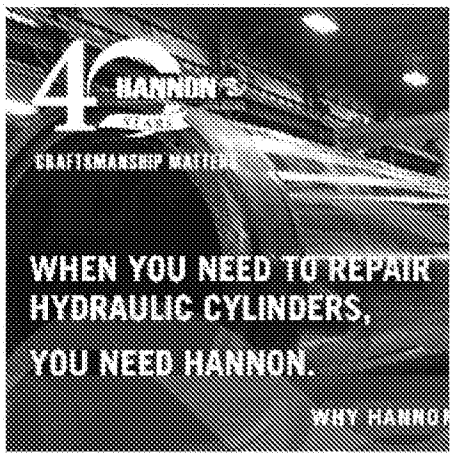
Clean Fleet® incorporates existing industry equipment configured to provide fracturing services with enhanced safety features, smaller physical and environmental footprints, and reduced noise levels at a lower cost relative to traditional fracturing equipment. It is a fully mobile, fully electric hydraulic fracturing system powered entirely by natural gas, whereby conventional diesel engines are totally replaced by electric motors. The technology

? uses electricity produced by on-site turbine generators fueled by field gas, reducing fuel-operating costs by 80%;

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- mitigates environmental exposure by reducing NO_x and CO emissions by 99%;
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The Clean Fleet® offered by U.S. Well Services consists of 14,500-psi technologically advanced hydraulic fracturing fleets manufactured by Stewart & Stevenson Manufacturing Technologies. The fracturing fleets are equipped to perform all aspects of pressure pumping operations.

For more information, visit www.uswellservices.com.

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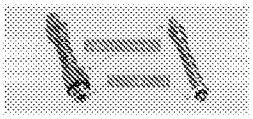
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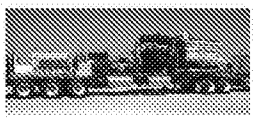
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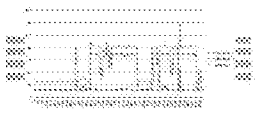
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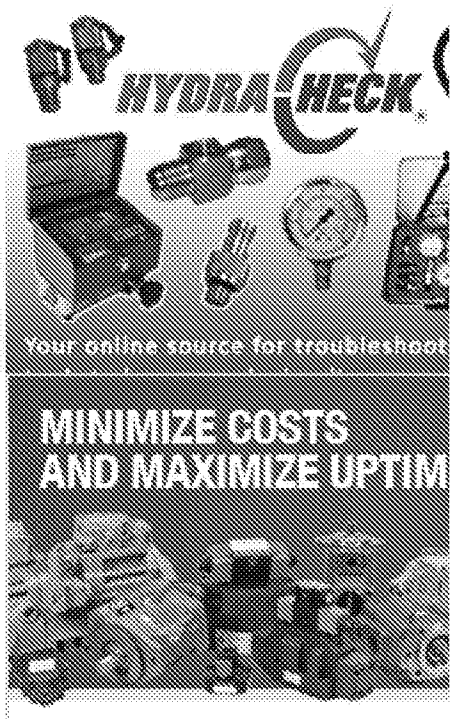


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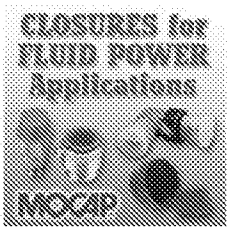
















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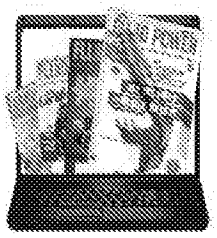
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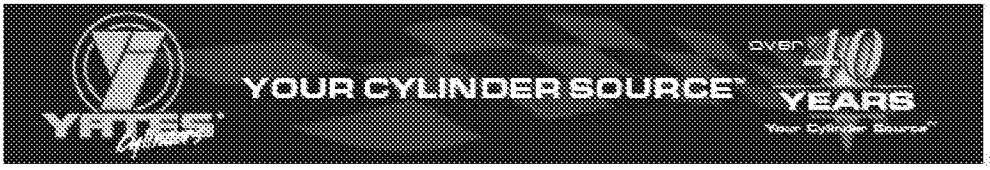
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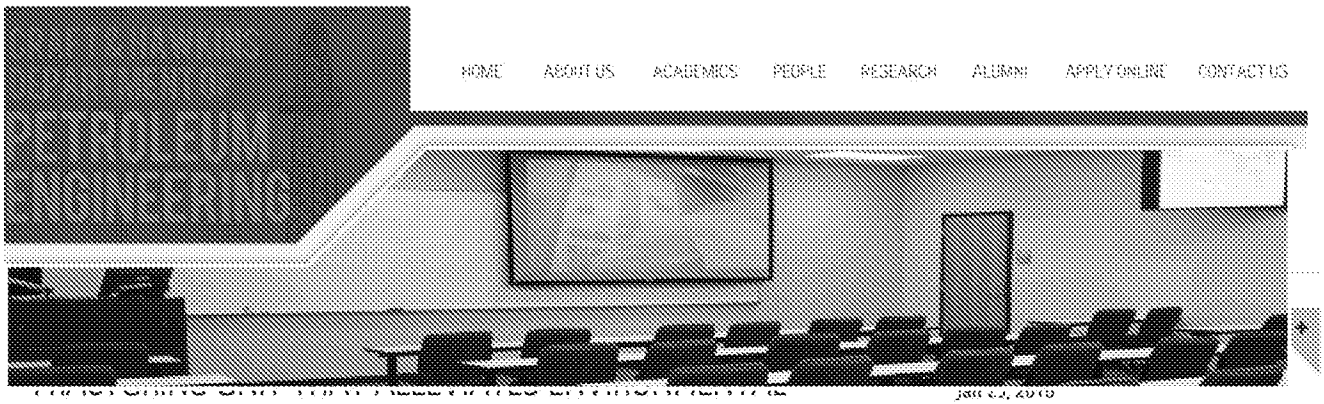




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IMPACT

JULY 13, 2015

A new concept in the petroleum industry came to life in November 2012 in the form of a mobile fracturing fleet run by electric motors and fueled by natural gas. A 1978 petroleum engineering alumnus from LSU and his team are to thank.



U.S. Well Services CEO Brian Stewart developed Clean Fleet®, the first fully-mobile, fully-electric, hydraulic fracturing fleet. This modern approach replaces every diesel engine with electric motors and turbine generators.



Clean Fleet®, patented in July 2014, uses a combination of different technologies used elsewhere in the industry to design a fleet that has lower NO_x and CO emissions (decreased by 99 percent), less noise pollution and a smaller physical footprint. The system accommodates 3500 hydraulic horsepower (HHP) on one trailer compared to 2250 HHP on a conventional fleet, and reduces the number of tractor-trailers on site, alleviating the environmental impact.

Stewart contributes his opportunities and success to his education at LSU's College of Engineering, along with his mentors, including his father and petroleum engineering professor Mr. Bill Hise.

"Hise taught you how to communicate and sell an idea utilizing data and economics that supported a recommendation," Stewart recounted.

Lessons like those helped the LSU alumnus transform his idea of a cleaner, safer and less expensive fracturing system into a business. This patented technology is an environmentally-friendly alternative that enables equipment to work closer to populous areas with little disturbance.

"This technology allows the oil industry and communities we serve to coexist," Stewart said.

The Algiers, La., native credits LSU for preparing him for this game-changer in his career. In addition to classroom lessons, he says, LSU carries many other great aspects.

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Patrick F. Taylor Hall Expansion: A Year in Review

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Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 176

"You get the full college experience, including academics, athletics, and social life that shapes you and enables you to address challenges and turn them into opportunities," he said.

For engineering students with entrepreneurial mindsets, Stewart advises that pursuing an MBA or minor in business allows one to identify a need, develop a solution and then commercialize that solution.

After Stewart's freshman year at LSU, his interest shifted from building roads and bridges to oil and gas wells. That is when he decided petroleum engineering was the best fit for him. During Stewart's junior year at LSU, he met his now wife of 35 years, and together they have two sons and five grandchildren.

###

Written by Erica Peter, assistant manager of alumni relations, College of Engineering.

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Baton Rouge, LA 70803
225-578-5210

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HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 1/7

Linda Kane
For Energy Pipeline

November 4, 2015

Energy Pipeline: US Well Services brings clean fleet to Weld County

One thing's clear in the oil and gas industry: it's constantly searching for and devising new innovations.

That's certainly the case with U.S. Well Services of Houston, which is using technology that utilizes natural gas instead of diesel during the fracturing process.

U.S. Well Services began work for Anadarko Petroleum in the Wattenberg field near Fort Lupton at the end of September and plans to continue through the end of October, possibly into November. The company calls its newest innovation Clean Fleet — which consists of a fleet of fracking equipment that runs on natural gas as opposed to diesel.

The end result is a more environmentally friendly way to frac, according to company CEO Brian Stewart.

"Emissions are much lower, and because we're using electric motors as opposed to diesel motors, it's much cleaner," Stewart said. "It's much better for the communities because it's less noise and we don't have the truck traffic."

Essentially, Stewart's company taps into an already existing natural gas line; it's pumped to a turbine generator and that generator produces the electricity used to power his frac equipment.

This new Clean Fleet is about a year old. Its first customer was in West Virginia and its second was the recent operation in the Wattenberg Field.

U.S. Well Services is an oilfield services provider of well stimulation services to the upstream oil and gas industry. The company engages in high-pressure hydraulic fracturing in unconventional oil and natural gas basins.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 178

"It was interesting because we developed it thinking that our clients would be most interested in it because it has lower emissions," Stewart said. "But, what we've found is just as important is noise emission. Because so many of these wells drilled are getting into urban areas, this is less disruptive to the community."

The company has about two months-worth of work for Anadarko, Stewart said. They have 390 stages or jobs to pump for Anadarko at 12 well locations.

"We certainly hope this will lead to a longer work commitment," Stewart said.

His company has a temporary base camp in Greeley and Stewart hopes to get more business in Colorado as word spreads about his Clean Fleet process.

"We identify Colorado as being one of those states that might see the benefit of a more environmentally conscious fracturing," he said.

Though based in Houston, Clean Fleet has not yet been tried in Texas. Again, the company is in talks with many oil producers throughout the country, but progress has been slowed by the crippled status of the industry.

"The problem right now is the market is so saturated it's very difficult to go into a new area and open a new opportunity," Stewart said. "It's restricted us in growing."

Of course, as crude prices increase and the market is in full-production again, Stewart said he believes his company will have many more opportunities for work.

Clean Fleet is proven to successfully decrease emissions by 99 percent, Stewart said, and adds cost savings to operations.

"The results experienced to date both validate and exceed performance and environment expectations," he said. "The performance of this patented technology has exceeded expectations, especially as it relates to fuel savings, emissions, vibration and noise reductions as well as increased reliability. We are also encouraged that this technology is being embraced by so many leading operators around the country. Testing of this technology by Anadarko for its Wattenberg Field operations further validates the commitment of many operators to conduct operations in a more environmentally compatible manner."

Fracturing has always been the core business of U.S. Well Services. They came up with the Clean Fleet technology while exploring more environmentally friendly ways to fracture.

Clean Fleet is a patented system developed by U.S. Well Services that incorporates existing industry equipment configured to provide fracturing services with enhanced safety features, smaller physical and environmental footprints and reduced noise levels at a lower cost relative to traditional fracturing equipment. The Clean Fleet is the industry's first fully mobile, fully electric hydraulic fracturing system that is powered entirely by natural gas whereby conventional diesel engines are totally replaced with electric motors, Stewart said.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 179

» Clean Fleet uses electricity produced by on site turbine generators fuelled by field natural gas, reducing fuel operating costs by 80 percent.

» Clean Fleet mitigates environmental exposure by reducing NO_x and CO emissions by 99 percent.

» Clean Fleet eliminates 25 diesel truck deliveries to the well site for an average horizontal well completion, reducing traffic within communities.

» Clean Fleet significantly reduces noise emanating from the well site.

» Clean Fleet incorporates advanced technology that reduces equipment and discharge iron vibrations by 80 percent, resulting in safer operations.

The Clean Fleet offered by U.S. Well Services consists of 14,500 psi-rated technologically advanced hydraulic fracturing equipment manufactured by Stewart & Stevenson Manufacturing Technologies to U.S. Well Services specifications.

"Anadarko's work in the Wattenberg Field and greater DJ Basin represents a significant opportunity for U.S. Well Services. Not only is it work for a new client but also in a new basin, further expanding the USWS brand as we seek to provide fracturing solutions that surpass existing regulatory requirements," Stewart said.

The new technology offers opportunities to work with companies he might not otherwise been able to work with, Stewart said.

"It gives us more opportunity and it's a better product," he said. "I think that's why you haven't seen our major competitors do this because they have a big enough market share. When you're the new guy — the small guy on the block — you have to do something that gets people's attention — and that's essentially how we got to where we are today."

U.S. Well Services has been in business since 2012.

"We expect this to allow us to grow the business and work for companies we might not otherwise have the opportunity to work for," Stewart said. "The economics are worth-while. They make sense at the end of the day."

He said neighbors of the Anadarko wells has made positive comments.

"Based on the results we've seen to date and based on the comments we've heard from Anadarko to date, we're hoping for many more opportunities in the Denver and Greeley area," Stewart said.

He hopes the job opportunities will become so vast they can create a permanent office, possibly in Greeley.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 180

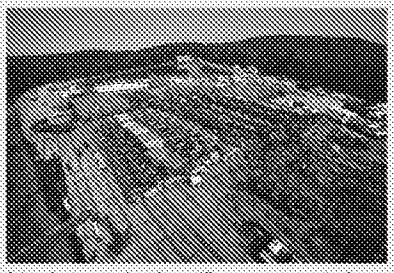
For more information, go to www.uswellservices.com.

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HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 181

and provides those multiple well services in Texas, New Mexico and Oklahoma, to serve the Permian Basin and Barnett, Woodford, Eagleford and Bakken shales.

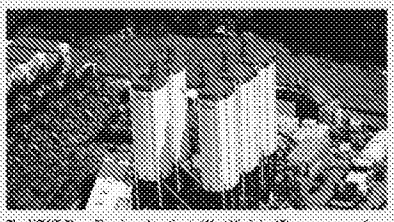
Diamond's Offshore's service fleet now includes 11 hydraulic fracturing jobs that operators or exercise cross, which allows running 3 jobs centered into without leaving the other, the company said on its website.



A second pad operation in north-central Pennsylvania near the city of Williamsport, Pa. (Photo courtesy of Patterson-UTI)

U.S. Well Services LLC

Focused on advanced U.S. well services (USWS) is an oilfield services provider of well stimulation services to the upstream oil and gas industry operating in the Marcellus and Utica shales. The company is looking to expand its services to new areas in the U.S.,



The USWS Clean Fleet is on location in West Virginia. (Photo courtesy of U.S. Well Services LLC)

including the Permian Basin, Granite Wash, Panhandle and the Bakken, Haynesville, Northern and Eagle Ford shales.

The company offers high pressure hydraulic fracturing in unconventional oil and natural gas basins. USWS equipment consists of eight mobile fracturing fleets that are among the newest in the Northeast and are rated to handle pressures exceeding 10,000 psi, the company said on its website. The company also has in place hydraulic horsepower rated at 16,500 psi and 120 bbl/min blenders.

In July 2014, USWS deployed its Clean Fleet fracturing technology, the first fully electric, fully mobile well stimulation system powered by natural gas, according to the company's website. The fleet runs on electric power generated by natural gas-fueled turbine engine generators. The company said that Clean Fleet can reduce noise pollution, related truck traffic, site water and emissions. According to a press release, Clean Fleet can mitigate environmental exposure by reducing NO_x and carbon monoxide emissions by 99%.

