

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTELLIGENT WELLHEAD SYSTEMS, INC.,
Petitioner,

v.

DOWNING WELLHEAD EQUIPMENT, LLC,
Patent Owner.

IPR2024-00300
U.S. Patent 11,560,770

PATENT OWNER SUR-REPLY

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PATENT OWNER’S EXHIBIT LIST

Exhibit	Description
Ex.2001	Wayback Machine - Downing Continuous Pumping Web Page
Ex.2002	Downing Continuous Pumping WordPress Page
Ex.2003	Tim Marvel Email RE Continuous Pumping Webpage with Attachment
Ex.2004	Marvel LinkedIn Post 1/12/2020
Ex.2005	Declaration of Tim Marvel
Ex.2006	Declaration of John Hughett
Ex.2007	CV of John Hughett
Ex.2008	Deposition Exhibit – SLB Energy Glossary, “zipper manifold”
Ex.2009	Deposition Exhibit – SLB Energy Glossary, “missile”
Ex.2010	Deposition Exhibit – SLB Energy Glossary, “gate valve”
Ex.2011	Deposition Exhibit – Annotated Fig. 5 of US2019/0233275 (Carr)
Ex.2012	Declaration of John Hughett in Support of Patent Owner Response
Ex.2013	Deposition Transcript of Robert A. Durham (Aug. 15, 2024)
Ex.2014	Downing Continuous Pumping Website (Sept. 16, 2024)
Ex.2015	Gulf Energy Excellence Awards 2023 Winners (Sept. 16, 2024)
Ex.2016	Gulf Energy Excellence Awards 2023 Finalists (Sept. 16, 2024)
Ex.2017	Wayback Machine - Gulf Energy Excellence Awards Methodology 2023 (archived Jun. 1, 2023)
Ex.2018	Wayback Machine - Gulf Energy Excellence Awards Nominations 2023 (archived Mar. 4, 2024)

Exhibit	Description
Ex.2019	Downing 2023 Gulf Energy Award Submission
Ex.2020	Liberty News - Liberty Announces Milestone Achievement of 24 Hours of Continuous Pumping Time (dated Sept. 27, 2021)
Ex.2021	Xstim Consulting, www.xstimconsulting.com (Sept. 17, 2024)
Ex.2022	XStim Consulting - About Us, www.xstimconsulting.com/about-us (Sept. 17, 2024)
Ex.2023	XStim Consulting – Fourteen Forty Pump Time Record, www.xstimconsulting.com/news/fourteen-forty-pump-time-record (Sept. 17, 2024)
Ex.2024	Downing LinkedIn Post – Aaron Dressel https://www.linkedin.com/posts/downingusa_permianbasin-permian-eagleford-activity-6849475549518192640-tX5_/ (Sept. 11, 2024)
Ex.2025	Q2 2023 Occidental Petroleum Corp Earnings Call of Aug. 3, 2023, https://www.oxy.com/siteassets/documents/investors/quarterly-earnings/oxy2q23transcript.pdf
Ex.2026	Downing LinkedIn Post – Occidental https://www.linkedin.com/posts/downingusa_haynesville-midcon-permianbasin-activity-7094430459455033344-jm8R?trk=public_profile_like_view (Sept. 16, 2024)
Ex.2027	Downing LinkedIn Post – Addison Kowal https://www.linkedin.com/posts/downingusa_permianbasin-permian-eagleford-activity-6885324063816912896-4RM4/ (Sept. 11, 2024)
Ex.2028	Chesapeake Energy Corporation Reports 2023 Second Quarter Results, Aug 1, 2023 (https://investors.chk.com/2023-08-01-CHESAPEAKE-ENERGY-CORPORATION-REPORTS-2023-SECOND-QUARTER-RESULTS)

Exhibit	Description
Ex.2029	Downing LinkedIn Post – Chesapeake https://www.linkedin.com/posts/downingusa_haynesville-midcon-permianbasin-activity-7092898981432754176-zo98?trk=public_profile_like_view/ (Sept. 17, 2024)
Ex.2030	Wayback Machine – Different Types of Pumps – Positive Displacement Pumps, https://web.archive.org/web/20200812201325/https://www.processindustryforum.com/article/different-types-pumps-positive-displacement-pumps (archived Aug. 12, 2020)
Ex.2031	US Patent Application Pub. No. 2021/0054727
Ex.2032	Declaration of Timothy Marvel in Support of Patent Owner Response
Ex.2033 (NEW)	Deposition Transcript of Robert A. Durham (Jan. 28, 2025)

I. INTRODUCTION

The Challenged Claims require performing a specific valve sequence in a multi-well system in response to a determination about the condition of fluid communicated to a first well. The Petition fails to demonstrate that any of the cited art discloses or renders obvious these steps. With respect to Carr, Petitioner's Reply continues to advance arguments based on a fundamental misreading of the claims and the prior art. With respect to Tolman, the Reply attempts to cure the Petition's lack particularly for the claimed "first valve" by improperly identifying—*for the first time*—an alleged "master valve" that is not mentioned in Tolman, the Petition, or the first expert declaration.

Petitioner respectfully requests that the Board confirm these deficiencies in the Petition and find the Challenged Claims not unpatentable.

II. THE PETITION FAILS TO PROVE THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. The Carr Grounds do not anticipate or render obvious the Challenged Claims.

Despite repeatedly accusing Downing of "rely[ing] on features nowhere in '770's claims," Petitioner ignores the claims' plain-language requirement of performing the recited valve sequence "in response to" a condition of "the fluid" communicated to the *first well*. Reply, 2. Petitioner's refusal to acknowledge the

basic requirements of the claims moots its arguments that Carr either anticipates or renders obvious the Challenged Claims.

Moreover, the Reply continues to conflate Carr’s different operations of simulating its two wells “individually” and stimulating its two wells “simultaneously.” Neither operation discloses or suggests performing the claimed valve sequence or doing so in response to conditions across two “isolated” manifold paths; and the Petition gives no reason for combining the different operations.

