

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PROFRAC HOLDING CORPORATION and
U.S. WELL SERVICES, LLC,
Petitioner,

v.

HALLIBURTON ENERGY SERVICES, INC.,
Patent Owner.

IPR2023-01318
Patent 7,931,082 B2

Before HUBERT C. LORIN, JAMES J. MAYBERRY, and
BRENT M. DOUGAL, *Administrative Patent Judges*.

DOUGAL, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. *Background and Summary*

Petitioner, ProFrac Holding Corporation and U.S. Well Services, LLC, filed a Petition requesting *inter partes* review of claims 1–15 and 17–31 (the “challenged claims”) of U.S. Patent No. 7,931,082 B2 (Ex. 1001, “the ’082 patent”). Paper 2 (“Pet.”). Patent Owner, Halliburton Energy Services, Inc., argues that Petitioner’s request is deficient and should not be granted. Paper 6 (“Preliminary Response” or “Prelim. Resp.”).

Applying the standard set forth in 35 U.S.C. § 314(a), which requires demonstration of a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim, we institute an *inter partes* review.¹

B. *Related Matters*

The parties identify the following pending district court litigation: *Halliburton Energy Services, Inc. v. U.S. Well Services, LCC and ProFrac Holding Corp.*, No. 6:22-cv-00905-ADA (W.D. Tex.). Pet. 2; Paper 5, 2.

C. *The ’082 Patent*

The ’082 patent is titled “Method and System for Centralized Well Treatment” and is directed to a method of stimulating multiple oil and gas wells from a central location with a treatment fluid. Ex. 1001, codes (54), (57), 1:16–18. The ’082 patent teaches a central location for distribution of fluids to service factories; preparing treatment fluids at the service factories; treating wells with the treatment fluids; and then recovering treatment fluids. *Id.* at code (57). The recovered treatment fluids can then be reconditioned “in order to store, dispose or re-flow reconditioned recovered well treatment fluids.” *Id.* at 1:66–2:3.

¹ Our findings and conclusions at this stage are preliminary.

D. Illustrative Claim

Of the challenged claims, claims 1 and 17 are independent. Claim 1 is reproduced below:

1. A method of providing centralized well development services to a plurality of wells, comprising the steps of:

flowing from a centralized well treatment fluid center to one or more centralized service factories one or more well development task fluids, wherein the one or more centralized service factories are selectively configurable to receive the one or more well development task fluids;

preparing, at the one or more centralized service factories, one or more well treatment fluids from the one or more well development task fluids, wherein the one or more centralized service factories are selectively configurable to prepare the one or more well treatment fluids;

flowing from the one or more centralized service factories to at least one of the plurality of wells the one or more well treatment fluids, wherein the one or more centralized service factories are selectively configurable to flow the one or more well treatment fluids;

recovering from the at least one of the plurality of wells the one or more well treatment fluids at the one or more centralized service factories, wherein the one or more centralized service factories are selectively configurable to receive the one or more recovered well treatment fluids; and

flowing from the one or more centralized service factories to the centralized well treatment fluid center the one or more recovered well treatment fluids, wherein the one or more centralized service factories are selectively configurable to flow the one or more recovered well treatment fluids, and wherein the centralized well treatment fluid center is selectively configurable to receive the one or more recovered well treatment fluids.

Ex. 1001, 10:25–55.

E. Evidence

Petitioner's grounds of unpatentability rely on the following evidence:

Name	Patent Document	Exhibit
Tolman	US 2009/0114392 A1 (May 7, 2009)	1005
Means	US 2005/0166961 A1 (Aug. 4, 2005)	1006
Crawford ²	US 6,236,894 B1 (May 22, 2001)	1007
Lehman	US 2004/0050550 A1 (Mar. 18, 2004)	1008

F. Asserted Grounds

Petitioner asserts the following grounds of unpatentability (Pet. 3), supported by the declaration of Michael Nikolaou (Ex. 1003):

Claim(s) Challenged	35 U.S.C. § ³	Reference(s)/Basis
1–3, 5–7, 9–15, 17, 18, 21–24, 26–28	103	Tolman, Means, Crawford
3, 4, 7–9, 11, 19, 20, 25, 29–31	103	Tolman, Means, Crawford, Lehman

II. ANALYSIS

A. Legal Standards

Petitioner bears the burden to demonstrate unpatentability. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). At this preliminary stage, we determine whether the information presented in the Petition shows a reasonable likelihood that Petitioner would

² See Prelim. Resp. 13 n.1 (“The first-named inventor is Stoitsits and the second-named inventor is Crawford. EX1006. The Petition and this Preliminary Response refer to this reference as ‘Crawford’ although the prosecution history refers to it as ‘Stoitsits.’”).

³ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 285–88 (2011), revised 35 U.S.C. § 103 effective March 16, 2013. We refer to the pre-AIA version of § 103, because the '082 patent issued before that date.

prevail in establishing that at least one of the challenged claims would have been obvious over the proposed combinations of prior art. *See* 35 U.S.C. § 314(a).

A claim is unpatentable as obvious 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.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (quoting 35 U.S.C. § 103(a)). We resolve the question of obviousness based on underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the prior art and the claims; (3) the level of skill in the art; and (4) when in evidence, objective indicia of nonobviousness. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

We apply these principles to the Petition’s challenges.

B. Level of Ordinary Skill in the Art

We review the grounds of unpatentability in view of the understanding of a person of ordinary skill in the art at the time of the invention. *Id.* at 13, 17. Petitioner asserts that a person of ordinary skill in the art (“POSITA”) would have had:

at least a bachelor of science in chemical engineering, mechanical engineering, materials science, or metallurgical engineering or an equivalent field and at least two years of academic or industry experience in the oil and gas industry, including experience with process control systems. A person having [more] education but less professional experience, and vice versa, may . . . also qualify as a POSITA.

Pet. 3–4 (citing Ex. 1003 ¶ 4). Patent Owner does not dispute this. Prelim.

Resp. 2. We are persuaded, on the present record, that Petitioner’s proposal is consistent with the problems and solutions in the ’082 patent and prior art

of record. We adopt Petitioner’s definition of the level of skill for the purposes of this Decision.

C. Claim Construction

In *inter partes* review, we construe claims using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100(b) (2023). We construe “those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.” *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Neither party proposes any constructions. Pet. 7; Prelim. Resp. 2. We agree that no express constructions are necessary at this time.

D. 35 U.S.C. § 103 – Tolman, Means, Crawford

Petitioner challenges claims 1–3, 5–7, 9–15, 17, 18, 21–24, and 26–28 as obvious over the combination of Tolman, Means, and Crawford. Pet. 10–79. Patent Owner argues Petitioner has not demonstrated a reasonable likelihood of success. Prelim. Resp. 26–58. For the reasons expressed below, we determine that Petitioner has established a reasonable likelihood of succeeding in showing that at least one claim is unpatentable.

1. Tolman

Tolman is titled “Method and Apparatus Associated with Stimulation Treatments for Wells,” and is directed to a system providing selectable control of the flow of stimulation treatment fluid to various wells through a pumping system manifold. Ex. 1005, codes (54), (57). The system also

includes flowback manifolds coupled to the wells to receive the produced hydrocarbons “for further processing or sales.” *Id.* ¶ 28.

2. *Means*

Means is titled “Closed Loop Additive Injection and Monitoring System for Oilfield Operations.” Ex. 1006, code (54). Means is directed to a system that adjusts the flow rate of additives being injected into a wellbore. *Id.* at code (57). The system can monitor the flow of formation fluid recovered from the wellbore to determine whether to adjust the additive flow rate. *Id.* ¶¶ 9–11.

3. *Crawford*

Crawford is titled “Petroleum Production Optimization Utilizing Adaptive Network and Genetic Algorithm Techniques.” Ex. 1007, code (54). Crawford teaches, among other things, that “the wells in a modern production field are linked together by a network of surface lines which transport the produced gas, oil, and water from each well to the centralized processing facilities.” *Id.* at 2:48–51.

4. *Analysis of Claim 1*

Petitioner argues that the combination of Tolman, Means, and Crawford renders obvious claim 1. Pet. 10–38. We first address Patent Owner’s arguments over Dr. Nikolau’s testimony. We then address the limitations of claim 1, broken into three sections, where Patent Owner contests aspects of the first and third section. We then address Patent Owner’s arguments surrounding reasonable expectation of success.

a) *Dr. Nikolau’s Testimony*

Patent Owner argues that

Wide swathes of Dr. Nikolaou’s declaration merely provide conclusory and unsupported opinions that substantively

mirror the Petition. *E.g., compare* Pet. at 10-16 *with* Ex. 1003 at ¶¶ 65-73; *compare* Pet. at 31-38 *with* Ex. 1003 at ¶¶ 98-107.

Prelim. Resp. 56.

The paragraphs highlighted by Patent Owner include extensive citations in support of the statements made by Petitioner's declarant, Dr. Nikolaou. For example, paragraph 69 of Dr. Nikolaou's declaration includes three citations to two different documents and includes extensive explanation. The noted paragraphs all appear to include support in the evidence of record. Further, Patent Owner only provides a general allegation without discussing any particular paragraph or opinion. Thus, it is unclear which opinions Patent Owner considers conclusory.

