UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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Intelligent Wellhead Systems, Inc.
Petitioner,

v.

Downing Wellhead Equipment, LLC
Patent Owner

_____

PGR2025-00002
Patent No. 12,134,952

_____

PETITION FOR POST-GRANT REVIEW OF U.S. PATENT NO. 12,134,952

("ABBREVIATED PETITION")

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Exhibit 1004	U.S. Patent No. 11,560,770 ("'770 Patent") and Prosecution History
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Exhibit 1012	Pre-litigation letter from IWS to Downing, dated Oct. 6, 2022

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Exhibit 1013	Downing's Supplemental Objections and Responses to IWS's First Set of Interrogatories in the Litigation, dated Dec. 15, 2023
Exhibit 1014	Order on Administrative Closing of The Litigation, dated Oct. 21, 2024
Exhibit 1015	Excerpts of Downing's Patent Owner Preliminary Response in *Inter Partes* Review of U.S. Patent No. 11,401,779 (*Intelligent Wellhead Systems, Inc. v. Downing Wellhead Equipment, LLC*, IPR2024-00256, Paper 9)
Exhibit 1016	Excerpts of Downing's Patent Owner Preliminary Response in *Inter Partes* Review of U.S. Patent No. 11,560,770 (*Intelligent Wellhead Systems, Inc. v. Downing Wellhead Equipment, LLC*, IPR2024-00300, Paper 8)
Exhibit 1017	Excerpt from Evans, Harry B.; "Water Distribution in Ancient Rome: The Evidence of Frontinus", University of Michigan Press, (Introduction pages 1-12) 1997
Exhibit 1018	U.S. Pub. No. US2021/0025267 A1 by Christie *et al.* entitled "Coordinated Pumping Operations" published January 28, 2021 ("*Christie*")
Exhibit 1019	Christie Provisional, entitled "Coordinated Pumping Operations," filed July 24, 2019 ("*Christie* Provisional")
Exhibit 1020	U.S. Publication 2020/0149389 A1 by Al-Salmani *et al.*, entitled "Surface Completion System for Operations and Monitoring," published May 14, 2020 ("*Al-Salmani*")
Exhibit 1021	U.S. Publication 2014/0352968 A1 by Pitcher *et al.*, entitled "Multi-Well Simultaneous Fracturing System," published December 4, 2014 ("*Pitcher*")

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Exhibit 1022	U.S. Patent Publication 2022/0268141 A1 by Andrew Krupa *et al.* entitled "System and Method for an Automated and Intelligent Frac Pumping," filed February 18, 2022, ("*Krupa*") (claiming priority to identical provisional (U.S. Provisional No. 63/153,607) filed February 25, 2021).
Exhibit 1023	U.S. Provisional No. 63/153,607, filed February 25, 2021, entitled "System and Method for an Automated and Intelligent Frac Pumping" ("*Krupa Provisional*")
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Exhibit 1037	Jacobs, Trent. "The Shale Evolution: Zipper Fracture Takes Hold," J Pet Technol 66 (2014): 60–67 (*available at* https://doi.org/10.2118/1014-0060-JPT)
Exhibit 1038	Video titled "Riglock: The Industry's First and Only Hands-Free Wellhead Connection," dated July 16, 2019 ("*RigLock Video*")
Exhibit 1039	Wayback Machine Affidavit of Nathaniel E Frank-White, dated July 6, 2024, Authenticating *RigLock Video*
Exhibit 1040	Michael Morton, "Unlocking the Earth: A Short History of Hydraulic Fracturing," GEO ExPro, Vol. 10, No. 6, December 2013 (*available at* https://geoexpro.com/unlocking-the-earth-a-short-history-of-hydraulic-fracturing/) (last accessed November 30, 2023)

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Exhibit 1042	Carl T. Montgomery and Michael B. Smith, "Hydraulic Fracturing: History of an Enduring Technology," *Journal of Petroleum Technology*, Vol. 62, Issue 12 (Dec. 2010)
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Exhibit 1044	Excerpt from Vassiliou, M. S., Historical Dictionary of the Petroleum Industry, Rowman & Littlefield (2018) (pages xxv-xliii, 146-149, 174-175, 186-187)
Exhibit 1045	U.S. Patent Application Publication No. 2013/0306322 to Sanborn *et al.*, entitled "System and Process for Extracting Oil and Gas by Hydraulic Fracturing," published November 21, 2013 ("*Sanborn*")
Exhibit 1046	U.S. Patent Publication No. 2012/0255734 to Coli *et al.* entitled "Mobile, Modular, Electrically Powered System for Use in Fracturing Underground Formations," published October 11, 2012 ("*Coli*")
Exhibit 1047	Waters, George, Dean, Barry, Downie, Robert, Kerrihard, Ken, Austbo, Lance, and Bruce McPherson, "Simultaneous Hydraulic Fracturing of Adjacent Horizontal Wells in the Woodford Shale," Paper presented at the SPE Hydraulic Fracturing Technology Conference, The Woodlands, Texas, January 2009 (*available at* https://doi.org/10.2118/119635-MS) ("*Waters*")
Exhibit 1048	Pearson, C.M., Bond, A.J., Eck, M.E., and J.H. Schmidt. "Results of Stress-Oriented and Aligned Perforating in Fracturing Deviated Wells." J Pet Technol 44 (1992): 10–18 (*available at* https://doi.org/10.2118/22836-PA) (*"Pearson*")

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Exhibit 1049	Mutalik, P N, and Bob Gibson. "Case History of Sequential and Simultaneous Fracturing of the Barnett Shale in Parker County." Paper presented at the SPE Annual Technical Conference and Exhibition, Denver, Colorado, USA, September 2008 (*available at* https://doi.org/10.2118/116124-MS) ("*Mutalik*")
Exhibit 1050	Mayerhofer, M. J., Lolon, E. P., Warpinski, N. R., Cipolla, C. L., Walser, D., and C. M. Rightmire. "What is Stimulated Reservoir Volume (SRV)?" Paper presented at the SPE Shale Gas Production Conference, Fort Worth, Texas, USA, November 2008 (*available at* https://doi.org/10.2118/119890-MS) ("*Mayerhofer*")
Exhibit 1051	Roussel, Nicolas P., and Mukul M. Sharma. "Optimizing Fracture Spacing and Sequencing in Horizontal-Well Fracturing." SPE Prod & Oper 26 (2011): 173–184 (*available at* https://doi.org/10.2118/127986-PA) ("*Roussel*")
Exhibit 1052	K. R. Webster, W. C. Goins, Jr., and S. C. Berry, "A Continuous Multistage Tracing Technique," *Journal of Petroleum Technology,* vol. 17, no. 06, pp. 619-625, 1965 (*available at* https://doi.org/10.2118/977-PA) ("*Webster*")
Exhibit 1053	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 *SPE International Symposium and Exhibition on Formation Damage Control*, 2008, vol. All Days (*available at* https://doi.org/10.2118/112442-MS) ("*Casero*")
Exhibit 1054	S. Rassenfoss, "A Look Into What Fractures Really Look Like," *Journal of Petroleum Technology,* vol. 70, no. 11, pp. 28-36, 2018 (*available at* https://doi.org/10.2118/1118-0028-jpt) ("*Rassenfoss*")
Exhibit 1055	R. Oberhofer, "Application of Ball-Drop Technology to Improve Efficiency and Stimulation of Limited Entry Completion Systems," in *Abu Dhabi International Petroleum Exhibition & Conference*, 2016, vol. Day 2 Tue, November 08, 2016 (*available at* https://doi.org/10.2118/183427-MS) ("*Oberhofer*")

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Exhibit 1056	Tolman, R. C., *et al.* (2009), "Method and Apparatus for Simultaneous Stimulation of Multi-Well Pads," SPE Hydraulic Fracturing Technology Conference ("*Tolman Article*").
Exhibit 1057	G. R. Holzhausen and R. P. Gooch, "Impedance of Hydraulic Fractures: Its Measurement and Use for Estimating Fracture Closure Pressure and Dimensions," in *SPE/DOE Low Permeability Gas Reservoirs Symposium*, 1985, vol. All Days (*available at* https://doi.org/10.2118/13892-MS) ("*Holzhausen*")
Exhibit 1058	R. W. Paige, L. R. Murray, and J. D. M. Roberts, "Field Application of Hydraulic Impedance Testing for Fracture Measurement," *SPE Production & Facilities,* vol. 10, no. 01, pp. 7-12, 1995 (*available at* https://doi.org/10.2118/26525-pa) ("*Paige*").
Exhibit 1059	L. V. Massaras, A. Dragomir, and D. Chiriac, "Enhanced Fracture Entry Friction Analysis of the Rate Step-Down Test," in *SPE Hydraulic Fracturing Technology Conference*, 2007, vol. All Days (*available at* https://doi.org/10.2118/106058-MS) ("*Massaras*")
Exhibit 1060	S. Mondal, "Pressure transients in wellbores: Water hammer effects and implications for fracture diagnostics," 2010 ("*Mondal*")
Exhibit 1061	*Christie*/*Christie Provisional* Citation Correlation
Exhibit 1062	Excerpts of Downing's Patent Owner Response in *Inter Partes* Review of U.S. Patent No. 11,560,770 (*Intelligent Wellhead Systems, Inc. v. Downing Wellhead Equipment, LLC*, IPR2024-00300, Paper 20)

TABLE OF CLAIMS

CLAIM / LIMITATION	CLAIM LANGUAGE
1.1	A method of hydraulically fracturing a plurality of wells, the plurality of wells comprising first and second wells, the method comprising:
1.2	communicating fluid from one or more pumps to the first well via a manifold and a first valve, wherein the first valve is associated with both the first well and the manifold so that the first valve is: in fluid communication with the manifold; and fluidically positioned between the first well and the one or more pumps; and
1.3	executing a continuous pumping ("CP") swap to transition from hydraulically fracturing the first well to hydraulically fracturing the second well, the CP swap comprising:
1.3.1	opening a second valve while fluid is communicated from the one or more pumps to the first well via the first valve and the manifold, wherein the second valve is associated with both the second well and the manifold so that the second valve is: in fluid communication with the manifold; and fluidically positioned between the second well and the one or more pumps from which fluid is communicated to the first well via the manifold and the first valve, wherein opening the second valve causes fluid to be communicated from the one or more pumps to the second well via the manifold and the second valve, and
1.3.2	wherein the second valve is opened in response to at least a portion of fluid communicated via the manifold satisfying one or more conditions, which one or more conditions include a flow rate, and/or a pressure, of the at least a portion of fluid communicated via the manifold; and

CLAIM / LIMITATION	CLAIM LANGUAGE
1.3.3	closing the first valve: after the at least a portion of fluid communicated via the manifold has satisfied the one or more conditions, which one or more conditions include the flow rate, and/or the pressure, of the at least a portion of fluid communicated via the manifold, and
1.3.4	while fluid is communicated from the one or more pumps to the second well via the second valve and the manifold;
1.4	wherein, during the CP swap, fluid is continuously communicated from the one or more pumps via the manifold.
20.1	A non-transitory computer readable medium having stored thereon computer-readable instructions executable by one or more processors to perform operations for hydraulically fracturing a plurality of wells, the plurality of wells comprising first and second wells, the operations comprising:
20.2	communicating fluid from one or more pumps to the first well via a manifold and a first valve, wherein the first valve is associated with both the first well and the manifold so that the first valve is: in fluid communication with the manifold; and fluidically positioned between the first well and the one or more pumps;
20.3	executing a continuous pumping ("CP") swap to transition from hydraulically fracturing the first well to hydraulically fracturing the second well, the CP swap comprising:
20.3.1	opening a second valve while fluid is communicated from the one or more pumps to the first well via the first valve and the manifold, wherein the second valve is associated with both the second well and the manifold so that the second valve is: in fluid communication with the manifold; and fluidically positioned between the second well and the one or more

CLAIM / LIMITATION	CLAIM LANGUAGE
	pumps from which fluid is communicated to the first well via the manifold and the first valve; wherein opening the second valve causes fluid to be communicated from the one or more pumps to the second well via the manifold and the second valve, and
20.3.2	wherein the second valve is opened in response to at least a portion of fluid communicated via the manifold satisfying one or more conditions, which one or more conditions include a flow rate, and/or a pressure, of the at least a portion of fluid communicated via the manifold; and
20.3.3	closing the first valve: after the at least a portion of the fluid communicated via the manifold has satisfied the one or more conditions, which one or more conditions include the flow rate, and/or the pressure, of the at least a portion of fluid communicated via the manifold, and
20.3.4	while fluid is communicated from the one or more pumps to the second well via the second valve and the manifold;
20.4	wherein, during the CP swap, fluid is continuously communicated from the one or more pumps via the manifold.
39.1	A system for hydraulically fracturing a plurality of wells, the plurality of wells comprising first and second wells, the system comprising:
39.2	a manifold via which fluid is adapted to be communicated from one or more pumps;
39.3	a first valve via which fluid is adapted to be communicated from the one or more pumps to the first well, the first valve being associated with both the first well and the manifold so that the first valve is: in fluid communication with the

CLAIM / LIMITATION	CLAIM LANGUAGE
	manifold; and fluidically positioned between the first well and the one or more pumps;
39.4	a second valve via which fluid is adapted to be communicated the one or more pumps to the second well, the second valve being associated with both the second well and the manifold so that the second valve is: in fluid communication with the manifold; and fluidically positioned between the second well and the one or more pumps from which fluid is adapted to be communicated to the first well via the manifold and the first valve; and
39.5	one or more controllers configured to execute a continuous pumping ("CP") swap, during which CP swap fluid is continuously communicated via the manifold, to transition from hydraulically fracturing the first well to hydraulically fracturing the second well, by:
39.5.1	opening the second valve: while fluid is communicated from the one or more pumps to the first well via the first valve and the manifold, to cause fluid to be communicated from the one or more pumps to the second well via the manifold and the second valve, and
39.5.2	in response to at least a portion of fluid communicated via the manifold satisfying one or more conditions, which one or more conditions include a flow rate, and/or a pressure, of the at least a portion of fluid communicated via the manifold; and
39.5.3	closing the first valve: after the at least a portion of fluid communicated via the manifold has satisfied one or more conditions, which one or more conditions include the flow rate, and/or the pressure, of the at least a portion of fluid communicated via the manifold, and

CLAIM / LIMITATION	CLAIM LANGUAGE
39.5.4	while fluid is communicated from the one or more pumps to the second well via the second valve and the manifold.
58.1	A method of hydraulically fracturing a plurality of wells, the plurality of wells comprising first and second wells, the method comprising:
58.2	communicating fluid from the one or more pumps to the first well via a manifold and a first valve, wherein the first valve is associated with both the first well and the manifold so that the valve is: in fluid communication with the manifold; and fluidically positioned between the first well and the one or more pumps;
58.3	displaying a dashboard, which dashboard comprises:
58.3.1	a visual reference of the first valve;
58.3.2	a first visual indicator associated with the visual reference of the first valve, the first visual indicator indicating that a state of the first valve is open to permit communicating fluid to the first well via the manifold and the first valve;
58.3.3	a visual reference of a second valve,
58.3.4	wherein the second valve is associated with both the second well and the manifold so that the second valve is: in fluid communication with the manifold; and fluidically positioned between the second well and the one or more pumps from which fluid is communicated to the first well via the manifold and the first valve; and
58.3.5	a second visual indicator associated with the visual reference of the second valve, the second visual indicator being different from the first visual indicator to indicate that a state of the second valve is closed; and

CLAIM / LIMITATION	CLAIM LANGUAGE
58.4	executing a continuous pumping ("CP") swap to transition from hydraulically fracturing the first well to hydraulically fracturing the second well, the CP swap comprising:
58.4.1	opening the second valve while fluid is communicated from the one or more pumps to the first well via the first valve and the manifold, wherein opening the second valve causes fluid to be communicated from the one or more pumps to the second well via the manifold and the second valve, and
58.4.2	wherein the second valve is opened in response to at least a portion of fluid communicated via the manifold satisfying one or more conditions; and
58.4.3	closing the first valve: after the at least a portion of fluid communicated via the manifold has satisfied the one or more conditions,
58.5	wherein the display of the dashboard visually communicates the respective states of the first and second valves; and
58.6	wherein fluid is continuously communicated via the manifold during the CP swap.
65.1	A non-transitory computer readable medium of hydraulically fracturing a plurality of wells, the plurality of wells comprising first and second wells, the method comprising:
65.2	communicating fluid from one or more pumps to the first well via a manifold and a first valve, wherein the first valve is associated with both the first well and the manifold so that the first valve is: in fluid communication with the manifold; and fluidically positioned between the first well and the one or more pumps;
65.3	displaying a dashboard, which dashboard comprises:

CLAIM / LIMITATION	CLAIM LANGUAGE
65.3.1	a visual reference of the first valve;
65.3.2	first visual indicator associated with the visual reference of the first valve, the first visual indicator indicating that a state of the first valve is open to permit communicating fluid to the first well via the manifold and the first valve;
65.3.3	a visual reference of a second valve,
65.3.4	wherein the second valve is associated with both the second well and the manifold so that the second valve is: in fluid communication with the manifold; and fluidically positioned between the second well and the one or more pumps from which fluid is communicated to the first well via the manifold and the first valve; and
65.3.5	a second visual indicator associated with the visual reference of the second valve, the second visual indicator being different from the first visual indicator to indicate that a state of the second valve is closed; and
65.4	executing a continuous pumping ("CP") swap to transition from hydraulically fracturing the first well to hydraulically fracturing the second well, the CP swap comprising:
65.4.1	opening the second valve while fluid is communicated from the one or more pumps to the first well via the first valve and the manifold, wherein opening the second valve causes fluid to be communicated from the one or more pumps to the second well via the manifold and the second valve, and
65.4.2	wherein the second valve is opened in response to at least a portion of fluid communicated via the manifold satisfying one or more conditions; and

CLAIM / LIMITATION	CLAIM LANGUAGE
65.4.3	closing the first valve: after the at least a portion of fluid communicated via the manifold has satisfied the one or more conditions;
65.5	wherein the display of the dashboard visually communicates the respective states of the first and second valves; and
65.6	wherein fluid is continuously communicated via the manifold during the CP swap.
72.1	A system for hydraulically fracturing a plurality of wells, the plurality of wells comprising first and second wells, the system comprising:
72.2	a manifold via which fluid is adapted to be communicated from one or more pumps;
72.3	a first valve via which fluid is adapted to be communicated from the one or more pumps to the first well, the first valve being associated with both the first well and the manifold so that the first valve is: in fluid communication with the manifold; and fluidically positioned between the first well and the one or more pumps;
72.4	a second valve via which fluid is adapted to be communicated from the one or more pumps to the second well, the second valve being associated with both the second well and the manifold so that the second valve is: in fluid communication with the manifold; and fluidically positioned between the second well and the one or more pumps from which fluid is adapted to be communicated to the first well via the manifold and the first valve;
72.5	a dashboard adapted to be displayed, which dashboard comprises:

CLAIM / LIMITATION	CLAIM LANGUAGE
72.5.1	a visual reference of the first valve;
72.5.2	a first visual indicator associated with the visual reference of the first valve, the first visual indicator indicating that a state of the first valve is open to permit communicating fluid to the first well via the manifold and the first valve;
72.5.3	a visual reference of the second valve; and
72.5.4	a second visual indicator associated with the visual reference of the second valve, the second visual indicator being different from the first visual indicator to indicate that a state of the second valve is closed; and
72.6	one or more controllers configured to execute a continuous pumping ("CP") swap, during which CP swap fluid is continuously communicated via the manifold, to transition from hydraulically fracturing the first well to hydraulically fracturing the second well, by:
72.6.1	opening the second valve: while fluid is communicated from the one or more pumps to the first well via the first valve and the manifold,
72.6.2	in response to at least a portion of fluid communicated via the manifold satisfying one or more conditions, and
72.6.3	to cause fluid to be communicated from the one or more pumps to the second well via the manifold and the second valve; and
72.6.4	closing the first valve: after the at least a portion of fluid communicated via the manifold has satisfied the one or more conditions;

CLAIM / LIMITATION	CLAIM LANGUAGE
72.7	wherein the display of the dashboard visually communicates the respective states of the first and second valves.

Intelligent Wellhead Systems, Inc. ("IWS"/"Petitioner") requests post grant review (PGR) of Claims 1, 20, 39, 58, 65, and 72 ("Challenged Claims") of Downing Wellhead Equipment, LLC's ("Downing's"/"Patent Owner's") U.S. Patent No. 12,134,952 ("'952 Patent"/"'952") (Ex. 1001) because they are unpatentable under 35 U.S.C. §§ 101, 112, 132, and 102/103.

I. INTRODUCTION

The '952 Patent exemplifies what can happen when patent-drafting tactics out-run substance and well-established patent law. Marked by overly-complicated sprawling family trees of patents, Downing's patent portfolio is littered with patents that, despite the impression of sophistication that specifications with 60+ pages of written description and drawings might give, merely cover basic abstract concepts in standard, conventional, and routine oil and gas operations. One such patent, '952, suffers several fatal flaws discussed in this Petition.

Since the beginning of multi-well oil and gas operations, operators have observed conditions on well sites, determined what conditions were or were not satisfied, and decided whether/when to open and/or close valves based on those determinations. If an operator wants to move fluid from one well to another, for example, the operator must first determine if there is sufficient fluid flow to go to the second well, and if there is, then the operator can open the valve to the second well. Operators have carried out that abstract concept in their minds for decades.

And, for just as long, operators have transitioned fluid from one well to another by opening one valve, then another, before closing the first valve. That is all the '952 Patent covers. Because the Challenged Claims merely cover this abstract idea carried out in an environment of standard conventional equipment, they are directed to patent-ineligible subject matter under § 101.

Even if they survive the § 101 hurdle, however, '952's Claims suffer from a second fatal flaw: they lack written support and include impermissible new matter that Downing introduced for the first time in post-allowance amendments. Finally, the prior art also describes '952's claimed well-known concept carried out by standard conventional equipment.

In sum, the Challenged Claims are unpatentable and should be cancelled because (1) they merely cover the well-known abstract idea of determining conditions to decide when to open/close valves in multi-well operations (§ 101), (2) they all lack required written support and impermissibly include new matter (§§ 112(a) and 132(a)), and (3) they are anticipated/rendered obvious by prior art (§§ 102/103).

II. MANDATORY NOTICES

A. REAL PARTIES-IN-INTEREST

Intelligent Wellhead Systems, Corp., IWS USA Corp., and Pason Systems Corp. are real parties-in-interest.

B. RELATED MATTERS

To the best of Petitioner's knowledge, the '952 Patent has not yet been involved in any legal proceeding; however, it is related to U.S. Patent No. 11,560,770 ("'770 Patent"/"'770"), and its parent, U.S. Patent No. 11,401,779 ("'779 Patent"/"'779"), which are involved in the following proceedings:

1. *Downing Wellhead Equipment, LLC v. Intelligent Wellhead Systems, Inc.*, *et al.*, No. 1:23-cv-01180-RMR-SP (D. Colo.) ("the Litigation") involving both the '770 and '779 Patents. Ex. 1011. On October 21, 2024, the district court administratively closed the Litigation pending the completion of IPR2024-00300, involving the '770 Patent. Ex. 1014.

2. *Intelligent Wellhead Systems, Inc. v. Downing Wellhead Equipment, LLC*, Case No. IPR2024-00256, before the Board, involving the '779 Patent. Institution was denied.

3. *Intelligent Wellhead Systems, Inc. v. Downing Wellhead Equipment, LLC*, Case No. IPR2024-00300, before the Board, involving the '770 Patent. The

Board instituted trial on June 10, 2024. The Final Written Decision is due June 10, 2025.

4. *Intelligent Wellhead Systems, Inc. v. Downing Wellhead Equipment, LLC*, Case No. IPR2024-00583, involving the '779 Patent, institution denied.

5. *Intelligent Wellhead Systems, Inc. v. Downing Wellhead Equipment, LLC*, Case No. IPR2024-00584, involving the '770 Patent, institution denied.

C. LEAD AND BACKUP COUNSEL

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D. SERVICE INFORMATION

Papers concerning this matter should be served on Lead and Back-up counsel. Petitioner consents to service by email at OBWB-IWS-Downing@obwb.com.

III. GROUNDS FOR STANDING

Petitioner certifies that '952 is available for PGR (the earliest filing date in '952's family, December 14, 2017, is after AIA's effective date); and Petitioner is not barred/estopped from requesting PGR on the identified grounds.

IV. IDENTIFICATION OF CHALLENGE

The Claims should be cancelled as unpatentable under post-AIA[1] 35 U.S.C. §§ 101, 102, 103, 112, and 132 on these grounds:

GROUND(S)	CHALLENGED CLAIMS (1-78)	35 U.S.C. §	BASIS
1	All	§ 101	Patent-ineligible
2	All	§§ 112/132	Lack of Written Description and New Matter
3	1, 20, 39	§§ 112/132	Lack of Written Description and New Matter
4	59, 65, 72	§§ 112/132	Lack of Written Description and New Matter
5	All	§ 103	*Christie*
6	All	§ 103	*Christie, Pitcher,* and *Al-Salmani*
7-8	All	§§ 102/103	*Krupa*
9	All	§103	*Krupa, FS-Video*, and *Al-Salmani*

[1] The earliest effective filing date of '952 is after 2013.

Dr. Robert Durham's Declaration (Ex. 1002) provides additional explanation and support. 37 C.F.R. § 42.104(b)(1); Ex. 1002, ¶¶ 1-48, 71-73.

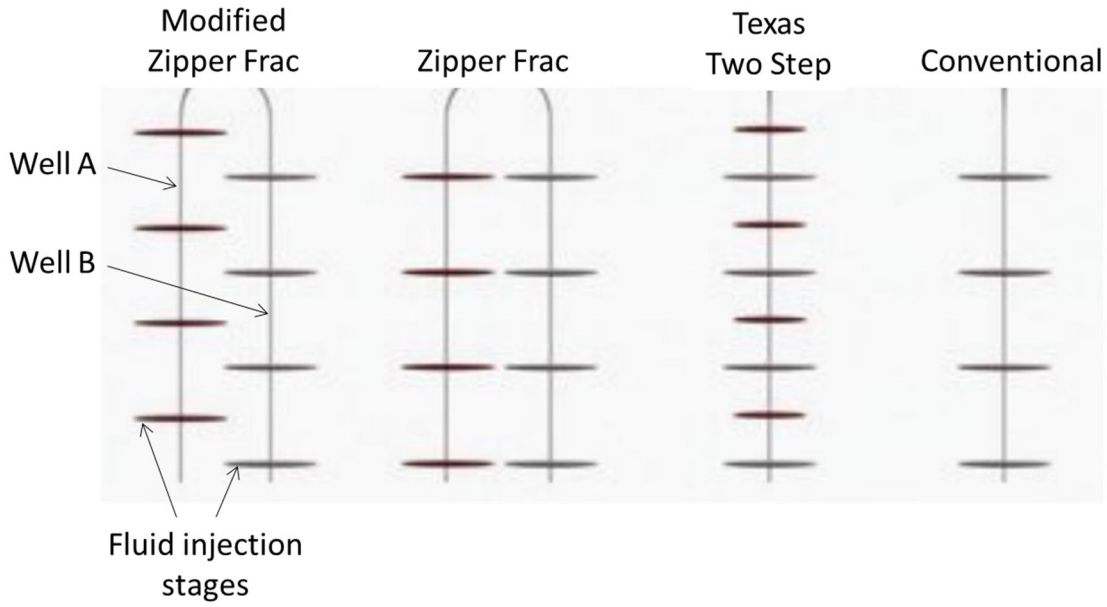
V. TECHNOLOGY BACKGROUND

Hydraulic fracturing is a commonly-performed oil and gas operation in which operators operate valves to direct pumped/high-pressure fluid (also known as "frac fluid") into wells to fracture the formation around the well to increase hydrocarbon recovery. Ex. 1002, ¶¶ 66-77, 81; *see also*, Exs. 1036-1060.

Hydraulic fracturing jobs use several well-service systems at a wellsite to stimulate/fracture wellbore sections at a time, referred to as stages. Ex. 1018, ¶ [0004]. Between each fracturing stage, operators use pumping and wireline operations (*e.g.*, pump-down and perforating operations) to isolate and perforate the wellbore in preparation for the next fracturing stage. *Id.*

These fracturing operations/systems use various well services and equipment that focus on different objectives, and which may be coordinated by different companies. *Id.*, ¶ [0005]. When multi-well pads are constructed to allow stimulation of multiple wellbores in parallel with the same well-servicing equipment (to save time and money), completion jobs become more challenging. *Id.* Coordination and communication between well service companies results in efficiencies, which means more hours of active pumping per day, and less time and money spent. *Id.*

To save time/money, operators began "zipper fracturing" (simultaneously/sequentially fracturing multiple wells) in the 1980s. Ex. 1002, ¶¶ 78-80. Zipper fracturing fluidly grouped multiple adjacent wells at the surface by sharing pumps, manifolds, and other equipment. *Id.* By 2014, zipper fracturing was widespread, as shown in this annotated illustration of well completion plans depicting multiple techniques/variations of alternating fluid into wells:



Id., ¶¶ 81-90; Ex. 1037, 61.

"Continuous pumping" ("CP") generally refers to pumping fluid to treat multiple stages and/or wells simultaneously/sequentially without stopping the pumps. Ex. 1002, ¶¶ 91-110. Different stages of fracturing operations can transition from one well to another "while pumping operations continue uninhibited" by using

control systems to remotely operate the fracturing system valves and/or equipment. Ex.1038.

CP has long been used to meet overall goals of reducing non-productive time (NPT) at the wellsite and reducing wear/damage to high-pressure pumps and valves. Ex. 1002, ¶ 91. Closing valves during high-flow conditions creates extreme pressure increases, which could damage equipment and/or cause catastrophic system failure. *Id*., ¶¶ 76, 94-99. Responsive and preventative measures, such as reducing flowrate between fracturing stages, have been commonly used to allow frac job execution. *Id*. For years, operators have also known to open a second well for CP only if there is sufficient flow to support two-well operation, but not so much flow to blow a valve or damage the system. *Id.*, *see also,* ¶¶ 100-105, 117.

The '952 Patent purportedly claims determining generic "conditions" and responsively opening and closing standard conventional valves in standard conventional hydraulic fracturing operations—an abstract idea humans have performed in their minds since such operations began, and that is well documented in the prior art, as shown in this Petition.[2]

[2] *See also*, Ex. 1002, 1061-1062.

VI. PERSON OF ORDINARY SKILL IN THE ART

A POSITA as of '952's priority date would have had an engineering degree and two or more years' well-related operations experience, or equivalent education/experience. Ex. 1002, ¶ 61.