1. Independent Claims 1, 14, 27.

- i. Carr does not disclose or render obvious performing the claimed valve sequence “in response to determining that *the* fluid communicated via the manifold has satisfied one or more conditions.”**

Petitioner asserts in the Reply, without citation or explanation, that the claims do not “requir[e] the fluid used for ‘determining’ to have been communicated to the first well or first valve.” Reply, 3. This argument ignores the only antecedent basis for the term “*the* fluid communicated via the manifold”—the previously recited “*communicating fluid to a first well via a manifold and a first valve.*” It is black-letter law that a claim’s use of “the” “refer[s] back to the same term recited earlier in the claim.” *Wi-Lan, Inc. v. Apple, Inc.*, 811 F.3d 455, 462 (Fed. Cir. 2016). Therefore, contrary to Petitioner’s assertions, the Challenged

Claims require opening a *second valve* in response to conditions of fluid communicated to a *first well*.

Carr neither anticipates nor renders obvious this interdependency. The Reply repeatedly points to Carr’s general statement that its control system can control the system’s valves “in light of fluid flow targets for the first well 140 *and/or* the second well 142.” Reply, 5; Petition, 51 (citing Ex.1004, [0035]). But the Challenged Claims do not merely require controlling the positions of the valves based on flow-meter data from one or both wells. They require opening a *second* valve in response to conditions of fluid communicated to the *first* well and performing the entire recited sequence in response to such conditions. Carr’s broad “and/or” statement does not include the “precision and detail” required for anticipation. *Wasica Fin. GmbH v. Cont’l Auto. Sys., Inc.*, 853 F.3d 1272, 1284 (Fed. Cir. 2017) (holding that the prior-art’s broad disclosure of transmitting using “any modulation scheme” did not disclose with sufficient particularity transmitting with a constant-frequency modulation scheme).

This “and/or” statement also cannot render obvious the claimed interdependency (opening a *second* valve in response to conditions of fluid communicated to a *first* well) because it must be read together with Carr’s explicit statement that the “*first* valve” controls flow to the “*first* well” and the “*second* valve” controls flow to the “*second* well.” Ex.1004, [0033] (“The **first valve 470**

can be utilized to control the flow from the mixing blender 108 **to the first well 140** and the **second valve 472** can be utilized to control the flow from the mixing blender 108 **to the second well 142.**”).

A cursory examination of Carr illustrates that the “and/or” statement cited in the Reply does not mean what Petitioner thinks it means. Rather, Carr uses such alternative language because the statement is meant to cover both of Carr’s alternative operations: stimulating its two wells “individually” or stimulating its two wells “simultaneously”:

The first valve 470 and the second valve 472 can allow for the first well 140 and the second well 142 to **each be stimulated individually** by opening the respective first valve 470 or the second valve 472 and closing the other valve. Further, in some embodiments, the first valve 470 and the second valve 472 can be used to control the flow rate to the first well 140, the second well 142, or to both the first well 140 and the second well 142 **simultaneously**.

Ex.1004, [0033]; *see also* Ex.2033, 40:16-24; Petition, 52. Dr. Durham confirmed during his deposition that Carr’s simultaneous and individual treatments are “**different operations.**” Ex.2033, 40:16-24. Thus, given this proper context, Petitioner’s cited “and/or” statement means that the control system would use only one of the fluid-flow targets when stimulating individually (“or”) or would use

both fluid-flow targets with stimulating simultaneously (“and”). But even in the simultaneous case, as noted above, each valve only controls the flow to its respective well. Ex.1004, [0033].

Moreover, interpreting the cited statement to instead refer to using the *first* flow meter 150 to operate the *second* valve 472, as Petitioner urges, would not make sense because Carr expressly states that the manifold paths are “*isolated*.” Ex.1004, [0022]. While, as Petitioner points out, both experts agree that splitting the fluid at the proportioning valve 474 affects the flow rate into each of valves 470 and 472, that does *not* mean that fluid conditions in one isolated manifold path affect the fluid conditions in another isolated manifold path. *See* Reply, 5-6. Carr repeatedly states that the isolated manifold paths are *independently* pressurized via “separate” arrays of pumps. Ex.1004, [0022]. Carr similarly contemplates “*separating* the well stimulation fluid flow via a proportioning valve” in communication with each isolated manifold. *Id.*, [0055]. Thus, while manipulating the proportioning valve 474 can affect the fluid conditions in both manifold paths, manipulating valves 470 and 472 *downstream* of the proportioning valve 474 does not—it only affects the isolated path with which the valve is associated. Ex.2012, ¶137. The paths would not be “isolated” otherwise.

Accordingly, a POSITA would not interpret Carr’s broad statement that its valves may be operated “in light of fluid flow targets for the first well 140 and/or

the second well 142” to disclose or suggest using the first flow meter 150 to operate valve 472 in the second isolated manifold path.

Moreover, Carr’s mapping in the Petition still fails even if the broad “and/or” statement could be interpreted in the manner Petitioner asserts. Reply, 5 (“Thus, Carr plainly discloses an operator would open a second valve to a second well based on (i.e., in response to) flow meter readings from the first well.”). Operating both valves to hit flow targets of both wells refers to *simultaneous* stimulation—yet Petitioner’s mapping to the claimed valve sequence (“closing the first valve after opening the second valve”) refers to Carr’s *individual* stimulation, which is a “different operation.” See Petition, 52 (citing Ex.1004, [0033]) (“The first valve 470 and the second valve 472 can allow for the first well 140 and the second well 142 *to each be stimulated individually* by opening the respective first valve 470 *or* the second valve 472 and closing the other valve.”); Ex.2033, 40:16-24. Petitioner cannot combine the two different operations to show anticipation. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed.Cir.2008) (no anticipation unless “all of the limitations [are] arranged or combined in the same way as recited in the claim”). Petitioner also fails to allege or support that it would have been obvious to somehow combine Carr’s different individual and simultaneous modes of operation. See Petition, 52-53 (single sentence referencing obviousness). The Petition, for example, is silent as to why a POSITA would have

been motivated to perform (or even could have performed) a valve sequence tailored for *individual* stimulation in combination with a dual-valve control scheme tailored for *simultaneous* stimulation. Petitioner’s mapping that pieces together disparate operations without any explanation fails as a matter of law. *In re Stepan Co.*, 868 F.3d 1342, 1346 n.1 (Fed. Cir. 2017).

ii. Carr does not anticipate or render obvious performing the claimed valve sequence in the claimed order.