Weatherford International Plc

Operating in more than 100 countries, Weatherford International Plc is one of the largest oilfield service companies and operates internationally in every major oil and gas region. Weatherford's completion and stimulation products and services include coiled tubing services, reservoir stimulation services, acidizing systems, chemicals and additives, fluid systems, and completion and stimulation equipment.

The company's new Fiber Klean is a proprietary diverting and fluid loss control agent for multi-stage fracturing, refracturing or workovers. Created from a dissolvable material, this technology provides zonal isolation and mechanical diversion while eliminating the need for bridge plugs, minimizing cleanup and reducing or eliminating clay stabilizers from the completion, the company said on its website.

Among the company's products in below ground news are ZoneSelect and Fracmax. The ZoneSelect openhole completion system includes hydraulic set and mechanically set packers, sleeves, floats, plugs and balls. The system is designed to withstand challenging well conditions and the high pressures of fracturing operations. The Fracmax stimulation ball-in packer is

designed for fracturing in
high-strength sandstone
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achieve high differentia
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to begin sooner," the com

In addition, the Fracm
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2014 annual report.

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S Chem LLC

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Additionally, Corrshie
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NANOfrac fracturing additive

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 182

Electronic Patent Application Fee Transmittal

Application Number:	13679689
Filing Date:	16-Nov-2012
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Filer:	Taylor P. Evans/Abby Derrickson
Attorney Docket Number:	085055.000003

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	1253	1	1400	1400
Miscellaneous:				
			Total in USD ($)	**1400**

Electronic Acknowledgement Receipt

EFS ID:	24812991
Application Number:	13679689
International Application Number:	
Confirmation Number:	5345
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Customer Number:	35979
Filer:	Taylor P. Evans/Abby Derrickson
Filer Authorized By:	Taylor P. Evans
Attorney Docket Number:	085055.000003
Receipt Date:	03-FEB-2016
Filing Date:	16-NOV-2012
Time Stamp:	16:58:02
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1400
RAM confirmation Number	3692
Deposit Account	500259
Authorized User	EVANS, TAYLOR P.

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 CFR 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 CFR 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 CFR 1.19 (Document supply fees)

Charge any Additional Fees required under 37 CFR 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Response_to_Non_Final_Office_Action_with_Exhibits.pdf	17228130 5dbd2eb32a77b7202b28a9063d639c286497d637	yes	57

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment Copy Claims/Response to Suggested Claims	1	5
	Applicant Arguments/Remarks Made in an Amendment	6	57

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30727 9db3a7e39c6622fe6e040bd09fdfac2bc5685af5	no	2

Warnings:

Information:

Total Files Size (in bytes):	17258857

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/679,689	11/16/2012	Joel N. Broussard	085055.000003	5345

35979 7590 08/03/2015

Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

EXAMINER
THOMPSON, KENNETH L

ART UNIT	PAPER NUMBER
3676	

NOTIFICATION DATE	DELIVERY MODE
08/03/2015	ELECTRONIC

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

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@bgllp.com

Office Action Summary	Application No. 13/679,689	Applicant(s) BROUSSARD ET AL.	
	Examiner KENNETH L. THOMPSON	Art Unit 3676	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 June 2015*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1,4,5,8-14,18 and 20-29* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1,4,5,8-14,18 and 20-29* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

HALLIBURTON EXHIBIT 1005
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 188

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Claim Objections

Claims 1, 4, 5, 8-14, 18, 20-29 are objected to because of the following:

The term "if " in the independent claims renders the claim indefinite because it is unclear whether the limitations following the term are part of the claimed invention. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 103

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 4, 5, 8, 13-14, 18, 20, 21, 23, 24, 25 and 29 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over in view of Paterson et al., U.S. 5,865,247 in view of Kiel, U.S. 3,722,595 in view of Kushion, U.S. 6,271, 637 and further in view of Streicher et al., U.S. 7,312,593.

Paterson et al. teaches use of system for injecting into a formation (col. 2, lines 43-46) using a plurality of electric pumps (45, 78) fluidly connected to the well driven by

a plurality of generators (75, 76; col. 8, lines 48-54). Paterson et al. discloses use of conventional power and engine monitoring equipment as well as automatic shut down equipment (col. 8, lines 60-65) but does not discloses diagnostic to prevent damage due to power loss.

Kushion teaches that it is well known to include a diagnostic method or system for an electrical motor to prevent damage (col. 4, line 56 – col. 5, line 3).

It would have been obvious to one having ordinary skill in the art at the time of the invention to make use of a well known diagnostic system for an electrical motor as taught by Kushion to achieve predictable results.

Paterson does not specifically state fracturing.

Kiel teaches use of a system for hydraulically fracturing (col. 1, lines 10-15) an underground formation with a system having a plurality pumps (20, 21, 22) to pump fluid into the wellbore at high pressure to fracture the formation; and a plurality of engines (turbine or diesel; col. 8, lines 55-60) connected to the plurality of pumps (20, 21, 22) to provide power to the pumps.

It would have been obvious to one having ordinary skill in the art at the time of the invention to substitute one known method of injection disclosed by Paterson et al. for another as taught by Kiel to fracture a particular formation to achieve predictable results.

Paterson et al. discloses all the claimed limitations including a variable frequency drive motor as noted above but does not discloses power semiconductor heat sinks

having one or more thermal sensors monitored by a microprocessor to prevent semiconductor damage caused by excessive heat.

Streicher et al. teaches use of a variable drive (12; col. 2, lines 45-62) including power semiconductor (SCR) heat sinks (30) having one or more thermal sensors (20) monitored by a microprocessor (24) to prevent semiconductor damage caused by excessive heat to provide thermal regulation of the AC drive when subjected to cold temperatures in order to prevent condensation of moisture in the air or to ensure that the components of the AC drive are maintained within an operational temperature range.

It would have been obvious to one having ordinary skill in the art at the time of the invention to arrange for the variable speed motors disclosed by Paterson et al. to have the protection system as taught by Streicher et al. to achieve predictable results.

Paterson et al. teaches use of an AC variable speed electric drive motor (col. 7, lines 4-11).

Kiel discloses the system is truck mounted (col. 8, lines 55-58) and Paterson teaches the system mounted on a trailer (col. 3, lines 53-63). The Examiner makes official notice that a truck or trailer may have a plurality of axles.

Paterson et al. is silent regarding the material of the electrical motors (45) allowing for the claimed temperature range.

However it would have been obvious to one having ordinary skill in the art at the time of the invention to construct an electrical motor capable of withstanding conditions since the selection of a known material based upon its suitability for the intended use is

a design consideration within the skill of the art. In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Paterson et al. teaches use a control or diagnostic system (col. 11, line 53 – col. 12, line 5).

Claims 9-12 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Kiel, U.S. 3,722,595 in view of Paterson et al., U.S. 5,865,247 in view of Kushion, U.S. 6,271, 637 in view of Streicher et al., U.S. 7,312,593 as applied to claim 8 and 21 above and further in view of Shampine et al., U.S. 7,845,413.

Kiel discloses pumps but does not discloses the pump is a triplex or a quinteplex pump rated at about 2250 hydraulic horsepower or more.

Shampine et al. teaches that the use of a triplex or a quinteplex pump (col. 1, lines 4253) rated at about 2250 hydraulic horsepower (col. 4, lines 25-39) or more is well known wherein the 10,000 horsepower would convert to 8,750 lb-ft at the correct revolutions per minute.

It would have been obvious to one having ordinary skill in the art at the time of the invention to substitute one known pump as disclosed by Kiel et al. for another as taught by Shampine et al. to achieve predictable results.

Shampine teaches use of a plunger pump but does not mention the size, 4.5 inch diameter plungers nor an eight inch stroke.

However it would have been obvious to one having ordinary skill in the art at the time of the invention to arrange a plunger to have the dimension as claimed since a

change in the size of a prior art device is a design consideration within the skill of the art. In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955).

Claims 22, 26, 27 and 28 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Kiel, U.S. 3,722,595 in view of Paterson et al., U.S. 5,865,247, in view of Kushion, U.S. 6,271, 637 in view of Streicher et al., U.S. 7,312,593 as applied to claims 1 and 21 above and further in view of Heilman et al., U.S. 2007/0201305.

Kiel in view of Paterson disclose all the claimed limitations including diesel power for the pumps but does not disclose use of natural gas.

Heilman et al. teaches use of natural gas power unit (103 [0023]) for powering a pump [0033].

It would have been obvious to one having ordinary skill in the art at the time of the invention to substitute one known fuel as disclosed by Kiel and Paterson et al. for another as taught by Heilman et al. to achieve predictable results.

Response to Arguments

Applicant's arguments have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KENNETH L. THOMPSON whose telephone number is (571)272-7037. The examiner can normally be reached on 6:30-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shane Bomar can be reached on 571-272-7026. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

27 July 2015

/KENNETH L THOMPSON/
Primary Examiner, Art Unit 3676

Notice of References Cited	Application/Control No. 13/679,689	Applicant(s)/Patent Under Reexamination BROUSSARD ET AL.	
	Examiner KENNETH L. THOMPSON	Art Unit 3676	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,271,637 B1	08-2001	Kushion, Mark Dennis	318/434
*	B	US-6,529,135 B1	03-2003	Bowers et al.	340/648
*	C	US-6,931,310 B2	08-2005	Shimizu et al.	701/33.7
*	D	US-7,755,310 B2	07-2010	West et al.	318/400.02
*	E	US-8,054,084 B2	11-2011	Schulz et al.	324/545
*	F	US-8,310,272 B2	11-2012	Quarto, Mark	324/765.01
*	G	US-8,354,817 B2	01-2013	Yeh et al.	318/812
*	H	US-8,789,601 B2	07-2014	Broussard et al.	166/308.1
*	I	US-8,838,341 B2	09-2014	Kumano, Masakazu	701/42
*	J	US-9,018,881 B2	04-2015	Mao et al.	318/490
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13679689	BROUSSARD ET AL.
	Examiner	Art Unit
	KENNETH L THOMPSON	3676

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
166	308.1, 177.5	3/9/2015	KT

SEARCH NOTES		
Search Notes	Date	Examiner

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 196

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	13679689	Filing Date	2012-11-16	Docket Number (if applicable)	085055.000003	Art Unit	3676
First Named Inventor	Broussard, Joel N.			Examiner Name	Thompson, Kenneth L.		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, to any international application that does not comply with the requirements of 35 U.S.C. 371, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV.

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☐ Other _____

☒ Enclosed

☒ Amendment/Reply

☐ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 500259

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (07-14)
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Signature of Registered U.S. Patent Practitioner			
Signature	/Taylor P. Evans/	Date (YYYY-MM-DD)	2015-06-16
Name	Taylor P. Evans	Registration Number	60506

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

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HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 198

Electronic Patent Application Fee Transmittal

Application Number:	13679689
Filing Date:	16-Nov-2012
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Filer:	Taylor P. Evans/Abby Derrickson
Attorney Docket Number:	085055.000003

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Request for Continued Examination	1801	1	1200	1200
		Total in USD ($)		**1200**

Electronic Acknowledgement Receipt

EFS ID:	22649985
Application Number:	13679689
International Application Number:	
Confirmation Number:	5345
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Customer Number:	35979
Filer:	Taylor P. Evans/Abby Derrickson
Filer Authorized By:	Taylor P. Evans
Attorney Docket Number:	085055.000003
Receipt Date:	16-JUN-2015
Filing Date:	16-NOV-2012
Time Stamp:	17:32:46
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1200
RAM confirmation Number	4749
Deposit Account	500259
Authorized User	EVANS, TAYLOR P.

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Response_to_Advisory_Action.pdf	123082 21eaf87d5ed8965f04f42a28fddc25b183b26f48	yes	8
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Amendment Copy Claims/Response to Suggested Claims		1	5	
	Applicant Arguments/Remarks Made in an Amendment		6	8	
Warnings:					
Information:					
2	Request for Continued Examination (RCE)	RCE.pdf	85154 729fd3f9dfc0c56d6a01a3b9c2abe5f20637bf73	no	2
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30587 a01b21966983241dc0a7e964655e5dc5d414c6a3	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	238823		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CERTIFICATE OF ELECTRONIC TRANSMISSION

I hereby certify that this correspondence is being filed electronically with the Office of the Commissioner for Patents, Alexandria, VA 22313-1450, on the date indicated below.

Date: June 16, 2015 /Abby Derrickson/

Abby Derrickson

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of: **Broussard et al.**	§	Attorney Docket No: **085055.000003**
Serial No.: **13/679,689**	§	Examiner: **Thompson, Kenneth L.**
Filed: **November 16, 2012**	§	Art Unit: **3676**
For: **SYSTEM FOR PUMPING HYDRAULIC FRACTURING FLUID USING ELECTRIC PUMPS**	§	Confirmation No.: **5345**

SUPPLEMENTAL RESPONSE TO FINAL OFFICE ACTION DATED MARCH 16, 2015

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

Subsequent to the Advisory Action dated May 28, 2015, and in response to the Final Office Action dated March 16, 2015, Applicants respectfully request reconsideration of the objections and rejections in view of the following arguments and amendments. If any additional fees are necessary for continued prosecution of this application, the Commissioner is authorized to charge those fees to Bracewell & Giuliani LLP's Deposit Account Number 50-0259 (085055.000003/TPE/ad).

Amendments to the Claims begin on page 2.

Remarks begin on page 6.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 204

AMENDMENTS TO THE CLAIMS

Applicants provide the following complete listing of all the claims in the application that shows the status of all pending claims and markings to show current changes:

THAT CLAIMED IS:

1. (Currently Amended) A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation, the system comprising:

a plurality of electric pumps fluidly connected to the well and powered by at least one electric motor, and configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the formation, and fractures the formation; and

a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency drive ~~has one or more power semiconductor heat sinks having thermal sensors monitored by a microprocessor to prevent damage caused by excessive heat~~ frequently performs electric motor diagnostics to prevent damage to the at least one electric motor if it becomes grounded or shorted.

2-3. (Cancelled)

4. (Original) The system of claim 1, further comprising:

an A/C console and a variable frequency drive that controls the speed of the pumps.

5. (Original) The system of claim 1, wherein the electric pumps are mounted on vehicles, and can be ported from one well to another.

6-7. (Cancelled)

8. (Currently Amended) A system for fracturing a rock formation in an oil or gas well by pumping hydraulic fracturing fluid into the well, the system comprising:

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 205

a pump for pumping the hydraulic fracturing fluid into the well, and then from the well into the formation, the pump capable of pumping the hydraulic fracturing fluid at high pressure to crack the formation;

an electric motor having a high-strength steel or steel alloy shaft attached to the pump and configured to drive the pump;

a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency drive ~~has one or more power semiconductor heat sinks having thermal sensors monitored by a microprocessor to prevent damage caused by excessive heat~~ frequently performs electric motor diagnostics to prevent damage to the electric motor if it becomes grounded or shorted.

9. (Original) The system of claim 8, wherein the pump is a triplex or a quinteplex pump rated at about 2250 hydraulic horsepower or more.

10. (Original) The system of claim 9, wherein the pump has 4.5 inch diameter plungers with an eight inch stroke.

11. (Original) The system of claim 8, wherein the electric motor has a maximum continuous power output of about 1750 brake horsepower or more.

12. (Original) The system of claim 11, wherein the electric motor has a maximum continuous torque of about 8750 lb-ft or more.

