

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.

IPR2024-00583
U.S. Patent 11,401,779

PATENT OWNER PRELIMINARY RESPONSE

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Patent Owner's Exhibit List

Exhibit	Description
Ex.2001	IWS Initial Invalidity Contentions
Ex.2002	Downing Continuous Pumping Web Page (DOWNING003692)
Ex.2003	IPR2024-00256 Patent Owner Preliminary Response
Ex.2004	Wayback Machine - Downing Continuous Pumping Web Page
Ex.2005	Email Correspondence Regarding Parties Meet and Confer
Ex.2006	Declaration of John Hughett
Ex.2007	CV of John Hughett
Ex.2008	IPR2024-00256, Institution Decision

I. INTRODUCTION

This is Petitioner IWS's second petition challenging the '779 Patent. IWS filed a first petition against the '779 Patent in IPR2024-00256 ("First Petition"), waited three months for the dispute between the parties to mature, and then filed the present petition ("Second Petition") against the same claims of the '779 Patent. By its own admission, IWS filed the Second Petition directly in response to learning about a deficiency of the primary prior art reference, Krupa, in the First Petition. This is precisely the type of serial attack that *General Plastic* was intended to address. *General Plastic Indus. Co. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 at 17 (Sept. 6, 2017) (precedential) ("Multiple, staggered petitions challenging the same patent and same claims raise the potential for abuse.") ("*General Plastic*").

Even ignoring the fairness concerns raised by IWS's staggered petitions, the Second Petition is simply not needed—IWS already had a chance to challenge the '779 Patent on non-Krupa grounds in the First Petition. This Second Petition merely asserts *more* non-Krupa grounds of the type the Board already found lacking in the First Petition.

While there is no reason to reach the substance of these additional backup grounds, a cursory review reveals that they fail to meet the standard for institution. Like the backup references in the First Petition, the references in the Second

Petition are again directed to aspects of hydraulic fracturing unrelated to Downing's continuous pumping invention, and thus lack disclosure of every element of the challenged claims. IWS's unsupported inherency and obviousness arguments cannot and do not make up for these deficiencies.

For these reasons, and the many others below, Patent Owner respectfully requests that the Board deny institution.

II. THE PETITION SHOULD BE DISCRETIONARILY DENIED UNDER *GENERAL PLASTIC*

Although IWS refers to its two petitions challenging the '779 patent as "parallel" petitions, they are anything but. The circumstances of the filings, including the timing and the content, illustrate that the Second Petition is the type of "serial" petition that should be denied under *General Plastic*.

IWS filed its Second Petition on March 1, 2024, ***three months*** after filing its First Petition on December 1, 2023. Despite the Second Petition being filed prior to Patent Owner's Preliminary Response in the first proceeding, this three-month delay allowed IWS to morph its positions in view of Patent Owner's Response to IWS's Initial Invalidity Contentions. That Response explained why Krupa is not prior art based upon Patent Owner's earlier public disclosures. *See* Ex.1039, 9. IWS advantageously used this information to prepare a second petition with references not susceptible to Krupa's deficiency. This road mapping strategy

“imposes inequities” on Patent Owner and is not permitted under *General Plastic*. *General Plastic* at 11 (“[t]he filing of sequential attacks against the same claims, with the opportunity to morph positions along the way, imposes inequities on [Patent Owner]”) (quoting original Institution Decision).

IWS’s Reasons for Parallel Petitions (Paper 3, “Reasons”) fails to justify the Second Petition because it fails to acknowledge that the First Petition already guarded against the possibility that Krupa was not prior art. The First Petition included backup grounds based upon references with much earlier filing dates. IWS provides no reason why it needs *additional* backup grounds of the same type in the Second Petition.

IWS’s Second Petition creates an unfair additional burden on Patent Owner and should be denied under *General Plastic*, as illustrated the factors below.

A. Factor 1: The same petitioner previously filed a petition directed to the same claims of the ’779 Patent.

IWS’s First and Second Petitions both challenge claims 1-3, 6, 8-10, 13, 15-18, 25-28, 31, and 36 of the ’779 patent. This factor therefore heavily favors denial.

B. Factor 2: At the time of the filing of the First Petition, Petitioner knew of the prior art asserted in the Second Petition.

IWS admits in its Reasons for Parallel Petitions that it knew of the prior art asserted in the Second Petition at the time of the filing of the First Petition:

“Petition 2’s Grounds could not be presented in Petition 1 due to the IPR petition word limit.” Reasons, 3-4. Consistent with this, each of the prior art references asserted in the Second Petition are listed in IWS’s Initial Invalidity Contentions served on November 22, 2023—prior to the filing of the First Petition on December 1, 2023. *See* Ex.2001, 17-19 (listing Ciezobka¹, McNeel, Beuterbaugh, and Jackson). Jackson is notably asserted in both the First and Second Petitions.

In other words, at the time of the First Petition, IWS had a choice of many different references to form backup grounds in the event Krupa was found not to be prior art. It simply elected to assert references other than Ciezobka, McNeel, and Beuterbaugh. The policies of fairness and efficiency urge against institution of a follow-on petition based on second tier prior art excluded from the First Petition².

Accordingly, this factor also heavily favors denial.

¹ IWS’s Invalidity Contentions list the substantively identical grandparent of the Ciezobka PCT application asserted in the Second Petition.

² Alternatively, it is possible IWS deemed Ciezobka, McNeel, and Beuterbaugh *more* relevant than the non-Krupa prior art included the First Petition—but holding back better prior art for future petitions also contradicts the policies of fairness and efficiency. *See Conopco, Inc. v. Proctor & Gamble Co.*, IPR2014-00628, Paper 21 at 11 (Oct. 20, 2014).

C. Factor 3: Whether at the time of filing of the Second Petition the petitioner already received Patent Owner’s Preliminary Response to the First Petition or received the Board’s decision on whether to institute review of the First Petition.

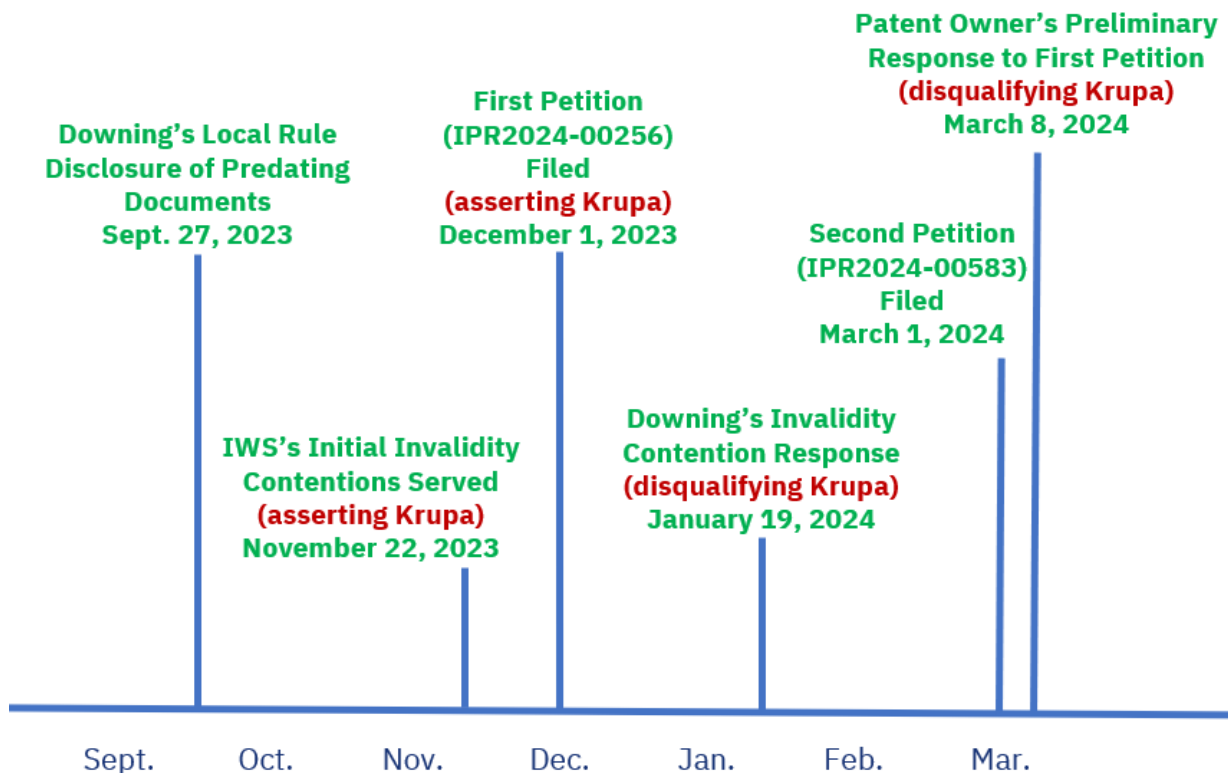
Although IWS filed the Second Petition eight days before Patent Owner filed its Preliminary Response, this factor nevertheless favors denial. When IWS filed the Second Petition, it had already learned of Krupa’s deficiencies and morphed its positions to exclude Krupa—thus engaging in the sort of road mapping prohibited by *General Plastic*. *General Plastic*, 17.

