

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTELLIGENT WELLHEAD SYSTEMS, INC.,
Petitioner,

v.

DOWNING WELLHEAD EQUIPMENT, LLC,
Patent Owner.

PGR2025-00002
U.S. Patent No. 12,134,952

**DECLARATION OF HAROLD E. MCGOWEN III, P.E.
IN SUPPORT OF PATENT OWNER'S PRELIMINARY RESPONSE**

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I, Harold McGowen, do hereby declare as follows:

I. INTRODUCTION

1. I am making this declaration at the request of Downing Wellhead Equipment, LLC in the matter of the Post-Grant Review of U.S. Patent No. 12,134,952 (“the ’952 Patent”).

2. I am also being reimbursed for reasonable and customary expenses associated with my work and testimony in this investigation. My compensation is not contingent on the outcome of this matter or the specifics of my testimony.

3. I have been asked to provide my opinions regarding whether Downing’s webpage on continuous pumping describes the same subject matter as Krupa, Ex. 1022. It is my opinion that Downing’s continuous pumping webpage discloses the same well swap in Krupa involving pumping fluid in a first well, then pumping fluid into a second well, and subsequently closing the valves associated with the first well to stop pumping—all while continuously pumping.

4. In the preparation of this declaration, I have studied:

- a. the ’952 Patent, Ex. 1001;
- b. U.S. Patent Publication No. 2022/0268141 (“Krupa”), Ex. 1022;
- c. Wayback Machine - Downing Continuous Pumping Web Page, Ex. 2015; and

- d. Petitioner's PGR Petition of U.S. Patent No. 12,134,952, (the "Petition");

In forming the opinions expressed below, I have considered the documents listed above and my own knowledge and experience based upon my work in the field of hydraulic fracturing as described below.

5. Unless otherwise noted, all emphasis in any quoted material has been added.

II. QUALIFICATIONS AND PROFESSIONAL EXPERIENCE

6. My complete qualifications and professional experience are described in my *Curriculum Vitae*, a copy of which can be found in Ex.2007. The following is a brief summary of my relevant qualifications and professional experience.

7. I hold a B.S. in Mechanical Engineering from Texas A&M University and have been a Registered Professional Engineer (P.E.) in Texas since 1989. Over my 40-year career, I have gained extensive expertise in hydraulic fracturing, well completions, and well-site operations, including:

- Designing, executing, and analyzing horizontal well multi-stage hydraulic fracturing treatments.
- Assessing wellbore integrity and equipment failures related to high-pressure fracturing.

- Evaluating fracture-driven interactions (FDIs) between parent and child wells, including pressure depletion effects and frac hit mitigation.
- Conducting large-scale statistical studies on fracturing techniques, technologies, fluid performance, refracturing effectiveness, and well spacing.
- Assessing hydraulic fracturing methodologies, including pressure management and simultaneous stimulation of proximal wellbores.

8. I have served as an expert witness in multiple high-profile patent disputes, *inter partes* reviews (IPRs), and related litigation, primarily focused on hydraulic fracturing technologies. My work includes technical claim analysis, distinguishing patented technologies from prior art, rebuttals of obviousness and anticipation arguments, and demonstrating or challenging the novelty of frac-related innovations to assess patent validity. Beyond patents, I have applied my hydraulic fracturing expertise in operational failure cases, including frac hits, well interference, and tubular failures impacting fracturing operations. My recent research on zipper fracs and near-simultaneous hydraulic fracturing of proximal (offset) wells has provided critical insights into mitigating parent-child well interactions, improving treatment efficiency, and preserving reservoir pressure to enhance well performance. I have also testified before the Texas Railroad

Commission (RRC) on reservoir spacing and completion optimization, providing data-driven engineering analysis to support technical and regulatory arguments.

III. OVERVIEW OF THE '952 PATENT

9. The '952 Patent is entitled “Hydraulic Fracturing Plan and Execution of Same” and was issued by the United States Patent Office on November 25, 2024. Specifically, the '952 Patent describes a process for “executing [a continuous pumping swap (or “CP swap”)] from hydraulically fracturing ... the n_1 well (e.g., well 105D) to hydraulically fracturing ... the n_1+1 well (e.g., well 105B),” which “transitions the zipper valves from one well to the other, opening the second well and subsequently shutting-in the first well, all while pumping.” '952 Patent, 14:43-48. Stated differently, by opening the valve and beginning pumping into a second well, while still pumping into a first well, and then closing the valve in a first well, pumping can occur continuously throughout the changeover.