Further, whether the declaration and Petition include similar or even identical statements is not a reason, by itself, to give the declaration little to no weight. As noted by Patent Owner (Prelim. Resp. 56–58), it is only when these statements are conclusory that they should be given little to no weight. *See, e.g., TQ Delta, LLC v. CISCO Sys., Inc.*, 942 F.3d 1352, 1359 (Fed. Cir. 2019) (“conclusory expert testimony is inadequate to support an obviousness determination”).

For these reasons, and at this stage, we decline Patent Owner's invitation to give little to no weight to Dr. Nikolaou's testimony as a whole.

b) Claim 1, Section 1

Claim 1 requires, *inter alia*:

1. A method of providing centralized well development services to a plurality of wells, comprising the steps of:

flowing from a centralized well treatment fluid center to one or more centralized service factories one or more well development task fluids, wherein the one or more centralized service factories are selectively configurable to receive the one or more well development task fluids.

Ex. 1001, 10:25–31.

Petitioner relies generally on Tolman for teaching the basic structure of the claim and on Means for additional details for controlling the flow of fluids. Pet. 10–24. Among other teachings, Petitioner points to Tolman Figure 2, reproduced below, for teaching various aspects of claim 1. *Id.*

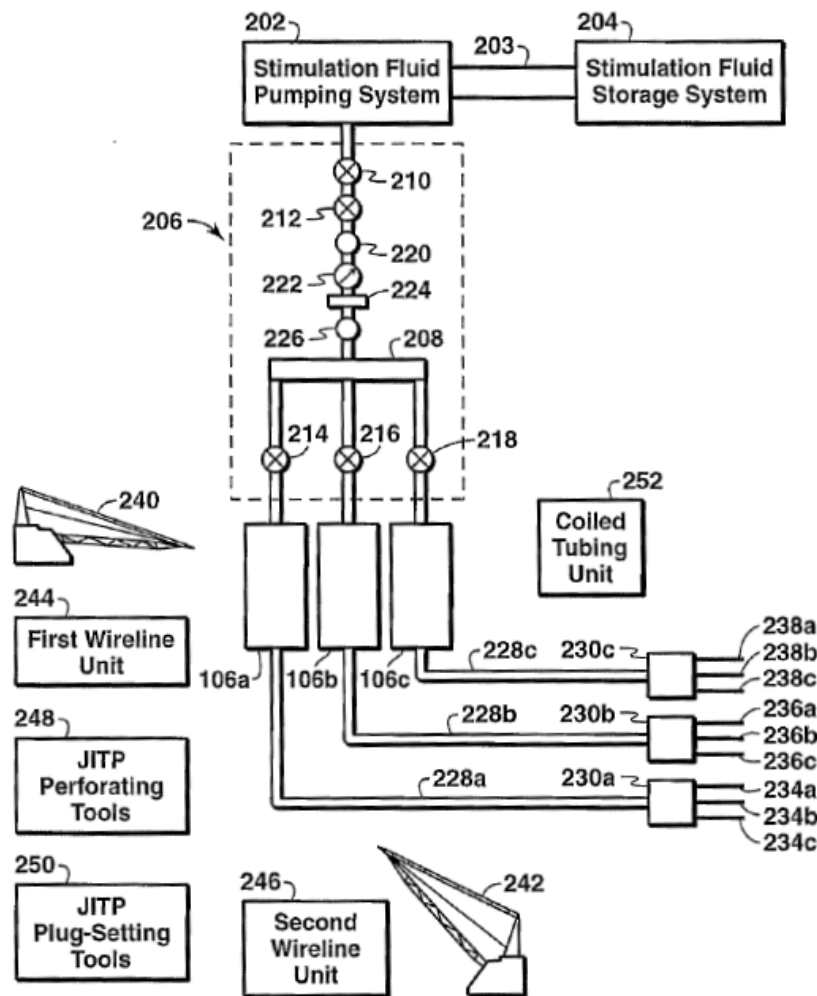


FIG. 2

Tolman Figure 2 shows a system providing selectable control of the flow of stimulation treatment fluid from a stimulation treatment fluid storage system (204) through a pump (202) and pumping system manifold (206) to various wells through respective oil field trees (106a-c). Ex. 1005, code (57), ¶ 27. The system also includes flowback manifolds (230a-c) coupled to the

wells to receive the produced hydrocarbons “for further processing or sales.”
Id. ¶ 28.

