

IPR2024-00300
Patent No. 11,560,770

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
Patent No. 11,560,770

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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Exhibit 1016	B.A. Wells and K.L. Wells. "Shooters – A "Fracking" History." American Oil & Gas Historical Society, (https://aoghs.org/technology/hydraulic-fracturing) (last accessed November 30, 2023)
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Exhibit 1028	A. Casero, G. Pace, B. Malone, F. Cantaloube, L. Tealdi, H. Malonga, and R. Seale, “Continuous Pumping, Multistage, Hydraulic Fracturing in Kitina Field, Offshore Congo, West Africa,” in <i>SPE International Symposium and Exhibition on Formation Damage Control</i> , 2008, vol. All Days, SPE-112442-MS, doi: 10.2118/112442-ms. [Online]. Available: https://doi.org/10.2118/112442-MS (“Casero”).
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Exhibit 1030	R. Oberhofer, “Application of Ball-Drop Technology to Improve Efficiency and Stimulation of Limited Entry Completion Systems,” in <i>Abu Dhabi International Petroleum Exhibition & Conference</i> , 2016, vol. Day 2 Tue, November 08, 2016, D021S052R004, doi: 10.2118/183427-ms. [Online]. Available: https://doi.org/10.2118/183427-MS (“Oberhofer”).

Exhibit 1031	Tolman, R. C., et al. (2009). <u>Method and Apparatus for Simultaneous Stimulation of Multi-Well Pads</u> . SPE Hydraulic Fracturing Technology Conference (“ <i>Tolman</i> ”).
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Exhibit 1033	R. W. Paige, L. R. Murray, and J. D. M. Roberts, "Field Application of Hydraulic Impedance Testing for Fracture Measurement," <i>SPE Production & Facilities</i> , vol. 10, no. 01, pp. 7-12, 1995, doi: 10.2118/26525-pa (“ <i>Paige</i> ”).
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I. INTRODUCTION

Downing responds to the Petition by touting a host of features and arguing various distinctions that are nowhere in the claims of the '770 Patent, as illustrated in this comparison:

Downing-Alleged Features <i>NOT</i> in Claims	Representative Claim 1
1. “Hydraulic fracturing” 2. “Switching” 3. “Continuous pumping (CP)” 4. “CP swap” 5. “Without any break in pumping operations” 6. “High-pressure pumping fluid” 7. “Zipper manifold” 8. “Shared zipper manifold” 9. “Common pressurized fluid flow” 10. “Interdependency between first and second wells” 11. “Shared fluid flow through a zipper manifold” 12. Zipper valves connected to the same “zipper manifold” 13. Fluid must be mixed and redirected from the manifold 14. Specific valve position in relation to the manifold 15. Wells cannot be hydraulically isolated 16. Eliminate/reduce non-pumping time 17. “After” requires specific timeframe	A method, comprising: communicating fluid to a first well via a manifold and a first valve, the first valve being associated with both the manifold and the first well; and 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.

Because Downing's entire analysis relies on improperly importing unclaimed features/limitations into the claims, Downing's arguments should be rejected. Downing provides neither evidence nor rationale for such importation and even agrees the claims deserve their plain and ordinary meaning.

Having chosen to draft overly broad claims merely covering conventional processes and equipment for opening/closing valves in well operations in response to determining that fluid communicated via a manifold has satisfied condition(s), Downing must face the problem of its own making. The Challenged Claims are unpatentable, as discussed in the Petition and below.

II. CARR

The Board correctly found that "*Carr* teaches the structural components necessary to perform" '770's claimed method. ID, 24-25; Pet., 47-48.

Downing's *Carr* arguments rely on features nowhere in '770's claims. POR, 12-16; Ex. 2012, ¶¶ 120-122, 129-169. The claims *do not* require a "common pressurized fluid flow," mixing and redirecting fluid to either well, "well swapping," or "seamlessly switch[ing]...without shutting pumps down." Having relied on unclaimed features, Downing's *Carr* analysis must be disregarded. *Carr* discloses and/or renders obvious the Challenged Claims (see Pet., 47-61; Ex. 1002; ¶¶ 317-486)—Downing's arguments to the contrary fail, as discussed below.

A. Independent Claims

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. Pet., 51-52 (quoting *Carr*, ¶ [0033]). Downing's valve-sequence argument that *Carr* must recite the word "**then**" to disclose or teach the claimed sequence (POR, 24) contradicts *Carr*'s plain language as understood by a POSITA.¹ Pet., 51-52, Ex. 1002, ¶¶ 323-333; ID, 25; Ex. 1044, ¶¶ 20-25.

Downing's "dependence between the valves"/shared-fluid-flow arguments (POR, 18-25) are red herrings and fail because none of the claims require such limitations. Notably, the independent claims do not require the second valve to be associated with the manifold or the first well, nor do the claims require the same fluid to be pressurized or communicated to both wells. The claims recite "communicating **fluid to a first well via a manifold and a first valve**," and opening a second valve "in response to determining that **the fluid communicated via the manifold has satisfied one or more conditions**," without requiring the fluid used for "determining" to have been communicated to the first well or first valve. Separately, the claims' recitation of "communicating **fluid** to a second well," refers to *any* fluid.

¹ Opposite Downing's assertion, unless recited, method-claim steps are not ordinarily construed to require an order.

Thus, the claims only require that the second valve is opened “in response to determining that the fluid communicated via the manifold has satisfied one or more conditions.” *Carr* discloses this limitation. *See* Pet., 51.

Regardless, *Carr* discloses Downing's shared-fluid-flow-interpretation of the claims. Ex. 1044, ¶¶ 9-11. *Carr*'s fluid would be pressurized and "redirected" to either well via the common line between the first/second valves by opening/closing the first/second valves (Pet., 48, 51-52; Ex. 2013, 141:12-21; Ex. 1044, ¶¶ 16-17, 19; Ex. 1045):