10. As shown in Figure 16D, during the CP swap “[t]he transition [between wells] is instantaneous and the total time between stages measured at treatment pressure is less than 20 seconds (as fast as 19 seconds in some instances).” '952 Patent, 14:49-51.

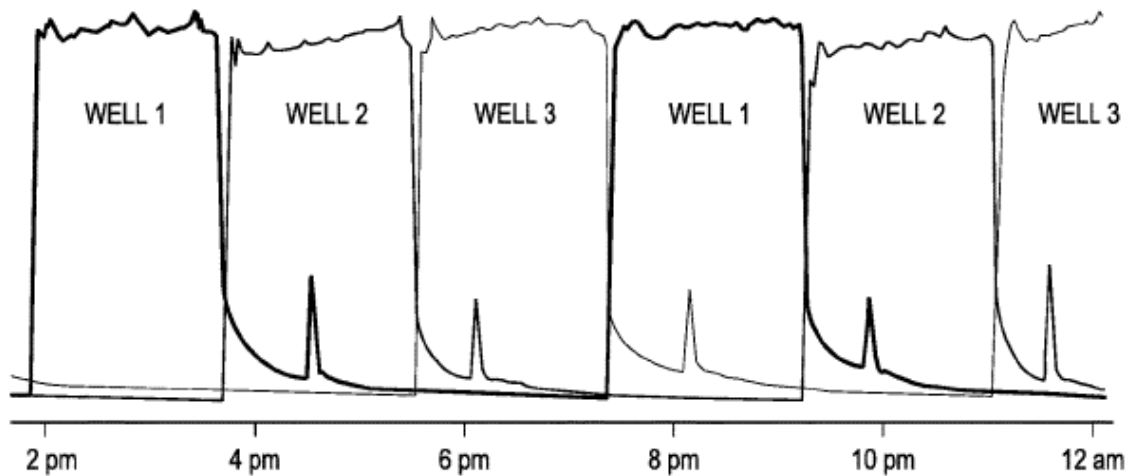


FIG. 16D

11. The CP swap described in the '952 Patent enables hydraulic fracturing pressure pumps to run continuously during multiwell zipper fracturing stimulations, thereby avoiding the need to shut down the pumps between frac stages. Shutting down pumps is disadvantageous as it introduces delays, for example while the pumps are shut down, re-primed (in some instances), and restarted.

12. The '952 Patent distinguishes the CP swap process from a conventional "regular swap." '952 Patent, 4:22-26 ("FIG. 12 is a flow diagram illustrating various sub-steps of a sixth step of the method illustrated in FIG. 1B, which sixth step is or includes determining whether to permit a regular swap or a continuous pumping swap (or 'CP swap'), according to one or more

embodiments.”). In contrast to the inventive CP swap method of the ’952 Patent, conventional regular swap methods begin by closing the valve on one well before opening the valve on the next well. ’952 Patent, 13:55-14:15 (during execution of regular swap, “[a]t the sub-step 256a, the n_1 well’s (e.g., well 105D) zipper valves 170a-b are closed” and then “[a]t the sub-step 256c, the $n_1 + 1$ well’s zipper valves 170a-b are opened...so that hydraulic fracturing fluid is communicated from the zipper manifold 145 to the n_1+1 well”). With both valves closed, pumping operations must cease. Next, the valve on the second well is opened. Pumping then resumes, but a delay occurs while the pumps are primed (in some instances) and brought back up to operating pressure.

IV. SUMMARY OF KRUPA (EX. 1022)

13. U.S. Patent Application No. 2022/0268141 to Krupa et al., entitled “System and Method for an Automated and Intelligent Frac Pumping” was filed on February 18, 2022 and published August 25, 2022. Krupa describes hydraulic fracturing including “pumping fluids into a first well via at least one pump manifold by opening a first set of valves. The method may also include pumping the fluids into a second well via the at least one pump manifold while continuously pumping the fluids into the first well by opening a second set of valves. The method further includes closing the first set of valves to stop pumping the fluids

into the first well and isolating and continuously pumping the fluids into the second well.” Ex. 1022, [0005].