13. (Original) The system of 12, wherein the electric motor has a high temperature rating of about 1100 degrees C or more.

14. (Original) The system of 13, wherein the shaft of the electric motor is composed of 4340 alloy steel.

15-17. (Cancelled)

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 206

18. (Currently Amended) A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation, the system comprising:

a trailer for attachment to a truck;

two or more electric pumps attached to the trailer and fluidly connected to the well, the electric pumps configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the formation, and fractures the formation;

one or more electric motors attached to the electric pumps to drive the pumps, the electric motors attached to the trailer; and

a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency drive ~~has one or more power semiconductor heat sinks having thermal sensors monitored by a microprocessor to prevent damage caused by excessive heat~~ frequently performs electric motor diagnostics to prevent damage to the one or more electric motors if they become grounded or shorted.

19. (Cancelled)

20. (Original) The system of claim 18, further comprising:

a skid to which at least one of the electric pumps, the one or more electric motors, and the variable frequency drives are attached.

21. (Previously Presented) The system of claim 1, further comprising:

a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps.

22. (Previously Presented) The system of claim 21, wherein at least some of the plurality of generators are powered by natural gas.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 207

23. (Previously Presented) The system of claim 21, wherein at least some of the plurality of generators are turbine generators.

24. (Previously Presented) The system of claim 21, wherein the electric pumps and generators are mounted on vehicles, and can be ported from one well to another.

25. (Previously Presented) The system of claim 21, wherein the vehicles are trucks having at least five axles.

26. (Previously Presented) The system of claim 8, further comprising:

a natural gas powered generator connected to the electric motor that provides electric power to the electric motor.

27. (Previously Presented) The system of claim 26, wherein the natural gas powered generator is a turbine generator.

28. (Previously Presented) The system of claim 18, further comprising:

a natural gas powered generator for connection to the electric motor that provides electric power to the electric motor.

29. (New) The system of claim 1, wherein the variable frequency drive has one or more power semiconductor heat sinks having thermal sensors monitored by a microprocessor to prevent damage caused by excessive heat.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 208

REMARKS

Applicants and the undersigned thank Examiner for providing a thorough review of the pending application. Claims 1, 4, 5, 9-14, 18, and 20-29 are pending in the application. Claims 1, 8, and 18 have been amended. Claims 2, 3, 6, 7, 15-17, and 19 have been cancelled. Claim 29 is new. No new matter has been introduced in the amendments.

In the Office Action, the Examiner rejected claims 1, 4, and 5 under 35 U.S.C. 112, second paragraph, for reciting the feature of "the electric motor" without antecedent basis. Applicants have amended claim 1 to positively recite "at least one electric motor." Accordingly, Applicants respectfully submit that the 112 rejections are overcome.

Next, the Examiner rejected claims 1, 4, 5, 8, 13-15, 18, 20, 21, 23, 24, and 25 under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 5,865,247 to Paterson et al. ("*Paterson*") in view of U.S. Patent No. 3,722,595 to Kiel ("*Kiel*"), and further in view of U.S. Patent No. 7,312,593 to Streicher et al. ("*Streicher*"). The Examiner further rejected claims 9-12 under 35 U.S.C. 103(a) as obvious over *Kiel* in view of *Paterson*, and further in view of *Streicher* and U.S. Patent No. 7,845,413 to Shampine et al. ("*Shampine*"). In addition, the Examiner rejected claims 22, 26, 27, and 28 under 35 U.S.C. 103(a) as obvious over *Kiel*, in view of *Paterson*, and further in view of *Streicher* and U.S. Patent Appln. Pub. No. 2007/0201305 to Heilman et al. ("*Heilman*"). In the application, claims 1, 8, and 18 are drafted in independent form.

I. Claims 1, 8, and 18 are patentable because the prior art cited by the Examiner does not describe a variable frequency drive performing electric motor diagnostics to prevent damage to the electric motors if they become grounded or shorted.

Applicants have amended claims 1, 8, and 18 to recite a variable frequency drive that performs electric motor diagnostics to prevent damage to the electric motor of it becomes grounded or shorted. This feature was previously recited in claim 15, which has been cancelled. This feature is advantageous because the electric motors of the technology described in the

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 209

patent application can operate in harsh environments, and drive large pumps used to pump hydraulic fracturing fluid into a well at high pressures. External conditions at a well site, as well as high pressures within the well, can lead to grounding or shorting of the motor, which will damage the motor. The variable frequency drive of claims 1, 8, and 18, however, performs diagnostics, to help prevent damage to the motors by shutting down or slowing the motors if a ground or short is detected. This feature is not described in the prior art relied on by the Examiner.

For example, in the Office Action, the Examiner relies on *Paterson* as describing this feature. *Paterson*, however, describes use of a variable speed drive only generally, and does not describe that the variable speed drive performs any diagnostics. The Examiner points specifically to col. 11, line 53 – col. 12, line 5 of *Paterson* as describing these features. But the paragraph referenced by the Examiner merely describes use of a computer to sequence the starting and stopping of motors and pumps. There is no disclosure of a variable frequency drive, or indeed of any component performing diagnostics. Accordingly, the combination of references cited by the Examiner does not render obvious claims 1, 8, and 18.

II. Dependent Claims

Dependent claims 4, 5, 9-14, and 20-29 are allowable by virtue of their dependency on at least one of the independent claims, as well as for other patentable features recited therein.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 210

CONCLUSION

The foregoing remarks are intended to assist the Examiner in re-examining the application and in the course of explanation may employ shortened or more specific or variant descriptions of some of the claim language. Such descriptions are not intended to limit the scope of the claims; the actual claim language should be considered in each case. Furthermore, the remarks are not to be considered to be exhaustive of the facets of the invention, which render it patentable, being only examples of certain advantageous features and differences that Applicants' attorney chooses to mention at this time. It is respectfully submitted that the claims are now in condition for allowance and favorable action is respectfully requested.

Respectfully submitted,

Date: 06/16/2015

/Taylor P. Evans/
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Email: taylor.evans@bgllp.com

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 211

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/679,689	Filing Date 11/16/2012	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT

06/16/2015	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 21	Minus	** 21	= 0	X $40 =	0
Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $210 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/ERIC DANTZLER/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Alexandria, Virginia 22313-1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/679,689	11/16/2012	Joel N. Broussard	085055.000003	5345

35979 7590 05/28/2015

Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

EXAMINER
THOMPSON, KENNETH L

ART UNIT	PAPER NUMBER
3676	

NOTIFICATION DATE	DELIVERY MODE
05/28/2015	ELECTRONIC

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

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@bgllp.com

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 13/679,689	**Applicant(s)** BROUSSARD ET AL.	
	Examiner KENNETH L. THOMPSON	**Art Unit** 3676	**AIA (First Inventor to File) Status** No

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 18 May 2015 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

NO NOTICE OF APPEAL FILED

1. ☒ The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:
   a) ☐ The period for reply expires _____months from the mailing date of the final rejection.
   b) ☒ The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
   c) ☐ A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection. The current period for reply expires months from the mailing date of *the prior Advisory Action* or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.
   Examiner Note: If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANT'S FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☒ The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   a) ☒ They raise new issues that would require further consideration and/or search (see NOTE below);
   b) ☐ They raise the issue of new matter (see NOTE below);
   c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.
   NOTE: *See Continuation Sheet*. (See 37 CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☐ For purposes of appeal, the proposed amendment(s): (a) ☐ will not be entered, or (b) ☐ will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
9. ☐ The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
10. ☐ The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
11. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

12. ☐ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: _____.
13. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
14. ☐ Other: _____.

STATUS OF CLAIMS

15. The status of the claim(s) is (or will be) as follows:
    Claim(s) allowed: .
    Claim(s) objected to: .
    Claim(s) rejected: 1, 4, 5, 8-15, 18 and 20-28.
    Claim(s) withdrawn from consideration: .

/KENNETH L THOMPSON/
Primary Examiner, Art Unit 3676

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 214

Continuation of 3. NOTE: The scope of the independent claims have been changed by the elimination of limitations directed to the heat sinks and the addition of diagnostics . Moreover the prior art discloses a control and monitoring system and the limitations following the recitation "if" are not positively recited and not included in the scope of the claims. Lastly, there does not appear to be a specific inventive feature or facet of the invention.

DO NOT ENTER: /KT/
05/22/2015

CERTIFICATE OF ELECTRONIC TRANSMISSION

I hereby certify that this correspondence is being filed electronically with the Office of the Commissioner for Patents, Alexandria, VA 22313-1450, on the date indicated below.

Date: May 18, 2015 /Abby Derrickson/

Abby Derrickson

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of: **Broussard et al.**	§	Attorney Docket No: **085055.000003**
	§	
	§	
Serial No.: **13/679,689**	§	Examiner: **Thompson, Kenneth L.**
	§	
Filed: **November 16, 2012**	§	Art Unit: **3676**
	§	
For: **SYSTEM FOR PUMPING HYDRAULIC FRACTURING FLUID USING ELECTRIC PUMPS**	§	Confirmation No.: **5345**

RESPONSE TO FINAL OFFICE ACTION DATED MARCH 16, 2015

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

In response to the Final Office Action dated March 16, 2015, Applicants respectfully request reconsideration of the objections and rejections in view of the following arguments and amendments. If any additional fees are necessary for continued prosecution of this application, the Commissioner is authorized to charge those fees to Bracewell & Giuliani LLP's Deposit Account Number 50-0259 (085055.000003/TPE/ad).

Amendments to the Claims begin on page 2.

Remarks begin on page 6.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 216

CERTIFICATE OF ELECTRONIC TRANSMISSION

I hereby certify that this correspondence is being filed electronically with the Office of the Commissioner for Patents, Alexandria, VA 22313-1450, on the date indicated below.

Date: May 18, 2015 /Abby Derrickson/

Abby Derrickson

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of: **Broussard et al.**	§	Attorney Docket No: **085055.000003**
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Serial No.: **13/679,689**	§	Examiner: **Thompson, Kenneth L.**
	§	
Filed: **November 16, 2012**	§	Art Unit: **3676**
	§	
For: **SYSTEM FOR PUMPING HYDRAULIC FRACTURING FLUID USING ELECTRIC PUMPS**	§	Confirmation No.: **5345**

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Amendments to the Claims begin on page 2.

Remarks begin on page 6.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 217

AMENDMENTS TO THE CLAIMS

Applicants provide the following complete listing of all the claims in the application that shows the status of all pending claims and markings to show current changes:

THAT CLAIMED IS:

1. (Currently Amended) A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation, the system comprising:

a plurality of electric pumps fluidly connected to the well and powered by at least one electric motor, and configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the formation, and fractures the formation; and

a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency drive ~~has one or more power semiconductor heat sinks having thermal sensors monitored by a microprocessor to prevent damage caused by excessive heat~~ frequently performs electric motor diagnostics to prevent damage to the at least one electric motor if it becomes grounded or shorted.

2-3. (Cancelled)

4. (Original) The system of claim 1, further comprising:

an A/C console and a variable frequency drive that controls the speed of the pumps.

5. (Original) The system of claim 1, wherein the electric pumps are mounted on vehicles, and can be ported from one well to another.

6-7. (Cancelled)

8. (Currently Amended) A system for fracturing a rock formation in an oil or gas well by pumping hydraulic fracturing fluid into the well, the system comprising:

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 218

a pump for pumping the hydraulic fracturing fluid into the well, and then from the well into the formation, the pump capable of pumping the hydraulic fracturing fluid at high pressure to crack the formation;

an electric motor having a high-strength steel or steel alloy shaft attached to the pump and configured to drive the pump;

a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency drive ~~has one or more power semiconductor heat sinks having thermal sensors monitored by a microprocessor to prevent damage caused by excessive heat~~ frequently performs electric motor diagnostics to prevent damage to the electric motor if it becomes grounded or shorted.

9. (Original) The system of claim 8, wherein the pump is a triplex or a quinteplex pump rated at about 2250 hydraulic horsepower or more.

10. (Original) The system of claim 9, wherein the pump has 4.5 inch diameter plungers with an eight inch stroke.

11. (Original) The system of claim 8, wherein the electric motor has a maximum continuous power output of about 1750 brake horsepower or more.

12. (Original) The system of claim 11, wherein the electric motor has a maximum continuous torque of about 8750 lb-ft or more.

13. (Original) The system of 12, wherein the electric motor has a high temperature rating of about 1100 degrees C or more.

14. (Original) The system of 13, wherein the shaft of the electric motor is composed of 4340 alloy steel.

15-17. (Cancelled)

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 219

18. (Currently Amended) A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation, the system comprising:

a trailer for attachment to a truck;

two or more electric pumps attached to the trailer and fluidly connected to the well, the electric pumps configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the formation, and fractures the formation;

one or more electric motors attached to the electric pumps to drive the pumps, the electric motors attached to the trailer; and

a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency drive ~~has one or more power semiconductor heat sinks having thermal sensors monitored by a microprocessor to prevent damage caused by excessive heat~~ frequently performs electric motor diagnostics to prevent damage to the one or more electric motors if they become grounded or shorted.

19. (Cancelled)

20. (Original) The system of claim 18, further comprising:

a skid to which at least one of the electric pumps, the one or more electric motors, and the variable frequency drives are attached.

21. (Previously Presented) The system of claim 1, further comprising:

a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps.

22. (Previously Presented) The system of claim 21, wherein at least some of the plurality of generators are powered by natural gas.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 220

23. (Previously Presented) The system of claim 21, wherein at least some of the plurality of generators are turbine generators.

24. (Previously Presented) The system of claim 21, wherein the electric pumps and generators are mounted on vehicles, and can be ported from one well to another.

25. (Previously Presented) The system of claim 21, wherein the vehicles are trucks having at least five axles.

26. (Previously Presented) The system of claim 8, further comprising:

a natural gas powered generator connected to the electric motor that provides electric power to the electric motor.

27. (Previously Presented) The system of claim 26, wherein the natural gas powered generator is a turbine generator.

28. (Previously Presented) The system of claim 18, further comprising:

a natural gas powered generator for connection to the electric motor that provides electric power to the electric motor.

29. (New) The system of claim 1, wherein the variable frequency drive has one or more power semiconductor heat sinks having thermal sensors monitored by a microprocessor to prevent damage caused by excessive heat.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 221

REMARKS

Applicants and the undersigned thank Examiner for providing a thorough review of the pending application. Claims 1, 4, 5, 9-14, 18, and 20-29 are pending in the application. Claims 1, 8, and 18 have been amended. Claims 2, 3, 6, 7, 15-17, and 19 have been cancelled. Claim 29 is new. No new matter has been introduced in the amendments.

In the Office Action, the Examiner rejected claims 1, 4, and 5 under 35 U.S.C. 112, second paragraph, for reciting the feature of "the electric motor" without antecedent basis. Applicants have amended claim 1 to positively recite "at least one electric motor." Accordingly, Applicants respectfully submit that the 112 rejections are overcome.

Next, the Examiner rejected claims 1, 4, 5, 8, 13-15, 18, 20, 21, 23, 24, and 25 under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 5,865,247 to Paterson et al. ("*Paterson*") in view of U.S. Patent No. 3,722,595 to Kiel ("*Kiel*"), and further in view of U.S. Patent No. 7,312,593 to Streicher et al. ("*Streicher*"). The Examiner further rejected claims 9-12 under 35 U.S.C. 103(a) as obvious over *Kiel* in view of *Paterson*, and further in view of *Streicher* and U.S. Patent No. 7,845,413 to Shampine et al. ("*Shampine*"). In addition, the Examiner rejected claims 22, 26, 27, and 28 under 35 U.S.C. 103(a) as obvious over *Kiel*, in view of *Paterson*, and further in view of *Streicher* and U.S. Patent Appln. Pub. No. 2007/0201305 to Heilman et al. ("*Heilman*"). In the application, claims 1, 8, and 18 are drafted in independent form.

