IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLORADO

Civil Action No. 1:23-cv-01180-RMR-SP

DOWNING WELLHEAD EQUIPMENT, LLC,

Plaintiff,

v.

INTELLIGENT WELLHEAD SYSTEMS, INC.,
INTELLIGENT WELLHEAD SYSTEMS, CORP., and
IWS USA CORP.,

Defendants.

DEFENDANTS' INITIAL INVALIDITY CONTENTIONS

Pursuant to D.C.COLO.LPtR Rules 8 and 9, and the Scheduling Order, Defendants Intelligent Wellhead Systems, Inc., Intelligent Wellhead Systems, Corp., and IWS USA Corp. (collectively referred to as "Defendants" or "IWS") hereby serve these Initial Invalidity Contentions.

Defendants' Contentions are based upon the claims of the Asserted Patents, U.S. Patent Nos. 11,401,779 ("the '779 Patent") and 11,560,770 ("the '770 Patent"), that Plaintiff Downing Wellhead Equipment, LLC ("Plaintiff" or "Downing") has identified in its Initial Infringement Contentions. Specifically, Plaintiff identified the following claims in its Initial Infringement Contentions (collectively, the "Asserted Claims"):

'779 Patent: claims 1-3, 6, 8–10, 15, 16–18, 25–28, 31, and 36; and

'770 Patent: claims 1–38.

Defendants' Contentions are based upon the ordinary and customary meaning of claim terms of the Asserted Claims of the Asserted Patents, and Defendants' current view of the scope

of the Asserted Claims as reflected in Downing's Initial Infringement Contentions as currently understood by IWS. Defendants reserve their right to amend and/or supplement these Contentions as new documents, information, and details are received.

Defendants' contentions are not, and should in no way be seen as, admissions or adoptions as to any particular claim scope or construction. Defendants object to any attempt to imply or infer claim constructions from these contentions. Defendants' prior art invalidity contentions are made in a variety of alternatives and do not represent Defendants' agreement or view as to the meaning, definiteness, written description support for, or enablement of any claim contained therein. To some extent, Defendants' invalidity contentions may take into account Plaintiff's improper or erroneous assertions of infringement and improper or erroneous applications of the claims, including Plaintiff's express or implied claim constructions. To the extent Defendants apply those express or implied constructions in these contentions, that application is not, and should not be considered an admission that Defendants agree with Plaintiff's constructions or its alleged mapping of the claims to the accused products; and no inference or conclusion should be drawn to the contrary.

IWS's discovery and investigation in connection with this litigation is ongoing and in the early stages. These disclosures are initial, as required by the Scheduling Order, and are based upon the analysis of prior art conducted to date. IWS expects that further discovery, continued investigation into system prior art, literature, and patent searching, analysis of prior art, and discussions with experts in the relevant fields will reveal additional prior art and non-prior art (*e.g.*, 35 U.S.C. §§ 101, 112) based grounds for invalidity. As such, IWS reserves the right to amend, clarify, and/or supplement these contentions for any appropriate reason, including, but not limited to, further investigation, discovery, search and/or analysis of prior art, claim construction, guidance

from experts in the relevant fields, and/or Downing's supplementation of its Initial Infringement Contentions.

On October 25, 2023, IWS served two interrogatories seeking information about conception, reduction to practice, due diligence, and Downing's alleged priority date for the Asserted Patents. On November 21, 2023, Downing responded to the interrogatories with pages of objections, refusing to identify the priority date or provide a date of conception. Instead, subject to their multitude of boilerplate objections, Downing responded "[f]ollowing service of Defendants' Invalidity Contentions, Downing will supplement its response to this Interrogatory." Downing's non-answers are improper and prejudicial. *Phillip M. Adams & Assocs., L.L.C. v. Fujitsu Ltd.*, No. 5-64, 2010 WL 1330002, at *2 (D. Utah Mar. 29, 2010) (ordering patentee to state whether it intends to rely on an earlier date of conception, and if so, to identify the approximate date); *Invacare Corp. v. Sunrise Med. Holdings, Inc.*, No. 4-1439, 2005 WL 1750271, at *3-4 (N.D. Ohio Jan. 21, 2005) (holding that "[p]laintiff's responses are essentially non-responses in that they entirely leave open the critical time period, *i.e.*, the earliest date on which the invention was conceived and reduced to practice"). *See Layne Christensen Co. v. Purolite Co.*, No. 9-2381, 2011 WL 231400, at *2-3 (D. Kan. Jan. 24, 2011) (ordering patentee to "describe any circumstances regarding diligence performed between conception and reduction to practice, or otherwise state there was no such diligence"); *accord* Report of Special Master, XPRT Ventures, LLC v. eBay, Inc., Civ. No. 10- 595, D.I. 152 at 8-12 (D. Del. Nov. 30, 2011) (ordering supplementation of interrogatory response that failed "to provide any information concerning due diligence and fail[ed] to identify any documents relating to conception, reduction to practice or due diligence"); *Vehicle Interface Techs., LLC v. Jaguar Land Rover N. Am., LLC*, C.A. No. 12-1285-RGA, D.I. 25, 21:19-22 (D. Del., Jun 17, 2013) ("to the extent that any of [plaintiff's

