

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

U.S. WELL SERVICES, LLC,
Petitioner,

v.

HALLIBURTON ENERGY SERVICES, INC.,
Patent Owner.

IPR2022-01165
Patent 7,836,949 B2

Before HUBERT C. LORIN, KRISTINA M. KALAN, and
JAMES J. MAYBERRY, *Administrative Patent Judges*.

LORIN, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. *Background*

U.S. Well Services, LLC (“Petitioner”) filed a Petition to institute an *inter partes* review of claims 1–14 of U.S. Patent No. 7,836,949 B2 (Ex. 1001, “the ’949 patent”) pursuant to 35 U.S.C. § 311 *et seq.* Paper 2 (“Petition” or “Pet.”). Halliburton Energy Services Inc. (“Patent Owner”) filed a Preliminary Response. Paper 7 (“Preliminary Response” or “Prelim. Resp.”).

We have authority under 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted unless the information presented in the Petition and the Preliminary Response shows that “there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a) (2021).

After considering the Petition, the Preliminary Response, and the evidence of record, we deny Petitioner’s request to institute an *inter partes* review as to the challenged claims of the ’949 patent on the grounds of unpatentability presented.

B. *Related Proceedings*

The parties identify the following related district court proceeding:

- U.S. Well Services, Inc. v. Halliburton Company, No. 6:21-cv-00367-ADA (W.D. Tex.).

Pet. 1; Prelim. Resp. 2.

Petitioner also identifies *inter partes* proceedings IPR2022-01162, IPR2022-01163, and IPR2022-01164 challenging U.S. Patent No. 9,435,333 B2, U.S. Patent No. 7,574,325 B2, and, U.S. Patent Reissue No.

RE47695 E1, respectively. Pet. 1.

C. Real Parties in Interest

Petitioner identifies itself as the real party-in-interest. Pet. 1. Patent Owner identifies itself as the real party-in-interest. Paper 5.

D. The '949 patent (Ex. 1001)

1. Disclosure

The '949 patent, titled “Method and Apparatus for Controlling the Manufacture of Well Treatment Fluid,” relates to input systems for delivering well treatment fluid to a well formation for the production of oil and gas. Ex. 1001, code (54), 1:19–21.

The '949 patent explains that “[a] typical well stimulation operation includes a proppant or sand system, a water system, a resin system, a gel system, a blending tub, and a pumping system,” each of which may be individually controlled. *Id.* at 1:24–27. “Because current well treatment subsystems often operate independently, some systems may be running ahead or behind of other systems,” leading “to well treatment fluid that does not comply with the needs of a well formation.” *Id.* at 1:32–37.

Accordingly, there is a need for a system that can “coordinate the various subsystems in a well treatment operation so that consistent performance be maintained according to a desired output rate or output property.” *Id.* at 1:54–59.

To that end, the '949 patent discloses a well treatment control system with a closed-loop feedback system. This is schematically depicted in Figure 3 of the '949 patent, reproduced below.