I. Claims 1, 8, and 18 are patentable because the prior art cited by the Examiner does not describe a variable frequency drive performing electric motor diagnostics to prevent damage to the electric motors if they become grounded or shorted.

Applicants have amended claims 1, 8, and 18 to recite a variable frequency drive that performs electric motor diagnostics to prevent damage to the electric motor of it becomes grounded or shorted. This feature was previously recited in claim 15, which has been cancelled. This feature is advantageous because the electric motors of the technology described in the

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 222

patent application can operate in harsh environments, and drive large pumps used to pump hydraulic fracturing fluid into a well at high pressures. External conditions at a well site, as well as high pressures within the well, can lead to grounding or shorting of the motor, which will damage the motor. The variable frequency drive of claims 1, 8, and 18, however, performs diagnostics, to help prevent damage to the motors by shutting down or slowing the motors if a ground or short is detected. This feature is not described in the prior art relied on by the Examiner.

For example, in the Office Action, the Examiner relies on *Paterson* as describing this feature. *Paterson*, however, describes use of a variable speed drive only generally, and does not describe that the variable speed drive performs any diagnostics. The Examiner points specifically to col. 11, line 53 – col. 12, line 5 of *Paterson* as describing these features. But the paragraph referenced by the Examiner merely describes use of a computer to sequence the starting and stopping of motors and pumps. There is no disclosure of a variable frequency drive, or indeed of any component performing diagnostics. Accordingly, the combination of references cited by the Examiner does not render obvious claims 1, 8, and 18.

II. Dependent Claims

Dependent claims 4, 5, 9-14, and 20-29 are allowable by virtue of their dependency on at least one of the independent claims, as well as for other patentable features recited therein.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 223

CONCLUSION

The foregoing remarks are intended to assist the Examiner in re-examining the application and in the course of explanation may employ shortened or more specific or variant descriptions of some of the claim language. Such descriptions are not intended to limit the scope of the claims; the actual claim language should be considered in each case. Furthermore, the remarks are not to be considered to be exhaustive of the facets of the invention, which render it patentable, being only examples of certain advantageous features and differences that Applicants' attorney chooses to mention at this time. It is respectfully submitted that the claims are now in condition for allowance and favorable action is respectfully requested.

Respectfully submitted,

Date: 5/18/15

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HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 224

Electronic Acknowledgement Receipt

EFS ID:	22379662
Application Number:	13679689
International Application Number:	
Confirmation Number:	5345
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Customer Number:	35979
Filer:	Taylor P. Evans/Abby Derrickson
Filer Authorized By:	Taylor P. Evans
Attorney Docket Number:	085055.000003
Receipt Date:	18-MAY-2015
Filing Date:	16-NOV-2012
Time Stamp:	18:08:50
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Response_to_Final_Office_Action.pdf	1160299 be8fec80cc25ec3b7fc2249b2efb3c8767075623	yes	8

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment Copy Claims/Response to Suggested Claims	1	5
	Applicant Arguments/Remarks Made in an Amendment	6	8
Warnings:			
Information:			
	Total Files Size (in bytes):	1160299	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/679,689	Filing Date 11/16/2012	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)		
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

		(Column 1)		(Column 2)	(Column 3)		
	05/18/2015	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	Total (37 CFR 1.16(i))	* 21	Minus	** 21	= 0	X $40 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $210 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	**0**

		(Column 1)		(Column 2)	(Column 3)		
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/MYRTLE LEIGH/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/679,689	11/16/2012	Joel N. Broussard	085055.000003	5345

35979 7590 03/16/2015

Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

EXAMINER
THOMPSON, KENNETH L

ART UNIT	PAPER NUMBER
3676	

NOTIFICATION DATE	DELIVERY MODE
03/16/2015	ELECTRONIC

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

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@bgllp.com

Office Action Summary	Application No. 13/679,689	Applicant(s) BROUSSARD ET AL.	
	Examiner KENNETH L. THOMPSON	Art Unit 3676	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 February 2015*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1,4,5,8-15,18 and 20-28* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1,4,5,8-15,18 and 20-28* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 229

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Claim Rejections - 35 USC § 112

The following is a quotation of 35 U.S.C. 112(b):
(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 recites the limitation "the electric motor" in line 7. There is insufficient antecedent basis for this limitation in the claim. Dependent claims 4 and 5 are likewise rejected.

Claim Rejections - 35 USC § 103

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 4, 5, 8, 13-15, 18, 20, 21, 23, 24 and 25 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over in view of Paterson et al., U.S. 5,865,247 in view of Kiel, U.S. 3,722,595 and further in view of Streicher et al., U.S. 7,312,593.

Paterson et al. teaches use of system for injecting into a formation (col. 2, lines 43-46) using a plurality of electric pumps (45, 78) fluidly connected to the well driven by a plurality of generators (75, 76; col. 8, lines 48-54).

Paterson does not specifically state fracturing.

Kiel teaches use of a system for hydraulically fracturing (col. 1, lines 10-15) an underground formation with a system having a plurality pumps (20, 21, 22) to pump fluid into the wellbore at high pressure to fracture the formation; and a plurality of engines (turbine or diesel; col. 8, lines 55-60) connected to the plurality of pumps (20, 21, 22) to provide power to the pumps.

It would have been obvious to one having ordinary skill in the art at the time of the invention to substitute one known method of injection disclosed by Paterson et al. for another as taught by Kiel to fracture a particular formation to achieve predictable results.

Paterson et al. discloses all the claimed limitations including a variable frequency drive motor as note above but does not discloses power semiconductor heat sinks having one or more thermal sensors monitored by a microprocessor to prevent semiconductor damage caused by excessive heat.

Streicher et al. teaches use of a variable drive (12; col. 2, lines 45-62) including power semiconductor (SCR) heat sinks (30) having one or more thermal sensors (20) monitored by a microprocessor (24) to prevent semiconductor damage caused by excessive heat to provide thermal regulation of the AC drive when subjected to cold temperatures in order to prevent condensation of moisture in the air or to ensure that

the components of the AC drive are maintained within an operational temperature range.

It would have been obvious to one having ordinary skill in the art at the time of the invention to arrange for the variable speed motors disclosed by Paterson et al. to have the protection system as taught by Streicher et al. to achieve predictable results.

Paterson et al. teaches use of an AC variable speed electric drive motor (col. 7, lines 4-11).

Kiel discloses the system is truck mounted (col. 8, lines 55-58) and Paterson teaches the system mounted on a trailer (col. 3, lines 53-63). The Examiner makes official notice that a truck or trailer may have a plurality of axles.

Paterson et al. is silent regarding the material of the electrical motors (45) allowing for the claimed temperature range.

However it would have been obvious to one having ordinary skill in the art at the time of the invention to construct an electrical motor capable of withstanding conditions since the selection of a known material based upon its suitability for the intended use is a design consideration within the skill of the art. In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Paterson et al. teaches use a control or diagnostic system (col. 11, line 53 – col. 12, line 5).

Claim 9-12 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Kiel, U.S. 3,722,595 in view of Paterson et al., U.S. 5,865,247 in view of Streicher

et al., U.S. 7,312,593 as applied to claim 8 above, and further in view of Shampine et al., U.S. 7,845,413.

Kiel discloses pumps but does not discloses the pump is a triplex or a quinteplex pump rated at about 2250 hydraulic horsepower or more.

Shampine et al. teaches that the use of a triplex or a quinteplex pump (col. 1, lines 4253) rated at about 2250 hydraulic horsepower (col. 4, lines 25-39) or more is well known wherein the 10,000 horsepower would convert to 8,750 lb-ft at the correct revolutions per minute.

It would have been obvious to one having ordinary skill in the art at the time of the invention to substitute one known pump as disclosed by Kiel et al. for another as taught by Shampine et al. to achieve predictable results.

Shampine teaches use of a plunger pump but does not mention the size, 4.5 inch diameter plungers nor an eight inch stroke.

However it would have been obvious to one having ordinary skill in the art at the time of the invention to arrange a plunger to have the dimension as claimed since a change in the size of a prior art device is a design consideration within the skill of the art. In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955).

Claim 22, 26, 27 and 28 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Kiel, U.S. 3,722,595 in view of Paterson et al., U.S. 5,865,247, further in view of Streicher et al., U.S. 7,312,593 as applied to claims 1 and 21 above and further in view of Heilman et al., U.S. 2007/0201305.

Kiel in view of Paterson disclose all the claimed limitations including diesel power for the pumps but does not disclose use of natural gas.

Heilman et al. teaches use of natural gas power unit (103 [0023]) for powering a pump [0033].

It would have been obvious to one having ordinary skill in the art at the time of the invention to substitute one known fuel as disclosed by Kiel and Paterson et al. for another as taught by Heilman et al. to achieve predictable results.

Response to Arguments

Applicant's arguments filed 26 February 2015 have been fully considered but they are not persuasive.

Applicants argue the prior art of Streicher et al. does not disclose the thermal sensors monitored by a microprocessor to prevent damage caused by excessive heat.

Applicants should note that the amended claims do not specifically require prevention of semiconductor damage caused by excessive heat. Nonetheless Streicher et al. discloses the capability of maintaining the drive within an operable temperature range with consideration of a high temperature set point, column 3, lines 33-43.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KENNETH L. THOMPSON whose telephone number is (571)272-7037. The examiner can normally be reached on 6:30-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shane Bomar can be reached on 571-272-7026. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

9 March 2015

/KENNETH L THOMPSON/
Primary Examiner, Art Unit 3676

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13679689	BROUSSARD ET AL.
	Examiner	Art Unit
	KENNETH L THOMPSON	3676

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
166	308.1, 177.5	3/9/2015	KT

SEARCH NOTES		
Search Notes	Date	Examiner

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 237

CERTIFICATE OF ELECTRONIC TRANSMISSION

I hereby certify that this correspondence is being filed electronically with the Office of the Commissioner for Patents, Alexandria, VA 22313-1450, on the date indicated below

Date: February 26, 2015 /Abby Derrickson/

Abby Derrickson

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Appln. of:	**Broussard et al.**	§	Attorney Docket No: **085055.000003**
Serial No.:	**13/679,689**	§	Examiner: **Thompson, Kenneth L.**
Filed:	**November 16, 2012**	§	Art Unit: **3676**
For:	**SYSTEM FOR PUMPING HYDRAULIC FRACTURING FLUID USING ELECTRIC PUMPS**	§	Confirmation No.: **5345**

RESPONSE TO NON-FINAL OFFICE ACTION DATED DECEMBER 3, 2014

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

In response to the Non-Final Office Action dated December 3, 2014, Applicants respectfully request reconsideration of the objections and rejections in view of the following arguments and amendments. If any additional fees are necessary for continued prosecution of this application, the Commissioner is authorized to charge those fees to Bracewell & Giuliani L.L.P's Deposit Account Number 50-0259 (085055.000003/TPE/ad).

Amendments to the Drawings begin on page 2.

Amendments to the Claims begin on page 3.

Remarks begin on page 7.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 238

AMENDMENTS TO THE DRAWINGS

Please replace sheets 1/2 and 2/2 of the drawings with replacement sheets 1/2 and 2/2 submitted herewith.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 239

AMENDMENTS TO THE CLAIMS

Applicants provide the following complete listing of all the claims in the application that shows the status of all pending claims and markings to show current changes:

THAT CLAIMED IS:

1. (Currently Amended) A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation, the system comprising:

a plurality of electric pumps fluidly connected to the well, and configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the formation, and fractures the formation; and

a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency drive has one or more power semiconductor heat sinks having thermal sensors monitored by a microprocessor to prevent damage caused by excessive heat~~,a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps.~~

2-3. (Cancelled)

4. (Original) The system of claim 1, further comprising:

an A/C console and a variable frequency drive that controls the speed of the pumps.

5. (Original) The system of claim 1, wherein the electric pumps are mounted on vehicles, and can be ported from one well to another.

6-7. (Cancelled)

8. (Currently Amended) A system for fracturing a rock formation in an oil or gas well by pumping hydraulic fracturing fluid into the well, the system comprising:

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 240

a pump for pumping the hydraulic fracturing fluid into the well, and then from the well into the formation, the pump capable of pumping the hydraulic fracturing fluid at high pressure to crack the formation;

an electric motor having a high-strength steel or steel alloy shaft attached to the pump and configured to drive the pump;

a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency drive has one or more power semiconductor heat sinks having thermal sensors monitored by a microprocessor to prevent damage caused by excessive heat.; and

~~a natural gas powered generator connected to the electric motor that provides electric power to the electric motor.~~

9. (Original) The system of claim 8, wherein the pump is a triplex or a quinteplex pump rated at about 2250 hydraulic horsepower or more.

10. (Original) The system of claim 9, wherein the pump has 4.5 inch diameter plungers with an eight inch stroke.

11. (Original) The system of claim 8, wherein the electric motor has a maximum continuous power output of about 1750 brake horsepower or more.

12. (Original) The system of claim 11, wherein the electric motor has a maximum continuous torque of about 8750 lb-ft or more.

13. (Original) The system of 12, wherein the electric motor has a high temperature rating of about 1100 degrees C or more.

14. (Original) The system of 13, wherein the shaft of the electric motor is composed of 4340 alloy steel.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 241

15. (Currently Amended) The system of claim 8, wherein the variable frequency drive frequently performs electric motor diagnostics to prevent damage to the electric motor if it becomes grounded or shorted.

16-17. (Cancelled)

18. (Currently Amended) A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation, the system comprising:

a trailer for attachment to a truck;

two or more electric pumps attached to the trailer and fluidly connected to the well, the electric pumps configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the formation, and fractures the formation;

one or more electric motors attached to the electric pumps to drive the pumps, the electric motors attached to the trailer; and

a variable frequency drive connected to the electric motor to control the speed of the motor, wherein the variable frequency drive has one or more power semiconductor heat sinks having thermal sensors monitored by a microprocessor to prevent damage caused by excessive heat.

~~a natural gas powered generator for connection to the electric motor that provides electric power to the electric motor.~~

19. (Cancelled)

20. (Original) The system of claim 18, further comprising:

a skid to which at least one of the electric pumps, the one or more electric motors, and the variable frequency drives are attached.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 242

21. (New) The system of claim 1, further comprising:

a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps.

22. (New) The system of claim 21, wherein at least some of the plurality of generators are powered by natural gas.

23. (New) The system of claim 21, wherein at least some of the plurality of generators are turbine generators.

24. (New) The system of claim 21, wherein the electric pumps and generators are mounted on vehicles, and can be ported from one well to another.

25. (New) The system of claim 21, wherein the vehicles are trucks having at least five axles.

26. (New) The system of claim 8, further comprising:

a natural gas powered generator connected to the electric motor that provides electric power to the electric motor.

27. (New) The system of claim 26, wherein the natural gas powered generator is a turbine generator.

28. (New) The system of claim 18, further comprising:

a natural gas powered generator for connection to the electric motor that provides electric power to the electric motor.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 243

REMARKS

Applicants and the undersigned thank Examiner for providing a thorough review of the pending application. Claims 1, 4, 5, 9-15, 18, and 20-28 are pending in the application. Claims 1, 8, 15, and 18 have been amended. Claims 2, 3, 6, 7, 16, 17, and 19 have been cancelled. Claims 21-28 are new. No new matter has been introduced in the amendments.