On January 19, 2024, more than a month prior to the Second Petition, Patent Owner served its Response to IWS’s Initial Invalidity Contentions. *See* Ex.1038. Patent Owner’s Invalidity Response explained that the Krupa reference asserted in IWS’s Initial Invalidity Contentions and the First Petition is not prior art under 35 U.S.C. § 102(b)(2)(B). *Id.* at 9. Specifically, Patent Owner demonstrated with previously produced documents that the subject matter claimed in the ’779 Patent was publicly disclosed prior to Krupa’s earliest filing date, and thus the portions of Krupa corresponding to that disclosed subject matter are excluded as prior art. *Id.* One of these previously produced documents supporting § 102(b)(2)(B) was a copy of Downing’s Continuous Pumping webpage archived by the Wayback

Machine on October 20, 2020. *See* Ex.2002 (bates labeled DOWNING003692 from Sept. 27, 2023, production³).

Because IWS also asserted Krupa in the First Petition, Patent Owner again made this § 102(b)(2)(B) argument in its Preliminary Response to the First Petition. *See* Ex.2003, 9-21. The Preliminary Response similarly showed that Krupa was not prior art because the claimed subject matter of the '779 Patent had been publicly disclosed on Downing's Continuous Pumping on October 20, 2020, as illustrated by the same Wayback Machine archive. *Id.* (citing "Ex.2001," reproduced here as Ex.2004).

³ Notably, the archived copy of Downing's Continuous Pumping webpage was served on IWS two months prior to IWS's ***First Petition***. That is, IWS had in its possession a document illustrating that Krupa is not prior art before filing the First Petition but nevertheless elected to include Krupa as a primary ground of invalidity.



Accordingly, when IWS filed its Second Petition, it already had knowledge of Patent Owner's public disclosures under § 102(b)(2)(B)—it did not need to wait for the Preliminary Response to gain that knowledge. This is the specific situation addressed by Factor 3, which questions whether a petitioner is “in a position to gain a benefit from having that information before filing its second petition.” *Apple Inc. v. Uniloc 2017 LLC*, IPR2020-00854, Paper 9 at 10 (Oct. 28, 2020) (precedential). Here, IWS was undoubtably in a position to gain a benefit—and in fact *did* gain a benefit from this information. It was able to present new prior art in the Second Petition that could not be excluded under § 102(b)(2)(B) based on

Patent Owner’s public disclosures. IWS admits as much in its Reasons for Parallel Petitions. *See* Reasons, 3-4.

This factor strongly favors denial because IWS’s road mapping strategy is “unfair” and “an inefficient use of the *inter partes* review process.” *See General Plastic* at 17-18 (holding that it is unfair to “allow petitioners the opportunity to strategically stage their prior art and arguments in multiple petitions ... until a ground is found that results in the grant of review”).

D. Factor 4: The Length of Time that Elapsed Between the Time the Petitioner Learned of the Prior Art Asserted in the Second Petition and the Filing of the Second Petition

As noted in association with Factor 2, IWS knew of every prior reference asserted in the Second Petition prior to the First Petition—as they were listed in IWS’s Initial Invalidity Contentions served on November 22, 2023. *See* Ex.2001, 17-19. IWS could have raised the new challenges in the Second Petition at the time of the First Petition—it simply elected not to. *See General Plastic* at 18 (factor 4 “allows us to assess and weigh whether a petitioner should have or could have raised the new challenges earlier”).

Accordingly, this factor strongly favors denial.

E. Factor 5: Whether the Petitioner Provides Adequate Explanation for the Time Elapsed Between the Filings of Multiple Petitions Directed to the Same Claims of the Same Patent

In its Reasons for Parallel Petitions, IWS attempts to justify why it waited three months to file its Second Petition, despite knowing of the prior art in the Second Petition at the time of First Petition. None of its justifications, however, are adequate to overcome the important policy concerns of *General Plastic*.

Most importantly, IWS fails to explain why it needs to challenge the '779 Patent with additional grounds of the type already present in the First Petition—that is, non-Krupa grounds. IWS argues “Patent Owner revealed new information related to '779’s priority date and alleged applicability of prior art exceptions” (Reasons, 1)—but this allegedly “new” information applies solely to the primary reference Krupa in the First Petition. The First Petition already included additional grounds based on an earlier reference, Kajaria, filed prior to any possible priority date of the '779 Patent and not subject to the prior art exceptions of 35 U.S.C. § 102(b)(2)(A) and (B). IWS purposely included these backup grounds in the event Krupa was excluded as prior art, as IWS itself explained in the First Petition. *See* Ex.1042, 15 n. 4 (“Even if '779 is entitled to an earlier effective filing date, *Kajaria*, *Jackson*, and *Martino* are still § 102(a)(1) prior art.”). Now that Krupa has been shown not to be prior art, Petitioner is asking for even *more* backup grounds based on earlier references of the type already included in the First Petition. Such a

request is not reasonable, especially given that the Board found IWS's non-Krupa ground in the First Petition deficient on the merits and denied institution. IWS has not justified why it deserves a second bite at the apple with respect to non-Krupa grounds.

While it is true that occasionally second petitions are needed “when there is a dispute about priority date requiring arguments under multiple prior art references,” as noted in the Trial Practice Guide, this is not one of those occasions. IWS was able to challenge the '779 Patent under multiple prior art references with different priority dates in the First Petition. It does not need another petition to do so.

Moreover, if not clear from IWS's Reasons for Parallel Petition, there is no priority dispute. Patent Owner agrees with IWS that the earliest effective filing date of the '779 Patent is May 17, 2021. To the extent IWS argues that Patent Owner somehow surprised it with the '779 Patent's earliest effective filing date after the First Petition, any such surprise is not reasonable and not a justification for the Second Petition. *See General Plastic*, 21 (holding a petitioner's alleged surprise must be “reasonable” from “an objective perspective in the context of the applicable law and facts”). Specifically, on November 29, 2023—**before** IWS filed the First Petition—the parties agreed that by December 15, 2023, Patent Owner would “provide its contentions regarding inventorship and priority” of the '779

Patent. *See* Ex.2005, 2 (email memorialization of meet and confer). On December 1, IWS filed the First Petition despite knowing that effective filing date information would be served in just fourteen days. And, on December 15, Patent Owner in fact did provide such filing date information, which showed the parties agreed on the '779 Patent's earliest effective filing date. *See* Ex.1040 (Downing's Supp. Objections and Responses to Defendants' Interrogatories), 8 ("'779 Patent Claims ... are entitled to an earliest effective filing date of May 17, 2021").