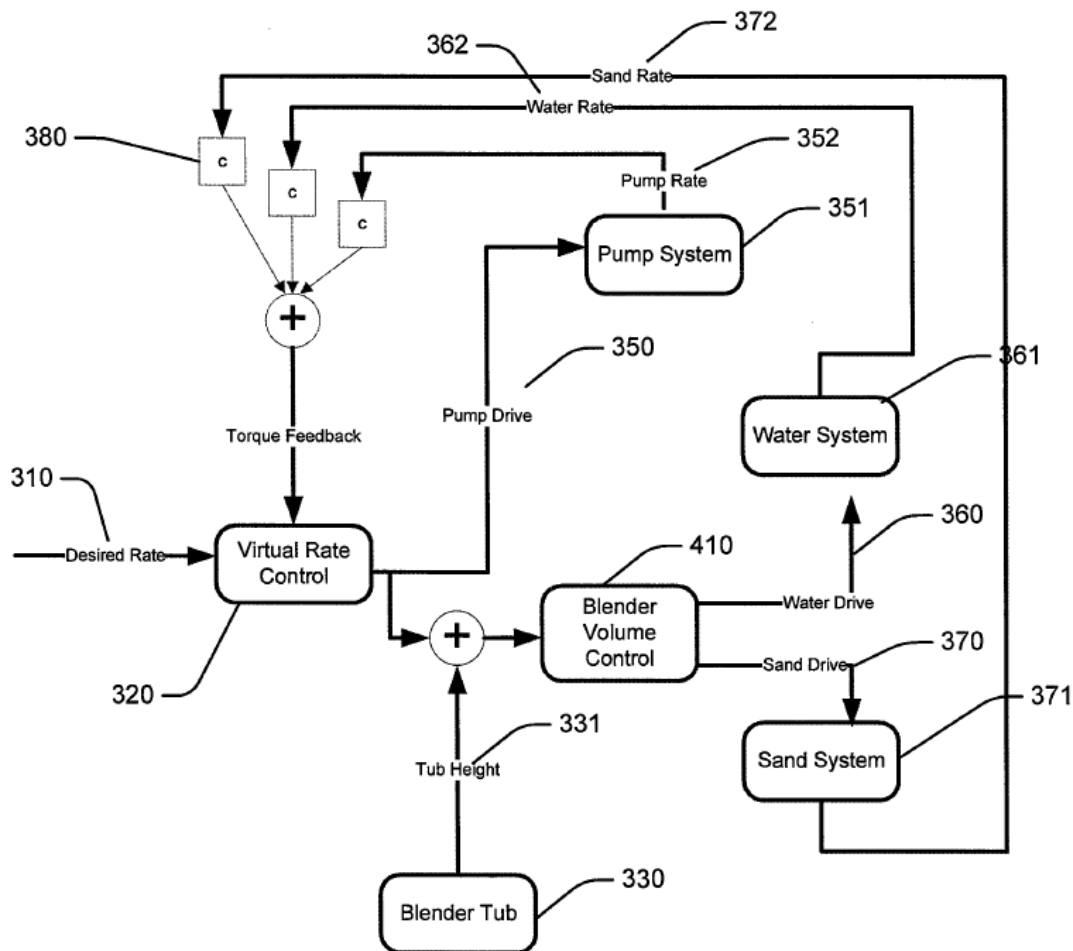


FIG. 3

Figure 3 of the '949 patent (Ex. 1001) shows a diagram of a well control system with pump system 351, water system 361 and sand system 371.

The well treatment control system depicted in Figure 3 comprises control rate 310 shown as an arrow pointing to virtual rate control 320. *Id.* at 5:60–6:3. “[R]ate 310 is entered into a virtual control 320 causing the control system 320 to drive the output rate of the fracturing operations factory to the desired rate,” by changing the rates of one or more various subsystems. *Id.* at 5:67–6:6. “[V]irtual rate control 320 can be implemented in hardware or software in a stand alone computer or ASIC, or within any of

the systems used to control the pumping system 351, water system 361, or proppant or sand system 371.” *Id.* at 6:6–10. For example, virtual rate control 320 outputs pump drive signal 350, shown as an arrow directed to pumping system 351. *Id.* at 7:3–8. “Drive signal 350 is sent to both the pump system 351 and the blender volume control 410 because whatever is mixed by the blender volume control system and the subsystems it controls must also be pumped by the pump system at the rates demanded by the virtual rate control 320.” *Id.* at 7:10–15. Blend volume control 410 further generates water drive signal 360 sent to water system 361 and sand drive signal 370 sent to sand system 371. *Id.* at 7:36–37.

Figure 3 further depicts feedback signals exiting pump system 351, water system 361, and sand system 371. For example,

pump rate feedback signal 352 can be generated by pressure sensors or pump sensors at the well pump or pumps and communicated to the virtual rate control 320 via ethernet, for example, or any other electronic communication means. The water rate feedback signal 362 can indicate the rate of water entering the blender tub and can be generated by sensors at a water valve and communicated the same way to the virtual rate control 320. The sand rate feedback signal 372 can indicate the rate of sand entering the blender tub and can be generated by sensors measuring the changes in the sand tub height and also communicated the same way to the virtual rate control 320.

Id. at 8:16–27. Pump rate 352, water rate 362, and sand rate 372 “are converted back to virtual torque feedback at converters 380 in a manner which preserves their relative importance (or weights) in the overall system such that they may be properly compared.” *Id.* at 11:4–11.

2. *Claims 1–14*

The '949 patent has 14 claims and Petitioner challenges all of them.

Pet. 3.

Claims 1 and 8 are the independent claims from which claims 2–7 and 9–14 depend, respectively. Claims 1 and 8 are reproduced below. Reference labels in brackets match those used in the Petition.

1. [pre] A method for controlling the production of well treatment fluid comprising:

- [a] determining an output rate from a sand system;
- [b] sensing an output rate from a water system;
- [c] sensing an output rate from a pumping system;
- [d] sensing the height within a blender tub of a mixture of sand from the sand system and water from the water system;
- [e] providing a virtual rate control system;
- [f] and producing a drive signal to the pumping system using the virtual rate control system using a desired rate of well treatment fluid to be delivered to a well, the output rate of the sand system, the output rate of the water system, and the output rate of the pumping system.

Ex. 1001, 11:48–60,

8. [pre] An apparatus for controlling the production of well treatment fluid at a predetermined rate comprising:

- [a] a sand system with a means for determining an output rate of the sand system;
- [b] a water system with an output rate sensor;
- [c] a pumping system with an output rate sensor;
- [d] a blender tub with a height sensor, wherein the blender tub is connected to the sand system and water system and

receives sand from the sand system and water from the water system; and

[e] a virtual rate control system, wherein the virtual rate control system is operable to: produce a drive signal to the pumping system using a desired rate of well treatment fluid to be delivered to a well, the output rate of the sand system, the output rate of the water system, and the output rate of the pumping system.