Petitioner argues that Tolman Figure 2 reads on the method required by the preamble of claim 1, that the stimulation treatment fluid storage system (204) reads on the claimed centralized well treatment fluid center, and that the combined pump (202) and pumping system manifold (206) read on the claimed one or more centralized service factories. Pet. 19–22 (citing Ex. 1005 ¶¶ 10, 20, 26, 29–30, 38, 64, Fig. 2; Ex. 1003 ¶¶ 75, 77); *see also id.* at 23–24. Petitioner further argues that Tolman teaches that the stimulation fluid (i.e., well development task fluids) is flowed from the stimulation treatment fluid storage system (204) to the pump (202) and pumping system manifold (206). *Id.* at 22–23 (citing *e.g.*, Ex. 1005 ¶ 29; Ex. 1003 ¶¶ 75, 80).

Petitioner relies on Means’s teaching of selectively injecting additives into a wellbore to argue that the combination of Tolman and Means teaches the “centralized service factories are selectively configurable to receive the one or more well development task fluids” as claimed. *Id.* at 22 (citing Ex. 1006 ¶ 26; Ex. 1003 ¶ 78). Petitioner argues that Means’s additives are also well development task fluids that would be stored at Tolman’s storage system 204 and mixed at Tolman’s pumping system 202 with Tolman’s stimulation fluid. *Id.* at 11–12, 23–24 (citing Ex. 1005 ¶¶ 29, 59; Ex. 1006 ¶¶ 5, 6, 40, 47; Ex. 1003 ¶¶ 69, 80–81); *see also id.* at 24 (“The Tolman/Means system would include Means’s pumps 314a–314m and meters 316a–316m in Tolman’s Pumping System 202 (part of ‘*the one or more centralized service factories*’) and be used to selectively increase, decrease, or shut off the reception of additives #1–m.” (citing Ex. 1006 ¶ 47; Ex. 1003 ¶ 82); *id.* at 10–16 (further discussing the combination)).

(1) Reason to Combine

Petitioner argues that “[i]t would have been obvious to modify Tolman’s centralized stimulation fluid pumping system with Means’s teachings describing a closed-loop additive injection system.” Pet. 10. Petitioner continues, “a POSITA would have understood that by combining the teachings of Tolman with Means, improved well efficiency could be attained by fine-tuning the mixture of additives.” *Id.* (citing Ex. 1003 ¶¶ 65–68; Ex. 1006 ¶¶ 6–8). Petitioner’s declarant, Dr. Nikolaou, as outlined by Petitioner, expands on this reasoning providing four specific reasons why the references would be combined:

First, Means provides an express reason to do so, EX-1003-¶71, in explaining that its additive systems prevent “[i]nsufficient amounts of treatment additives [that] can increase the formation of corrosion, scale, paraffins, emulsion, hydrates etc., thereby reducing hydrocarbon production, the operating life of the wellbore equipment and the life of the wellbore itself, requiring expensive rework operations or even the abandonment of the wellbore.” EX-1006, [0006].

Second, Means also explains that it is “economically beneficial” to use additive injection systems like Means because they “can supply precise amounts of additives” by “periodically or continuously monitor[ing] the actual amount of the additives being dispensed.” EX-1006, [0007].

Third, Means also explains that his additive injection system is an improvement over conventional pumps by providing “an additive injection system which dispenses precise amounts of additives, monitors the dispensed amounts, communicates with remote locations, takes corrective actions locally, and/or in response to commands received from the remote locations.” *Id.*, [0008]; EX-1003-¶71.

Fourth, Dr. Nikolaou explains that a POSITA would have also recognized that using Means’s closed-loop additive system [sic] teachings in Tolman would have been a beneficial design

choice. EX-1003-¶72. Dr. Nikolaou further explains that a POSITA would have weighed the trade-offs and advantages of each of these choices, and that although a POSITA would have recognized that Means's additive system would increase costs, such costs would be mitigated based on the improved well efficiency attained by fine-tuning the mixture of additives. *E.g.*, EX-1006, [0006]–[0008]; EX-1003-¶72. This trade-off would also be important if a wellsite was in subsea environment. EX-1006, [0006]. EX-1003-¶72.

Pet. 15–16 (some paragraphing added).

(2) Different Phases of Tolman and Means

Patent Owner argues that the teachings of Tolman and Means are directed to different phases of oil well production, and thus would not be combined in the manner suggested by Petitioner. Prelim. Resp. 34–39. In particular, Patent Owner argues that Tolman is directed to the pre-production stimulation phase and Means is directed to the production phase. *Id.* at 35 (citing Ex. 1005 ¶¶ 9, 20, Fig. 2; Ex. 1006 ¶¶ 5, 9, Fig. 3). Based on the different phases, Patent Owner asserts that “any combination of features of Tolman's stimulation system with features of Means's production system would not form anything that could or would be used at the same time in the oilfield.” *Id.* at 36.