IWS's Reasons for Parallel Petitions alleges the First Petition "necessarily" included a detailed priority discussion because Patent Owner "refused" to provide such information. Reasons, 2. Patent Owner did not refuse—it *agreed* to provide the effective filing date information—and so agreed before the First Petition. Likewise, the First Petition's priority discussion was only "necessar[y]" because IWS chose not to wait a handful of days for the service it agreed to. This short delay would have not prejudiced IWS because it waited that same amount of time to file its IPR challenging the related '770 Patent. Moreover, the First Petition was filed with more than five months left before the one-year statutory bar. The purpose of giving defendants a full year to seek IPR is to "afford defendants a reasonable opportunity to identify and understand the patent claims that are relevant to the litigation." 157 Cong. Rec. S5429 (daily ed. Sept. 8, 2011). IWS did

the opposite—it hurried to file the First Petition *without* knowing the relevant issues. Willful blindness is not a reasonable basis for a second petition.

Similarly, with respect to IWS’s complaint about Krupa’s disqualification as prior art under § 102(b)(2)(B) after the First Petition, IWS was already in possession of the evidence that formed the basis of the disqualification. Patent Owner had served the archived copy of Downing’s Continuous Pumping webpage on IWS two months prior to IWS’s First Petition. *See* Ex.2002 (bates labeled DOWNING003692 from Sept. 27, 2023, production). Either IWS ignored that disqualifying evidence or elected to nevertheless proceed with the Krupa grounds. In either case, a second petition is not warranted because IWS already guarded against the possibility that Krupa was not prior art in the First Petition. *See Louisiana-Pacific Co. v. Huber Engineered Wood LLC*, IPR2020-00609, Paper 12 at 9 (Aug. 20, 2020) (holding that a follow-on petition is not justified “simply because Patent Owner disputes the prior art status of [some but not all] references relied on in the Original Petition”).

For these reasons, this factor strongly favors denial.

F. Factor 6: The Finite Resources of the Board, and the Requirement to Issue a Final Determination Not Later Than One Year After the Date on Which the Director Notices Institution of Review

The Board's finite resources would not be efficiently expended on IWS's Second Petition, which asserts prior art IWS itself elected not to include in the First Petition. As noted above, all asserted prior art in the Second Petition was available to IWS at the filing of the First Petition. When faced with word count issues, IWS elected to assert references *other* than Ciezobka, McNeel, and Beuterbaugh. Reasons, 3-4 ("Petition 2's Grounds could not be presented in Petition 1 due to the IPR petition word limit."). Upon inspection of Ciezobka, McNeel, and Beuterbaugh, it becomes apparent why—each of these references lack disclosure of at least one claim limitation recited by the challenged claims. For example, as illustrated below, Ciezobka teaches opening and closing valves in a predetermined sequence based on *time* to create desired flow rate changes while pumping into two wells simultaneously, whereas the claims require measuring an unknown flow rate and choosing a valve sequence for swapping between wells *in response* to that measured flow rate. Similarly, Beuterbaugh discloses delivering alternating rapid pulses to two or more wells based on *time* rather than the claimed methods of determining how to swap from fracturing one well to fracturing another in response to flow-rate conditions.

Accordingly, this factor weighs strongly in favor of denial.

G. Factor 7: The Requirement to Issue a Final Determination Not Later Than One Year After the Date on Which the Director Notices Institution of Review

This factor is neutral because IWS's First Petition was denied institution.

H. *Summary of General Plastic Factors*

On balance, the *General Plastic* factors overwhelmingly favor denial of IWS's Second Petition. Factors 1-6 all weigh strongly against institution, with only Factor 7 being neutral. Institution of IWS's Second Petition in the face of these circumstances would contradict the twin policies of "efficiency" and "fundamental fairness." *General Plastic*, 18. Patent Owner therefore respectfully requests the Board deny institution.

III. THE '779 PATENT

A. Technological background

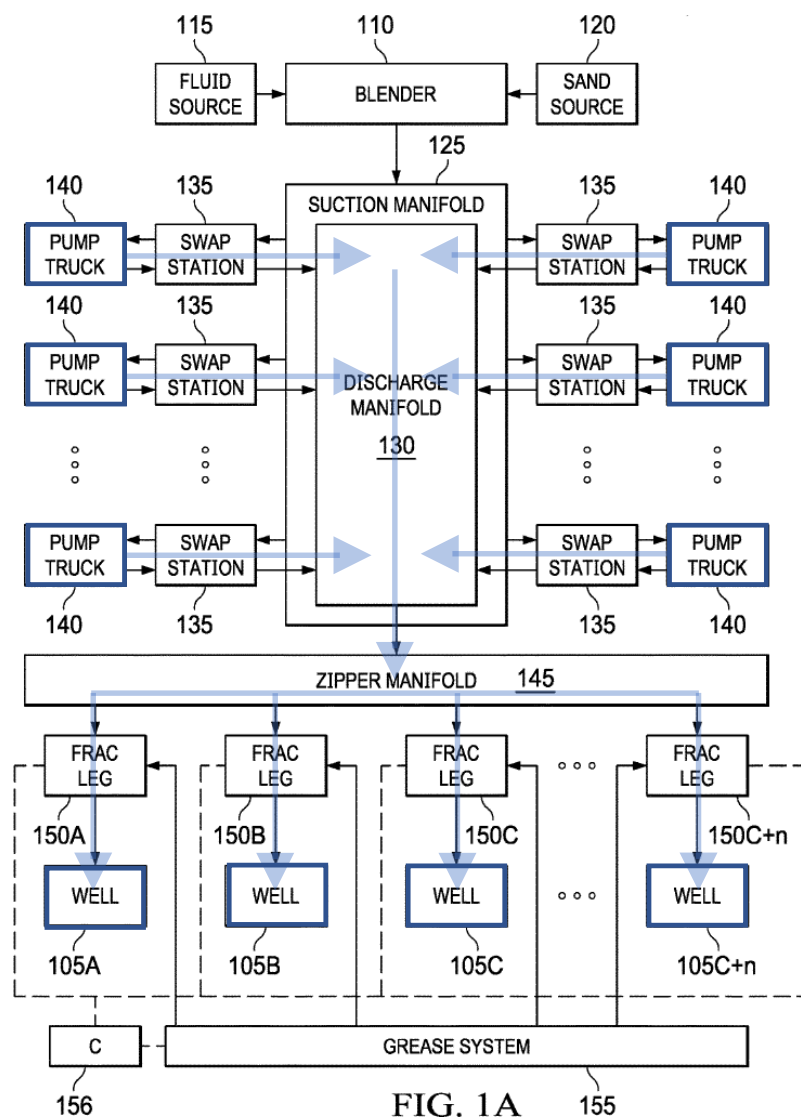
Hydraulic fracturing is a technique employed in the oil-and-gas industry to enhance the extraction of hydrocarbons from drilled wells. Ex.2006, ¶33.

Hydraulic fracturing is used to fracture the geology in the formation by pumping high pressure fluid into the well, allowing oil and gas to flow out of the fractures into the well. *Id.*, ¶¶61-63. In many operations where hydraulic fracturing is employed, numerous wells are spaced closely apart on the same "pad" or wellsite to increase extraction from the reservoir. *Id.*, ¶51.