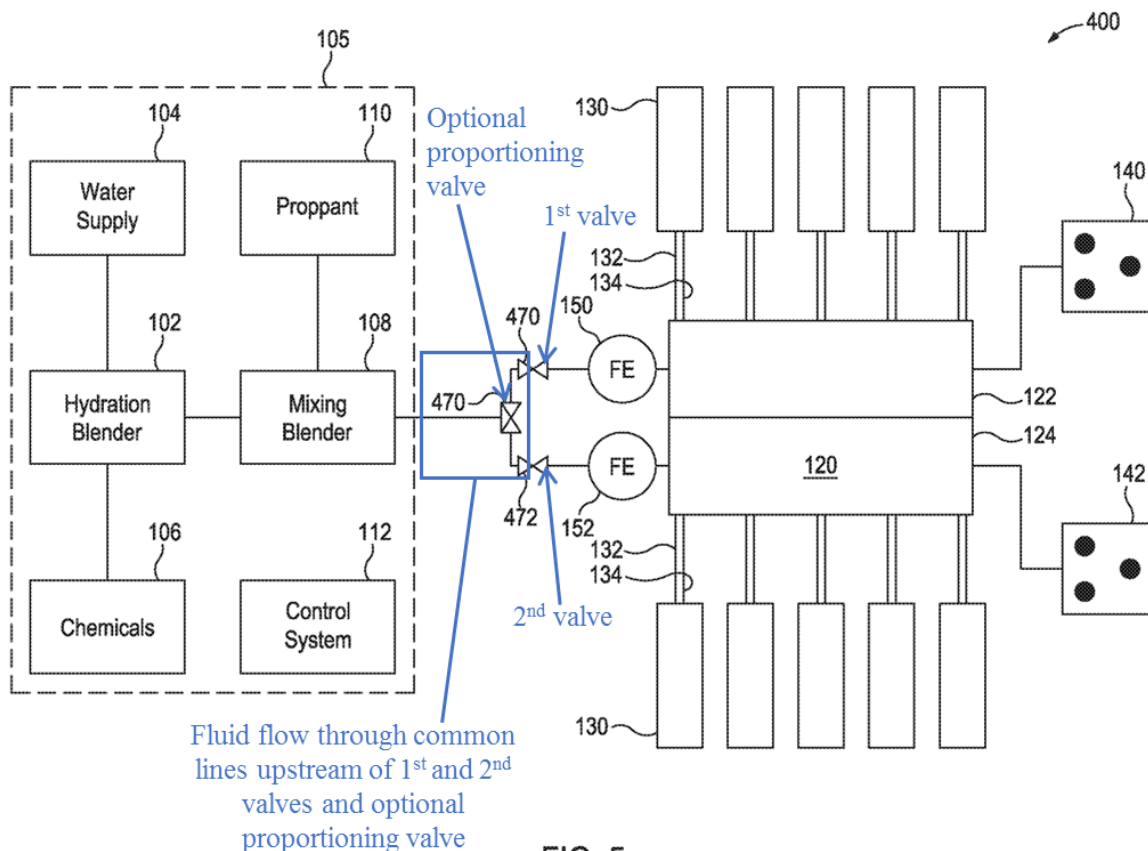


FIG. 5
(annotated)

Carr, as a whole, discloses or teaches that the valves are operated “in light of fluid flow targets for the first well 140 **and/or** the second well 142” to stimulate the wells individually or simultaneously. Ex. 1002, ¶¶ 109-110, 320, 326, 331-332; Ex. 1044, ¶ 12. 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. Downing disputes this by mischaracterizing Dr. Durham’s testimony and improperly focusing on a single embodiment while ignoring *Carr*’s entire disclosure. POR, 22 *citing Carr*, [0058]; Ex. 1044, ¶ 18. For example, *Carr* also explains that operators monitor and control fluid flow from a “centralized location” to “multiple wells” to enhance operations. *Carr*, [0015]. Thus, *Carr*’s isolated flow paths are not operated independently, as Downing insists. *Carr*’s disclosure of an optional proportioning valve confirms this. *Carr*, [0034] (explaining *Carr*’s proportioning valve provides another way to control flow into one well in response to flow into another well); *see also* Ex. 1002, ¶¶ 107-110, 393.

Indeed, Downing’s expert admits it was conventional for operators to consider data across the entire wellsite (Ex. 1043, 22:18-21, 23:23-24:11), and that it was well-known to control fluid flow to wells according to a pumping plan/schedule and move to a next step/stage in response to that plan and data gathered (*see, e.g., Id.*, 19:18-24, 22:18-23:16, 25:9-15, 29:2-13, 32:11-15). And, despite initially testifying that “changing the position of valve 472 would have ***no impact at all*** on the flow

rate in the first isolated manifold path” (Ex. 2012, ¶ 137) (emphasis added), he also admits that splitting flow *does impact* flowrate (Ex. 1043, 40:17-42:11). He thus concedes that operating *Carr*’s first/second valves *would impact* fluid flow, contradicting Downing’s basis for its *Carr* “in-response-to” arguments. Ex. 1044, ¶ 10-12.

Downing also misreads *Carr*’s simultaneous stimulation to require simultaneously opening and closing valves. POR, 25. Instead, as described, *Carr* teaches treating wells “individually” and “simultaneously,” and during treatment, adjusting the position (*i.e.*, opening or closing) of the first and/or second valve “in light of fluid flow targets for the first well 140 and/or the second well.” Pet., 49; Ex. 1002, ¶¶ 323-324, 359-360. As such, when treating *Carr*’s first well (with its valve open), *Carr* discloses opening the second well’s valve according to fluid flow targets for the first and/or second well. Ex. 1002, ¶¶ 326-328.

Next, Downing’s argument that it would be “nonsensical” to “completely clos[e]” *Carr*’s first valve while simultaneously treating the wells because “doing so would cut off fluid flow to the well and potentially deadhead the pumps” (POR, 26), incorrectly assumes that “opening” requires adjusting valves from fully-closed to fully-open and “closing” requires adjusting from fully-open to fully-closed. This is neither true nor in the claims. Downing could have claimed “completely opening” or “completely closing,” but did not—the claims as written recite “opening” and

“closing” valves, which includes partially opening/closing. *Carr* states that the “position” of a valve may be controlled to “control the flow rate” to the well, which a POSITA would understand includes partially opening/closing the valve. Ex. 1002, ¶¶ 326-331.