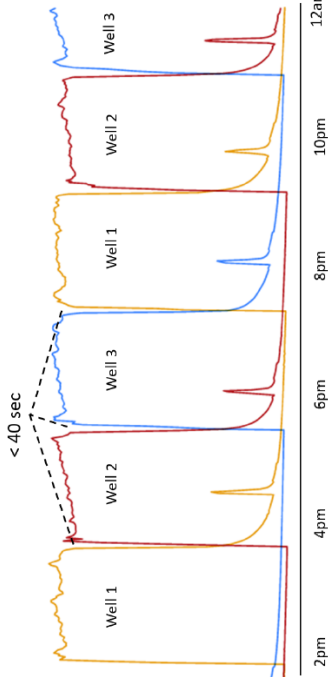
V. THE CLAIMED SUBJECT MATTER WAS DISCLOSED PRIOR TO KRUPA

14. I understand that Downing previously disclosed its continuous pumping swap invention in a webpage that was published on October 12, 2020 on its public-facing website (Ex. 2015), prior to any filing date associated with the Krupa prior art reference. I have been asked to perform an analysis comparing Downing’s webpage to portions of Krupa cited in the Petition, and I understand that if Downing’s webpage discloses those portions of Krupa, such portions are not prior art. In my opinion, Downing’s webpage discloses the portions of Krupa related to the continuous pumping swap sequence of pumping fluid to a second well while pumping fluid to a first well, and subsequently closing the valves associated with the first well.

15. I am not an attorney. In preparing and expressing my opinions, I am relying on certain basic legal principles that counsel have explained to me. I have been informed and understand that for purposes of this analysis, the subject matter disclosed in Downing’s webpage must be the same as the subject matter disclosed in Krupa. However, it is not necessary for Downing’s webpage to disclose the same subject matter using the same words as Krupa. Instead, I am to evaluate the character and weight of the disclosure. Additionally, I have been informed and

understand that the portions of Krupa that were previously disclosed by Downing's webpage are disqualified as prior art, regardless of whether Krupa includes other disclosures.

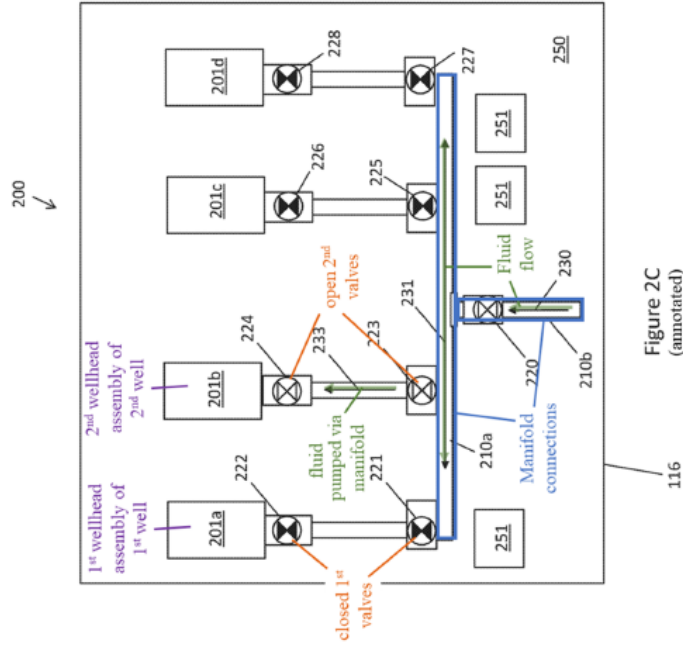
16. In the below chart, I identify the relevant claim limitations, the portions of Krupa cited in the Petition, and the portions of Downing's October 2020 webpage on continuous pumping that disclose the same subject matter cited by Krupa.