Carr additionally fails to perform the claimed ordered valve sequence. Despite asserting that “Carr’s plain language discloses or teaches that a second well 142 can be stimulated individually by opening the second valve 472, *then* closing the first valve 470 to the first well 140,” Petitioner fails to point to any statement in Carr that the operations are performed in that specific order and fails to explain why a POSITA would understand Carr to imply that they are. Reply, 3.

Indeed, Petitioner does not dispute that operators conventionally used the opposite valve sequencing to swap between wells—first closing the valve of the first well and then opening the valve of the second well. *See id.*; Ex.2012, ¶148. Nothing in Carr suggests deviating from that convention. The disclosure does not address the specifics of switching from treating the first well to treating the second at all, much less purport to disclose an unconventional method of doing so. *See* Ex.1004, [0033]. It merely states that when wells 140 and 142 are “stimulated

individually,” only the valve associated with the well being treated will be open.

See id.; Ex.2012, ¶¶145-146.

Petitioner’s secondary argument that Carr discloses the required sequence by disclosing simultaneous treatment of both wells also fails because the Petition fails to explain how *simultaneous* stimulation meets the claimed valve sequence. *See* Petition, 52-53. As Dr. Durham admits, the valves 470 and 472 “would both be open” and remain open during simultaneous treatment—meaning that simultaneous treatment cannot include “*closing the first valve after opening the second valve.*” Ex.2033, 43:6-21.

Accordingly, Petitioner fails to show that Carr discloses or renders obvious the claimed valve sequence.

2. Carr does not anticipate or render obvious dependent claims 11, 24, and 36.

Carr does not disclose or render obvious a “*zipper valve.*” Contrary to Petitioner’s assertions, both parties’ experts agree that zipper valves redirect or “swap” fluid between wells. The ’770 Patent itself makes this clear, and Petitioner’s expert testified in his opening declaration that zipper valves are “used to swap fracturing operations from one wellhead to another.” Ex.2012, ¶¶103-107, 113-122, 165-168 (citing Ex.1001, Ex.2031); Ex.1002, ¶378.

Petitioner asserts, without explanation, that Downing “mischaracterized” Dr. Durham’s testimony on this point, but Dr. Durham’s reply declaration and deposition both confirm his earlier testimony. Specifically, Dr. Durham’s reply declaration explains that, as he testified at deposition, “a ‘zipper valve,’ ‘[n]o matter its location ... *is used to direct fluid flow between the wells.*” Ex. 1044, ¶15. While Dr. Durham disputes that a zipper valve must be part of a zipper manifold, that distinction is not relevant, as neither party contends that the claims recite a zipper manifold.

Mr. Hughett’s testimony also confirms that a “‘zipper valve’ redirects common pressurized fluid flow between multiple wells.” Ex.2012, ¶165. Mr. Hughett did not contradict this definition during his deposition, as Petitioner asserts. Petitioner’s cited testimony merely acknowledges that the ’770 Patent’s zipper valves are not part of the zipper manifold, but Mr. Hughett never contended they had to be. *See* Reply, 11; Ex. 1043, 55:2-5.

Thus, both parties’ experts agree that a zipper valve must redirect fluid between wells. Ex. 1044, ¶15; Ex.2012, ¶165. Petitioner fails to show that either of the valves it maps to the claimed zipper valves—valve 470 or valve 472—does so. Reply, 10-11; *see also* Ex.2012, ¶¶131-133, 168. That is instead the function of Carr’s *proportioning valve 474*. As the Carr explains, proportioning valve “*separat[es]* the well stimulation fluid flow” between the first and second *isolated*

manifold paths. Ex.1004, [0055]; *see also* [0034]. Once the fluid reaches the first or second “***isolated***” manifold path past the proportioning valve 474, it cannot be redirected. Ex.2012, ¶133. Thus, valves 470 and 472, which are ***downstream*** of the proportioning valve in the isolated manifold paths, cannot redirect fluid; they simply “control the flow” of the already separated fluid to each respective well. Ex.1004, [0033] (“The **first valve 470** can be utilized to control the flow from the mixing blender 108 **to the first well 140** and the **second valve 472** can be utilized to control the flow from the mixing blender 108 **to the second well 142.**”).

B. Ground 5

1. Beuterbaugh does not cure Carr’s deficiencies with respect to the “in response to” limitations.

The Petition relies on Beuterbaugh only for the controller limitations and the claimed valve sequence and ***not*** for the Challenged Claims’ requirement of performing that sequence “*in response to determining that the fluid communicated via the manifold has satisfied one or more conditions.*” Petition 62-76; Inst. Dec., 26; *see also* Ex.2013 (Durham Dep.), 176:13-178:7. Accordingly, Beuterbaugh cannot cure Carr’s failure to disclose or render obvious the “*in response to*” limitations.

2. Petitioner fails to show a POSITA would have been motivated to add Beuterbaugh's valve sequencing to Carr.

Petitioner's Reply does not cure the Petition's failure to prove that a POSITA would have substituted Beuterbaugh's valve sequencing into Carr. The Petition's reasons for combination still do not apply to Carr's fundamentally different system. Beuterbaugh discloses opening and closing valves at predetermined intervals to simultaneously treat two or more wells by delivering alternating, fixed-duration pulses of fracturing fluid to each well. See *id.* at [0022], [0026]-[0027]; Ex.2012, ¶172. The Petition does not suggest incorporating Beuterbaugh's timed pulses into Carr's system. Petition, 63-67.

