

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PERMIAN GLOBAL INC., AND
MANTICORE FUELS, LLC
Petitioners

v.

FUEL AUTOMATION STATION, LLC,
Patent Owner

Case No. IPR2023-01238
Patent 10,974,955

**DECLARATION OF DR. ROBERT DURHAM
IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 10,974,955**

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I, Robert A. Durham, Ph.D., hereby declare as follows:

I. INTRODUCTION

1. My name is Dr. Robert A. Durham. I make this declaration based upon my own personal knowledge and, if called upon to testify, would testify competently to the matters contained herein.

2. I have been asked to provide technical assistance in the inter partes review of U.S. Patent No. 10,974,955 which I may abbreviate as “the ‘955 Patent” or refer to as the “Challenged Patent.” This declaration is a statement of my opinions on issues related to the unpatentability of claims of the ‘955 Patent. I am being compensated at my normal hourly rate for my analysis, plus reimbursement for expenses. My compensation does not depend on the content of my opinions or the outcome of this proceeding.

II. EXPERIENCE AND QUALIFICATIONS

3. In formulating my opinions, I have relied upon my knowledge, training, and experience in the relevant art. My qualifications are stated more fully in my curriculum vitae, which has been provided as EX1002 and Appendix A. My CV also lists publications on which I am a named author and identifies parties on behalf of whom I have previously provided expert testimony within the past four years. Here, I provide a summary of my qualifications.

4. I am a consulting engineer with experience in several technical areas. I have expertise in the electrification of the oil and gas industry from drilling and completion to downstream. I have been working with oil field production companies, refining and chemical plants and equipment manufacturers and technology development companies, as a consultant, for nearly twenty years. My work relates to the subject matter of the Challenged Patent, which I describe below in Section VII (“Overview of the Challenged Patent”).

5. I received my Bachelor of Science in Electrical Engineering and Master of Engineering and Technology Management degrees, from the University of Tulsa in 1992 and 1997, respectively. After years of professional work and research I received my Ph.D. in Engineering Management from Kennedy Western University in 2004.

6. I have also served in positions of leadership in the Petroleum and Chemical Industry Committee (PCIC) of the Institute of Electrical and Electronics Engineers (IEEE) for nearly twenty years. IEEE is the world’s largest technical professional association. The PCIC is the premier forum for the exchange of electrical applications technology related to the petroleum and chemical industry. From 2005 – 2012, I served as secretary, then vice chair and then ultimately chair of the Production Subcommittee of the PCIC. The Production Subcommittee is the primary method for PCIC members to communicate technical papers related to

drilling, well head and facilities operations of oil and gas wells. In 2013, I was appointed as Vice-Chair of the Standards Subcommittee of the PCIC, a role which transitioned to Chair in 2014. I served as chair until 2022, at which time I transitioned to an executive role in the PCIC. The Standards subcommittee of the PCIC is the Sponsor of IEEE standards relating to electrification and electrical equipment operations in the Oil and Gas Industry. The PCIC Standards Subcommittees sponsors nearly 50 electrical and oil and gas related standards.

7. My peers have recognized my contributions, particularly in the area of electrical equipment in the oil and gas industry. Because of this recognition, in 2019 I was elevated to the grade of Fellow of the IEEE for “contributions to submersible electrical equipment analysis and multi-point ground methods in hazardous petroleum and chemical environments.” The IEEE Fellow grade is limited to the top 0.1% of the membership of IEEE worldwide.

8. I have worked directly in the area of electrification of oil and gas fields both as an employee and as a consulting engineer. From 2000 until the end of 2002, I was employed as Manager of Electric Infrastructure for New Dominion, LLC (NDL). In that capacity I administratively owned and was responsible for all electrical equipment including overhead power lines, transformers, switchgear, drives and motors throughout NDL’s production, exploration and drilling areas.

9. After a brief stint as Vice President for EDG Power Group, responsible for Engineering and Project Management of generation and co-generation facilities across the U.S., I transitioned to the role of consulting engineer. In that role I have served as consulting engineer relating to the design, construction and analysis of all kinds of power systems, especially those in the oil and gas industry. This has included not only design and selection of equipment but also analysis of failures of equipment in the oil and gas field from drilling/completion sites to production facilities, midstream and downstream (refinery) locations.

10. In addition, I am a principal of PEDOCS, Inc., an oil and gas production company operating over 50 oil and gas production wells in Oklahoma. As such, I am familiar with operations of oil and gas wells including well stimulation, completion, hydraulic fracturing and production.

11. I have been familiar with oil and gas drilling, fracturing (fracking) and completion operations for over twenty years. In addition to being responsible for interfacing with drilling and fracturing operations with regards to electrical needs as an employee of New Dominion, LLC, I have been further educated about drilling, fracturing and operations as I have consulted and investigated incidents on multiple well drilling, fracturing and completion pad sites over my engineering consulting engagements.

12. I have been familiar with power distribution, including generation transmission and distribution equipment. As an employee I worked as a design and construction engineer for generation facilities for Central and Southwest (now American Electric Power AEP). I was also responsible for design and construction of generation facilities when employed by EDG Power Group, as discussed above. While at AEP, I spent three years as a transmission planner, responsible for modeling transmission systems and developing plans for increased power distribution capacities at high voltages. While at New Dominion LLC, I owned and was responsible for design, construction and maintenance of several hundred miles of medium voltage (5 – 25 kV) distribution lines, switchgear, drives and motors used for oil and gas drilling, completion and production. Over the last ~ 20 years I have consulted with numerous clients ranging from utilities to oil and gas development and production companies on the design, upgrades and maintenance of generation and power distribution facilities.

13. I have been familiar with Occupational Safety and Health Administration (“OSHA”) and its responsibilities at oil and gas locations. I have consulted and investigated incidents on multiple oil and gas sites where OSHA has also performed investigations regarding injuries and fatalities that have occurred at oil and gas locations, including drilling, fracturing and completion operations. As Principal Scientist of THEWAY Labs, part of my responsibilities includes

overseeing the Health Safety and Environmental (HSE) program at THEWAY Labs, including establishing policies and procedures commensurate with OSHA requirements at all locations, including requirement for oil and gas sites.

14. I am the author or co-author of over fifty published papers and five books. A list of publications that I have authored over the last thirty years is included in my professional CV, which is attached as EX1002 and Appendix A.

15. Therefore, based on my education, professional experience of 30 years, and scholarly books and publications, I am an expert in the relevant field of the Challenged Patent at issue (as explained further in Section IX) and have been an expert in this field since before the Challenged Patent was filed with the United States Patent and Trademark Office (“USPTO”). I am familiar with how a person having ordinary skill in the art would have understood and used the terminology found in the ‘955 Patent at the time of its filing.

III. TASK SUMMARY AND MATERIALS REVIEWED

16. I have been asked to review the Challenged Patent and its prosecution history, to provide an understanding of the technology relevant to the Challenged Patent, to review certain prior-art references, and to analyze whether those references disclose or teach limitations of claims from the Challenged Patent. The opinions stated in this declaration are from the perspective of a person of ordinary skill in the art (POSITA).

IV. LIST OF EXHIBITS

17. In forming my opinions, I have reviewed the Challenged Patent, its prosecution history and references cited by the Examiner, the materials cited in the List of Exhibits, and the materials cited throughout my declaration.

Exhibit #	Description
EX1001	U.S. Patent No. 10,974,955 to Shock (“the ‘955 Patent”)
EX1002	CV of Petitioners’ Expert
EX1003	Expert Declaration of Petitioners’ Expert
EX1004	U.S. Patent Pub. No. 2011/0197988 to Van Vliet et al. (“ <i>Van Vliet</i> ”)
EX1005	U.S. Patent No. 3,810,487 to Cable et al. (“ <i>Cable</i> ”)
EX1006	<u>LectroCount LCR 600™ Electronic Register</u> , https://web.archive.org/web/20140521011059/http://www.lcmeter.com/en/Literature/Documents/Specifications/ES100-30%20(LCR%20600).pdf (May 21, 2014) (“ <i>LCR I</i> ”)
EX1007	<u>Liquid Controls Electronic Registers and Data Management Systems</u> , https://web.archive.org/web/20151010104600/http://www.lcmeter.com/en/Literature/Documents/Overviews/E100-10%20Electronics%20Overview.pdf (Oct. 10, 2015) (“ <i>LCR II</i> ”)
EX1008	U.S. Patent No. 8,360,152 to DeFosse et al. (“ <i>DeFosse</i> ”)
EX1009	File History of ‘955 Patent
EX1010	Intentionally omitted
EX1011	Claim Listing
EX1012	<u>LectroCount LCR 600 Setup and Operation</u> , https://web.archive.org/web/20160509031030/http://www.lcmeter.co

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	m/en/Literature/Documents/Installation/Electronics/EM150-11%20(LCR%20600%20Setup%20&%20Op).pdf (Feb. 2010)
EX1013	Affidavit of Nathaniel E Frank-White regarding <i>LCR I</i> and <i>II</i>
EX1014	Notice of Allowance for U.S. Patent No. 9,586,805 (Dec. 29, 2016)
EX1015	<u>Coxreels 1125 Series Hand Crank and Motorized Hose Reels</u> , https://web.archive.org/web/20140408035634/http://www.coxreels.com/products/hand-crank/1125-series (Apr. 08, 2014)
EX1016	Husky “Swivels” page, archived on March 28, 2016 (https://web.archive.org/web/20160328173930/http://www.husky.com/husky/swivels/conventional-fueling-swivels/) (last accessed Aug. 3, 2023)
EX1017	Frac Shack “Technology” Page, https://web.archive.org/web/20150711214455/http://www.fracshack.com/technology) (archived on July 11, 2015) (last accessed July 17, 2023)
EX1018	U.S. Patent Pub. No. 2007/0181212 to Joe Fell (“ <i>Fell</i> ”)
EX1019	Michael Morton, “Unlocking the Earth: A Short History of Hydraulic Fracturing,” <i>GEO ExPro</i> , Vol. 10, No. 6, December 2013
EX1020	Carl T. Montgomery and Michael B. Smith, “Hydraulic Fracturing: History of an Enduring Technology,” <i>Journal of Petroleum Technology</i> vol. 62 issue 12 (Dec. 2010)
EX1021	Bourgoyne, A. T., Jr., K. K. Millheim, M. E. Chenevert and F. S. Young, Jr. (1986). <i>Applied Drilling Engineering</i> , Society of Petroleum Engineers
EX1022	schematic, Vocabulary.com, https://www.vocabulary.com/dictionary/schematic (accessed June 29, 2023)
EX1023	Vassiliou, M. S. (2018), <i>Historical dictionary of the petroleum industry</i> , Rowman & Littlefield
EX1024	B.A. Wells and K.L. Wells. “Shooters – A “Fracking” History.” <i>American Oil & Gas Historical Society</i> ,

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	(https://aoghs.org/technology/hydraulic-fracturing) (last accessed July 17, 2023)
EX1025	U.S. Patent Application Publication No. 2013/0306322 to Sanborn <i>et al.</i> entitled “System and Process for Extracting Oil and Gas by Hydraulic Fracturing” (“ <i>Sanborn</i> ”)
EX1026	U.S. Patent Publication No. 2012/0255734 to Coli <i>et al.</i> (“ <i>Coli</i> ”) entitled “Mobile, Modular, Electrically Powered System for Use in Fracturing Underground Formations”
EX1027	U.S. Patent No. 4,187,962 to Henry <i>et al.</i> (“ <i>Henry</i> ”)
EX1028	U.S. Patent Pub. No. 2008/0223482 to Dagmar Hockner (“ <i>Hockner</i> ”)
EX1029	<u>AFD Onsite Refueling</u> , http://web.archive.org/web/20150922012312/https://www.afdpetroleum.com/fuel/onsite_refuelling (Sept. 22, 2015) (“ <i>AFD</i> ”)
EX1030	Affidavit of Internet Archive Representative (applicable to <i>Coxreels</i>)
EX1031	U.S. Patent Pub. No. 2018/0057348 to Lowrie (“ <i>Lowrie</i> ”)
EX1032	Archived Designation Ltd. Website, http://web.archive.org/web/20160818200712/http://www.desihose.com/default.aspx , (archived on August 18, 2016) (last accessed on August 4, 2023).
EX1033	Archived Rhino Sleeve Website, http://web.archive.org/web/20161025131730/http://www.rhinosleeve.com/ , (archived on October 25, 2016) (last accessed on August 4, 2023)
EX1034	Archived Rhino Sleeve Website, HT Rhino Sleeve HT, http://web.archive.org/web/20180815044032/http://rhinosleeve.com/rhino-sleeve-ht/ , (archived on August 15, 2018) (last accessed on August 4, 2023)
EX1035	Harlander, L. A. "Container System Design Developments over Two Decades." <i>Marine Technology and SNAME News</i> , vol. 19, no. 04, 1982, doi:10.5957/mt1.1982.19.4.364. available from

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	http://www.onepetro.org
EX1036	Archived Xcaliber Website, Shipping Container Specialists, https://web.archive.org/web/20160308154429/https://www.xcalibercontainer.com/ (archived on Mar. 8, 2016) (last accessed on Aug. 4, 2023)
EX1037	Archived Container King Website, Accessories & Modifications, https://web.archive.org/web/20160220172317/http://containerking.com/accessories/ (archived on Feb. 20, 2016) (last accessed on Aug. 4, 2023)
EX1038	Archived Falcon Structures Website, Repurposed Shipping Containers for the Oil and Gas Industry, https://web.archive.org/web/20160419045503/http://www.falconstructures.com/oilfield-container-house (archived on Aug. 19, 2016) (last accessed on Aug. 4, 2023)

18. All citations to exhibits reference original page numbers found in the underlying document, and all emphases are added unless otherwise noted.