However, as presented, Petitioner appears to be suggesting that the benefits of Means' additive system would be equally beneficial in Tolman's centralized stimulation fluid pumping system, presumably in use during the pre-production phase.⁴ *See* Pet. 10–16. As instructed by the Supreme Court,

⁴ Petitioner's declarant Dr. Nikolaou also takes the position that it was known to use additives when preparing fracturing fluid (Ex. 1003 ¶¶ 36–37 (citing Ex. 1009–1011)), however, the support cited in his declaration does not represent the state of affairs at the time of invention in 2007 (Ex. 1001, code (22)). *See* Ex. 1009, code (22) (filed in 2012); Ex. 1010, codes (22),

“if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond that person's skill.” *KSR*, 550 U.S. at 401. Petitioner appears to be arguing that the benefits of Means’ system, such as prolonging the life of the wellbore and more precisely providing additives to the wellbore, would apply equally in Tolman’s system and methods. Pet. 15–16.

Thus, though we agree that the references must be considered as a whole, based on the current record, we decline to limit the applicability of Means’ teachings to only the oil production phase. We determine that Petitioner’s position and argument is sufficient to establish a reasonable likelihood of success, especially in view of the current evidence of record, such as the testimony of Dr. Nikolaou (*see, e.g.*, Ex. 1003 ¶¶ 71–72) and the teachings of Means (*see, e.g.*, Ex. 1006 ¶¶ 6–8).

(3) Two Pipes

Patent Owner also argues that though the Petition argues that multiple substances would be stored unmixed at “Tolman’s modified stimulation fluid storage system 204,” it does not “explain[] *how* Tolman’s pipes 203 as disclosed could flow Tolman’s stimulation fluid *and* Means’s additives.” Prelim. Resp. 41. Patent Owner appears to be arguing that the Petition rather than saying “pipes” needed to explain that there are at least two pipes and that each pipe contained a different substance. This is clearly implicit in Petitioner’s argument.

(60), (filed in 2012 and claiming priority to 2011); Ex. 1011, codes (22), (60), (filed in and claiming priority to 2012).

(4) Conclusion

After review of the evidence and arguments, including those summarized above, we determine that a reasonable likelihood of prevailing has been shown that the combination of Tolman and Means teaches or suggests the claim limitations of the first section of claim 1.

c) Claim 1, Section 2

Claim 1 also requires:

preparing, at the one or more centralized service factories, one or more well treatment fluids from the one or more well development task fluids, wherein the one or more centralized service factories are selectively configurable to prepare the one or more well treatment fluids;

flowing from the one or more centralized service factories to at least one of the plurality of wells the one or more well treatment fluids, wherein the one or more centralized service factories are selectively configurable to flow the one or more well treatment fluids;

recovering from the at least one of the plurality of wells the one or more well treatment fluids at the one or more centralized service factories, wherein the one or more centralized service factories are selectively configurable to receive the one or more recovered well treatment fluids.

Ex. 1001, 10:32–47.

For the “preparing” and “flowing” steps, Petitioner points to the combined teachings of Tolman and Means in a manner similar to the prior claim elements. Pet. 24–28. In particular, Petitioner argues that the combined Tolman and Means system selectively prepares well treatment fluids by mixing the stimulation fluid and additives which are then selectively flowed to one or more wells through valves 214, 216, 218 in Tolman Figure 2. *Id.* (citing *e.g.*, Ex. 1005 ¶¶ 30–31, 37, 44–46, Fig. 2; Ex. 1006 ¶¶ 5, 24, 34, 47–48; Ex. 1003 ¶¶ 86–88, 90–91).

Then, concerning the “recovering” step, Petitioner points to Tolman as teaching that “flowback manifolds [230a–230c (seen in Tolman Figure 2)] direct the recovered well fluid to the appropriate destination via flowlines 234a–238c, such as a “flowback pits, flow test units, sales lines, tankage, oil/gas/water separating and processing units and/or other similar devices.” Pet. 30 (quoting Ex. 1005 ¶ 28); *see also id.* at 29–31.