Nevertheless, Petitioner suggests that it would have been obvious to import Beuterbaugh's valve sequencing into Carr's system to allow the "overlap of fluid flows to each well [to] be controlled to optimize the downhole pressure waves and minimize the surface impacts." See Petition, 66-67. But simply incorporating Beuterbaugh's valve sequencing into Carr would not provide the benefit alleged. See Petition, 66 (citing Ex.1005, [0024]). Beuterbaugh describes controlling the overlap of fluid flows to each well to optimize the pressure and rarefaction waves created by Beuterbaugh's timed pulses:

As the one or more switching valves 150a, 150b cause fluid flow to shift from one well 120a, 102b to the other, *the rate of opening*

the flow to one well and closing to the other will have an impact on the pulse seen by each well 120a, 120b. When a flow starts to flow into a first well, a positive waterhammer wave going to that first well is created while a rarefaction wave is created in the second well due to the sudden drop in the flow rate to the second well. ***The overlap of fluid flows to each well 120a, 120b can be controlled to optimize the downhole pressure waves and minimize the surface impacts.***

See Ex.1005, [0024].

This teaching does not apply to the Carr because, contrary to Petitioner's assertions, the two valves the Petition maps to the claimed first and second valves—valves 470 and 472—lack a common flow line of fluid and therefore do not redirect fluid to the other well like the valves in Beuterbaugh's system. Ex.2012, ¶¶174-178. Petitioner's contrary argument relies on fluid flow between the mixing blender 108 and the proportioning valve 474:

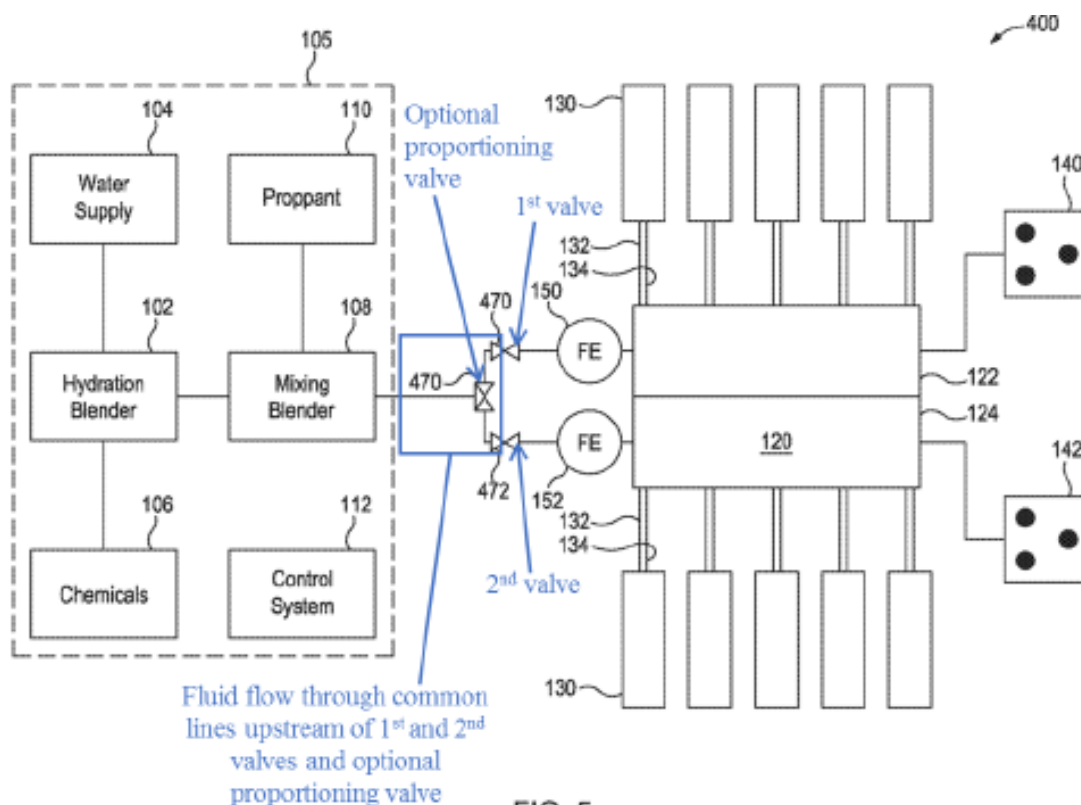


FIG. 5
 (annotated)

Reply, 13 (citing Ex.1004, Fig. 5).

But as shown, that “common flow line” *does not reach* valves 470 and 472. Instead, as explained above, the proportioning valve 474 separates the fluid in that common flow line into the first and second “*isolated*” manifolds. Ex.1004, [0021]-[0034], [0043]. Because the manifold paths are then “isolated,” manipulating valves 470 and 472 would not create the same kind of opposing effects as described in Beuterbaugh that would need to be “controlled and optimized” using Beuterbaugh’s valve sequence. Ex.2012, ¶¶ [173]-[178]. As such, a POSTIA

would have found the benefits of Beuterbaugh's valve sequencing inapplicable to Carr.

C. Grounds 7-8: The Tolman Grounds do not anticipate or render obvious the Challenged Claims.

The Petition failed to identify "with particularity" which element of Tolman Petitioner contends discloses the Challenged Claims' "*first valve*." See 35 U.S.C. § 312(a)(3). In its Reply, Petitioner attempts to remedy this deficiency by improperly introducing *entirely new arguments* centered around an alleged "master valve" in Tolman's frac trees that neither the Petition nor Tolman itself even mentions. Reply, 18-20. Even if Petitioner were permitted to change its mapping, its identification of a singular "master valve" still lacks particularity because frac trees include *two* master valves that may be operated independently.