V. SUMMARY CONCLUSIONS AND GROUNDS FOR CHALLENGE

19. After reviewing the materials identified in the List of Exhibits, I have concluded that each of the Challenged Claims of the '955 Patent would have been obvious to a person of ordinary skill in the art, based on the following grounds:

Ground	'955 Claims	Summary
1	1, 11-12	Anticipated and/or rendered obvious by <i>Van Vliet</i>
2	1-5, 11-12	Obvious over <i>Van Vliet</i> in view of <i>Cable</i>
3	6-10, 14-20	Obvious over <i>Van Vliet</i> in view of <i>LCR I</i> and/or <i>LCR II</i>
3A	6-10, 14-20	Obvious over <i>Van Vliet</i> in view of <i>Cable</i> further in view of <i>LCR I</i> and/or <i>LCR II</i>
4	13	Obvious over <i>Van Vliet</i> in view of <i>DeFosse</i>
4A	13	Obvious over <i>Van Vliet</i> in view of <i>Cable</i> further in view of <i>DeFosse</i>

VI. LEGAL STANDARDS

A. Level of Ordinary Skill in the Art

20. When interpreting a patent, I understand that it is important to identify the relevant art pertaining to the patent-in-suit as well as the level of ordinary skill in that art at the time of the claimed invention. The “art” is the field of technology to which the patent is related.

21. I have been instructed by counsel that the person of ordinary skill in the art is a hypothetical person who is presumed to know the relevant prior art. I understand that the actual inventor's skill is not determinative of the level of ordinary skill. I further understand that the factors that may be considered in determining the level of skill include: the types of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field. I understand that not all such factors may be present in every case, and one or more of them may predominate.

B. Legal Standard for Claim Construction

22. I understand that the first step in determining whether a patent claim would have been anticipated or obvious is to ascertain how a POSITA would have understood the claim terms.

23. I have been instructed by counsel on the law regarding claim construction and patent claims, and I understand that a patent may include two types of claims: independent claims and dependent claims. An independent claim stands alone and includes only the limitations it recites. A dependent claim can depend from an independent claim, or it can further depend from another dependent claim. I understand that a dependent claim includes all the limitations that it recites, in addition to all the limitations recited in the claim(s) from which it depends.

24. It is my understanding that in proceedings before the USPTO, the claims of a patent are to be construed under what is referred to as the “Phillips standard.” I understand that this means that claim terms of a patent are given the meaning the terms would have to a POSITA, in view of the description provided in the patent itself and the patent’s file history.

25. I understand that to determine how a person of ordinary skill would understand a claim term, one should look to those sources available that show what a person of skill in the art would have understood the disputed claim language to mean. I understand that, in construing a claim term, one looks primarily to the intrinsic patent evidence, including the words of the claims themselves, the remainder of the patent, and the patent’s prosecution history. I understand that extrinsic evidence, which is evidence external to the patent and the prosecution history, may also be useful in interpreting patent claims when the intrinsic evidence itself is insufficient.

26. I understand that words or terms should be given their ordinary and accepted meaning unless it appears that the inventors were using them to mean something else. In making this determination, the claims, the remainder of the patent, and the prosecution history are of paramount importance. Additionally, the patent and its prosecution history must be consulted to confirm whether the patentee has

acted as its own lexicographer (*i.e.*, provided its own special meaning to any disputed terms), or intentionally disclaimed, disavowed, or surrendered any claim scope.

27. In comparing the claims of the Challenged Patent to the prior art, I have considered the Challenged Patent and its file history considering the understanding of a person of skill at the time of the alleged invention.

C. Anticipation

28. It is my understanding that the claims of a patent are anticipated by a prior art reference if each and every element of the claim is found either explicitly or inherently in a single prior art reference or system. I understand that inherency requires a showing that the missing descriptive matter in the claim is necessarily or implicitly present in the allegedly anticipating reference, and that it would have been so recognized by a POSITA. In addition, I understand that an enabling disclosure is a disclosure that allows a POSITA to make the invention without undue experimentation. Although anticipation typically involves the analysis of a single prior art reference, I understand that additional references may be used to show that the primary reference has enabling disclosure, to explain the meaning of a term used in the primary reference, and/or to show that a characteristic is inherent in the primary reference.

D. Obviousness

29. I understand that the prior art may render a patent claim “obvious.” I understand that two or more prior art references (*e.g.*, prior art articles, patents, or publications) that each disclose fewer than all elements of a patent claim may nevertheless be combined to render a patent claim obvious if the combination of the prior art collectively discloses all elements of the claim and one of ordinary skill in the art at the time would have been motivated or had sufficient rationale to combine the prior art in such a way. I understand that this rationale or motivation to combine need not be explicit in any of the prior art but may be inferred from the knowledge of one of ordinary skill in the art at the time the patent was filed. I also understand that one of ordinary skill in the art is not an automaton but is a person having ordinary creativity. I further understand that one or more prior art references, articles, patents, or publications that disclose fewer than all the elements of a patent claim may render a patent claim obvious if including the missing element would have been obvious to one of skill in the art (*e.g.*, the missing element represents only an insubstantial difference over the prior art or a reconfiguration of a known system).

30. I understand that under the doctrine of obviousness, a claim may be invalid if the differences between the invention and the prior art are such that the subject matter would have been obvious at the time the invention was made to a POSITA to which the subject matter pertains.

31. To assess obviousness, I understand that I am to consider the scope and content of the prior art, the differences between the prior art and the claim, the level of ordinary skill in the art, and any secondary considerations to the extent they exist.

32. I understand that any evidence of secondary indicia of non-obviousness should be considered when evaluating whether a claimed invention would have been obvious to one of ordinary skill at the time of invention. These secondary indicia of non-obviousness may include, for example:

- a long felt but unmet need in the prior art that was satisfied by the claimed invention;
- commercial success of processes claimed by the patent;
- unexpected results achieved by the invention;
- praise of the invention by others skilled in the art;
- the taking of licenses under the patent by others; and
- deliberate copying of the invention.

33. I understand that there must be a nexus between any such secondary indicia and the claimed invention.

34. It is also my understanding that there are additional considerations that may be used as further guidance as to when the above factors will result in a finding that a claim is obvious, including the following:

- the claimed subject matter is simply a combination of prior art elements according to known methods to yield predictable results;

- the claimed subject matter is a simple substitution of one known element for another to obtain predictable results;
- the claimed subject matter uses known techniques to improve similar devices or methods in the same way;
- the claimed subject matter applies a known technique to a known device or method that is ready for improvement to yield predictable results;
- the claimed subject matter would have been “obvious to try” choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- there is known work in one field of endeavor that may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to a POSITA;
- there existed at the time of the invention a known problem for which there was an obvious solution encompassed by the patent’s claims; and
- there is some teaching, suggestion, or motivation in the prior art that would have led a POSITA to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed subject matter.

35. Finally, I understand that a claim may be deemed invalid for obviousness in light of a single prior art reference, without the need to combine references, if the elements of the claim that are not found in the reference can be supplied by the knowledge or common sense of one of ordinary skill in the relevant art.

E. Priority Date

36. I understand that, subject to the next paragraph, the asserted “priority date” of a patent is the earlier of: (a) the date on which a patent application is filed;

or (b) the date on which an earlier-filed patent application is filed if the patentee claims the benefit of priority to that earlier-filed patent application.

37. I understand that it is not enough for a patent to merely claim the benefit of an earlier-filed application, but that additional criteria must be met. In particular, the prior application itself must describe the claimed invention, and must do so in sufficient detail that one skilled in the art can clearly conclude that the inventor invented the claimed invention as of the filing date sought. First, I understand that a priority-date analysis is on a claim-by-claim basis. Second, I understand that, in order for a patent claim to be entitled to the filing date of an earlier patent application, a “Section 112 analysis” must be conducted. I am informed that a “Section 112” analysis encompasses looking to the earlier patent application and ascertaining whether that earlier patent application meets both the written-description and enablement requirements as of the filing date of the earlier application. I understand that it is not enough that the claim would have been obvious from the earlier application, but that application itself must describe the claimed invention.

38. I understand that in order to satisfy the written description requirement the earlier application must reasonably convey to those skilled in the art that the inventors had possession of the subject matter of the patent as of the filing date of the earlier application. I have been informed that it is the disclosures of the earlier patent application that count, and that while the meaning of terms, phrases, or

diagrams in the earlier patent application must be interpreted from the vantage point of one skilled in the art, all the claimed limitations must appear in the specification. Further, I understand that this analysis is not a question of whether one skilled in the art might be able to construct the claimed invention from the teachings of the disclosure. The question is not whether a claimed invention is an obvious variant of that which is disclosed in the specification; rather, I understand that an earlier application must itself describe each of the claim limitations.

39. I also understand that in order to satisfy the enablement requirement, the earlier application must enable a person of ordinary skill in the art to practice the claimed invention without undue experimentation.

F. Burden of Proof

40. I understand that a party alleging a patent claim is invalid (including by obviousness) bears the burden of proof by “clear and convincing evidence.” I have been informed that clear and convincing evidence means evidence that produces a firm belief or conviction as to the truth of the matter sought to be established. I have further been informed that the parties submitted that clear and convincing evidence is evidence that is so clear, direct, weighty and convincing as to enable one to come to a clear conviction without hesitancy.

VII. OVERVIEW OF THE CHALLENGED PATENT

41. I have reviewed U.S. Patent No. 10,974,955 (“the ‘955 Patent”), which is entitled “Mobile Distribution Station for Fluid Dispensing”¹ I understand that the application which led to the ‘955 patent (Appl., No 16/700,095, the “‘905 application” was filed on Dec 2, 2019, and that the ‘955 Patent was issued on April 13, 2021.² I understand that the ‘955 Patent claims priority to application 15/890,584 filed on Feb. 7, 2018 (issued as Pat. No. 10,494,251, the “‘251 Patent”. I understand that the ‘584 application claims priority to application 15/416,198 filed on Jan 26, 2017 (issued as Pat. No 9,932,220). I further understand that the ‘198 application claims priority to application No 15/290,371 filed on Oct. 11, 2016 (issued as Pat. No 9,586,805). I understand that Petitioner, for purposes of the Petition, assumes the Oct. 11, 2016 filing date of the parent application as the priority date of the ‘955 Patent. Regardless of whether a priority date of Dec 2, 2019 or Oct. 11, 2016 is applied, my opinions remain the same.

¹ EX1001, Title.

² EX1001, Cover.

A. Summary of Subject Matter

42. The 955 Patent describes a distribution station for distributing fuel or other fluids to equipment at a hydraulic fracturing site.³ The ‘955 Patent includes a section entitled “Background.” The “Background” section discusses several known aspects of hydraulic fracturing, including the process of “hot refueling” during fracturing operations:⁴

Hydraulic fracturing (also known as fracking) is a well stimulation process that utilizes pressurized liquids to fracture rock formations. Pumps and other equipment used for hydraulic fracturing typically operate at the surface of the well site. The equipment may operate until refueling is needed, at which time the equipment may be shut-down for refueling. Shut-downs are costly and reduce efficiency. More preferably, to avoid shut-downs fuel is replenished in a hot-refueling operation while the equipment continues to run. This permits fracking operations to proceed continuously. However, hot-refueling can be difficult to reliably sustain for the duration of the fracking operation.

³ EX1001, 1:18-30, 2:13-23.

⁴ EX1001 1:18-30.

43. More specifically, the ‘955 Patent is directed to a distribution station having a pump, manifolds, reels, and hoses located on a mobile trailer.⁵ The ‘955 Patent discusses that it was known that hydraulic fracturing equipment operates semi-continuously and that, in order to reduce unwanted shutdowns, it was known to “hot-refuel” the equipment, or to re-fuel the equipment while it was still running.⁶ A known problem of hot-refueling, according to the ‘955 Patent, was that “hot-refueling can be difficult to reliably sustain for the duration of the fracking operation.”⁷ The ‘955 patent purports to solve this problem by combining known components, such as a mobile trailer, a pump, manifolds, a plurality of reels, a plurality of hoses, a plurality of valves, a plurality of fluid level sensors, and a controller, among others, according to their known functions.⁸

B. The Challenged Claims of the ‘955 Patent

44. The Challenged Claims of the ‘955 Patent, which are Claims 1-22, are set forth below. Some of the claim elements have been further sub-divided for ease of reference.

⁵ EX1001, 1:35 - 47.