Claim Limitation	Petition's Mapping to Krupa	Downing's Prior Public Disclosure
[1.3.1]/ [20.3.1]/ [39.5.1]/ [58.4.1]/ [65.4.1]/ [72.6.1]/ [72.6.3]: “opening a second valve while fluid is communicated from the one or more pumps to the first well...wherein opening the second valve causes fluid to be communicated from the one or more pumps to the second well”	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:	“The Freedom Series Completion System with FS iControl enables instant transitions between stages, allowing your pumps to run continuously[.]” Ex. 2015, 1. The FS iControl “automat[es] the hydraulic gate valves.” Ex. 2015, 1. “FS iControl’s proprietary algorithms integrated with the Freedom Series Completion System transition the zipper valves from one well to the other, opening the second well and subsequently shutting-in the first well, all while pumping. The transition is instantaneous[.]” Ex. 2015, 1.  Ex. 2015, 2.

	200 ↙ Figure 2B (annotated) 116	[0042]-[0043], [0058]. Petition 114-115. 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	“The Freedom Series Completion System with FS iControl enables instant transitions between stages, allowing your pumps to run continuously[.]” Ex. 2015, p. 1. The FS iControl “automat[es] the hydraulic gate valves.” Ex. 2015, 1.
[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]:			

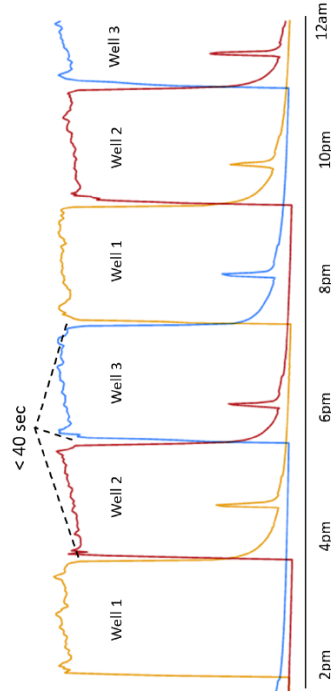
closing the first valve: after the at least a portion of fluid communicated via the manifold has satisfied the one or more conditions, which one or more conditions include the flow rate, and/or the pressure, of the at least a portion of fluid communicated via the manifold, and while fluid is communicated from the one or more pumps to the

...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:



[0043], claims 2-3.

“FS iControl’s proprietary algorithms integrated with the Freedom Series Completion System transition the zipper valves from one well to the other, opening the second well and subsequently shutting-in the first well, all while pumping. The transition is instantaneous[.]” Ex. 2015, 1.



Ex. 2015, 2.

second well via the second valve and the manifold” or “closing the first valve: after the at least a portion of fluid communicated via the manifold has satisfied the one or more conditions.”		
[1.4]/ [20.4]/ [39.5]/ [58.6]/ [65.6]/ [72.6]: “wherein, during the CP swap, fluid is continuously	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	“Pump continuously stage after stage.” Ex. 2015, 1. “Continuously pump stage to stage.” Ex.2015, 2. “The Freedom Series Completion System with FS iControl enables instant transitions between stages, allowing your pumps to run continuously, dramatically increasing completion rates and reducing cost per well.” Ex. 2015, p. 1. The FS

communicated from the one or more pumps via the manifold.”	pumping from the pumps) via the manifold. [0005]-[0007], [0046], [0058], claim 1. 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].	iControl “automat[es] the hydraulic gate valves.” Ex. 2015, 1. “FS iControl’s proprietary algorithms integrated with the Freedom Series Completion System transition the zipper valves from one well to the other, opening the second well and subsequently shutting-in the first well, all while pumping. The transition is instantaneous and the total time between stages measured at treatment pressure is as fast as 40 seconds.” Ex. 2015, 1. “Instant Transition Time” and “[r]educes transition time to zero.” Ex. 2015, 2.
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17. For the reasons explained above, in my opinion, Downing's October 2020 webpage on continuous pumping discloses the same CP swap sequence the Petition relies on in Krupa for the limitations of opening a second well while a first well is still open, and subsequently closing the first well, all while pumping.

VI. CONCLUSION

18. This declaration and my opinions herein are made to the best of my knowledge and understanding, and based on the material available to me, at the time of signing this declaration. I declare that all statements made herein on my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 or Title 18 of the United States Code.


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3/5/2025

Date: March ⁵____, 2025

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