1. Petitioner cannot introduce new arguments at this stage.

The Petition failed to particularly identify where Tolman allegedly discloses the claimed "*first valve*." It instead variably refers to Tolman's manifold well valve 214 and/or an unspecified "tree valve" on the wellhead tree 106a at different points in its claim mapping. See *id.*, 71-75. In its Reply, Petitioner attempts to cure its lack of specificity and evidence by arguing *for the first time* that "[a] POSITA ... would have understood Tolman's tree valves as including at least a 'master valve' that is open during fracturing (treatment) and flowback and closed at shut-in" and

that “the master valve, is thus the claimed ‘first valve.’” Reply, 19. This alleged “master valve” appears nowhere in the Petition, the supporting expert declaration, or Tolman itself.

In an IPR, the petition drives the contours of the proceeding. *SAS Inst., Inc. v. Iancu*, 584 U.S. 357, 364 (2018). Accordingly, “[t]he IPR petition...must provide an understandable explanation of the element-by-element specifics of the patentability challenges[,]” and the Board cannot “entertain shifting arguments, but must, instead, reject any entirely new theory” absent from the petition. *Corephotonics, Ltd. v. Apple Inc.*, 84 F.4th 990, 1001-02 (Fed. Cir. 2023); *see also* 37 C.F.R. § 42.23(b); *Wasica Fin. GmbH v. Cont’l Auto. Sys., Inc.*, 853 F.3d 1272, 1286–87 (Fed. Cir. 2017) (“Shifting arguments [on reply] in this fashion is foreclosed by statute, our precedent, and Board guidelines.”).

The Federal Circuit has repeatedly affirmed the Board in refusing to consider new arguments presented in Reply briefs, including attempts by petitioners to backfill facts and contentions to cure the petition’s lack of particularity. For example, in *Ariosa Diagnostics v. Verinata Health, Inc.*, the Federal Circuit held that the Board properly rejected the petitioner’s reliance in its reply submissions “on previously unidentified portions of a prior-art reference to make a meaningfully distinct contention.” 805 F.3d 1359, 1367–68 (Fed. Cir. 2015). There, the petition “[did] no more than point to a generic statement in [the

cited reference] that any sequencing method can be used.” *Id.* It wasn’t until the reply declaration that the petitioner identified “specific embodiments” within the prior art reference. *Id.*

Here, Petitioner’s belated identification of the purported “master valve” parallels the facts in *Ariosa* and should similarly be rejected. Arguably, Petitioner’s late argument is *more* egregious than the excluded late evidence in *Ariosa* because neither the Petition nor Tolman itself even mentions a “master valve.” Petitioner did not simply identify another portion of Tolman—it instead pointed to evidence ***not submitted with the Petition***. Reply, 18-19 (citing Ex. 2006 (Patent Owner’s expert declaration), ¶98; Ex.1043 (Patent Owner’s expert deposition), 48:2-54:9). Petitioner’s attempt to backfill its mapping by belatedly identifying a “master valve”—and doing so with evidence not submitted with the Petition—is improper and should be rejected.

Even if a POSITA would understand a master valve to be inherent in Tolman’s disclosure of a frac tree, the Petition and supporting evidence gave no indication that Petitioner intended to rely on the “master valve” as the claimed “*first valve*.” As Dr. Durham admits, frac trees can vary in configuration and can include at least eight different valves. Ex. 2033, 22:24-24:13. The Petition provides no guidance on which “tree valve” in Tolman’s frac tree allegedly constitutes the claimed “*first valve*” beyond vaguely suggesting that it is one used for flowback.

Petition, 75-76. And Tolman itself provides no details on the configuration of its particular frac tree. Ex. 2033, 26:4-14; Ex.1006 (“a valve (not shown) on the tree 106a-106c”), Fig. 2 (representing frac trees as plain rectangles).

As such, Downing could not have anticipated Petitioner’s new argument and has had no opportunity to develop rebuttal evidence. Permitting Petitioner to rely on that mapping would thus fundamentally prejudice Downing and violate both the IPR statute and the APA. *Corephotonics*, 84 F.4th at 1002; *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1331 (Fed. Cir. 2019).

2. Petitioner has *still* failed to identify with particularity which valve in Tolman is the claimed “*first valve*” of Claims 1, 14, and 27.

Even if Petitioner were permitted to raise its new Reply theory, the theory would fail because Petitioner *still* fails to identify Tolman’s alleged “first valve” with particularity. As both experts agree, frac trees commonly include *two* master valves—an upper and a lower one—yet the Reply only points to a singular “master valve.” Ex. 2006, ¶98; Ex. 1043, 45:11-13; 46:9-47:12; 48:2-54:9; Ex.1044, ¶33; Ex.2033, 24:14-17. Indeed, Dr. Durham agrees with Dr. Hughett’s markup of a conventional frac tree below, which includes upper and lower master valves:

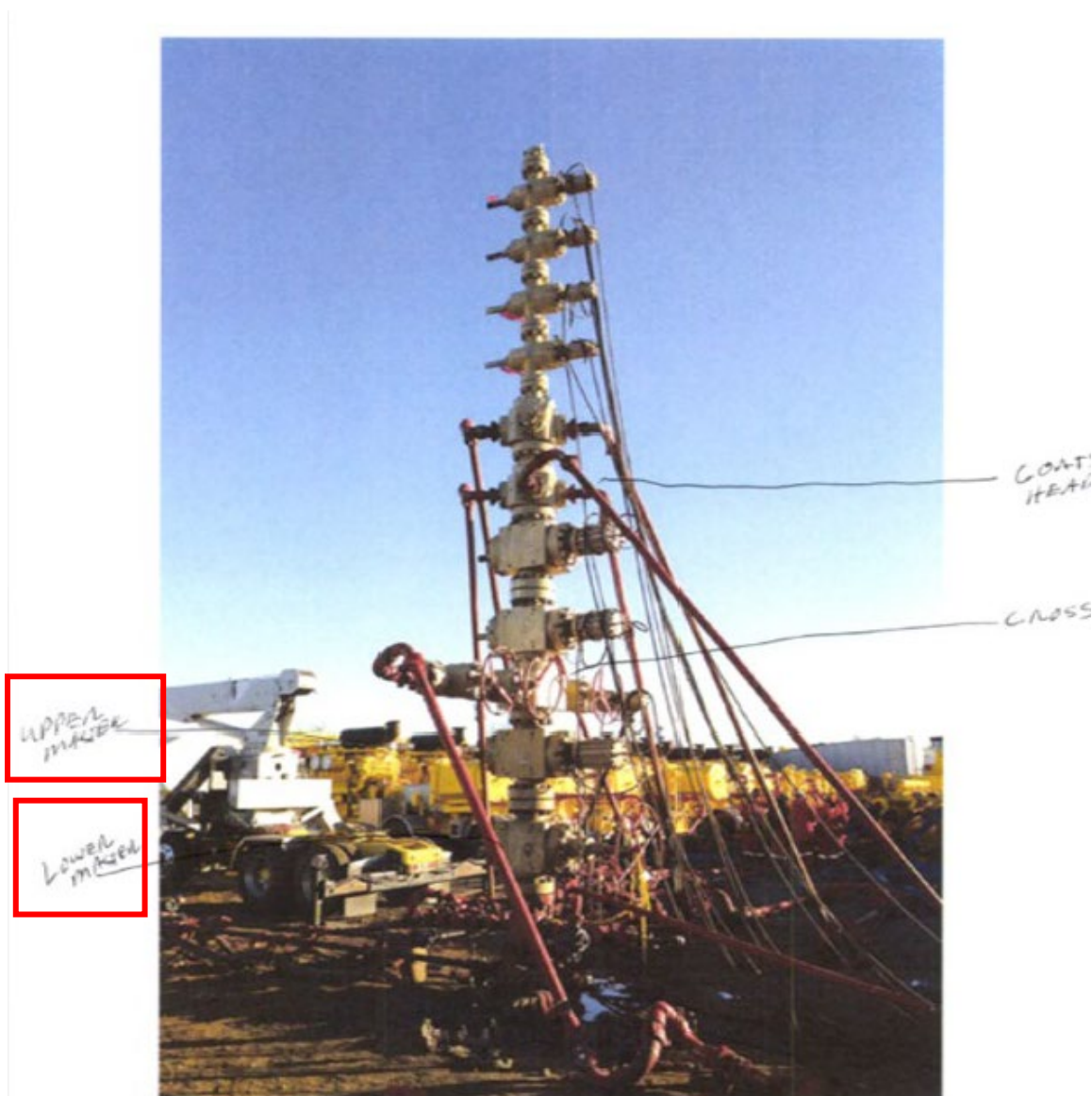


Figure 15 A "frac stack" atop BP's D-1 well in Oklahoma's Woodford shale while the well was being refractured in early 2013. BP doubled production from horizontal shale gas wells last year in a program meant to determine if refracturing

Ex.1044, ¶33 (citing Ex.1038).

Petitioner's Reply fails to identify *which* master valve it contends is the claimed "first valve." See Reply, 19. It instead vaguely asserts that "*the* master valve, is thus the claimed 'first valve.'" *Id.* This is important because upper and

lower master valves may be opened and closed independently, as confirmed by Petitioner’s expert—so Petitioner’s generic identification of “the master valve” is insufficient when the claims require a specific valve opening and closing sequence. Ex.2033, 24:18-25:2.

Moreover, Petitioner’s belated identification of “the master valve” on the frac tree does not cure the Petition’s lack of particularity in its mapping of elements [1.4]/[14.5]/[27.5]. *See* Petition, 77. For those elements, Petitioner broadly states that “‘shutting in’ the first well necessarily includes closing **first well’s valves**” without alleging such valve would be on the frac tree. *Id.* Dr. Durham’s deposition testimony further conflicts with this vague statement. Ex.2033, 27:1-3, 17-22. He explained that “[t]here may be” valves *open* on Tolman’s frac tree—including the lower master valve—during shut-in. *Id.*

Thus, Petitioner’s improper new argument also lacks the requisite particularity. *See* 35 U.S.C. § 312(a)(3).

3. Petitioner’s new “master valve” contradicts Tolman, the Petition, and its own expert’s testimony.

Petitioner’s belated new theory also fails on the merits. The crux of the theory is that Tolman’s valve 216 (the alleged “*second valve*”) would be opened to treat the second well while the first well’s “master valve” (the alleged “*first valve*”) is open for flowback of the first well, and the first well’s “master valve” would

later close when the well is shut in. *See* Reply, 18-20; Petition, 75-77. But Tolman expressly states that during pumping into the second well, the other wells are isolated, and at least one tree valve is preferably ***closed*** “during any given isolation from the other wells.” Ex.1006, 7:20-30. The Petition likewise states that “Tolman discloses well tree valves are ***closed*** during isolation and open during stimulation.” Petition, 75 (citing *id.*). And, as noted above, Dr. Durham admits that at least one master valve may be left ***open*** at shut in. Ex.2033, 27:1-22. Thus, even if Petitioner were permitted to cure the Petition’s lack of particularity with its new master-valve argument, it would still fail to show that Tolman discloses the claimed sequence.

4. Petitioner fails to show that Tolman discloses or renders obvious the “in response to” limitations.

Even if Petitioner could show that Tolman discloses the claimed valve sequence, it cannot show that Tolman discloses or renders obvious performing the entire sequence “*in response to determining that the fluid communicated via the manifold has satisfied one or more conditions,*” as the Challenged Claims require.

The claims recite:

in response to determining that the fluid communicated via the manifold has satisfied one or more conditions:

opening a second valve;

communicating fluid to a second well via the second valve;

and

closing the first valve after opening the second valve.