⁶ EX1001, 1:25-27.

⁷ EX1001 1:23-24.

⁸ EX1001 1:34 - 49; *see also id.*, Claims 1-20.

Claim Element	Claim Language from '955 Patent
1[pre]	1. A distribution station comprising:
1[a]	a container including first and second opposed side walls that join first and second opposed end walls;
1[b]	a pump in the container;
1[c]	first and second manifolds in the container and fluidly connected with the pump;
1[d]	a plurality of reels in the container;
1[e]	a plurality of hoses, each said hose connected with a different one of the reels, wherein a portion of the reels are connected to be fed from the first manifold and another portion of the reels are connected to be fed from the second manifold;
1[f]	a plurality of valves in the container, each said valve situated between one of the first or second manifolds and a respective different one of the reels;
1[g]	a plurality of fluid level sensors, each aid fluid level sensors being associated with a respective different one of the hoses; and
1[h]	a controller configured to individually open and close the valves responsive to the fluid level sensors.
2	2. The distribution station as recited in claim 1, wherein the reels are arranged on first and second opposed sides in the container.
3	3. The distribution station as recited in claim 2, further comprising an aisle walkway down the middle of the container between the reels on the first and second opposed sides in the container.
4	4. The distribution station as recited in claim 3, further comprising a floor pan in the container.

Claim Element	Claim Language from '955 Patent
5	5. The distribution station as recited in claim 1, wherein the reels on each of the first and second opposed sides are arranged in upper and lower rows of reels.
6	6. The distribution station as recited in claim 1, further comprising a register configured to measure an amount of fluid from the pump.
7	7. The distribution station as recited in claim 6, wherein the register is in communication with the controller.
8	8. The distribution station as recited in claim 7, wherein the controller is configured to track the amount of fluid provided from the pump over a selected time interval.
9	9. The distribution station as recited in claim 8, wherein the controller is configured to trigger generation of an invoice for the amount of fluid.
10	10. The distribution station as recited in claim 8, wherein the register is an electronic register that has a resolution of about 0.1 gallons.
11[pre]	11. A distribution station comprising:
11[a]	a container including first and second opposed side walls that join first and second opposed end walls;
11[b]	at least one pump in the container;
11[c]	at least one manifold in the container and fluidly connected with the at least one pump;
11[d]	a plurality of reels in the container, each said reel individually connected with the at least one manifold;
11[e]	a plurality of hoses, each said hose connected with a different one of the reels;

Claim Element	Claim Language from '955 Patent
11[f]	a plurality of valves in the container, each said valve situated between the at least one manifold and a respective different one of the reels;
11[g]	a plurality of fluid level sensors, each said fluid level sensor connectable to an end of a different one of the hoses; and
11[h]	a controller configured to individually open and close the valves responsive to the fluid level sensors.
12	12. The distribution station as recited in claim 11, wherein the at least one pump includes two pumps.
13	13. The distribution station as recited in claim 12, wherein the two pumps are arranged in fluid series.
14	14. The distribution station as recited in claim 11, further comprising a register configured to measure an amount of fluid from the pump.
15	15. The distribution station as recited in claim 14, wherein the register is in communication with the controller.
16	16. The distribution station as recited in claim 15, wherein the controller is configured to track the amount of fluid provided from the pump over a selected time interval.
17	17. The distribution station as recited in claim 16, wherein the controller is configured to trigger generation of an invoice for the amount of fluid
18	18. The distribution station as recited in claim 16, wherein the register is an electronic register that has a resolution of about 0.1 gallons.
19[pre]	19. A distribution station comprising:
19 [a]	a container including first and second opposed side walls that join first and second opposed end walls;

Claim Element	Claim Language from '955 Patent
19[b]	at least one pump in the container;
19[c]	at least one manifold in the container and fluidly connected with the at least one pump;
19[d]	a register between the at least one pump and the at least one manifold;
19[e]	a plurality of reels in the container and connected with the at least one manifold;
19[f]	a plurality of hoses, each said hose connected with a different one of the reels;
19[g]	a plurality of valves in the container, each said valve situated between the at least one manifold and a respective different one of the reels;
19[h]	a plurality of fluid level sensors, each said fluid level sensor being associated with a different one of the hoses; and
19[i]	a controller configured to individually open and close the valves responsive to the fluid level sensors.
20	20. The distribution station as recited in claim 19, wherein the register is configured to generate measurement data representative of an amount of fluid provided from the at least one pump, and the register is in communication with the controller to send the measurement data to the controller.

C. Relevant Prosecution History of the '955 Patent

45. I have reviewed the prosecution history of the '955 Patent. The application that would issue as the '955 Patent, Patent Application No. 16/700,095

(the “’095 Application”), was filed on Dec. 2, 2019.⁹ Prosecution of the ’095 Application was short and did not demonstrate any significant discussion of prior art, obviousness or anticipation. The Examiner issued a Notice of Allowance on January 29, 2021 after only one non-final office action. The Examiner did not state a reason for allowance. In the one non-final office action issued during prosecution, the Examiner only made double-patenting rejections and did not discuss the prior art. In fact, the only reference mentioned by the Examiner in direct relation to the ’095 Application’s claims (other than patents to which the ’095 Application claimed priority) was U.S. Patent Application Publication 2007/0181212 to Fell, which is not relied upon in this Petition. Fell was relied upon in a single paragraph discussing a double-patenting rejection.¹⁰

D. Claim Construction

46. In my opinion, all the claim terms in the ’955 Patent should be given their plain and ordinary meaning, as a POSITA would have understood them in light of the specification and file history of the ’955 Patent. Except as otherwise noted, I have applied such a plain and ordinary meaning in my analysis of the claims. I

⁹ EX1001, Cover.

¹⁰ EX1009, 57-58.

reserve the right to offer additional opinions on claim construction in response to arguments that may be made by Patent Owner.

VIII. TECHNOLOGY BACKGROUND

47. In the subsections below, I describe some of the basic aspects of the technology field of the alleged invention of the Challenged Patent that were well-known as of the filing of the '403 application (which led to the '955 Patent).

A. History of Hydraulic Fracturing

48. Fracturing the hydrocarbon bearing formations is a technique that has been used to increase or speed up oil and gas production for nearly as long as oil and gas production has existed. Fracturing methods as early as the 1850's used explosives such as gunpowder ignited by red-hot iron or nitroglycerin "torpedoes."¹¹ Hydraulic fracturing, in its modern form of pumping liquids and proppants (sand) into the formation, began in the 1940s using a process developed by Stanolind Oil and used by Halliburton in the mid-continent region.¹² On March 17, 1949, Stanolind and Haliburton performed the first commercial application of hydraulic fracturing at a location about 12 miles east of Duncan, Oklahoma.¹³

¹¹ EX1019.

¹² EX1019.

¹³ EX1020, 26.



49. The expansion of directional and horizontal drilling extended the use of hydraulic fracturing into previously underdeveloped “tight” formations, including shale. In oil and gas exploration, directional drilling is a technique for accessing hydrocarbon bearing formations (oil and gas formations) that are not located immediately beneath the surface location, or to increase the amount of formation exposed to the wellbore. Some tool or process is used to cause the well bore to deviate from the vertical to reach previously inaccessible formation locations, to expose more of the hydrocarbon bearing formation to the well bore, or to drill several wells from a single surface location, such as an offshore platform or a land-based drilling pad. Like most developments in the oil and gas industry “the early drilling of directional wells was clearly motivated by economics.”¹⁴ It was the offshore fields

¹⁴ EX1021, 351.

of California that spawned the technology which led to modern directional and horizontal drilling. In the 1930s, directional drilling was being used in the Huntington Beach, California field to reach an offshore oil-bearing formation from a well initiated on an onshore pad.

50. Throughout the 1980s, directional drilling increased, in particular on offshore pads and in the Austin Chalk trend of central Texas. The Austin Chalk is a soft, loosely cemented, easily pulverized limestone characterized by natural fractures oriented primarily vertically. Horizontally deviated wells were drilled into the chalk to intersect several of the natural fractures, allowing for transport of the hydrocarbons into the wellbore. This was combined with artificial fracturing to increase the flowrate of hydrocarbons. By at least 1986, the techniques of horizontal drilling were well known and heavily developed. In 1986, the “first successful multifracture horizontal well is drilled in Wayne County, West Virginia.”¹⁵ This well used directional drilling to cause the wellbore to enter a more or less horizontal orientation (parallel to the surface of the earth) and combined it with advanced hydraulic fracturing techniques (originally developed in the 1940s) to not only expose large lengths of the hydrocarbon formation to the wellbore, but also to create

¹⁵ EX1023, xliii.

artificial cracks or “fractures” in the formation from multiple location in order to allow the hydrocarbons to “leak” out of the formation into the wellbore.

51. The use of horizontal drilling and fracturing systems in shale formations led to the U.S. vastly increasing its oil and especially natural gas production—starting in the 1980s and continuing to present day.¹⁶



52. As more formation is exposed to be fractured, horizontal wells use much higher volumes of fracturing fluid and proppant than do vertical wells. This

¹⁶ EX1024 (2011 map from the Energy Information Administration showing shale plays where hydraulic fracturing is common).

requires the use of more and bigger blending and pumping systems. As discussed by Sanborn, pumping systems of 32,000 hp were typically used as early as 2012.¹⁷ Other references, such as *Coli*, suggest systems of pumps as large as 2,500 hp each, with total system power as high as 40,000 hp were used in the same time period (four trailers, each with four 2500 hp pumps operating in parallel).¹⁸ These pumps are typically triplex or quintuplex positive displacement (plunger) type pumps.¹⁹ Although some fracturing systems have been converted to electric driven pump motors, the large majority of hydraulic pumping systems “are typically mobilized on skids or tractor-trailers and powered using diesel motors.”²⁰ These diesel engines require large amounts of diesel fuel, along with the requisite extra safeguards to address potential safety concerns.²¹

53. Fracturing is often conducted in remote locations and is typically powered using fuel brought to the frac site. The large amount of fuel necessary to be

¹⁷ EX1025, [0005].

¹⁸ EX1026, [0049] & FIG. 2.

¹⁹ EX1025, [0005]; EX1026, [0011].

²⁰ EX1026, [0005]; *see also id.*, [0007] (“standard fluid pumps require large

volumes of diesel fuel and extensive equipment maintenance programs”).

²¹ EX1025, [0007].

delivered to the fracturing site, and the diesel-powered fracturing pumps, presented known logistical challenges such as site congestion, orientation and arrangement of fracturing equipment, and safety concerns for personnel in the “red zone.”²²

B. Mobile Fuel Delivery

54. Although the volumes of fuel used in fracturing sites continued to increase, mobile fuel delivery was well-known in the prior art for many years before the ‘955 Patent was filed. For example, as a licensed pilot I am familiar with “fuel trucks” that deliver aviation fuel to aircraft which are parked on the ramp. These fuel trucks carry and deliver fuels, such as Aviation Gasoline (AvGas) or Jet Fuel (Jet A) to aircraft without the necessity of moving the aircraft. As fuel trucks are generally smaller and more maneuverable than the aircraft, this practice increases not only convenience but safety when refueling aircraft. As an example, US Patent 4,187,962 (“*Henry*”) describes a mobile liquid-dispensing apparatus usable for refueling airplanes and the like. *Henry*’s apparatus includes “a reel-mounted, extensible and retractable, fluid delivery conduit connected to an adjacent liquid supply.”²³ *Henry*

²² The “red zone” at a fracturing site is an area surrounding the fracturing pumps and the wellheads where personnel would be exposed to high pressure piping, risk of fire and high noise. As such, it is a dangerous environment and common practice is to keep personnel out of the red zone whenever practical.

²³ EX1027, Abstract.

also discloses that such a practice is not limited to aircraft but is applicable to “airplanes or other equipment which cannot conveniently be brought to a central fuel depot.”²⁴

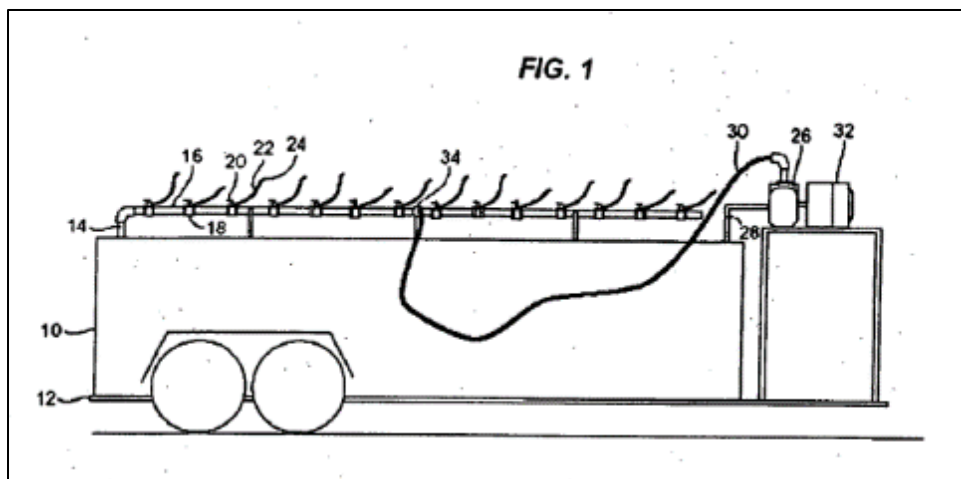
55. This practice was not limited to refueling equipment one at a time. As another example of mobile fueling, U.S. Patent Pub. No. 2007/0181212 (“*Fell*”) (published on August 9, 2007) discloses a portable refueling dock for simultaneously refueling multiple pieces of equipment.²⁵ *Fell* describes fueling in the context of “a construction site, [where] large vehicles that are used in moving and hauling dirt and debris need to be refueled.”²⁶ As illustrated in FIG. 1 (below), *Fell* discloses that its portable refueling dock has a fuel tank 10 supported by a wheeled base 12, such as a trailer.²⁷

²⁴ EX 10127, 1:9-11.