interrogatory] answers depends on the idea that you don't have to provide the [priority date] information now, because [defendants] haven't provided invalidity contentions, I reject that."), available at https://bd6f.s3.amazonaws.com/media/documents/gov.uscourts.ded.49865.25.0.pdf.

In short, there is no justification for Downing, the patentee who brought this patent infringement lawsuit, to refuse to confirm the priority dates and inventors for the patents they are asserting on the basis that they want to see IWS's invalidity contentions first. IWS reserves all rights to supplement its invalidity contentions after it receives proper responses to interrogatories from Downing and to seek appropriate modifications to the Scheduling Order accordingly.

Pursuant to D.C.COLO.LPtR 9, IWS identifies the following documents produced with and supporting these contentions:

IWS_00001043-IWS_00001875.

I. The Asserted Claims are Invalid Under 35 U.S.C. § 101

All Asserted Claims of the Asserted Patents are invalid under 35 U.S.C. § 101 ("Section 101). As set forth in IWS's Rule 12(b)(6) Motion to Dismiss First Amended Complaint for failure to state a claim (ECF No. 34), incorporated by reference here, both the '770 Patent and the '779 Patent claim patent-ineligible subject matter.[1] The two-part test for patent-eligibility is governed by the decision in *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2354 (2014). Under the *Alice* test, the claims must be analyzed to determine:

(1) whether they are directed to an abstract idea or other patent-ineligible concept; and

[1] IWS originally filed a similar Motion to Dismiss Downing's Original Complaint for failure to state a claim due to the '770 and '779 Patents being directed to patent-ineligible subject matter under Section 101 (ECF No. 26), which was dismissed as moot (*see* ECF No. 32) when Downing amended their complaint (*see* ECF No. 29). IWS filed another motion to dismiss because none of the amendments to the complaint change the ultimate conclusion that the claims of the '779 and '770 patents are directed to patent-ineligible subject matter under Section 101.

(2) if so, whether the claim elements include an inventive step such that it transforms the nature of the claims into a patent-eligible application. *Id.* at 2355.

At *Alice* step one, the Court must determine what the claims as a "whole" are directed to. If the claim merely recites a desired result or effect "that itself is the abstract idea and merely invoke[s] generic processes and machinery" rather than "a specific means or method that improves the relevant technology," the claim as a whole is directed to the abstract idea under *Alice* step one. *Yu v. Apple Inc.*, 1 F.4th 1040, 1043 (Fed. Cir. 2021). The Asserted Claims are directed to the abstract idea of monitoring certain conditions in oil and gas well equipment, and "determining" the meaning or import of those conditions, and executing a well operation plan of some kind based on the "determining" of those conditions, whether through the use of "controllers" or not. "Determining one or more fluid conditions" is an abstract idea, and controlling a well operation such as hydraulic fracturing by opening and closing valves in view of what has been "determined" is nothing but "insignificant post-solution activity," which does not change the essentially abstract nature of the Asserted Claims of the Asserted Patents. Additionally, although some of the Asserted Claims recite computer technology, they merely recite such technology as a tool for implementing the abstract idea itself. *See*, *e.g.*, *Credit Acceptance Corp. v. Westlake Servs.*, 859 F.3d 1044, 1055 (Fed. Cir. 2017) (automation of previously manual processes with a generic computer "does not constitute a patentable improvement in computer technology"); *Versata Dev. Grp., Inc. v. SAP Am., Inc.*, 793 F.3d 1306, 1333-34 (Fed. Cir. 2015) (computer performed "purely conventional" steps to carry out claims directed to an abstract idea). Accordingly, the abstract ideas set forth in the Asserted Claims fail at *Alice* step one.