Contrary to Petitioner’s assertions, this language does not indicate that “[t]he only claimed requirement for closing the first valve is that it occurs after opening the second valve, which opening happens in response to fluid satisfying one or more undefined conditions.” *See* Reply, 22. Rather, the claims’ use of a colon followed by an indented list of three steps clearly indicates that ***all three steps*** must be performed “in response to determining that the fluid communicated via the manifold”—namely, the fluid communicated ***to*** the first well—“has satisfied one or more conditions.” *See Securus Techs., Inc. v. Global Tel*Link Corp.*, 701 F. App’x 971, 975 (Fed. Cir. 2017) (concluding that a colon following a limitation “is indicative that a list of particulars is to follow” and that “the most natural reading of the limitation is one that incorporates all the steps” that follow). Petitioner’s allegations that Tolman discloses opening a second valve (valve 216) in response to one fluid condition (treatment being complete on the first well) and then closing the first valve (tree valve) based on a ***different***, later determination about a different condition of fluid communicated ***out*** of the first well (flowback being completed) are insufficient. Petition, 75-77.

III. THE OBJECTIVE EVIDENCE IS TIED TO THE CLAIMS

There is no dispute that Downing’s Freedom Series Completion System (“Freedom Series”) has received significant industry praise for performing CP

swaps, continuous pumping, instantaneous transitioning of wells while pumping, eliminating non-pumping time, and improving continuous pumping time. *See* Reply, 26–27.

Petitioner’s only argument regarding secondary considerations is that Downing did not establish a nexus between the Freedom Series and the Challenged Claims. *Id.* But nexus does not require a “claim limitation-by-limitation” analysis as Petitioner asserts—it requires only “showing that the evidence of secondary considerations is the ‘direct result of the unique characteristics of the claimed invention.’” *Volvo Penta of the Americas, LLC v. Brunswick Corp.*, 81 F.4th 1202, 1210 (Fed. Cir. 2023); Reply, 26. Here, the undisputed industry praise for the Freedom Series is a direct result of the unique CP swap claimed by the ’770 patent. POR, 61–65, 67–69; Ex.2032, ¶¶7–8, 10; Ex.2012, ¶¶233–241.

As the ’770 patent explains, the unique characteristic of the CP swap is that it “transitions the zipper valves from one well to the other, opening the second well and subsequently shutting-in the first well, all while pumping” such that “[t]he transition is instantaneous.” Ex.1001, 14:43-50; Ex.2032, ¶7. That unique characteristic is captured in the claims, as shown by claim 1:

(i) *communicating fluid to a first well via a manifold and a first valve (i.e., begin stimulation operations in the first well);*

(ii) *in response to determining that the fluid communicated via the manifold has satisfied one or more conditions:*

(iii) *opening a second valve;*

(iv) *communicating fluid to a second well via the second valve (i.e., fluid is flowing to both wells); and*

(v) *closing the first valve after opening the second valve (i.e., completing stimulation of first well). See, e.g., Ex.1001, claim 1; see also Ex.2012, ¶¶240-41.*

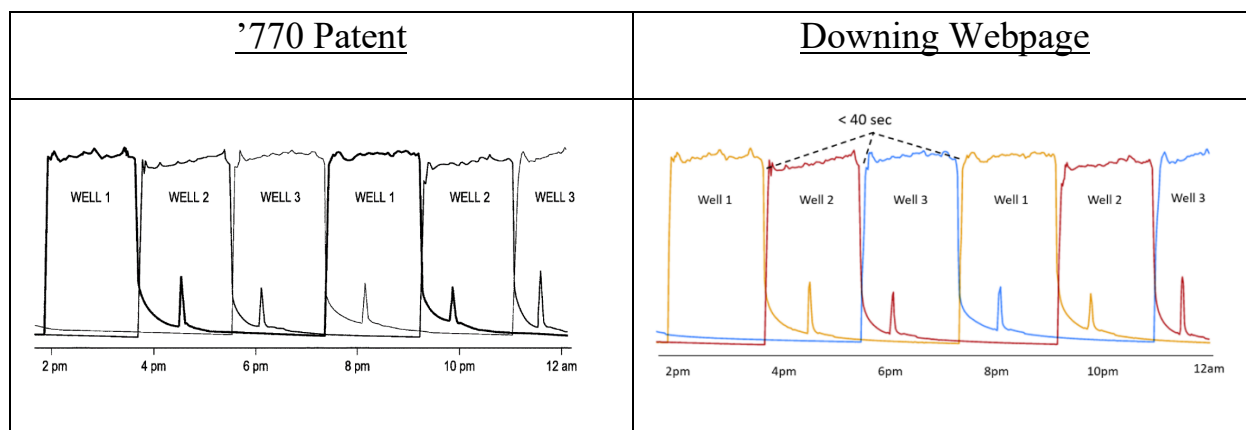
Independent claims 14 and 27 recite similar limitations.

It is undisputed that the CP swap feature of the Freedom Series embodies the '770 patent's claimed CP swap, as established by the unrebutted declarations of Downing's Vice President of Business Development and Technology, Tim Marvel, and Mr. Hughett. Downing's website has consistently described the Freedom Series' CP swap feature using the *same language* as appears in the '770 patent:

Downing's Original Continuous Pumping Webpage	Downing's Current Continuous Pumping Webpage
“FS iControl’s proprietary algorithms integrated with the Freedom Series Completion System <i>transition the zipper valves from one well to the other, opening the second well and subsequently shutting-in the first well, all while pumping. The transition is instantaneous</i> and the total time between stages measured at treatment pressure is as fast as 40 seconds.” Ex.2001, p.1 (emphasis added).	“With a simple, single click, the system <i>transitions the zipper valves from one well to the other, opening the second well and subsequently shutting-in the first well, all while pumping. The transition is instantaneous</i> and the total time between stages is less than 30 seconds.” Ex.2014, p.1 (emphasis added).

Both Mr. Marvel and Mr. Hughett confirm that the above description found both in the '770 patent and Downing's webpage “refers to the continuous pumping swap feature *implemented in the Freedom Series.*” Ex.2032, ¶7; *see also* Ex.2012, ¶¶233-239.