VII. '952 OVERVIEW

A. SUMMARY

Downing filed '952's application after accusing IWS of infringing '952's grandparent patent and after IWS informed Downing that IWS's systems do not infringe because, among other reasons, they do not measure flowrate. Ex. 1012.

Titled "Hydraulic Fracturing Plan and Execution of Same," '952 describes conventional, routine, and well-known hydraulic fracturing operations:

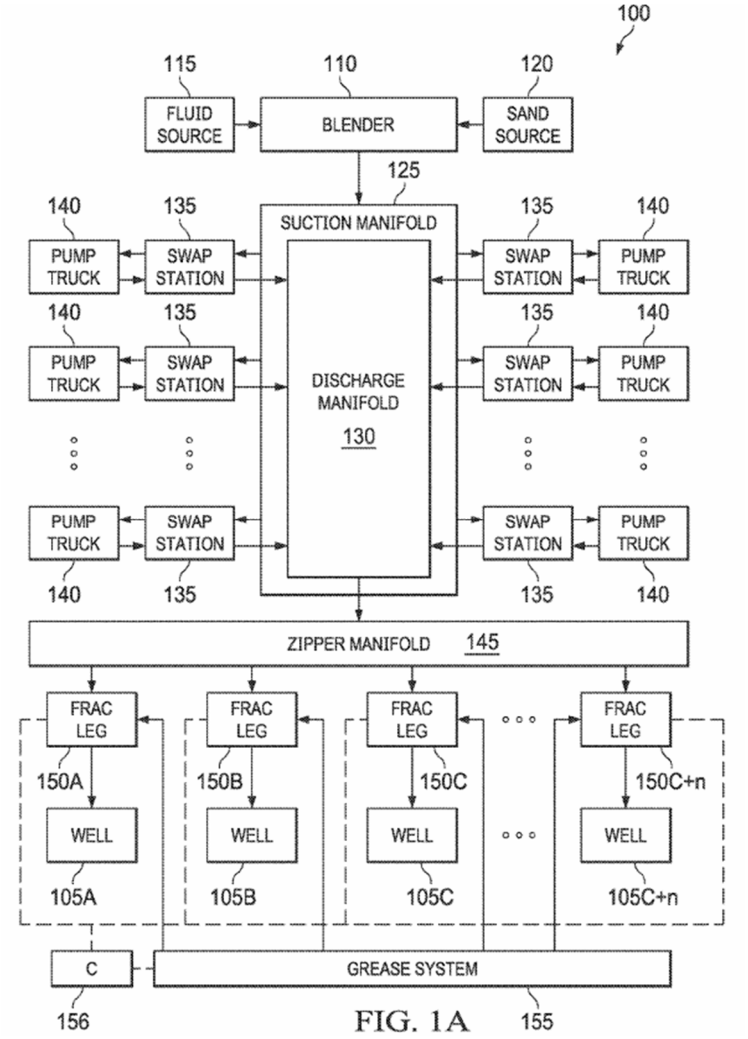


FIG. 1A

'952 describes the alleged invention in terms of what a human previously performed: determining when to open and shut conventional, routine, and well-known valves based on sensing, monitoring, transmitting, receiving, and analyzing data in conventional, routine, and well-known hydraulic fracturing operations. Ex. 1001.

Beyond that, the patent merely describes doing what humans have done for decades in this industry and for centuries in general, that is, opening and closing

valves in response to determined but undefined flowrate conditions. Ex. 1001, 13:30-54; 18:25-37, 55-62; 19:12-15, 44-51; 20:11-22; 21:8-19; Fig. 12. Essentially, the claims cover opening a second valve if there is enough flow to a first valve, and later closing the first valve.

'952's specification shows that the focus of the patent and its claims is on determining whether to open/close valves during hydraulic fracturing operations. For example, the Abstract and Background refer to "a hydraulic fracturing plan executable by a hydraulic fracturing system to hydraulically fracture a plurality of oil and gas wells." Ex. 1001, Abstract, 2:13-16. '952 describes that "hydraulic fracturing plan" as follows:

> …determining whether to permit a regular swap or a CP swap from hydraulically fracturing the well 105D to hydraulically fracturing…the well 105B, by, for example: checking an idle rate of the … system…and detecting or otherwise determining that an idle rate…is below an upper threshold and above a lower threshold…".

Ex. 1001, 13:33-40.

'952 neither states that it seeks to improve upon existing operations, nor does its claims describe any improvement to fracturing operations beyond any unstated improvement brought by determining when to open/close valves between wells. Accordingly, the problem '952's inventors presumably purported to solve was

nothing more than determining whether and when to open/close well valves based on fluid "satisfying one or more conditions." Ex. 1002, ¶¶ 140-143. The purported solution—opening a second valve before closing the first valve—has been a standard sequence of operations in the oil and gas industry for decades. *Id.* Indeed, the same purported solution has been standard in any situation involving transitioning flow from one well or pipe to another since humans figured out how to run fluid in multiple pipes/wells simultaneously and/or sequentially. *Id.*

Some dependent claims recite non-descript/unquantified flowrate/pressure thresholds, but '952 provides no rationale for how to select or quantify such thresholds to know when to open the second well's valve.

Although '952's specification proposes an allegedly new latch/valve assembly with automated control and greasing and says that technology is what allegedly enables '952's operations to be performed without shutting off the fracturing pumps, '952's claims do not recite the purportedly new latch/valve/greasing system. Ex. 1001, 12:5-16:4-7, Fig. 1B. Instead, '952's claims purport to broadly cover conventional fracturing systems/methods that do not require such latch/valve/greasing technology.

B. PROSECUTION

'952 issued November 5, 2024, from Application No. 18/158,122 ("'122"), filed January 23, 2023, as a continuation of Application No. 17/878,493 ("'493

Application," issued as the '770), which is a continuation of 17/388,716 ("'716 Application," issued as the '779), which purports to claim priority to provisional 63/189,663 ("'663"), filed May 17, 2021. *See*, Exs. 1003; 1008. '952 is the latest of 19 in a complicated web of related provisional, non-provisional, continuation, and CIP[3] applications, some of which, despite covering very different subject matter, Downing filed as related anyway, presumably to benefit from earlier priority dates. Ex. 1008.

'952 issued after one office action, three RCEs, and four NOAs. The sole office action only objected to the abstract and three dependent claims, and rejected all but three original claims as "not patentably distinct" from '770's/'779's claims. EX_1003_345-350. Downing amended all originally-filed claims and added sixty-six claims after subsequent NOAs without receiving another office action. EX_1003_017-021, 050-077, 148-152, 197-222, 228-231, 279-296, 308-311, 325-330; *see also* Ex. 1002, ¶¶ 52-60.

C. PRIORITY

'952 claims priority to '663, filed May 17, 2021, via '770 and '779. '952 also claims priority to seven non-provisional and nine provisional applications, collectively referred to as "the CIP Family," as each application is related to '952

[3] (Continuation-in-part)

through at least one CIP relationship (*see* Ex.1008). Because '952's claims include new matter not disclosed in any prior application, '952 is not entitled to an earlier priority date—'952's earliest effective filing date ("EEF-date") is '952's actual filing date, January 23, 2023.

For a later-filed claim to be entitled to an earlier-filed application's filing date, each earlier-filed application in the chain must provide § 112-required written description support to the later-filed claim "to gain the benefit of the filing date of an earlier application under 35 U.S.C. § 120." *Lockwood v. Am. Airlines, Inc*., 107 F.3d 1565, 1571-72 (Fed. Cir. 1997); *Arthrex, Inc. v. Smith & Nephew, Inc.,* 35 F.4th 1328, 1343 (Fed. Cir. 2022), *cert. denied*, 143 S. Ct. 2493 (2023).

"[R]eading the original disclosure," a POSITA "*must immediately discern the limitation* at issue in the [later-filed] claims." *Purdue Pharma L.P. v. Faulding Inc*., 230 F.3d 1320, 1323 (Fed. Cir. 2000) (emphasis added).

"Entitlement to a[n] [earlier] filing date extends only to the subject matter that is disclosed; *not to that which is obvious*…[t]herefore the parent application must actually or inherently disclose the elements of the later-filed claims." *Research Corp. Techs., Inc. v. Microsoft Corp*., 627 F.3d 859, 870 (Fed. Cir. 2010) (emphasis added).

Moreover, priority is granted on a claim-by-claim, not a limitation-by-limitation, basis. Thus, a later-filed claim that includes *any* new matter (not properly

supported by an earlier-filed § 112-compliant application) is not entitled to the earlier-filed application's filing date. *In re Van Lagenhoven,* 458 F.2d 132, 136-137 (CCPA 1972).

Downing has stated that '770's and '779's claims, similarly directed to "CP swaps," share '663 Provisional's filing date (May 17, 2021) as an EEF-date. *See* Ex. 1013, 8. '952's specification and '770/'779's are identical[4] and include most of '663 Provisional's specification, adding some predictable detail around standard conventional components/steps of fracturing systems/operations. The '952's/'770's/'779's/'663's specifications, however, are completely different from every prior application in the CIP family, except for a few "boilerplate" passages and generic descriptions of computing components. *See* Ex. 1009. Because '952/'770/'779/'663 are so different from the rest of the CIP family, even under the most liberal interpretations, the earliest date '952 could hope to claim priority to would be '663's filing date, May 17, 2021. However, because '952's claims include new matter not found in the specifications of '952, '770, '779, or '663, '952 is not even entitled to that date.[5]

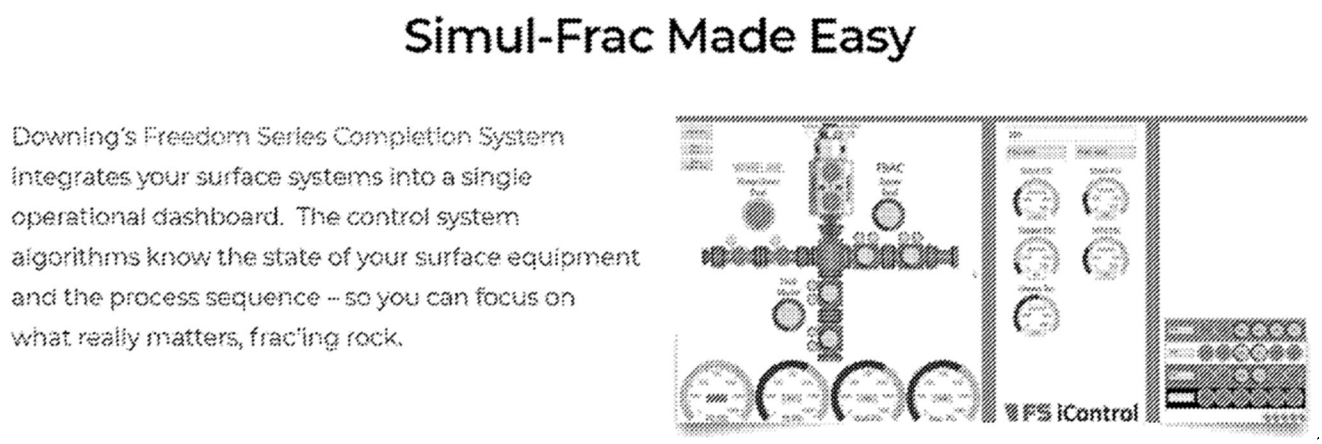
First, the CIP Family applications do not provide § 112-compliant written

[4] Except for updates to referenced related applications.

[5] For this same reason, '952 is unpatentable under §§ 112(a) and 132(a). *See* Section VIII.B.

support for ’952’s claims because they disclose entirely different subject matter from ’952’s claimed valve swaps based on “one or more conditions,” and lack written description support for at least the claimed limitations for “CP swap,” “opening a second valve while fluid is communicated…to the first well,” and “in response to…fluid…satisfying one or more conditions.” Neither ’952’s specification nor the earlier-filed applications to ’952 provide written description support for “pressure” as a “condition” for opening a valve for a “CP swap,” as in ’952’s Claims 62, 69, 76. Instead, ’952/’770/’779/’663 Provisional’s specifications only discuss using “frac rate,” “idle rate,” or “flow rate” when determining whether to open/close valves for a “CP swap.” Indeed, the term “flow rate condition” was only introduced in an Examiner’s Amendment for the ’779 on April 25, 2022, as an umbrella term to encompass the terms “upper flow rate threshold” and “lower flow rate threshold.” EX_1005_110-111.

’952 and its related applications also lack written description support for the claimed “dashboard” elements. Instead, the only mention of a “dashboard” appears in Appendix A of the ’663 Provisional (reproduced below). A picture showing a frac tree and some non-descript gauges is also shown:



EX_1006_081.

The ’952/’770/’779/’663, and CIP Family are completely silent as to the “dashboard” limitations, *i.e.,* “visual” “reference(s)” and “indicator(s)” for first/second valves being open/closed.

Their earliest disclosure was in the claim amendments Downing submitted during ’952’s prosecution on February 8, 2024. EX_1003_196-222.

Because the dashboard limitations are new matter found nowhere in any previous application, ’952’s Claims are not entitled to any earlier-filed application’s filing date. *In re Van Lagenhoven,* 458 F.2d at 136-137. Thus, ’952’s earliest possible effective filing date is 952’s actual filing date, January 23, 2023.

Even that date is problematic, however, because it requires one to assume the dashboard limitations have written description support in ’952’s specification—they do not. Thus, either ’952 is not entitled to any filing date because all ’952’s claims include impermissible new matter (*i.e.*, ’952 is invalid), or one must assume that §

112 support for the "dashboard" limitations exists in '952, even though '952's specification does not at all disclose these elements. Such assumptions are unfounded and indefensible. Nevertheless, if a filing date is accorded to '952 at all, it should be 952's actual filing date, January 23, 2023. Ex. 1002, ¶¶ 61-70

D. CLAIM CONSTRUCTION

The Board construes claims only when necessary to resolve the underlying controversy and applies *Phillips* when doing so. *Toyota Motor Corp. v. Cellport Sys., Inc*., IPR2015-00633, Paper No. 11 at 16 (P.T.A.B. Aug. 14, 2015); 37 C.F.R. § 42.100(b); *Phillips v. AWH Corp*., 415 F.3d 1303, 1312-16 (Fed. Cir. 2005). Claim construction is not necessary in this proceeding.[6]

E. CLAIM RELATEDNESS

Independent Claims 20 and 65 recite standard computer language that executes the methods of Claims 1 and 58, respectively. Claims 39 and 72 recite "one or more controllers" "configured to" perform the methods of Claims 1 and 58, respectively. Ex. 1007 shows groupings of the claims according to their shared/identical subject matter. Because of the similarities across groupings (though grammatically different, functionally the same), claims are discussed together where appropriate.

[6] Claim construction may be necessary in the Litigation for invalidity, noninfringement, and/or unenforceability purposes.

Each claim is considered as a whole, separated into discrete subparts for ease of discussion only. Dependent claim discussions incorporate their respective independent/intervening claim discussions.

VIII. §§101/112 GROUNDS

A. GROUND 1-THE CHALLENGED CLAIMS (1/20/39/58/65/72) ARE PATENT-INELIGIBLE UNDER § 101

1. INTRODUCTION

Claims 1, 20, 39, 58, 65, 72are unpatentable under § 101 because they are directed to the abstract idea of determining that one or more "conditions" in oilfield operations have been met and opening/closing valves in response to such "condition(s)," using standard criteria and equipment POSITAs have routinely considered and used in the oilfield. The claims do not recite an inventive concept beyond that abstract idea, and as such, could improperly preempt an entire industry from performing processes that have been performed for decades.

The '952 Patent covers the longstanding practice of determining when and whether to open and close valves during hydraulic fracturing operations. '952 claims the steps of "communicating fluid from one or more pumps to the first well via a manifold and a first valve" and "executing a continuous pumping ("CP") swap," by "opening a second valve…in response to at least a portion of fluid communicated via the manifold satisfying one or more conditions" and closing the valve for the first well "after the at least a portion of fluid…has satisfied the one or

more conditions" (Ex. 1001, Claims 1/20/39/58/65/72). A "regular swap," according to the specification, is where the valve for the first well is closed before opening the valve for the second well (Ex. 1001, 13:48-14:15; Figure 13). Though the independent claims do not explicitly use the word "determining," all Challenged Claims are directed to the same abstract idea of determining that fluid communicated via a manifold has "satisf[ied] one or more conditions" to decide whether to open/close valves.

Notably, while '952 describes "regular" and "CP" swap valve openings/closings while hydraulically fracturing two or more wells, '952 never discusses (1) why the CP swap is preferred or better than a regular swap, (2) any technical problems facing the fracturing industry solved by the claimed CP swap, or by choosing one swap over another, or, (3) anything regarding how or why—despite roughly 60 or so pages of drawings and written specification—the invention is anything more than the abstract idea of determining conditions to decide which valves to open/close, without actually telling one how to select/set/"satisfy" such "conditions." And, while the claims appear to recite the alleged problem of hydraulically fracturing a plurality of wells, the purported solution—opening/closing valves—is no more than an abstract and well-known approach to fluid control in any multi-well system. Ex. 1002, ¶¶ 93-104.

The only purported difference the '952 Patent allegedly brings is to specify that after opening one valve and performing the mental steps of determining that "one or more" undefined "conditions" have been met, one opens another valve, and, some unspecified time later, one closes the first valve. *That* is *it*. *See*, *e.g.*, *TDE Petroleum Data Sol'ns, Inc. v. AKM Enter., Inc.*, 657 Fed. Appx. 991, 5-6 (Fed. Cir. 2016) (nonprecedential), *aff'g* No. H-15-1821, 2015 WL 5311059 (S.D. Tex. Sept. 11, 2015), *cert. denied*, 137 S.Ct. 1230 (2017) (affirming § 101 patent-ineligibility-finding where claims covered abstract idea of "determining" oil well conditions).

While the claims may generically describe transitioning fluid flow between valves by opening a second valve when fluid satisfies "one or more conditions" (*e.g.* flowrate), then closing the first valve, such result-based, functional language does not save these claims, particularly when placed into an environment of conventional, routine, known hardware. Low water pressure homes have regularly navigated the same abstract idea for decades—*e.g.*, if turning on the shower significantly reduces the sink's water pressure, one does not run the shower while running the sink faucet. If, however, flowrate is sufficient, one can turn on the shower (*i.e.*, open second valve) while the sink faucet is running (*i.e.*, first valve is open) without consequence. Humans have been making these determinations in their minds since the introduction of household plumbing.

Nor is there an inventive concept in the claims' specific order of

opening/closing valves (opening one valve, then another, then closing the first valve), despite what Downing may argue. Operators were transitioning fluid from one well to another by opening one valve, then another, and then closing the first valve, since the beginning of multi-well operations on oil and gas rigs. Ex. 1002, ¶¶ 100-104. And, using the household plumbing example, anyone who has ever decided to start the shower while brushing their teeth at the sink has carried out the same exact valve sequence based on determining (in their mind) if "one or more conditions" has been satisfied—(1) turning on the sink (*i.e.*, opening first valve); (2) turning on the shower (*i.e.*, opening second valve) if the "condition" of the sink faucet having sufficient flow is met; (3) then turning off the sink (*i.e.*, closing the first valve). The specific order of opening/closing valves in '952's claims is simply not patentable.

Finally, while some claims have computers perform the mental steps of determining that condition(s) have been met so that a human can decide which valves to open/close, and other claims display such data on a "dashboard," the law is clear that merely performing existing processes on a computer, even with a dashboard display, is insufficient to render claims patent-eligible. *See*, *e.g.*, *AI Visualize, Inc. v. Nuance Communications, Inc.*, 97 F.4th 1371, 1378 (Fed. Cir. 2024) ("We have explained that the steps of obtaining, manipulating, and displaying data, particularly when claimed at a high level of generality, are abstract concepts."); *Elec. Power*

Grp., LLC v. Alstom S.A., 830 F.3d 1350, 1353-54 (Fed. Cir. 2016) (collecting cases); *Hawk Tech. Sys., LLC v. Castle Retail, LLC*, 60 F.4th 1349 (Fed. Cir. 2023).

2. LEGAL STANDARDS

Under 35 U.S.C. § 101, claims directed to abstract ideas are patent-ineligible. The Supreme Court adopted a two-step subject-matter eligibility test in *Mayo* and *Alice*. *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 217-18 (2014) (citing *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 75-77 (2012)).

As shown below, '952's claims are patent-ineligible under *Alice/Mayo*.[7]

3. REPRESENTATIVE CLAIM 1

The Board may evaluate a representative claim when other claims are "substantially similar and linked to the same abstract idea." *Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat. Ass'n*, 776 F.3d 1343, 1348 (Fed. Cir. 2014); *Mobile Acuity Ltd. v. Blippar Ltd.*, 110 F.4th 1280, 1290–91 (Fed. Cir. 2024).

[7] Because Federal Circuit and Supreme Court law "must control" the patent eligibility analysis, Petitioner presents its arguments under the *Alice/Mayo* framework, while addressing the Office's §101 guidance ("*Guidance*") (MPEP §§2103-2106.07(c)) in Section VIII.A.5. *See In re Rudy*, 956 F.3d 1379, 1381-83 (Fed. Cir. 2020) ("we apply our law and the relevant Supreme Court precedent, not the Office Guidance, when analyzing subject matter eligibility. To the extent the Office Guidance contradicts or does not fully accord with our caselaw, it is our caselaw, and the Supreme Court precedent it is based upon, that must control."), *In re Jobin*, 811 Fed.Appx. 633, 636 (Fed. Cir. 2020) (quoting *In re Rudy* for same proposition), *and In re Abel*, 838 Fed.Appx. 558, 561 (Fed. Cir. 2021) ("the Guidance…does not bind us.").

Claim 1 is representative because claims 1/20/39/58/65/72 are substantially similar and directed to the same abstract idea—determining "conditions" in a well and opening/closing valves based on whether fluid "has satisfied one or more conditions," using standard equipment and criteria POSITAs have used for decades.

Claim 1 recites (emphasis added):

> ***A method of hydraulically fracturing a plurality of wells****, the plurality of wells comprising first and second wells, the method* ***comprising****:*
>
> ***communicating fluid from one or more pumps to the first well*** *via a manifold and a first valve, wherein the first valve is associated with both the first well and the manifold so that the first valve is:*
>
> *in fluid communication with the manifold; and fluidically positioned between the first well and the one or more pumps;*
>
> ***and***
>
> ***executing a continuous pumping ("CP") swap*** *to transition from hydraulically fracturing the first well to hydraulically fracturing the second well,* ***the CP swap comprising****:*
>
> ***opening a second valve while fluid is communicated*** *from the one or more pumps* ***to the first well*** *via the first valve and the manifold,*

wherein the second valve is associated with both the second well and the manifold so that the second valve is:

in fluid communication with the manifold; and

fluidically positioned between the second well and the one or more pumps from which fluid is communicated to the first well via the manifold and the first valve;

wherein opening the second valve causes fluid to be communicated from the one or more pumps to the second well via the manifold and the second valve,

and

***wherein the second valve is opened in response to at least a portion of fluid communicated via the manifold satisfying one or more conditions, which one or more conditions include a flow rate, and/or a pressure**, of the at least a portion of fluid communicated via the manifold;*

and

***closing the first valve**:*

***after the at least a portion of fluid communicated via the manifold has satisfied the one or more conditions,** which one or more conditions include the flow rate, and/or the*

pressure, of the at least a portion of fluid communicated via the manifold, and while fluid is communicated from the one or more pumps to the second well via the second valve and the manifold;

wherein, during the CP swap, fluid is continuously communicated from the one or more pumps via the manifold.

Although "determining" is not explicitly stated in Claim 1, every limitation in Claim 1 is tied to the abstract concept of determining whether one or more "conditions" has been satisfied to decide whether to "execute" a "CP swap" (transitioning wells by opening one valve before closing another) in hydraulic fracturing operations.[8] These are all processes/events that can be performed/can occur entirely in a human well operator's mind. *Elec. Power Grp.*, 830 F.3d at 1354 (claims directed to analyzing information "by steps people go through in their

[8] While '952's parent's ('770) and grandparent's ('779) claims explicitly recite a "determining" step, '952's claims instead recite "executing a CP swap," which involves opening a second valve "in response to…fluid…satisfying one or more conditions" and closing a first valve "after the…fluid…has satisfied" "one or more conditions." These steps *necessarily require determining* whether "the one or more conditions" exist/have been satisfied. Thus "executing a CP swap" is merely a rewording of the "determining" step. Although certain dependent claims recite "determining," those violate § 112(d) as failing to further limit their independent claims. *See* Section VIII.C.

minds…, without more, [are] essentially mental processes within the abstract-idea category").

Presumably to try to circumvent § 101 issues, instead of reciting "determining," Claim 1 recites that valves are opened/closed "in response to…fluid…satisfying one or more conditions," which necessarily requires a determining step (Ex. 1002, ¶ 152). Indeed, without such a determining step, the claim merely recites "communicating" fluid via a manifold to two wells via valves—basic, conventional, generic oil and gas well operations. The purported invention is merely determining information about the "communicated" fluid and then opening and closing conventional valves accordingly. Though written in technical jargon, Claim 1 recites nothing more than the bare abstract idea of determining condition(s) in a well environment, which can be done entirely in an operator's mind.

'952's remaining claims are all substantially similar and linked to Claim 1's same abstract idea. '952 includes method (Claims 1 and 58), apparatus (Claims 20 and 65), and system claims (Claims 39 and 72) for a person/computer "executing a CP swap" between two-four wells by determining whether fluid has satisfied "one or more conditions" and opening/closing valves responsively. Ex. 1001, 22:33-34:65. Thus, all claims recite steps/conventional equipment configured for performing Claim 1's abstract idea.

Other claims merely recite/identify/repeat these patentably insignificant features:

- Adding "displaying a dashboard" with "visual reference(s)"/"visual indicator(s)" for valves/wellheads (Claims 58/65/92);
- Adding "non-transitory computer readable medium having stored thereon computer-readable instructions executable by one or more processors to perform" the above-described CP swap (Claims 20/65);
- Having "one or more controllers configured to execute" a CP swap (Claims 39/72).

These claims' limitations have no distinctive significance relative to § 101's patent-eligibility analysis. *See Elec. Power Grp.*, 830 F.3d at 1352 (claim may be treated as representative where there is no "distinctive significance" of any other claims' limitations); Ex. 1002, ¶ 51. Accordingly, Claim 1 is representative of all Challenged Claims.

a. *ALICE* STEP 1: CHALLENGED CLAIMS ARE "DIRECTED TO" THE ABSTRACT IDEA OF DETERMINING CONDITIONS AND OPENING/CLOSING VALVES BASED ON THOSE CONDITIONS USING CONVENTIONAL EQUIPMENT/CRITERIA A POSITA WOULD HAVE CONSIDERED IN WELL FRACTURING.

Alice Step one asks whether a claim is directed to a judicial exception, such as an abstract idea. *Yu v. Apple, Inc.*, 1 F.4th 1040, 1043 (Fed. Cir. 2021) (citing *Alice*, 573 U.S. at 217). If the answer is "no," the claim survives § 101 and the

analysis ends. If the answer is "yes," analysis proceeds to *Alice* step two. *Yu,* 1 F.4th at 1043.

As shown below, the claims are "directed to" the abstract idea of determining whether to open/close valves using standard criteria a POSITA would have considered in fracking operations. Ex. 1002, ¶¶ 48-50. Pumping fluid though a manifold is thousands of years old,[9] generally, and decades old in the well completion and stimulation industry. Ex. 1002, ¶¶ 82-85. Watching fluid flow and opening and/or closing valves to accomplish some goal, based on what is seen—using gauges or one's eyes—has also been done for many years. Ex. 1002, ¶ 94. Even in the context of oil and gas well operations, human well operators have long watched gauges to determine "one or more conditions" of fluid flowing via a manifold to a well to make decisions about opening/closing valves. *Id*.

'952's purported invention is nothing more than determining that fluid communicated via a manifold has "satisf[ied] one or more conditions" without even defining what it means to satisfy them. That the result of such determination is used to open/close conventional valves, or that the determination itself is performed with

[9] *See*, *e.g.*, Ex. 1017 (describing Ancient Rome's water supply, and its manifolds, pipes, and valves).

conventional computer equipment, is insubstantial and does not save the Challenged Claims. Ex. 1002, ¶ 139. Claim 1 is unquestionably directed to an abstract idea.

Decisions involving patent claims having explicit and implicit "determining" method steps are instructive. *See*, *e.g.*, *Intellectual Ventures I LLC v. Symantec Corp.*, 838 F.3d 1307, 1313-1314 (Fed. Cir. 2016) (holding anti-spamware and anti-malware claims were directed to the abstract idea of "filtering files/e-mail," noting that the "list of relevant characteristics could be kept in a person's head" and that "[c]haracterizing e-mail based on a known list of identifiers is no less abstract. The patent merely applies a well-known idea using generic computers 'to the particular technological environment of the Internet.'") (quoting *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1259 (Fed. Cir. 2014)); *ChargePoint, Inc. v. SemaConnect, Inc.*, 920 F.3d 759, 770 (Fed. Cir. 2019) (holding electric vehicle charging claims ineligible under § 101 because they were directed to "the good idea to add networking capabilities to existing charging stations to facilitate various business interactions"—an abstract idea); *Yu v. Apple, Inc.*, 1 F.4th 1040, 1042-1043 (Fed. Cir. 2021) (holding claim reciting an "improved digital camera" with various image sensors/lenses/analog-to-digital converting circuitry/image memory/digital image processor, in specific mounting arrangements, patent-ineligible despite many pages of drawings and detailed descriptions of the arrangement and manner of operation of the invention's components, because claim was "directed to the abstract

idea of taking two pictures (which may be at different exposures) and using one picture to enhance the other."); *TDE*, 657 Fed. Appx. at 992 (holding claim patent-ineligible where patent involved "determining" oil-well conditions because claim was directed to the abstract idea of "storing data, receiving data, and using mathematics or a computer to organize that data and generate additional information."); *Nabors Drilling Techs. USA Inc. v. Helmerich & Payne Int'l Drilling Co.*, No. 3:20-cv-03126-M, 2022 WL 4589093 (N.D. Tex. Sept. 28, 2022) (holding claim for "method for controlling a well drilling operation," patent-ineligible as directed to abstract idea, explaining "[t]his functional, results-oriented language does not explain how that purpose is to be achieved, and instead only specifies that the method is to be performed in a certain context, *i.e.*, in a well drilling operation."); *Nabors Drilling Techs. USA Inc. v. Motive Drilling Techs., Inc.*, PGR2022-00055, Paper 27 at 20-21 (P.T.A.B. Feb. 22, 2024) (holding patent-ineligible claims describing a system for drilling a well that performs various steps (including receiving information, using received information to generate a set of possible drilling paths, removing certain paths, selecting a desired path, and updating a plan to include the selected path) because claims recited abstract idea of "selecting a desired convergence path" that falls within the grouping of mental processes, and the "generic processor and memory recitations" were "no more than mere instructions to apply the exception using a generic computer component," that did

"not impose any meaningful limits on practicing the abstract idea.") (citing *Alice*, 573 U.S. at 221-23).