Additionally, neither the claims nor *Carr* requires the pumps to continuously run while operating the valves, as Downing contends. Ex. 1044, ¶ 29. Nor would closing the valves “deadhead the pumps,” as Downing also argues, because one could always turn off the pumps. *Id.*

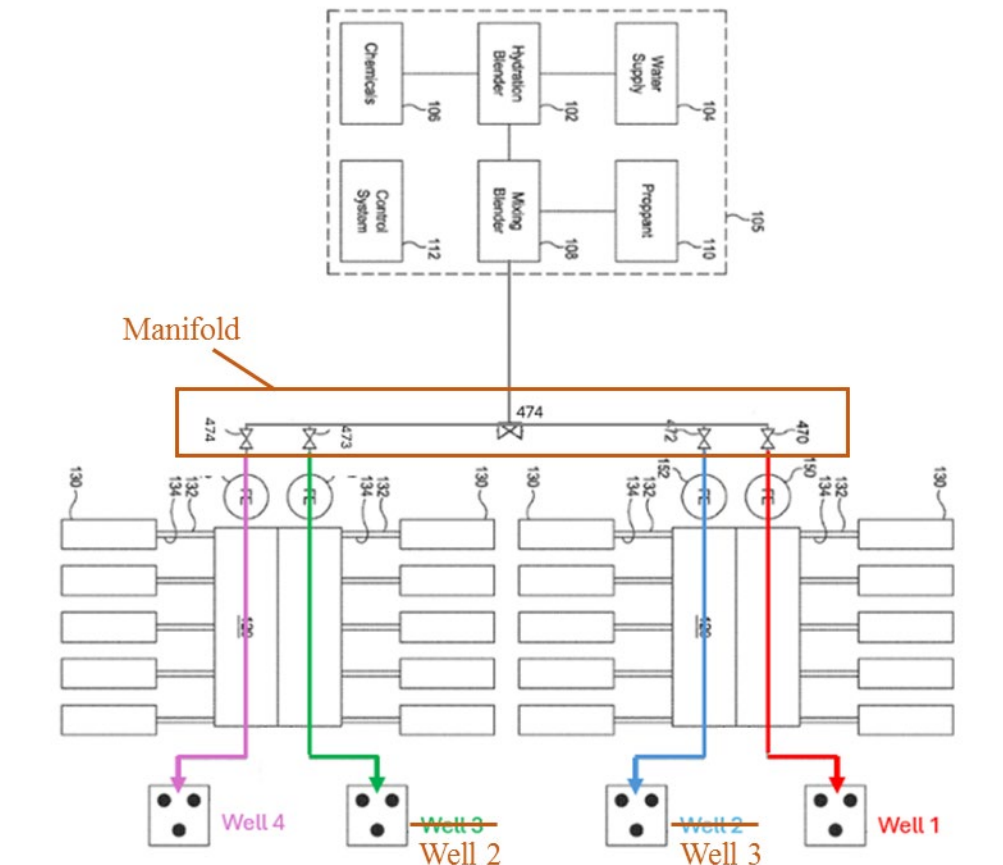
Carr discloses the ’770’s claim limitations.

B. Dependent Claims

Claims 2/15/28. Downing’s argument that Petitioner allegedly has not shown “that the same fluid feeding the first well 140 would also feed a third well, [] or that the third and fourth valves are operated “*in response*” to a fluid condition of the first isolated manifold path” (POR, 28), is without merit for the same reasons discussed regarding the independent claims. Again, the **claims do not require** “the same fluid” feeding multiple wells, nor do they require the second/fourth valve to be associated with the manifold. As also discussed, *Carr* explicitly discloses operating the valves in response to flow targets for the various wells. Pet., 53.

Downing’s argument is also belied by its own reconfiguration of *Carr*’s Figure 5 (POR, 29) (below, Petitioner’s annotations in orange), which shows that

based on *Carr*'s disclosure even Downing can envision having four wells with four flow paths, all connected by a common manifold:



Ex. 2012, ¶ 158
(annotated)

See also, 2012, ¶ 90 (Hughett defining “a manifold” as “a pipe that connects multiple other pipes in various ways.”); Ex. 1044, ¶¶ 26-27.

Although Petitioner does not agree that *Carr* is limited to this embodiment, Downing’s *Carr*-based reconfiguration shows all limitations of Claims 2/15/28. Specifically, each well has a valve associated with the manifold through which fluid

is communicated to each well, each valve is opened in response to determining that the fluid communicated via the manifold has satisfied *Carr*'s flow targets, and another one of those already-opened valves is closed after opening a subsequent valve, for the same reasons discussed with the independent claims.

Even if the manifold in Downing's drawing is limited to manifold 120, Downing's arbitrarily labeled "Well 2" could just as easily be labeled "Well 3," and Downing's configuration still meets the claim limitations because Wells 1 and 3 are associated with the same manifold, as claimed, and a POSITA would have readily understood that *Carr*'s systems and methods would be similarly applied to its more-than-two-well embodiments. Ex. 1044, ¶¶ 13-14. Thus, *Carr*'s valves in Downing's drawing (first valve 470, second valve 473, third valve 472, fourth valve 474), are operated using flow data from the wells "in light of" (*i.e.*, in response to) flow targets for the wells, according to the "sequence" discussed above. Pet., 53; Ex. 1002, ¶ 335.

Claims 11/24/36. These dependent claims recite that the first valve and/or the second valve is a "zipper valve," which *Carr* clearly discloses/teaches. Pet., 59; Ex. 1002, ¶ 377. Downing responds by urging a new construction of "zipper valve" that, ironically, proves Petitioner's point.

According to Downing, “a ‘zipper valve’ redirects a common pressurized fluid flow between multiple wells attached to a zipper manifold,”² and a “zipper manifold” “function[s] [to] redirect[] pressurized fluid flow between the wells.” POR, 31; *citing* Ex. 2012, ¶165. Aside from the fact that neither “redirect[ion] [of] a common pressurized fluid flow” nor “zipper manifold” is anywhere in the claims, and that Downing’s “zipper valve” definition contradicts Downing’s own expert’s testimony,³ even according to Downing’s unsupported definition, *Carr*’s valves 470 and 472 are zipper valves. *See* Pet., 59; Ex. 1002, ¶¶ 377-381. *Carr*’s Fig. 5 shows valves 470 and 472 receive a common pressurized flow⁴ from the mixing blender (see line between 108 and 470) and redirect it between multiple wells (140, 142) attached to manifold 120:

² Downing also improperly relies on Schlumberger’s definition of “zipper manifold” to define the term “zipper valve.” Ex. 1044, ¶ 15.

³ Ex. 1043, 55:2-5.

⁴ As Downing’s expert admits, it was well-known in the fracturing industry that the blender mixes and pressurizes the fluid and directs it to a manifold. Ex. 2006, ¶ 91; *see also* Ex. 1044, ¶¶ 10, 19.