In the Office Action, the Examiner rejected claims 1, 3-8, 13-16, and 18-20 as obvious over U.S. Patent No. 3,722,595 to Kiel ("*Kiel*") in view of U.S. Patent No. 5,865,247 to Paterson et al. ("*Paterson*"). The Examiner further rejected claim 2 over *Kiel* in view of *Paterson*, and further in view of U.S. Patent Appln. Pub. No. 2007/0201305 to Heilman et al. ("*Heilman*"), claims 9-12 over *Kiel* in view of *Paterson*, and further in view of U.S. Patent No. 7,845,413 to Shampine et al. ("*Shampine*"), and claims 8 and 17 over *Paterson* in view of *Kiel*, and further in view of U.S. Patent No. 7,312,593 to Streicher et al. ("*Streicher*"). In the Application, claims 1, 8, and 18 are written in independent form.

I. Claims 1, 8, and 18 are patentable because the prior art cited by the Examiner does not describe a variable frequency drive having one or more power semiconductor heat sinks having thermal sensors monitored by a microprocessor to prevent damage caused by excessive heat.

Applicants have amended claims 1, 8, and 18 to recite a variable frequency drive that has one or more power semiconductor heat sinks having thermal sensors monitored by a microprocessor to prevent damage caused by excessive heat. This feature was previously recited in claim 17, which has been cancelled. This feature is advantageous because the electric motors of the technology described in the patent application can operate in harsh environments, and drive large pumps used to pump hydraulic fracturing fluid into a well at high pressures. External conditions at a well site, as well as high pressures within the well, can lead to heavy loads on the electric motors driving the pumps. With such heavy loads comes a risk of overheating. Use of

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 244

the semiconductor heat sinks with thermal sensors helps to monitor the temperatures associated with the motors, so the motors can be protected from damage due to excessive heat. These features are not described in the prior art relied on by the Examiner.

For example, in the Office Action, the Examiner relies on *Streicher* as describing this feature. The apparatus of *Streicher*, however, is much different than that of the present claims, and includes a temperature sensor 20 that is monitored while the electric motor is inactive. As described in *Streicher*, "[a] controller 24 monitors the temperature signal from the temperature sensor 20, [and] determines if the temperature is below a first predetermined setpoint." *See Streicher* at column 3 lines 22-25. If the temperature is below the predetermined setpoint, a heater resistor is connected and acts as a heat source to add head to the motor components. Thus, the AC drive of *Streicher* "can be mounted in a low temperature environment, and left in an idle state." *Id.* at column 3, lines 37-38.

In other words, *Streicher* describes exactly the opposite structure of that claimed in claims 1, 8, and 18, for the purpose of carrying out the opposite function. That is, *Streicher* describes a temperature sensor connected to a heater for heating a motor in cold conditions, while claims 1, 8, and 18 recite thermal sensors monitored by a microprocessor to prevent damage caused by excessive heat. Thus, *Streicher* does not render obvious claims 1, 8, and 18.

II. Dependent Claims

Dependent claims 4, 5, 9-15, and 20-28 are allowable by virtue of their dependency on at least one of the independent claims, as well as for other patentable features recited therein.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 245

CONCLUSION

The foregoing remarks are intended to assist the Examiner in re-examining the application and in the course of explanation may employ shortened or more specific or variant descriptions of some of the claim language. Such descriptions are not intended to limit the scope of the claims; the actual claim language should be considered in each case. Furthermore, the remarks are not to be considered to be exhaustive of the facets of the invention, which render it patentable, being only examples of certain advantageous features and differences that Applicants' attorney chooses to mention at this time. It is respectfully submitted that the claims are now in condition for allowance and favorable action is respectfully requested.

Respectfully submitted,

Date: 2/26/15

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HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 246

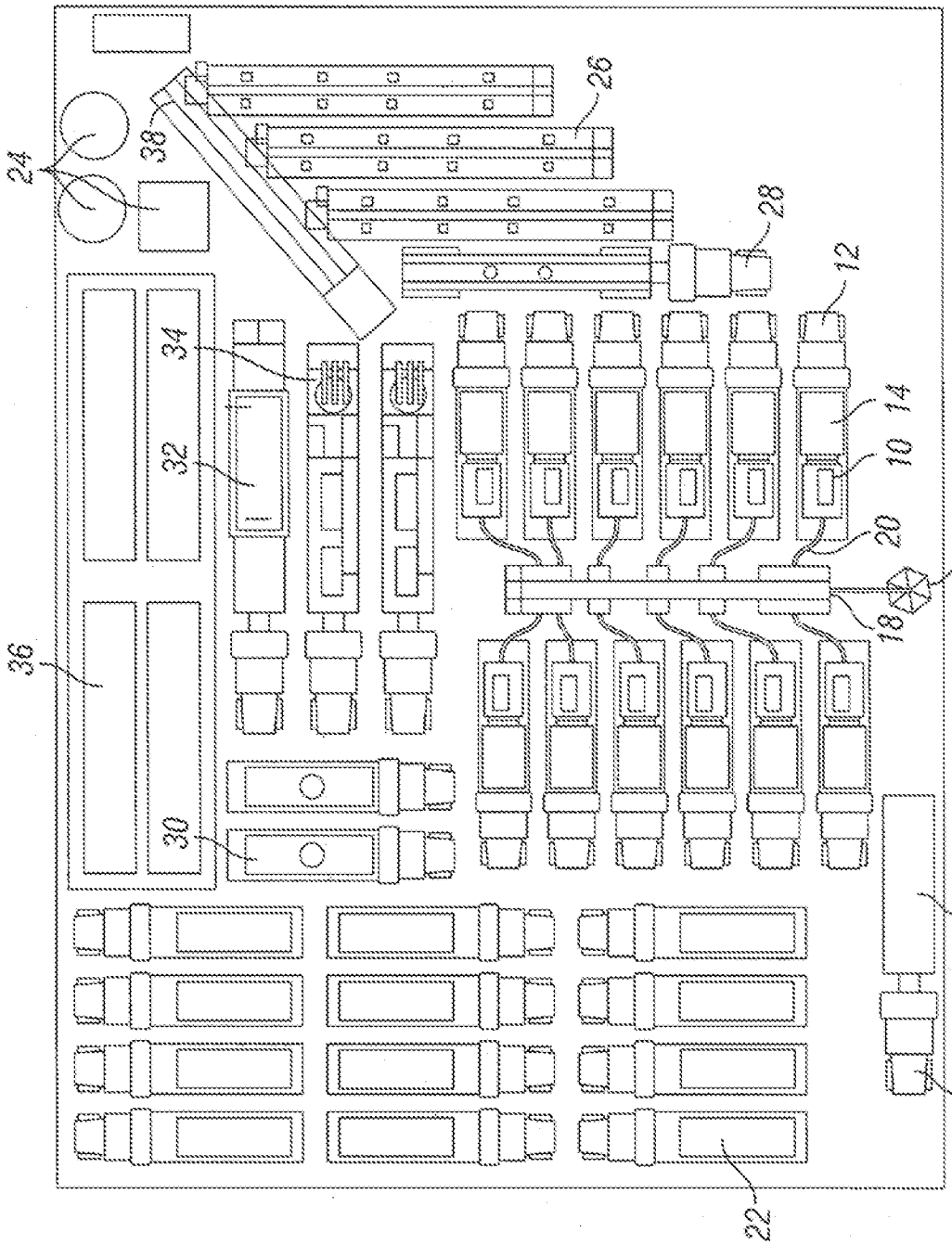


FIG. 1

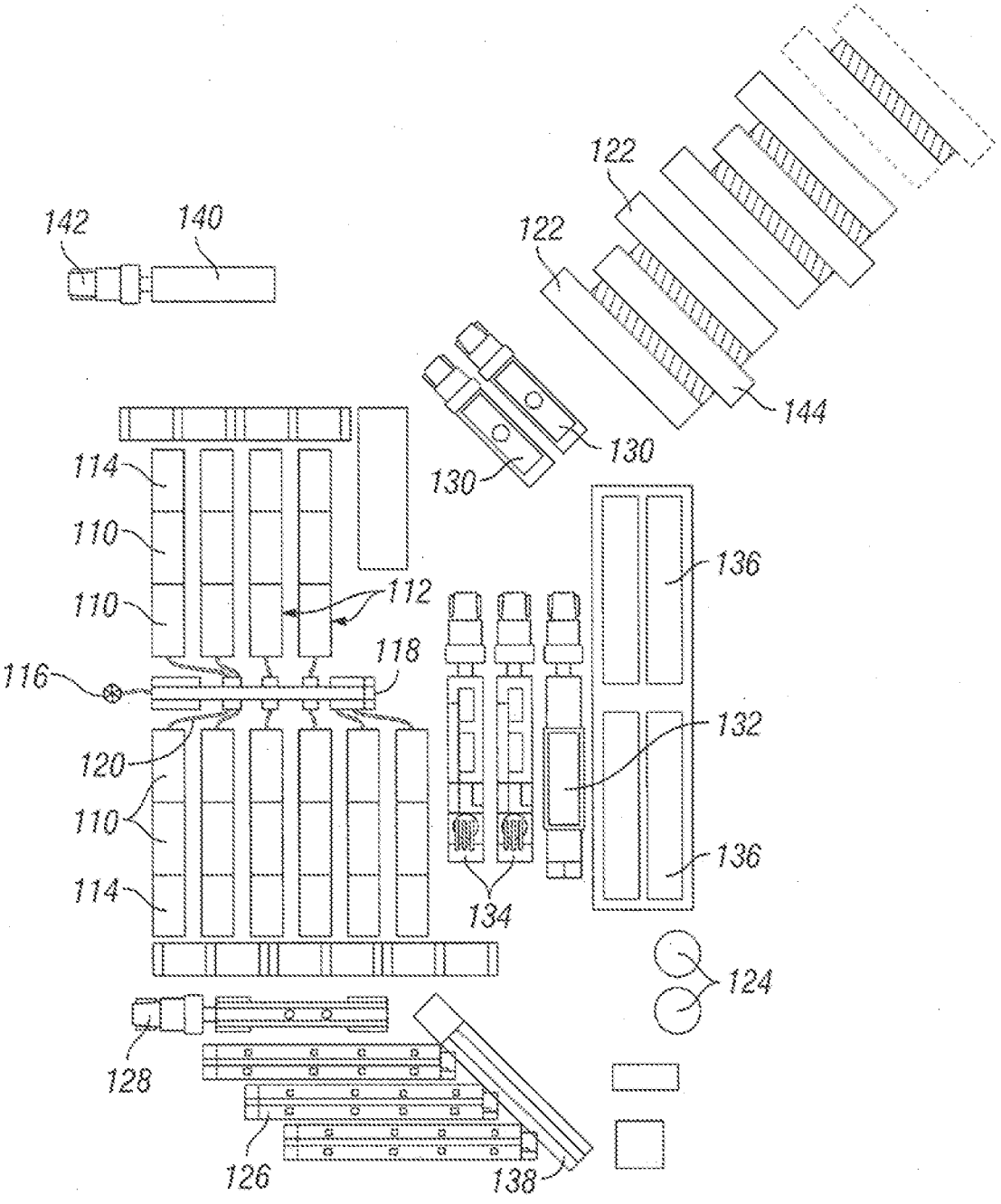

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FIG. 2

Electronic Acknowledgement Receipt

EFS ID:	21605271
Application Number:	13679689
International Application Number:	
Confirmation Number:	5345
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Customer Number:	35979
Filer:	Taylor P. Evans/Abby Derrickson
Filer Authorized By:	Taylor P. Evans
Attorney Docket Number:	085055.000003
Receipt Date:	26-FEB-2015
Filing Date:	16-NOV-2012
Time Stamp:	11:14:19
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Response.pdf	1380044 0bbe334efeb5899507e3d5793d9bbf3e24154925	yes	11

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment Copy Claims/Response to Suggested Claims	1	6
	Applicant Arguments/Remarks Made in an Amendment	7	9
	Drawings-only black and white line drawings	10	11
Warnings:			
Information:			
	Total Files Size (in bytes):	1380044	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/679,689	Filing Date 11/16/2012	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	02/26/2015	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 21	Minus	** 20	= 1	X $40 =	40
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $210 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	**40**

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

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This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/679,689	11/16/2012	Joel N. Broussard	085055.000003	5345

35979 7590 12/03/2014

Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

EXAMINER
THOMPSON, KENNETH L

ART UNIT	PAPER NUMBER
3676	

NOTIFICATION DATE	DELIVERY MODE
12/03/2014	ELECTRONIC

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

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@bgllp.com

Office Action Summary	Application No. 13/679,689	Applicant(s) BROUSSARD ET AL.	
	Examiner KENNETH L. THOMPSON	Art Unit 3676	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-20* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-20* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *16 November 2012* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 254

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Claim Rejections - 35 USC § 103

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3-8, 13-16 and 18-20 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Kiel, U.S. 3,722,595 in view of Paterson et al., U.S. 5,865,247.

Kiel discloses a system for hydraulically fracturing (col. 1, lines 10-15) an underground formation with a system having a plurality pumps (20, 21, 22) to pump fluid into the wellbore at high pressure to fracture the formation; and a plurality of engines (turbine or diesel; col. 8, lines 55-60) connected to the plurality of pumps (20, 21, 22) to provide power to the pumps.

Kiel does not disclose electric pumps driven by a generator.

Paterson et al. teaches use of system for injecting into a formation (col. 2, lines 43-46) using a plurality of electric pumps (45, 78) fluidly connected to the well driven by a plurality of generators (75, 76; col. 8, lines 48-54).

It would have been obvious to one having ordinary skill in the art at the time of the invention to substitute one known method of powering a pump disclosed by Kiel to another as taught by Paterson et al. to achieve predictable results.

Paterson et al. teaches use of an AC variable speed electric drive motor (col. 7, lines 4-11).

Kiel discloses the system is truck mounted (col. 8, lines 55-58) and Paterson teaches the system mounted on a trailer (col. 3, lines 53-63). The Examiner makes official notice that a truck or trailer may have a plurality of axles.

Paterson et al. is silent regarding the material of the electrical motors (45) allowing for the claimed temperature range.

However it would have been obvious to one having ordinary skill in the art at the time of the invention to construct an electrical motor capable of withstanding conditions since the selection of a known material based upon its suitability for the intended use is a design consideration within the skill of the art. In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Paterson et al. teaches use a control or diagnostic system (col. 11, line 53 – col. 12, line 5).

Claim 2 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Kiel, U.S. 3,722,595 in view of Paterson et al., U.S. 5,865,247 as applied to claim 1 above, and further in view of Heilman et al., U.S. 2007/0201305.

Kiel in view of Paterson disclose all the claimed limitations including diesel power for the pumps but does not disclose use of natural gas.

Heilman et al. teaches use of natural gas power unit (103 [0023]) for powering a pump [0033].

It would have been obvious to one having ordinary skill in the art at the time of the invention to substitute one known fuel as disclosed by Kiel and Paterson et al. for another as taught by Heilman et al. to achieve predictable results.

Claim 9-12 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Kiel, U.S. 3,722,595 in view of Paterson et al., U.S. 5,865,247 as applied to claim 8 above, and further in view of Shampine et al., U.S. 7,845,413.

Kiel discloses pumps but does not discloses the pump is a triplex or a quinteplex pump rated at about 2250 hydraulic horsepower or more.

Shampine et al. teaches that the use of a triplex or a quinteplex pump (col. 1, lines 4253) rated at about 2250 hydraulic horsepower (col. 4, lines 25-39) or more is well known wherein the 10,000 horsepower would convert to 8,750 lb-ft at the correct revolutions per minute.