Petitioner argues that flowback manifolds 230a–230c are either part of the centralized service factory, or it would have been obvious to include them as part of such. Pet. 29, 30. Petitioner argues, supported by the testimony of Dr. Nikolaou, that “it would have been obvious to use flowback manifolds to recover well treatment fluids from wells as part of centralized service factories to use the produced water in further hydraulic fracturing operations” as the “use [of] recycled water in hydraulic fracturing operations . . . reduce[s] regulation-driven disposal costs and operation-driven water supply costs.” Pet. 31 (citing Ex. 1003 ¶ 95; Ex. 1008 ¶¶ 9, 39, 52).

Patent Owner does not contest the individual teachings of Tolman and Means discussed above. *See generally* Prelim. Resp. 28–46. Patent Owner does not contest the combination of Tolman and Means other than for the reasons discussed elsewhere herein. *Id.*

After review of the evidence and arguments, including those summarized above, we determine that a reasonable likelihood of prevailing has been shown that the combination of Tolman and Means teaches or suggests the claim limitations of the second section of claim 1.

d) Claim 1, Section 3

Claim 1 also requires:

flowing from the one or more centralized service factories to the centralized well treatment fluid center the one or more recovered well treatment fluids, wherein the one or more centralized service factories are selectively configurable to flow the one or more recovered well treatment fluids, and wherein the centralized well treatment fluid center is selectively configurable to receive the one or more recovered well treatment fluids.

Ex. 1001, 10:48–55.

Petitioner argues that Tolman’s “[m]anifolds 230a–230c (part of ‘*the one or more centralized service factories*’) direct (‘*flow*’) fluid (including ‘*the one or more recovered well treatment fluids*’) to various destinations.” Pet. 31 (citing Ex. 1005 ¶ 28; Ex. 1003 ¶ 97). Petitioner further argues that the manifolds are selectively configurable to flow the fluid. *Id.* at 36 (citing Ex. 1005 ¶ 28; Ex. 1003 ¶ 97).

Petitioner argues that “Crawford discloses multiple drill sites (‘*centralized service factories*’) that pump . . . well output fluids [(including oil, gas, and water)] to a central processing facility 6 (a ‘*centralized well treatment fluid center*’).” *Id.* at 32 (citing Ex. 1008, 6:31–34; Ex. 1003 ¶ 100). Petitioner argues that:

A POSITA would have been motivated to incorporate Crawford’s teaching of a centralized processing of recovered well fluids in the combined system of Tolman and Means. EX-1003-¶102. A POSITA would have recognized that such a modification would implement surface lines from Tolman’s flowback manifold. EX-1003-¶102. Notably, Tolman explains that multiple flowlines may be coupled to processing units, like the one described in Crawford. *See* EX-1005, [0028]. Because fluids like water may be reused for future stimulation treatment after being separated from other recovered well fluids, Crawford’s centralized processing unit should be part of

Tolman's Storage System 204, which provides fluids for stimulation treatment. *See* EX-1005, [0029]; EX-1008, Fig. 2, 6:36–41. The Tolman/Means/Crawford system includes surface lines between Tolman's flowback manifolds and the Crawford's central processing facility carry the well treatment fluids recovered from Tolman's wells. EX-1003-¶102.

Pet. 33–34.

Petitioner further argues that Crawford teaches the benefits of centralized processing of recovered well fluids which would provide the motivation to combine Crawford with Tolman. *Id.* at 34–35 (citing Ex. 1007, 8:59–65; Ex. 1003 ¶¶ 103–105).

Petitioner also further discusses the “use of recycled water in hydraulic fracturing operations,” arguing that it was a common practice “to reduce regulation-driven disposal costs and operation-driven water supply costs.” *Id.* at 35 (citing Ex. 1008 ¶¶ 9, 39, 52; Ex. 1003 ¶ 106). Thus, Petitioner argues “[a] POSITA would have been motivated to use Crawford's central processing facility, surface lines, and optimization method in the combined system of Tolman and Means to optimize cost reduction.” *Id.* (citing Ex. 1003 ¶ 106).

Patent Owner outlines some of the above analysis from the Petition and then argues that the discussion does not provide a sufficient explanation. Prelim. Resp. 43–46. Patent Owner argues that the Petition should explain in more detail what it means for the central processing unit in Crawford to be “part of” Tolman's storage system 204. *Id.* at 44–45.

It is unclear what additional detail Patent Owner believes is missing. As discussed above, Petitioner provides a detailed discussion on how the teachings of Tolman and Crawford would be combined and discusses how the use of recycled water would be reason for making Crawford's central

processing facility part of Tolman's storage system 204. Patent Owner appears to be arguing for a level of detail in the Petition that exceeds the level of detail in the claims.

Patent Owner then argues that the Petition does not discuss whether the combination uses Tolman's or Crawford's processing units. Prelim. Resp. 45 (*see also id.* at 46). It is unclear what impact Patent Owner believes the distinction would make on institution as the processing units appear to serve the same purpose, and thus would be essentially interchangeable, or are essentially the same thing.