²⁵ EX1018, Abstract, [0003]-[0004], [0007].

²⁶ EX 1018, [0003].

²⁷ EX1018, [0005], [0014]-[0015], FIG. 1, FIG. 2.



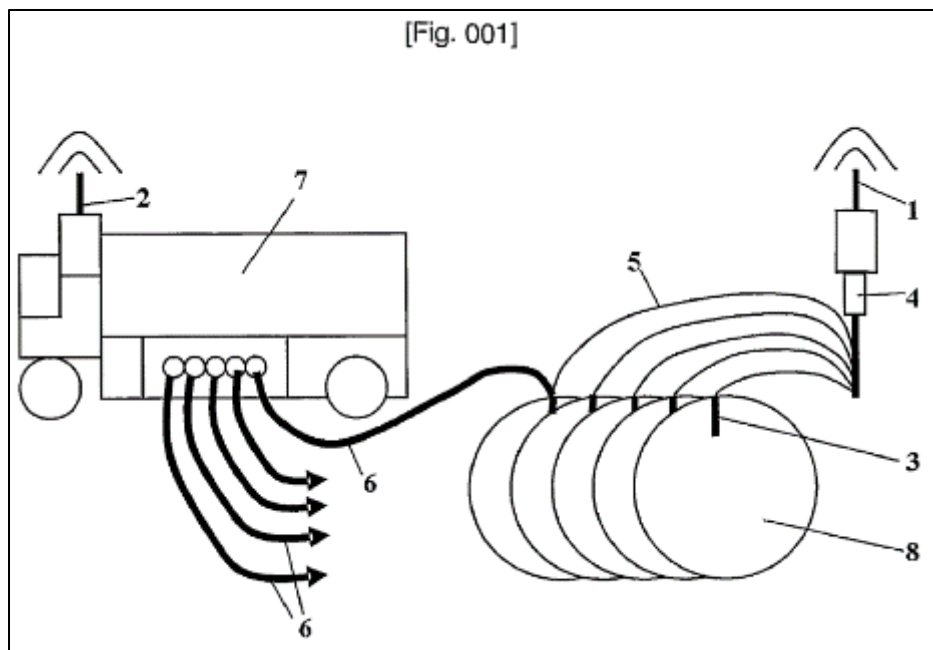
56. As another example, U.S. Patent Pub. No. 2008/0223482 (“*Hockner*”) (published September 18, 2008) discloses a tank truck for fuel delivery.²⁸ (“During filling of the tanks 3 [sic; 8], hoses 6 are extended from the tank truck 7 to the tanks 8 and connected thereto.”). *Hockner* describes mobile fuel delivery in the context of “filling of tanks at filling stations.”²⁹ As illustrated in FIG. 1 (below), *Hockner* discloses a tank truck 7 with a fuel tank. A plurality of hoses 6 connect to the tank truck, where the fuel flow in each hose is controlled by a respective valve 10.³⁰ Hoses 6 extend from the valves to simultaneously deliver fuel to a plurality of fuel tanks 8.³¹

²⁸ see EX1028, [0016].

²⁹ *Id.*, [0004].

³⁰ EX1028, FIG. 1, 2:54- 3:10.

³¹ EX1028, FIG. 1.



57. As yet another example, Frac Shack advertised on its website’s “Technology” page at least as early as July 11, 2015, a “modular” “fuel delivery system.”³² *Frac Shack* describes mobile fuel delivery in the context of fracking operations.³³ The archived video embedded on that page shows the product being stored and moved on mobile trailers:³⁴

³² EX1017 (“*Frac Shack*”).

³³ *see* EX 1017.

³⁴ *see* EX 1017, (video around timestamps 00:12 and 00:31 respectively).



58. U.S. Patent Pub. No. 2011/0197988 to Van Vliet et al. (“*Van Vliet*”), U.S. Patent Pub. No. 2018/0057348 to Lowrie (“*Lowrie*”), and AFD Onsite Refueling(<http://web.archive.org/web/20150922012312/https://www.afdpetroleum>).

com/fuel/onsite_refuelling) (“AFD”)³⁵ provide still further examples of mobile fuel delivery and are discussed further in Section XI.³⁶

C. Hoses and Reels

59. As seen above, regarding Mobile Fuel Delivery, the use of hoses and reels for fuel delivery was well-known in the art. For example, *Fell* discloses that “hoses 22 can be unspooled from hose reels that can be used to store the hoses” and the hoses reels may be mounted on the base of a portable refueling dock.³⁷ As another example, *Hockner* describes that “[d]uring filling of the tanks 3 [sic; 8], hoses 6 are extended from the tank truck 7 to the tanks 8 and connected thereto.”³⁸ Further, *Henry* describes “a reel-mounted, extensible and retractable, fluid delivery conduit connected to an adjacent liquid supply” for use in delivering fuel to “aircraft or other equipment which cannot conveniently be brought to a central fuel depot.”³⁹ As yet

³⁵ I note that *AFD* appears to be associated with a service offered by AFD Petroleum Ltd. (see copyright mark at the bottom of EX1029) and *Lowrie* appears to be an application assigned to AFD Petroleum Ltd. (see EX1031, Cover).

³⁶ see *Infra*. Section XI.

³⁷ EX1018, [0022].

³⁸ EX1028, [0016].

³⁹ EX1027, 1:9-11.

another example, Frac Shack's advertisement for its fuel delivery system on its website's "Technology" page shows hoses arranged on reels:⁴⁰



60. The embedded video on that webpage shows fuel being distributed using the hoses:⁴¹



⁴⁰ EX1017 (excerpted).

⁴¹ see EX1017 (video around timestamp 00:43).

61. A variety of hose constructions were available at the time of the ‘955 patent. For example, Designation limited, was “an independent company specializing in the supply and assembly of hoses and couplings”, often referred to a “Desihose”.⁴² One of the offerings of Desihose was the “Brent Oil/fuel Hose 3106”. Brent hose is “designed for use on engines and fuel lines. It has a fabric finish to the cover and is highly flexible.”⁴³

Internet Explorer | http://www.desihose.com/viewproduct.aspx?psd=192 | 7 captures | 13 MAR | 2017 | About this capture

DESIGNATION | Home | Browse Catalogue | Search | Contact Us | Policy | The Hose & Coupling specialists

Products

- ☐ Draflex™
- ☐ Air Hose
- ☐ Ducting Hose
- ☐ Food Quality / Steam Hose
- ☐ PVC Suction / Layflat Hose
- ☐ Thermoplastic / PVC / PTFE Hoses
- ☐ Couplings and Fittings
- ☐ Water Hose
- ☐ Oil Hose
- ☐ Fuel Hose
- ☐ Nylon and Polyurethane Tubes
- ☐ Silicone Hose
- ☐ Silverflex Fuel and WRC Hose
- ☐ Chemical, Paint and Solvent Hose
- ☐ Stainless PTFE Hose
- ☐ Fire Hose
- ☐ Materials Handling Hose
- ☐ Stainless Metallic Hose
- ☐ Composite Hose
- ☐ Hydraulic Hose & Couplings
- ☐ Copper/Bundy Tubes
- ☐ Welding & Gas Hose
- ☐ Air Conditioning Hose
- ☐ Misc

Fuel Hose - BRENT OIL/FUEL HOSE 3106

This hose is designed for use on engines and fuel lines. It has a fabric finish to the cover and is highly flexible. Designed for use with leaded and unleaded petrol.



Click to enlarge

Colour Black
Cover Black NBR rayon fabric finish
Lining NBR/PVC rubber
Reinforcement Rayon textile cords
Specification DIN 73379 Type B
Application Fuel hose
Temperature -30°C + 100°C

Diameter		Pressure Psi	Weight g/m	Bend radius mm	Availability
Inside	Outside				
3.2	7.2	150	40	15	*
5.0	10.0	150	80	20	*
6.0	11.0	150	90	20	*
8.0	13.0	120	110	30	*
10.0	15.0	90	130	40	*
* Usually ex-stock					

☒ Back to previous page ☐ Enquire about this product

Related Products



BRENT OIL/FUEL HOSE BRENT OIL/FUEL HOSE 3106
This hose is designed for use on engines and fuel lines. It has a fabric finish to the cover and is highly flexible. Designed for use with leaded and unleaded petrol.



BRENT OIL/FUEL HOSE BRENT OIL/FUEL HOSE 3121
This fuel injection hose is made to SAE and BS standards. It has a smooth nitrile rubber liner and a NBR/PVC cover and is designed with a working pressure of 225 psi. Designed for use with diesel and unleaded petrol.



FORTIES FORTIES 3006
Premium quality, long length moulded oil/petrol hose for industrial and automotive use.



PIPER OIL HOSE PIPER OIL HOSE 7040
Hose for marine fuel lines. Approved to DNV and Lloyds. This hose has an improved fire resistance rating and is used on all craft of 22 metres or less.

⁴²EX1032.

⁴³EX1032.

62. As another example, at least by October 25, 2016, SRM Industries marketed several types of hose protection sleeves, including those made of nylon, metal and fabric:⁴⁴



63. For example, RHINO Sleeve HT is a high temperature hose protection constructed of “Densely twisted proprietary engineered fabric [which] offers optimum UV & abrasion protection”⁴⁵, and was offered in sizes ranging from .64 inches to 5.5 inches.⁴⁶ The fabric sleeve had “ultra tight construction [which] contains oil spillage from pin hole leaks” and “meets conductivity requirements of

⁴⁴ EX1033.

⁴⁵ EX1034.

⁴⁶ EX1034.

ISO 8031.” Accordingly, a POSITA would have understood that RhinoSleeve was appropriate for protection of hoses transferring hydrocarbons, as the conductive hose would help dissipate any static buildup.

64. Further, the use of reels to support hoses, including reels that are part of the “flow path” of the fluids being transferred were well known. For example, one type of commercially available hose reel system was provided by Coxreels. Coxreels was a known supplier of hose reels, as supported by the Coxreels website from April 8, 2014 describing the Coxreels 1125 Series hand crank and motorized hose reels.⁴⁷



⁴⁷ EX1015.

65. Coxreels 1125 Series Hand Crank and Motorized Hose Reels (“Coxreels”) was made available online at least as early as April 8, 2014, as explained in the affidavit of the Internet Archive representative.⁴⁸ The public accessibility of *Coxreels* is established by the Internet Archive, Wayback Machine, which preserved Coxreels on April 8, 2014.⁴⁹

66. The *Coxreels*’ 1125 reels come in various heights and widths; the length/diameter of each reel is 17 and 5/8 inches. A portion of the table from *Coxreels* showing an example of the sizes of reels available at the time of *Coxreels* is duplicated below.⁵⁰

⁴⁸ see EX1030.

⁴⁹ see EX1030.

⁵⁰ EX1015.

DECLARATION OF DR. ROBERT DURHAM
IN SUPPORT OF PETITION FOR INTER PARTES REVIEW
OF U.S. PATENT NO. 10,974,955

Reel			CAPACITY			OPT. CAPACITY			PSI	SIZE INDEX			
MOUL	LBS	KOSL	I.D.	O.D.	I.L.	I.D.	O.D.	I.L.		W	H	L	
1125-4-100	36	N	1/2"	7/8"	100	3/8"	3/4"	140"	3000	18-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-200	36	N	1/2"	7/8"	200	3/8"	3/4"	300"	3000	28-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-325	48	N	1/2"	7/8"	325	3/8"	3/4"	450"	3000	31-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-450	50	N	1/2"	7/8"	450	3/8"	3/4"	825"	3000	37-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-600	50	N	1/2"	7/8"	600	3/8"	3/4"	700"	3000	41-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-5-50	30	N	3/4"	1-1/4"	50	1/2"	7/8"	100"	3000	20-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-100	42	N	3/4"	1-1/4"	100	1/2"	7/8"	200"	3000	26-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-175	50	N	3/4"	1-1/4"	175	1/2"	7/8"	325"	3000	32-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-200	50	N	3/4"	1-1/4"	200	1/2"	7/8"	400"	3000	36-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-250	50	N	3/4"	1-1/4"	250	1/2"	7/8"	500"	3000	42-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-6-35	50	N	1"	1-7/8"	35	3/4"	1-1/4"	50"	3000	20"	18-1/2"	17-5/8"	Add to Quote
1125-6-50	50	N	1"	1-7/8"	50	3/4"	1-1/4"	75"	3000	32"	18-1/2"	17-5/8"	Add to Quote
1125-6-75	60	N	1"	1-7/8"	75	3/4"	1-1/4"	100"	3000	38-1/2"	18-1/2"	17-5/8"	Add to Quote

67. I am familiar with products such as those described in *Coxreels* for use as in various applications, including refueling. As an example, I have used fixed diesel fuel stations that had similar reels for the storage of fueling hoses to fuel company and personal vehicles being used in the oil field. Further, as a licensed pilot, I am familiar with the use of reels, such as those used in *Coxreels* on mobile fueling trucks used to fuel aircraft. The use of such reels, for example for fuel distribution, was well known to me, and would have been well known to a POSITA, at the time of the '955 Patent.