It would have been obvious to one having ordinary skill in the art at the time of the invention to substitute one known pump as disclosed by Kiel et al. for another as taught by Shampine et al. to achieve predictable results.

Shampine teaches use of a plunger pump but does not mention the size, 4.5 inch diameter plungers nor an eight inch stroke.

However it would have been obvious to one having ordinary skill in the art at the time of the invention to arrange a plunger to have the dimension as claimed since a change in the size of a prior art device is a design consideration within the skill of the art. In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955).

Claims 8 and 17 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over in view of Paterson et al., U.S. 5,865,247 in view of Kiel, U.S. 3,722,595 and further in view of Streicher et al., U.S. 7,312,593.

Paterson et al. teaches use of system for injecting into a formation (col. 2, lines 43-46) using a plurality of electric pumps (45, 78) fluidly connected to the well driven by a plurality of generators (75, 76; col. 8, lines 48-54).

Paterson does not specifically state fracturing.

Kiel teaches use of a system for hydraulically fracturing (col. 1, lines 10-15) an underground formation with a system having a plurality pumps (20, 21, 22) to pump fluid into the wellbore at high pressure to fracture the formation; and a plurality of engines (turbine or diesel; col. 8, lines 55-60) connected to the plurality of pumps (20, 21, 22) to provide power to the pumps.

It would have been obvious to one having ordinary skill in the art at the time of the invention to substitute one known method of injection disclosed by Paterson et al. for another as taught by Kiel to fracture a particular formation to achieve predictable results.

Paterson et al. discloses all the claimed limitations including a variable drive motor as note above but does not discloses power semiconductor heat sinks having one or more thermal sensors monitored by a microprocessor to prevent semiconductor damage caused by excessive heat.

Streicher et al. teaches use of a variable drive (12; col. 2, lines 45-62) including power semiconductor (SCR) heat sinks (30) having one or more thermal sensors (20) monitored by a microprocessor (24) to prevent semiconductor damage caused by excessive heat to provide thermal regulation of the AC drive when subjected to cold temperatures in order to prevent condensation of moisture in the air or to ensure that the components of the AC drive are maintained within an operational temperature range.

It would have been obvious to one having ordinary skill in the art at the time of the invention to arrange for the variable speed motors disclosed by Paterson et al. to have the protectiohn system as taught by Streicher et al. to achieve predictable results.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KENNETH L. THOMPSON whose telephone number is (571)272-7037. The examiner can normally be reached on 6:30-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shane Bomar can be reached on 571-272-7026. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

28 November 2014

/KENNETH L THOMPSON/
Primary Examiner, Art Unit 3676

Notice of References Cited	Application/Control No. 13/679,689	Applicant(s)/Patent Under Reexamination BROUSSARD ET AL.	
	Examiner KENNETH L. THOMPSON	Art Unit 3676	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2,248,051 A	07-1941	ARMSTRONG EDWARD R	405/208
*	B	US-3,722,595 A	03-1973	Kiel, Othar M.	166/308.4
*	C	US-5,865,247 A	02-1999	Paterson et al.	166/252.1
*	D	US-2007/0201305 A1	08-2007	Heilman et al.	366/141
*	E	US-2010/0132949 A1	06-2010	DeFosse et al.	166/308.1
*	F	US-7,845,413 B2	12-2010	Shampine et al.	166/369
*	G	US-2011/0272158 A1	11-2011	Neal, Kenneth Gregory	166/305.1
*	H	US-2012/0085541 A1	04-2012	Love et al.	166/308.1
*	I	US-2012/0205301 A1	08-2012	McGuire et al.	210/151
*	J	US-2014/0251623 A1	09-2014	LESTZ et al.	166/308.2
*	K	US-7,312,593	12-2007	Streicher et al.	318/473
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
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*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 261

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	13/679,689
Filing Date	2012-11-16
First Named Inventor	Joel N. Broussard
Art Unit	
Examiner Name	
Attorney Docket Number	085056.000003

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20140010671	A1	2014-01-09	CRYER ET AL.	
	2	20130306322		2013-11-00	SANBORN ET AL	

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HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 262

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	13/679,689
	Filing Date	2012-11-16
	First Named Inventor	Joel N. Broussard
	Art Unit	
	Examiner Name	
	Attorney Docket Number	085055.000003

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
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Examiner Signature	/Kenneth Thompson/	Date Considered	11/28/2014

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Art Unit	
Examiner Name	
Attorney Docket Number	085056.000003

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Taylor P. Evans/	Date (YYYY-MM-DD)	2014-05-28
Name/Print	Taylor P. Evans	Registration Number	60506

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 264

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13679689	BROUSSARD ET AL.
	Examiner	Art Unit
	KENNETH L THOMPSON	3676

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
166	308.1, 177.5	11/28/2014	KT

SEARCH NOTES		
Search Notes	Date	Examiner

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 265

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First Named Inventor	Broussard, Joel N.
Art Unit	3676
Examiner Name	
Attorney Docket Number	085055.000003

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	1	20120255734	A1	2012-10-11	Coli et al.	

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	Art Unit	3676
	Examiner Name	
	Attorney Docket Number	085055.000003

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EXAMINER SIGNATURE

Examiner Signature	/Kenneth Thompson/	Date Considered	11/28/2014

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HALLIBURTON EXHIBIT 1004
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	Attorney Docket Number	085055.000003

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☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Taylor P. Evans/	Date (YYYY-MM-DD)	2013-03-01
Name/Print	Taylor P. Evans	Registration Number	60506

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /KT/

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 268

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /KT/

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 269

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	13/679,689
Filing Date	2012-11-16
First Named Inventor	Joel N. Broussard
Art Unit	
Examiner Name	
Attorney Docket Number	085056.000003

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20140010671	A1	2014-01-09	CRYER ET AL.	
	2	20130306322		2013-11-00	SANBORN ET AL	

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FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐

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NON-PATENT LITERATURE DOCUMENTS

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 270

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	13/679,689
	Filing Date	2012-11-16
	First Named Inventor	Joel N. Broussard
	Art Unit	
	Examiner Name	
	Attorney Docket Number	085055.000003

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		☐

If you wish to add additional non-patent literature document citation information please click the Add button

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 271

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	13/679,689
Filing Date	2012-11-16
First Named Inventor	Joel N. Broussard
Art Unit	
Examiner Name	
Attorney Docket Number	085056.000003

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Taylor P. Evans/	Date (YYYY-MM-DD)	2014-05-28
Name/Print	Taylor P. Evans	Registration Number	60506

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Electronic Acknowledgement Receipt

EFS ID:	19148923
Application Number:	13679689
International Application Number:	
Confirmation Number:	5345
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Customer Number:	35979
Filer:	Taylor P. Evans/Abby Derrickson
Filer Authorized By:	Taylor P. Evans
Attorney Docket Number:	085055.000003
Receipt Date:	28-MAY-2014
Filing Date:	16-NOV-2012
Time Stamp:	16:03:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	IDS.pdf	547779 98986e06f38a5819feaa01fe3208cee1a1a21858	no	3

Warnings:	
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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/679,689	11/16/2012	Joel N. Broussard	085055.000003

CONFIRMATION NO. 5345

35979
Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

PUBLICATION NOTICE

OC00000068591740

Title: System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps

Publication No.US-2014-0138079-A1
Publication Date:05/22/2014

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 275

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/679,689	11/16/2012	Joel N. Broussard	085055.000003

CONFIRMATION NO. 5345

POA ACCEPTANCE LETTER

35979
Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

OC00000059775432

Date Mailed: 03/15/2013

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/01/2013.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/hsarwari/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 276

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	13679689
Filing Date	2012-11-16
First Named Inventor	Broussard, Joel N.
Art Unit	3676
Examiner Name	
Attorney Docket Number	085055.000003

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20120255734	A1	2012-10-11	Coli et al.	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	First Named Inventor	Broussard, Joel N.
	Art Unit	3676
	Examiner Name	
	Attorney Docket Number	085055.000003

	1		☐

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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	Art Unit	3676
	Examiner Name	
	Attorney Docket Number	085055.000003

CERTIFICATION STATEMENT

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OR

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☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

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Signature	/Taylor P. Evans/	Date (YYYY-MM-DD)	2013-03-01
Name/Print	Taylor P. Evans	Registration Number	60506

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	15097899
Application Number:	13679689
International Application Number:	
Confirmation Number:	5345
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Customer Number:	35979
Filer:	Taylor P. Evans/Sharanda Mozart
Filer Authorized By:	Taylor P. Evans
Attorney Docket Number:	085055.000003
Receipt Date:	01-MAR-2013
Filing Date:	16-NOV-2012
Time Stamp:	17:37:06
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	13679689_POA_by_Applicant.pdf	146690 ea779098c7a10dbdcc824838890995a268323288	no	1

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	13679689_IDS.pdf	612417 3d2e391341320d05a805f3446f0b4674e044a1d9	no	4

Warnings:	
Information:	
Total Files Size (in bytes):	759107

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

POWER OF ATTORNEY BY APPLICANT

This Power of Attorney by Applicant is directed to the application titled **SYSTEM FOR PUMPING HYDRAULIC FRACTURING FLUID USING ELECTRIC PUMPS**, (check one)

____ the application of which is attached hereto;

_X_ the US Application No. 13/679,689 filed on 11/16/2012; or

___ the PCT International Appl. No._____ filed on _____.

I hereby revoke all previous powers of attorney given in the above-identified application.

I hereby appoint the practitioners associated with Bracewell & Giuliani LLP's U.S. Patent and Trademark Office **Customer No. 35979** as my/our attorney(s) or agent(s), and to transact all business in the U.S. Patent and Trademark Office connected therewith for the application referenced above.

Please **direct all correspondence** to the address associated with:

U.S. Patent and Trademark Office **Customer No. 35979**

In the event of questions, the attorney in charge can be reached at constance.rhebergen@bgllp.com or (713) 221-3306.

I am the Applicant's Assignee or Person to Whom the Inventor is Under an Obligation to Assign.

SIGNATURE: _____ DATE: 8/1/2013

NAME: **Brian R. Stewart**

TITLE: **President & CEO**

COMPANY: **U.S. Well Services LLC**

#4249619 1

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 13/679,689

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	98		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	310		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	125		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*	x 31 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 125 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	533		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/679,689	11/16/2012	3676	533	085055.000003	20	3

CONFIRMATION NO. 5345

35979
Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

FILING RECEIPT

OC00000058087086

Date Mailed: 12/24/2012

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Joel N. Broussard, Lafayette, LA;
Jeff McPherson, Spring, TX;
Robert Kurtz, Fairmont, WV;

Applicant(s)

US Well Services LLC, Houston, TX

Assignment For Published Patent Application

US Well Services LLC, Houston, TX

Power of Attorney: None

Domestic Applications for which benefit is claimed - None.
A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 12/10/2012
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/679,689**

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 285

Projected Publication Date: 05/22/2014

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps

Preliminary Class

166

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 286

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage, facilitate, and accelerate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

HALLIBURTON EXHIBIT 1004

Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 287

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/679,689	11/16/2012	Joel N. Broussard	085055.000003

CONFIRMATION NO. 5345

IMPROPER CPOA LETTER

35979
Bracewell & Giuliani LLP
P.O. Box 61389
Houston, TX 77208-1389

OC00000058087084

Date Mailed: 12/24/2012

NOTICE REGARDING POWER OF ATTORNEY

This is in response to the power of attorney filed 11/16/2012. The power of attorney in this application is not accepted for the reason(s) listed below:

- The power of attorney from the inventors has not been accepted because the power of attorney must be signed by the applicant for patent. See 37 CFR 1.32(b)(4).

/sfu/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 288

Docket No. 085055.000003

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As the below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below my name.

I believe that I am the original and first inventor of the subject matter, which is claimed and for which a patent is sought on the invention titled **SYSTEM FOR PUMPING HYDRAULIC FRACTURING FLUID USING ELECTRIC PUMPS**, the specification of which is filed HEREWITH.

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States application(s) listed below:

SERIAL NUMBER	DATE FILED

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

The application was made or authorized by me.

I acknowledge the duty to disclose information that is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Sec. 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, Sec. 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN APPLICATION(S)

SERIAL NUMBER	COUNTRY	DATE FILED	PRIORITY CLAIMED

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 289

paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) that occurred between the filing date of the prior application and the national or PCT international filing date of this application:

PCT APPLICATION NO. PCT FILING DATE

POWER OF ATTORNEY

I hereby appoint the attorneys associated with Bracewell & Giuliani LLP's U.S. Patent and Trademark Office Customer No. **35979** to prosecute this application and to transact all business in the U.S. Patent and Trademark Office in connection therewith.

Please **direct all correspondence** to the address associated with:

U.S. Patent and Trademark Office Customer No. **35979**

In the event of questions, the attorney in charge can be reached at constance.rhebergen@bgllp.com or (713) 221-3306.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made 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, or both, under Sec. 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the publication or any patent issued thereon.

INVENTOR'S NAME: Joel Broussard

SIGNATURE: Joel M Broussard

DATE: November 15, 2012

RESIDENCE ADDRESS: 117 Oak Terrace Drive, Lafayette, LA 70508

COUNTRY OF CITIZENSHIP: U.S.

POST OFFICE ADDRESS: N/A

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 290

INVENTOR'S NAME: Jeff McPherson

SIGNATURE: _____

DATE: 11/13/12

RESIDENCE ADDRESS: 25818 Over Lake DR, Spring TX 77380

COUNTRY OF CITIZENSHIP: U.S.

POST OFFICE ADDRESS: _____

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 291

INVENTOR'S NAME: Robert Kurtz

SIGNATURE: Robert Kurtz

DATE: 11-9-12

RESIDENCE ADDRESS: RT 7 573-I Fairmont W.V.

COUNTRY OF CITIZENSHIP: U.S.

POST OFFICE ADDRESS: _____

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 292

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Filer:	Taylor P. Evans/Sharanda Mozart
Attorney Docket Number:	085055.000003

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	98	98
Utility Search Fee	2111	1	310	310
Utility Examination Fee	2311	1	125	125
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**533**

Electronic Acknowledgement Receipt

EFS ID:	14254802
Application Number:	13679689
International Application Number:	
Confirmation Number:	5345
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Customer Number:	35979
Filer:	Taylor P. Evans/Sharanda Mozart
Filer Authorized By:	Taylor P. Evans
Attorney Docket Number:	085055.000003
Receipt Date:	16-NOV-2012
Filing Date:	
Time Stamp:	17:52:11
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$533
RAM confirmation Number	5770
Deposit Account	500259
Authorized User	EVANS, TAYLOR P.