Here, '952's Claim 1 covers humans watching fluid flow and determining, in their heads, when some condition has been met (*e.g.*, seen or gauged). Just like "[c]ontrolling access to resources is exactly the sort of process that 'can be performed in the human mind, or by a human using a pen and paper,' which [the Federal Circuit has] repeatedly found unpatentable", so is determining where fluid should flow based on fluid "satisfying one or more conditions" as recited in Representative Claim 1. *See Ericsson Inc. v. TCL Commc'n Tech. Hold's Ltd.*, 955 F.3d 1317 (Fed. Cir. 2020) (holding claims with "determining" step patent-ineligible because they were directed to the abstract idea of controlling access or limiting permission to resources, and though written in technical jargon, required nothing more than that abstract idea). As in the ineligible claim in *Symantec Corp.*, the "one or more conditions" in Claim 1's determining/"executing" step may be kept in an operator's head. The operator would simply need to watch the fluid or gauge indicating the "condition" of interest. *See, e.g., Synopsys, Inc v. Mentor Graphics Corp*., 839 F.3d 1138, 1149 (Fed. Cir. 2016) (holding claims as "so broad as to read on an individual performing the claimed steps mentally or with pencil and paper.")

'952 does not suggest that its generically claimed valves, pumps, or manifolds are improved in any way over conventional valves, pumps, and manifolds, that

valves would operate any differently than they otherwise would to allow or shut off fluid flow from pumps to wells via a manifold, or that any technical difficulties exist in performing the claimed "determining" step or in any post-solution activity. Indeed, although the specification describes a "regular swap" versus a "CP swap," the claims use the same conventional equipment in the same conventional way to hydraulically fracture wells, the only difference being when one closes a first valve relative to opening a second valve. Ex. 1001, 5:45-6:4, 14:8-26, Fig. 1A.

Moreover, the fact that '952's specification includes descriptions of hardware and software does not affect the analysis, for

> '[t]he § 101 inquiry must focus on the language of the Asserted Claims themselves,' *Synopsys*, 839 F.3d at 1149, and the specification cannot be used to import details from the specification if those details are not claimed.
> *Even a specification full of technical details about a physical invention* may nonetheless conclude with claims that claim nothing more than the broad law or abstract idea underlying the claims, thus preempting all use of that law or idea.

ChargePoint, 920 F.3d at 769 (emphasis added).

'952's Claim 1 goes even further in abstractness—it does not even recite conventional computer technology for determining "conditions," but instead only a determining method that can be performed entirely in a human's mind. *Elec. Power*

Grp., 830 F.3d at 1354 (claims directed to analyzing information "by steps people go through in their minds…without more, [are] essentially mental processes within the abstract-idea category").

Ultimately, determining "one or more conditions" is as abstract as it gets, and controlling well operations such as hydraulic fracturing by opening/closing valves in view of what has been determined is nothing but "insignificant post-solution activity" that does not change the abstract nature of '952's claims. *Mayo*, 566 U.S. at 610–11. Nor does the sequence of closing a first valve after opening a second valve make '952's claims any less abstract. Nothing in Claim 1 recites any improvement in how any of its method steps are performed. And Claim 1 makes clear that no computing tools are required to perform the essential steps of the invention, further highlighting its abstractness.

Accordingly, Claim 1 recites an abstract idea, failing at *Alice* Step 1.

b. *ALICE* STEP 2: CHALLENGED CLAIMS DO NOT PROVIDE AN "INVENTIVE CONCEPT."

Alice Step 2 asks whether any additional claim limitations possess an "inventive concept" to ensure that it amounts to "significantly more" than the abstract idea itself. *Alice*, 573 U.S. at 217-18. "[A]dding novel or non-routine components is not necessarily enough to survive a § 101 challenge." *ChargePoint*, 920 F.3d at 773.

Claim 1's limitations, considered individually and as an ordered combination, fail to provide an inventive concept. Everything in Claim 1 is tied to the abstract concept of determining whether one or more conditions has been satisfied to decide whether to "execute" a "CP swap" (transitioning wells by opening one valve before closing another) in hydraulic fracturing operations. Ex. 1002, ¶¶ 152-153.

'952's claims and specification neither address any technical issues or difficulties, nor do they describe any improvements in pumps, manifolds, "communicating" fluids to manifolds, valves, or wells. Opening one valve before closing another was nothing new—pumping fluid through a manifold to two or more wells, which necessarily required opening/closing valves in various sequences, was well known by '952's EEF date. Ex. 1002, ¶ 93-104; Ex. 1018; Ex. 1021.

Yu's patentee argued the challenged claims survived at *Alice* step two because "the claimed 'hardware configuration is vital to performing the claimed image enhancement' and that, '[t]herefore, the claimed combination of limitations ... is unconventional.'" *Yu*, 1 F.4th at 1045. The Federal Circuit disagreed, explaining "the conclusion does not follow from the premise. Conventional computer equipment can be 'vital' to an advance that is still abstract, but not suffice to avoid ineligibility at *Alice* step two. …" *Id*. The "claimed configuration does not add sufficient substance to the underlying abstract idea of enhancement [of one photo

with another]—the generic hardware limitations of claim 1 merely serve as 'a conduit for the abstract idea.'" *Id*. (quoting *In re TLI Commc'ns*, 823 F.3d at 612).

The same is true here; regardless of how important or vital Downing argues any claimed hardware or its arrangement may be to '952's invention, it is still all just conventional hardware "behav[ing] exactly as expected according to their ordinary use." *Id*. (quoting *In re TLI Commc'ns*, 823 F.3d at 615). The pumps, manifold, and valves are merely the "conduit" for the abstract idea of determining conditions. That the determining of conditions happens in conventional routine hydraulic fracturing operations using conventional, standard, and routine hardware and following conventional valve opening/closing sequences does not make these claims patent eligible.

Nor does '952's specification indicate that Claim 1's "determining" step cannot be done by human well operators looking at flow and/or gauges, or that the recited components do anything other than automate what was or could already be done by human well operators engaged in hydraulic fracturing operations.

There is nothing inventive about the claimed ordered combination of elements, either. All the claimed elements, including the wells, pumps, valves, and well equipment, are connected and used as they have always been in hydraulic fracturing operations. That the equipment may be used to perform *either* a CP swap *or a regular swap* confirms the conventionality of the arrangement. '952's

specification says nothing regarding technical problems being purportedly solved by performing a "CP" versus a "regular" swap. In fact, the Challenged Claims essentially say: do a CP swap, which means open one valve before closing another based on conditions that were determined. Nothing is new, everything is routine. Nothing in any Challenged Claim represents a non-conventional and non-generic arrangement of known, conventional hardware.

No other claim limitation provides an inventive concept that saves Claim 1 from ineligibility at *Alice* step two. For example, some limitations include pumps and pumping—aspects of no significance. Other limitations simply recite that fluid is communicated and others identify which wells are to receive fluid—again, insignificant matters. Far from relying on any of these things as inventive, '952 treats them almost as afterthoughts. No matter what lens the claims are viewed through, they remain, at most, nothing more than mere determination of conditions in the environment of hydraulic fracturing multiple oil and gas wells.

Finally, determining that conditions have been satisfied to decide to open/close valves also fails to provide an inventive concept, as this is merely insignificant post-solution activity that amounts to an instruction to "apply it." *See Apple Inc. v. Ameranth, Inc.*, 842 F.3d 1229, 1242 (Fed. Cir. 2016). To the extent '952 allegedly teaches how to transition flow between wells, '952's only described

"solution" is closing one valve after opening another, which hardly includes an inventive concept, nor does it transform Claim 1 into anything less abstract.

Because Representative Claim 1 does not recite anything significant and unconventional, it fails *Alice* Step 2 and is invalid for claiming patent-ineligible subject matter under Section 101. For the same reasons, all Challenged Claims are also invalid, as discussed below.

4. CLAIMS 20/39/58/65/72ARE DIRECTED TO THE SAME ABSTRACT IDEA, ADDING ONLY CONVENTIONAL ELEMENTS, AND DO NOT PROVIDE AN INVENTIVE CONCEPT.

Claims 20/39/58/65/72of the '952 Patent are directed to the same abstract idea as Claim 1. These claims do not provide "significantly more" to render them patent eligible because they merely recite "insignificant post-solution activities," features that were already well known, routine, and conventional in the fracturing industry, or both. *See Ameranth*, 842 F.3d at 1242.

Claims 20/39/58/65/72are discussed in two groups, the "main" claims (Claims 20/39), which cover the purported method, software, and system claims for "executing a CP swap," and the "dashboard" claims (Claims 58/65/72), which merely add a dashboard display.

a. "MAIN" CLAIMS

Claims 20 and 39 are software and system versions of Claim 1—essentially repeating Claim 1's limitations, adding only standard computer or equipment

language. Claim 20, for example, adds at the beginning, "A non-transitory computer readable medium having stored thereon computer-readable instructions executable by one or more processors to perform operations for hydraulically fracturing a plurality of wells,…the operations comprising." Claim 39, meanwhile, recites "a system for hydraulically fracturing a plurality of wells," that includes "a manifold," "a first valve," "a second valve," "one or more controllers configured to execute a continuous pumping ("CP") swap," and the same "in response to…fluid…satisfying one or more conditions" language and all Claim 1's other limitations.

Neither Claim 20's standard computer language nor Claim 39's recitation of physical components changes the § 101 analysis. Regarding Claim 20, "[n]othing in the claims, understood in light of the specification, requires anything other than off-the-shelf, conventional computer, network, and display technology for gathering, sending, and presenting the desired information," which does not pass § 101's "test of an inventive concept." *See, e.g., Elec. Power Grp.,* 830 F.3d at 1355.

Regarding Claim 39, merely reciting physical components does not render a claim patent eligible. *ChargePoint*, 920 F.3d at 770 (quoting *Alice*, 574 U.S. at 224)). Besides, the manifold, valves, and controllers are relevant only to steps of insignificant post-solution activity, which cannot provide an inventive concept. Ex. 1002, ¶¶ 82-104; *Ameranth*, 842 F.3d at 1242. These claims suffer from the same patent-ineligibility flaws as Claim 1 for the same reasons discussed above.

b. "DASHBOARD" CLAIMS

Claims 58/65/72 merely add "dashboard" display limitations to the above-described already well-known processes. None of these claims add any inventive concept to claims 1/20/39's abstract idea.

Claims 58/65/72 add a "dashboard" comprising "a visual reference" of the first/second valves, "wherein the display of the dashboard visually communicates respective states" of the valves. These claims add even less than *AI Visualize*'s claims, which, despite having numerous "functionally-oriented steps" including "storing data," "accepting user requests," "checking for the location of all data," "creating image frames," "compiling" such frames, and "sequentially displaying the image frames to the user" the Federal Circuit considered to be directed to an abstract idea and patent-ineligible. *AI Visualize*, 97 F.4th at 1378-1380. Here, the claims merely add that a display includes visual indicators to show whether a valve is open or closed—this adds no patentable weight to '952's purported invention. These claims are, therefore, unpatentable under § 101 for the same reasons as Claims 1, 20, and 39.

Thus, for the reasons discussed regarding Representative Claim 1 and these additional reasons, Claims 20/39/58/65/72 should likewise be held unpatentable.

5. *GUIDANCE* ANALYSIS YIELDS SAME RESULTS

Guidance yields the same results. The difference between the *Alice/Mayo* and *Guidance* frameworks is that *Guidance* adds *Guidance* Step 1 (statutory category) and divides the *Alice/Mayo* analysis into *Guidance* Steps 2A and 2B. MPEP § 2106.04(II.A), MPEP § 2106.05(I)(A). *Guidance* Step 1, which examines whether the claimed subject matter falls within one of the four statutory categories of invention (process, machine, manufacture, or composition of matter), is satisfied because Claims 1-19 and 58-64 recite a method, Claims 20-38 and 65-71 an apparatus, and Claims 39-57 and 72-78 a system. MPEP § 2106.03(I). Regardless, this does not change the analysis of *Alice/Mayo/Guidance* Steps 2A and 2B, which, as discussed above yields a conclusion of patent ineligibility.

Thus, all Challenged Claims are unpatentable under § 101, under all frameworks.

B. GROUNDS 2-4-THE CHALLENGED CLAIMS LACK WRITTEN DESCRIPTION AND HAVE NEW MATTER

Even if the Challenged Claims survive § 101, Downing overreached with '952 by adding wholly unsupported new matter to the claims ("one or more conditions…includ[ing]…flow rate and/or pressure" (all claims) and "dashboard" limitations (Claims 58-78)) for the first time during post-allowance amendments during '952's prosecution. All Challenged Claims, therefore, are also unpatentable under 35 U.S.C. §§ 112(a) and 132(a) for lack of written description and new matter.

1. LEGAL STANDARDS

The test for § 112(a) written description is "whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Ariad Pharmaceuticals, Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). A claim that contravenes the specification by, *e.g.*, omitting components the specification describes as mandatory or broadly encompassing undisclosed configurations, fails the written description requirement. *See*, *e.g.*, *Cisco Sys., Inc. v. Cirrex Sys., LLC*, 856 F.3d 997, 1009-10 (Fed. Cir. 2017); *LizardTech, Inc. v. Earth Res. Mapping, Inc.*, 424 F.3d 1336, 1343-46 (Fed. Cir. 2005).

Relatedly, § 132(a) prohibits "introduc[ing] new matter into the disclosure of the invention" by amendment. 35 U.S.C. § 132(a). Adding new matter to claims violates the written description requirement. *In re Rasmussen*, 650 F.2d 1212, 1214-15 (CCPA 1981). "The written description requirement and its corollary, the new matter prohibition of . . . § 132, both serve to ensure that the patent applicant was in full possession of the claimed subject matter on the application filing date." *TurboCare Div. of Demag Delaval Turbomach. Corp. v. Gen. Elec. Co.*, 264 F.3d 1111, 1118 (Fed. Cir. 2001). Any amendments to the claims or specification after the original filing date "must find support in the original specification." *Id.*

2. BACKGROUND

'952's original application included 21 claims with the same specification as '770 and '779. During prosecution, Downing added patentably meaningless limitations to the original 21 claims and sixty-six claims, including new matter that was neither part of the original application nor supported by the CIP Family.

Original Claim 1 looked very different from as-issued-Claim 1 and said nothing about "conditions," "pressure" as a "condition," "dashboard[s]," or any associated "visual" "indicators"/"references." Ex. 1010. Indeed, '952's original application included none of these terms. Downing added these limitations to the claims post-allowance.

Post-first-NOA, Downing added twenty-six new claims and never-before-seen "pressure" "condition" limitations. EX_1003_278-296. Shortly thereafter, another NOA issued without another office action and without addressing "new matter." EX_1003_228. Post-second-NOA, Downing added *forty more claims* with the previously-added "pressure" new matter, plus never-before-seen "dashboard" limitations. EX_1003_196-222. Another NOA issued—again, no office action and no "new matter" discussion. EX_1003_144. Post-third-NOA, Downing filed an IDS adding 3,753 pages of documents to the record, mostly from '770/'779's IPRs. EX_1003_127-142. Subsequently, '952 issued with 78 claims.

The Examiner never addressed the new limitations or discussed written

support or "new matter."

3. GROUND 2-"CONDITIONS" CLAIMS (1/20/39/58/65/72)

By omitting and replacing undefined flowrate thresholds with "one or more conditions" in the issued claims, Downing has overreached '952's disclosure, violating § 112(a)'s written description requirement and § 132(a)'s new matter prohibition. All Challenged Claims are therefore unpatentable.

Downing added/amended all independent claims to require "conditions" to be "satisfied" to execute a "CP Swap," but the specification does not define what these "conditions" are, how they are satisfied, or provide a rationale for selecting any condition. Instead, Downing later amended certain independent claims (1, 20, and 39) to identify "flow rate and/or pressure" as potential "conditions" for a "CP swap," and later amended several dependent claims to specify "flow rate" (Claims 5-8/24-27/43-46/61/68/75) or "pressure" (Claims 13-17/21-23/26/52-53/59/62/66/73) as the "condition." Because these "conditions" limitations are new matter added to the claims by amendment with no support in the original specification, all claims are unpatentable under §§ 112(a) and 132(a) for lack of written description and new matter.

Limitations 1.3.2, 1.3.3, 20.3.2, 20.3.3, 39.5.2, 39.5.3, 58.4.2, 58.4.3, 65.4.2, 65.4.3, 72.6.2, and 72.6.4 ("the "Conditions" Limitations"), added to all Challenged Claims by post-allowance amendment, include new matter with no support in '952's

original specification. All Challenged Claims are therefore unpatentable for lacking written description support.

All independent claims require "[executing]/[configured to execute] a continuous pumping ("CP") swap…[comprising]/[by]…" "[the second valve is opened]/[opening the second valve…]" "in response to at least a portion of fluid communicated via the manifold *satisfying one or more conditions*," and "closing the first valve: after the at least a portion of fluid communicated via the manifold *has satisfied the one or more conditions*." Ex. 1001, Claims 1/20/39/58/65/72. Yet, nowhere does '952's specification discuss what these "conditions" are or what it means to be "satisfying"/to have "satisfied" a "condition," nor is there any mention of anything that could be interpreted as a "condition" other than a solitary example of flowrate thresholds. Ex. 1001; 1002, ¶¶ 140-148.

In every instance, '952 refers to opening/closing valves based on fluid meeting one or more undefined flowrate thresholds. *See*, *e.g.*, Ex. 1001, 20:10-20, 21:8-18. For example:

> … Figure 12… step 250 is or includes ***determining whether to permit a regular swap or a CP swap*** … ***by***, for example: … detecting or otherwise ***determining that an idle rate*** of the hydraulic fracturing system … ***is below an upper threshold and above a lower threshold*** …, ***or***, … that the idle rate …is ***below the lower threshold***.

> …
>
> The first method generally includes: (a) permitting …hydraulic fracturing…on a first well,…; (b) ***determining that the flow rate*** of the fluid being pumped into the first well ***is below a flow rate threshold***…; (c)…opening a second valve…; (d) permitting … hydraulic fracturing…the second well…; and (e) during pumping…into the second well…, closing the first valve associated with the first well; wherein, during each of steps [(a)-(e)], fluid is continuously pumped to the first…, …second…, or both…first…and…second valve.
>
> ….

Ex. 1001, 13:30-43, 18:20-39; *see also* 19:1-21:47 (similarly describing other embodiments only in terms of "measuring" and "determining" flowrate thresholds).

'952 neither discusses a rationale for why a particular "condition" or threshold is relevant to a "CP swap," nor tells a POSITA what the thresholds would need to be, nor the rationale associated with selecting such thresholds for executing a "CP swap." Ex. 1002, ¶¶ 140-148. The only example of flowrate thresholds '952 mentions is that if flowrate is above a lower flowrate threshold of 0 bbls (which only means there is flow) and below an upper flowrate threshold of 10 bbls then a CP swap would be permitted, but if flowrate was below the lower flowrate threshold of 0 bbls (which only means there is no flow) then a regular swap would be permitted. Ex. 1001, 13:43-54. '952's specification provides no rationale or explanation for

selecting these seemingly arbitrary numbers for thresholds or any other thresholds that would allow for a "CP swap."

Even if such conditions/thresholds would have been obvious to a POSITA, as Downing may argue, such descriptions do not satisfy §112. *See Ariad*, 598 F.3d at 1356 ("a description that merely renders the invention obvious does not satisfy the [written description] requirement.") (citations omitted), *and Lockwood*, 107 F.3d at 1571-1572 ("It is not sufficient for purposes of the written description requirement of § 112 that the disclosure, when combined with the knowledge in the art, would lead one to speculate as to modifications that the inventor might have envisioned, but failed to disclose.")

Nor does any application to which '952 purports to claim priority provide the missing support. The only "condition" of fluid communicated via the manifold that the specifications of '952/'770/'779/'663 mention are "flow rate" and related terms, "frac rate" and "idle rate," and their discussion is always in the context of these flowrates being below an upper threshold and/or above a lower threshold. Ex. 1001, 13:35-50. This makes sense because '779's ('952's grandparent's) Examiner introduced the term "flow rate condition" to '779's claims as an umbrella term for the terms "upper flow rate threshold" and "lower flow rate threshold." EX_1005_110-113. The term "conditions" insofar as it including anything other than undefined flowrate thresholds does not have written support in any of the

applications leading up to ’952. Although ’770’s (’952’s parent’s) claims include “one or more conditions,” this bare phrase is indefinite because a POSITA would not understand the metes and bounds of the claims and, therefore does not provide written description support for ’952’s “Conditions” Limitations.[10] Ex. 1002, ¶¶ 140-148. None of these specifications discuss “conditions” or anything other than undefined flowrate thresholds, and the occasional mention of undefined flowrate thresholds imparts no meaning to the term “condition,” particularly because the applications have no description of what other “conditions” may be, what their thresholds might be, and no rationale for identifying a particular threshold of any “condition.” As such, no evidence exists showing ’952’s inventor possessing the claimed invention at the time of ’952’s filing.

Therefore, ’952’s claims violate §§ 112 and 132.

4. GROUND 3-“PRESSURE [CONDITION]” CLAIMS (1/20/39)

Even if ’952’s undefined flowrate thresholds were found to provide written support for “conditions,” ’952 never mentions a “pressure” “condition” for “executing a CP swap.” Thus, claims identifying “pressure” as such a condition (Claims 1-57/62/69/76) are unpatentable for lacking written description support.

[10] The phrase also improperly added new matter without support in the ’770 or ’779, making ’770 invalid or, at best, a CIP, not a continuation, rendering ’952’s incorporation of ’770 defective. *See e.g.*, *Ariad*, 598 F. 3d at 1350 (description of species does not necessarily show genus was invented).

'952 never mentions a "pressure" "condition" for executing a "CP Swap," let alone any pressure thresholds or other pressure-based criteria on which a POSITA could determine what "pressure condition" would trigger opening/closing valves. Ex. 1002, ¶¶ 144-148. In fact, the earliest and only disclosure of "pressure" as a claimed "condition" was in '952's post-allowance claim amendments Downing submitted on October 18, 2023. EX_1003_278-296. And, as Downing has argued, "pressure" is "not flow rate." *See* EX_1015_006 (distinguishing prior art because "'pressure' (not flow rate) is the monitored parameter").

And, although '952's specification mentions "pressure," it is only in the context of lubricator "pressure equalization" and other unrelated concepts (*see*, Ex. 1001, 7:22-24, 8:24-60, 9:49-56, 10:12-30, 11:47-12:60, 14:4-8, 55, 15:6-36), which are irrelevant to '952's claimed "pressure" "condition" for a "CP Swap." Ex. 1002, ¶¶ 144-148. Rather, '952 discusses "equalization (EQ) valves" in the "valve apparatus" (210) that provide "pressure equalization" between the lubricator (220) and the well (105A) to allow tool access into the well, as shown in Figure 2A (annotated below):

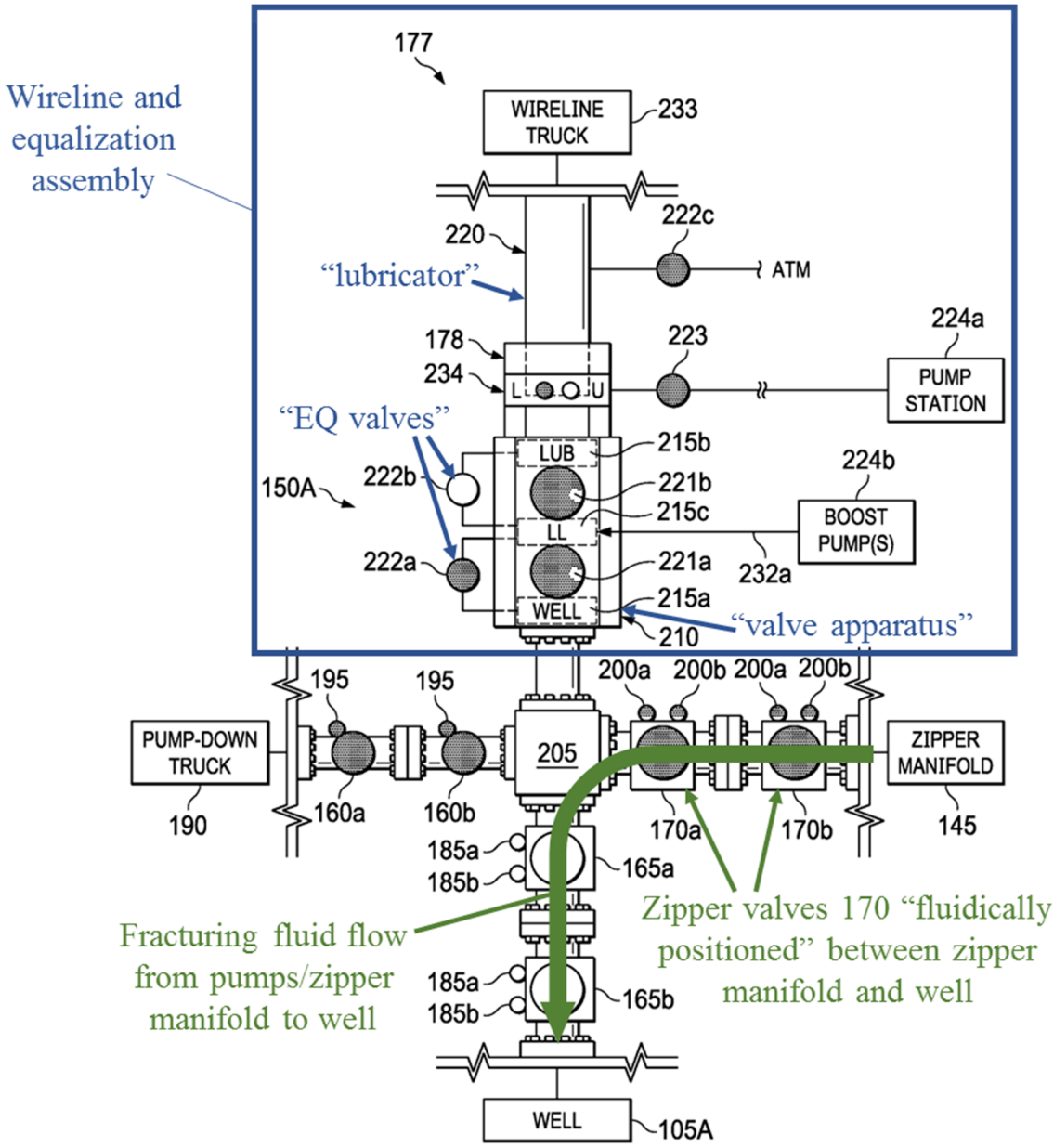


FIG. 2A
(Annotated)

Ex. 1001, 7:49-8:60.

The pressures across the valve apparatus have nothing to do with the claimed "swap[ping] from hydraulically fracturing a first well to hydraulically fracturing the second well." Ex. 1002, ¶¶ 144-148, 630. Indeed, the manifold and valves

associated with the "CP Swap" are in a completely different part of the system than the wireline and equalization assembly part of the system, which does *not* receive fracturing fluid from the pumps or manifold. *Id*. Thus, the wireline/equalization pressure cannot be the same "pressures" of the claimed "at least a portion of fluid communicated via the manifold" or the "fluid communicated from one or more pumps to the first well via a manifold and first valve." *Compare Id.* and Claim 1.

Never does '952 or any earlier-filed application disclose, actually or inherently, executing a "CP Swap" in response to fluid communicated via the manifold satisfying a "pressure" "condition." Ex. 1002, ¶¶ 144-148. Nor would a POSITA have understood '952's inventors as of the time of the filing of '952's application to have possessed a method of opening/closing valves based on "satisfying" any "pressure condition." Ex. 1002, ¶ 148. Indeed, as discussed, this new matter was not introduced until October 18, 2023, nearly ten months after Downing filed the '122 Application. This itself is evidence that the "pressure"-as-a-"condition"-for-a-"CP-Swap" limitations are new matter and lack written description. Because Claims 1, 20, and 39 lack written description, they cannot properly be accorded a filing date, let alone an earlier priority date. *See*, *e.g.*, *Research Corp. Techs.*, 627 F.3d at 870 ("Entitlement to a[n] [earlier] filing date extends only to the subject matter that is disclosed; not to that which is obvious…the parent application must actually or inherently disclose the elements of the later-filed

claims."); *Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1323 (Fed. Cir. 2000).

Therefore, '952's specification does not "describe the invention sufficiently to convey to a [POSITA] that…the patentee invented what is claimed." *Lizardtech, Inc.*, 424 F.3d at 1345. Claims 1, 20, and 39's limitation "one or more conditions…wherein the one or more conditions include a pressure condition," therefore, fails to meet § 112's written description requirement. These claims are unpatentable for violating §§ 112(a) and 132(a).

5. GROUND 4-"DASHBOARD" CLAIMS (58/65/72)

Claims 58, 65, and 72 ("the Dashboard Claims") are also unpatentable for having new matter lacking written description because Downing again overreached by adding "dashboard" elements not supported by '952's or any prior filing's specification.

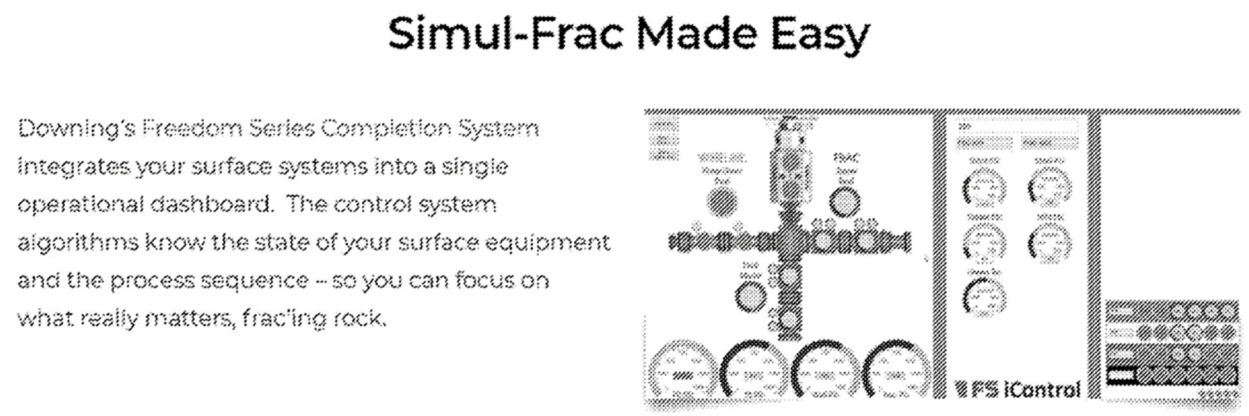
The Dashboard Claims recite that a "dashboard comprises" one or more of:

- "a visual reference of the first valve;"
- "a first visual indicator associated with the visual reference of the first valve,…indicating that a state of the first valve is open to permit communicating fluid to the first well via the manifold and the first valve;"
- "a visual reference of a second valve;" and
- "a second visual indicator associated with the visual reference of the

second valve, the second visual indicator being different from the first visual indicator to indicate that a state of the second valve is closed."