68. The Coxreels website describes an “[e]xternal fluid path with machined from solid brass 90° full-flow NPT swivel inlet”:⁵¹



The Coxreels website also describes a “low profile outlet riser & open drum slot design for flat smooth hose wrap.”:⁵²

⁵¹ EX1015, 1 (excerpted and annotated to show “external fluid path” with brass “swivel inlet.”).

⁵² EX1015, 1 (excerpted and annotated to show “outlet” and “drum slot.”).

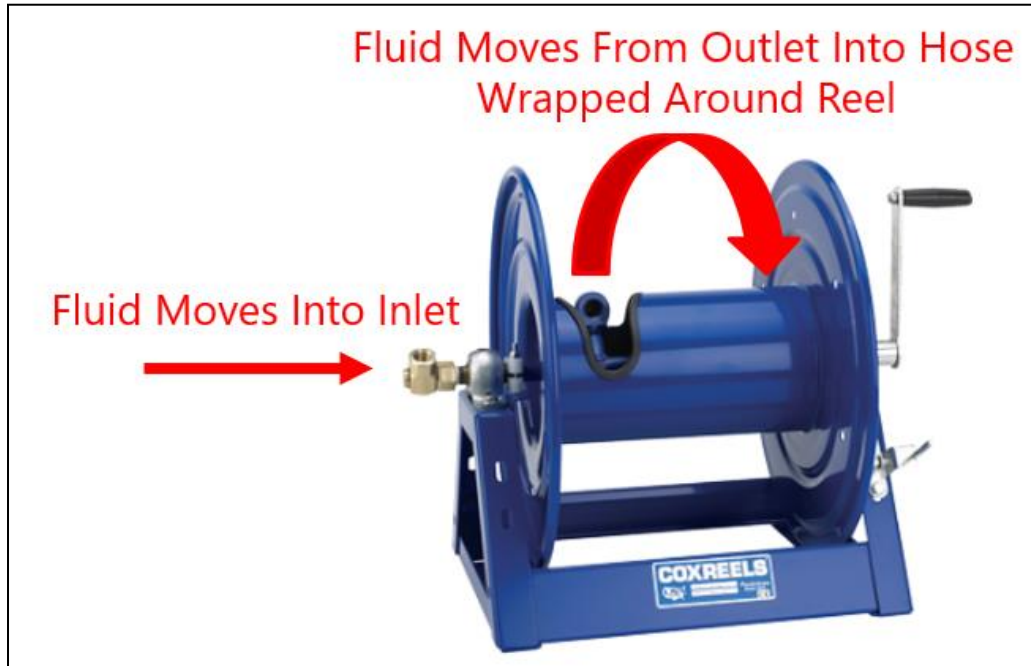


69. A POSITA would have recognized the “outlet riser” above, annotated in red, would have been the outlet, or discharge point, of fluid that flowed into the swivel inlet. A POSITA would have recognized that fluid in a system using *Coxreels* would be fluidly connected to the “external fluid path” via the brass inlet, pass through the reel body, and exit into a hose from the outlet made accessible by the “low profile outlet riser & open drum slot design.”⁵³

70. Further, a POSITA would have recognized the inlet port as a swivel joint, sometimes referred to as a “rotatable coupling” for feeding fluid into the flow

⁵³ see EX1015, 1.

path of the reel. A swivel joint allows the fluid to flow through the joint while the fitting is being rotated.



71. Accordingly, a POSITA would have recognized as obvious fluidly connecting a manifold (upstream of the reel body) to hoses (downstream of the reel body) through a flow passage in the reel body.

72. Further, a POSITA would have recognized the inlet port as a swivel joint, sometimes referred to as a “rotatable coupling” for feeding fluid into the flow path of the reel. A swivel joint allows the fluid to flow through the joint while the fitting is being rotated. One example of a commercially available swivel joint,

showing operation of the swivel joint, is the Husky general fueling products website.⁵⁴

HUSKY | SWIVELS

Swivels

High-performance, American-made fuel nozzles and accessories.

Conventional Fueling
Standard
Inline
Farm & Commercial
Standard
Truck & High Volume
Vapor Recovery
Truck & High Volume
Diesel
High Volume
DEF
Model 007269
Model 007275
Model 007282/010936
Model
007467/008510/008822
Ethanol Fueling
E85 Swivel

Standard Swivels: For Standard Fueling Applications

Features & Benefits

Specifications

All Husky® Multi-Plane Swivels

- Compatible with unleaded, diesel, and Ethanol blends through E10.
- Compact and light weight for easy handling.
- High flow rates due to laminar flow design.
- High strength step shoulder bearing diameters and impact absorbing

73. The Husky website teaches that fuel swivel joints were available at least by Mar 28, 2016. These swivel joints were compatible with “unleaded, diesel and Ethanol blends through E10.” Further, the website teaches that the swivel joints have full 360° rotation.

⁵⁴ EX1016.

All Weather Swivels

- Multi-plane, full 360° spherical rotation for easy movement of nozzle.
- Double o-ring seals at each swivel provide long life at low temperatures (-40° F/C).

Warm Weather Swivels

- Multi-plane, full 360° spherical rotation for easy movement of nozzle.
- Double o-ring seals at each swivel provide long life at high temperatures (482° F / 250° C).

74. A POSITA would have recognized that swivel joints would have been used in fueling systems, and in particular on hose reels to allow for “full 360° spherical rotation” while the reel was winding or unwinding the hose stored thereupon.

D. Fluid Level Sensors

75. Fluid level sensors were well-known in fuel delivery systems. For example, *Hockner* describes a “fill-level threshold sensor” in the context of measuring fuel in a tank:⁵⁵

Multiple tanks, i.e., fuel tanks **8**, are provided at a filling station, not illustrated in greater detail in FIG. 1. In each of these tanks **8a** fill-level threshold sensor **3** is provided that generates a signal when a predetermined level, preferably the maximum level, is reached in the respective tank **8**.

These threshold sensors **3** may be known optical systems in which light is emitted, refracted in a defined manner on a glass prism on the probe, and reflected to a light sensitive element. When the liquid reaches the

⁵⁵ EX1028, [0012]-[0013].

prism the index of refraction is altered, and less light or no light at all is reflected to the light-sensitive element, whereupon a signal is outputted.

76. As another example, Frac Shack advertised its fuel delivery system on its website's "Technology" page as having "[w]ireless remote fuel level monitoring on every tank, in real time."⁵⁶

E. Containers / Trailers

77. The use of containers to transport equipment, including on trailers, was well known in the oil and gas industry long before the '095 application (or the '955 Patent). The development of container systems to allow for intermodal (i.e., different modes) transportation of goods and products began at least by 1958.⁵⁷ These efforts led to the publication of American Standards Association (ASA)⁵⁸ standards in September, 1965, followed by International Organization for Standardization (ISO) approval in 1967. The initial documents provided for standardized container lengths (i.e., 10, 20, 30, 40 ft), heights (i.e., 8 ft), gross weights, corner strength, stacking requirements and dynamic loading.⁵⁹ The ANSI and ISO standards have

⁵⁶ EX1017.

⁵⁷ EX1035, 364-76.

⁵⁸ Now called the American National Standards Institute (ANSI).

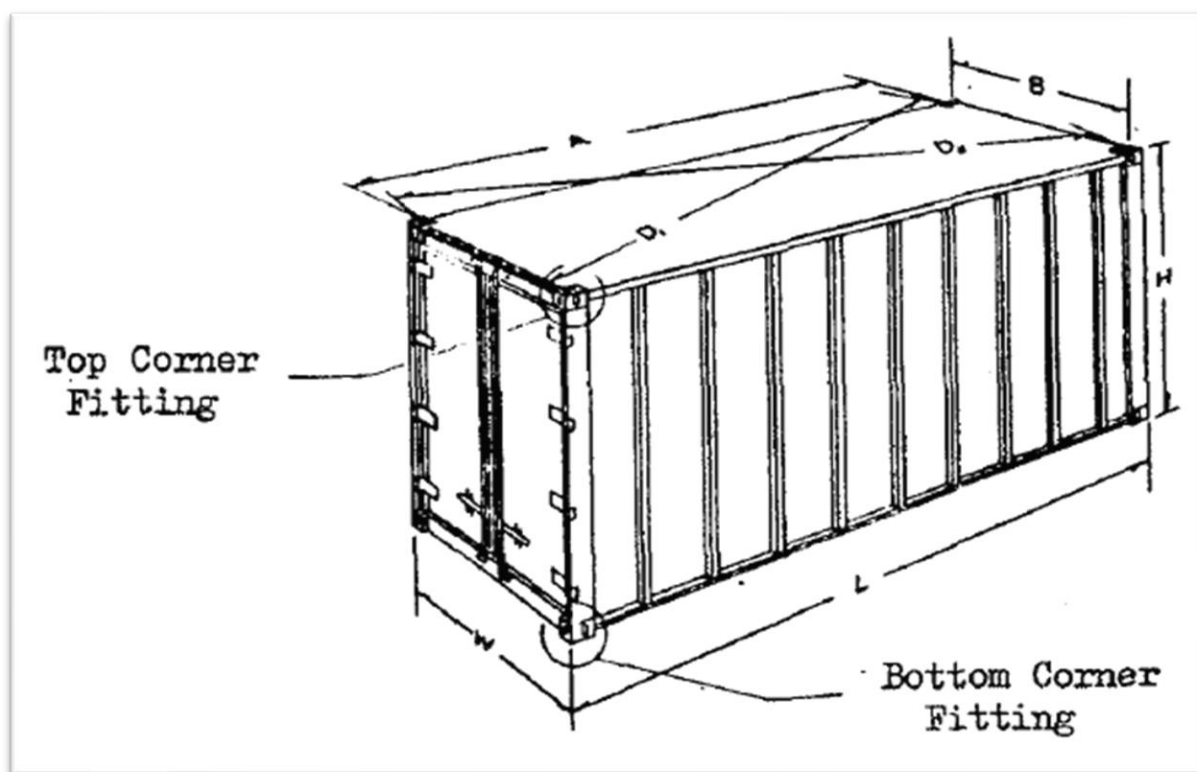
⁵⁹ EX 1035.

subsequently been revised (e.g., 1979/1980, 1995, 2015). Current standard containers are 40 feet long and 8 ½ or 9 ½ feet high. At the time of the development of the ANSI standards “The 40-ft container, which was generally accepted by all, was chosen because it was the maximum size which could be transported by highway throughout most of the United States, and there were indications that those states which did not permit 40-ft semitrailers were considering the liberalization of their length restrictions.”⁶⁰

78. These standard containers are designed with side walls, end walls, tops and bottoms to create a watertight “box” for storage and transportation of a variety of items. The primary advantage of such standardized containers is the ability to be used in multiple modes of transportation. For example, a sea-born container can be loaded directly on a trailer bed for transportation by trailer to an off-port location. Further, the standardized containers meet size requirements for transportation on the highway system and protect the components from weather.⁶¹

⁶⁰ EX 1035.

⁶¹ EX 1035., FIG. 1.



79. One example of the public availability of such containers at the time of the '955 Patent were containers offered by "Xcaliber Container" of Fort Worth, TX. By at least March, 2016, Xcaliber container offered "*steel storage containers* for Texas, Southern Oklahoma, and Western New Mexico. Our *steel storage containers* can be used for storage, hunting cabins, lake cabins and mobile offices. All of the *steel storage containers* offered by Xcaliber Container are rust resistant, waterproof and rodent proof. We also provide professional delivery and set-up for all *steel storage containers*.⁶² As disclosed by the Xcaliber website, the steel containers were

⁶²EX1036.

known not only for transportation of goods, but also for other uses such as cabins and mobile offices. As another example of modified shipping containers being used for various purposes, Container King of Sanger, TX at least by Feb, 2016 offered containers with various accessories and modifications including shelving, doors, windows, A/C & Heat, custom interiors, ramps, lights and vents.⁶³

80. As a further example, at least by August, 2016 Falcon Structures offered “Repurposed Shipping Containers for the Oil and Gas Industry”. Falcon Structures offered modified containers for “oil and gas solutions – specifically in drill site or production site structures” including structures for “living, working, equipment housing and storage solutions [in] North American shale plays, oil plays, coal-bed fields [and] offshore jobs.”⁶⁴ Falcon industries taught “[s]ome of the country’s most promising basins are plotted in remote locations with extreme weather” and Falcon’s structures protect against the effects of weather.⁶⁵ A POSITA would have known of the use of modified intermodal shipping containers in the oil

⁶³EX1037.