Further, under step two of *Alice*, the Asserted Claims of the Asserted Patents do not capture an "inventive concept" to ensure that it amounts to "significantly more" than the abstract idea

itself. *Alice*, 573 U.S. at 2355. Looking at the elements individually, everything in Representative Claim 1 is tied to the abstract concept of determining one or more fluid conditions. In fact, without the determining step, the claim merely recites "communicating" fluid via a manifold to two wells via valves—basic, conventional, generic oil and gas well operations. The invention is merely "determining" information about the fluid being "communicated" and then opening and closing the valves accordingly. Although written in technical jargon, the invention set forth in the Asserted Claims of the Asserted Patents is nothing more than the bare abstract idea of determining one or more fluid conditions in a well environment. Additionally, no technical issues or difficulties are addressed in the claims or specification of the Asserted Patents, nor do they describe any improvements in manifolds, "communicating" fluids to manifolds, valves, or wells. If the invention is supposed to be some improvement in the functioning of computers, neither the Asserted Claims nor Asserted Patents' written specifications explain how or what that might be. Accordingly, because the Asserted Claims do not receive anything significant and unconventional, they fail *Alice* step two and are invalid for claiming patent-ineligible subject matter under 35 U.S.C. § 101.

Thus, the Asserted Claims of the Asserted Patents are invalid under 35 U.S.C. § 101.

II. The Asserted Claims are Invalid Under 35 U.S.C. § 112

The Asserted Claims are invalid because they lack enablement and/or a sufficient written description, as required under 35 U.S.C. § 112(a). Various Asserted Claims are also invalid because they fail to "particularly point[] out and distinctly claim[] the subject matter which the inventor…regards as the invention," as required by 35 U.S.C. § 112(b).

The claims of the '779 and '770 Patents are invalid under 35 U.S.C. § 112 because the claims lack written description, are not enabled, and/or do not further limit the base claim or

intervening claim(s). The claims of the ’779 and ’770 Patents are also unclear such that the scope of the claims cannot be determined with reasonable certainty. Defendants have applied prior art in accordance with Defendants’ assumption that Plaintiff contends the claims are directed to patentable subject matter, are definite, have written description support, are enabled, and, with respect to dependent claims, properly limit those claims from which they depend. Defendants’ prior art invalidity contentions, however, do not represent Defendants’ agreement or view as to the subject matter, meaning, definiteness, written description support for, or enablement of any claim contained therein, or that the Asserted Patents properly disclose structures corresponding to functions in claims governed by 35 U.S.C. § 112(f).

a. The ’779 Patent

The following claims of the ’779 Patent, and any claims depending therefrom, are invalid under 35 U.S.C. § 112(b) at least because the following claim language is unclear and its scope could not have been determined with reasonable certainty.

- Claims 1, 8, 15, 16, 18, 23, 24, 25, 26, and 28
    - “permitting” or “permit” as used in “permitting performance of a [first/second] hydraulic fracturing operation,” “permitting hydraulic fracturing,” “permit pumping”
- Claims 15, 25, 36
    - “satisfied [the] one or more flow rate conditions”
- Claims 1, 2, 8, 9, 15, 18, 25, 28
    - “continuously pumped”

b. The ’770 Patent

All claims of the ’770 Patent are invalid under 35 U.S.C. § 112(a) for lacking written description support and enablement in the specification. For example, each independent claim recites “in response to determining that the fluid communicated via the manifold has satisfied one or more conditions.” There is no support or enablement in the specification for at least this limitation.

Additionally, the following claims of the ’770 Patent, are invalid under 35 U.S.C. § 112(b) at least because the following claim language is unclear and its scope could not have been determined with reasonable certainty:

- Claims 1, 14, 27
    - “in response to determining that the fluid communicated via the manifold has satisfied one or more conditions”

Further, claims 4, 8, 9, 17, 21, and 30 of the ’770 Patent, and any claims depending therefrom, are invalid under 35 U.S.C. § 112(d) at least because the claims do not further limit the base claim or intervening claim(s), and as a result a person of skill in the art would not understand the intended scope of the claims.