These "dashboard" elements were not in '952's original application. They were added on February 8, 2024, after the second NOA. Indeed, '952's original application makes no mention of "dashboard," "visual indicators," or "visual references" anywhere in its 60-plus pages of specification and drawings, nor does its parent, grandparent, or the '663 Provisional application, to which '952 purports to claim priority. Nor would a POSITA understand any of '952's disclosures to disclose such terms. Ex. 1002, ¶¶ 149-151. '952 says nothing about a dashboard that indicates valve states (open/closed).

Indeed, the only mention of a "dashboard" is buried in an appendix to the '663 Provisional (several applications prior to the '122 Application), which merely states that a system is integrated "into a single operational dashboard," and that control system algorithms "know the state of your surface equipment and the process sequence," while showing a partial image with non-descript well equipment and gauges:



EX_1006_081.

Because none of '952's family of specifications disclose "dashboard" limitations, which constitute new matter, Claims 58, 65, and 72lack written support required by § 112(a) and violate § 132(a)'s prohibition against new matter. These claims should therefore be cancelled.

IX. §§102/103 GROUNDS

A. PRIOR ART

1. CHRISTIE

"*Christie*" (U.S. Pub. No. US2021/0025267, Ex. 1018), filed July 24, 2020 (before Downing's alleged first public disclosure (EX_1015_003; EX_1016_005)), and published January 28, 2021, is §§ 102(a)(1) and 102(a)(2) prior art. *Christie* also claims priority to U.S. Provisional No. 62/877,994 ("*Christie Provisional*," Ex. 1019), filed July 24, 2019, which also fully supports *Christie*'s disclosures relied on

in this Petition.[11] Ex. 1002, ¶ 125. Therefore, no §102(b) exceptions apply.

Christie discloses multi-well zipper fracturing systems/methods for stimulating/fracturing stages in different wells that "at least partially overlap in time," where a second well's valves are opened to initiate its fracturing stage before the first well's valves are closed to end its fracturing stage. *Christie*, [0033], [0040], [0161]-[0162], Fig. 9. Controllers determine when stimulation/fracturing on one wellbore is ending and if the next wellbore is ready for fracturing using "sensors relating to any and all of the operational parameters," *e.g.*, pumped fluid pressure and flowrate. *Id*., [0087], [0094], [0099], [0107]-[0108]. Using sensors and monitoring operational parameters, *Christie*'s controller may "automatically coordinate a well swap process, such as by automatically opening and closing…valves" associated with each well to swap from fracturing one well to the next "with the goal of performing continuous pumping downhole." *Id*., [0098], [0101]. Ex. 1002 ¶¶ 126-128.

[11] Ex. 1061 shows *Christie*'s *Provisional'*s support for *Christie*.

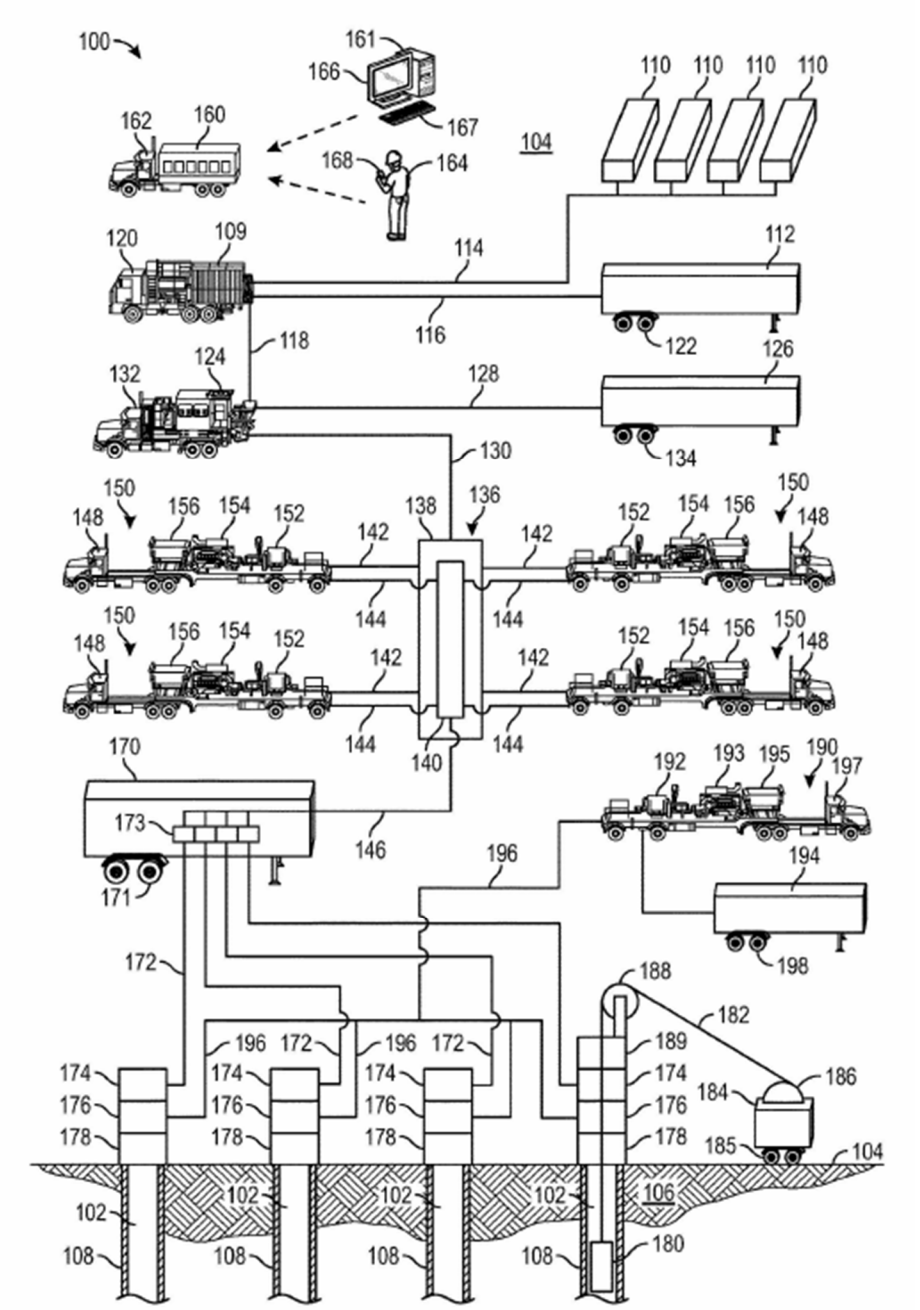

100
161
166
167
162
160
168
164
104
110
110
110
110
120
109
114
112
116
122
118
124
126
132
128
134
130
150
148
156
154
152
138
136
142
144
140
146
170
173
171
192
193
195
190
197
194
196
198
172
188
182
189
174
176
178
186
184
185
102
106
108
180

FIG. 1

2. PITCHER

"*Pitcher*" (U.S. Publication 2014/0352968, Ex. 1021), published December 4, 2014—more than one year before '952's EEF-date—is § 102(a)(1) prior art. Ex. 1002, ¶ 135.

Pitcher discloses a multi-well fracturing system, where a "fracturing manifold is connected to the [wells'] fracturing trees and includes output valves to independently control flow of fracturing fluid from the manifold to each of multiple wells." *Pitcher*, Abstract. While pumping fracturing fluid into the wells, sensors monitor the pumped fluid parameters such as flowrate and pressure, and the manifold's output valves are operated based on those parameters. *Id*., [0030]. *Pitcher* teaches closing a manifold valve associated with the well while pumping additional fracturing fluid from the manifold into another well once a desired volume of fracturing fluid has been pumped into one well (as determined by flowrate or pumping time). *Id*., [0036-0038]; Ex. 1002, ¶¶ 136-138.

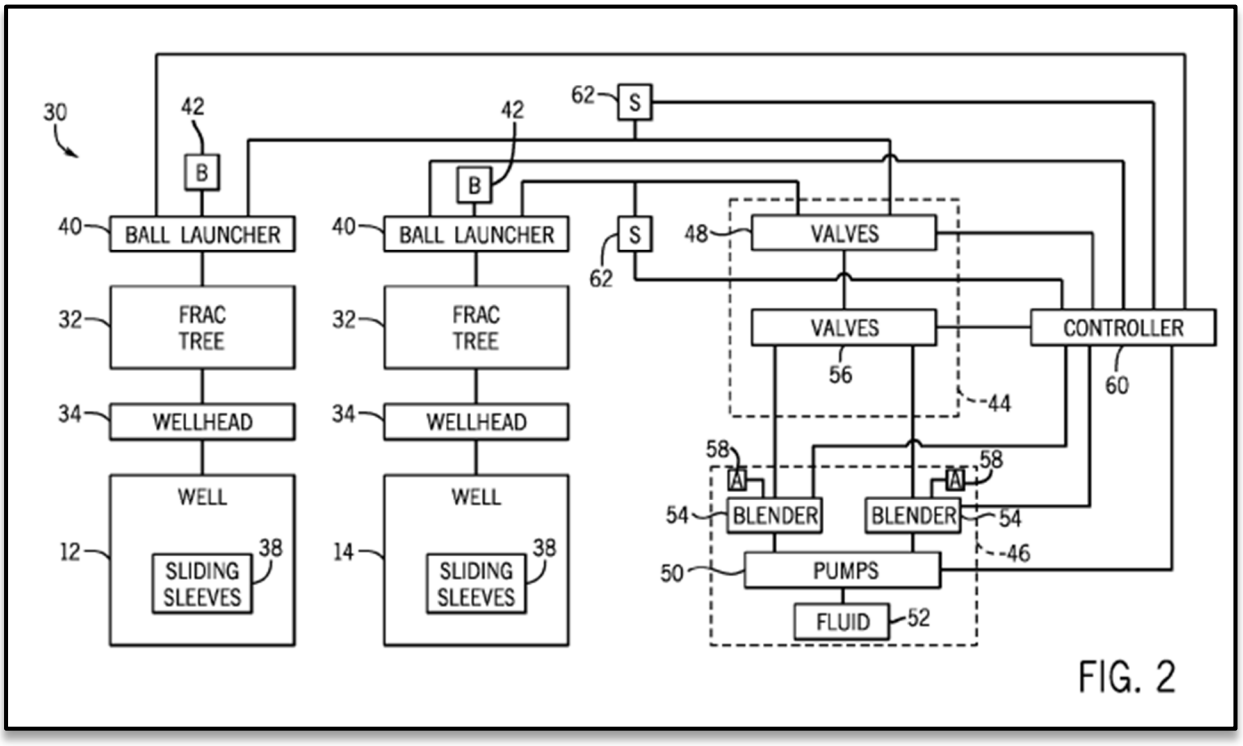

30
42
42
62
S
B
B
40
BALL LAUNCHER
40
BALL LAUNCHER
S
62
48
VALVES
32
FRAC TREE
32
FRAC TREE
VALVES
CONTROLLER
56
60
44
34
WELLHEAD
34
WELLHEAD
58
58
A
A
WELL
WELL
54
BLENDER
BLENDER
54
12
SLIDING SLEEVES
38
14
SLIDING SLEEVES
38
50
PUMPS
46
FLUID
52

FIG. 2

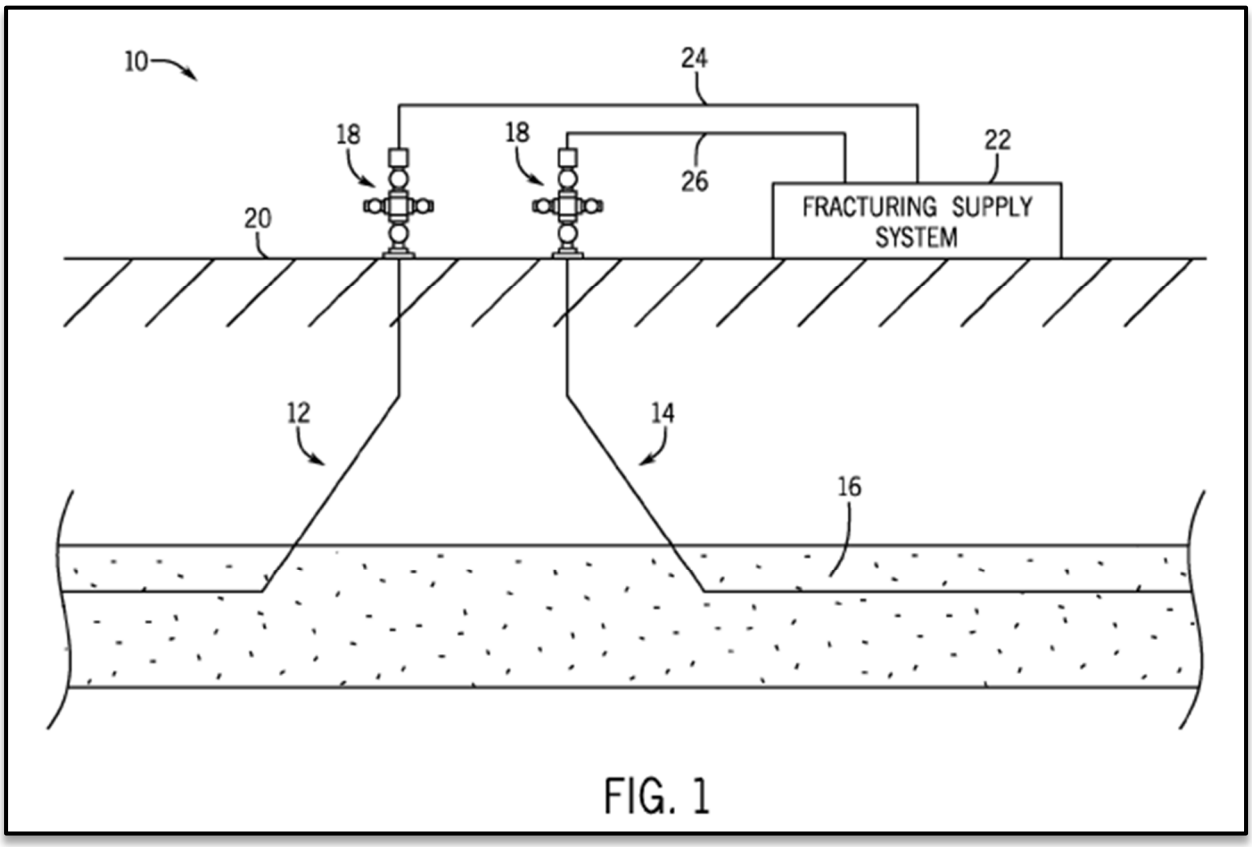

10
24
18
18
26
22
20
FRACTURING SUPPLY SYSTEM
12
14
16

FIG. 1

3. AL-SALMANI

"*Al-Salmani*" (U.S. Publication 2020/0149389, Ex. 1020) published May 14, 2020, more than one year before '952's EEF-date, is § 102(a)(1) prior art. Ex. 1002 ¶ 129.

Al-Salmani discloses wellhead-monitoring systems including sensors associated with a fracturing tree for obtaining wellhead operating conditions and "providing continuous monitoring of pressure and valve positions." *Al-Salmani*, ¶¶ [0005], [0022]. The sensors monitor pressure and/or "flow into and out of the wellbore," which "may be correlated to different stages of the fracturing operation." *Id*., ¶¶ [0038], [0039]. Ex. 1002 ¶ 130. A control unit receives/transmits sensor information and displays it so an operator can "evaluate a particular mode or stage within the fracturing operation, which may drive additional operations." *Id*., ¶¶ [0005], [0024]. Ex. 1002 ¶ 131.

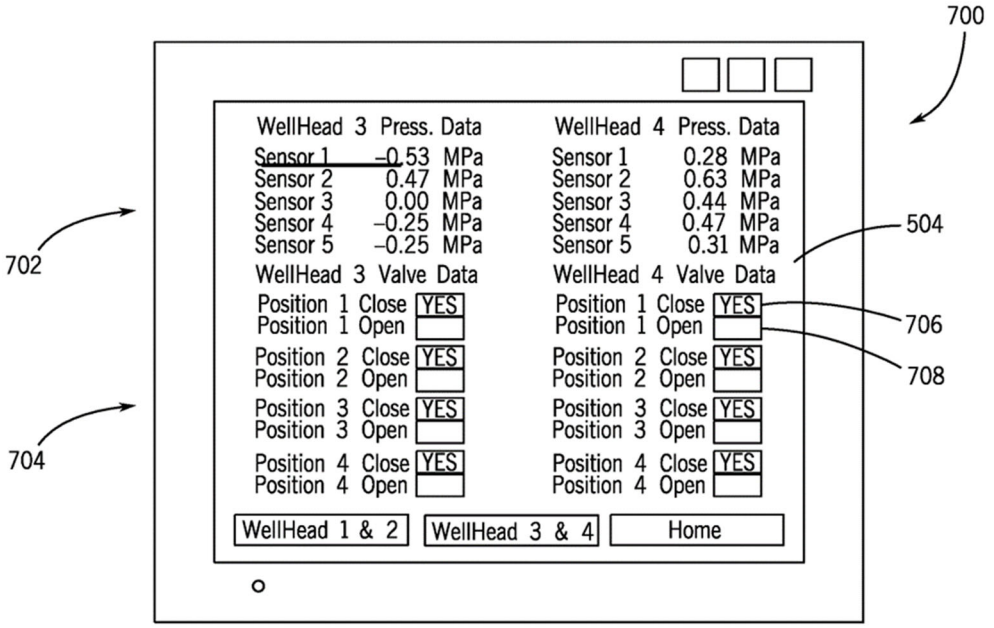

700
WellHead 3 Press. Data
Sensor 1 −0.53 MPa
Sensor 2 0.47 MPa
Sensor 3 0.00 MPa
Sensor 4 −0.25 MPa
Sensor 5 −0.25 MPa
WellHead 4 Press. Data
Sensor 1 0.28 MPa
Sensor 2 0.63 MPa
Sensor 3 0.44 MPa
Sensor 4 0.47 MPa
Sensor 5 0.31 MPa
WellHead 3 Valve Data
WellHead 4 Valve Data
Position 1 Close YES
Position 1 Open
Position 2 Close YES
Position 2 Open
Position 3 Close YES
Position 3 Open
Position 4 Close YES
Position 4 Open
WellHead 1 & 2
WellHead 3 & 4
Home
702
704
504
706
708

FIG. 7

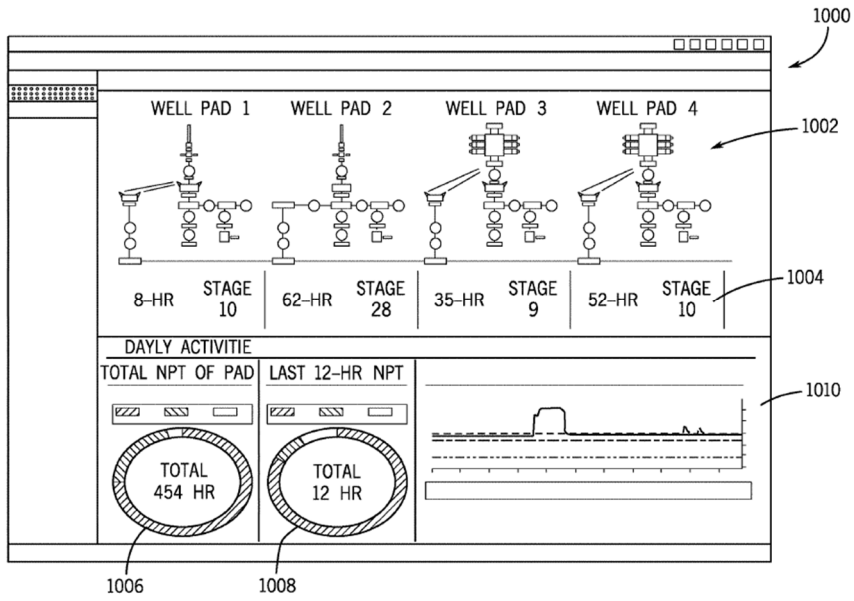

1000
WELL PAD 1
WELL PAD 2
WELL PAD 3
WELL PAD 4
1002
8-HR STAGE 10
62-HR STAGE 28
35-HR STAGE 9
52-HR STAGE 10
1004
DAYLY ACTIVITIE
TOTAL NPT OF PAD
LAST 12-HR NPT
1010
TOTAL 454 HR
TOTAL 12 HR
1006
1008

FIG. 10

4. KRUPA

"*Krupa*" (U.S. Pub. No. 2022/0268141, Ex. 1022) was filed on February 18, 2022, published on August 25, 2022, and claims priority to U.S. Provisional No. 63/153,607 ("*Krupa-Provisional*," Ex. 1023), filed February 25, 2021, which is identical and entirely supports *Krupa.* (*Compare* Ex. 1022 and Ex. 1023; *see also* Ex. 1024 (*Krupa/Krupa-Provisional* merge-compare); Ex. 1002, ¶ 118. *Krupa*'s effective filing date is February 25, 2021—more than one year before '952's EEF-date (January 23, 2023). Krupa is § 102(a)(1) prior art.[12]

Krupa discloses CP hydraulic fracturing systems/methods for multiple wells, where a pump manifold directs pressurized fracking fluid from high pressure pump(s) to a zipper manifold for selective distribution to the wellhead assemblies:

[12] Even if '952 were somehow given '663 Provisional's filing date of May 17, 2021, however, *Krupa* would be § 102(a)(2) prior art because *Krupa*'s EEF-date precedes May 17, 2021.

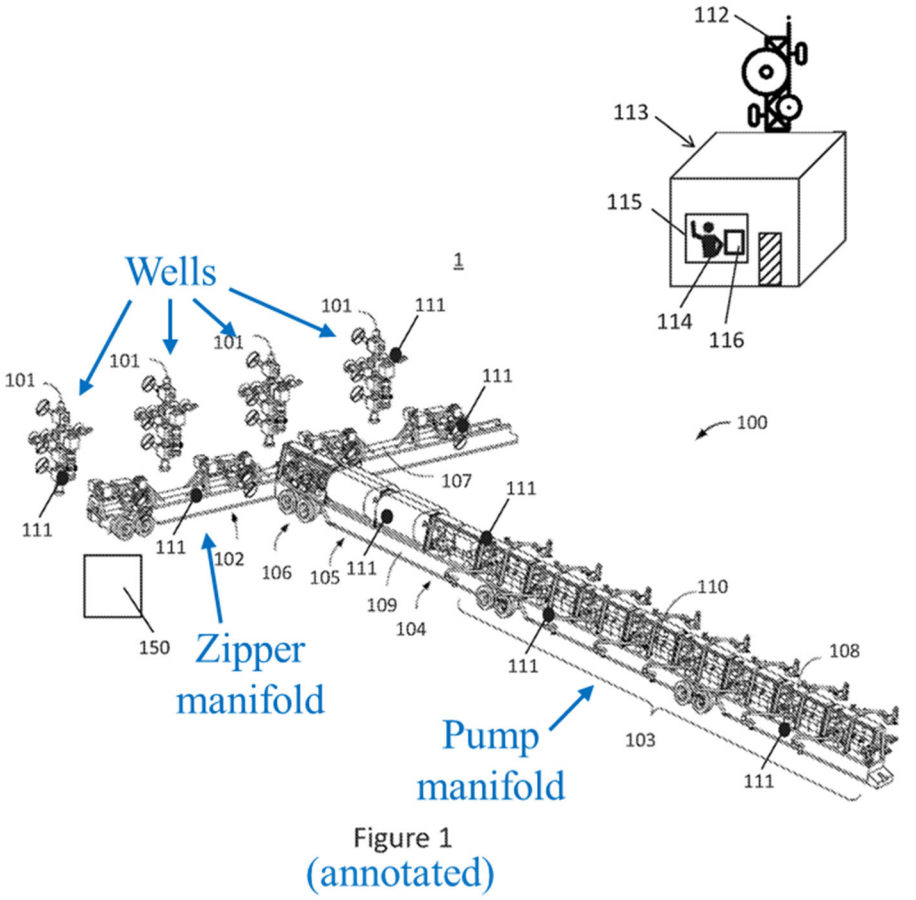


Figure 1
(annotated)

Krupa, Abstract, ¶¶ [0019], [0038]; Ex. 1002, ¶¶ 119-124.

Computing systems and/or controllers execute software instructions for a sequence of valve operations to direct fluid into selected wells. *Id*., [0027], [0051]-[0053]. Figures 2A-E show an exemplary valve sequence/flow path for fluid flow (230) continuously pumped through the zipper manifold, via manifold connection (210a) to wellhead assemblies (201a-d) to direct fluid flow (232-234) into selected wells:

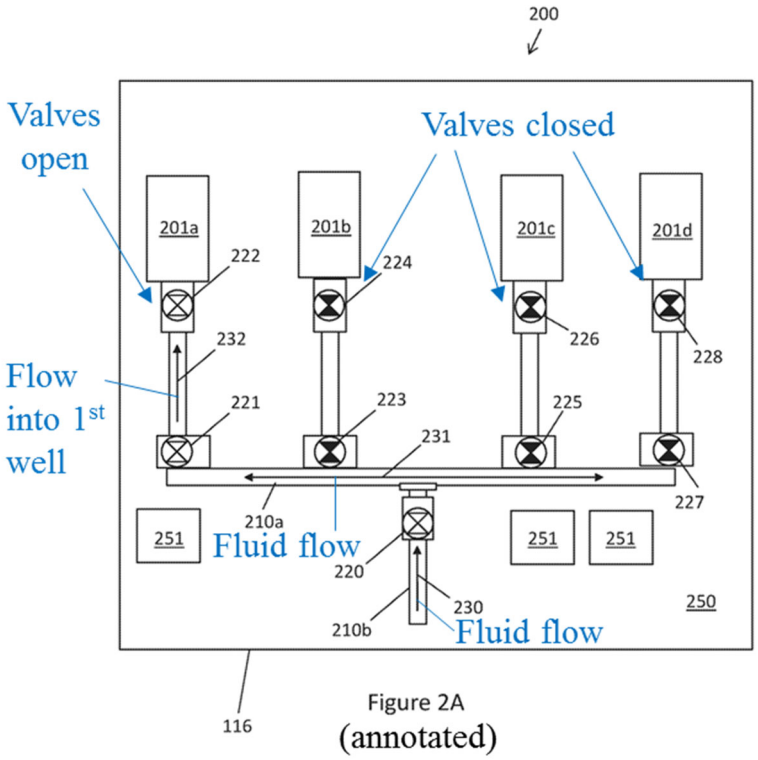


Figure 2A
(annotated)

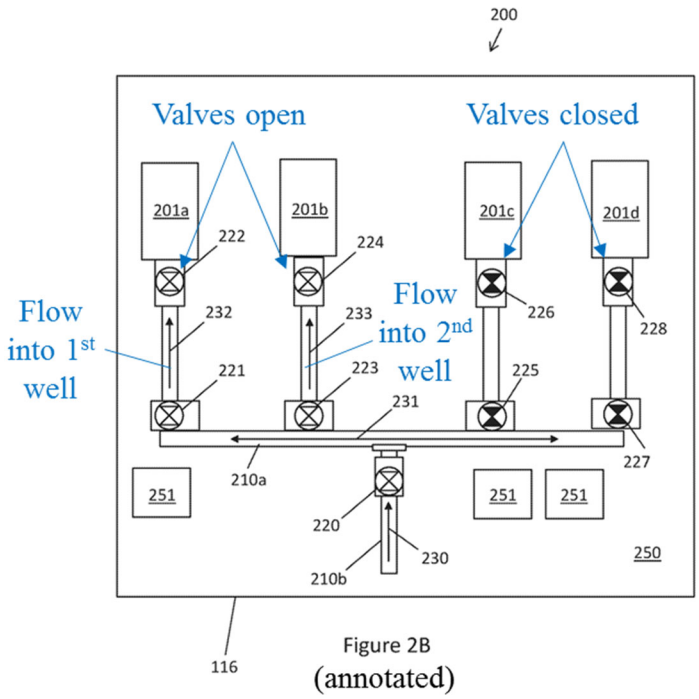


Figure 2B
(annotated)

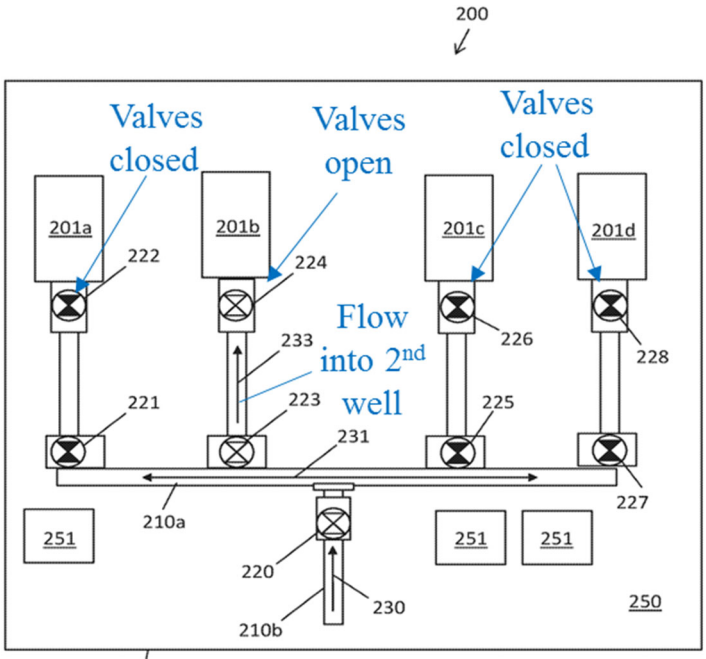


Figure 2C
(annotated)

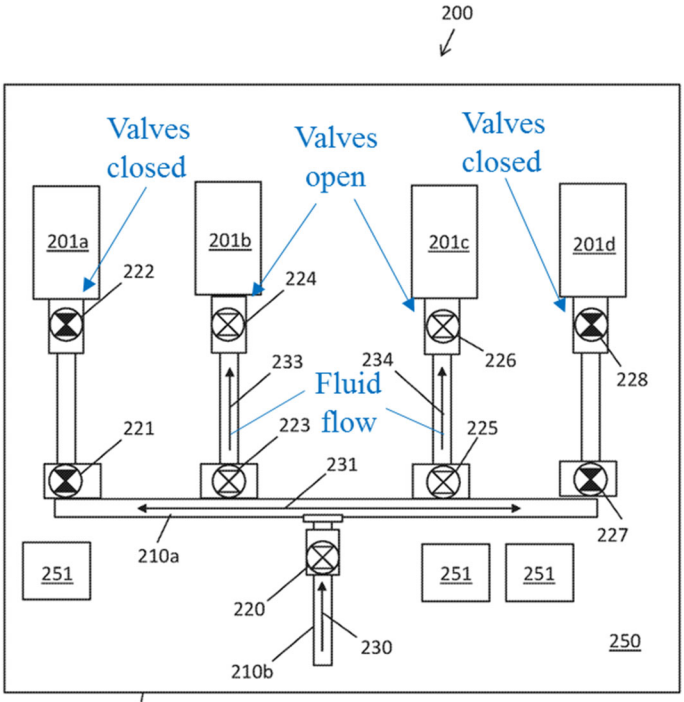


Figure 2D
(annotated)

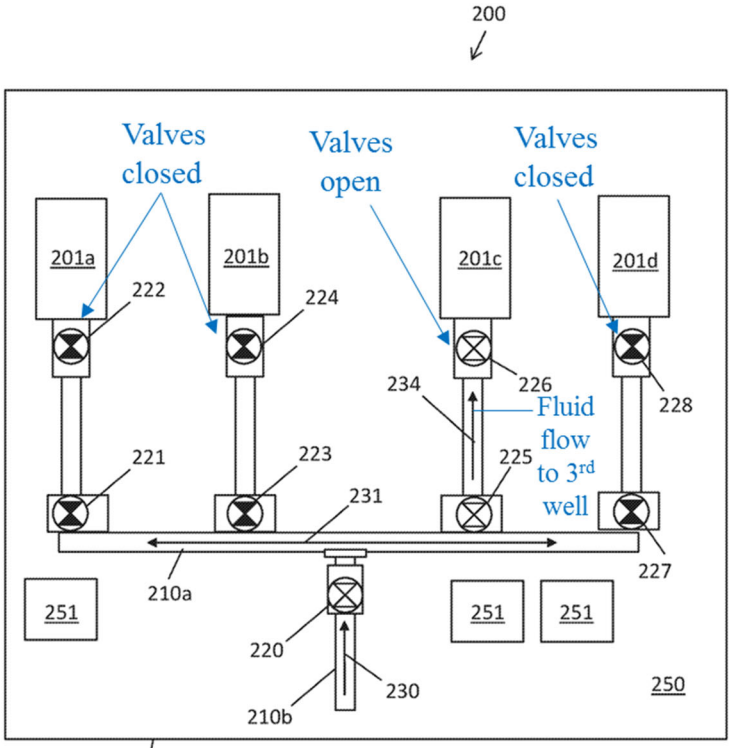


Figure 2E
(annotated)

Id. ¶¶ [0005], [0040]-[0046].