Patent Owner argues that the Petition should discuss "the other structures coupled to Tolman's flowlines." *Id.* It is unclear what impact Patent Owner believes a discussion of these other structures would have on institution. Tolman sets forth a number of structures that "may be coupled to" the flowlines and flowback manifolds. Ex. 1005 ¶ 28. Tolman does not require use of these other structures and thus, it is not clear why Patent Owner believes that they need to be discussed.

Moving to the motivation to combine, Patent Owner notes that neither Tolman nor Crawford individually teach a processing facility combined with a fluid storage system. Prelim. Resp. 46–48. Patent Owner further argues that Tolman teaches a "flowback system, which is separate from the storage system." *Id.* at 46. Patent Owner acknowledges that the Petition relies on "a POSITA's knowledge of reuse of recovered fluids [to] . . . motivate a POSITA to combine the references."⁵ *Id.* at 48. However, Patent Owner argues that this is not enough of a reason "why a POSITA would *combine*

⁵ Patent Owner also argues that "Dr. Nikolauo offers no evidence to support this statement." Prelim. Resp. 50.

Crawford's processing facility with Tolman's stimulation fluid storage system." *Id.* Patent Owner similarly argues that Petitioner has not provided enough support for the reason to combine. *Id.* at 49–52. Patent Owner further argues that in the absence of a teaching in the art, Petitioner's reasoning appears to be based on improper hindsight. *Id.* at 48.

At this stage Petitioner's uncontroverted evidence that one of skill in the art would have found it obvious to combine Crawford's processing facility with Tolman's stimulation fluid storage system based on a knowledge of and desire to reuse recovered fluids is sufficient to provide a reasonable likelihood of prevailing. *See e.g.*, Ex. 1003 ¶¶ 102, 106.

Patent Owner's assertion to the contrary, is, at this stage, mere attorney argument. At the same time, we do agree that these issues should be further developed during trial.⁶ For example, there is no evidence at this stage that a "centralized well treatment fluid center" requires anything more than a processing facility adjacent to a fluid storage facility. The claim itself requires additional details about the flow of fluid, but there is no argument that a "centralized well treatment fluid center" requires a particular structure not met by the proposed combination.

Finally Patent Owner also argues that Crawford teaches away from combining with Tolman because it teaches that there can be multiple central

⁶ We further note that it is not clear that a finding of obviousness of claim 1 would require that Crawford's processing facility be located at Tolman's stimulation fluid storage system. Rather, the claim requires the flow of fluid from the centralized service factory to the centralized well treatment fluid center. Ex. 1001, 10:48–50. Petitioner argues that this would be provided by recycling water from Tolman's flowback manifolds to the storage system. Pet. 31–38. It is not clear, at this stage, that a processing facility between the two would not read on claim 1.

processing facilities. Prelim. Resp. 53–56 (citing Ex. 1007, 7:30–35). It is unclear how this could be characterized as a teaching away as it does not criticize, discredit, or otherwise discourage the combination. *See In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004). Further, this teaching is consistent to how Petitioner is relying on Crawford. Whether there are multiple *central* processing facilities spread over an oil field, or just one, Crawford teaches that the central processing facilities each receive the output from multiple wells. *See, e.g.*, Ex. 1007, Fig. 1.

After review of the evidence and arguments, including those summarized above, we determine that a reasonable likelihood of prevailing has been shown that the combination of Tolman, Means, and Crawford teaches or suggests the claim limitations of the third section of claim 1.

e) Reasonable Expectation of Success

Patent Owner argues that “[t]he Board should deny institution because the Petition never addresses reasonable expectation of success and therefore cannot establish obviousness.” Prelim. Resp. 28. Patent Owner further argues that “[e]ven if an inferential argument would be sufficient, there also is no foothold in the Petition or Petitioner’s expert declaration for Petitioner to assert an inferential case of a reasonable expectation of success.” *Id.* at 30.

Patent Owner also argues that the combinations of references involve great “complexity” and that the Petition does not provide the exact details on “what the system would look like or how it would work.” *Id.* at 31–32.

As discussed above, claim 1 largely requires the control of flows of fluids to different locations. Ex. 1001, 10:25–55. Claim 1 does not require any specific type of control, such as specific manifolds, valves, pipes, pumps, etc., other than features that are “selectively configurable to flow” or “receive” a liquid. *Id.* As such, it is not required of Petitioner to provide the

level of complexity of explanation inferred by Patent Owner. Such details are beyond the level of detail that claim 1 requires.