Id. at 12:42–58.

E. Asserted References

Petitioner relies on the following references:

Name	Reference	Ex. No.
SPE-17315	H.L. Tomlinson, et al., <i>SPE 17315 Fracturing Process Control and Automation</i> , Society of Petroleum Engineers 371–378 (March 10–11, 1988)	1005
SPE-26220	S.V. Stephenson et al., <i>Fracturing Process Control and Automation: Phase 2</i> , Society of Petroleum Engineers 43–49 (July 11–14, 1993)	1006
SPE-22294	D.L. Purvis et al., <i>Field-Applied Computerized Tracking System: A Practical Approach to On-Site Quality Control</i> , Society of Petroleum Engineers 22–28 (June 17–20, 1991)	1007

Petitioner also relies on the Declaration of John W. Ely (Ex. 1004, “Ely Decl.”) and the prosecution file for the ’949 patent (Ex. 1002) as support for the various contentions. Patent Owner relies on the Declaration of Robert A. Durham, Ph.D. (Ex. 2001, “Durham Decl.”) as support for the various contentions.

F. Asserted Grounds

Petitioner contends that claims 1–14 of the '949 patent are unpatentable on the following grounds:

Ground	Claims Challenged	35 U.S.C. §	Reference(s)
I	1–14	103 ¹	HAL-FCP ²
II	1–14	103	SPE-22294

Pet. 9–10.

II. ANALYSIS

A. Claim Construction

For petitions filed on or after November 13, 2018, “[claims] of a patent . . . shall be construed using the same claim construction standard that would be used to construe the [claims] in a civil action under 35 U.S.C. § 282(b), including construing the [claims] in accordance with the ordinary and customary meaning of such claims as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100 (2021); *see also Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005).

Petitioner does not submit constructions for any claim terms. Pet. 12. “Patent Owner does not dispute Petitioner’s constructions for the purposes of [the] preliminary response.” Prelim. Resp. 1–2.

¹ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. §§ 102 and 103. Because the challenged claims of the ’949 patent have an effective filing date before the effective date of the applicable AIA amendments, we refer to the pre-AIA versions of 35 U.S.C. § 103 throughout this Decision.

² “HAL-FCP” refers to the combined “two (2) Society of Petroleum Engineers (“SPE”) publications detailing Phase I (*SPE17315*) and Phase II (*SPE-26220*) of a Fracturing Process Control and Automation design.” Pet. 5–6; Exs. 1005 and 1006, respectively.

Only those terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999). We determine that no claims require express construction for purposes of this Decision.

B. Legal Standards

A patent claim is unpatentable as obvious 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. *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 ordinary skill in the art; and (4) objective evidence of obviousness or non-obviousness.³ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the

³ The parties have not directed us to any such objective evidence. Petitioner indicates that “Patent Owner has advanced certain ‘secondary indicia’ arguments tied to the claimed invention of the ’949 Patent in an interrogatory response in the USWS litigation.” Pet. 62. But, according to Petitioner, “the record in the USWS litigation has not been fully developed showing objective indicia of nonobviousness.” *Id.* Patent Owner has not advanced any secondary considerations in the Preliminary Response. See generally Prelim. Resp.

grounds for the challenge to each claim’’)). Petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

C. Level of Ordinary Skill in the Art

Petitioner contends:

A person of ordinary skill in the art (“POSITA”) in the relevant field relating to the ’949 Patent, as of its priority date, would include someone who has, a Bachelor of Science in Mechanical Engineering, Electrical Engineering, Petroleum Engineering, or an equivalent field and at least two years of academic or industry experience in the oil and gas industry, including in process control systems.

Pet. 12. Patent Owner applies Petitioner’s definition “[f]or the purposes of [the Preliminary Response] only.” Prelim. Resp. 17.

Petitioner’s proposed definition of a person of ordinary skill in the art appears reasonable, and we adopt that definition for our analysis in this decision. Accordingly, for the purposes of this Decision, we adopt Petitioner’s proposal regarding the level of one of ordinary skill in the art with the exception of the open-ended phrase “at least,” which expands the range of experience indefinitely without an upper bound. We determine that the level reflected in the prior art is consistent with Petitioner’s definition.

D. Overview of the Prior Art References

1. HAL-FCP

a) SPE-17135 (Ex. 1005)⁴

SPE-17135 discloses Phase 1 of a program for implementing automatic and remote control of a fracturing process for the petroleum industry. Ex. 1005, 1⁵. Figure 3 is reproduced below.