Although *Krupa* undisputedly discloses a CP process, Downing has argued that 35 U.S.C. § 102 (b)(2)(B) disqualifies *Krupa*'s CP disclosures because Downing allegedly publicly disclosed *Krupa*'s CP disclosures on a webpage on October 12, 2020 ("*Downing's Webpage*"). EX_1015_003, 021. But § 102(b)(2)(B) only applies (1) to § 102(a)(2) prior art, and (2) if the prior art and the inventor's prior public disclosure's *subject matter is the same*.[13] If there are *any* differences, even

[13] MPEP § 717.01(b)(2).

insubstantial changes or only trivial or obvious variations, the exceptions do not apply.[14]

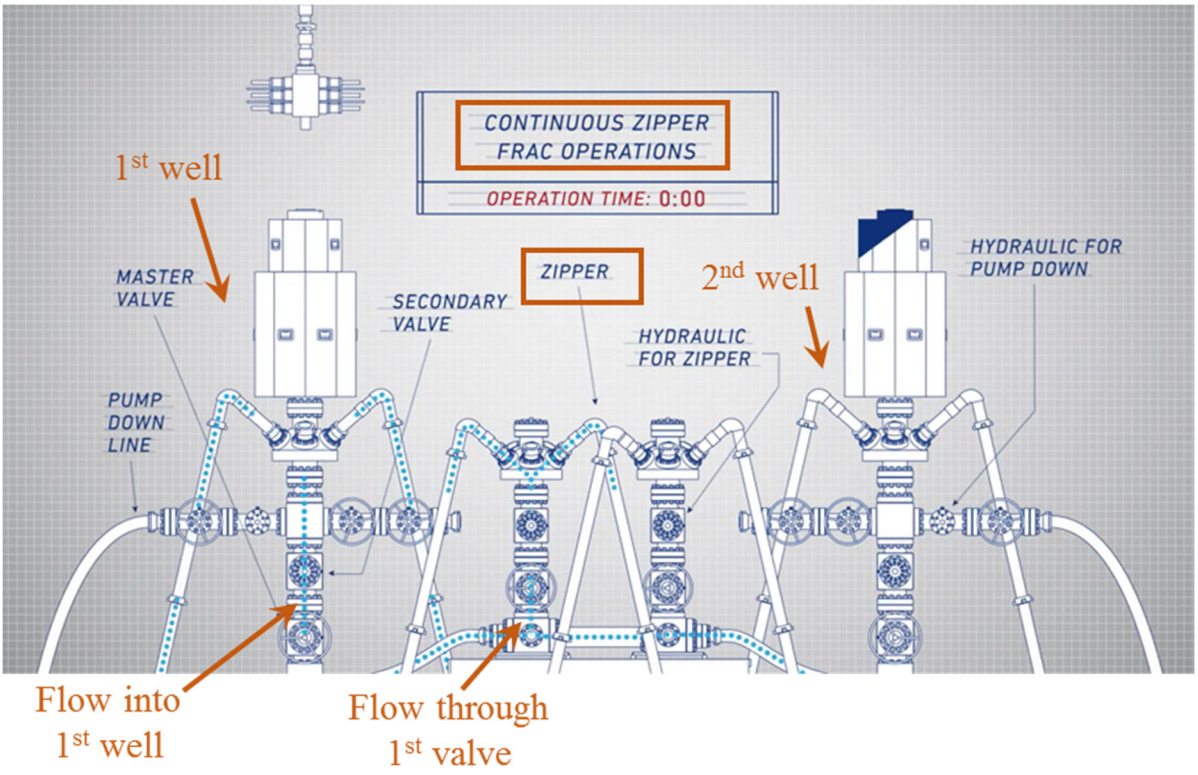
If '952's EEF-date is January 2023, *Krupa* is § 102(a)(1) prior art. Even if *Krupa* were § 102(a)(2) prior art (if '952's EEF-date was May 17, 2021), § 102(b)(2)(B) does not apply because *Krupa* and *Downing's Webpage*'s subject matters are not the same. *Downing's Webpage* does not disclose, for example, *Krupa*'s manifold connection to multiple wells, opening valves in response to operational conditions (including flowrate), and other features discussed below.

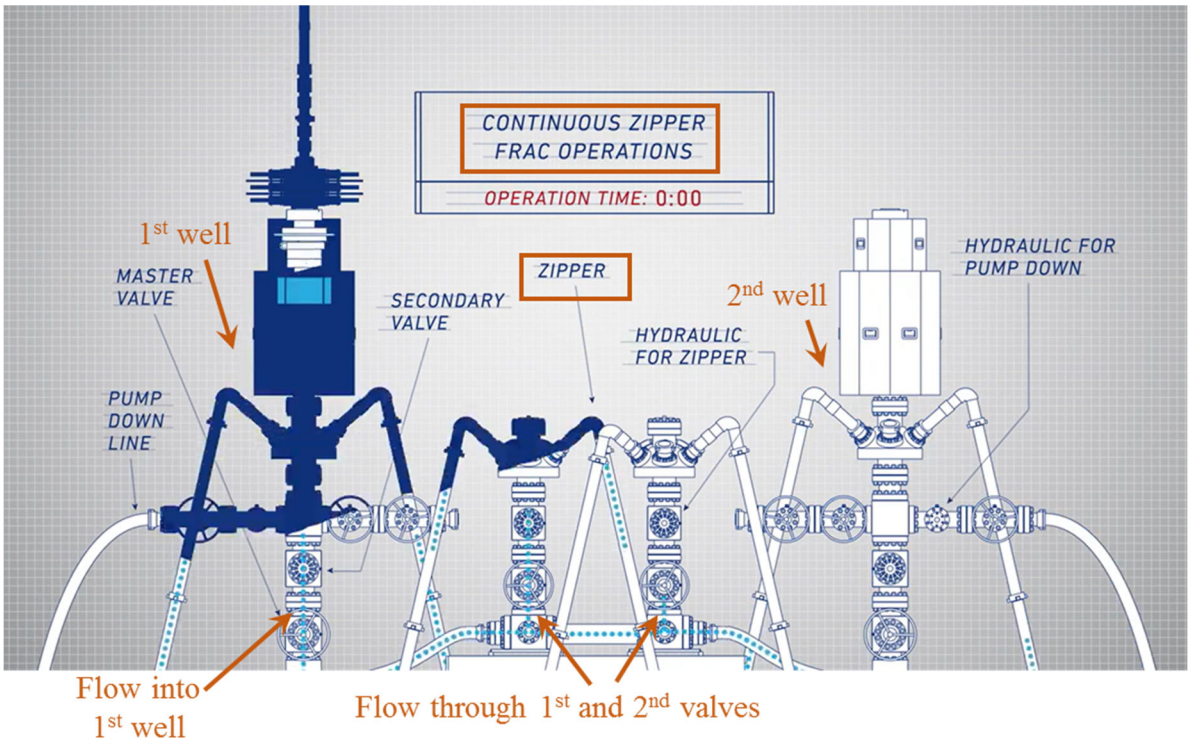
5. FS-VIDEO

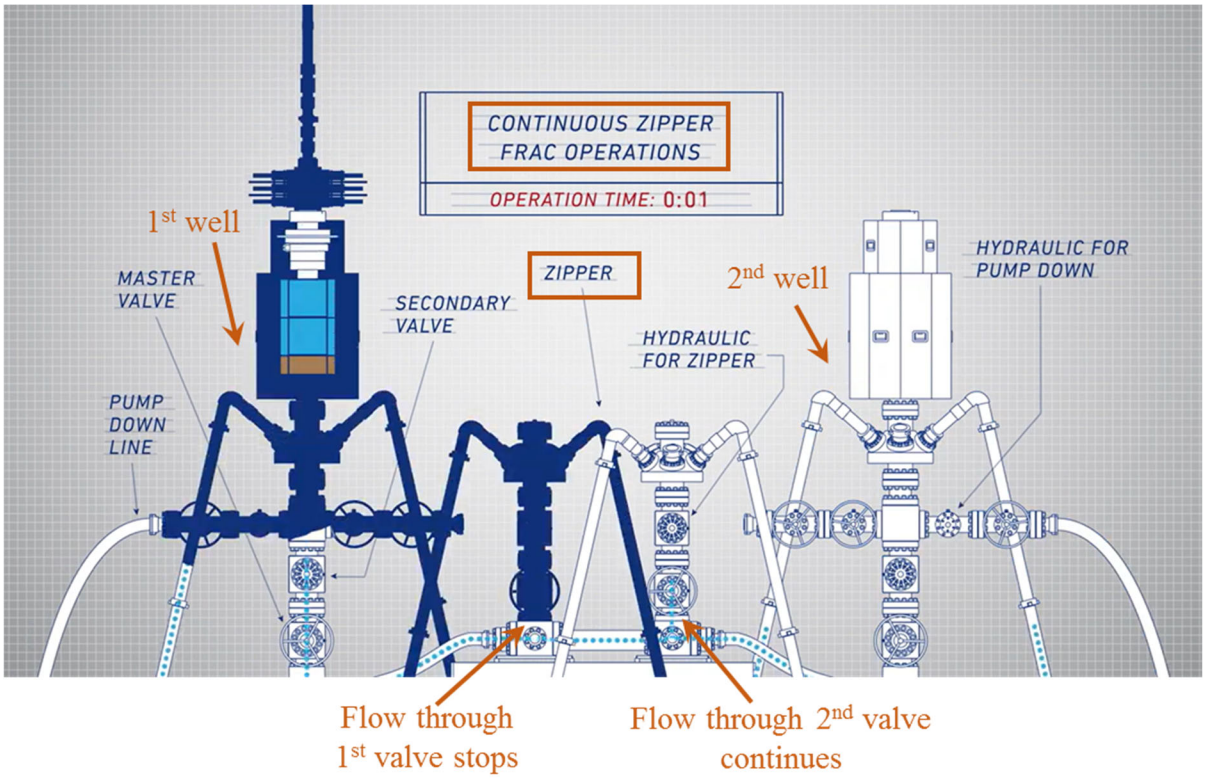
Downing published "FS Completion System: How it Works" (Ex. 1027 ("*FS-Video*"), available at https://www.youtube.com/watch?v=X0m9DcnZczE) on March 5 (YouTube) and August 27, 2019 (Facebook)—more than one year before '952's EEF-date. Exs. 1026-1035. *FS-Video* is §102(a)(1) prior art. Ex. 1002 ¶ 132.

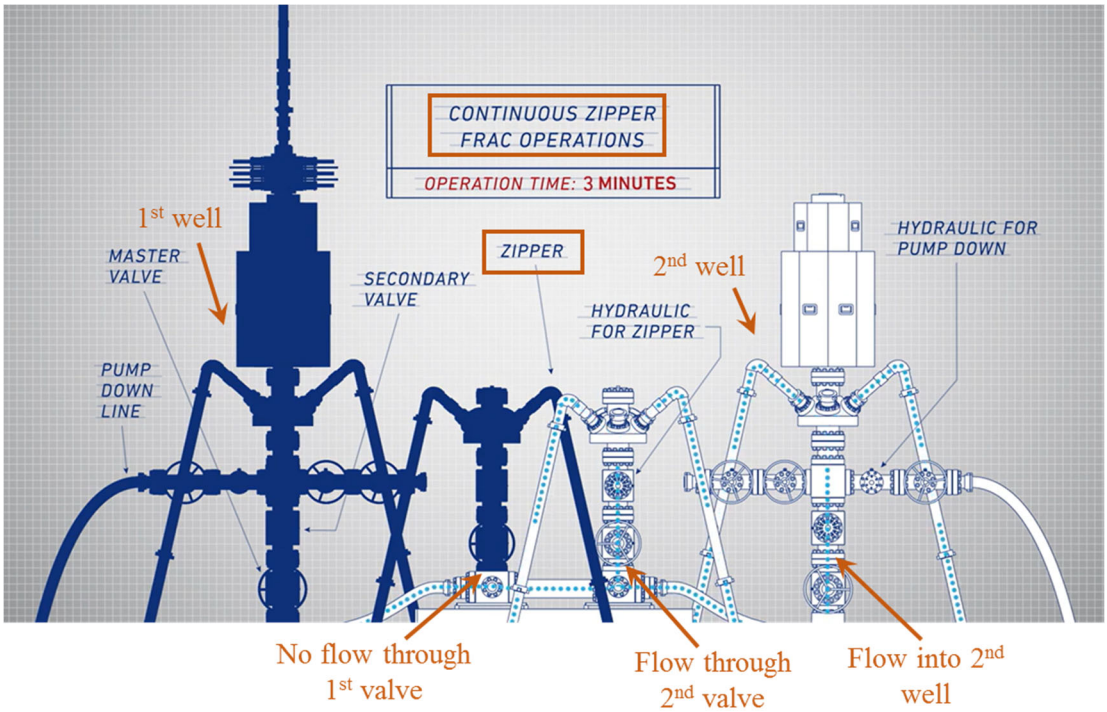
FS-Video shows "continuous frac operations," *i.e.*, continuously pumping fluid through a zipper while swapping flow between wells. *FS-Video*, 0:55-1:37. As fluid is continuously pumped through the zipper and second valve, to the second well, flow is stopped through the first valve, as shown in annotated screenshots. Ex. 1002 ¶¶ 133-134; *FS-Video*, 1:07-1:09 and 1:37:

[14] *Id.*


CONTINUOUS ZIPPER
FRAC OPERATIONS
OPERATION TIME: 0:00
1st well
MASTER VALVE
SECONDARY VALVE
ZIPPER
2nd well
HYDRAULIC FOR PUMP DOWN
HYDRAULIC FOR ZIPPER
PUMP DOWN LINE
Flow into 1st well
Flow through 1st valve


CONTINUOUS ZIPPER
FRAC OPERATIONS
OPERATION TIME: 0:00
1st well
MASTER VALVE
SECONDARY VALVE
ZIPPER
2nd well
HYDRAULIC FOR PUMP DOWN
HYDRAULIC FOR ZIPPER
PUMP DOWN LINE
Flow into 1st well
Flow through 1st and 2nd valves


CONTINUOUS ZIPPER FRAC OPERATIONS
OPERATION TIME: 0:01
1st well
MASTER VALVE
SECONDARY VALVE
ZIPPER
2nd well
HYDRAULIC FOR ZIPPER
HYDRAULIC FOR PUMP DOWN
PUMP DOWN LINE
Flow through 1st valve stops
Flow through 2nd valve continues


CONTINUOUS ZIPPER FRAC OPERATIONS
OPERATION TIME: 3 MINUTES
1st well
MASTER VALVE
SECONDARY VALVE
ZIPPER
2nd well
HYDRAULIC FOR ZIPPER
HYDRAULIC FOR PUMP DOWN
PUMP DOWN LINE
No flow through 1st valve
Flow through 2nd valve
Flow into 2nd well

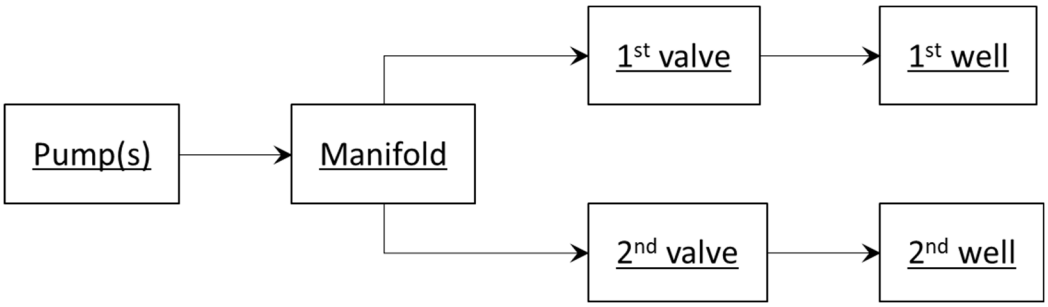
B. GROUND 5—*CHRISTIE* RENDERS OBVIOUS ALL CHALLENGED CLAIMS

Hydraulic fracturing operations commonly include "dividing the wellbore into numerous individual operations or stages" and performing pumping and wireline operations (*e.g.*, pump-down and perforating operations) to isolate and perforate the wellbore for each stage. *Christie*, [0004]. When "multiple wellbores" are stimulated/fractured in parallel, "[l]ack of coordination and communication between the well services results in inefficiencies, resulting in fewer…hours of active pumping per day." *Id*., [0005]. *Christie* teaches systems/methods for reducing these inefficiencies using monitoring and valve control to "simultaneously" switch hydraulic fracturing operations between multiple wells. *Id*., [0009], [0033], [0039]-[0041], [0047]. In *Christie*, "simultaneous" means "certain operations that are performed at generally the same time (e.g., concurrently)," *i.e.*, "simultaneous operations are intended to mean operations that at least partially overlap in time." *Id*., [0033]. Thus, *Christie* discloses '952's claimed concept of using generic/conventional fracturing equipment for "continuous pumping ('CP') swaps," *i.e*., merely beginning a next/second well's fracturing stage before ending a first well's fracturing stage.

1. INDEPENDENT CLAIMS

All claims recite a conventional fracturing system configuration with the wells fluidly connected to pumps via a manifold and associated valves. Certain limitations

outline a pump-manifold-valve$_1$-well$_1$ configuration, where fluid is communicated from pump(s) to the first well via a manifold and an associated first valve, and other limitations outline a pump-manifold-valve$_2$-well$_2$ configuration, where the second well is also in fluid communication with the pump(s) via the manifold and an associated second valve, as illustrated here:



All claims also recite "executing a CP swap" where a first valve on a first well is opened, then a second valve on a second well is opened "in response to" "one or more conditions" being satisfied, then the first valve is closed, while fluid is continuously communicated via a manifold.

Christie discloses/teaches/suggests all limitations of '952's Challenged Claims. Ex. 1002, ¶ 154.

This section discusses the Challenged Claims (1/20/39/58/65/72), which recite identical (or similar/reworded) limitations with only slight variations. Claim 1 is addressed first, followed by the slight variations in the other independent claims.

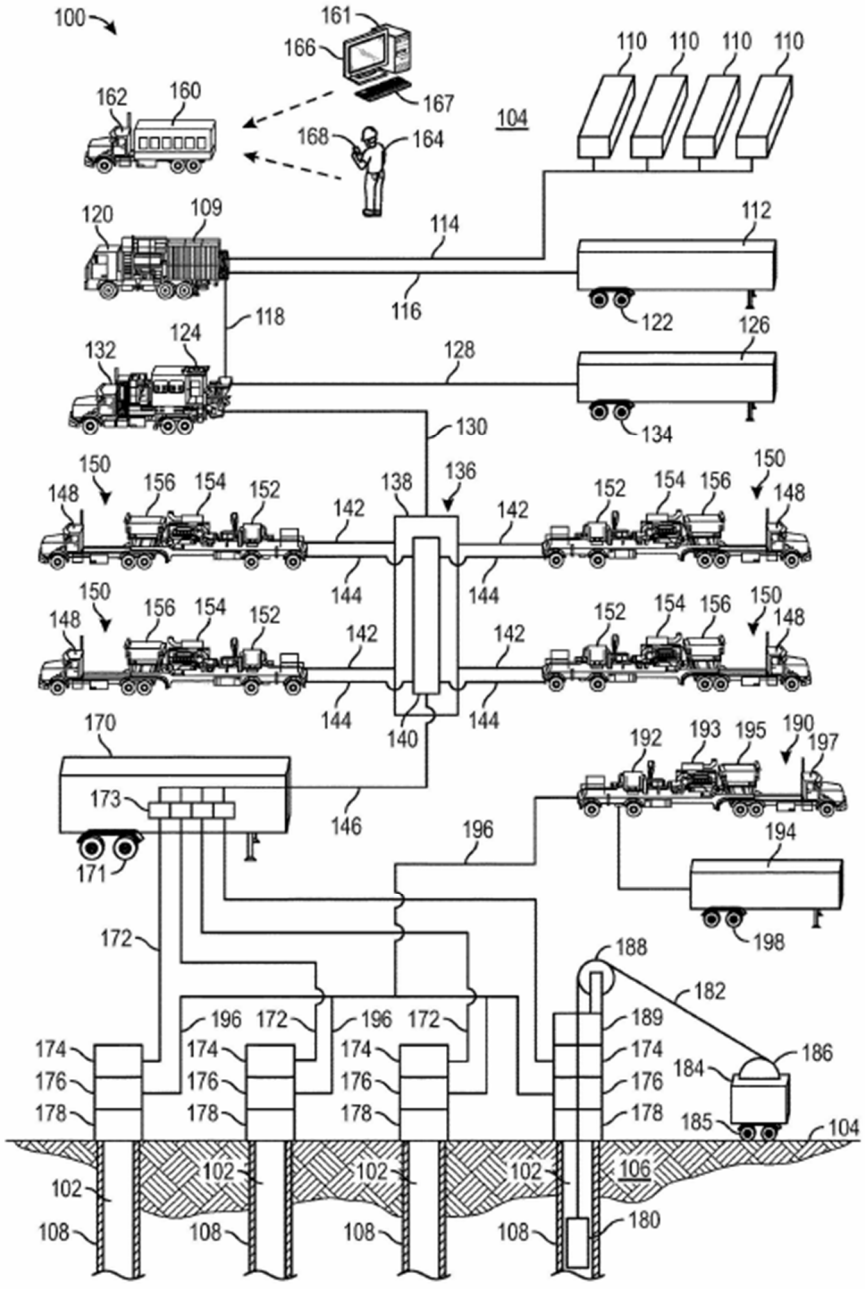
a. CLAIM 1

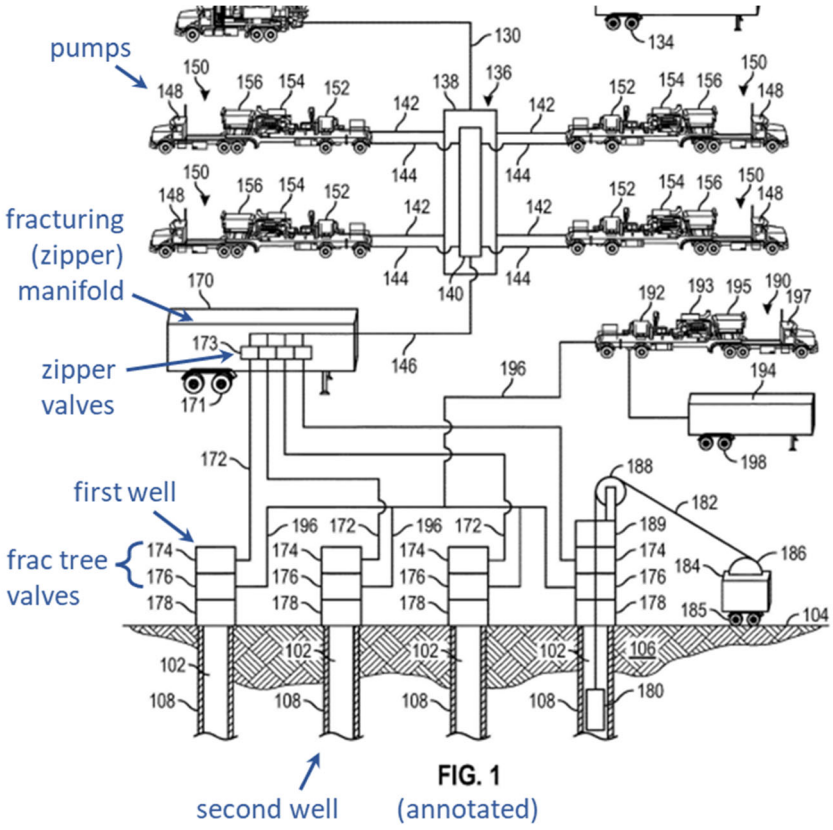
Christie renders Claim 1 obvious[15].

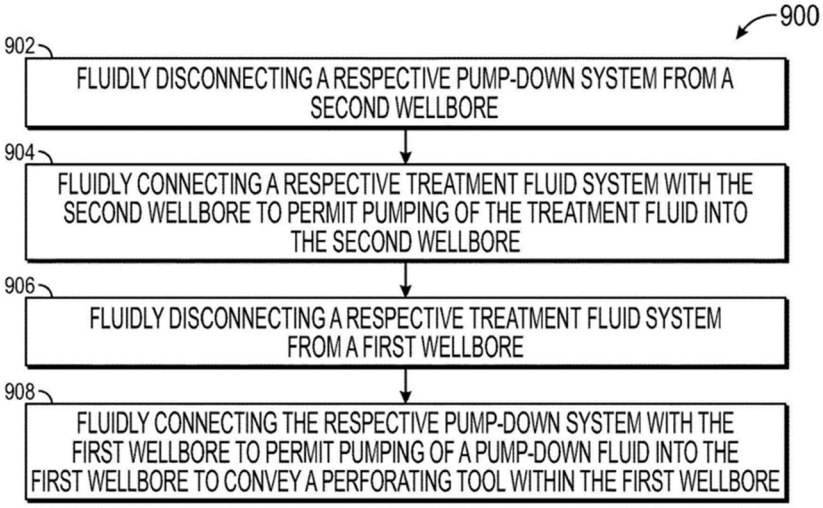
CHRISTIE-CHART 1

Claim	*Christie*
[1.1]-"A method of hydraulically fracturing a plurality of wells, the plurality of wells comprising first and second wells, the method comprising:"	*Christie* discloses a "monitoring and control system ... for ... controlling various wellsite equipment of the wellsite systems 100, 200, 300 to perform processes, operations, and methods...., including ... stimulation operations" for hydraulic fracturing first and second wells. [0004], [0009], [0088]; *see also*, [0032]-[0034], [0040], [0047]-[0048], [0144]; Ex. 1002, ¶¶ 156-159.

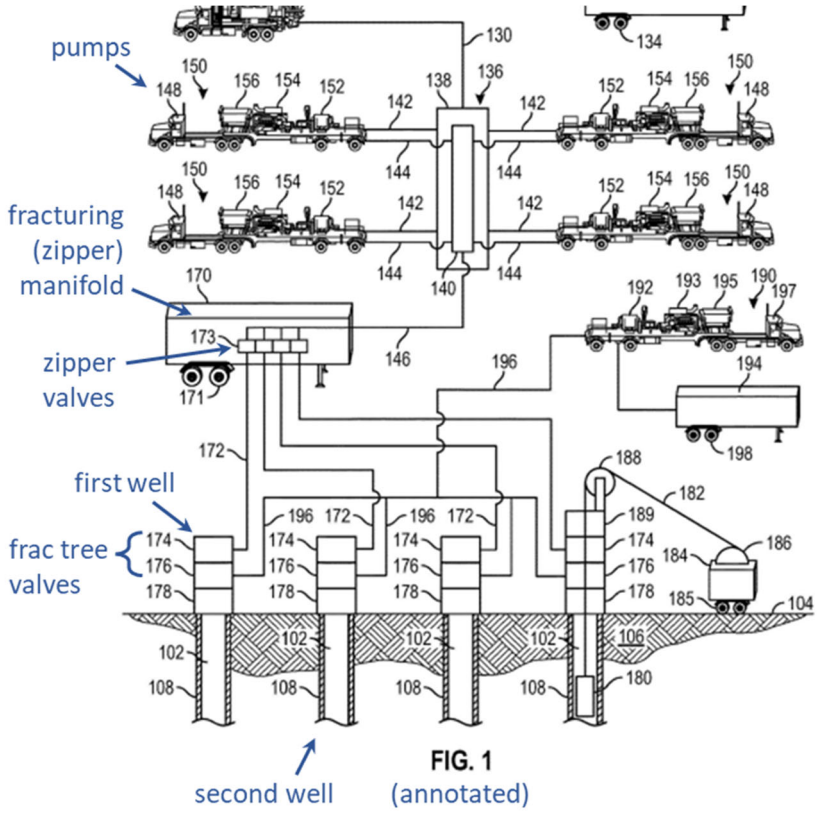
[15] Bracketed 4-digit numbers in claim charts refer to the reference's numbered paragraphs. Figures cites are exemplary.