One relatively recent improvement to the hydraulic fracturing process is known as “zipper fracturing.” *Id.*, ¶¶12, 97-98. Originally, hydraulic fracturing was accomplished one stage at a time in a single well before moving on to the next well. *Id.*, ¶¶67, 104. Zipper fracturing improved this process through use of a hydraulic fracturing manifold or “zipper manifold.” *Id.*, ¶¶12, 94-95. In this method, the pressure pumps are connected to a common manifold that distributes fluid to each of a series of connected wells. *Id.* Each well’s connection to the zipper manifold includes valves that can be closed to isolate the well. *Id.*, ¶94. Thus, pumping into a given well may be accomplished by closing the valves to all but one well, so that fluid is directed to the desired well. *Id.*

Hydraulic fracturing and perforating operations on a particular well may take hours to perform, resulting in significant idle time for pumping and wireline personnel while one crew waits for the other to finish. *Id.*, ¶95. Zipper fracturing reduced this downtime by allowing one well to be fractured while the next well in the series is perforated. *Id.* When both operations are complete, the newly fractured well can be isolated, fluid may be rerouted through the zipper manifold to the newly perforated well for fracturing, and wireline operations can begin immediately in the next well in the series. *Id.* In this manner, operations move through a series of wells in assembly-line fashion, cutting the time to complete wells nearly in half.

Figure 1A of the '779 Patent shows a diagram of a conventional zipper
fracturing setup:



Ex.1001, Fig. 1A (annotated).

The dramatic reduction in non-productive time enabled by zipper fracturing resulted in its widespread adoption in the industry. *See, e.g.*, Ex.1008, 1. But operators accustomed to significant downtime between pumping operations had to

adapt to the relatively fast-paced pumping schedule in zipper fracturing operations.

Id., 2. One Journal of Petroleum Technology article from 2014 described this quicker schedule as “continuous” because of the little downtime between pumping operations—and noted these pumping operations resulted in increased wear on pumps and left little time for maintenance. *See id.*

But the description of these previous zipper-based pumping operations as “continuous” was a misnomer—these operations were not truly continuous because they still required at least a 15-minute break in stimulation operations during the transition between wells. Ex.1008, 2 (“[W]hen doing zipper fracturing the break in stimulation operations may only last 15 minutes as workers switch from one well to another.”); Ex.2006, ¶¶167-168. This delay was due to the time it took to shut down the pumps, close the valve to the first well, open the valve to the second well, and start the pumps back up to begin fracturing. Ex.2006, ¶95. One of the reasons this conventional sequence still involved downtime—despite the industry’s focus on efficiency—was because of safety concerns. *Id.*, ¶¶105-107. The traditional understanding was that this transition downtime was necessary to safely operate the valves. *Id.* Downing’s novel continuous pumping system and method described in the ’779 Patent upended this traditional understanding.

B. Summary of the '779 Patent

The '779 Patent issued on August 2, 2022, and is entitled “Hydraulic Fracturing Plan and Execution of Same.” It describes and claims a novel process for transitioning between fracturing different wells attached to the same zipper manifold, called a continuous pumping swap or “CP swap.” As described in the specification, a CP swap allows for non-stop pumping throughout such a transition by opening a valve to the second well while still pumping into a first well, and then closing the valve to the first well:

As shown in FIGS. 16D and 16E, executing the CP swap from hydraulically fracturing (at the step 262) the n_1 well (e.g., well 105D) to hydraulically fracturing (at the step 262) the n_1+1 well (e.g., well 105B) transitions the zipper valves from one well to the other, opening the second well and subsequently shutting-in the first well, all while pumping.

Ex.1001, 14:41-46.

As shown below in '779 Patent Figure 16D, during the CP swap “[t]he transition [between wells] is instantaneous and the total time between stages measured at treatment pressure is less than 20 seconds (as fast as 19 seconds in some instances).” Ex.1001, 14:47-49.

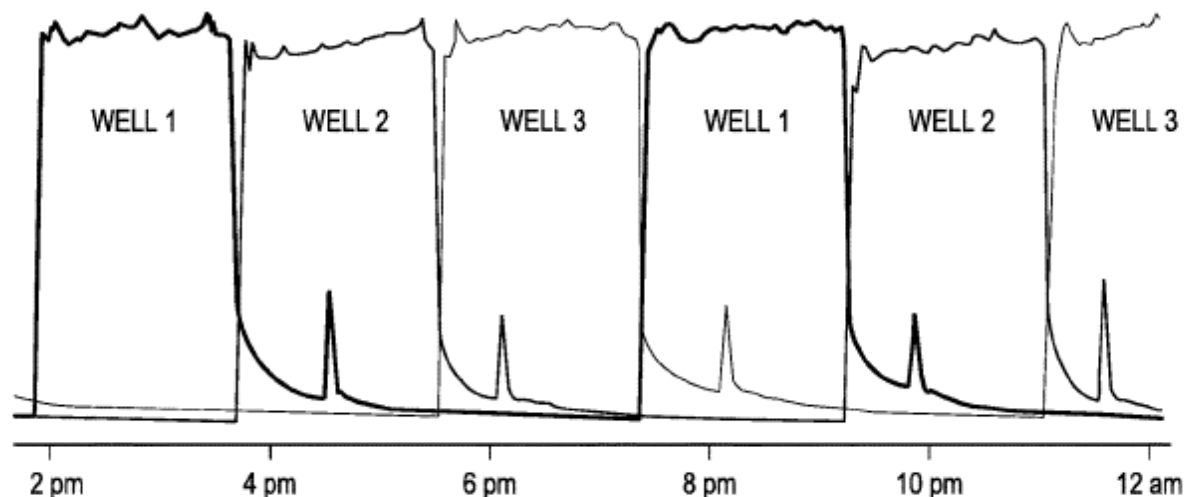


FIG. 16D

The '779 Patent distinguishes this inventive CP swap process from a conventional “regular swap.” *See, e.g., id.* at 13:31 (“determining whether to permit a **regular swap** or a **CP swap**”). Conventional swaps begin by closing the valve on one well before opening the valve on the next well. With both valves closed, pumping operations must cease. When the valve on the second well is opened, pumping resumes, but a delay occurs while the pumps are primed (in some instances) and returned to operating pressure.

The '779 Patent’s claimed CP swap method thus enables hydraulic fracturing pumps to run continuously during multi-well zipper fracturing stimulations, thereby avoiding downtime in pumping operations associated with conventional methods.

C. Prosecution History of the '779 Patent

The '779 Patent issued on August 2, 2022, from Application No. 17/388,716 (“’716 Application”), filed July 29, 2021, as a continuation-in-part application of Application No. 17/319,854.

During prosecution, the Examiner rejected pending independent claims 15 and 23 as being anticipated by Kajaria. Ex.1009, 112-115. With respect to pending dependent claims 17 and 25, the Examiner combined Kajaria with a second reference, U.S. App. Pub. 2014/0352968 to Pitcher, because Kajaria “does not specifically disclose measuring a flow rate of the fluid being pumped into the second well.” *Id.* at 115.

In response to these rejections, Downing amended the rejected claims to recite the subject matter that the Examiner indicated was allowable: “determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time.” Ex.1009, 116, 81-103. The claims were subsequently allowed. *Id.* at 49-52.

IV. CLAIM CONSTRUCTION

No claim construction is necessary to deny institution. Patent Owner’s arguments for denial do not hinge on the outcome of an actual controversy about construction of a claim term. *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999). As explained throughout this Preliminary Reply, the

defects in the Petition are readily identifiable without defining any specific claim term.

V. THE PETITION FAILS TO SHOW A REASONABLE LIKELIHOOD OF SUCCESS ON THE MERITS

A. The Ciezobka Grounds do not establish a reasonable likelihood of success.

Petitioner fails to establish a reasonable likelihood of success in showing that Ciezobka, alone or in combination, anticipates or renders obvious any of the Challenged Claims. Ciezobka is not related to and does not describe the continuous pumping method claimed in the '779 Patent. Instead, Ciezobka discloses a different type of system for delivering *timed* pressure impulses while pumping into two wells in an alternating fashion. *See* Ex.1037, 11:24-2:16. And because Ciezobka contemplates opening and closing valves based on time, Ciezobka's system necessarily fails to disclose comparing a measured flow rate to a flow rate threshold (claims 1 and 8) or performing a valve sequence based on a measured flow rate condition (claims 15 and 25). Ex.2006, ¶ 131-35.