Both parties agree that one of skill in the art possesses “experience with process control systems.” Pet. 3–4 (citing Ex. 1003 ¶ 4); Prelim. Resp. 2. Further, the cited prior art appears to show that the use of various process controls for the control of fluid is well known to those of ordinary skill in the art. *See KSR*, 550 U.S. at 415–16 (a “patent for a combination which only unites old elements with no change in their respective functions . . . obviously withdraws what already is known into the field of its monopoly and diminishes the resources available to skillful men.”) (*quoting Great Atlantic & Pacific Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 152–153 (1950)).

The prior art combinations provided here by Petitioner do not appear to be such a technological leap that a person of ordinary skill in the art would have had significant trouble making the combinations as proposed by Petitioner. Rather, they appear to be the predictable use of prior art elements according to their established functions.

At this stage, and based on the current record and claim scope, we disagree that a reasonable expectation of success cannot be inferred from Petitioner’s arguments. *Elekta Ltd. v. ZAP Surgical Sys., Inc.*, 81 F.4th 1368, 1375–76 (Fed. Cir. 2023) (“To be clear, an obviousness determination requires finding that a person of ordinary skill in the art would have had a reasonable expectation of success. Reasonable expectation of success refers to the likelihood of success in combining references to meet the limitations of the claimed invention. Unlike a motivation to combine determination, which requires an explicit analysis, a finding of reasonable expectation of success can be implicit.” (internal citations omitted)).

f) Conclusion

After review of the evidence and arguments, including those summarized above, we determine that a reasonable likelihood of prevailing has been shown that the combination of Tolman, Means, and Crawford teaches or suggests the limitations of claim 1.

5. Claims 2, 3, 5–7, 9–15, 17, 18, 21–24, 26–28

Petitioner argues that claims 2, 3, 5–7, 9–15, 17, 18, 21–24, and 26–28 are obvious over the combination of Tolman, Means, and Crawford. Pet. 38–79. Claims 2, 3, 5–7, and 9–15 depend from claim 1. Ex. 1001, 10:56–13:8. Independent claim 17 is a system claim substantially similar to method claim 1. *Compare id.* at 10:25–55 *with id.* at 13:9–22. Thus, Petitioner largely relies on its arguments over claim 1 for teaching the limitations of claim 17. Pet. 38–45. Claims 18, 21–24, and 26–28 depend from claim 17. Ex. 1001, 13:23–14:64.

Patent Owner argues claim 17 together with claim 1, which arguments are addressed above, and does not address the other claims. *See* Prelim. Resp. 32–58.

Having determined that Petitioner has shown a reasonable likelihood of prevailing with respect to claim 1, it is unnecessary to address these additional claims.

E. 35 U.S.C. § 103 – Tolman, Means, Crawford, Lehman

Petitioner argues that claims 3, 4, 7–9, 11, 19, 20, 25, and 29–31 are rendered obvious by the combination of Tolman, Means, Crawford, and Lehman. Pet. 79–96. Patent Owner does not address this ground. *See generally* Prelim. Resp.

Having determined that Petitioner has shown a reasonable likelihood of prevailing with respect to claim 1, it is unnecessary to address these additional claims.

F. 35 U.S.C. § 325(d) – Discretionary Denial

Patent Owner requests that we exercise discretion to deny the Petition under 35 U.S.C. § 325(d). Prelim. Resp. 15–28. We decline. As noted in the Petition, “the Examiner did not consider Tolman in combination with any other reference.” Pet. 98 (citing Ex. 1002, 777–778). For this reason, we find that the same or substantially the same prior art or arguments previously were presented to the Office. Even considering that the Examiner considered Crawford “pertinent to applicant’s disclosure (Ex. 1002, 550), the Examiner did not apply Crawford in a rejection, nor did the Examiner consider Means. We further agree with Petitioner that “the Examiner’s analysis mapped different elements of Tolman to satisfy the claim elements of the ’082 patent from Dr. Nikolous’ analysis, such as Tolman’s production system 100 to the claimed ‘centralized well treatment fluid center.’” *Id.* at 98–99. Thus, the art and arguments as a whole are not the same as considered in prosecution.

Thus, Patent Owner does not persuade us that exercising our § 325(d) discretion is appropriate.

III. CONCLUSION

For the foregoing reasons, we have determined that there is a reasonable likelihood that the Petitioner would prevail with respect to at least one claim challenged in the Petition. We, therefore, institute trial.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, *inter partes* review as to claims 1–15 and 17–31 of U.S. Patent 7,931,082 B2 is instituted; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial will commence on the entry date of this decision.

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