III. The Asserted Claims are Invalid Under 35 U.S.C. §§ 102 and 103

a. Prior Art

Appendices A (’779 Patent Invalidity Claim Chart) and B (’770 Patent Invalidity Claim Chart) (collectively, “the Invalidity Charts”) identify prior art that anticipates each Asserted Claim expressly or inherently under 35 U.S.C. § 102, or that renders each Asserted Claim obvious either alone or in combination with other prior art, under 35 U.S.C. § 103. The citations in those charts to specific pages, paragraphs, or figures are exemplary. Each reference in its entirety, not just the

exemplary cited portions, discloses the limitations of the Asserted Claims as set forth in the Invalidity Charts. IWS reserves all rights to rely on other portions of the identified references to support its contentions and/or defenses. Persons of ordinary skill in the art generally read a prior art reference as a whole and in the context of the other publications and literature. IWS intends to rely on uncited portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpreting the portions of the prior art references that are cited.

Where IWS cites a particular figure in a prior art reference, the citation should be understood to encompass the caption and description of the figure and any text relating to the figure in addition to the figure itself. Any and all citations to particular figures in the Invalidity Charts shall be deemed to wholly incorporate the figure by reference and include the figure as if it had been inserted into the chart itself along with any text discussing the figure.

Disclosures relating to initial limitations of dependent claims are disclosed in connection with the independent claims on which they depend.

To the extent that a reference does not expressly disclose a limitation, IWS reserves the right to assert or argue that the reference inherently discloses the limitation and/or that it would have been obvious to a person of ordinary skill in the art in view of the disclosure. To the extent that one or more references identified in the Invalidity Charts do not anticipate an asserted claim of an asserted patent, IWS contends that such reference(s), alone or in combination, render the Asserted Claim obvious.

IWS contends that all Asserted Claims are invalid as anticipated under 35 U.S.C. § 102 and/or as obvious under 35 U.S.C. § 103 as set forth in the Invalidity Charts. In addition, each anticipatory prior art reference may be combined with: (1) information known to persons skilled

in the art at the time of the alleged invention; and (2) any of the other prior art references identified in this document. In addition, to the extent Downing contends that any of the charted prior art fails to disclose one or more limitations of the Asserted Claims, IWS reserves the right (1) to argue single-reference obviousness in light of the knowledge of one of ordinary skill in the art; and (2) to identify portions of additional prior art reference that, when combined with other portions of the charted references, would render obvious each and every limitation of the Asserted Claims. IWS expressly reserves the right to rely on the combination of any prior art identified herein with any prior art identified herein.

IWS contends that one of ordinary skill in the art at the time of the purported invention would have been motivated to combine one or more of the identified references together. In general, a motivation to combine any of the identified references with others exists within the references themselves, as well as within the knowledge of those of ordinary skill in the art. A person of ordinary skill in the art at the time of the purported invention would have been motivated to modify the prior art or combine prior art references as result of (i) his or her education and experience, (ii) the state of the prior art as a whole, (iii) the nature of the problem to be solved, (iv) common knowledge in the art, (v) common sense, (vi) design incentives, (vii) market forces, and/or (viii) a desire to tailor a solution using all of the skills, knowledge and creativity at his or her disposal. *See*, *e.g.*, *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007); *Examination Guidelines for Determining Obviousness Under 35 U.S.C. § 103 in View of the Supreme Court Decision in KSR Int'l v. Teleflex, Inc.*, Fed. Reg. 57526 (Oct. 10, 2007).

Rationales supporting the combinations of the prior art references in the Invalidity Charts include one or more of the following:

1. the references are within the same field, *i.e.*, oil and gas well systems, including drilling, completion, and production technologies;
2. although the Asserted Patents do not disclose the state of the art of the particular problem being solved, the references disclose the same or similar oilfield equipment used in oil and gas well systems that address known areas for improvement such as controlling valves, controlling flow into or out of a well, efficiency and safety of well operations, including hydraulic fracturing operations;
3. the fact that the cited references are within the field of the Asserted Patents, are directed to similar subject matter within that field and address similar technical issues, are directed systems and methods that solve problems commonly encountered in hydraulic fracturing operations, disclose solutions with similar advantages, and the references existed or were invented in the same time period as each other, based on the alleged problems solved and solutions thereto of the Asserted Patents as described in the First Amended Complaint;
4. the references are in an old and predictable art (*e.g.*, valve function and control) such that combining known prior art elements such as those claimed by the Asserted Patents would yield predictable results;
5. the knowledge or common sense of a person of ordinary skill in the art;
6. the prior art references themselves, many of which discuss, incorporate by reference, or cite to other prior art references;
7. the subject matter and references acknowledged as prior art, including the "regular" way of doing things, in the Asserted Patents;
8. the interrelated teachings of multiple prior art references identified herein;