Moreover, although Petitioner also asserts that Ciezobka renders all Challenged Claims obvious, the Petition does not even attempt to explain why the '779 Patent's independent claims would be obvious over Ciezobka, instead asserting only that "[i]f any differences exist between Ciezobka and Claims 1 and 8's or Claims 15 and 25's limitations, they are insubstantial, and Ciezobka would

still render obvious these claims' subject matter 'as a whole.'" Petition, 31. This lack of explanation or evidence alone defeats Petitioner's obviousness challenge.

1. Ground 1: Ciezobka does not anticipate the Challenged Claims.

Independent claims 1 and 8 require "*measuring a flow rate*" of fluid being pumped into a first well and determining that the measured flow rate "*is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time*" or instructions for performing those steps. Independent claims 15 and 25 similarly require "*measuring a flow rate of the fluid being pumped into the second well*" and controlling valves "*in response to determining that the flow rate ... has satisfied one or more flow rate conditions*" or instructions for performing those steps.

For each of the claim elements related to flow-rate measurements, the Petition relies on Ciezobka's disclosures of controlling the flow of fracturing fluid into each of the wells to create timed pulses during which the flowrate in the well is less than the initial flowrate for a short period of time. Petition, 13-17, 25, 28-30 (citing Ex.1037, 4:2-15, 12:4-15, 15:18-21, Fig. 7). More simply, Ciezobka discloses controlling valves to purposely create a known, reduced flow rate. See Ex.1037, 12:8-11 ("A pressure pulse 222, 232 is *induced* by closing one of the valves 219, increasing the total flow rate 220 to the 10 first wellhead 202 and

decreasing the total flow rate 230 to the second wellhead 204 for a short period of time.).⁴ The claims, however, require measuring and comparing an *unknown* flow rate to a threshold or deciding to open and close valves *in response* to such a comparison.

In more detail, Ciezobka's specification explains that during fracturing, the amount of pressure in the fracturing fluid being pumped into the well tends to naturally decrease as fractures open up, which decreases the fluid's ability to create new fractures. Ex.1037, 1:25-31. To combat this problem, Ciezobka discloses systems and methods for providing timed "pressure pulses" to cause temporary increases in pressure to create new fractures. *Id.*, 3:32-4:2. In a preferred embodiment, "rather than rapidly increasing and/or decreasing the pump rate of the fracturing pumps" to create the pulses, "a portion of the fracturing fluid, with or without proppant, is diverted away" from one wellhead and toward another wellhead for a predetermined amount of time to create a pulse. *Id.*, 9:28-31.

The embodiment Petitioner cites contemplates having a pair of wellheads (206 and 208), each connected to both a "constant rate flow line (212 and 214)," and a "diverter line (216)" that is connected to both wellheads, as shown in Figure 6 below:

⁴ All emphasis is added unless otherwise noted.

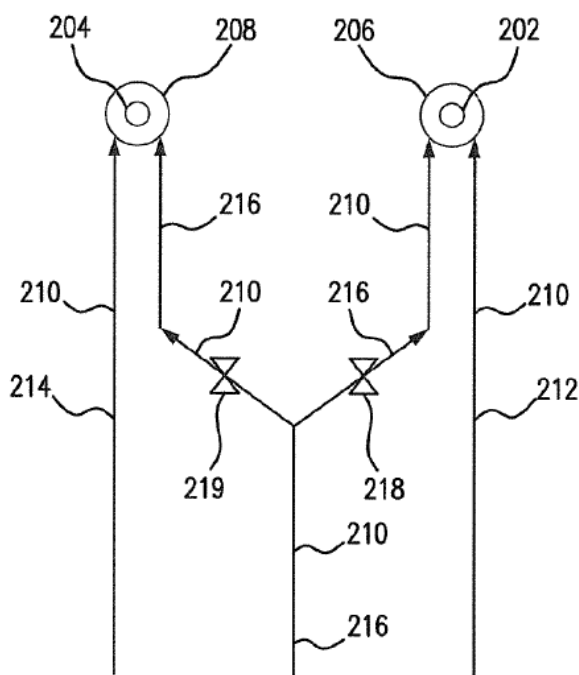


FIG. 6

Id., Fig. 6, 11:24-28. Ciezobka discloses closing diverter valves 218 and 219 in an alternating fashion to deliver alternating pulses to each of the two wells by diverting the fluid flowing through the diverter line 216 to each well one at a time.

Id., 12:2-5. Specifically, Ciezobka explains that in this embodiment, a high-pressure fracturing pump supplies fluid to each of the three lines 212, 214, and 216 at a constant rate, and initially, both diverter valves 218 and 219 are open to allow the fluid flowing in the diverter line 216 to flow to both wellheads. *Id.* 11:32-12:8. Then, “[a] pressure pulse 222, 232 is induced by closing one of the valves 219, increasing the total flow rate 220 to the first wellhead 202 and decreasing the total flow rate 230 to the second wellhead 204 for a short period of time.” *Id.*, 12:8-11.

After that “short period of time,” which “may range from 1 minute to 1 second” and preferably “equals 10 seconds,” the valve 219 is reopened, and the process is repeated by closing valve 218 for another “short period of time.” *Id.*, 12:11-15.

Thus, Ciezobka discloses closing valves in a predetermined sequence based on *time* to create *known* flow rate changes. That is the opposite of Challenged Claims, which contemplate measuring an *unknown* flow rate, determining whether the measured flow rate is below a threshold, and using that comparison and the flow rate to determine when to open and close valves. Further, because Ciezobka’s method involves opening and closing valves at predetermined times, there is no need in Ciezobka’s system to measure a flow rate and compare it to a threshold. Ex.2006, ¶ 134-35. That the flow rate to one well drops after the diverter valve associated with that well is closed is the desired and necessary result of closing the valve, not a condition being evaluated to determine further valve operations. *Id.*

Because Petitioner cannot show that Ciezobka discloses the claimed steps either expressly or inherently, Ground 1 fails.

- i. **Ciezobka does not disclose “*determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold*” (Limitations 1.3, 8.5).**

Claims 1 and 8 each require “*determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time.*” For this element, Petitioner

cites Ciezobka's disclosures of closing diverter valves to reduce a flow rate of fluid into a first well from an initial flow rate. Petition, 14-15 (citing Ex.1037, 4:4-15, 8:11-13). Petitioner appears to point to the initial flow rate (before the valve is closed) as the claimed "*threshold*," and argues that closing the valve to cause the flow rate of fluid to drop below that initial flow rate amounts to determining that the lower flow rate is below a threshold. *Id.*

But this disclosure is manifestly different than "*determining*" that a flow rate "*is below a flowrate threshold*," as the claims require. The claimed "*determination*" necessarily requires comparing an unknown flow rate of fluid to a specific "*threshold*." Ciezobka does not teach or suggest this comparison—nor would such a comparison be necessary.

Closing Ciezobka's diverter valve ***necessarily results*** in a flow rate reduction from the initial flow rate. Ex.2006, ¶ 139-40. Ciezobka's method doesn't require determining whether the second flow rate is lower because it ***must*** be—fluid is diverted away from the wellhead. *See* Ex.1037, 9:30-31 ("a portion of the fracturing fluid, with or without proppant, is diverted away from the wellhead, changing the flow rate, in order to provide a pressure pulse to the wellbore 10."). For example, referring to Fig. 6 below, when the diverter valve 218 is closed, all flow from the diverter line 216 to wellhead 202 is stopped, necessarily lowering the flow rate into well 206. *Id.*, Fig. 6, 11:24-28.