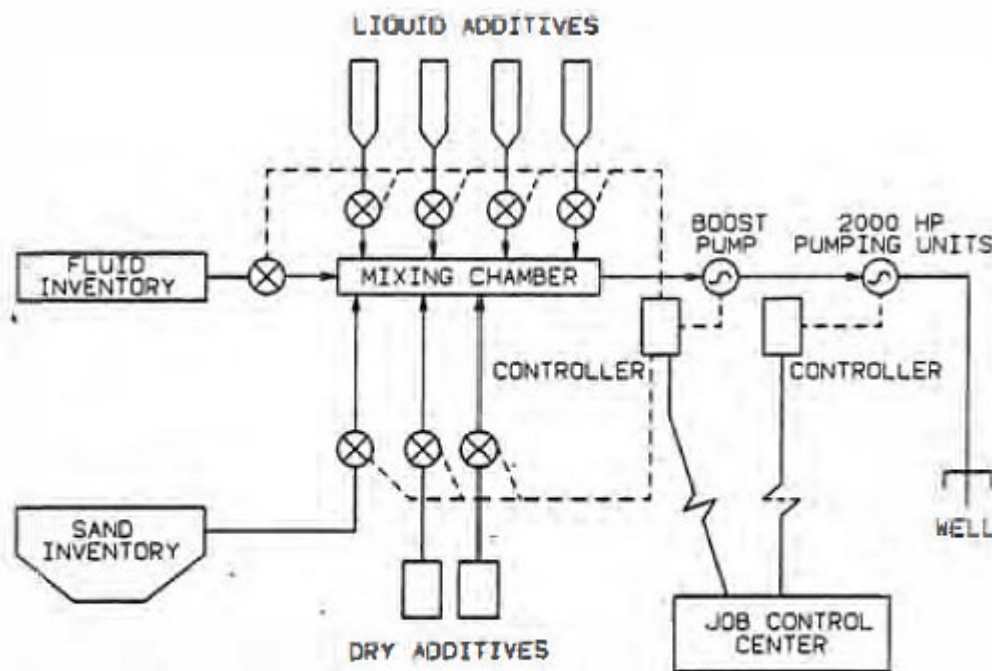


Fig. 3—Fracturing treatment process.

Figure 3 is a diagram of a fracturing system comprising a mixture chamber (blender) that is fed, through electro-hydraulic valves, by a fluid inventory, four liquid additive containers, a sand inventory, and two dry additive containers. The mixing chamber

⁴ Patent Owner refers to Ex. 1005 as “Tomlinson 1988.” See Prelim. Resp. 13.

⁵ Wherever a page number is cited it refers to the page of the Exhibit.

outputs a mixture to a series of two pumps, which pump the mixture into a well. Two controllers are independently connected by dashed lines to each respective pumps, with one of the controllers further connected to the electro-hydraulic valves.

SPE-17135 discloses controller electronics for the pump trailer, blender, and instrument skid, connected by a local area network to a job control center. *Id.* at 2.

Figure 11 illustrates a control loop and is reproduced below.

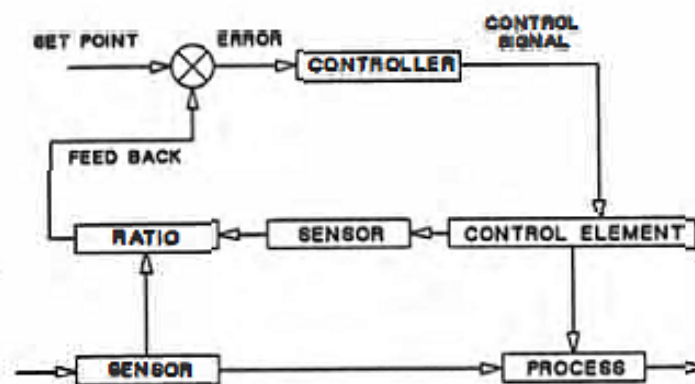


Fig. 11—Typical control loop.

Figure 11 is a diagram of a “typical ratio control process” comprising a controller which receives an “error” from an electro-hydraulic valve which receives a setpoint. The controller sends a control signal to a controller element which sends separate signals to a sensor and a process. The sensor outputs to a ratio, which outputs a feedback signal to the valve.

SPE-17135 discloses that “[d]uring a fracturing treatment, additives and proppant are added to base fluid by some predetermined ratio, so the rate and volume of the base fluid becomes the reference for automatically controlling fluid additives and proppant.” *Id.* at 3. “[C]ontrol of additives is accomplished by electro-hydraulic valves which govern the speed of the

additive pump drive motor. Base fluid is measured with a flowmeter, and additive rates with a speed sensor.” *Id.* “The system continuously checks (electronically) and adjusts additive rate to maintain the precise ratio between the base fluid rate and additive rate.” *Id.* Four different methods are provided for obtaining base fluid rate including: (1) magnetic flowmeter; (2) turbine flowmeter; (3) automatic calculation; and (4) operator input from job rate. *Id.* SPE-17135 discloses that “[t]his system is designed to maintain a constant base fluid rate instead of holding a precise tub level.” *Id.* Additionally, “[p]umping units have control loops to adjust engine speed, select transmission gears, and control pumping pressure.” *Id.* at 2.