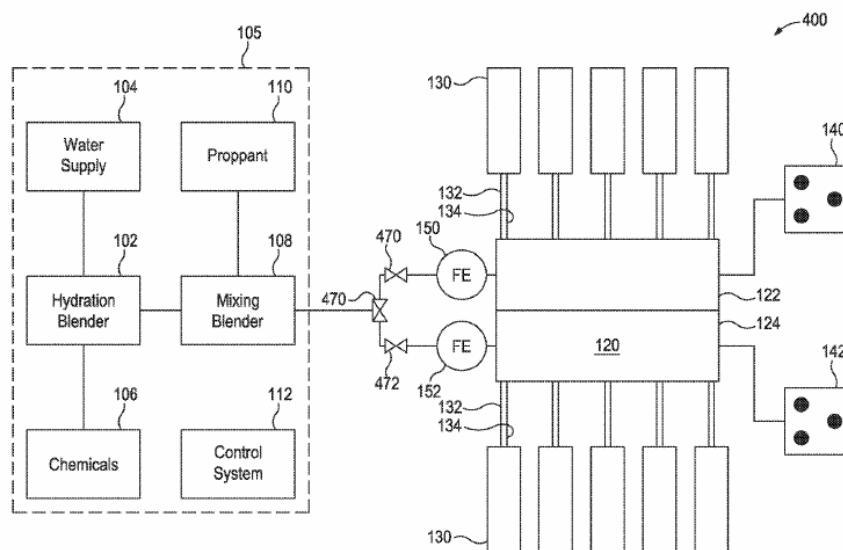


FIG. 5

See also, Ex. 1004, [0033]; Ex. 1044, ¶¶ 19, 28. Valves 470/472 and manifold 120, therefore, satisfy Downing’s zipper valve/manifold definitions.

Finally, Downing mischaracterizes Dr. Durham’s testimony (POR, 3-6, 31), which, when read in context, does *not* support Downing’s “zipper valve” arguments. Ex. 1044, ¶¶ 15-19; Ex. 2013, 62:2-22; Ex. 1002, ¶ 378.

III. CARR AND BEUTERBAUGH

Downing does not meaningfully dispute what *Beuterbaugh* and *Carr* teach.

As the Board correctly observed, pre-institution, Downing did not dispute that *Beuterbaugh* uses an overlapping valve sequence to enhance well operations or that *Carr* uses a control system to control valve sequencing in response to fluid flow targets. ID, 26-28; Pet., 63; Ex. 1002, ¶ 498. Post-institution, Downing still does

not dispute these teachings. Instead, Downing again improperly bodily incorporates *Beuterbaugh*'s pulsing method into *Carr*, rearguing (at length) that a POSITA would not use *Beuterbaugh*'s overlapping valve sequencing because *Beuterbaugh*'s and *Carr*'s fracturing systems are "different." POR, 33-39; POPR, 37-39; Ex. 1044, ¶ 31. The Board should reject Downing's arguments for the same reasons it did pre-institution.

Beuterbaugh and *Carr* are not, as Downing contends, "fundamentally different" (POR, 33-36). Ex. 1044, ¶ 30. First, both references teach the use of pumps, manifolds, and valves to direct fracturing fluid to a plurality of wells. Ex. 1002, ¶ 490. *Beuterbaugh*'s overlapping valve sequence to direct fluid between wells would therefore be entirely applicable to *Carr*'s systems/methods for controlling/operating valves to direct fluid between wells. Ex. 1002, ¶ 490; Ex. 1044, ¶¶ 28-29. That *Beuterbaugh* and *Carr* describe different locations of valves relative to the manifold (POR, 35) is of no moment. A POSITA would have readily understood that *Beuterbaugh*'s valve sequence equally applies to *Carr*'s pressurized fluid outside/within the manifold, and that both *Beuterbaugh*'s and *Carr*'s valves ultimately control and adjust the flow from a common source to one or more wells. Ex. 1002, ¶¶ 488-491; Ex. 1044, ¶¶ 28-31.

Next, Downing's assertion that *Beuterbaugh*'s benefits do not apply to *Carr* because "Carr's system does not have an 'overlap of fluid flows to each well' that

can be controlled and optimized” (POR, 37) is demonstrably wrong. First, *Carr*’s system undisputably has a common flow line (upstream of the first/second manifold valves) that is controlled and optimized to provide overlapping sequence of fluid flows to each well, as shown below and Dr. Durham testified in deposition:

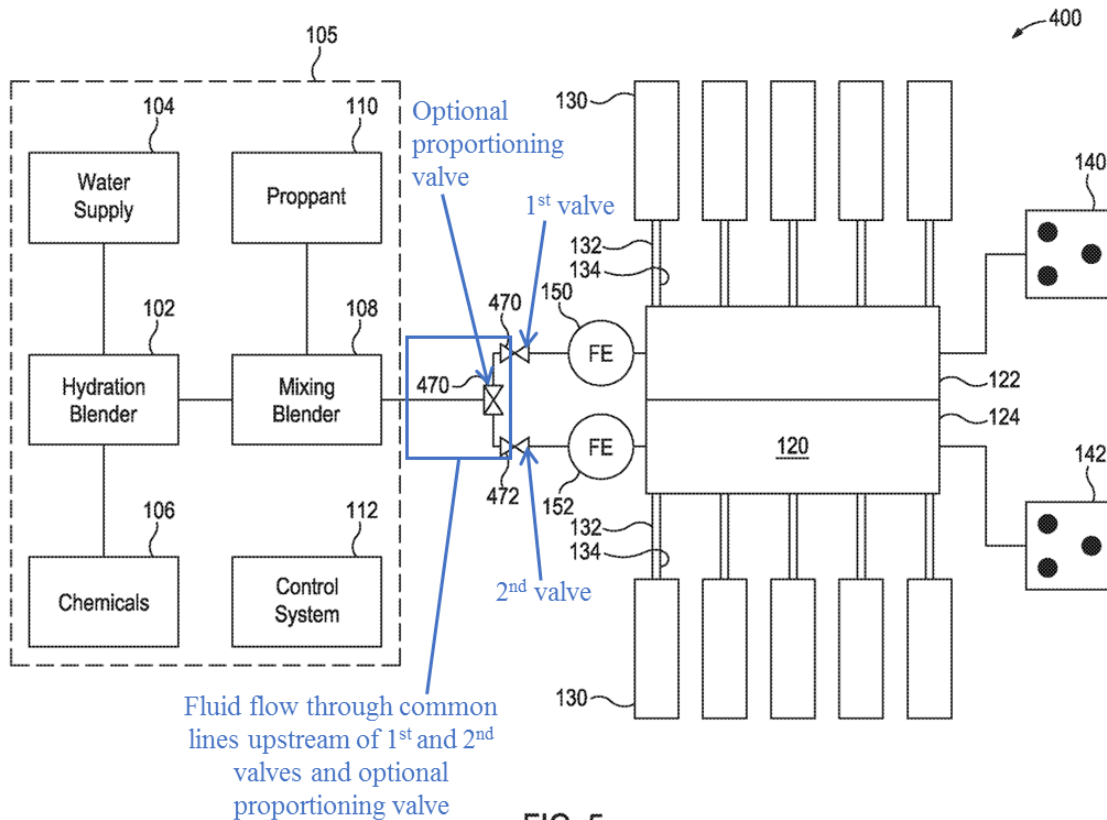
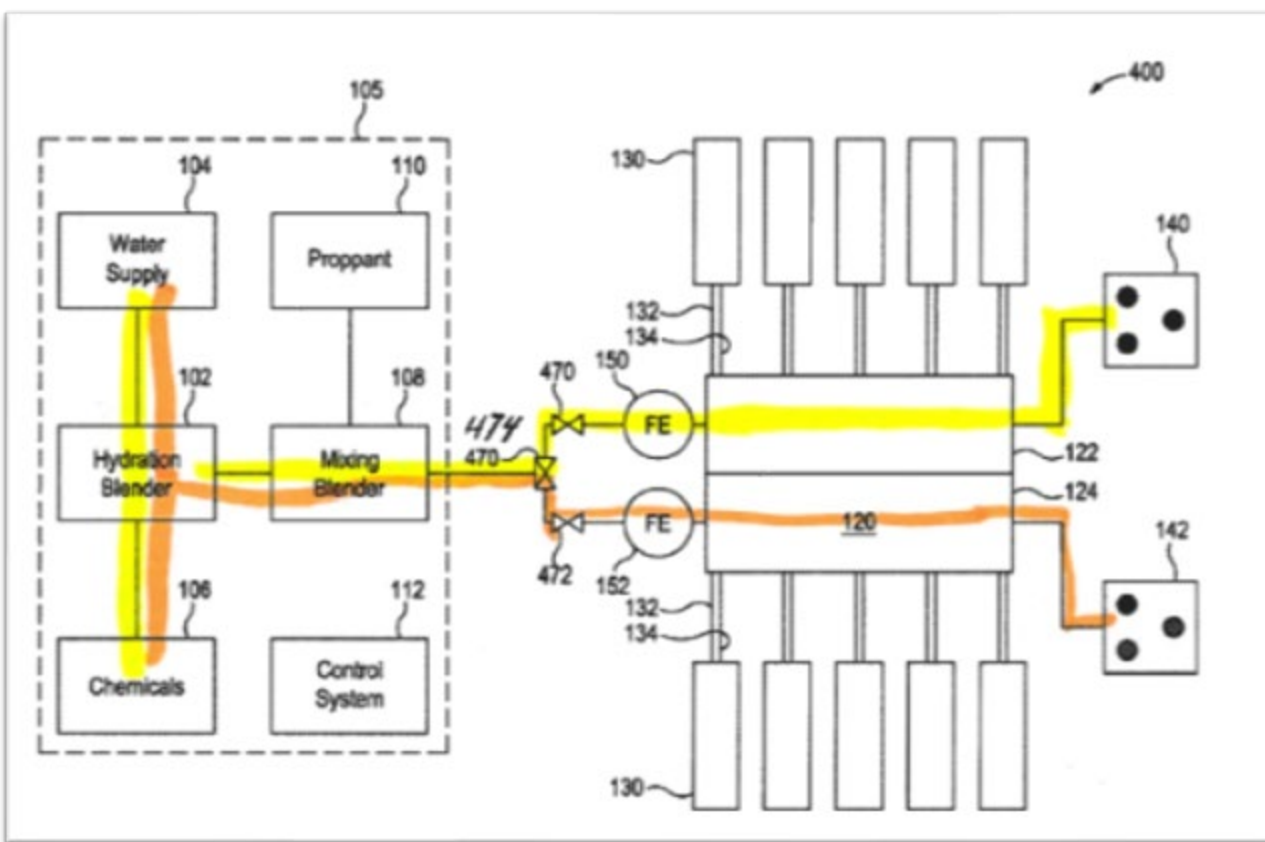


FIG. 5
(annotated)

(Ex. 1004, Fig. 4, [0032]-[0034]; Ex. 1044, ¶¶ 16-19; Ex. 2013, 75:10-79:14, 138:5-155:3);



(Exs. 2013, 138:8-155:3; 2011). Second, just as *Beuterbaugh* can control valve operation to optimize downstream flow and minimize impacts to surface equipment, *Carr*'s manifold valves can also be controlled and operated in the same overlapping sequence for the same benefits. Ex. 1002, ¶¶ 491-495; Ex. 1044, ¶¶ 28-31.

Pitched as another insurmountable difference, Downing also incorrectly claims that *Beuterbaugh* relies on running the pumps at a constant rate, while *Carr*'s methods may adjust the pump rate. POR, 38. Downing again misapprehends the references. *Carr*'s pumps may be controlled with or independently of controlling first/second valves 470/472 to control fluid flow to each well based on flowrate

targets, including operating at a constant rate. *Carr*, ¶ [0025]; Ex. 1044, ¶¶ 18-19, 29. This pump-control flexibility *allows* use of an overlapping valve sequence (such as *Beuterbaugh*'s) with *Carr*'s valves to direct fluid to first/second wells 140/142. Ex.1002, ¶¶ 491-495; Ex. 1044, ¶ 29-30.

Moreover, constant pump rate is not the enabling feature of *Beuterbaugh*'s overlapping valve sequence. *Beuterbaugh* runs its pumps “at a constant rate” and times the overlapping valve sequence to deliver a “pulse size” of fracturing fluid to each well, to allow for easy volume calculations. Ex. 1002, ¶¶ 112-113; Ex. 2013, 168:5-169:11. A POSITA would have understood that any change in the pump rate (flowrate) would impact the time required to deliver the same fluid volume. Ex. 2013, 171:23-172:13. Because *Carr* teaches that the pumps may be controlled *in addition to* operating the first/second valves to adjust the flowrate to each well, a POSITA would also have readily understood that *Beuterbaugh*'s valve sequence could be used in *Carr* to provide *Beuterbaugh*'s benefits. (Ex. 1044, ¶¶ 30-31).

Lastly, Downing recycles its *Carr* “zipper valve” arguments relating to claims 11/24/36, which fail for the same reasons discussed above. Regardless, even under Downing's definition, *Beuterbaugh*'s valves are zipper valves because, like *Carr*'s, they are coupled to a manifold and redirect fluid to different wells. Ex. 1002, ¶¶ 112, 380; *Beuterbaugh*, Fig. 2; Ex. 2013, 81:7-23; 179:18-180:3.