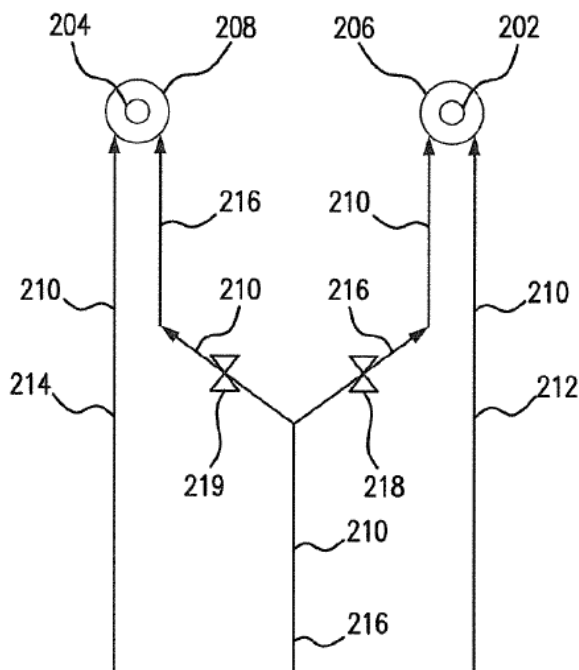


FIG. 6

Id., Fig. 6. In other words, Ciezobka closes the diverter valve to cause a **known** and desired drop in flow rate from the initial flow rate. The claim limitation requires the opposite: determining whether an **unknown** flow rate is below a threshold. Accordingly, Ciezobka fails to meet this claim element.

Petitioner also asserts in conclusory fashion that a POSITA would understand that Ciezobka's disclosures of using a "software toolbox" to selected parameters for the timed pulses "would have included software instructions for opening/closing valves according to the determined optimized rate fluctuation schedules, including 1.1-1.8 and 8.3-8.10's steps." Petition, 31 (citing Ciezobka,

27:30-28:2; Ex.1037 ¶¶ 137-138, 140, 142-143, 187-189, 190-192, 274-277). But neither Petitioner nor its expert explain why a POSITA would understand that Ciezobka's method of delivering time pulses would necessarily include comparing a measured flow rate to any threshold, let alone software instructions for performing that step. *See* Petition, 31; Ex.1041, ¶ 140. Petitioner therefore cannot satisfy its burden of showing that Ciezobka inherently discloses this limitation. *In re Robertson*, 169 F.3d 743, 745 (Fed.Cir.1999).

ii. Ciezobka does not disclose determining that the flow rate of the fluid being pumped into the first well has been below a flow rate threshold for a threshold amount of time (Limitations 1.4, 8.6).

Because Ciezobka lacks any disclosure of determining that the flow rate of fluid being pumped into a well is below a flow rate threshold, it also lacks any disclosure of determining that the flow rate “*has been below the flow rate threshold for a threshold amount of time.*” Petitioner cites Figures 6 and 7, which Petitioner asserts “show the total flowrate of fluid being pumped to the first well during a pulse is decreased (below a secondary flowrate threshold) ‘for a short period of time,’ e.g., ranging ‘from 1 minute to 1 second’ or ‘any period of time.’” Petition, 16. But neither Figure 6 nor Figure 7 illustrates determining that the flow rate has been below a threshold for a threshold amount of time.

Instead, Figure 7 merely shows the *result* of the valve operations. Nothing in the figure or the accompanying description discloses actually measuring the flow rate for that period of time to ensure that it is under any “threshold” for the entire time period. *See* Ex.1037, 12:5-16. Again, doing so would not make sense in the context of Ciezobka because, as Petitioner’s own quotes from Ciezobka demonstrate, Ciezobka’s flow rate characteristics are designed and set in advance:

Ciezobka discloses that the parameters of variable rate fracturing are “select[ed] and design[ed]...including... parameters such as flow rate (e.g., magnitude of change and duration) as well as frequency (for example... measured...period[s] of time between the endings of successive flow rate variations).”

Petition, 15 (quoting Ex.1037, 15:18-21).

For similar reasons, Petitioner fails to show that the “short period of time” of the pulse is a “*threshold period of time*” during which the flow rate must be under a specific “*flow rate threshold*.” Again, Petitioner fails to point to any disclosure in Ciezobka of making any decisions or performing any actions because the flow rate has been under a certain value for a certain period of time. *See* Petition, 16-17. Instead, Ciezobka contemplates opening the second valve after a “short period of time” to end the pulse. *See* Ex.1037, 12:8-15. It makes no mention of measuring a flow rate during the pulse period, let alone determining that the flow rate remains below a threshold for that period. *See id.* Again, Ciezobka contemplates

determining pulse duration *in advance*, confirming that Ciezobka contemplates using time alone as the trigger to open the valve and end the pulse. Ex.1037, 15:18-21. A determination that a “short period of time” has expired is not a determination that a measured flow rate “*is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time.*” Ex.2006, ¶ 144.

Petitioner again makes no effort to show that Ciezobka inherently requires this step. *See* Petition, 16-17. Nor could it. As already noted, there would be no need to measure the pulse flow rate to determine that it is under an initial flow rate because closing one of the lines supplying fluid to a well to create a pulse would necessarily reduce the total flow rate of fluid into that well. Ex.2006, ¶¶139-40. Because Petitioner fails to demonstrate that Ciezobka discloses this limitation either expressly or inherently, it cannot establish a reasonable likelihood of success in showing that Ciezobka anticipates claims 1 and 8 or their dependent claims.

iii. Ciezobka does not disclose swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well (Limitations 15.4, 25.6).

Ciezobka does not disclose swapping from permitting fracturing of one well to permitting fracturing of another well. Instead, the embodiments Petitioner relies on exclusively describe fracturing two wells *simultaneously* and *continuously*. The only element that “swaps” between the wells is a timed pressure pulse, as

described above. *See* Petition, 25-27 (citing Ex.1037, 11:28-12:15, Figs. 6-7).

Ciezobka expressly describes that each wellhead 202 and 204 continuously receives a constant flow of fluid from “separate constant flow rate line 212, 214,” where “the flow rate supplied by each of the constant rate flow lines 212, 214 **does not change during the pressure pulse.**” Ex.1037, 11:30-12:4. Thus, throughout Ciezobka’s process, both wells are being continuously fractured at least via the constant-rate flow lines. *See id.*

Figure 7, which Petitioner cites, demonstrates this. As shown in the figure, throughout the disclosed method, the flow rate of fluid into each well remains non-zero throughout the process because fluid is being pumped into both wells. *Id.*, Fig. 7. Even during the pulse of increased pressure to one well, the flow rate to the other well never reaches zero because of the fluid being pumped into that well via the constant-rate flow line. *See id.*; Ex.2006, ¶¶ 147-48. Thus, both wells are being fractured throughout the method, and no “*swapping from permitting hydraulic fracturing of the second well to permitting hydraulic fracturing of the first well*” occurs. *Id.*

- iv. **Ciezobka does not disclose opening a first valve before closing a second valve in response to determining that a measured flow rate has satisfied one or more flow rate conditions (Limitations 15.6, 25.8).**

Ciezobka does not disclose “*determining that a measured flow rate has satisfied one or more flow rate conditions,*” let alone performing the recited valve sequence “*in response to*” that determination. As already explained, Ciezobka instead contemplates opening and closing valves based solely on *time*.

First, Petitioner asserts that “[a]fter determining a pulse flowrate (greater than, less than and/or within a range of an initial flowrate) has been directed into a well for a certain time, a subsequent valve sequence is performed,” but Petitioner fails to point to any such disclosure in Ciezobka. Petition, 28-29. At most, Petitioner shows that Ciezobka contemplates tracking a pre-determined pulse period of time. *See id.*, 29 (“In Figures 6-7, after a pulse has been delivered to the second well, the first valve 218 is opened to resume secondary flowrates to the first and second wells.”); *see also* Ex.1037, 12:8-11 (“A pressure pulse 222, 232 is induced by closing one of the valves 219, increasing the total flow rate 220 to the 10 first wellhead 202 and decreasing the total flow rate 230 to the second wellhead 204 *for a short period of time.*”). That time period is not a “flow rate” and is not compared to any flow-rate condition. *See* Ex.1037, 12:8-11; Ex.2006, ¶ 150.