*b) SPE-26220 (Ex. 1006)*⁶

SPE-26220 discloses Phase 2 of a program for implementing automatic and remote control of a fracturing process for the petroleum industry. Ex. 1006, 1. Phase 2 includes “creating software for the central computer in the control and engineering center,” and developing fluid monitoring systems, among other improvements. *Id.*

SPE-26220 discloses that the

control and engineering center is the focal point of a frac job. It is from this area that the frac operator monitors and controls the job, the automated equipment, inputs data for the Auto Job Manager, and defines controlling parameters to be used for the various calculations performed in the system.

The control and engineering center monitors over 1,200 surface treatment parameters through the communications network. These parameters consist of rates, pressures, temperatures, densities, material inventories, and equipment status.

⁶ Patent Owner refers to Ex. 1006 as “Stephenson July 1993.” *See* Prelim. Resp. 13–14.

Id. at 5.

SPE-26220 discloses retrofitting the blender with automatic controls that “continuously check and adjust the additive rates to maintain precisely a selected ratio.” *Id.* The automatic controls may further include “[a] flowmeter measures the clean gel and speed sensors measure the additive and proppant delivery rates. Control loops proportion the additives and proppant. Suction and discharge pressures, . . . can also be automatic and remotely controlled.” *Id.* at 3–4.

SPE-26220 further discloses that the automatic and remote controls may extend to the downhole pumping units. *Id.* at 4. For example, the pumping units may include automatic controls so that “transmission shifting is automatic. The control system selects the throttle setting and the gear required to obtain a requested flowrate.” *Id.*

2. *SPE-22294 (Ex. 1007)*⁷

SPE-22294 concerns a computerized system for automating and monitoring a modern hydraulic fracturing treatment. Ex. 1007, 1. The computerized system provides “[m]icroprocessor-based monitoring, control, and recording equipment [for] an efficient, high-speed method of processing, adjusting, transmitting, displaying, and recording all the data necessary to ensure a quality treatment.” *Id.* at 1–2. “The actual treatment is a very dynamic process that requires the tracking of changing fluid conditions, proppant concentrations, crosslinking, and additive effects to calculate downhole conditions.” *Id.* at 5.

⁷ Patent Owner refers to Ex. 1007 as “Purvis.” *See* Prelim. Resp. 14.

SPE-22294 discloses a control system using 12 identical controller modules that monitor and adjust the fluid level of the liquid fracture concentrate (“LFC”), and monitor and adjust each additive stream. *Id.* at 2. Controller modules “monitor[] the water flow rate and use[] preset ratios to determine the necessary control signal to be sent to the additive pumps. . . . The proportions of the chemicals will then be controlled over a wide range of flow rates.” *Id.* Moreover, controller modules may maintain a ratio for all chemicals by monitoring a particular “base” rate. *Id.* “The correct ratio is maintained by automatic responses to changes in the base rate.” *Id.* For example, the controller may maintain the proper ratio of chemicals by changing proppant concentration and pump rate. *Id.* at 3.

SPE-22294 discloses that the well-treatment analyzer (“WTA”) “is the heart of the stimulation system.” *Id.* at 4. “The WTA processes, displays, and records the necessary surface information. With this information, the service supervisor can be assured that the proper ratios of materials are being added, the treatment is proceeding on schedule, and the equipment is operating within its design performance standards.” *Id.* The WTA obtains signals from pressure transducers used to monitor pressure, both tubing and annulus, at the wellhead and a nuclear densimeter used on the high-pressure treating line near the wellhead as a final verification of slurry quality. *Id.*

E. Ground 1

Petitioner challenges claims 1–14 as unpatentable under 35 U.S.C. § 103 over HAL-FCP. Pet. 10, 12–40.

1. Independent Claims 1 and 8

Limitation [c] of independent claim 1 recites “sensing an output rate from a pumping system.” Ex. 1001, 11:52. Limitation [c] of independent claim 8 recites “a pumping system with an output rate sensor.” *Id.* at 12:47.

a) Petitioner’s Contentions

For limitation [c] of both claims 1 and 8, Petitioner contends that HAL-FCP discloses:

- “[a]utomatic rate control on the pumping unit provided smoother rate changes and more precise rate control” (Ex. 1005, 3);
- “[p]umping units have control loops to adjust engine speed, select transmission gears, and control pumping pressure” (*id.* at 2); and,
- “[b]oth existing and newly designed downhole pumping units have been equipped with automatic and remote controls. With the automatic controls, transmission shifting is automatic. The control system selects the throttle setting and the gear required to obtain a requested flowrate” (Ex. 1006, 4).

Pet. 14–15, 28. For limitation [c] of claim 8, Petitioner also states that “HAL-FCP teaches a pumping system with an output rate sensor.” Pet. 28 (citing Ex. 1004 ¶¶ 83–85).

Petitioner further contends that “HAL-FCP also teaches that the control and engineering center ‘monitors over 1,200 surface treatment parameters through the communications network. These parameters consist of rates, pressures, temperatures, densities, material inventories, and equipment status.’” Pet. 15 (quoting Ex. 1006, 5), 29 (same).