9. the nature of the problems purported to be solved by the Asserted Patents, according to the First Amended Complaint, and the existence of similar improvements in similar applications and technologies;

10. design incentives and other market forces;

11. the ability to implement the alleged invention as a predictable variation of the prior art by applying well-known methods and techniques to a known device to yield predictable results in combining the teachings of claimed elements by known methods, with no change in their respective functions;

12. the fact that the cited references explicitly or implicitly reference other prior art references, share common authors or inventors or assignees, were published in the same journals, presented at the same conferences, or were developed at common companies, organizations or industries which would motivate one of skill in the art to combine them;

13. the fact that, in some cases, these references provide explicit motivation for the technology disclosed to be used in combination with one another by virtue of cross-references to one another's solutions, incorporation by reference of one another's basic premises, or close involvement with one another in the industry;

14. the fact that most, if not all, of the cited references were publicly available in electronic databases maintained by the United States Patent & Trademark Office, universities, other governmental, academic, and private organizations, and in other locations commonly known and accessed by academics, researchers, engineers, and scientists, such as publicly available web sites; and/or

15. the fact that many of the references include teachings, suggestions, or motivations to modify the disclosed subject matter, making it obvious to lead one skilled in the art to try to modify or combine their teachings, or to choose from the multiple identified, predictable solutions to this recognized need and would have pursued the known potential solutions with reasonable expectation of success.

All motivations for such combinations would have been within the knowledge generally available to one of ordinary skill in the art or located in the references themselves. To specify some of the motivations to combine the references, IWS has provided some examples below. This is not a full list of combination of references and illustrates some reference combinations and the motivation to combine them.

For example, the prior art references disclose using different parameters to determine stages in a hydraulic fracture cycle and a person of ordinary skill in the art would have been motivated to use parameters taught by different references to better understand or determine stages of hydraulic fracturing cycles.

Some prior art references also disclose additional software applications/mechanisms or control processors for automating the fracturing process. A person of ordinary skill in the art would have been motivated to incorporate these features to improve efficiency and/or safety of the hydraulic fracturing system.

The prior art references also disclose using different triggers or thresholds for determining when to move to different stages in a hydraulic fracturing cycle. A person of ordinary skill in the art would have been motivated to use the triggers or thresholds taught by the different prior art references to improve efficiencies in the fracturing operation.

IWS has listed the references of which it is currently aware and intends to rely upon in the attached list, which also identifies the priority/publication dates as appropriate.

An element-by-element chart (Appendices A and B) is also attached that identifies where specific elements may be located in the respective references. This identification is not intended to be exhaustive and will be supplemented as the case progresses.

These references are all in the same or analogous arts for oil and gas well systems, including drilling, completion, and production technologies. These devices are straightforward mechanical implements and methods of using these straightforward mechanical implements in their normal and customary way, and combining concepts from the relevant references would be obvious and accomplished without difficulty by a person of ordinary skill in the art. The claims merely recite opening and closing valves in response to a flow rate reading or alleged "condition" determination. Nothing about the claim limitations of the asserted patents adds anything novel or non-obvious over the prior art. If any element is not explicitly disclosed in a reference, it is either inherently disclosed, would have been obvious to a person skilled in art due to their knowledge of the art, and/or would have been obvious in combination with any other reference cited here which explicitly discloses that element.

b. Priority Date

As discussed above, Downing has refused to meaningfully respond to IWS's interrogatories seeking Downing's alleged priority date for the Asserted Patents. Instead, subject to pages of boilerplate objections, Downing has merely responded "[f]ollowing service of Defendants' Invalidity Contentions, Downing will supplement its response to this Interrogatory." Downing's non-answers are improper and prejudicial as discussed above. IWS reserves its right to further supplement these invalidity contentions in view of same.