Second, even if determining that the “short time period” for the pulse has ended could be considered “*determining that a measured flow rate has satisfied one or more flow-rate conditions,*” Petitioner has not shown that Ciezobka discloses “*opening a first valve before closing a second valve*” “*in response to*”

that flow rate condition. At most, Ciezobka discloses opening the first valve to end the pulse in response to the *time period* for the pulse having expired. *See* Ex.1037, 12:8-11. But it does not disclose “*closing a second valve*” in response to the expiration of the same time period. *See id.* 12:8-16. Instead, as Petitioner’s annotated version of Figure 7 demonstrates, Ciezobka contemplates closing the second valve to initiate a pulse of the first well after a *second* time period has expired. *See* Petition, 29.

Thus, at most, Ciezobka discloses opening a first valve based on the pulse time period expiring, not “*opening a first valve before closing a second valve*” in response to that time period expiring. The particular sequence of “*opening the first valve before closing the second valve*” has nothing to do with any particular pulse period ending or any flow-rate condition being met. Instead, as noted, Ciezobka contemplates opening and closing the valves in a *predetermined* sequence to *cause* desired flow rate conditions. *See* Ex.1037, 12:7-15 (“Initially, both valves 218 are open A pressure pulse 222, 232 is induced by closing one of the valves 219, increasing the total flow rate 220 to the first wellhead . . . for a short period of time. . . . The process is then repeated by closing the valve 218, increasing the total flowrate 230 to the second wellhead.”). That is the opposite of the Challenged Claims, which contemplate measuring an unknown flow rate to determine whether

it meets one or more conditions and using that determination to select between two potential valve sequences for swapping between wells.

- v. **Ciezobka does not disclose opening a first valve during or after closing a second valve in response to determining that a measured flow rate has not satisfied one or more flow rate conditions (Limitations 15.7, 25.9).**

Similarly, Ciezobka does not disclose “*opening a first valve during or after closing a second valve*” “*in response to determining that the flow rate . . . has not satisfied one or more flow rate conditions.*” As explained above, Petitioner has not shown that Ciezobka discloses determining whether or not a flow rate has satisfied one or more conditions and therefore cannot show that Ciezobka discloses this step. *See* Petition, 28-30.

Separately, Ciezobka does not disclose “*opening a first valve during or after closing a second valve,*” which requires having valves associated with both the first well and the second well closed (or in the process of closing) ***at the same time.***

Ex.2006, ¶ 154. In Ciezobka’s disclosed method, the diverter valves 218 and 219 ***never*** close at the same time. *See* Ex.1037, 12:5-16. Either they are both open, or one valve is closed to create a pressure pulse. *See id.*

Because Petitioner cannot show that Ciezobka discloses either limitations 15.6 and 25.8 or limitations 15.7 and 25.9, it cannot establish a reasonable

likelihood of success in showing that Ciezobka anticipates claims 15 and 25 or their dependent claims.

2. Ground 2: Ciezobka does not render the Challenged Claims obvious.

Despite asserting that Ciezobka renders all challenged claims obvious in Ground 2, Petitioner does not even attempt to explain its theory. The Petition's sole obviousness argument for claim 1 consists of the following conclusory statement, made without citation:

If any differences exist between *Ciezobka* and Claims 1 and 8's or Claims 15 and 25's limitations, they are insubstantial, and *Ciezobka* would still render obvious these claims' subject matter "as a whole."

Petition, 31. The Petition fails to provide any explanation of how Ciezobka renders obvious comparing the measured flow rate to a threshold to determine whether the flow rate is below the threshold, or determining that the flow rate has been below a flow rate threshold for a threshold amount of time. *See id.*⁵ Petitioner's general

⁵ Although Petitioner's expert provides additional obviousness arguments not raised or even referenced in the Petition related to these claim elements, Petitioner cannot incorporate those arguments into the Petition by reference. *See Parus Holdings, Inc. v. Google LLC*, 70 F.4th 1365, 1370 (Fed. Cir. 2023).

statement that Ciezobka would render obvious “any differences” between Ciezobka’s disclosures and the Challenged Claims does not come close to meeting Petitioner’s burden of showing with particularity why Ciezobka renders the Challenged Claims obvious. *See Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3)).

Likewise, with respect to claims 15 and 25, the Petition does not make any attempt to show that Ciezobka renders obvious the steps of swapping from permitting fracturing of one well to permitting fracturing of another or choosing any particular method of doing so *in response to* determining that a measured flow rate has satisfied one or more conditions. *See* Petition, 30-31. Instead, the only obviousness arguments the Petition makes related to the independent claims of the ’779 Patent relate to (1) claim 8 and 25’s requirements of a processor executing the steps of the claimed process and (2) claim 15.7 and 25.9’s requirements of “opening a first valve during or after closing a second valve” in response to a determination that the measured flow rate does not satisfy one or more conditions. *See id.* Because Petitioner fails to even address the alleged obviousness of any of the remaining elements discussed above, Ground 2 fails.

As to claims 15.7 and 25.9, Petitioner’s conclusory statement that “if flowrate conditions are not met, Fig. 7’s schedule would not be implemented” is insufficient to meet Petitioner’s burden of establishing obviousness. *See id.* For the

reasons already explained, Ciezobka does not disclose performing any of the steps of Figure 7's schedule in response to flow rate conditions being met and therefore does not disclose or render obvious *not* performing those steps if flow rate conditions are *not* met.

In fact, Petitioner's argument emphasizes the fundamental differences between the challenged claims and Ciezobka. Petitioner asserts that if flow rate conditions were not met, "the wells would be operated individually." Petition 31. But the recited valve operations are what *cause* the flow rate changes illustrated in Figure 7 that Petitioner relies on as the determined flow rate conditions. Ex.2006, ¶¶ 160-62. Ciezobka does not contemplate any determination that those flow rate changes have *not* occurred because they are simply a byproduct of performing Ciezobka's pulsing method. *Id.*, ¶ 161.

Further, Petitioner fails to explain how operating the two wells "individually" is an alternative to Ciezobka's disclosed method or how that alternative would involve opening a first valve after or during closing a second valve or how flow rate conditions would dictate doing so in Ciezobka's system. Ciezobka does not relate to swapping between wells at all—either using a continuous pumping or traditional method. *Id.*, ¶ 162. Its predetermined sequence for closing and opening diverter valves aims to create pulses while pumping into two wells simultaneously. *Id.* Altering that sequence to close a first valve during or

after closing a second valve would not make sense because it would result in having both diverter line valves closed while fluid is being pumped through diverter line 216 “at a constant flow rate.” Ex.1037, 11:30-12:2; Ex.2006, ¶ 162. This would not result in the wells being fractured “individually.”

Petitioner therefore fails to satisfy its burden of showing with particularity how Ciezobka renders obvious any Challenged Claim.

3. Ground 3: Ciezobka and McNeel do not render the Challenged Claims obvious.

For Ground 3, Petitioner again relies on Ciezobka to disclose limitations 1.2-1.4, 8.4-8.6, 15.3-15.7, and 25.5-25.9 and cites McNeel only to argue the obviousness of Claim 8 and 25’s requirements of a computer processor programmed to perform the steps of the recited process, as well as certain dependent claims. Because Petitioner has not shown that Ciezobka discloses or renders obvious the Challenged Claims’ steps of determining whether that flow rate is below certain thresholds, or performing valve operations in response to a determining whether the flow rate meets one or more conditions, it cannot satisfy its burden with respect to Ground 3.