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees) Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees) Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	085055_003_ADS.pdf	1063844 ce723bee1c8e64e3d46bfb96000ee25863b94c9f	no	6
Warnings:					
Information:					
2	Specification	085055_003_NonProv_App1.pdf	54558 8f6d745c083716f0556127aa5bad0a0406cafbaf	no	20
Warnings:					
Information:					
3	Drawings-only black and white line drawings	085055_003_Drawings.pdf	61829 380eefab3c1a40e530aa5006509f7d53b1b33cec	no	2
Warnings:					
Information:					
4	Oath or Declaration filed	085055_003_Dec_POA.pdf	142247 25fe4d53a28df2c0338e499ba5f24017dd09a8f8	no	4
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	32533 42a4d7254d781860ab0046d4e99acc4ec2cc0c41	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1355011		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/14 (08-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	085055.000003
	Application Number	
Title of Invention	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Joel	N.	Broussard	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Lafayette	State/Province	LA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	117 Oak Terrace Drive
Address 2	

City	Lafayette	State/Province	LA
Postal Code	70508	Country i	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Jeff		McPherson	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Spring	State/Province	TX	Country of Residence i	US

Mailing Address of Inventor:

Address 1	25818 Overlake Dr.
Address 2	

City	Spring	State/Province	TX
Postal Code	77380	Country i	US

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Robert		Kurtz	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

PTO/AIA/14 (08-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	085055.000003
	Application Number	
Title of Invention	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps	

City	Fairmont	State/Province	WV	Country of Residence i	US

Mailing Address of Inventor:

Address 1	Rt. 7, 573 - I		
Address 2			
City	Fairmont	State/Province	WV
Postal Code		Country i	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	35979		
Email Address	docketing@bgllp.com	Add Email	Remove Email

Application Information:

Title of the Invention	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps		
Attorney Docket Number	085055.000003	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	2	Suggested Figure for Publication (if any)	1

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

PTO/AIA/14 (08-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	085055.000003
	Application Number	
Title of Invention	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps	

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	35979		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

Remove

Application Number	Country i	Filing Date (YYYY-MM-DD)	Priority Claimed
			◉ Yes ○ No

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

PTO/AIA/14 (08-12)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	085055.000003
	Application Number	
Title of Invention	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps	

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Name of the Deceased or Legally Incapacitated Inventor :	

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PTO/AIA/14 (08-12)
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ATTORNEY DOCKET NO. 085055.000003

PATENT APPLICATION

TITLED:

SYSTEM FOR PUMPING HYDRAULIC FRACTURING FLUID USING ELECTRIC PUMPS

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HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 304

SYSTEM FOR PUMPING HYDRAULIC FRACTURING FLUID USING ELECTRIC PUMPS

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] This technology relates to hydraulic fracturing in oil and gas wells. In particular, this technology relates to pumping fracturing fluid into an oil or gas well using pumps powered by electric motors.

2. Brief Description of Related Art

[0002] Hydraulic fracturing has been used for decades to stimulate production from conventional oil and gas wells. The practice consists of pumping fluid into a wellbore at high pressure. Inside the wellbore, the fluid is forced into the formation being produced. When the fluid enters the formation, it fractures, or creates fissures, in the formation. Water, as well as other fluids, and some solid proppants, are then pumped into the fissures to stimulate the release of oil and gas from the formation.

[0003] Fracturing rock in a formation requires that the fracture fluid be pumped into the wellbore at very high pressure. This pumping is typically performed by large diesel-powered pumps. Such pumps are able to pump fracturing fluid into a wellbore at a high enough pressure to crack the formation, but they also have drawbacks. For example, the diesel pumps are very heavy, and thus must be moved on heavy duty trailers, making transport of the pumps between oilfield sites expensive and inefficient. In addition, the diesel engines required to drive the pumps require a relatively high level of expensive maintenance. Furthermore, the cost of diesel fuel is much higher than in the past, meaning that the cost of running the pumps has increased.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 305

[0004] What is needed therefore, is a pump system for hydraulic fracturing fluid that overcomes the problems associated with diesel pumps.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 306

SUMMARY OF THE INVENTION

[0005] Disclosed herein is a system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation. The system includes a plurality of electric pumps fluidly connected to the well, and configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the formation, and fractures the formation. The system also includes a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps. At least some of the plurality of generators can be powered by natural gas. In addition, at least some of the plurality of generators can be turbine generators.

[0006] In one embodiment, the system further includes an A/C console and a variable frequency drive that controls the speed of the pumps. Furthermore, the electric pumps, as well as the electric generators, can be mounted on vehicles, and can be ported from one well to another. The vehicles can be trucks and can have at least five axles.

[0007] Further disclosed herein is a system for fracturing a rock formation in an oil or gas well by pumping hydraulic fracturing fluid into the well that includes a pump, an electric motor, a variable frequency drive, and a natural gas powered electric generator. The pump is configured for pumping the hydraulic fracturing fluid into the well, and then from the well into the formation, and is capable of pumping the hydraulic fracturing fluid at high pressure to crack the formation. The electric motor can have a high-strength steel or steel alloy shaft attached to the pump and configured to drive the pump. The variable frequency drive can be connected to the electric motor to control the speed of the motor. In addition, the natural gas powered generator,

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 307

which can be a turbine generator, can be connected to the electric motor and provide electric power to the electric motor.

[0008] In one embodiment, the pump can be a triplex or a quinteplex pump, optionally rated at about 2250 hydraulic horsepower or more. In addition, the pump can also have 4.5 inch diameter plungers with an eight inch stroke. In another embodiment, the electric motor can have a maximum continuous power output of about 1500 brake horsepower, 1750 brake horsepower, or more, and a maximum continuous torque of about 8750 lb-ft or more. Furthermore, the electric motor can have a high temperature rating of about 1100 degrees C or more, and a shaft composed of 4340 alloy steel.

[0009] In another embodiment, variable frequency drive can frequently perform electric motor diagnostics to prevent damage to the electric motor if it becomes grounded or shorted. In addition, the variable frequency drive can include power semiconductor heat sinks having one or more thermal sensors monitored by a microprocessor to prevent semiconductor damage caused by excessive heat.

[0010] Also disclosed herein is a system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation. The system includes a trailer for attachment to a truck. Two or more electric pumps can be attached to the trailer and are fluidly connected to the well, the electric pumps configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the formation, and fractures the formation. One or more electric motors are attached to the electric pumps to drive the pumps. The electric motors can also be attached to the trailer. A natural gas powered generator is provided for connection to the electric motor to provide electric power to the electric motor. The

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 308

system of claim can further include a variable frequency drive attached to the trailer and connected to the electric motor to control the speed of the motor. In addition, the system can include a skid to which at least one of the electric pumps, the one or more electric motors, and the variable frequency drives are attached.

[0011] Also disclosed herein is a process for stimulating an oil or gas well by hydraulically fracturing a formation in the well. The process includes the steps of pumping fracturing fluid into the well with an electrically powered pump at a high pressure so that the fracturing fluid enters and cracks the formation, the fracturing fluid having at least a liquid component and a solid proppant, and inserting the solid proppant into the cracks to maintain the cracks open, thereby allowing passage of oil and gas through the cracks. The process can further include powering the electrically powered pump with a natural gas generator, such as, for example, a turbine generator.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 309

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The present technology will be better understood on reading the following detailed description of nonlimiting embodiments thereof, and on examining the accompanying drawing, in which:

[0013] Fig. 1 is a schematic plan view of equipment used in a hydraulic fracturing operation, according to an embodiment of the present technology; and

[0014] Fig. 2 is a schematic plan view of equipment used in a hydraulic fracturing operation, according to an alternate embodiment of the present technology.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 310

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0015] The foregoing aspects, features, and advantages of the present technology will be further appreciated when considered with reference to the following description of preferred embodiments and accompanying drawing, wherein like reference numerals represent like elements. In describing the preferred embodiments of the technology illustrated in the appended drawing, specific terminology will be used for the sake of clarity. However, the technology is not intended to be limited to the specific terms used, and it is to be understood that each specific term includes equivalents that operate in a similar manner to accomplish a similar purpose.

[0016] Fig. 1 shows a plan view of equipment used in a hydraulic fracturing operation. Specifically, there is shown a plurality of pumps 10 mounted to pump vehicles 12. The pump vehicles 12 can be trucks having at least five axles. In the embodiment shown, the pumps 10 are powered by electric motors 14, which can also be mounted to the pump vehicles 12. The pumps 10 are fluidly connected to the wellhead 16 via the missile 18. As shown, the pump vehicles 12 can be positioned near enough to the missile 18 to connect fracturing fluid lines 20 between the pumps 10 and the missile 18. The missile 18 is then connected to the wellhead 16 and configured to deliver fracturing fluid provided by the pumps 10 to the wellhead 16.

[0017] In some embodiments, each electric motor 14 can be capable of delivering about 1500 brake horsepower (BHP), 1750 BHP, or more, and each pump 10 can optionally be rated for about 2250 hydraulic horsepower (HHP) 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 0 degrees C or less to about 55 degrees C or more. In addition, each electric motor 14 can be equipped with a variable

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 311

frequency drive (VFD), and an A/C console, that controls the speed of the electric motor 14, and hence the speed of the pump 10.

[0018] The electric motors 14 of the present technology can be designed to withstand an oilfield environment. Specifically, some pumps 10 can have a maximum continuous power output of about 1500 BHP, 1750 BHP, or more, and a maximum continuous torque of about 8750 lb-ft or more. Furthermore, electric motors 14 of the present technology can include class H insulation and high temperature ratings, such as about 1100 degrees C or more. In some embodiments, the electric motor 14 can include a single shaft extension and hub for high tension radial loads, and a high strength 4340 alloy steel shaft, although other suitable materials can also be used.

[0019] The VFD 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 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 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.

[0020] In some embodiments, the pump 10 can optionally be a 2250 HHP triplex or quinteplex pump. The pump 10 can optionally be equipped with 4.5 inch diameter plungers that have an

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 312

eight (8) inch stroke, although other size plungers can be used, depending on the preference of the operator. The pump 10 can further include additional features to increase its capacity, durability, and robustness, including, for example, a 6.353 to 1 gear reduction, autuofrettaged steel or steel alloy fluid end, wing guided slush type valves, and rubber spring loaded packing.

[0021] In addition to the above, certain embodiments of the present technology can include a skid (not shown) for supporting some or all of the above-described equipment. For example, the skid can support the electric motor 14 and the pump 10. In addition, the skid can support the VFD. Structurally, the skid can be constructed of heavy-duty longitudinal beams and cross-members made of an appropriate material, such as, for example, steel. The skid can further include heavy-duty lifting lugs, or eyes, that can optionally be of sufficient strength to allow the skid to be lifted at a single lift point.

[0022] Referring back to Fig. 1, also included in the equipment is a plurality of electric generators 22 that are connected to, and provide power to, the electric motors 14 on the pump vehicles 12. To accomplish this, the electric generators 22 can be connected to the electric motors 14 by power lines (not shown). The electric generators 22 can be connected to the electric motors 14 via power distribution panels (not shown). In certain embodiments, the electric generators 22 can be powered by natural gas. For example, the generators can be powered by liquefied natural gas. The liquefied natural gas can be converted into a gaseous form in a vaporizer prior to use in the generators. The use of natural gas to power the electric generators 22 can be advantageous because, where the well is a natural gas well, above ground natural gas vessels 24 can already be placed on site to collect natural gas produced from the well. Thus, a portion of this natural gas can be used to power the electric generators 22, thereby reducing or eliminating the need to import fuel from offsite. If desired by an operator, the

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 313

electric generators 22 can optionally be natural gas turbine generators, such as those shown in Fig. 2.

[0023] Fig. 1 also shows equipment for transporting and combining the components of the hydraulic fracturing fluid used in the system of the present technology. In many wells, the fracturing fluid contains a mixture of water, sand or other proppant, acid, and other chemicals. Examples of fracturing fluid components include acid, anti-bacterial agents, clay stabilizers, corrosion inhibitors, friction reducers, gelling agents, iron control agents, pH adjusting agents, scale inhibitors, and surfactants. Historically, diesel has at times been used as a substitute for water in cold environments, or where a formation to be fractured is water sensitive, such as, for example, clay. The use of diesel, however, has been phased out over time because of price, and the development of newer, better technologies.

[0024] In Fig. 1, there are specifically shown sand transporting vehicles 26, an acid transporting vehicle 28, vehicles for transporting other chemicals 30, and a vehicle carrying a hydration unit 32, such as, for example, a water pump. Also shown are fracturing fluid blenders 34, which can be configured to mix and blend the components of the hydraulic fracturing fluid, and to supply the hydraulic fracturing fluid to the pumps 10. In the case of liquid components, such as water, acids, and at least some chemicals, the components can be supplied to the blenders 34 via fluid lines (not shown) from the respective component vehicles, or from the hydration unit 32. In the case of solid components, such as sand, the component can be delivered to the blender 34 by a conveyor belt 38. The water can be supplied to the hydraulic unit 32 from, for example, water tanks 36 onsite. Alternately, the water can be provided by water trucks. Furthermore, water can be provided directly from the water tanks 36 or water trucks to the blender 34, without first passing through the hydration unit 32.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 314

[0025] Pump control and data monitoring equipment 40 can be mounted on a control vehicle 42, and connected to the pumps 10, electric motors 14, blenders 34, and other downhole sensors and tools (not shown) to provide information to an operator, and to allow the operator to control different parameters of the fracturing operation. For example, the pump control and data monitoring equipment 40 can include an A/C console that controls the VFD, and thus the speed of the electric motor 14 and the pump 10. Other pump control and data monitoring equipment can include pump throttles, a pump VFD fault indicator with a reset, a general fault indicator with a reset, a main estop, a programmable logic controller for local control, and a graphics panel. The graphics panel can include, for example, a touchscreen interface.

[0026] Referring now to Fig. 2, there is shown an alternate embodiment of the present technology. Specifically, there is shown a plurality of pumps 110 which, in this embodiment, are mounted to pump trailers 112. As shown, the pumps 110 can optionally be loaded two to a trailer 112, thereby minimizing the number of trailers needed to place the requisite number of pumps at a site. The ability to load two pumps 110 on one trailer 112 is possible because of the relatively light weight of the electric pumps 110 compared to other known pumps, such as diesel pumps. In the embodiment shown, the pumps 110 are powered by electric motors 114, which can also be mounted to the pump trailers 112. Furthermore, each electric motor 114 can be equipped with a VFD, and an A/C console, that controls the speed of the motor 114, and hence the speed of the pumps 110.

[0027] In addition to the above, the embodiment of Fig. 2 can include a skid (not shown) for supporting some or all of the above-described equipment. For example, the skid can support the electric motors 114 and the pumps 110. In addition, the skid can support the VFD. Structurally, the skid can be constructed of heavy-duty longitudinal beams and cross-members made of an

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 315

appropriate material, such as, for example, steel. The skid can further include heavy-duty lifting lugs, or eyes, that can optionally be of sufficient strength to allow the skid to be lifted at a single lift point.

[0028] The pumps 110 are fluidly connected to a wellhead 116 via a missile 118. As shown, the pump trailers 112 can be positioned near enough to the missile 118 to connect fracturing fluid lines 120 between the pumps 110 and the missile 118. The missile 118 is then connected to the wellhead 116 and configured to deliver fracturing fluid provided by the pumps 110 to the wellhead 116.

[0029] Still referring to Fig. 2, this embodiment also includes a plurality of turbine generators 122 that are connected to, and provide power to, the electric motors 114 on the pump trailers 112. To accomplish this, the turbine generators 122 can be connected to the electric motors 114 by power lines (not shown). The turbine generators 122 can be connected to the electric motors 114 via power distribution panels (not shown). In certain embodiments, the turbine generators 122 can be powered by natural gas, similar to the electric generators 22 discussed above in reference to the embodiment of Fig. 1. Also included are control units 144 for the turbine generators 122.