Regardless, the earliest priority date for the ’779 and ’770 Patents is May 17, 2021, because the patent application that eventually became the ’779 Patent (US. Application No. 17/388,716), which is the parent of the ’770 Patent, claims priority to U.S. Provisional Application No. 63/189,663 (“the ’663 Provisional”), which was filed on May 17, 2021, and although the ’779 and ’770 Patents purport to claim the benefit of earlier applications, none of the ’779 or ’770 Patent claims are sufficiently supported by the written description in any earlier applications.

c. State of the Art References

Additionally, the principles set forth in the references below would have been well-known to a POSITA in the 2019-2021 timeframe, and long before. These “state-of-the-art references” include, but are not limited to, the following:

- Michael Morton, “Unlocking the Earth: A Short History of Hydraulic Fracturing,” GEO ExPro, Vol. 10, No. 6, December 2013;
- Carl T. Montgomery and Michael B. Smith, “Hydraulic Fracturing: History of an Enduring Technology,” *Journal of Petroleum Technology* vol. 62 issue 12 p. 26 (Dec. 2010);
- Vassiliou, M. S. (2018), *Historical Dictionary of the Petroleum Industry*, Rowman & Littlefield, p. xxv – xliii, 146-49, 174-75, 186-87;
- U.S. Patent Application Publication No. 2013/0306322 to Sanborn *et al.* at [0005];
- U.S. Patent Publication No. 2012/0255734 to Coli *et al.* at [0049], FIG. 2;
- Jacobs, Trent. “The Shale Evolution: Zipper Fracture Takes Hold,” J Pet Technol 66 (2014): 60–67;
- Waters, George, Dean, Barry, Downie, Robert, Kerrihard, Ken, Austbo, Lance, and Bruce McPherson. "Simultaneous Hydraulic Fracturing of Adjacent Horizontal

Wells in the Woodford Shale." Paper presented at the SPE Hydraulic Fracturing Technology Conference, The Woodlands, Texas, January 2009;

- Pearson, C.M., Bond, A.J., Eck, M.E., and J.H. Schmidt. "Results of Stress-Oriented and Aligned Perforating in Fracturing Deviated Wells." J Pet Technol 44 (1992): 10–18;
- Mutalik, P N, and Bob Gibson. "Case History of Sequential and Simultaneous Fracturing of the Barnett Shale in Parker County." Paper presented at the SPE Annual Technical Conference and Exhibition, Denver, Colorado, USA, September 2008;
- Mayerhofer, M. J., Lolon, E. P., Warpinski, N. R., Cipolla, C. L., Walser, D., and C. M. Rightmire. "What is Stimulated Reservoir Volume (SRV)?" Paper presented at the SPE Shale Gas Production Conference, Fort Worth, Texas, USA, November 2008;
- Roussel, Nicolas P., and Mukul M. Sharma. "Optimizing Fracture Spacing and Sequencing in Horizontal-Well Fracturing." SPE Prod & Oper 26 (2011): 173–184;
- K. R. Webster, W. C. Goins, Jr., and S. C. Berry, "A Continuous Multistage Tracing Technique," *Journal of Petroleum Technology,* vol. 17, no. 06, pp. 619-625, 1965;
- A. Casero, G. Pace, B. Malone, F. Cantaloube, L. Tealdi, H. Malonga, and R. Seale, "Continuous Pumping, Multistage, Hydraulic Fracturing in Kitina Field, Offshore Congo, West Africa," in *SPE International Symposium and Exhibition on Formation Damage Control*, 2008, vol. All Days, SPE-112442-MS;
- S. Rassenfoss, "A Look Into What Fractures Really Look Like," *Journal of Petroleum Technology,* vol. 70, no. 11, pp. 28-36, 2018;

- R. Oberhofer, "Application of Ball-Drop Technology to Improve Efficiency and Stimulation of Limited Entry Completion Systems," in *Abu Dhabi International Petroleum Exhibition & Conference*, 2016, vol. Day 2 Tue, November 08, 2016, D021S052R004;
- Tolman, R.C., et al. (2009). *Method and Apparatus for Simultaneous Stimulation of Multi-Well Pads*, SPE Hydraulic fracturing Technology Conference at 1;
- R. W. Paige, L. R. Murray, and J. D. M. Roberts, "Field Application of Hydraulic Impedance Testing for Fracture Measurement," *SPE Production & Facilities,* vol. 10, no. 01, pp. 7-12, 1995;
- L. V. Massaras, A. Dragomir, and D. Chiriac, "Enhanced Fracture Entry Friction Analysis of the Rate Step-Down Test," in *SPE Hydraulic Fracturing Technology Conference*, 2007, vol. All Days, SPE-106058-MS; and
- S. Mondal, "Pressure transients in wellbores: Water hammer effects and implications for fracture diagnostics," at 12 (2010).