B. Ground 4: Beuterbaugh and Jackson do not render the Challenged Claims obvious.

Petitioner fails to establish a *prima facie* case of obviousness with respect to the combination of Beuterbaugh and Jackson. While Beuterbaugh and Jackson are

both related to fracking operations, they solve different problems in different ways. Beuterbaugh, like Ciezobka, relates to delivering alternating rapid pulses to ***two or more wells*** based on ***time***. Jackson, on the other hand, relates to moving between fracking stages in a ***single well*** based on ***flowrate thresholds***. These differences create at least two deficiencies in Petitioner’s obviousness theory: (i) Jackson’s technique of measuring ***varying*** flowrate against a threshold would never be needed in Beuterbaugh’s system because its pumps run at a “constant” rate, producing ***unvarying*** flow rate, and (ii) even when combined, Beuterbaugh and Jackson fail to teach using flow-rate conditions to determine when to switch fracturing fluid flow from one well to another—as Beuterbaugh switches between wells based on ***time*** and Jackson adjusts fluid flow in a ***single well***.

More generally, Petitioner’s obviousness analysis lacks the required “motivation to combine accompanied by a reasonable expectation of achieving what is claimed in the patent-at-issue.” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016). Petitioner’s analysis is legally insufficient because Petitioner fails to support it with teachings from the references and instead relies only on conclusory expert testimony. *See Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15-16 (August 24, 2022); 37 C.F.R. § 42.65(a).

- i. **A POSITA would not have combined Beuterbaugh and Jackson to arrive at claims 1 and 8 because Jackson’s technique of measuring varying flowrates against thresholds would not improve Beuterbaugh.**

Despite insisting that Jackson would somehow “improve” Beuterbaugh, Petitioner fails to address the above flaws or even explain why a POSITA would have expected to be successful combining two incompatible systems. Its obviousness analysis is limited to the generic statement that Jackson and Beuterbaugh “are in the same field of endeavor (as is ’779) and directed to solving the same problem of controlling and improving fracturing operations.” Petition, 58. *A prima facie* case of obviousness requires much more. *KSR v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (a showing of obviousness requires “articulated reasoning with some rational underpinning”).

For example, with respect to claim elements 1.3-1.4 and 8.5-8.6, which require “*determining that the flow rate of the fluid being pumped into the first well is below a flow rate threshold and has been below the flow rate threshold for a threshold amount of time,*” Petitioner asserts that a “POSITA would have considered using Jackson’s systems/methods for measuring/monitoring flowrate according to flowrate thresholds as a simple complement to Beuterbaugh’s fracturing systems/methods for directing fracturing fluid pulses with a selected pulse size to wells in a multi-well system.” Petition, 62. But Petitioner fails to

explain how Jackson’s flow-rate measurements and comparisons would complement Beuterbaugh’s multi-well pulsing scheme in any way. *See id.* Beuterbaugh makes no mention of flow-rate measurements and instead contemplates opening and closing valves to create pulses based on solely on time. *See, e.g.,* Ex.1036, ¶0022. Petitioner makes no effort to explain how an operator would use flow-rate measurements or thresholds in implementing Beuterbaugh’s timed pulsing scheme. *See* Petition, 62.

Importantly, Beuterbaugh explains that its pressure pumps “run at a constant rate” and, in fact, touts this feature as a fundamental advantage of its method: “Because the one or more high pressure pumps 135a-135e can run at a constant rate, the wear and tear on the pumps is significantly reduced.” Ex.1036, ¶0018. Therefore, there would be no need to compare a measured flow rate to a threshold in Beuterbaugh’s system—the flow rate is constant. *See id.*; Ex.2006, ¶ 171.

Again, Beuterbaugh’s method contemplates opening and closing valves based on time, not flow-rate conditions. To the extent that Petitioner proposes modifying Beuterbaugh to instead vary flow rate in a way that would necessitate measuring flow rates and comparing them to thresholds, such a modification would destroy the very advantage of Beuterbaugh’s system: reducing wear and tear by running the pumps at a constant rate. Ex.1036, ¶0018; Ex.2006, ¶ 171.

“[O]bviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention.” *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (emphasis original). Critically absent from the Petition is **any** explanation of **why** a POSITA would have been motivated to use Jackson’s thresholds for the claimed purposes in Beuterbaugh. Accordingly, Petitioner cannot establish a reasonable likelihood of success with respect to claims 1 and 8.

ii. Neither Jackson nor Beuterbaugh discloses using flow rates to determine how to swap between wells, as Claims 15 and 25 require.

Likewise, with respect to claim elements 15.6-15.7 and 25.8-25.9, which require “*opening the first valve before closing the second valve*” if the measured flow rate “*has satisfied one or more flow conditions*” or “*opening the first valve during or after closing the second valve*” if not, Petitioner asserts that “[i]t would have been obvious to determine next steps in response to flowrate conditions, as taught by Jackson, in Beuterbaugh’s systems/methods to allow for additional control of the fracturing operation.” Petition, 87. But, even when combined, Beuterbaugh and Jackson fail to teach swapping between **two wells** based on **flow rate**—Beuterbaugh swaps wells based on time (not flow rate), and Jackson teaches adjusting fluid flow into a single well to meet certain pressure thresholds.

Petitioner relies on Jackson’s disclosure of adjusting the flow rate into a single well when the rate reaches various “thresholds.” Petition, 87. But adjusting the flow rate to meet thresholds is different from monitoring the flow rate and basing determinations about how to swap between wells on whether the monitored flow rate meets certain conditions. Ex.2006, ¶ 173. Jackson does not disclose a multi-well system at all, let alone using flow-rate thresholds or other conditions to determine how to swap from pumping into one well to pumping into a different well. Neither Petitioner nor its expert explain how Jackson’s teaching regarding a *single well* is relevant to determining when to switch fracturing one well to another. *See* Ex.2008 (IPR2024-00256, Institution Decision) at 21.

The Challenged Claims contemplate using flow-rate conditions to determine whether to open a valve associated with the next well to be treated before closing a valve associated with the well currently being treated based on flow rate conditions. As Petitioner acknowledges, Beuterbaugh contemplates opening and closing valves in a defined sequence to create pulses. *See* Petition, 7. Petitioner does not explain why a POSITA would alter that sequence based on flow-rate conditions or how using flow-rate conditions would improve Beuterbaugh’s pulsing method. As a result, Petitioner again fails to show that “a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or

modifications of prior art to arrive at the claimed invention.” *Belden*, 805 F.3d at 1073 (emphasis original).

Further, even if Petitioner could show that a POSITA would have been motivated to “to determine next steps in response to flowrate conditions” in Beuterbaugh’s system, Petitioner does not explain how or why a POSITA would use flow rate conditions to determine or alter a sequence of opening and closing valves, as the Challenged Claims contemplate. *See* Petition, 87. Like Ciezobka, Beuterbaugh teaches opening and closing valves in a *predefined* sequence to create pulses—specifically “to allow two or more wells to be pulsed simultaneously by a single source of high pressure fracturing fluid” by delivering timed pulses in “an alternating fashion solely to a single well among a plurality of wells” at a time. *See* Ex.1036, ¶0015; Ex.2006, ¶ 175. And it only discloses one way manipulate the valves to create these alternating pulses—simultaneously closing the first well’s valve and opening the second well’s valve in a “near instantaneous switching” operation. *See* Ex.1036, ¶0015, 0021. Petitioner provides no explanation of how Jackson, which does not relate to swapping between wells at all, would motivate a POSITA to alter that valve sequence based on flow-rate conditions.

Petitioner’s attempts to shoehorn Jackson’s distinct and incompatible teachings into Beuterbaugh lack any rational underpinning and fall far short of

meeting Petitioner's burden of establishing that Beuterbaugh and Jackson render the challenged claims obvious.

III. CONCLUSION

For the foregoing reasons, Patent Owner requests that institution be denied.

Respectfully submitted,

Dated: June 17, 2024
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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 Preliminary Response, that the number of words in this paper is 9,318. 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 June 17, 2024

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Exhibits Ex.2001 – Ex.2008**

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