Additionally, Mr. Marvel testified that the '770 patent's Figure 16D illustrating the fluid conditions during the disclosed CP swap represents fluid conditions during “*actual continuous pumping swaps performed by the Freedom Series*” (Ex.2032, ¶7) and is also reproduced on Downing's Freedom Series webpage:



Ex.1001, Fig.16D; Ex.2001, 2; *see also* Ex.2012, ¶236 (Mr. Hughett testifying same). This undisputed evidence shows the CP swap captured in the '770 patent's claims is implemented in the Freedom Series. Indeed, the *very purpose* of the '770 patent was to protect the Freedom Series' unique CP swap feature, as explained by Mr. Marvel. Ex.2032, ¶8 ("I know that the '770 Patent was filed to protect that feature of the Freedom Series.").

The undisputed testimony also establishes the praise outlined in the POR from participants in the oil-and-gas industry was "based on the continuous pumping swap feature" of the Freedom Series. *See, e.g.*, Ex.2032 ¶10]; POR, 67-69. For example, Liberty Oilfield Services was able to reach a "milestone achievement of 24 hours of continuous pumping time" specifically because of the Freedom Series' CP swap feature claimed in the '770 patent. Ex.2020, 1-2 (explaining Liberty "utilized Downing's Freedom Series iControl, a completion system that instantaneously transitions from one well to the other, opening the second well and subsequently shutting-in the first well, all while pumping,

eliminating the time between stages”); *compare id.*, with Ex.1001, 14:43-50 (explaining CP swap “transitions the zipper valves from one well to the other, opening the second well and subsequently shutting-in the first well, all while pumping” such that the “transition is instantaneous”); Ex.2032, ¶¶18-19, 25.

As explained in the POR, the ’770 patent’s CP swap feature enables transitioning from one well to another and continuous pumping, with resulting efficiency benefits such as instant transitions between wells, eliminating NPT, and extending continuous pumping time. POR, 61-65, 67-69; Ex.2012, ¶¶240-241; Ex.2032, ¶¶12-13, 18-20, 25-28. Thus, the cited praise related to these benefits directly results from the CP swap feature embodied in the Freedom Series and claimed by the ’770 patent.

Accordingly, the unrebutted evidence in the POR establishes the significant industry praise for the Freedom Series was a direct result of the unique characteristics of the claims of the ’770 patent. With that nexus, the objective evidence illustrates non-obviousness of the Challenged Claims.

IV. DOWNING’S EXPERT TESTIMONY IS CREDIBLE AND ENTITLED TO DUE WEIGHT

Petitioner’s attack on Mr. Hughett’s testimony is misguided and irrelevant to the pertinent issues. *See* Reply 27-29. Petitioner alleges Mr. Hughett’s testimony contains various deficiencies but fails to explain how these alleged deficiencies

impact Mr. Hughett’s testimony on the relevant question before the Board: whether claims 1-38 are unpatentable over the asserted prior art references. *See* Reply 27-28.¹ Moreover, Petitioner’s attack on Mr. Hughett regarding his prior expert experience in “an inequitable conduct case” is inappropriate and irrelevant. Reply 28-29.

Even on the merits, Petitioner’s arguments fail. Petitioner argues Mr. Hughett ignored publications cited by Petitioner’s expert to show “the state of the art.” Reply 27-28. But Mr. Hughett did not ignore these publications. Mr. Hughett testified that he considered Dr. Durham’s declaration, which included these publications. Ex.2012, ¶¶4-5; Ex.1043, 60:18-61:9, 66:13-17. To the extent the publications were relevant to Mr. Hughett’s opinion, *e.g.*, Exhibit 1031 (the *Tolman* article), he expressly discussed them. Ex.2012, ¶¶4-5, 111, 148; Ex.1043, 65:11-16.

Petitioner also argues Mr. Hughett’s declaration ignored “the teachings of references as a whole,” ignored “Dr. Durham’s testimony,” and contradicted his own testimony. Reply 28. But these arguments amount to nothing more than the

¹ Although Petitioner argues Mr. Hughett “misinterpreted the *Tolman* article [Ex.1044],” Reply 28, this article is different than the *Tolman* reference (Ex.1006) relied on in the Petition. Pet. 8.

parties' experts' disagreement on Petitioner's the merits of Petitioner's prior-art challenges. *See* Reply 28.

Finally, Petitioner alleges Mr. Hughett falsely represented that he testified—and his side prevailed—in five IP cases. Reply 28-29. But Mr. Hughett's statement appeared in an email responding to Petitioner's request for expert witness support—not a statement made under oath. Ex.1040. Any lack of precision in Mr. Hughett's informal communications with Petitioner does not impact his credibility in this IPR proceeding. *Gree, Inc. v. Supercell Oy*, IPR2019-00083, Paper 45, at 63-64 (May 11, 2020) (rejecting argument that party's expert testimony should be afforded no weight based on omissions and misstatements in expert's CV). Moreover, Petitioner's focus on Mr. Hughett's alleged loss in an “inequitable conduct case” is a red herring (and unfair)—Mr. Hughett was a “technical expert” in that case. Ex.1041, 15 n.5.

Mr. Hughett's testimony is credible and supported by underlying factual evidence, and the Board should accord his testimony due weight.

V. CONCLUSION

For the foregoing reasons, Petitioner has not shown the Challenged Claims to be unpatentable.

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), Patent Owner hereby certifies, in accordance with and reliance on the word count provided by the word-processing system used to prepare this Patent Owner's Sur-Reply, that the number of words in this paper is 5,455. This word count excludes the table of contents, table of authorities, mandatory notices under §42.8, certificate of service, certificate of word count, signature block, and appendix of exhibits. *See* 37 C.F.R. §42.24(c).

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CERTIFICATE OF SERVICE

The undersigned certifies that, in accordance with 37 C.F.R. § 42.6(e),
service was made on Petitioner as detailed below.

Date of service February 3, 2025

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