According to Petitioner, “[i]t is both disclosed and understood by a POSITA⁸ that HAL-FCP teaches this step of ‘sensing an output rate from a pumping system.’” Pet. 15 (citing Ex. 1004 ¶¶ 42–43). And “[i]t is both disclosed and understood by a POSITA that HAL-FCP teaches a pumping system with an output rate sensor as claimed in the ’949 Patent.” *Id.* at 29 (citing Ex. 1004 ¶ 85).

Petitioner also addresses “output rate” in relation to limitations [e] and [f] of claim 1 and claim limitation [e] of claim 8. Pet. 17, 18, 30–32; Ex. 1001, 11:55, 11:56–60, 12:52–58. In that regard, Petitioner contends HAL-FCP teaches a virtual rate control system and that the virtual rate control system “monitors the surface treatment parameters (including desired rate of treatment fluid, output rate of sand, output rate of water system, and *output rate of the pumping system*) and controls the rate of the pumping system through a communication network and control center.” *Id.* at 17–18 (citing Ex. 1004 ¶ 50), 31 (citing Ex. 1004 ¶ 92) (emphasis added). This leads Petitioner to further contend that HAL-FCP discloses a virtual rate control system producing a drive signal because a “POSITA would understand that control of the *output rate of a pumping system* in the system taught in HAL-FCP necessitates producing a ‘drive signal.’” *Id.* at 18 (citing Ex. 1004 ¶ 50), 32 (citing Ex. 1004 ¶ 92) (emphasis added). Emphasis added.

⁸ POSITA is an acronym for a “person (having) ordinary skill in the art.”

b) Patent Owner's Contentions

Patent Owner disagrees that HAL-FCP discloses limitation [c] of claims 1 and 8. Prelim. Resp. 21–23, 24. “The Petition does not present any evidence that the output rate is ‘sensed’ in [HAL-FCP].” *Id.* at 22.

Patent Owner disputes Petitioner’s reliance on disclosures of automatic rate control and use of automatic and remote controls to show that HAL-FCP senses an output rate. Prelim. Resp. 22 (referring to Ex. 1005, 2, 3, Ex. 1006, 4, cited at Pet. 14–15, 28).

According to Patent Owner, these disclosures “do not imply that an output rate from the pumping system is sensed, as opposed to [being] determined by other means.” Prelim. Resp. 22 (citing Durham Decl. ¶ 21). “For example, automatic rate control could be accomplished by sensing a pressure and then calculating an output rate.” *Id.*

Patent Owner also disputes Petitioner’s reliance on “monitoring parameters—that is, that the system ‘monitors over 1,200 surface treatment parameters through the communication network’ including ‘rates, pressures, temperatures, densities, material inventories, and equipment status’.” Prelim. Resp. 22 (referring to Ex. 1006, 5, cited at Pet. 15, 29).

However, “monitor[ing] . . . rates” does not teach “sensing” (the references’ rate monitoring is likely performed via calculation from another input ([Durham Decl.] at ¶ 21)), nor does it teach “output rate[s] from a pumping system” ([Ex. 1006’s] rates could be any other rates, such as sand rates, water rates, gel rates, proppant rates, blender rates, or even input rates from a pumping system).

Id. at 22–23.

Patent Owner further contends, *inter alia*, that Petitioner fails to explain why a person of ordinary skill in the art would have been led to the

claimed subject matter. Prelim. Resp. 19–23 (citing Durham Decl. ¶ 21). “The Petitioner’s conclusory assertions, devoid of reasoning or supporting evidence, are insufficient to support an argument of obviousness.” *Id.* at 20.

c) Analysis

We agree with Patent Owner’s identified deficiencies.

Petitioner contends that “[i]t is both disclosed and understood by a POSITA that HAL-FCP teaches this step of “sensing an output rate from a pumping system [limitation [c] of claim 1].” Pet. 15 (citing Ex. 1004 ¶¶ 42–43). A similar contention is made for the “output rate sensor” element in limitation [c] of claim 8. *Id.* at 29 (citing Ex. 1004 ¶ 85).

Petitioner principally relies on four statements in HAL-FCP. Ex. 1005, 2, 3, Ex. 1006, 4, 5; Pet. 14–15, 28–29.

The first statement indicates that a pumping unit is provided with automatic rate control to “provide[] smoother rate changes and more precise rate control.” Ex. 1005, 3; Pet. 14–15, 28.

The second statement indicates that pump rate and pressure can be controlled, engine speed can be adjusted, and transmission gears selected. Ex. 1005, 2; Pet. 14–15, 28.

The third statement indicates that downhole pumping units have been equipped with automatic controls for rendering transmission shifting automatic. They have also been equipped with remote controls. It further indicates that a “control system selects the throttle setting and the gear required to obtain a requested flowrate.” Ex. 1006, 4; Pet. 14–15, 28.