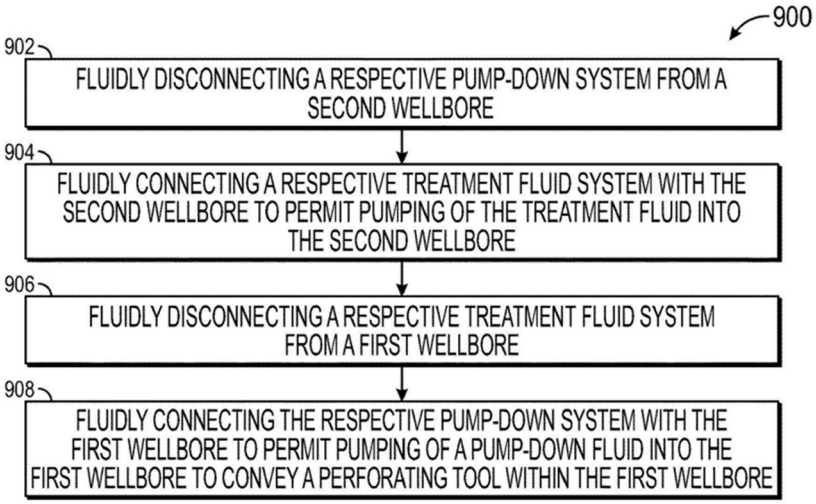
Claim	*Christie*
	 FIG. 1
[1.2]- "communicating fluid from one or more pumps to the first well	*Christie* discloses communicating fluid through this conventional pump-manifold-valve-well configuration. *Christie* discloses pumping treatment/fracturing fluid from pumps (150/152) through a fracturing (zipper) manifold (170)

Claim	*Christie*
via a manifold and a first valve, wherein the first valve is associated with both the first well and the manifold so that the first valve is: in fluid communication with the manifold; and fluidically positioned between the first well and the one or more pumps; and”	to “a selected one or more of the wellbores [(102)]…ready to be fractured.” [0039], [0047], [0072]. The fracturing/zipper manifold “selectively distribute[s] the treatment fluid between the wellbores” using “remotely operated” fracturing/zipper manifold valves (173) to inject the fracturing fluid through frac tree valves (174/176) “into a selected one or more of the wellbores:”  FIG. 1 (annotated) [0040]-[0041], [0073]. The first well (102) has a first valve (173/174) fluidly connected to (*i.e.,* in fluid communication with) the fracturing/zipper manifold to selectively allow/prevent fluid pumped from the pumps to the first well. [0040], Fig. 1. Figure 1 shows the first valve (*e.g.*, fracturing/zipper manifold or frac tree valve) fluidically positioned between its associated well and pump(s) via conduits (144/146/172). [0038]-[0040], [0075]; Ex. 1002, ¶¶ 160-171.

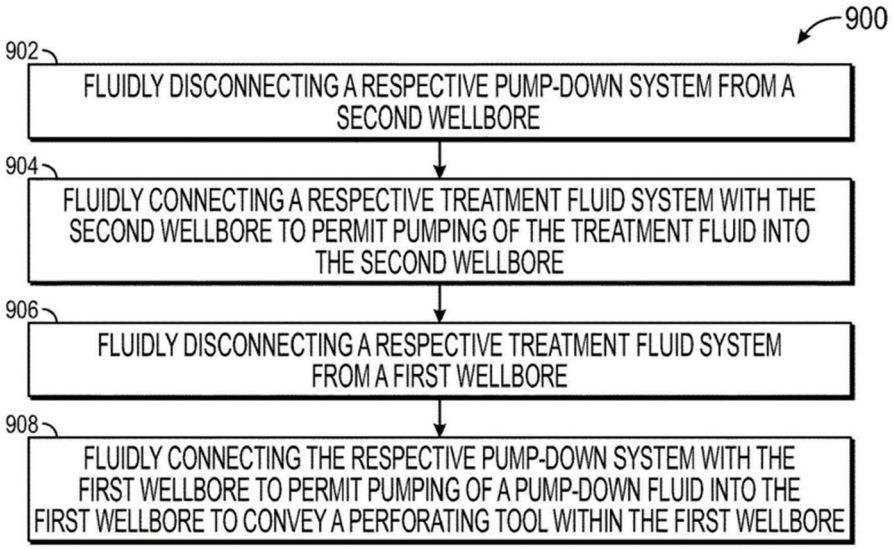
Claim	*Christie*
[1.3]-"executing a continuous pumping ("CP") swap to transition from hydraulically fracturing the first well to hydraulically fracturing the second well, the CP swap comprising:"	*Christie* discloses executing a CP swap to transition hydraulic fracturing from a first to a second well. [0101]. *Christie*'s controller 410 "automatically coordinate[s] a well swap process," which includes "opening and closing…valves" (fluidly connecting/disconnecting) associated with each well to "swap" from fracturing one well to the next. *Id.*  FIG. 9 *Christie* uses a controller, including a processor and "memory storing computer program code," "to implement optimal…wellsite equipment coordination…with the goal of performing continuous pumping downhole" to "provide or facilitate continuous stimulation operations."[16] [0031], [0093], [0098]. Although *Christie* refers to use of crew and equipment as "nearly continuous," this simply refers to the need to pause operations only for maintenance and does not teach away from continuous pumping operations—one of *Christie*'s explicitly-stated goals. [0047], [0093], [0098], [0102], [0104], Figure 9; Ex. 1002, ¶¶ 172-177.
[1.3.1]-"opening	*Christie* discloses opening a second valve as claimed.

[16] "Hydraulic fracturing" is a type of well "stimulation." *Christie*, [0004], [0093].

Claim	*Christie*
a second valve while fluid is communicated from the one or more pumps to the first well via the first valve and the manifold so that the second valve is: in fluid communication with the manifold; and fluidically positioned between the second well and the one or more pumps from which fluid is communicated to the first well via the manifold and the first valve, wherein the second valve is associated with both the second well and the manifold, wherein opening the second valve causes fluid to be communicated	Figures 1 and 9 show switching to a second well's fracturing stage when the first well's fracturing stage is ending by opening the second well's valve (173/174) to permit pumping of treatment/fracturing fluid into the second well (block 904) while the treatment/fracturing fluid is also being pumped to the first well. As shown, at 906 fluid is disconnected from the first wellbore after fluidly connecting the system to the second wellbore at 904. Thus, the second valve is opened providing fluid communication to the second well while fluid is still communicated (pumped) to the first well via the manifold and first valve.  FIG. 1 (annotated)

Claim	*Christie*
from the one or more pumps to the second well via the manifold and the second valve, and"	 FIG. 9 [0144], [0161]-[0162]. *Christie* operates the fluid valve system to "simultaneously" ("partially overlap[ping] in time") perform the steps in Figure 9 with "the goal of performing continuous pumping downhole". *Christie*, [0098], [0161]-[0162] (emphasis added); Ex. 1002, ¶¶ 178-204. *Christie* uses conventionally arranged zipper fracturing systems for its "well swap process," to pump treatment/fracturing fluid through a fracturing (zipper) manifold to "a selected one or more of the wellbores," with a second valve (173/174) fluidically positioned between the second well (102) and the one or more pumps (150/152) from which fluid is communicated to the first well (102) via the manifold (170) and the first valve (173/174). Figure 1, [0039], [0040]-[0041], [0047], [0072]-[0073], [0101]. Ex. 1002 ¶¶ 195-197.
[1.3.2]-"wherein the second valve is opened in response to at least a portion of fluid	*Christie*'s second valve is opened in response to fluid satisfying one or more conditions, as claimed. *Christie*'s fracturing operations include moving to a next well's fracturing stage using an overlapping valve sequence (opening the second well's valve(s) before closing the first well's valve(s)) in response to monitored flowrate/pressure

Claim	*Christie*
communicated via the manifold satisfying one or more conditions, which one or more conditions include a flow rate, and/or a pressure, of the at least a portion of fluid communicated via the manifold; and"	conditions of the pumped fluid. [0029], [0094], [0100], [0108], [0126], [0161]-[0162]. *Christie*'s controller 410 determines when stimulation/fracturing on one wellbore is ending and if the next wellbore is ready for fracturing "based at least in part on feedback from sensors relating to any and all of the operational parameters," including downhole "pressures" and "flow rates" and "pressures"/"flow rates" exiting the pump units (*i.e.*, fluid being communicated to the wells via the fracturing/zipper manifold). [0087], [0094], [0099], [0107]-[0108]. *Christie*'s controller executes commands to control parameters of the wellsite system "based at least in part on feedback from sensors," (*i.e.*, "in response to…one or more conditions") including "automatically coordinat[ing] a well swap process, such as by automatically opening and closing flow control wellhead valves 444" (*e.g.*174). [0009], [0067], [0094], [0100]-[0101]. For example, if sensor feedback indicates "the next wellbore…is ready for stimulation operations, the controller…may operate (*i.e.*, open) the corresponding fluid access valve…to inject the treatment fluid (*e.g.*, fracturing fluid) into the next wellbore." [0099]. *Christie*'s controller also includes a program "to determine whether a particular operational parameter is within an acceptable operating range." [0110]. Using sensors and monitoring operational parameters (*i.e.*, "conditions"), *Christie*'s controller may "implement optimal…wellsite equipment coordination…with the goal of performing continuous pumping downhole." [0098]. In Figure 9, when the first well's fracturing stage is ending, *e.g.*, via measured fluid pressure/flowrate indicative of a fracturing stage's end, the next well's valves are opened to initiate the next well's fracturing stage, and afterwards, the first well's valves are closed to end the first well's fracturing stage. [0087]-[0108], [0161]-[0162], Figures 4 and 9.

Claim	*Christie*
	Further, a POSITA would have understood that fluid conditions, such as those measured/monitored by *Christie*, correspond with different events in a fracturing stage, including the end of a fracturing stage, where flowrate and/or pressure may drop. Ex. 1002, ¶¶ 205-221. Accordingly, it would have been obvious, based on *Christie* and a POSITA's general knowledge, to open the second valve in response to operational parameters (*i.e.*, "conditions"), including flow/rate and pressure of fluid pumped via the manifold to swap hydraulic fracturing from the first to second well. *Id*.
[1.3.3]- "closing the first valve: after the at least a portion of fluid communicated via the manifold has satisfied the one or more conditions, which one or more conditions include the flow rate, and/or the pressure, of the at least a portion of fluid communicated via the manifold, and" **[1.3.4]**- "while fluid is communicated from the one or more pumps to the second well via the second	*Christie* discloses closing the first valve after the fluid has satisfied "condition(s)." Figure 9 shows closing the first valve (at 906) *after* opening the second valve (at 904), thereby ending the first well's fracturing stage, while fracturing fluid is pumped via the manifold to the second well:  FIG. 9 [0033], [0144], [0156], [0161]-[0162], Figure 9, Ex. 1002, ¶¶ 222-227. Because the first valve is closed after the second valve is opened in response to the fluid (communicated via the manifold) satisfying condition(s), the first valve is also closed

Claim	*Christie*
valve and the manifold;"	after that fluid has met the condition(s). As discussed with [1.3.2], opening/closing valves (173/174) is "based…on feedback from sensors relating to any and all of the operational parameters" (*i.e.*, "in response to…one or more conditions"). [0094]-[0097].
[1.4]-"wherein, during the CP swap, fluid is continuously communicated from the one or more pumps via the manifold."	*Christie*'s controller operates the valve system to fluidly connect/disconnect the fluid system to the first/second wellbore via their respective valves while continuously pumping fluid during a coordinated well "swap" process. [0033], [0098], [0161]-[0162]; Ex. 1002, ¶¶ 228-232. Fracturing fluid from the pumps (150/152) is continuously communicated to the wells (102) via the manifold (170). Figure 1.

See also, Ex. 1002, ¶¶ 155-232, 1061-1062.; Ex. 1019, Figure 1, Abstract, [0004]-[0006], [0015]-[0024], [0029]-[0031], [0049], [0065], [0075]-[0083], [00100]-[00101], [0108], [00113]-[00116].

b. CLAIMS 20/39/58/65/72

Claim 20 is the computer implementation of Claim 1. Claim 39 is Claim 1's system. Claims 58, 65, and 72 mirror Claims 1, 20, and 39, respectively, adding only "dashboard" limitations while broadening "one or more conditions" to not require the specific examples of flowrate/pressure. The independent claims share most limitations, as summarized here:

Limitations	Covering
[1.2]/[20.2]/[39.2]-[39.3]/[58.2]/[65.2]/[72.2]-[72.3]	Communicating fluid to first well via pump-manifold-$valve_1$-$well_1$
[1.3.1]/[20.3.1]/[39.4]/[58.3.4]/[65.3.4]/[72.4]	Second valve
[1.3]-[1.3.4]/[20.3]-[20.3.4]/[39.5]-[39.5.3]/[58.4]-[58.4.3]/[65.4]-[65.4.3]/[72.6]-[72.6.4]	Executing CP swap (opening $valve_2$ "in response to" satisfying "one or more conditions," then closing $valve_1$)
[1.4]/[20.4]/[39.5.4]/[58.6]/[65.6]	while continuously communicating fluid

Christie meets the independent claims' shared limitations for the reasons discussed in *Christie*-Chart 1.

The additional limitations not already discussed are discussed below.

Claims 20 and 65 are the computer implementation of Claims 1 and 58. *Christie* discloses their computer-implemented limitations:

CHRISTIE-CHART 2

Claim	*Christie*
[20.1]/[65.1]-A non-transitory computer readable medium [(20.1)having stored thereon computer-readable instructions executable by one or more processors to perform operations for]/[(65.1)of] hydraulically fracturing a plurality of wells, the plurality of wells comprising first and second wells, the [(20.1)operations]/[(65.1)method] comprising:	*Christie* discloses a "processing device 500 may be or form at least a portion of the controllers" (*e.g.* 161, 252, 272, 410). [0125]. The processor 512 includes local memory 514 and executes "machine-readable and executable program code instructions 532" in the local memory 514, and may execute program code instructions "to implement [*Christie*'s] example methods, processes, and/or operations," causing equipment to perform *Christie*'s methods/operations. [0032]-[0034], [0047]-[0048], [0124-0128]; Ex. 1002, ¶¶ 326-329, 412.

Claims 58, 65, and 72 add "dashboard" limitations that *Christie* also discloses:

CHRISTIE-CHART 3

Claim	*Christie*
[58.3]/[65.3]-[displaying a dashboard]/[([**72.5**]) a dashboard adapted to be displayed], which dashboard comprises:	*Christie* discloses the claimed dashboard. *Christie*'s controller connects to a "human machine interface (HMI)…for displaying…information from the controller(s)," which includes the system's valves' "operational status (i.e., position)." [0050], [0093], [0132]. *Christie*'s HMI display, which "permit[s] visualization…of various data, such as sensor data" and/or status data (e.g., valve position), is a dashboard, or at least it would have been obvious to a POSITA to use

Claim	*Christie*
	Christie's HMI display to display valve operational status (*i.e.* position). *Id.*; Ex. 1002, ¶¶ 394, 414, 434.
[58.3.1]/[65.3.1]/[72.5.1]-a visual reference of the first valve; **[58.3.2]/[65.3.2]/[72.5.2]-**a first visual indicator associated with the visual reference of the first valve, the first visual indicator indicating that a state of the first valve is open to permit communicating fluid to the first well via the manifold and the first valve; **[58.3.3]/[65.3.3]/[72.5.3]-**a visual reference of a second valve[([**72.5.3**]); and]/ **[58.3.5]/[65.3.5]/[72.5.4]**-a second visual indicator associated with the visual reference of the second valve, the second visual indicator being different from the first visual indicator to indicate that a state of the second valve is closed; [(**[58.3.4]/[65.3.4]**)and] **[58.5]/[65.5]/[72.7]**wherein the display of the dashboard visually communicates the respective states of the first and second valves]/[(**[58.5]/[65.5]**); and]	*Christie*'s dashboard includes a visual reference of first and second valves and associated visual indicators as claimed or it would have been obvious to display them. Ex. 1002, ¶¶ 395-398, 405, 415, 417-418, 423, 435-438, 444. *Christie's* controller monitors and controls "stimulation (e.g., fracturing) operations being performed in one of the wellbores 102…and operational status (i.e., position) of the fluid flow control valves [(173/174)]…for controlling fluid flow through…the wellheads 178 into the corresponding one or more of the wellbores 102." [0093]. The "operational status" or "position" of the fluid control valves would be open, closed, or a partially opened/closed position. Because *Christie*'s dashboard/HMI display "permit[s] visualization…of various data," including status data (e.g., valve position) of the valves (the fluid control valves 173/174), it discloses visual references of the first and second valve, visually communicating their respective states ("operational status" data or "position"), which would also be obvious to a POSITA. [0093], [0132], *Id*.

If Christie's disclosure is somehow insufficiently explicit on these "dashboard" limitations, it would have been obvious to a POSITA to display valve

references and their open/closed positions (indicators), as in Limitations [58.3-58.3.4]/[65.3-65.3.4]/[72.5-72.5.4] and [58.5]/[65.5]/[72.7] on *Christie*'s HMI dashboard display that visualizes system data, including valve positions. Ex. 1002, ¶¶ 395-398, 405, 415, 417-418, 423, 435-438, 444. *Christie*'s disclosure of its valve-position displays is more explicit and thorough than anything in '952's specification, which does not even mention a "dashboard."

Christie discloses the "dashboard" limitations of Claims 58, 65, and 72.

Claims 39/72 are systems for Claims 1 and 58's methods, but separately claim the "manifold," "first valve," and "second valve" ([39.2-39.4]/[72.2-72.4]) already recited in Limitations 1.2/1.3.1/58.2/58.3.3, which *Christie* discloses, as discussed above in Limitations [1.2]-[1.3.1]. Claims 58 and 65 include a "visual reference" of the same "second valve" of Claims 39 and 72. *Christie* discloses these limitations:

***CHRISTIE*-CHART 4**

Claim	*Christie*
[39.2]/[72.2]-"a manifold…" **[39.3]/[72.3]**-"a first valve…" **[39.4]/[72.4]-**[a second valve via which fluid is adapted to be communicated from the one or more pumps to the second well,]/ **[([58.3.4]/[65.3.4])** wherein] / [([*39.4*]/[*58.3.4*]/[*65.3.4*]/[*72.4*] the second valve [being]/[is] associated with both the second well and the manifold so that the second valve is: in fluid communication with the manifold; and fluidically positioned between the second well and the one or more pumps from which fluid is [([*39.4*]/[*72.4*])adapted to be] communicated to the first well via the manifold and the first valve;	*Christie* discloses a second valve (173/174) that receives fluid communicated by the pumps (150/152) via the manifold (170) and is fluidically between the second well (102) and the pumps (150/152) that communicate fluid via the manifold to the first valve (173/174) of the first well (102), as claimed. *See* Limitations [1.2]-[1.3.1]. Therefore, *Christie*'s visualization of the second valve discussed above (*Christie*-Chart 3, Limitations [58.3.3]/[65.3.3]), also discloses a visual reference of the claimed second valve just discussed. Ex. 1002, ¶¶ 348-376, 391-406, 411-424, 429-444.

Finally, Claims 58, 65, and 72 claim "one or more conditions" without requiring they include flowrate/pressure. Because *Christie* discloses opening/closing valves in response to flowrate/pressure conditions as discussed above in Limitation 1.3.2, *Christie* discloses the broader "one or more conditions" limitations in Claims 58, 65, and 72 for the same reasons.

In summary, *Christie* discloses/renders obvious all limitations of Claims 1/20/39/58/65/72. Ex. 1002, ¶¶ 155-232, 325-337, 391-406-424, 429-444.

C. GROUND 6—*CHRISTIE* IN VIEW OF *PITCHER* AND *AL-SALMANI* RENDERS OBVIOUS ALL CHALLENGED CLAIMS

As discussed, *Christie* discloses all limitations of the Challenged Claims (1/20/39/58/65/72). *See Christie*-Chart 1.

1. "IN RESPONSE TO"

If any dispute exists that *Christie* discloses moving to a next well's fracturing stage (by opening an associated valve) "in response to" "conditions," Downing admits that *Pitcher* discloses using conditions, including flowrate and time, "to trigger a subsequent fracturing stage." EX_1015_009 (citing *Pitcher*, [0037]).

Pitcher discloses fracturing multiple wells, where "operation of the fracturing system can be improved by controlling the individual flows of fracturing fluid to each well from the fracturing manifold" by "monitoring one or more fluid parameters for each well" such as "flow rate…and pressure," and "operating valves of the fracturing manifold 44 (*e.g.*, output valves 46…) to control the fracturing fluid

entering each of the wells connected to the manifold…based on fluid parameters monitored for each well." *Pitcher*, [0030].

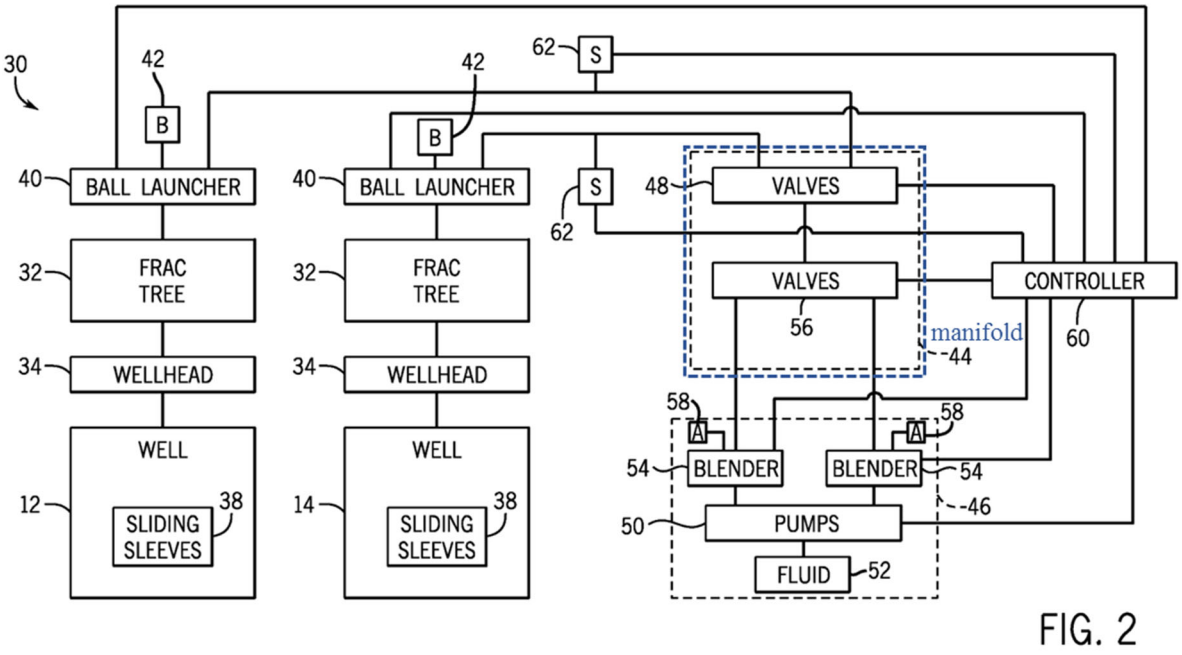


FIG. 2

In *Pitcher*, a next stage in a fracturing operation is triggered when sensor(s) determine a desired flowrate to a first well has been met for a desired amount of time. *Pitcher*, [0037].

Although *Pitcher* discloses different valve sequencing/fracturing stage orders than *Christie*, *Pitcher*'s teachings—next steps in a fracturing operation may be performed based on determined conditions indicating a current step in such operation—applies to fracturing operations, generally. Ex. 1002, ¶ 454-456. It would have been obvious to a POSITA to use flowrate and/or pressure conditions to trigger a subsequent fracturing stage, as *Pitcher* teaches, with *Christie*'s CP

fracturing operations to determine when the end of a first well's fracturing stage occurs to automatically swap to the next well's fracturing stage. *Id*. Doing so would have involved simply combining known techniques (monitoring flowrate to determine an end of a fracturing stage and when to move to the next stage) with *Christie*'s known CP systems/methods with the predictable results of more efficiently determining when to perform the CP swap. *Id.*

Al-Salmani has similar disclosures. *Al-Salmani*'s multi-well fracturing systems use sensors, *e.g.*, pressure/flow sensors, to evaluate "ongoing wellbore operations," including "a particular mode or stage within the fracturing operation, which may drive additional operations." *Al-Salmani*, [0024]-[0025], [0029], [0040], [0053]; Ex. 1002, ¶¶ 452-453. For example, sensors measure pressure within the frac tree to "enable monitoring of stages of the fracturing operation" because different operating pressures indicate different stages. *Id*., [0038], [0065]. "Spikes in pressure may be indicative of fracturing operations whereas decreases in pressure may be indicative of successful fracturing." *Id*., [0058]. "[I]f data indicates the end of the fracturing job is approached, the operator may plan to have subsequent operations prepared and ready at the well site to reduce NPT." *Id*., [0057].

Thus, *Pitcher* and *Al-Salmani* reinforce that moving a multi-well fracturing operation to a next/second well's fracturing stage (by opening the next well's associated valves to allow fluid pumped therein) was commonly done in response to

conditions of the current/first well's fracturing stage. *Pitcher*, [0030]; *Al-Salmani*, [0038]-[0040], [0053], [0057]. *Pitcher* and *Al-Salmani* disclose that such conditions may include flowrate/pressure of fluid pumped to the first well, and that flowrate/pressure thresholds may indicate when to move to the next/second well's fracturing stage. *Pitcher*, [0037]; *Al-Salmani*, [0038]-[0040], [0058], [0065].

Like *Christie*, *Pitcher* and *Al-Salmani* are directed to multi-well hydraulic fracturing systems/methods that use controllers (with processors and memory) to hydraulically fracture multiple wells. *Christie*, [0032]-[0034], [0040], [0047]-[0048], [0144]; *Pitcher*, Abstract, [0039], Figure 1; *Al-Salmani*, [0008]. It would have been obvious to a POSITA to combine the teachings of *Christie*, *Pitcher*, and *Al-Salmani* as being analogous systems used for the same purpose of efficiently fracturing multiple wells. For example, it would have been obvious to a POSITA to use *Pitcher*'s and/or *Al-Salmani*'s teachings of monitoring conditions to determine when the first well's fracturing stage is ending to initiate the swap to the next fracturing stage in *Christie*'s CP fracturing operations (opening *Christie*'s next/second/third/fourth valve before closing *Christie*'s first valve to stop flow to the first well from the manifold/pumps) to reduce NPT, as taught in *Al-Salmani*. Ex. 1002, ¶¶ 450-459; *Al-Salmani*, [0003], [0024]-[0025], [0029], [0040], [0053], [0057]; *Pitcher*, [0037]; *Christie*, [0033], [0040], [0161]-[0162], Figure 9.

2. DASHBOARD LIMITATIONS

Al-Salmani reinforces that displaying wellsite information on dashboards was common. *Al-Salmani*'s dashboard displays the system's valves and their states using "visual indicators" for "which valves are in open/closed/intermediate positions" for different wellheads ("frac trees") in a multi-well fracturing site to "enable[] operators to quickly identify conditions at the well site." *Al-Salmani*, [0026], [0046], [0049], [0060], [0063], Figures 7 and 10. In *Al-Salmani*'s Figure 7 dashboard, visual valve references are listed for "WellHead[(s)]" in a multi-well fracturing site, while "color-coding" and/or "different icons" are used as visual indicators "to provide the valve information, such as a green" or "YES" "icon 706 for an open valve and a red" or empty icon 708 "for a closed valve," indicating whether pressurized fracking fluid from the pump/manifold is communicated to the well:

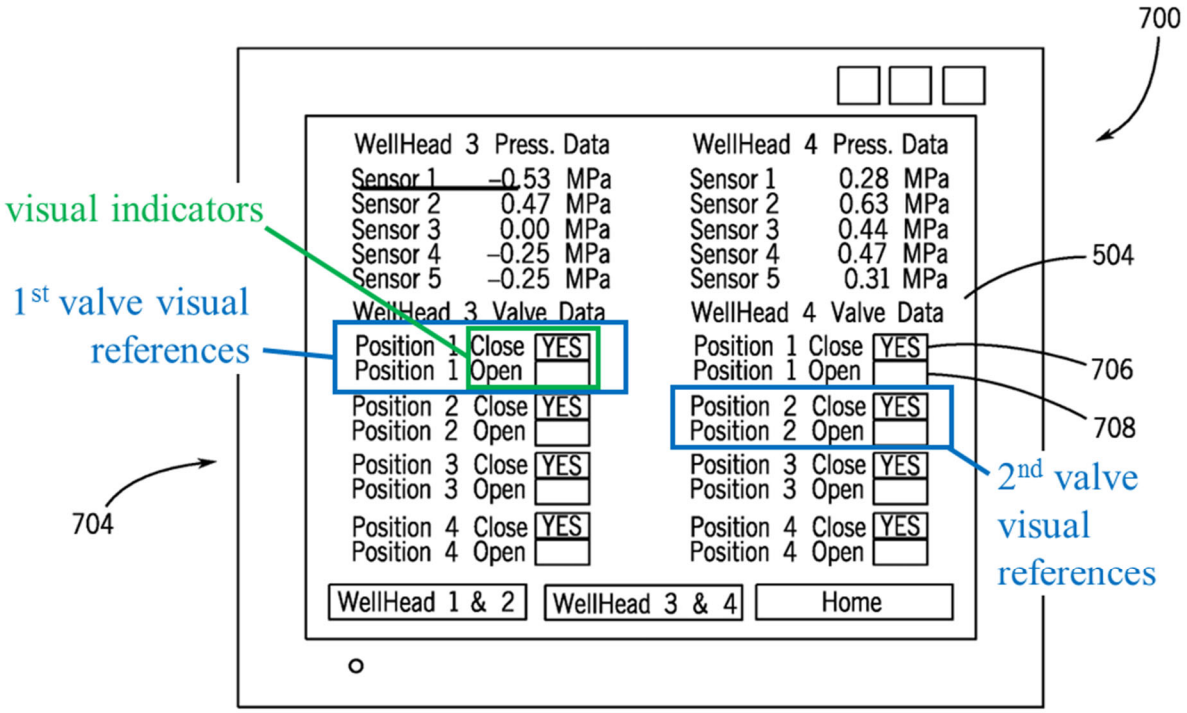


FIG. 7
(annotated)

Id., [0003]-[0005], [0025]-[0026], [0049], Figures 7 and 8.

It would have been obvious to a POSITA to use *Al-Salmani*'s dashboard's valve visual references and visual indicators with *Christie*'s dashboard for CP fracturing systems/methods to enable an operator "to evaluate a particular…stage within the fracturing operation, which may drive additional operations," as taught by *Al-Salmani*. Ex. 1002, ¶¶ 496-511, 553-560; *Christie*, [0050], [0057], [0132]; *Al-Salmani*, [0024]-[0026], [0063].