In sum, considering the references as a whole, *Carr* and *Beuterbaugh* render the Challenged Claims obvious. Pet., 62-69.

IV. **CARR, BEUTERBAUGH, AND JACKSON**

Downing admits that *Jackson* teaches moving between fracturing stages based on flowrate thresholds (Ex. 2012, ¶ 187), arguing only that *Jackson* is a single-well system and its teachings are, therefore, somehow inapplicable to multi-well systems. POR, 40-42. Downing's argument ignores basic obviousness principles and is meritless.

Petitioner acknowledges that *Jackson* describes a one-well system—that does not mean *Jackson*'s teachings are limited to one well. The thrust of an obviousness argument is that a POSITA, having ordinary creativity, would have understood an invention to be obvious in view of prior art teachings even though a single prior art reference may not explicitly disclose it. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007).

Jackson describes using flowrate thresholds to determine the end of a fracturing stage so an operator may transition to the next stage in one well, which Downing's expert admits. Ex. 1002, ¶ 528; Ex. 2012, ¶ 185. Fracturing is performed segment-by-segment (*i.e.*, in stages) along the length of a wellbore. Ex. 1002, ¶¶ 72, 79-80, 83-85; Ex. 1043, 18:1-19:17. In multi-well systems, it was well-known that a first stage would be performed on a first well, followed by the next stage on a

second well, followed by the next stage on the first well, and so on in a back-and-forth pattern until all stages were complete. Ex. 1002, ¶¶ 73-83. Downing's expert admits this. Ex. 1043, 18:1-19:17. A POSITA would have found it obvious to use *Jackson's* threshold teachings to determine when to switch from a first stage (first well) to the next stage (second well) in a multi-well system, because *Jackson* teaches determining the end of a stage using thresholds, regardless of stage location. Ex. 1002, ¶¶ 528-529; Ex. 1044, ¶ 32; Ex. 1043, 24:17-25:2. Applying *Jackson's* teachings to *Carr/Beuterbaugh* would only require mere duplication of process/equipment. Ex. 1044, ¶ 32.

Carr, Beuterbaugh, and Jackson teach/render obvious the claimed valve sequence in response to meeting flowrate thresholds as claimed in Claims 5/6/9/18/19/22/31/32. See, Pet., 69-70, Ex. 1002, ¶¶ 525-538.

V. **TOLMAN**

Tolman anticipates or renders obvious all Challenged Claims. Pet., 70-89. Downing's response and Downing's expert's cross-examination testimony confirm this. To begin, other than the "in response to" and "controller" limitations, Downing's expert admits that *Tolman* discloses all limitations of the independent claims. Ex. 1043, 55:19-58:21 (agreeing that *Tolman* discloses communicating fluid via a manifold and open first/second valves to first/second wells, "communicating fluid" to the second well via an open "second valve" while a flowback operation is

performed on the first well, and subsequently closing a tree valve (*i.e.*, “first valve”). Meanwhile, Downing’s response hinges on red herrings and features found nowhere in the claims.

Downing begins by criticizing *Tolman* as not teaching or suggesting “the claimed continuous pumping swap” (POR, 42), but ’770 ***does not claim*** “continuous pumping swap[s]” or “continuous pumping.” Nor does ’770 claim any other advantage that Downing argues *Tolman* doesn’t disclose. For example, the claims do not require “treatment” of two wells at a time, elimination/reduction of “non-pumping time,” or performing any operation “without requiring pumps to be shut down.” POR, 42-44. The claims merely require “communicating fluid” and “opening” and “closing” valves. While *Tolman* may treat one well at a time, it explicitly discloses concurrently performing operations on two wells while their valves are open and the *claimed* limitations, including “closing the first valve after opening the second valve.” Pet., 74-77; *see* Ex. 1002, ¶¶ 542-559.

A. “First Valve”

Downing’s lack-of-particularity argument (POR, 44-47) fails because Petitioner specifically identified multiple valves that meet the limitations of the claimed “first valve.” Pet, 72, 75-77. For example, each *Tolman* tree has multiple tree valves that meet all the limitations of the claimed “first valve.” Pet., 78; Ex. 1002, ¶¶ 544, 556-557; Ex. 1044, ¶¶ 39-42. As Downing’s expert admits, it was

well-known that tree valves included master and other valves. Ex. 1043, 48:2-54:9; Ex. 1042, ¶ 98; Ex. 2006, ¶ 98; Ex. 1038. Downing’s expert also admits it was conventionally understood that a master valve “is the ultimate valve for allowing or preventing flow into or out of the well,” and that a well is “shut-in” when the master valve is closed. Ex. 1043, 46:18-47:19; 51:6-12; Ex. 1044, ¶¶ 33-34, 38. A POSITA, therefore, 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. Ex. 1043, 46:9-17; 51:6-12; 53:21-54:9; Ex. 1044, ¶¶ 34, 37-39. At least one of *Tolman*’s “tree valves,” the master valve, is thus the claimed “first valve,” as explained in the Petition. Pet., 75-76; Ex. 1002, ¶¶ 544, 556-557; Ex. 1044, ¶ 39. That tree valve is associated with the manifold,⁵ allows communication from the manifold to the first well, and is closed (*i.e.*, shut-in) after opening the second valve (*e.g.*, a tree valve on tree 106b or manifold well valve 216) to communicate fluid for treating the second well. Pet., 72, 75-76; *Tolman*, 9:17-38; Ex. 1002, ¶¶ 552-553. Downing’s willful ignorance of the evidence is not a lack of

⁵As the Board correctly explained, Claim 1 does not require the first valve to be “part of the manifold” to qualify as a “first valve.” ID, 34. Even Downing’s expert admits the ’770’s first valve (“zipper valve”) is part of the frac leg (well tree) not the manifold. (Ex. 1043, 54:16-55:18).

particularity by Petitioner. On this record, the Board can easily discern where the claimed elements are in *Tolman*.

Downing's argument that *Tolman*'s tree valve does "not communicate fluid to the first well" (POR, 51-53) defies logic and contradicts Downing's own expert. As discussed, the first well's tree valve (*e.g.*, the master valve) is open during fracturing *and* flowback and, therefore, communicates fluid to the first well, as Downing's expert admits. (Ex. 1043, 46:1-54:9). Downing essentially argues that fluid must be communicated *to the first well* while fluid is communicated *to the second well*, but that is not required by the claims. The claims merely require closing the first valve at any time after opening the second valve, which *Tolman* explicitly discloses. Thus, that certain *Tolman* valves are closed to isolate one well from another is irrelevant. As was well-known to a POSITA (and as Downing's expert admits), at least *Tolman*'s master tree valve must be open to allow fluid communication during treatment and flowback of the first well and must be closed to shut-in the well. Ex. 1043, 46:1-54:9; Ex. 1044, ¶¶ 33-34, 37-42.