The fourth statement indicates that “over 1,200 surface treatment parameters” can be monitored via a communications network. “These

parameters consist of rates, pressures, temperatures, densities, material inventories, and equipment status.” Ex. 1006, 5; Pet. 15, 29.

These four statements do not provide a sufficient basis for Petitioner’s contention that HAL-FCP “discloses” limitation [c] of claims 1 and 8. Pet. 15, 29. This is because “sensing an output rate from a pumping system” and an “output rate sensor” are nowhere mentioned and Petitioner provides no further explanation as to why these statements would nevertheless teach “sensing an output rate from a pumping system” and an “output rate sensor” to one of ordinary skill in the art.

At best, these statements indicate that a pump’s output rate can be controlled and monitored. But the claims require more particularly “sensing the output rate” and employing an “output rate sensor,” not merely controlling and monitoring output rate. Even though one would control and monitor output rates against a determined actual output rate, an output rate can be determined a number of different ways other than by “sensing the output rate,” as Patent Owner points out. “For example, automatic rate control could be accomplished by sensing a pressure and then calculating an output rate.” Prelim. Resp. (citing Ex. 2001 ¶ 21).

These statements, coupled with the lack of explanation, also insufficiently support Petitioner’s contention that a person of ordinary skill in the art would have *understood* HAL-FCP to disclose limitations [c] of claim 1 and 9. Pet. 15, 29. Paragraphs ¶¶ 42–43 and 85 of the Ely Declaration are cited as evidence. Pet. 15 (citing Ex. 1004 ¶¶ 42–43), 29 (citing Ex. 1004 ¶ 85). But they simply repeat “[i]t is both disclosed and understood by a POSITA that HAL-FCP teaches this step of ‘sensing an output rate from a pumping system’” (Ex. 1004 ¶ 43) and “[i]t is both

disclosed and understood by a POSITA that HAL-FCP teaches a pumping system with an output rate sensor as claimed in the '949 Patent" (*id.* at ¶ 85), without further elaboration.

Regarding Petitioner's position relative limitations [e] and [f] of claim 1 and limitation [e] of claim 8, wherein "output rate" is also recited, Petitioner contends HAL-FCP teaches a virtual rate control system and that the virtual rate control system "monitors the surface treatment parameters (including desired rate of treatment fluid, output rate of sand, output rate of water system, and output rate of the pumping system) and controls the rate of the pumping system through a communication network and control center." Pet. 17–18 (citing Ex. 1004 ¶ 50), 31 (citing Ex. 1004 ¶ 92). This contention is based on the above-discussed "first" and "second" statements in HAL-FCP that Petitioner relied upon for showing that HAL-FCP discloses limitation [c] of claim 1. *See* Ex. 1004 ¶¶ 50, 92, discussing Ex. 1005, 2, 3. As we explained, "sensing an output rate from a pumping system" and an "output rate sensor" are nowhere mentioned in these statements. Petitioner's position relative to limitations [e] and [f] of claim 1 and limitation [e] of claim 8 adds no further explanation as to why one of ordinary skill in the art would nevertheless have understood said statements to teach said "sensing"/"sensor." This reinforces our earlier view that Petitioner has insufficiently shown that one of ordinary skill in the art would have been led to the method and apparatus of claims 1 and 8 comprising limitation [c].

d) Conclusion as to Claims 1 and 8

After considering Petitioner's and Patent Owner's contentions in light of the supporting evidence on this record, we agree with Patent Owner that

the Petition insufficiently identifies the evidence and provides insufficient reasoning in support of its contentions that “[i]t is both disclosed and understood by a POSITA that HAL-FCP teaches” “sensing an output rate from a pumping system” and an “output rate sensor” as claimed. Pet. 15, 29; limitation [c] of claims 1 and 8.

Given the Petition insufficiently identifies the evidence and provides insufficient reasoning in support of the contentions discussed, Petitioner insufficiently shows that HAL-FCP would have led one of ordinary skill in the art to a method (claim 1) and apparatus (claim 8) comprising limitation [c]. Accordingly, we determine Petitioner has not shown a reasonable likelihood of establishing the obviousness of claims 1 and 8 under Ground I.

2. Claims 2–7 and 9–14

Dependent claims 2–7 and 9–14 depend from independent claims 1 and 8, respectively, and therefore require all the limitations of said respective independent claims. Thus, the analysis presented above for claims 1 and 8 applies equally to claims 2–7, and, 9–14. For the reasons discussed with respect to claims 1 and 8, Petitioner has not provided a sufficient showing that all the limitations of claims 2–7 and 9–14 of the ’949 patent are disclosed or rendered obvious by HAL-FCP.

Accordingly, we determine Petitioner has not shown a reasonable likelihood of establishing the obviousness of claims 2–7 and 9–14 under Ground I.

F. Ground II

Petitioner sets forth an additional ground (Ground II) challenging claims 1–14 based on SPE-22294. Pet. 10, 40–63.