⁶⁴EX1038.

⁶⁵ <http://www.falconstructures.com/repurposed-shipping-container> (falcon boxes “include a quality check to make sure it is wind and watertight”).

and gas industry, including for housing equipment such as the pumps, hoses, reels, etc. of the '955 Patent.

F. Area Classification/Fire Standards

81. Several industry codes and standards would apply to the design and construction of a mobile fuel distribution station, such as the one described in the prior art and the Challenged Claims. These codes and standards would have been well-known to a POSITA and would serve to inform a POSITA regarding design and construction of facilities and equipment, in particular those facilities and equipment that handle or dispense combustible and flammable liquids, such as fuels. Some of the requirements of these codes and standards are discussed in the paragraphs below.

1. NFPA 70 National Electrical Code (NEC)

82. NFPA 70, the National Electrical Code (NEC), provides, in Article 500, the definitions and requirements for equipment in classified (hazardous) areas. NFPA 70 is published by the National Fire Protection Association (NFPA). NFPA is a “leading information and knowledge resource on fire, electrical and related hazards.”⁶⁶ NFPA standards, including NEC, were well known sources of

⁶⁶ see National Fire Protection Association, (<https://www.nfpa.org/>) (last accessed July 17, 2023).

information regarding installation of electrical systems to protect “persons and property from hazards arising from the use of electricity.”⁶⁷ The NEC is regularly adopted by state, county, and municipal jurisdictions for governing installation of electrical systems in industrial, commercial, and residential locations. The version of the NEC in place at the time of the ‘955 Patent was published in 2014 (“NEC-2014”). A POSITA would have looked to NEC-2014 for information regarding the safe design and construction of electrical equipment, as discussed below.

83. NEC-2014 Chapter 5 addresses unique requirements for “Special Occupancies.” Included in the “Special Occupancies” are provisions for electrical installations in “Hazardous (Classified) Locations, Classes I, II and II, Divisions 1 and 2,” addressed in Article 500 of NEC-2014. The Scope of Article 500 is shown below:⁶⁸

500.1 Scope – Articles 500 Through 504.

Articles **500** through **504** cover the requirements for electrical and electronic equipment and wiring for all voltages in Class I, Divisions 1 and 2; Class II, Divisions 1 and 2; and Class III, Divisions 1 and 2 locations where fire or explosion hazards may exist due to flammable gases, flammable liquid-produced vapors, combustible liquid-produced vapors, combustible dusts, or ignitable fibers/flyings.

84. Article 500 also defines Class I locations as those locations “in which flammable gases, flammable liquid-produced vapors, or combustible liquid-

⁶⁷ NEC-2014 Art. 90.1 “Purpose.”

⁶⁸ NEC-2014 Art. 500.1.

produces vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.”⁶⁹ Class I areas are divided into two divisions. A Class I Division 1 location is defined as follows:⁷⁰

(1) Class I, Division 1.

A Class I, Division 1 location is a location

- (1) In which ignitable concentrations of flammable gases, flammable liquid–produced vapors, or combustible liquid–produced vapors can exist under normal operating conditions, or
- (2) In which ignitable concentrations of such flammable gases, flammable liquid–produced vapors, or combustible liquids above their flash points may exist frequently because of repair or maintenance operations or because of leakage, or
- (3) In which breakdown or faulty operation of equipment or processes might release ignitable concentrations of flammable gases, flammable liquid–produced vapors, or combustible liquid–produced vapors and might also cause simultaneous failure of electrical equipment in such a way as to directly cause the electrical equipment to become a source of ignition.

In contrast, a Class I Division 2 location is defined as an area:⁷¹

⁶⁹ NEC-2014 Art, 500.5 (B).

⁷⁰ NEC-2014 Art. 500.5(B)(1).

⁷¹ NEC-2014 Art. 500.5(B)(2).

- (1) In which volatile flammable gases, flammable liquid–produced vapors, or combustible liquid–produced vapors are handled, processed, or used, but in which the liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems or in case of abnormal operation of equipment, or
- (2) In which ignitable concentrations of flammable gases, flammable liquid–produced vapors, or combustible liquid–produced vapors are normally prevented by positive mechanical ventilation and which might become hazardous through failure or abnormal operation of the ventilating equipment, or
- (3) That is adjacent to a Class I, Division 1 location, and to which ignitable concentrations of flammable gases, flammable liquid–produced vapors, or combustible liquid–produced vapors above their flash points might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clean air and effective safeguards against ventilation failure are provided.

85. Areas that are hazardous (classified) areas require special electrical equipment. There are many methods of protection against ignition listed in NEC-2014, for example, explosionproof equipment, purged and pressurized equipment, intrinsically safe equipment, etc. Regardless of the protection technique used, the equipment must be identified (listed) for use in the Class/Division where it is installed. According to NEC-2014, suitability of equipment for use in a hazardous area shall be by one of the following:⁷²

⁷² NEC-2014 500.8(A).

(A) Suitability.

Suitability of identified equipment shall be determined by one of the following:

- (1) Equipment listing or labeling
- (2) Evidence of equipment evaluation from a qualified testing laboratory or inspection agency concerned with product evaluation
- (3) Evidence acceptable to the authority having jurisdiction such as a manufacturer's self-evaluation or an owner's engineering judgment.

86. A POSITA would have understood that classified area equipment, which requires additional design, testing and listing requirements over and above “normal” area use equipment would be more expensive and, in many applications (such as conduit seals, etc.) more labor intensive to install. Other provisions and requirements for classified area equipment apply and are listed in NEC-2014.

2. International Fire Code

87. The International Fire Code (IFC) is published by the International Code Council (ICC), which is a “leading global source of model codes and standards and building safety solutions that include product evaluation, accreditation, technology, training, and certification.”⁷³ The IFC is a well-known source for information regarding safe design construction of facilities, in particular those facilities handling combustible or flammable liquids, such as fuels. The IFC is

⁷³ see International Code Council, (<https://www.iccsafe.org/about/who-we-are/>) (last accessed July 17, 2023).

regularly adopted by state, county and municipal jurisdictions for governing fire prevention, suppression, and elimination in industrial, commercial, and residential locations. The version of the IFC in place at the time of the '955 Patent was the 2015 version ("IFC-2015"). A POSITA would have looked to IFC-2015 for information regarding the safe design and construction of equipment used in refueling operations, as discussed below.

88. The Scope and intent of the IFC are contained in Chapter 1.⁷⁴

[A] 101.2 Scope.

This code establishes regulations affecting or relating to structures, processes, premises and safeguards regarding all of the following:

1. The hazard of fire and explosion arising from the storage, handling or use of structures, materials or devices.
2. Conditions hazardous to life, property or public welfare in the occupancy of structures or premises.
3. Fire hazards in the structure or on the premises from occupancy or operation.
4. Matters related to the construction, extension, repair, alteration or removal of fire suppression or alarm systems.
5. Conditions affecting the safety of fire fighters and emergency responders during emergency operations.

[A] 101.3 Intent.

The purpose of this code is to establish the minimum requirements consistent with nationally recognized good practice for providing a reasonable level of life safety and property protection from the hazards of fire, explosion or dangerous conditions in new and existing buildings, structures and premises, and to provide a reasonable level of safety to fire fighters and emergency responders during emergency operations.

Accordingly, IFC-2015 provides a resource of the knowledge of a POSITA at the time of the application which led to the '955 Patent.

89. Section 309 of IFC-2015 deals directly with "Powered Industrial Trucks and Equipment" and provides general information regarding this equipment.

⁷⁴ International Code Council, Inc. "International Fire Code 2015 (IFC)." ICC, 2015., Chapter 1.

Section 309.5 deals directly with refueling of such equipment and states, in part, “Fixed fuel-dispensing equipment and associated fueling operations shall be in accordance with Chapter 23. Other fuel-dispensing equipment and operations, including cylinder exchange for LP-gas-fueled vehicles, shall be in accordance with Chapter 57 for flammable and combustible liquids or Chapter 61 for LP-gas.”⁷⁵ Accordingly, a POSITA would have looked to Chapter 57 for information regarding “fuel dispensing equipment” (such as the refueling systems described in the prior art and the Challenged Patents) that handle “flammable and combustible liquids.” IFC-2015 provides definitions of Flammable Liquids and Combustible Liquids as follows:⁷⁶

COMBUSTIBLE LIQUID. A liquid having a closed cup flash point at or above 100°F (38°C). Combustible liquids shall be subdivided as follows:

Class II. Liquids having a closed cup flash point at or above 100°F (38°C) and below 140°F (60°C).

Class IIIA. Liquids having a closed cup flash point at or above 140°F (60°C) and below 200°F (93°C).

Class IIIB. Liquids having closed cup *flash points* at or above 200°F (93°C).

The category of combustible liquids does not include *compressed gases* or *cryogenic fluids*.

FLAMMABLE LIQUID. A liquid having a closed cup flash point below 100°F (38°C). Flammable liquids are further categorized into a group known as Class I liquids. The Class I category is subdivided as follows:

Class IA. Liquids having a flash point below 73°F (23°C) and having a *boiling point* below 100°F (38°C).

Class IB. Liquids having a *flash point* below 73°F (23°C) and having a *boiling point* at or above 100°F (38°C).

Class IC. Liquids having a *flash point* at or above 73°F (23°C) and below 100°F (38°C).

The category of flammable liquids does not include *compressed gases* or *cryogenic fluids*.

⁷⁵ IFC-2015 §309.5.

⁷⁶ IFC-2015 §202 General Definitions.

90. An example of a combustible liquid is diesel fuel, which has a flashpoint of around 126°F⁷⁷ and a boiling point between 304°F and 574°F.⁷⁸ Diesel would be characterized as a Class IIIB combustible liquid. An example of a flammable liquid would be gasoline, which has a flash point of around -45°F⁷⁹ and a boiling point of between 100°F and 400°F.⁸⁰ Gasoline would be characterized as a Class IB flammable liquid.

91. Chapter 57 of IFC-2015 deals with “Prevention, control and mitigation of dangerous conditions related to storage, use, dispensing, mixing and handling of flammable and combustible liquids”⁸¹ Section 5703.1 of IFC-2015 deals with electrical installations around handling of flammable and combustible liquids. Section 5703.1.1 states, in part “Areas where flammable liquids are stored, handled, dispensed or mixed shall be in accordance with Table 5703.1.1. A classified area

⁷⁷ see Flash Point – Liquids, The Engineering toolbox, (https://www.engineeringtoolbox.com/flash-point-fuels-d_937.html) (last accessed July 17, 2023).

⁷⁸ see Fuels – Boiling Points, The Engineering Toolbox, (https://www.engineeringtoolbox.com/fuels-boiling-point-d_936.html) (last accessed July 17, 2023).

⁷⁹ see Flash Point – Liquids, The Engineering toolbox, (https://www.engineeringtoolbox.com/flash-point-fuels-d_937.html) (last accessed July 17, 2023).

⁸⁰ see Fuels – Boiling Points, The Engineering Toolbox, (https://www.engineeringtoolbox.com/fuels-boiling-point-d_936.html) (last accessed July 17, 2023).

⁸¹ IFC-2015 §5701.1.

shall not extend beyond an unpierced floor, roof or other solid partition.”⁸² Table 5703.1.1 contains provisions which determine what area classification exists around certain types of equipment. Area classification is described in more detail in the section regarding NFPA 70 (National Electrical Code) below. All areas that are classified (hazardous) areas due to flammable or combustible liquids are considered “Class 1.” Areas are classified by Divisions, where Div. 1 is an area where a flammable atmosphere may exist on a regular basis and Div. 2 is an area where a flammable atmosphere may exist during abnormal operations. Some area classification divisions applicable to the Challenged Patents are taken from Table 5703.1.1 and shown below:⁸³ All The numbers in the table have to do which division the area is classified.

Drum and container filling		
Outdoor or indoor with adequate ventilation	1	Within 3 feet of vent and fill opening, extending in all directions.
	2	Area between 3 feet and 5 feet from vent of fill opening, extending in all directions. Also up to 18 inches above floor or grade level within a horizontal radius of 10 feet from vent or fill opening.

⁸² IFC-2015 §5703.1.1.

⁸³ IFC-2015 Table 5703.1.1.