B. "Controller"

Downing's "controller/computer system controls" argument (POR, 53-54) also fails because *Tolman* does not limit its computer system/controller disclosure "exclusively to" certain valves (Claims 14/27). In the context of reducing risks associated with concurrently/simultaneously performing operations on different

wells on a single pad, *Tolman* discloses the advantages associated with using automated and processor-controlled devices in stimulation operations. Pet., 73-74; Ex. 1002 ¶¶ 628-629; 666-667; *Tolman*, 13:1-14:22. One *example* of automation *Tolman* explains is “the computer systems of the stimulation fluid pumping system 202...[that] manage the pumping stimulation treatment process for the plurality of wells 104a-104c.” Pet., 70-71, 73-74; Ex. 1002, ¶¶ 628-629; 666-667.

Although *Tolman* describes a computer system adjusting certain valves’ positions, a POSITA would have understood *Tolman*’s computer system automates and controls various stimulation operations (*e.g.*, pumping, flowback, and logistical coordination), including associated components (pumps, manifold valves, and tree valves (*e.g.*, master valve)). *Tolman*, 13:1-5; 14:3-5, 8-10; Ex. 1002, ¶¶ 628-629; 666-667.

Besides, Downing’s expert admits that it was standard for wellheads/trees to have remotely-operated upper master valves (Ex. 1043, 50:25-51:3), which were operated by controller(s) (Ex. 1044, ¶¶ 33-34). It, therefore, would have been obvious to a POSITA to use *Tolman*’s computer system to control the first tree (master) valve, as was commonly known. Pet., 70-71, 73-74; Ex. 1002, ¶¶ 628-629, 666-667; Ex. 1044, ¶¶ 35-36.

C. “In Response To”

Downing’s “in response to” arguments (POR, 54-58) also fail. *Tolman* teaches that the valve “sequence” occurs “in response to determining that the fluid communicated via the manifold has satisfied one or more conditions.” Pet., 74-75; Ex. 1002, ¶¶ 547-551. Downing again ignores the claim language to distinguish prior art. Downing argues that the Challenged Claims require performing the “entire valve sequence” in response to a “single condition or set of conditions.” POR, 54-55. This is **not claimed**. The claim language states that the sequence begins once the fluid “has satisfied one or more conditions,” which may include but is not the same as “fluid conditions.” Downing’s notion that there is “a single fluid condition or set of conditions” or that the condition for closing the first valve must be the same as the condition for opening the second valve (POR, 55) contradicts the claims’ plain language. The 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. Regardless, *Tolman* discloses the claimed “in response to” limitation in all embodiments. Pet., 77-78; Ex. 1002, ¶¶ 546-551; *Tolman*, 10:6-28.

Further, Downing’s expert admits it was conventional for operators to determine the status of and make decisions for a frac job based on (*i.e.*, in response to) monitored parameters (*i.e.*, conditions). Ex. 1043, 21:19-25:20. For example,

operators would conventionally monitor flowrate and/or other parameters to determine if the goals of a pumping plan for the frac job were being met. *Id.*, 21:19-25:20; 29:2-16. Monitored parameters (*e.g.*, flowrate) indicate the end of the frac stage if they match the pumping plan's indicated end-of-stage parameters. *Id.* It was also known to move to a next stage in a frac job when the current frac stage is ending. POR, 41; Ex. 2012, ¶¶ 185-190; Ex. 1043, 18:11-13, 23:17-21. Thus, Hughett concedes that *Tolman* discloses or renders obvious operating the valves "in response to determining ... one or more conditions."

D. Downing's Other Arguments Fail

Downing's arguments that *Tolman*'s first valve isn't closed after opening a second valve (POR, 55-56) are baseless. Ex. 1044, ¶¶ 37-42. As Petitioner explained and Downing's expert admits, *Tolman* discloses stimulating the first well when valves 210, 214, and tree valves 106a are open to communicate fluid to first well. Pet., 71-72; *Tolman*, 10:29-35; Ex. 1043, 56:17-57:7. After stimulation, the first well is flowed back, and concurrently the second well receives fracture treatment via valves 210, 216, and well tree valves 106b. Pet., 75-76; *Tolman*, 11:4-21; Ex. 1043, 57:8-58:11; Ex. 1044, ¶ 40. The first well is shut-in (tree valve closed) after opening the second well's manifold valve and tree valves for communicating fluid (fracture treatment) to the second well. Pet., 77; *Tolman*, 11:46-49; Ex. 1043, 58:12-21; Ex. 1044, ¶¶ 38-42. Whether or not flowback has started on the second

well, the first well's valve is closed (shut-in) *after opening* the second well's valve and communicating fluid to the second well via the second valve (*e.g.*, 216, 106b), as the claims require.

Downing's "two system" arguments (POR, 56-57) ignore *Tolman*'s explicit teachings. *Tolman*'s duplication of systems meets the claim limitations for the same reasons explained above and the claims simply do not require that the first and second valves be associated with the same manifold. Pet., 77. This system also anticipates a four-well system (claims 3/16/29; Pet., 80-81). Downing's argument that "Tolman teaches only a three well system" (POR 58-59) contradicts Downing's concession that "Tolman describes using two or more of the systems shown in Figure 2 at a site," (POR, 56) which would be 6 or more wells.

Downing's argument that *Tolman*'s disclosure of "injecting fluid" does not meet the "in response to" limitation fails. POR, 57. When stimulation treatment is flowing into the first well, a condition that there is fluid flow into the first well is satisfied, and a valve to the second well is opened in response to that condition. Pet., 78-79; Ex. 1002, ¶ 557.

Downing also argues that *Tolman* "expressly warns that an operator should *not* manipulate valves when stimulating a first well"—*Tolman* says no such thing. *Tolman* says it may be "*preferred*" to not concurrently manipulate certain valves during "high pressure pumping or JITP ball sealing pressure events." POR, 59;

Tolman, 13:35-40. However, the '770 claims are not limited to high pressure valve operations and the valve operations Petitioner relies on in *Tolman* are not concurrent high pressure or ball sealing events. Regardless, Petitioner relies on valve operations *as Tolman explicitly describes* them. Pet., 70-89. Further, Downing's expert has confirmed *Tolman's* valve operations. Ex. 1043, 56:17-58:21.