[0030] The embodiment of Fig. 2 can include other equipment similar to that discussed above. For example, Fig. 2 shows sand transporting vehicles 126, acid transporting vehicles 128, other chemical transporting vehicles 130, hydration units 132, blenders 134, water tanks 136, conveyor belts 138, and pump control and data monitoring equipment 140 mounted on a control vehicle 142. The function and specifications of each of these is similar to corresponding elements shown in Fig. 1.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 316

[0031] Use of pumps 10, 110 powered by electric motors 14, 114 and natural gas powered electric generators 22 (or turbine generators 122) to pump fracturing fluid into a well is advantageous over known systems for many different reasons. For example, the equipment (e.g. pumps, electric motors, and generators) is lighter than the diesel pumps commonly used in the industry. The lighter weight of the equipment allows loading of the equipment directly onto a truck body. In fact, where the equipment is attached to a skid, as described above, the skid itself can be lifted on the truck body, along with all the equipment attached to the skid, in one simple action. Alternatively, and as shown in Fig. 2, trailers 112 can be used to transport the pumps 110 and electric motors 114, with two or more pumps 110 carried on a single trailer 112. Thus, the same number of pumps 110 can be transported on fewer trailers 112. Known diesel pumps, in contrast, cannot be transported directly on a truck body or two on a trailer, but must be transported individually on trailers because of the great weight of the pumps.

[0032] The ability to transfer the equipment of the present technology directly on a truck body or two to a trailer increases efficiency and lowers cost. In addition, by eliminating or reducing the number of trailers to carry the equipment, the equipment can be delivered to sites having a restricted amount of space, and can be carried to and away from worksites with less damage to the surrounding environment. Another reason that the electric pump system of the present technology is advantageous is that it runs on natural gas. Thus, the fuel is lower cost, the components of the system require less maintenance, and emissions are lower, so that potentially negative impacts on the environment are reduced.

[0033] In practice, a hydraulic fracturing operation can be carried out according to the following process. First, the water, sand, and other components are blended to form a fracturing fluid, which is pumped down the well by the electric-powered pumps. Typically, the well is designed

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 317

so that the fracturing fluid can exit the wellbore at a desired location and pass into the surrounding formation. For example, in some embodiments the wellbore can have perforations that allow the fluid to pass from the wellbore into the formation. In other embodiments, the wellbore can include an openable sleeve, or the well can be open hole. The fracturing fluid can be pumped into the wellbore at a high enough pressure that the fracturing fluid cracks the formation, and enters into the cracks. Once inside the cracks, the sand, or other proppants in the mixture, wedges in the cracks, and holds the cracks open.

[0034] Using the pump control and data monitoring equipment 40, the operator can monitor, gauge, and manipulate parameters of the operation, such as pressures, and volumes of fluids and proppants entering and exiting the well. For example, the operator can increase or decrease the ratio of sand to water as the fracturing process progresses and circumstances change.

[0035] This process of injecting fracturing fluid into the wellbore can be carried out continuously, or repeated multiple times in stages, until the fracturing of the formation is optimized. Optionally, the wellbore can be temporarily plugged between each stage to maintain pressure, and increase fracturing in the formation. Generally, the proppant is inserted into the cracks formed in the formation by the fracturing, and left in place in the formation to prop open the cracks and allow oil or gas to flow into the wellbore.

[0036] While the technology has been shown or described in only some of its forms, it should be apparent to those skilled in the art that it is not so limited, but is susceptible to various changes without departing from the scope of the technology. Furthermore, it is to be understood that the above disclosed embodiments are merely illustrative of the principles and applications of the present technology. Accordingly, numerous modifications can be made to the illustrative

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 318

embodiments and other arrangements can be devised without departing from the spirit and scope of the present technology as defined by the appended claims.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 319

What is claimed is:

1. A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation, the system comprising:

a plurality of electric pumps fluidly connected to the well, and configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the formation, and fractures the formation; and

a plurality of generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps.

2. The system of claim 1, wherein at least some of the plurality of generators are powered by natural gas.

3. The system of claim 1, wherein at least some of the plurality of generators are turbine generators.

4. The system of claim 1, further comprising:

an A/C console and a variable frequency drive that controls the speed of the pumps.

5. The system of claim 1, wherein the electric pumps are mounted on vehicles, and can be ported from one well to another.

6. The system of claim 5, wherein the generators are mounted on vehicles, and can be ported from one well to another.

7. The system of claim 6, wherein the vehicles are trucks having at least five axles.

8. A system for fracturing a rock formation in an oil or gas well by pumping hydraulic fracturing fluid into the well, the system comprising:

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 320

a pump for pumping the hydraulic fracturing fluid into the well, and then from the well into the formation, the pump capable of pumping the hydraulic fracturing fluid at high pressure to crack the formation;

an electric motor having a high-strength steel or steel alloy shaft attached to the pump and configured to drive the pump;

a variable frequency drive connected to the electric motor to control the speed of the motor; and

a natural gas powered generator connected to the electric motor that provides electric power to the electric motor.

9. The system of claim 8, wherein the pump is a triplex or a quinteplex pump rated at about 2250 hydraulic horsepower or more.

10. The system of claim 9, wherein the pump has 4.5 inch diameter plungers with an eight inch stroke.

11. The system of claim 8, wherein the electric motor has a maximum continuous power output of about 1750 brake horsepower or more.

12. The system of claim 11, wherein the electric motor has a maximum continuous torque of about 8750 lb-ft or more.

13. The system of 12, wherein the electric motor has a high temperature rating of about 1100 degrees C or more.

14. The system of 13, wherein the shaft of the electric motor is composed of 4340 alloy steel.

15. The system of 8, wherein the variable frequency drive frequently performs electric motor diagnostics to prevent damage to the electric motor if it becomes grounded or shorted.

16. The system of 15, wherein the natural gas powered generator is a turbine generator.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 321

17. The system of 8, wherein the variable frequency drive includes power semiconductor heat sinks having one or more thermal sensors monitored by a microprocessor to prevent semiconductor damage caused by excessive heat.

18. A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation, the system comprising:

a trailer for attachment to a truck;

two or more electric pumps attached to the trailer and fluidly connected to the well, the electric pumps configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the formation, and fractures the formation;

one or more electric motors attached to the electric pumps to drive the pumps, the electric motors attached to the trailer; and

a natural gas powered generator for connection to the electric motor that provides electric power to the electric motor.

19. The system of claim 18, further comprising:

a variable frequency drive attached to the trailer and connected to the electric motor to control the speed of the motor.

20. The system of claim 18, further comprising:

a skid to which at least one of the electric pumps, the one or more electric motors, and the variable frequency drives are attached.

HALLIBURTON EXHIBIT 1004
Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 322

ABSTRACT

A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation. The system includes a plurality of electric pumps fluidly connected to the well, and configured to pump fluid into the wellbore at high pressure so that the fluid passes from the wellbore into the, and fractures the formation. The system can also include a plurality of natural gas powered generators electrically connected to the plurality of electric pumps to provide electrical power to the pumps.

HALLIBURTON EXHIBIT 1004

Halliburton Energy Services, Inc. v. U.S. Well Services, LLC, IPR2023-00558, Page 323

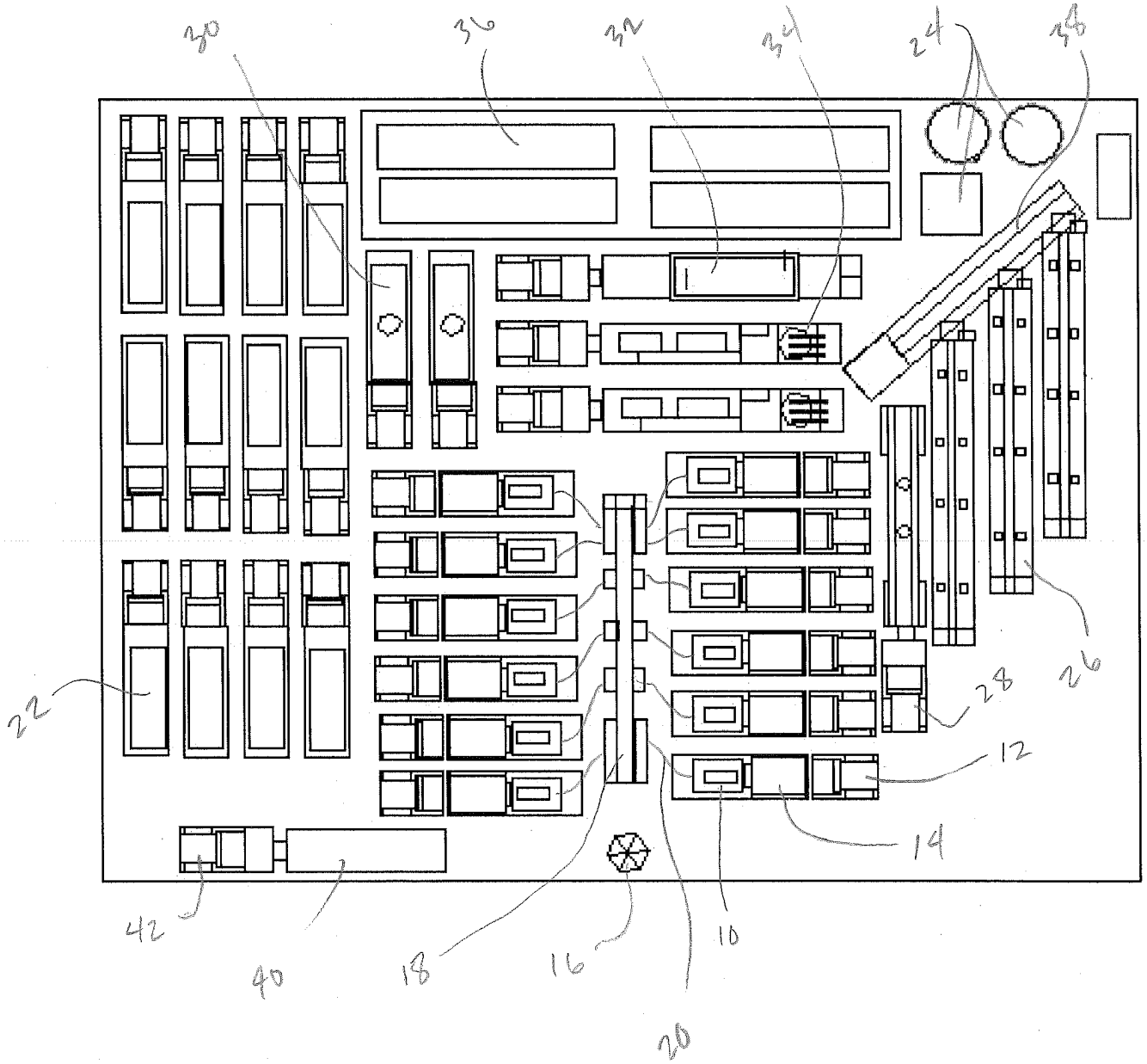


FIG. 1

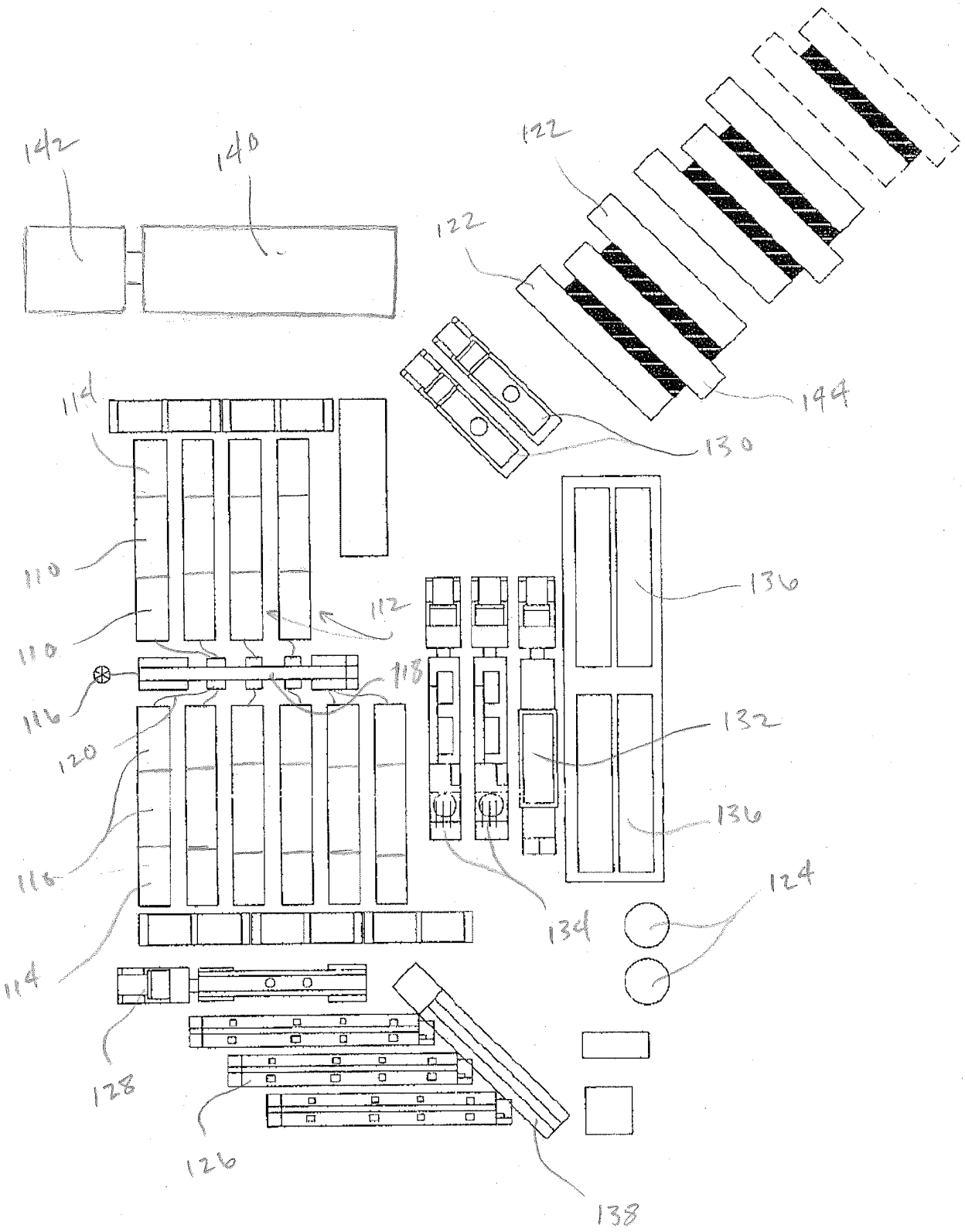

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FIG. 2

Electronic Acknowledgement Receipt

EFS ID:	14254802
Application Number:	13679689
International Application Number:	
Confirmation Number:	5345
Title of Invention:	System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps
First Named Inventor/Applicant Name:	Joel N. Broussard
Customer Number:	35979
Filer:	Taylor P. Evans/Sharanda Mozart
Filer Authorized By:	Taylor P. Evans
Attorney Docket Number:	085055.000003
Receipt Date:	16-NOV-2012
Filing Date:	
Time Stamp:	17:52:11
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$533
RAM confirmation Number	5770
Deposit Account	500259
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	085055_003_ADS.pdf	1063844 ce723bee1c8e64e3d46bfb96000ee25863b94c9f	no	6
Warnings:					
Information:					
2	Specification	085055_003_NonProv_App1.pdf	54558 8f6d745c083716f0556127aa5bad0a0406cafbaf	no	20
Warnings:					
Information:					
3	Drawings-only black and white line drawings	085055_003_Drawings.pdf	61829 380eefab3c1a40e530aa5006509f7d53b1b33cec	no	2
Warnings:					
Information:					
4	Oath or Declaration filed	085055_003_Dec_POA.pdf	142247 25fe4d53a28df2c0338e499ba5f24017dd09a8f8	no	4
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	32533 42a4d7254d781860ab0046d4e99acc4ec2cc0c41	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1355011		

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