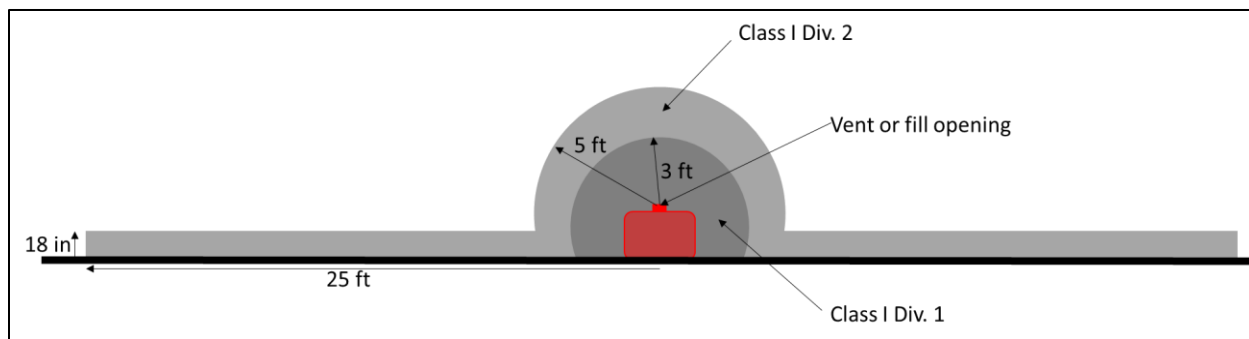
DECLARATION OF DR. ROBERT DURHAM
IN SUPPORT OF PETITION FOR INTER PARTES REVIEW
OF U.S. PATENT NO. 10,974,955

Pumps, bleeders, withdrawal fittings, meters and similar devices		
Indoor	2	Within 5 feet of any edge of such devices, extending in all directions, and up to 3 feet above floor or grade level within 25 feet horizontally from any edge of such devices.
Outdoor	2	Within 3 feet of any edge of such devices, extending in all directions, and up to 18 inches above floor or grade level within 10 feet horizontally from an edge of such devices.

Pits		
Without mechanical ventilation	1	Entire area within pit if any part is within a Division 1 or 2 classified area.
With mechanical ventilation	2	Entire area within pit if any part is within a Division 1 or 2 classified area.
Containing valves, fittings or piping, and not within a Division 1 or 2 classified area	2	Entire pit.
Drainage ditches, separators, impounding basins		
Indoor	1 or 2	Same as pits.
Outdoor	2	Area up to 18 inches above ditch, separator or basin, and up to 18 inches above grade within 15 feet horizontal from any edge.

Indoor equipment where flammable vapor/air mixtures could exist under normal operations	2	Area between 5 feet and 8 feet of any edge of such equipment, extending in all directions, at the area up to 3 feet above floor or grade level within 5 feet to 25 feet horizontally from any edge such equipment. ^c
	1	Area within 3 feet of any edge of such equipment, extending in all directions.
Outdoor equipment where flammable vapor/air mixtures could exist under normal operations	2	Area between 3 feet and 8 feet of any edge of such equipment extending in all directions, at the area up to 3 feet above floor or grade level within 3 feet to 10 feet horizontally from any edge such equipment.

92. For example, around an area where drums or containers are filled, there is a Class I Div. 1 area that extends three feet from the vent or fill opening in all directions, and a Class I Div. 2 area that extends from 3 – 5 feet around the vent or fill opening, and up to 18” from the floor extending 10 feet from the vent or fill opening. The area would be represented by the Figure below.



93. Based on the information contained in Table 5703.1., an area classification would have been made by a POSITA to determine what protection or separation electrical equipment, including sources of ignition such as heaters, would need in the design and construction of fuel handling equipment.

94. Section 5703 contains further provisions regarding protection from spills.

5703.4 Spill control and secondary containment.

Where the *maximum allowable quantity per control area* is exceeded, and where required by Section 5004.2, rooms, buildings or areas used for storage, dispensing, use, mixing or handling of Class I, II and IIIA liquids shall be provided with spill control and secondary containment in accordance with Section 5004.2.

95. Section 5004.2, referenced by Section 5703.4, provides that spill control and secondary containment is required in areas used for the storage of hazardous material liquids in individual vessels having a capacity of more than 55 gallons (208 L), or in which the aggregate capacity of multiple vessels exceeds 1,000 gallons (3785 L). Accordingly, a POSITA would look to IFC-2015 for information regarding when and what type of spill control (e.g., floor plan) would be necessary in a fuel distribution station.

96. Section 5706 contains provisions for “special operations” which include the following activities⁸⁴:

5706.1 General.

This section shall cover the provisions for special operations that include, but are not limited to, storage, use, dispensing, mixing or handling of flammable and *combustible liquids*. The following special operations shall be in accordance with Sections 5701, 5703, 5704 and 5705, except as provided in Section 5706.

1. Storage and dispensing of flammable and *combustible liquids* on farms and construction sites.
2. Well drilling and operating.
3. Bulk plants or terminals.
4. Bulk transfer and process transfer operations utilizing tank vehicles and tank cars.
5. Tank vehicles and tank vehicle operation.
6. Refineries.
7. Vapor recovery and vapor-processing systems.

97. If the distribution station is classified as a tank vehicle, this section demonstrates that the same provisions as discussed above still apply. There is nothing in Section 5706 to contradict the area classification requirements discussed above.

98. The use of walls or barricades to reduce the risk of ignition, and to protect electrical equipment from being in a flammable environment were well known at the time of the filing of the application which led to the ‘955 Patent. Multiple industry standards address the classification of facilities into various flammable (hazardous) atmospheres. With respect to oil and gas equipment, API RP 500, “Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2”

⁸⁴ IFC-2015 §5706.1.

governs the classification of different facilities that use electrical equipment. Further, NFPA 497 “Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas” addresses similar, but not identical, requirements. Both documents address hazardous (classified) areas based on the requirements of the NEC, and in an analogous manner to the IFC. These documents reinforce a POSITA’s knowledge regarding protection of ignition from flammable atmospheres.

IX. LEVEL OF ORDINARY SKILL IN THE ART

99. I understand that the claims and specification of a patent must be read and construed through the eyes of a person of ordinary skill in the art (“POSITA”) at the time of the priority date of the claims.

100. I have also been advised that to determine the appropriate level of a person having ordinary skill in the art, the following factors may be considered: (a) the types of problems encountered by those working in the field and prior art solutions thereto; (b) the sophistication of the technology in question, and the rapidity with which innovations occur in the field; (c) the educational level of active workers in the field; and (d) the educational level of the inventors.

101. It is my opinion that a person of ordinary skill in the art of the ‘955 Patent would have either (1) a Bachelor of Science in Mechanical Engineering,

Electrical Engineering, Petroleum Engineering or an equivalent field as well as at least 2 years of academic or industry experience in the oil and gas industry, including well drilling, completion, or production, or (2) at least four years of industry experience in the oil and gas industry including well drilling, completion, or production. This definition is approximate, and more education may substitute for industry experience or vice versa.

102. Based on my educational and employment background, I am qualified to provide opinions concerning what a POSITA would have known and understood by Oct. 11, 2016. Indeed, as reflected in my qualifications above, I am more than qualified as a person of ordinary skill in the art as of the relevant date of the ‘955 Patent.

X. OVERVIEW OF THE PRIOR ART

103. As explained below, it is my opinion that the following prior art reference discloses or renders obvious all technical features of the Challenged Claims of the ‘955 Patent, thus rendering them unpatentable:

A. *Van Vliet* (EX1004)

1. Status of *Van Vliet*

104. *Van Vliet* is a publication of a United States patent application, U.S. Patent Publication No. 2011/0197988. *Van Vliet* entitled “Fuel Delivery System and Method.” *Van Vliet* was filed February 6, 2011, and published August 18, 2011.

Each of these dates is before the earliest possible priority date of all Challenged Claims of the ‘955 Patent. *Van Vliet* was cited by the examiner during prosecution of the ‘955 Patent.⁸⁵

2. Summary of *Van Vliet*

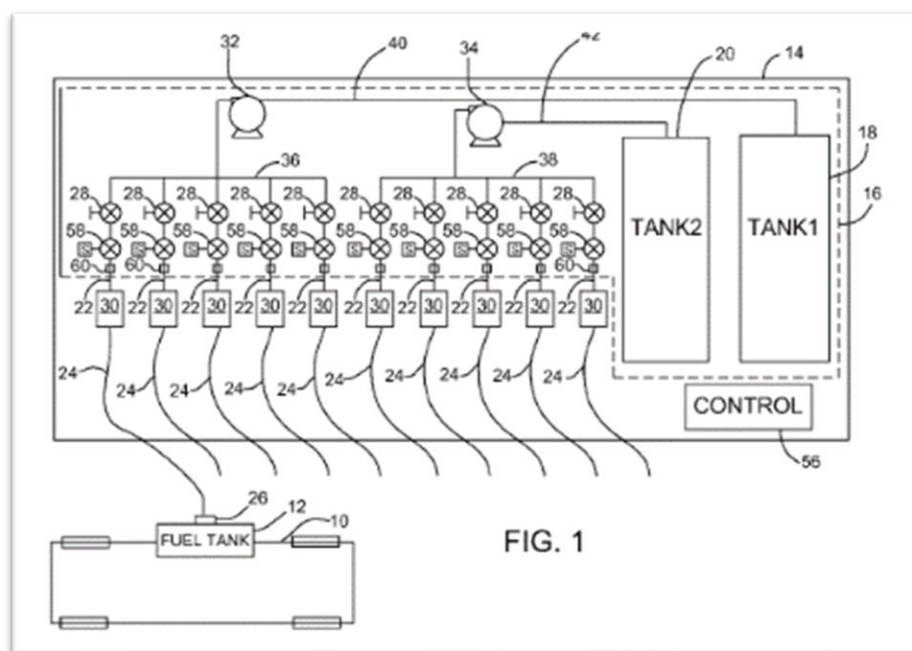
105. *Van Vliet* describes “[f]uel delivery systems and methods,” and more specifically, “[a] fuel delivery system and method” for equipment used in oil and gas well fracturing operations. The goal of *Van Vliet* is “reducing the likelihood that a fuel tank of equipment at a well site during fracturing of a well will run out of fuel.”⁸⁶

106. *Van Vliet* describes “[e]quipment at a well site use[d] for a fracturing job may comprise several pumpers and blenders. A pumper **10** is shown in FIG. 1 with a fuel tank **12**. *Van Vliet* further describes “[a] fuel delivery system is provided for delivery of fuel to multiply fuel tanks **12** of multiple pieces of equipment **10** at a well site during fracturing of a well. Further, *Van Vliet* discloses “The fuel delivery system **14** may be contained on a single trailer,” and is depicted in Figure 1.⁸⁷

⁸⁵ EX1009, 227.

⁸⁶ EX1004, Abstract, [0003].

⁸⁷ EX 1004, [0014], Fig]; *id.*, FIG. 1.



107. In the above fuel delivery system **14**, tanks **18** and **20** “are used to store fuel.” The tanks connect to pumps **32** and **34**, which further connect to manifold **36** and manifold **38** respectively. The manifolds connect to valves **28** and **58** “to control fluid flow through the hose **24** connected to each respective fuel outlet **22** to permit independent operation of each hose **24**.” Each hose **24** is “preferably stored on a reel[] **30**. The reels **30** may be manual reels or may be spring loaded.” Each hose **24** connects to a fuel tank **12**, associated with a separate piece of equipment such as a fracturing pump engine.⁸⁸

⁸⁸ EX1004, FIG. 1; *see also* [0015].

108. *Van Vliet* further describes “[e]ach hose **24** is connected to a fuel cap or fuel head **26** on a respective one of the fuel tanks **12** for delivery of fuel to the fuel tank **12** through the hose **24**.”⁸⁹ Further, *Van Vliet* discloses “[e]ach cap **26** also preferable comprises a fuel level sensor **54**.” This sensor “communicates with a control station **56** on the trailer **14** via a wireless communication channel, though a wired channel may also be used.”⁹⁰ The controller **56** starts fuel flow to the fuel tank **12** in response to a low-level signal from sensor **54** and stops fuel flow to the fuel tank **12** in response to a high-level signal from sensor **54**.⁹¹

109. *Van Vliet* notes that “The spatial orientation of the reels **30**, manifolds **36** and **38**, tanks **18** and **20**, and other equipment shown “is a matter of design choice for the manufacturer and will depend on space requirements.”⁹² The connection between a hose **24** and a fuel tank **12** is depicted in a preferred embodiment shown in more detail in FIG. 2 from *Van Vliet* duplicated below:⁹³

⁸⁹ EX1004, [0015].

⁹⁰ EX1004, [0017].

⁹¹ EX1004, [0020].

⁹² EX1004, [0027].

⁹³ EX1004, FIG. 2.