Downing's "threshold" argument (POR, 59-60) completely ignores the claim language and *Tolman's* explicitly described flowrate thresholds (*e.g.*, 20 bbls/minute for a desired amount of time). Pet., 81-82; Ex. 1002 ¶¶ 586-593. Contrary to Downing's assertions, the claims do not require well-by-well determinations; the claims merely recite that "the fluid communicated via the manifold" is below and/or above threshold(s). Regardless, *Tolman does* disclose flowrate thresholds for individual wells. Pet., 81-82. By singling out *Tolman's* step 318 of Figure 3, Downing ignores that *Tolman's* valve sequence occurs "after a first stimulation is completed," which is based on thresholds determined on a well *prior to* going to step 318. Pet., 81-82; Ex. 1002 ¶¶ 547-551; *Tolman* 9:16-22; 10:6-28. *Tolman* discloses/rendered obvious '770's threshold claims.

Finally, Downing does not dispute that *Tolman* discloses a zipper valve as claimed (Claims 11/24/36). POR, 42-60.

VI. SECONDARY CONSIDERATIONS

Downing has not shown any objective indicia of nonobviousness. Other than general hand-waving about the Downing “Freedom Series,” Downing provides no evidence that actually establishes a nexus between any Downing product/system and any claim of the ’770 Patent, let alone any other factor required to prove secondary considerations. *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019).

Instead of a claim limitation-by-limitation analysis, Downing touts various features its system allegedly has, such as “CP swaps,” “continuous pumping,” the ability to “transition from one well to the other,” and improvements in “continuous pumping time.” POR, 60-64, 66-69; Exs. 2020, 2023-2026. But **none** of these **are in the claims**. Nor does Downing present any evidence tying any alleged success of its Freedom Series to any claimed limitation. Ex. 1044, ¶¶ 43-44. Summarily stating that a product practices a claimed invention does not make it so.

Having offered no evidence of nexus, nexus-tied commercial success, nexus-tied industry praise, long-felt need, expert skepticism, copying/licensing, or unexpected results, Downing has not met its burden to show secondary considerations of non-obviousness in this case. *Fox Factory*, 944 F.3d at 1373. Regardless, secondary considerations cannot override a strong showing of obviousness or anticipation. *Leapfrog Enterprises, Inc. v. Fisher-Price, Inc.*, 485

F.3d 1157, 1162 (Fed. Cir. 2007); Ex. 1044, ¶ 46.

VII. KRUPA

Petitioner maintains that *Krupa* is § 102(a)(2)-prior art with an effective filing date of February 25, 2021, because it claims priority to and is fully supported by its identical U.S. Provisional App. No. 63/153,607, filed February 25, 2021,⁶ and no exceptions apply.⁷ Petitioner also maintains that *Krupa* discloses or renders obvious all Challenged Claims (Pet., 17-47), which Downing has not meaningfully disputed.

VIII. DOWNING'S EXPERT'S TESTIMONY DESERVES LITTLE WEIGHT

Because Downing's expert, Mr. Hughett, has ignored swaths of relevant evidence, made critical errors, and contradicted himself in ways that render his testimony unreliable, his testimony should be disregarded.

For example, at the outset, Mr. Hughett chose to ignore nearly twenty publications related to the state of the art that were cited and discussed by

⁶ <https://patentcenter.uspto.gov/applications/63153607/ifw/docs?application=>; Ex. 1037-1.

⁷ Neither Downing's POR nor non-withdrawn evidence submitted with Downing's POPR establishes applicability of § 102(b)(2)(B)'s exception because Downing's alleged disclosures and *Krupa*'s relied-on-disclosures are not the same. *Compare* Exs. 1003 *against* 2001-2002; *see also*, Ex. 1044, ¶ 45.

Petitioner's expert, apparently, because he thought they did not need to be examined.
Exs. 1039, 1043, 60:18-66:21.

Mr. Hughett also made several critical errors in his analysis including ignoring the teachings of references as a whole, ignoring Dr. Durham's testimony, and contradicting his own testimony in this case. Ex. 1044, ¶¶ 20-30, 37-42. Regarding *Carr*, for example, Mr. Hughett testified in his POR declaration that Petitioner did not explain how *Carr* would deploy a multi-well system, but completely ignored Petitioner's explanation and Dr. Durham's testimony on that issue, and in that same declaration Hughett himself illustrated how *Carr* could deploy a four-well system. Ex. 2012, ¶¶ 156-159; Ex. 1044, ¶¶ 26-27.

In another example, Hughett misinterpreted the *Tolman* article to say that only one well's valves can be open at a time, arguing one well's valves must be closed before opening another. Ex. 2012, ¶¶ 111, 148; Ex. 1044, ¶¶ 20-25. But the *Tolman* article makes clear that multiple wells' valves are open at the same time. Ex. 1044, ¶¶ 20-25. This makes clear that Hughett's refusal to consider all of the background information and art critically impaired his analysis, rendering his testimony unreliable.

Finally, before he became Downing's expert, Mr. Hughett tried to be retained by Petitioner. Exs. 1043, 69:9-76:20; 1040. In promoting himself to get hired for the job, Mr. Hughett represented that he testified at trial in five IP cases and in all

five cases, his side prevailed. *Id.* This was false—just three and a half years earlier, his side lost an inequitable conduct case where he testified at trial as the patent owner’s only testifying expert. Exs. 1043, 77:4-77:25; 1041. Mr. Hughett does not have hundreds of IP cases under his belt, nor did this loss occur so long ago as to be forgettable. Besides, inequitable conduct trials happen infrequently, and it is even less common for a patent to be rendered unenforceable due to inequitable conduct. Mr. Hughett’s claim that he forgot is simply not credible.

Downing’s expert’s testimony is unreliable and undeserving of any weight in this proceeding.

IX. CONCLUSION

All Challenged Claims are unpatentable.

Dated: December 9, 2024

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CERTIFICATION OF WORD COUNT UNDER 37 C.F.R. § 42.2(d)

The undersigned certifies that the foregoing Petitioner's Reply to Patent Owner's Response contains 5,587 words according to the word count of the word-processing software used to prepare the reply. This word count does not include the items excluded by 37 C.F.R. § 42.24(a).

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6, I hereby certify that a true and correct copy of the foregoing Petitioner's Reply to Patent Owner's Response was served on December 9, 2024, via email to counsel for Patent Owner at the following:

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