Christie in view of *Pitcher* and *Al-Salmani* renders obvious all Independent Claims. Ex. 1002, ¶¶ 450-471, 512-524, 534-543, 553-567, 572-585, 590-605.

D. GROUNDS 7 AND 8—*KRUPA* ANTICIPATES AND/OR RENDERS OBVIOUS ALL CHALLENGED CLAIMS

Downing admits that *Krupa* discloses continuous pumping limitations in '770 and '779's independent claims (which substantially overlap with '952's claims). EX_1015_004. But, Downing alleged in other proceedings that portions of *Krupa* are disqualified/excepted under § 102(b)(2)(B) by *Downing's Webpage*.

Section 102(b)(2)(B) only applies when the subject matter in the prior art and inventor's disclosures is the same. MPEP § 717.01(b)(2).I. . Prior art that is merely obvious over the inventor's disclosure is not "the same," and therefore not disqualified. *Id*. Section 102(b)(2)(B) does not apply when prior art "is more specific than the subject matter" in the inventor's disclosure. MPEP § 717.01(b)(2).IV.

Downing has alleged that *Krupa*'s CP disclosures are the same as *Downing's Webpage*'s CP disclosure.[17] They are not. *Krupa* discloses specific CP operations that involve valve sequencing between sets of valves positioned between a shared manifold connection and multiple wells. *Krupa*, [0005], Figures 2A-2G. *Krupa*'s

[17] EX_1015_003; EX_1016_003-006.

sets of valves are operated in an overlapping sequence in response to sensor-measured flowrate and pressure conditions of fluid pumped from the pumps to the wells via the manifold. *Id*., [0019], [0024]-[0026], [0042], [0046], Figures 2A-G.

Meanwhile, *Downing's Webpage* merely generically announces a goal of CP, saying: "The Freedom Series Completion System with FS iControl enables instant transitions between stages, allowing your pumps to run continuously"; "reduces transition time to zero"; "pump continuously stage after stage;" and "transition the zipper valves from one well to the other, opening the second well and subsequently shutting-in the first well, all while pumping." Ex. 1025.

Downing's Webpage does not disclose when or how to run a CP swap or how to transition stage-to-stage or run pumps continuously. It does not disclose pump equipment/configurations, does not identify the valves or their relationship to the wells, does not explain "opening the second well" or "shutting-in the first well" relative to CP swap, and provides no guidance as to any elements' structure/configuration, meaning, or implementation.[18]

Because *Downing's Webpage*'s and *Krupa*'s disclosures are not "the same,"

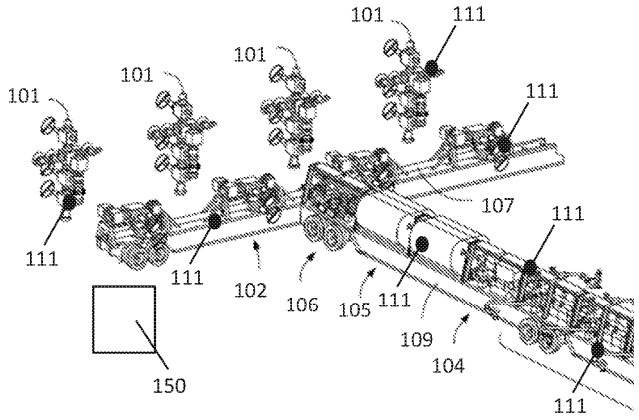
[18] Downing argued in related IPRs that minor variances in equipment configurations and "generic" versus specific disclosures impact patentability. *See e.g.*, EX_1062_002. Downing cannot demand greater specificity from prior art for obviousness purposes, but then argue its webpage's generic disclosure of continuously running pumps is "the same" as *Krupa*'s detailed pump/manifold/valve configurations and operations.

Krupa is § 102(a)(2) prior art without exception.

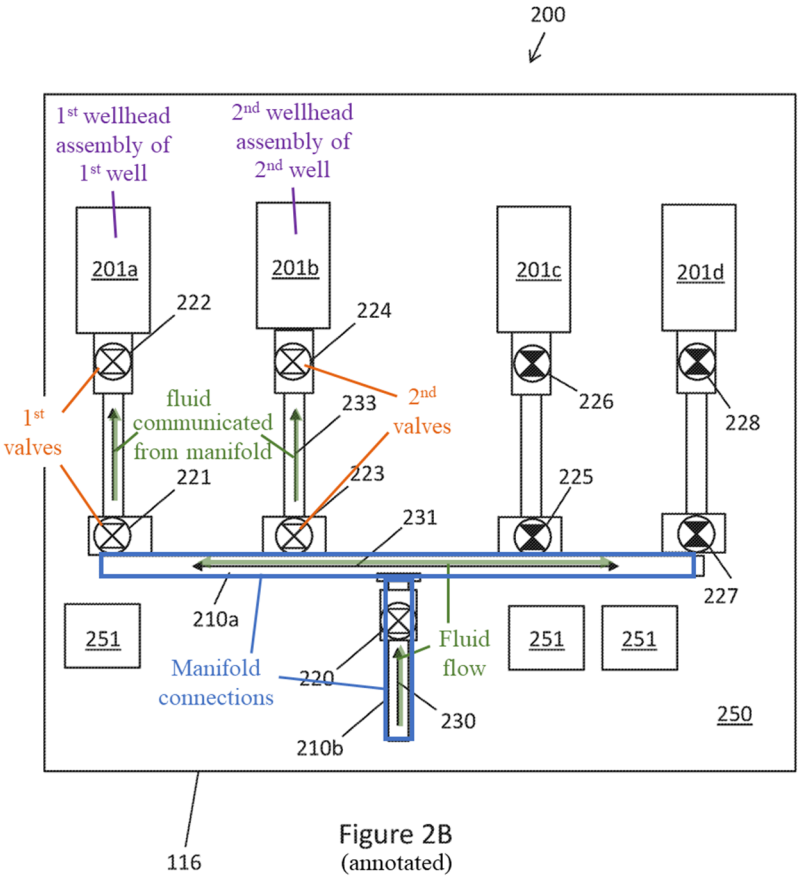
1. CHALLENGED CLAIMS

Krupa discloses all the Challenged Claims' (1/20/39/58/65/72) limitations:

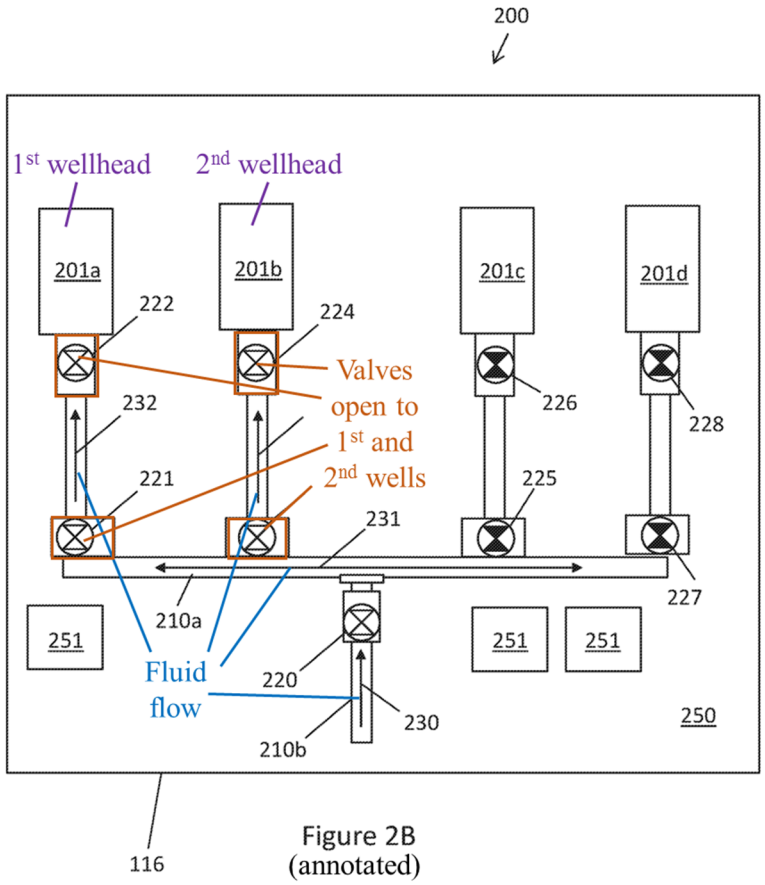
***KRUPA*-CHART 1**

Claim	Krupa
Preambles for hydraulically fracturing first and second wells: [1.1]/[20.1]/[39.1]/[58.1] /[65.1]/[72.1]	Figure 1 shows a system for hydraulically fracturing four wells (101), including first/second wells:  Figure 1 [0019]. *Krupa*'s methods hydraulically fracture well(s) during "continuous pumping operations." Abstract, [0007], [0038], [0042]-[0046]. Processor(s) execute software instructions ("computer readable program code") stored "on a non-transitory computer readable medium" "to perform one or any" of *Krupa*'s "automated hydraulic fracturing systems features." [0032].

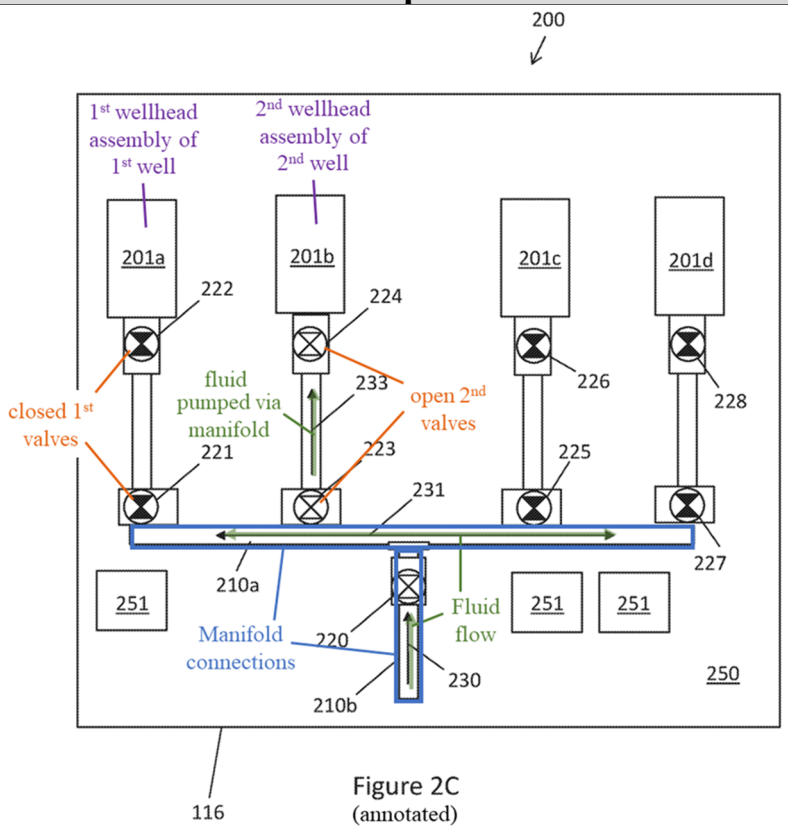
Claim	Krupa
	Ex. 1002, ¶¶ 617-619, 749-754, 771-772, 793-794, 813-814, 831-832.
Pump-manifold-valve-well configurations: • **[1.2]/[1.3.1]** • **[20.2]/[20.3.1]** • **[39.2]/[39.3]/[39.4]** • **[58.2]/[58.3.4]** • **[65.2]/[65.3.4]** • **[72.2]/[72.3]/[72.4]**	*Krupa*'s "fracturing equipment" includes "high-volume fracturing pumps." [0014]. Pressurized fracking fluid from the pumps is communicated to the zipper manifold, which may include one or more valves associated with each of the wellheads. [0019]. Figures 2A-2G show "continuous hydraulic fracturing pumping operations between" first wellhead 201a on a first well and second wellhead 201b on a second well, where fluid is continuously pumped from pumps through a manifold (210a) while first (221/222)/second (223/224) sets of valves are selectively opened to allow the fluid from the manifold to flow into their respective first/second wellheads:

Claim	Krupa
	 Figure 2B (annotated) [0005], [0038]-[0046]. As shown, each set of first/second valves is associated with and fluidically positioned between its respective first/second well and the manifold, which is fluidically connected to and receives pressurized fluid from pumps. Figures 1-2G, [0019]. Thus, *Krupa* discloses the claimed pump-manifold-valve$_1$-well$_1$ configuration ([1.2]/[20.2]/[39.3]/[58.2]/65.2]/[72.2-72.3]) and pump-manifold-valve$_2$-well$_2$ configuration ([1.3.1]/[20.3.1]/[39.4, 39.5.1]/[58.3.4]/[65.3.4]/[72.4]). Ex. 1002, ¶¶ 620-641, 755-757, 773-779, 795, 799, 815, 819, 833-835.

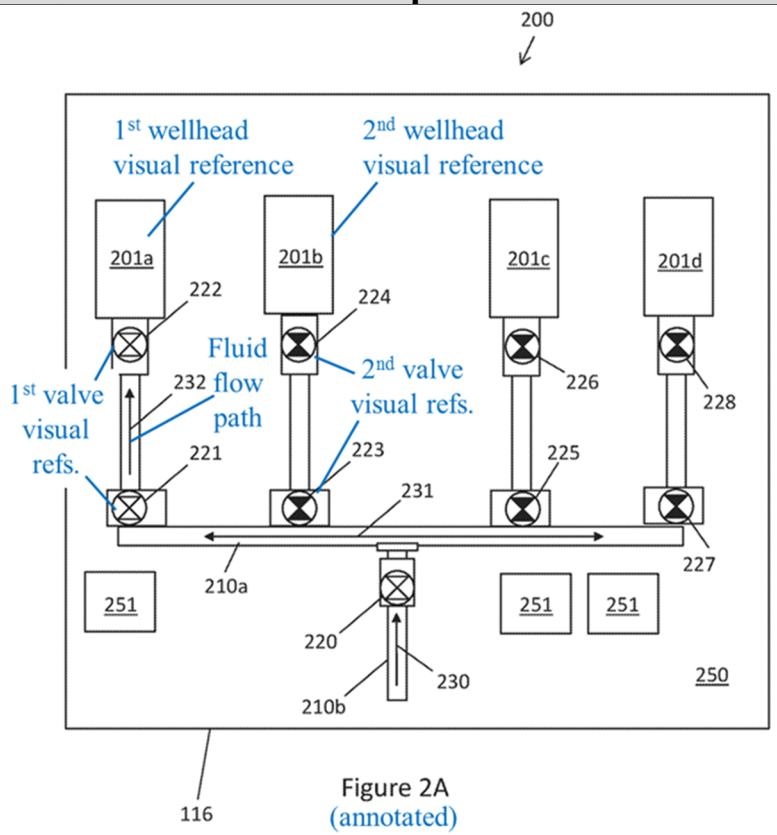
Claim	Krupa
CP swap to transition hydraulically fracturing the first to the second well "in response to…condition(s)": • **[1.3]/[1.3.1]/[1.3.2]/[1.3.3]/[1.3.4]** • **[20.3]/[20.3.1]/[20.3.2]/[20.3.3][20.3.4]** • **[39.5]/[39.5.1]/[39.5.2]/[39.5.3]/[39.5.4]** • **[58.4]/[58.4.1]/[58.4.2]/[58.4.3]** • **[65.4]/[65.4.1]/[65.4.2]/[65.4.3]** • **[72.6]/[72.6.1]/[72.6.2]/[72.6.3]/[72.6.4]**	*Krupa* discloses the CP Swap Limitations of the Independent Claims. Limitations [1.3]/[20.3]/[39.5]/[58.4]/[65.4]/[72.6] *Krupa*'s fracturing pumping plans include "a sequence of valve operations to direct fluid flow through a selected path in one or more…wellhead assemblies and manifolds on the frac pad" to "provide continuous hydraulic fracturing pumping operations between the wellhead[s]." Abstract, [0036]-[0046]. The sequence of valve operations may be "automatically controlled by the software through a valve control system associated with the valves" "to perform at least one [CP] operation for…one or more wells." [0005]-[0007], [0036]. Additionally, valve positions "may be fed into a controller" for operating the system's valves to perform the CP operations. [0021]-[0022], [0027], [0053]. Limitations [1.3.1]/[20.3.1]/[39.5]/[39.5.1]/[58.4.1]/[65.4.1]/[72.6/72.6.1/72.6.3] In Figure 2B, fluid is pumped into a second well "while continuously pumping the fluids into the first well by opening a second set of valves" fluidically positioned between the second well and the manifold (*via* manifold connections 210a-b), where the manifold is fluidically connected to and receives pressurized fluid from pumps. [0005], [0019]. As shown, the second valves are opened while the first valves remain open during the pumping of fluid through the shared manifold such that the fluid is communicated from the pumps through both first/second sets of open valves to their respective first/second wellheads:

Claim	Krupa
	 Figure 2B (annotated) [0042]-[0043], [0058]. <u>Limitations [1.3.2]/[20.3.2]/[39.5.2]/[58.4.2]/[65.4.2]/[72.6.2]</u> *Krupa*'s second valves are opened "in response to" the fluid satisfying condition(s) ([58.4.2]/[65.4.2]/[72.6.2]), including flowrate/pressure condition(s) ([1.3.2]/[20.3.2]/[39.5.2]). *Krupa*'s fracturing operations include "many gauges and meters for flow rate, fluid density, treating pressure, etc." [0014]. "[S]ensors work[] in conjunction with [a] built hydraulic fracturing system" for "automating fracturing operations for continuous pumping in one or more wells." [0016], [0026]. *Krupa*'s sensors provide information about

Claim	Krupa
	the state of the fracturing operation and help provide "choices for possible stages." *Id*. In one example, a next stage in a fracturing operation is triggered when determined flowrate and pressure conditions of fluid pumped via the manifold to the first well are met: "When a frac stage of the first wellhead…is at an end, a flush fluid may be pumped to flow…at a full pump rate, such as…50-150 bbl/min, into the first wellhead…. Once a total volume of the flush fluid is pumped, a pump rate may be reduced…to 5-15 bbl/min. Once a pressure has stabilized at the reduced pump rate, the software application may move the fracturing pumping plan to the next step." [0042]. As shown in Figures. 2B-C, the next step includes opening the second valves to the second well in response to the flowrate for the given amount of time and pressure stabilization, while the first valves remain open during pumping. [0043]. <u>Limitations [1.3.3-1.3.4]/[20.3.3-20.3.4]/[39.5.3-39.5.4]/[58.4.3]/[65.4.3]/[72.6.4]</u> With the second valves opened and fluid pumped therethrough, hydraulic fracturing operations are conducted on the second well. [0043]. "Once injection is established and pressure has stabilized in both the first …and…second wellhead[s] …, the first set of valves…may be closed remotely to shut in the first wellhead" while fluid is pumped into the second well via the open second valves and manifold to conduct fracturing operations on the second well:

Claim	Krupa
	 Figure 2C (annotated) [0043], claims 2-3. Thus, *Krupa* discloses opening the second valves and then closing the first valves in response to conditions being met by fluid communicated via the manifold. Ex. 1002, ¶¶ 627-655, 756-760, 777-783, 800-806, 821-824, 841-845.
[1.4]/[20.4]/[39.5]/[58.6]/[65.6]/[72.6]	Limitations [1.4]/[20.4]/[39.5]/[58.6]/[65.6]/[72.6] Figures 2A-2G show a CP swap, as claimed, between first/second wells, where the second well's valve(s) are opened before closing the first well's valve(s), to "connect[] the initial and terminal 'cleaning' portions of the frac operations of a first well and a second well, respectively," all while continuously communicating pumped fluid (continuous pumping from the pumps) via the manifold. [0005]-[0007], [0046], [0058], claim 1.

Claim	Krupa
	Krupa's CP operations may "eliminate the time required to transition between wells," "allow operations to not have to shut down and/or idle pumps while bleeding pressure," and "reduce[] maintenance on pumps due to less frequent start up and shut down of the pumps." [0058]. Ex. 1002, ¶¶ 656-658, 761-762, 777-783, 807, 826, 841-845.
Dashboard: [58.3]/[58.3.1]/[58.3.2]/[58.3.3]/[58.3.5]/[58.5] [65.3]/[65.3.1]/[65.3.2]/[65.3.3]/[65.3.5]/[65.5] [72.5-72.5.4]/[72.7]	*Krupa* "displays information on a display device of the HMI," and organizes how data is presented, *e.g.*, "into a visual representation of the data, such as through visualizing a data model." [0027], [0031], [0033]. A POSITA would have understood this disclosure to be a dashboard (Limitations [58.3]/[65.3]/[72.5]). Ex.1002 ¶¶ 795-800, 807, 816, 820, 825, 836-840, 846-847. "Figures 2A-2G show…a hydraulic fracturing pumping system displayed on the HMI" including visual references of the valves (valve symbols) associated with the manifold (via manifold connections 210a-b) and each wellhead, *e.g.*, visual references of first valves 221/222 associated with the first wellhead 201a and visual references of second valves 223/224 associated with the second wellhead 201b:

Claim	Krupa
	 Figure 2A (annotated) [0038]. *Krupa*'s dashboard "display[s] the open and closed positions of valves 220-228 in the hydraulic fracturing pumping system" using different visual indicators, *e.g.*, closed valves are shown as blacked-out while open valves are "shown having no fill, thereby indicating the available path of fluid flow (see arrows 230-235)," through the manifold (210a-b) and valves to the well(s). [0040]. In Figure 2A, second visual indicators show second valves 223/224 are closed, first visual indicators show first valves 221/222 are open. *Id*. (Limitations [58.3.1-58.3.3, 58.3.5, 58.5]/[65.3.1-65.3.3, 65.3.5, 65.5]/[72.5.1-72.5.4, 72.7]).

If *Krupa* does not anticipate these claims, *Krupa* renders them obvious. A POSITA would understand *Krupa* to disclose a CP swap (computer-implemented) method and system that operates valves associated with wells and a manifold in response to flow rate and pressure conditions to transition from hydraulic fracturing one well to another by opening a second well's valve before closing a first well's valve, while displaying, as claimed. Ex. 1002, ¶¶ 610-617, 630, 642, 652-653, 658, 749, 755-762, 771, 775-776, 779-783, 793-808, 813-826, 831-847.

Krupa anticipates/renders obvious Claims 1/20/39/58/65/72. *Id*.

E. GROUND 9—*KRUPA*, *FS-VIDEO*, AND *AL-SALMANI* RENDER OBVIOUS ALL CHALLENGED CLAIMS

Krupa, *FS-Video*, and *Al-Salmani* render obvious all '952's Claims.

If *Krupa* (1) does not anticipate/render obvious '952's Claims, or (2) is disqualified-in-part (as to CP-Swap-Limitations, as previously argued by Downing), then the claims are obvious over non-disqualified portions of *Krupa*, *FS-Video*[19], and *Al-Samani*. Ex. 1002, ¶¶ 852-859.

Krupa discloses all Claims 1/20/39/58/65/72's limitations, as described in Section IX.D.1.

[19] Downing cannot publish a concept, then try to patent that same concept more than one year later. § 102.

1. PUMP-MANIFOLD-VALVE-WELL CONFIGURATIONS

Krupa discloses these limitations as discussed in Section IX.D.1 (Limitations [1.1]-[1.2]/[1.3.1]/[20.1]-[20.2]/[20.3.1]/[39.12]-[39.4]/[58.1]-[58.2]/[58.3.45]/[58.6]-[58.6.3]/[58.5]-[58.6]/[65.1]-[65.2]/[65.3.45]/[65.5]/[72.1]-[72.45.4]. If § 102(b)(2)(B) applies, *Krupa*'s disclosure of '952's pump-manifold-valve-well-configurations limitations is not disqualified because *Downing's Webpage* does not disclose/show these conventional features. *See* Section IX.D.

2. CP SWAP TO TRANSITION HYDRAULICALLY FRACTURING THE FIRST WELL TO THE SECOND WELL "IN RESPONSE TO…CONDITIONS"

As discussed, *Krupa*'s disclosure of these limitations is not shown in *Downing's Webpage* and, therefore, is not disqualified under § 102(b)(2)(B). Nevertheless, if the Board finds portions of *Krupa*'s CP Swap disclosure are disqualified, then *FS-Video* and *Al-Salmani*, combined with *Krupa*'s non-excepted disclosures, disclose/render obvious these limitations.

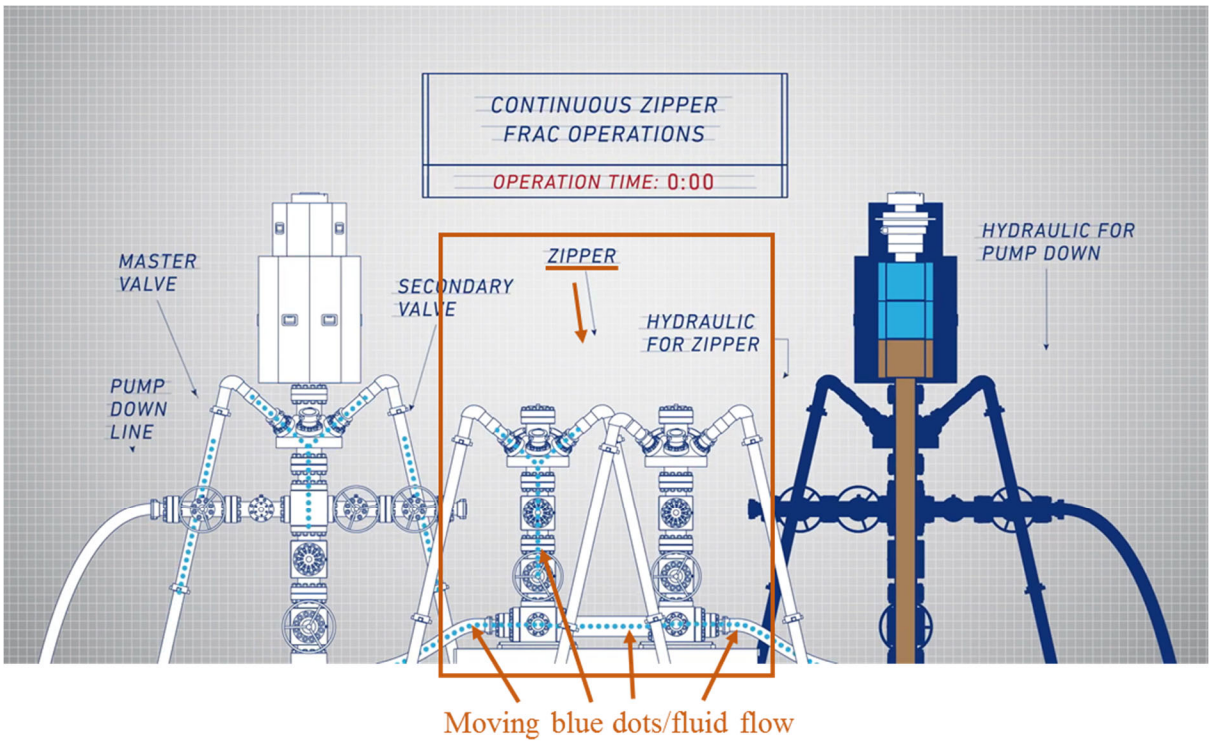
Limitations [1.3]/[20.3]/[39.5]/[58.4]/[65.4]/[72.6]

Downing's *FS-Video* discloses transitioning wells while continuously pumping. *See* Ex. 1027[20]. *FS-Video*'s multi-well fracturing systems/methods for "continuous zipper frac operations" include transitioning from "fracking on one

[20] Cited as "*FS-Video*" and available at https://www.youtube.com/watch?v=X0m9DcnZczE.

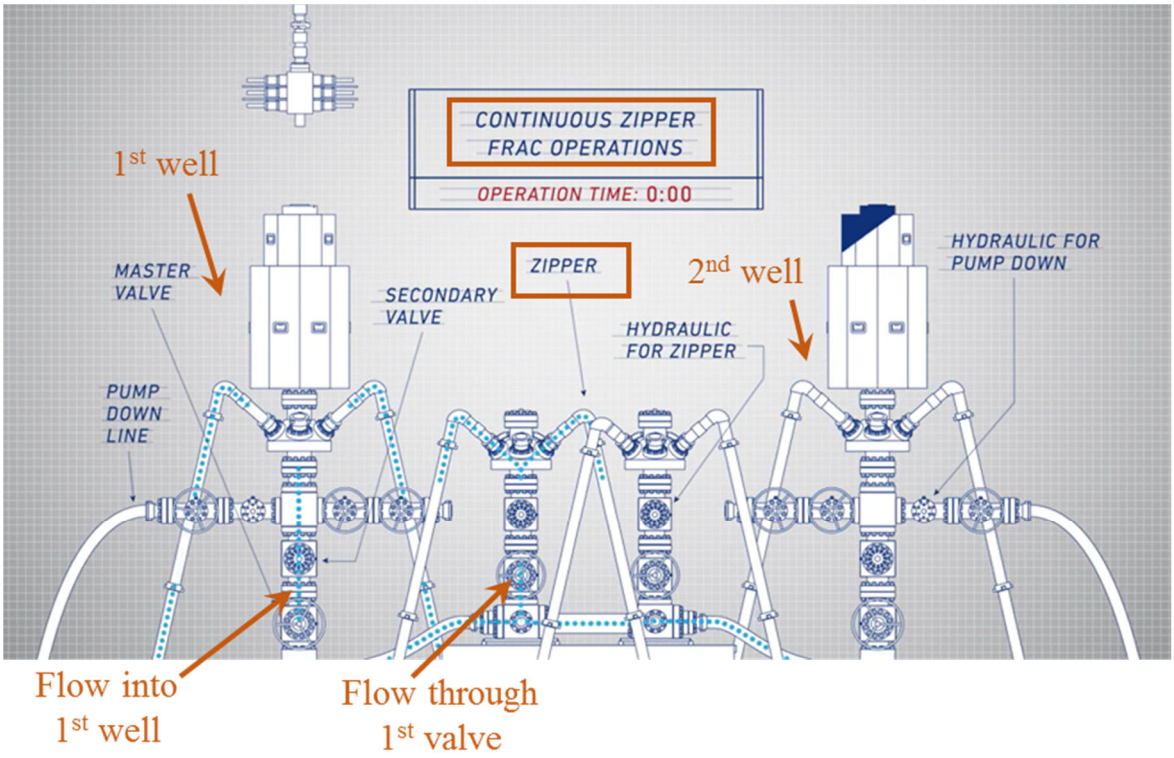
well" to fracking on a second well, and "complet[ing] swap and equalization operations in under five minutes," to provide "the benefit of continuous frac operations, previously available only with ball and sleeve systems." *FS-Video*, 0:54-1:17 . Thus, Downing admits that "continuous frac operations" were previously known—*FS-Video* merely incorporates Downing's "FS valve and FS latch system" into such operations. *Id*.