References used in Invalidity Charts attached as Appendices A and B:

Abbreviated Name	**Patent/Publication Number/ Article Name**	**Country**	**Filing Date**	**Publication Date**
Krupa	2022/0268141	U.S.	2/18/2022	8/25/2022
Jaaskelainen	2022/0112796	U.S.	10/9/2020	4/14/2022
Beuterbaugh	WO 2020/145978	WIPO Patent	1/10/2019	7/16/2020
Kajaria ’980	2017/0275980	U.S.	3/28/2017	9/28/2017
Martin	2021/0363856	U.S.	6/27/2019	11/25/2021
Lopez ’331	2018/0045331	U.S.	3/8/2016	2/15/2018
Lopez ’406	10,533,406	U.S.	1/3/2017	1/14/2020
Martino	2017/0315566	U.S.	4/28/2016	11/2/2017
Carr	2019/0233275	U.S.	1/31/2018	8/1/2019
Kajaria 2015	2015/0345272	U.S.	5/29/2015	12/3/2015
Merritt	4,721,158	U.S.	8/15/1986	1/26/1988
McNeel	2007/0125543	U.S.	12/1/2005	6/7/2007
Jackson ’373	7,559,373	U.S.	5/30/2006	7/14/2009

Jackson ’427	8,061,427	U.S.	5/30/2006	11/22/2011
Ciezobka	2016/0061016	U.S.	8/26/2014	3/3/2016
Harmon	4,754,808	U.S.	1/16/1987	7/5/1988
An	2020/0408077	U.S.	6/28/2019	12/31/2020
Demong	2011/0030963	U.S.	12/6/2009	2/10/2011
Yeung	2021/0396117	U.S.	1/27/2021	12/23/2021
Cherewyk ’227	2022/0099227	U.S.	9/16/2021	3/31/2022
Cherewyk ’695	2011/0048695	U.S.	11/3/2010	3/3/2011
Tolman	8,490,685	U.S.	1/12/2009	7/23/2013
Pitcher	2014/0352968	U.S.	6/3/2013	12/4/2014
Kraynek	2020/0270977	U.S.	2/21/2019	8/27/2020
Anders	2021/0324718	U.S.	4/15/2020	10/21/2021
Chen	Chen, "Optimal control of ICV's and well operating conditions for the water-alternating gas injection process," Journal of Petroleum Science and Engineering (2016).			11/4/2016
Halliburton	Halliburton, *Reducing Days on Location and Time to First Oil* (2020)			8/20/2020
TTU Research	TTU Research, *Hydraulic Fracturing Symposium at Texas Tech* , YouTube (Dec. 3, 2013), https://www.youtube.com/watch?v=pKL1_tog0Kk			12/3/2013
Cudd Energy Services	Cudd Energy Services, *Hydraulic Fracturing Process Animation*, YouTube (May 7, 2013), https://www.youtube.com/watch?v=eEADi7X3kPM			5/7/2013
Burton	Aaron Burton, *Comparing Multistage Completions Part 13 – Operational Efficiency of Plug-and-Perf with Zipper Frac*, YouTube (June 23, 2020),			6/23/2020

	https://www.youtube.com/watch?v=LnIhENHTGWg			
SLB	SLB, *Sundance Energy Saves USD 500,000 with 60% More Stages per Day in Simultaneous Fracturing Operations* (2020)			6/24/2020

IV. Invalidity Based on Improper Inventorship

A patent that does not name the correct inventors is invalid. *See*, *e.g.*, 35 U.S.C. §§ 101, 115(a), 116; *Pannu v. Iolab Corp.*, 155 F.3d 1344, 1349 (Fed. Cir. 1998) (misjoinder or nonjoinder of inventors may render patent invalid). The '779 Patent is a continuation-in-part of application no. 17/319,854 ("the '854 Application") and the '770 Patent is a continuation of US. Application No. 17/388,716, which eventually became the '779 Patent. The '779 and '770 Patents identify four inventors, whereas the '854 Application identifies only two inventors. Additionally, other applications in the family tree of the '854 Application identify other inventors that are not identified as inventors of the '779 or '770 Patents.

This litigation is in the early stages and IWS expects to obtain significant discovery related to the issue of inventorship. As of the date of these contentions, Downing has refused to answer IWS interrogatories directed to inventorship information. IWS reserves all rights to assert this defense based on future discovery from Downing's past and current prosecution counsel, named inventors, or anyone else with relevant information.

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Respectfully submitted,

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Certificate of Service

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