1. Independent Claim 1

a) Petitioner's Contentions

For limitation [c] of claim 1, Petitioner contends that SPE-22294 teaches:

[i]n addition to the surface information, modern hydraulic fracturing technology uses downhole data to indicate the progress of the treatment in the formation. This information usually is not available from direct measurements and therefore is calculated. The actual treatment is a very dynamic process that requires the tracking of changing fluid conditions, proppant concentrations, crosslinking, and additive effects to calculate downhole conditions. An additional engineering on-site analysis computer is used.

Pet. 47–48 (quoting Ex. 1007, 2). “It is further taught that, ‘[t]he base rate may be the water flow rate between the fracturing tanks and the mixer, the flow rate between the gel mixer and the blender, or the flow rate at the discharge of the blender (downhole rate).’” *Id.* at 44 (quoting Ex. 1007, 2).

Based on these disclosures, Petitioner contends that it “would be understood by a POSITA [that] SPE-22294 teaches [] the step of ‘sensing an output rate from a pumping system.’” Pet. 44 (citing Ex. 1004 ¶ 129).

Petitioner’s position as to limitation [c] of claim 8 is the same. *See* Pet. 55 (“As discussed with respect to the method claim 1 . . . SPE-22294 teaches a “pumping system with an output rate sensor.”) (citing Ex. 1004 ¶ 166).

b) Patent Owner's Contentions

Patent Owner contends that SPE-22294 does not teach “sensing an output rate from a pumping system” but rather “uses ‘downhole data to indicate the progress of the [hydraulic fracturing] treatment in the

formation.” Prelim. Resp. 23. “[T]here is no disclosure in [SPE-22294] of sensing the pumping system’s output rate. Indeed, [SPE-22294] never claims to sense (rather than calculate or otherwise monitor) any rate, let alone the output rate from the pumping system.” *Id.* (citing Ex. 1007).

c) Analysis

We agree with Patent Owner. We see no mention of “sensing an output rate from a pumping system” or an “output rate sensor” as set forth in limitation [c] of claims 1 and 8 in the passages of SPE-22294 that Petitioner cites. There is a mention of a “water flow rate” but nothing about sensing a pumping system’s output rate. Ex. 1007, 2.

No further explanation is given to guide us in understanding how one of ordinary skill in the art would have been led to the subject matter of limitation [c] of claims 1 and 8 given said disclosures.

Accordingly, we determine Petitioner has not shown a reasonable likelihood of establishing the obviousness of claims 1 and 8 under Ground II.

d) Conclusion as to Claims 1 and 8

After considering Petitioner’s and Patent Owner’s contentions in light of the supporting evidence on this record, we agree with Patent Owner that the Petition insufficiently shows that SPE-22294 would have led one of ordinary skill in the art to a method (claim 1) and apparatus (claim 8) comprising limitation [c]. Accordingly, we determine Petitioner has not shown a reasonable likelihood of establishing the obviousness of claims 1 and 8 under Ground II.

2. Claims 2–12

Dependent claims 2–7 and 9–14 depend from independent claims 1 and 8, respectively, and therefore require all the limitations of said respective independent claims. Thus, the analysis presented above for claims 1 and 8 applies equally to claims 2–7, and, 9–14. For the reasons discussed with respect to claims 1 and 8, Petitioner has not provided a sufficient showing that all the limitations of claims 2–7 and 9–14 of the '949 patent are disclosed or rendered obvious by SPE-22294.

Accordingly, we determine Petitioner has not shown a reasonable likelihood of establishing the obviousness of claims 2–7 and 9–14 under Ground II.

G. Discretion under 35 U.S.C. § 325 (d) and 314(a)

Petitioner argues that the Board should not exercise its discretion to deny institution under 35 U.S.C. § 314(a) in view of the district court litigation. Pet. 10–11 (citing, *inter alia*, *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential)). Petitioner also argues that the Board should not exercise its discretion to deny institution under 35 U.S.C. § 325(d). *Id.* at 11.

Patent Owner presents arguments directed to whether we should exercise our discretion to deny institution under 35 U.S.C. § 314(a) and *Fintiv*. Prelim. Resp. 2–11. Patent Owner also presents arguments directed to whether we should exercise our discretion to deny institution under 35 U.S.C. § 325(d). *Id.* at 12–16.

For the reasons stated above, we decline to institute *inter partes* review. Because we base our denial of institution on the merits of this case,

it is unnecessary for us to analyze whether we should also discretionarily deny institution under 35 U.S.C. § 314(a) or 35 U.S.C. § 325(d).

III. CONCLUSION

For the foregoing reasons, we determine that Petitioner has not demonstrated a reasonable likelihood that it would prevail with respect to at least one of the claims challenged in the Petition. We decline to institute an *inter partes* review.

IV. ORDER

It is

ORDERED that the Petition is denied; and

FURTHER ORDERED that that no *inter partes* review is instituted.

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