FS-Video's "continuous zipper frac operations" show fluid (represented by moving blue dots) continuously pumped through a zipper manifold (labeled "Zipper") and associated valves into a first well, then a second well, during a CP swap:



FS-Video, 0:55-1:37 (screenshot at 1:05[21]). Although pumps are not shown, a POSITA would have understood from *FS-Video* that pump(s) are used in *FS-Video*'s continuous frac operations because "[h]ydraulic fracturing is a stimulation treatment routinely performed," where "fluids are pumped at high pressure and rate into the reservoir interval to be treated…." *Krupa*, [0001]; Section V; Ex. 1002, ¶¶ 66-77; *Al-Salmani*, [0029].

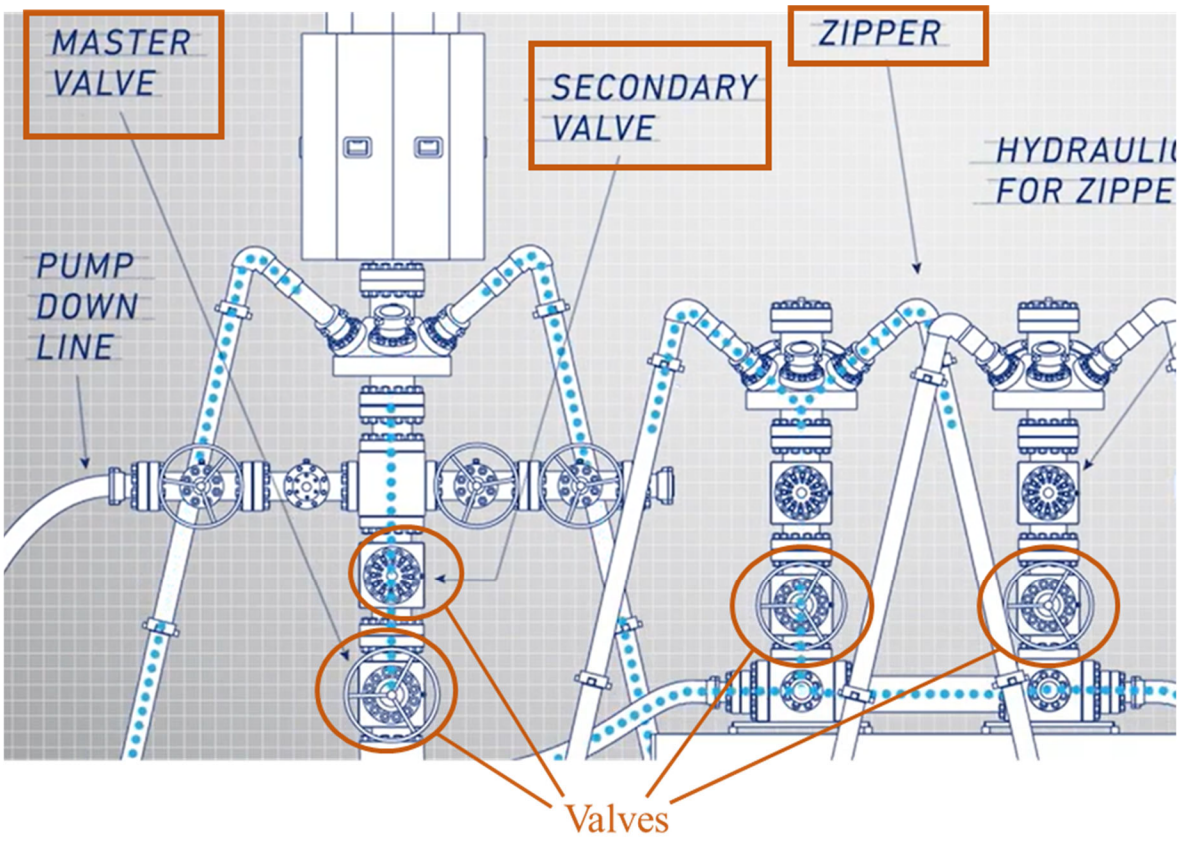
Initially, fluid flows through the "zipper" and a first valve into the first wellhead "to illustrate…fracking on one well:"



[21] *FS-Video* screenshots are annotated in orange.

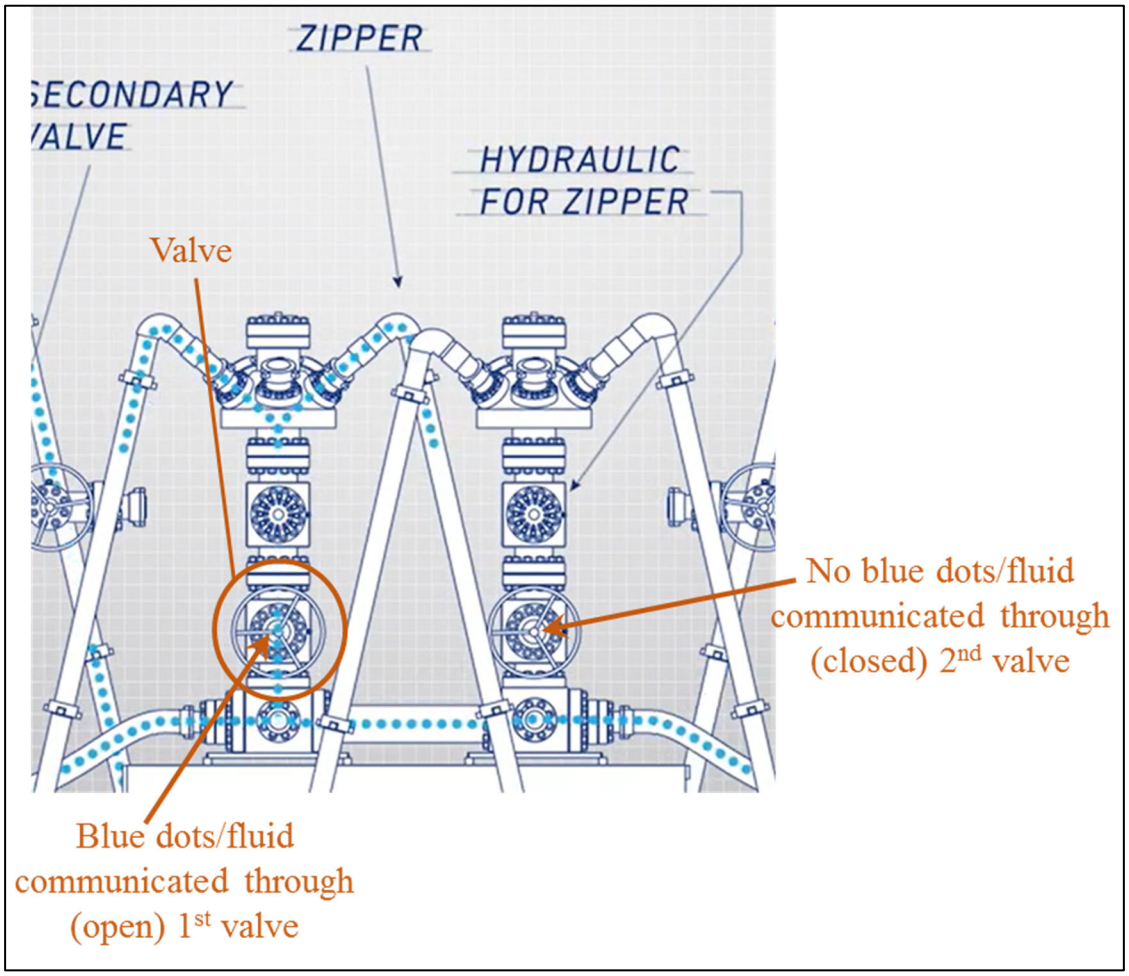
FS-Video, 1:05-1:09 (screenshot at 1:07).

FS-Video uses valve symbols:



FS-Video, 1:07 (partial/annotated); Ex. 1002, ¶ 873.

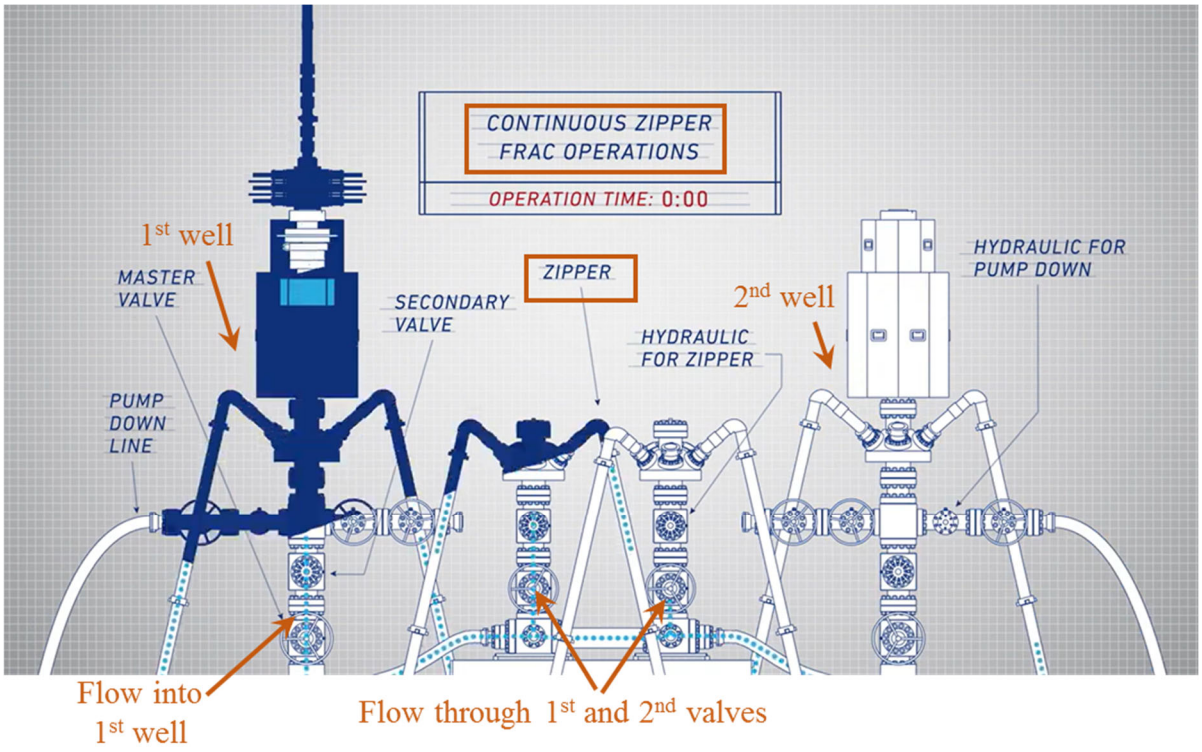
When *FS-Video*'s blue dots/fluid move through a valve, the valve is open, and when the blue dots/fluid do not move through a valve, the valve is closed (Ex. 1002, ¶¶ 134, 870-872):



FS-Video, 1:07 (partial/annotated).

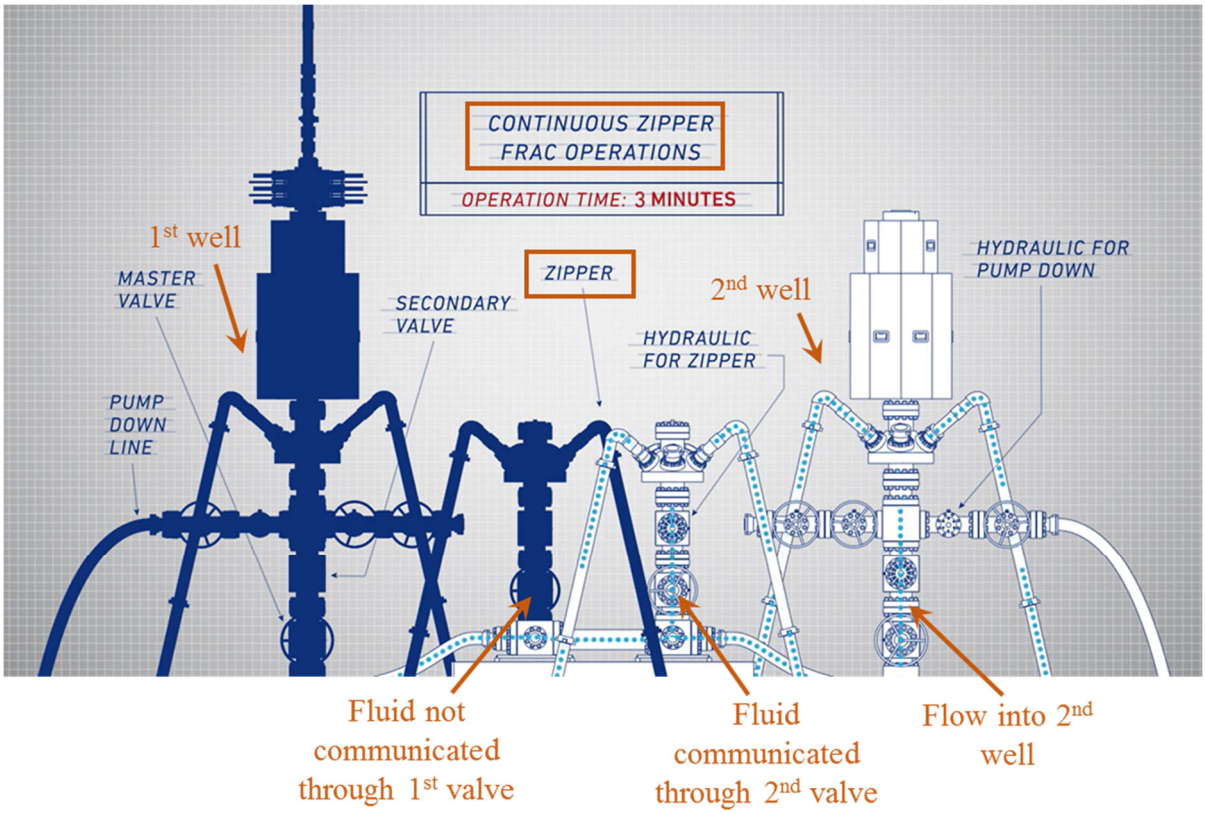
Limitations [1.3.1]/[20.3.1]/[39.5.1]/[58.4.1]/[65.4.1]/[72.6.1]/[72.6.3]

At *FS-Video* 1:08, while fluid is pumped through the first zipper valve and "zipper" to the first well, the second zipper valve is opened to allow fluid to be pumped through the "zipper" to the second well (*FS-Video*, 1:05-1:08):



Limitations [1.3.3-1.3.4]/[20.3.3-20.3.4]/[39.5.3-39.5.4]/[58.4.3]/[65.4.3]/72.6.4])

During *FS-Video* (Ex. 1027, 1:10-1:38), after the second zipper valve is opened, and while fluid continues to flow from the zipper to the second well, the first zipper valve is closed to stop flow from the zipper manifold to the first well:



FS-Video, 1:37.

Limitations [1.4]/[20.4]/[39.5]/[58.6]/[65.6]/[72.6]

FS-Video shows the fluid/(blue dots) continuously communicated via the manifold during the swap; a POSITA would have understood/considered obvious that the fluid was communicated via the manifold from pump(s). Ex. 1002, ¶¶ 892-893.

Although portions of the system between the "zipper" and wells are not shown, they are readily understood by a POSITA. Ex. 1002, ¶ 872. *FS-Video* says it demonstrates "fracking on…well[s]" and labels/shows the wellheads with known wellhead components, *e.g.*, "pump down line" connections and "master valve." *FS-*

Video, 1:07-1:17; *see also*, *Krupa*, [0020]. A POSITA would understand or find it obvious that *FS-Video*'s zipper valves are associated and in fluid communication with the zipper manifold and wells. Ex. 1002, ¶ 865. Fluid pumped from the pumps to the zipper, through its valve(s), and then to their respective well(s) further demonstrates that each zipper valve is fluidically positioned between its respective well and pump(s). *FS-Video*, 1:05-1:38; Ex. 1002, ¶ 869-877. Further, it would have been obvious to use *FS-Video*'s "continuous zipper frac operations" method with *Krupa*'s multi-well fracturing systems, including *Krupa*'s pump-manifold-valve-well configuration ([0019], [0026], [0035], Figure 1), to continuously pump fluid as claimed, because *FS-Video* discloses reducing swap-time/red-zone-personnel (1:18-1:30), one of *Krupa*'s stated goals ([0048], [0058]). Ex. 1002, ¶ 859.

Limitations [39.5]/[72.6]

FS-Video also describes controllers for executing a CP swap, as claimed. *FS-Video*'s systems/methods are "an integrated remotely operated completion system," and include a "control center" having a computer system with "remote software." *FS-Video*, 0:21-0:28. A POSITA would understand this "control center" to be a controller using standard computer software and processor(s) configured to execute *FS-Video*'s CP swap operations. Ex. 1002, ¶¶ 981-989, 1050-1054.

Limitations ([1.3.2]/[20.3.2]/[39.5.2]/[58.4.2]/[65.4.2]/[72.6.2]

Krupa, *FS-Video*, and *Al-Salmani* render the "in response to…" limitations obvious.

FS-Video discloses CP swap operations for reducing transition time between the end of one well's fracturing stage to the beginning of the next well's fracturing stage (*FS-Video*, 0:28-1:23). The Independent Claims merely require opening the second valve to swap in response to "condition[(s)]," such as flowrate/pressure condition(s), which could include determining if there is or isn't flow. *FS-Video* explains that its CP swap begins "while fracking on one well," *i.e.*, is initiated in response to determining the "condition" of flow into the first well. *FS-Video*, 1:07-1:17.

Krupa's second valves are opened "in response to…condition(s)" being satisfied ([58.4.2]/[65.4.2]/[72.6.2]), including flowrate/pressure condition(s) ([1.3.2]/[20.3.2]/[39.5.2]), and *Krupa*'s first valve is closed after "condition(s)" are satisfied ([1.3.3]/[20.3.3]/39.5.3]/[58.4.3]/[65.4.3]/[72.6.4]). *See* Section IX.D.1.

Al-Salmani discloses pressure, flow, and other sensors used to indicate the stages of the fracturing operations. *Al-Salmani*, ¶ [0005]-[0007], [0024], [0038], [0040], [0057]-[0058], [0065]. If condition(s) "indicates the end of the fracturing job is approached, the operator may plan to have subsequent operations prepared and ready at the well site to reduce NPT." *Id.*, ¶ [0057]. "[T]he operator may…evaluate

a particular…stage within the fracturing operation," to "drive additional operations." *Al-Salmani*, [0024]. Thus, it would have been obvious to a POSITA to initiate the additional operation of *FS-Video*'s or *Krupa*'s CP swap in response to "conditions" such as pressure/flowrate indicative of the end of the fracturing stage, as taught by *Al-Salmani*. *Al-Salmani*, [0040], [0057]; Krupa, [0042]-[0043]; *FS-Video* 0:54-1:33; Ex. 1002, ¶¶ 878-884, 963, 987, 1009-1011, 1031, 1052. A POSITA would have been motivated to so modify *FS-Video/Krupa* so operators/controllers would know when to initiate the CP Swap based on fracturing-stage-data. Ex. 1002, ¶ 859. Further, combination of *Al-Salmani*'s systems/methods with *Krupa*'s and/or *FS-Video*'s would have involved combining known elements according to known methods to yield the predictable results of reducing NPT, as taught by *Al-Salmani*. *Id.*

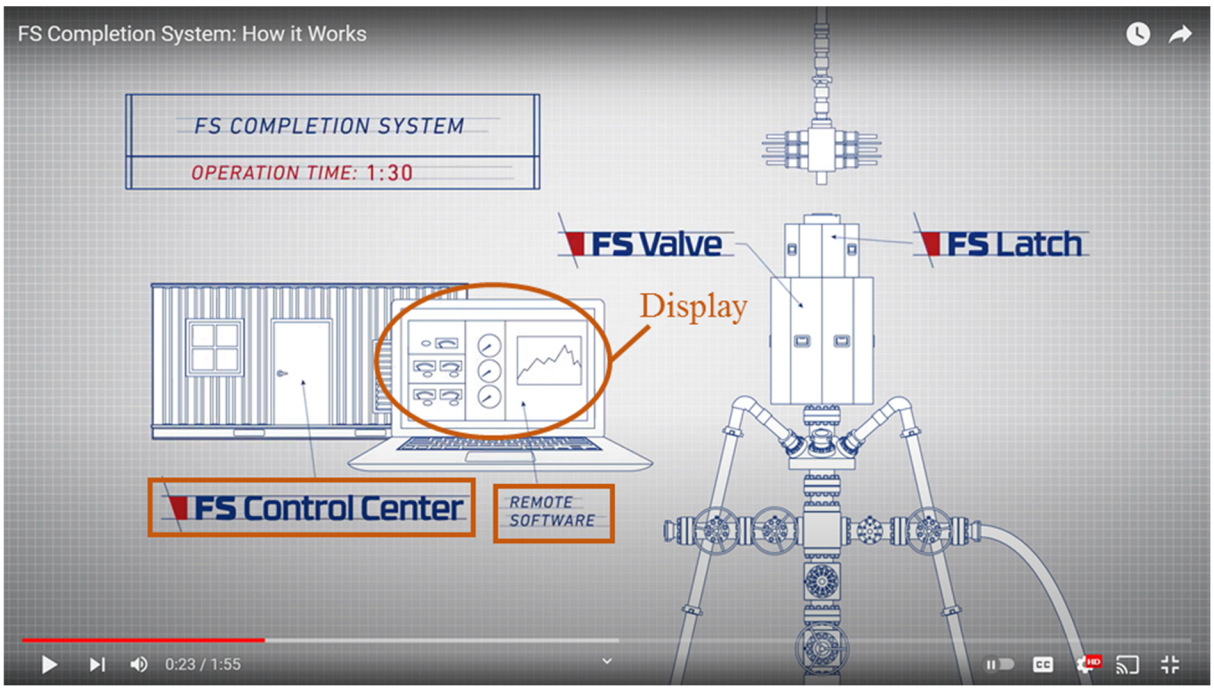
Al-Salmani also discloses using a controller and instructions executed by a processor to determine conditions from sensor data indicating wellbore operation status. *Al-Salmani*, [0008]. For example, a "remote control unit may include a memory and a processor, for example as part of a computer system," to "execute instructions stored on the memory to conduct one or more operations" and "to collect and analyze information received from the one or more sensors associated with the system." *Id*., [0045]. It would have been obvious to use *Al-Salmani*'s sensor and processing systems in *Krupa*'s and/or *FS-Video*'s multi-well fracturing

systems/methods to remotely control their systems and reduce personnel risk. *Id.*, [0023], [0044], Ex. 1002, ¶¶ 857-858.

c. DASHBOARD LIMITATIONS [58.3-58.3.3]/[58.3.5]/[58.5]/[65.3-65.3.3]/[65.3.5]/[65.5]/[72.5-72.5.4]/72.7]

Al-Salmani and *Krupa* disclose these limitations as discussed above. *See* Sections IX.C.1.b., IX.C.2.c., IX.D.1., and IX.D.2.f.

FS-Video's "control center" uses a dashboard displaying graphs and gauges to visually display fracturing operational data to "remotely operate" fracturing systems:



FS-Video, 0:21-0:28 at 0:23 (annotated).

It would have been obvious to incorporate *Krupa*'s and *Al-Salmani*'s dashboards into *FS-Video*'s dashboard to provide visual references of valves and

different visual indicators of valve states/positions, as taught by *Krupa* and/or *Al-Salmani*, to improve remote visibility into well operations. Ex. 1002, ¶¶ 937-938; *Krupa*, [0036]; *Al-Salmani*, [0049], [0063].

Krupa in view of *FS-Video* and *Al-Salmani* discloses all Independent Claim Limitations and a POSITA would have been motivated to combine the references as discussed above. Ex. 1002, ¶¶ 852-894, 953-967, 976-989, 999-1014, 1019-1035, 1040-1056.

X. PTAB DISCRETION SHOULD NOT PRECLUDE INSTITUTION

The Board has consistently "held that a reference that 'was neither applied against the claims nor discussed by the Examiner' does not weigh in favor of exercising . . . discretion under § 325(d)." *Fasteners for Retail, Inc. v. RTC Indus., Inc.*, IPR2019-00994, Paper 9 at 7–11 (P.T.A.B. Nov. 5, 2019); *Hobbico, Inc. v. Traxxas*, *L.P.*, IPR2018-00010, Paper 8 at 19 (P.T.A.B. Apr. 18, 2018) (IDS-citation and indication of consideration without comment do not prove Examiner substantively considered reference).

A two-part framework applies to determine whether §325(d) discretion should be exercised: (1) whether the same or substantially same prior art or arguments in the Petition were made to the Office; and (2) if so, whether the Office erred in a manner material to patentability. *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 (P.T.A.B. Feb. 13,

2020) (precedential). The six non-exclusive *Becton-Dickinson*[22] factors help show how to apply the framework. *Advanced Bionics,* IPR2019-01469, Paper 6, 9-11. The factors are: (a) similarities and material differences between asserted versus examination prior art; (b) cumulative nature of asserted and examination art; (c) extent to which examination evaluated asserted art, including whether prior art formed basis for rejection; (d) overlap between examination arguments and petitioner's reliance on prior art; (e) whether petitioner has sufficiently identified examiner's error in asserted prior art evaluation; and (f) additional petition evidence and facts that warrant reconsideration of the prior art/arguments.

All factors weigh against exercising § 325(d) discretion.

This Petition presents §§ 101, 112, and 102/103 grounds, none of which the Office considered during '952's examination. The sole office action only objected to the abstract and made double-patenting rejections; it did not address any of this Petition's unpatentability arguments. Nor did the Examiner discuss any such arguments anywhere in the file history. EX_1003_017-021, 346-350. That alone shows the Petition's grounds and '952's prosecution arguments could not possibly overlap—*Becton-Dickinson* factors (a)-(d) weigh against § 325(d) denial.

[22] *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (Dec. 15, 2017) (precedential as to § III.C.5, first paragraph) ("*Becton-Dickinson*").

But the Examiner also failed to address key patentability issues related to prior art identified in '770 and '779, despite considering '952's claims "not patentably distinct from" '770 and '779—this shows material error. EX_1003_017-021, 148-152, 228-231, 308-311, and 348-349.; *See e.g.*, *Keysight Tech., Inc. v. Centripetal Networks, Inc.*, IPR2022-01421, Paper 14 (P.T.A.B. Aug. 24, 2023). *Becton-Dickinson* factor (e) weighs against § 325(d) denial.

First, *Krupa* was overlooked. Downing cited *Krupa* in an IDS only *after* the first NOA. EX_1003_239. Three weeks later, the Examiner issued a second NOA with identical reasons for allowance as the first. Later, Downing submitted another IDS with '770/'779-IPR-documents admitting that *Krupa* discloses most, if not all, limitations in '770/'779's independent claims[23], which substantially overlap with '952's claims. EX_1003_028-031. Yet, the Examiner issued another NOA within weeks, curiously characterizing *other* references as the closest prior art, in strikingly similar fashion (*i.e.*, copy-paste-style) to '779's last NOA. Ex. 1002, ¶¶ 74-75; EX_1003_017-021.

Had the Examiner considered *Krupa*, he would have seen its identical provisional application, entitling *Krupa* to an earlier prior-art-date, *before* '952's

[23] Instead of disputing *Krupa* discloses CP swaps, Downing misapplied § 102(b)(2)(B) and argued portions of *Krupa* were disqualified by *Downing's Webpage* in other proceedings. EX_1015_005; EX_1016_014-24.

date. Similarly, had the Examiner reviewed IDS-cited-IPR documents, he would have assessed whether § 102(b)(2)(B) applied to *Krupa* and would have necessarily evaluated if any *Krupa* portions were "the same as" *Downing's Webpage*. The Examiner performed no such assessment. These omissions show the Examiner did not consider *Krupa*, thereby materially erring.

Pitcher was similarly overlooked. Although an assumption arises that *Pitcher* was reviewed during '952's prosecution because it was cited during '779's prosecution (EX_1003_345-360; EX_1005_001, 168, 181-184), the record shows the Examiner overlooked *Pitcher* and IDS-cited-IPR documents. For example, had the Examiner reviewed IDS-cited-IPR documents, he would have seen Downing argue that "Pitcher teaches using…flow rate and…time as thresholds to trigger a subsequent fracturing stage." EX_1015_009 (citing *Pitcher*, [0037]); *see also* Ex. 1002, ¶ 77. He also would have seen Downing *only* characterizing *Pitcher* as insufficient for failing to meet the '779-specific claim requirement of "determining that flowrate…is below a flowrate threshold and *has been below the flowrate threshold for a threshold amount of time*." *Id*. (emphasis modified). Significantly, this limitation is not present in '952's claims—they merely cover "condition(s)" triggering moving to a next well's stage, which *Pitcher* undisputedly teaches. Yet, despite Downing arguing *Pitcher*'s high relevance to '779's and '952's subject matter in IDS-cited-IPR documents, '952's Examiner never mentioned *Pitcher*

(EX_1003_043-046). This shows *Pitcher* was not considered during '952's prosecution.

By failing to consider *Krupa* and *Pitcher*, references Downing admits are relevant to subject matter central to '952's claims, the Examiner erred in a manner material to '952's claims' patentability.

Finally, this Petition includes never-considered §§ 101 and 112 grounds fatal to all claims, plus never-presented prior art, including *Christie*, *Al-Salmani*, and Downing-published *FS-Video* (*see* Section VIII-IX, *supra*). *Becton-Dickinson* factor (f) weighs in favor of institution.

Denial under § 325(d) is unwarranted.

XI. CONCLUSION

All Claims are unpatentable.

Dated: November 14, 2024

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

The undersigned hereby certifies that the foregoing Petition contains 18,254 words, excluding those portions identified in 37 C.F.R. § 42.24(a), as measured by the word-processing system used to prepare this Petition.

Dated: November 14, 2024 By: */s/ Tammy J. Terry*

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e) and 42.105(a), the undersigned hereby certifies that on November 14, 2024, a true and correct copy of the foregoing **Petition for *Post-Grant* Review of U.S. Patent No. 12,134,952** and copies of all supporting materials and exhibits was served by Federal Express on the following correspondence address of record as listed on USPTO's Patent Center (formerly PAIR):

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UNITED STATES

Pursuant to 37 C.F.R. § 42.105(a), the undersigned hereby certifies that on November 14, 2024, a true and correct copy of the foregoing **Petition for *Post-Grant* Review of U.S. Patent No. 12,134,952** and copies of all supporting exhibits was served by Federal Express on the Patent Owner at the following address known to the Petitioner as likely to effect service:

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