B. Cable (EX1005)

110. *Cable* is U.S. Patent no. 3,810,487. *Cable* is entitled “Mobile Lubrication Apparatus.” The application which led to *Cable* was filed November 22,

PERMIAN GLOBAL, INC. AND MANTICORE FUELS, LLC EXHIBIT 1003, Page 77

1971, and the Patent was issued May 14, 1974. Each of these dates is before the earliest possible priority date of all Challenged Claims of the ‘955 Patent.⁹⁵ *Cable* was not cited by the examiner during prosecution of the ‘955 Patent, nor is it listed as one of the references considered by the examiner during prosecution of the ‘955 Patent.⁹⁶

2. Summary of *Cable*

111. *Cable* describes “a mobile lubrication apparatus having a van truck with storage tanks mounted therein connected to pressure hoses.” These hoses are part of an assembly which includes “four rotatably mounted reels with a hose wrapped around each reel.” The hoses are pulled out from the reel “to allow lubrication of another vehicle.”⁹⁷ The hoses and reels are mounted, along with supporting equipment, in a rear compartment of a van truck. *Cable* describes the van truck “having a driver compartment as well as a rear compartment.”⁹⁸ The rear

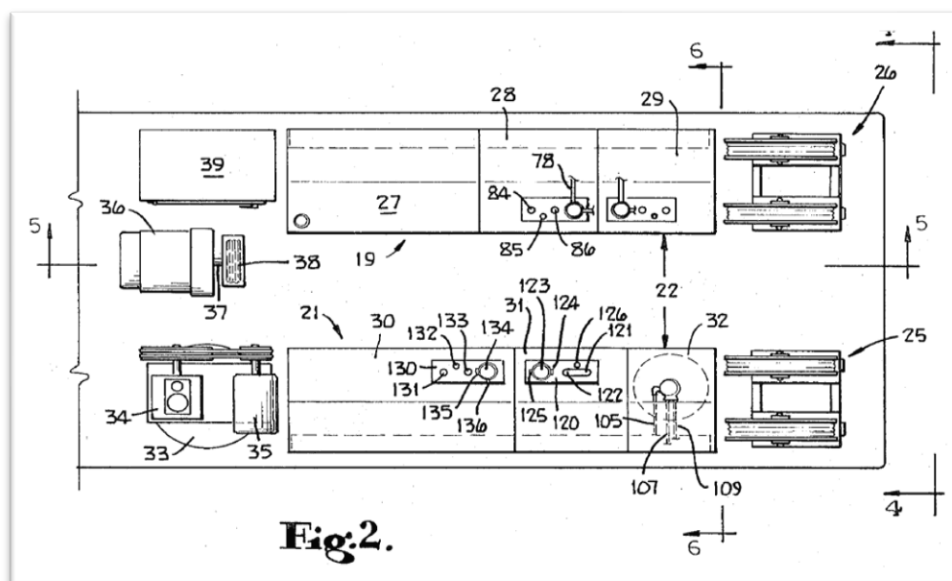
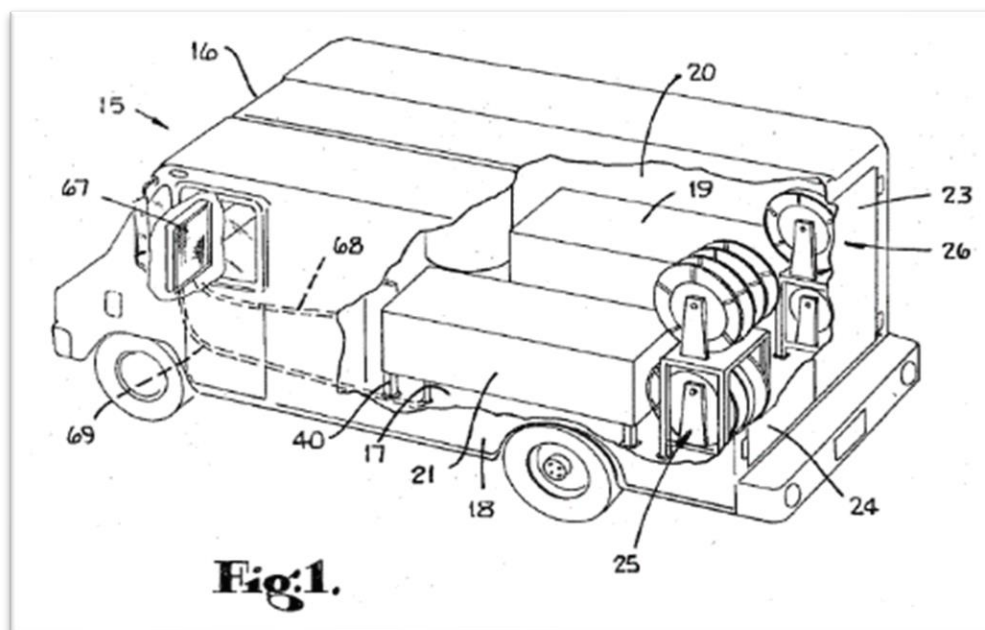
⁹⁵ EX1005 generally.

⁹⁶ EX1005., Cover.

⁹⁷ EX1005, Abstract.

⁹⁸ EX1005, 2:51-52.

compartment of *Cable's* van truck is shown in FIG. 1 and FIG. 2 from *Cable*,
duplicated below:⁹⁹



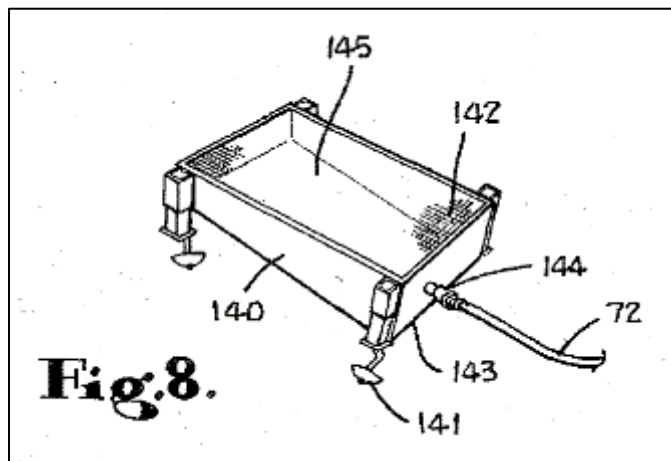
⁹⁹ EX1005, FIG. 1, FIG. 2.

112. *Cable* describes the layout of the rear compartment to include a row of tanks mounted to the truck platform adjacent each one of the two side walls of the truck. These on opposed side walls are spaced away from each other “forming a walkway and a storage area therebetween allowing a person to walk between the tanks from the driver compartment toward the back doors **23** and **24** which are hingedly mounted to the truck.”¹⁰⁰ Also included in *Cable*’s rear compartment are “pumps [which] are mounted atop the tanks...to force the contents of the tanks out through the hoses of the hose assemblies.” Further, *Cable* discloses “[a] waste oil receiver may be positioned under the vehicle being lubricated to receive waste oil and is connected to a suction hose which conveys the waste oil back to a storage tank within the truck.”¹⁰¹ This receiver is described by *Cable* as “a generally rectangular-shaped container having an open top with a screen **142** extending thereacross.” According to *Cable*, “the oil received by container **140** will flow downwardly through coupling **144** and into waste soil suction hose **42**” which leads to oil waste

¹⁰⁰ EX1005, 2:56-62.

¹⁰¹ EX1005, Abstract.

storage tank **30**.¹⁰² Waste oil receiver **140** is detailed in FIG. 8 of *Cable*, duplicated below:¹⁰³



C. LCR I (EX1006) and LCR II (EX1007)

1. Status of LCR I and LCR II

113. *LCR I* is a document available online at [https://web.archive.org/web/20140521011059/http://www.lcmeter.com/en/Literature/Documents/Specifications/ES100-30%20\(LCR%20600\).pdf](https://web.archive.org/web/20140521011059/http://www.lcmeter.com/en/Literature/Documents/Specifications/ES100-30%20(LCR%20600).pdf) titled “LectroCount LCR 600™ Electronic Register.” *LCR I* was available online at least as early as May 21, 2014, which is before the earliest possible priority date of all Challenged Claims of the ‘955 Patent. *LCR I* was not cited by the examiner during prosecution

¹⁰² EX1004, 6:36-53.

¹⁰³ EX1005, FIG. 8.

of the ‘955 Patent, nor is it listed as one of the references considered by the examiner during prosecution of the ‘955 Patent.

114. *LCR II* is a document available online at <https://web.archive.org/web/20151010104600/http://www.lcmeter.com/en/Literature/Documents/Overviews/E100-10%20Electronics%20Overview.pdf> titled “Liquid Controls Electronic Registers and Data Management Systems.” *LCR II* was available online at least as early as October 10, 2015, which is before the earliest possible priority date of all Challenged Claims of the ‘955 Patent. *LCR II* was not cited by the examiner during prosecution of the ‘955 Patent, nor is it listed as one of the references considered by the examiner during prosecution of the ‘955 Patent.

2. Summary of *LCR I* and *LCR II*

115. *LCR I* and *LCR II* are each online documents released by the same company, Liquid Controls LLC, relating to their electronic fluid register products. *LCR II* is a product overview brochure for Electronic Registers and Data Management Systems offered by Liquid Controls LLC.¹⁰⁴ *LCR I* is a product specification for the LectroCount LCR 600 Electronic Register, one of the electronic

¹⁰⁴ EX1007, 1.

fluid registers discussed in *LCR II*.¹⁰⁵¹⁰⁶ *LCR I* relates to an electronic register and flowmeter system capable of recording fuel flow from a pump, communicating with a controller, and printing an invoice for the delivered fuel.¹⁰⁷ *LCR II* describes “Practical Electronic Flowmeter Systems” including the LectroCount LCR 600 discussed in *LCR I*.¹⁰⁸ *LCR II* discloses that the LectroCount LCR 600 displays gross quantity and flow rate in with a precision of 0.1 gallons and 0.1 gallons per minute:¹⁰⁹

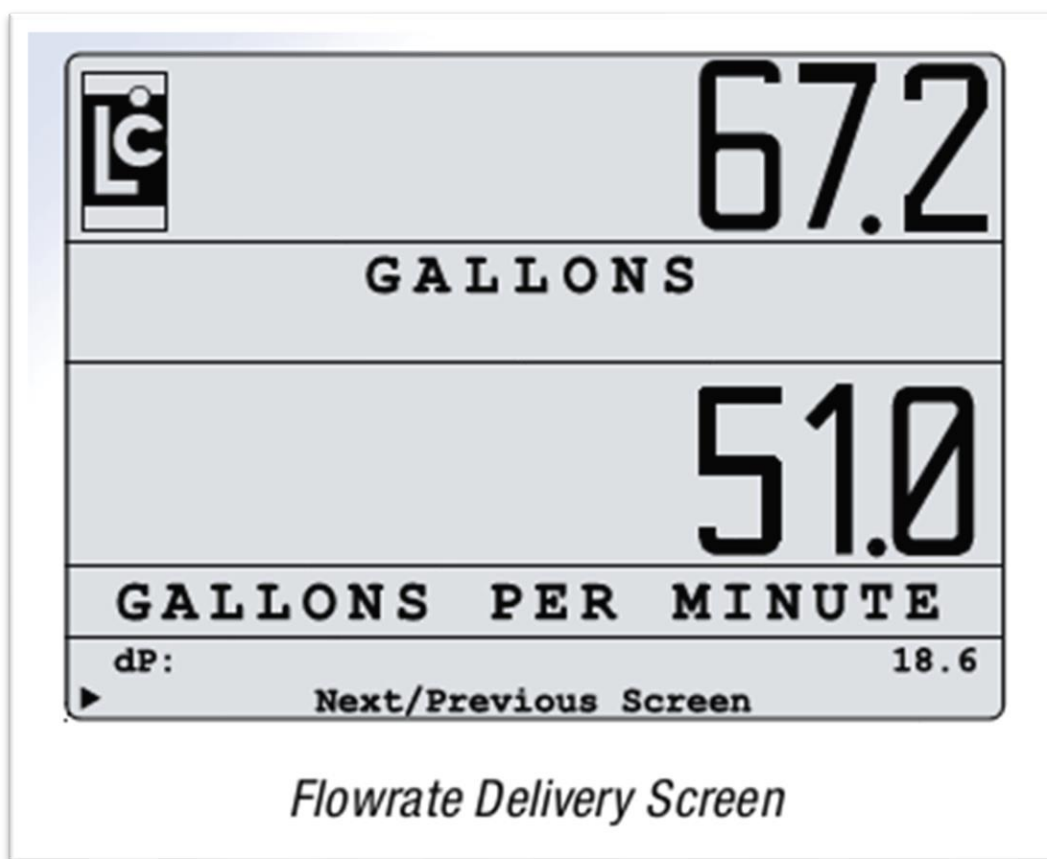
¹⁰⁵ see EX1006, 2; see also EX1007, 5.

¹⁰⁶ Further evidence of how a POSITA would understand the installation and operation of the LCR 600 meter are described in the Setup and Operation Manual for that meter, a copy of which is provided as EX1012 (bearing a copyright date of 2010).

¹⁰⁷ EX1006, 2; EX1007, 4 & 8.

¹⁰⁸ EX1007, 2.

¹⁰⁹ EX1007, 5.



Neither *LCR I* nor *LCR II* was prior art of record during prosecution of the ‘955 Patent.

D. DeFosse (EX1008)

1. Status of DeFosse

116. *DeFosse* is U.S. Patent no. 8,360,152. *DeFosse* is entitled “Process and Process Line for the Preparation of Hydraulic Fracturing Fluid.” *DeFosse* was filed November 27, 2009, and the Patent was issued January 29, 2013. Each of these dates is before the earliest possible priority date of all Challenged Claims of the ‘955

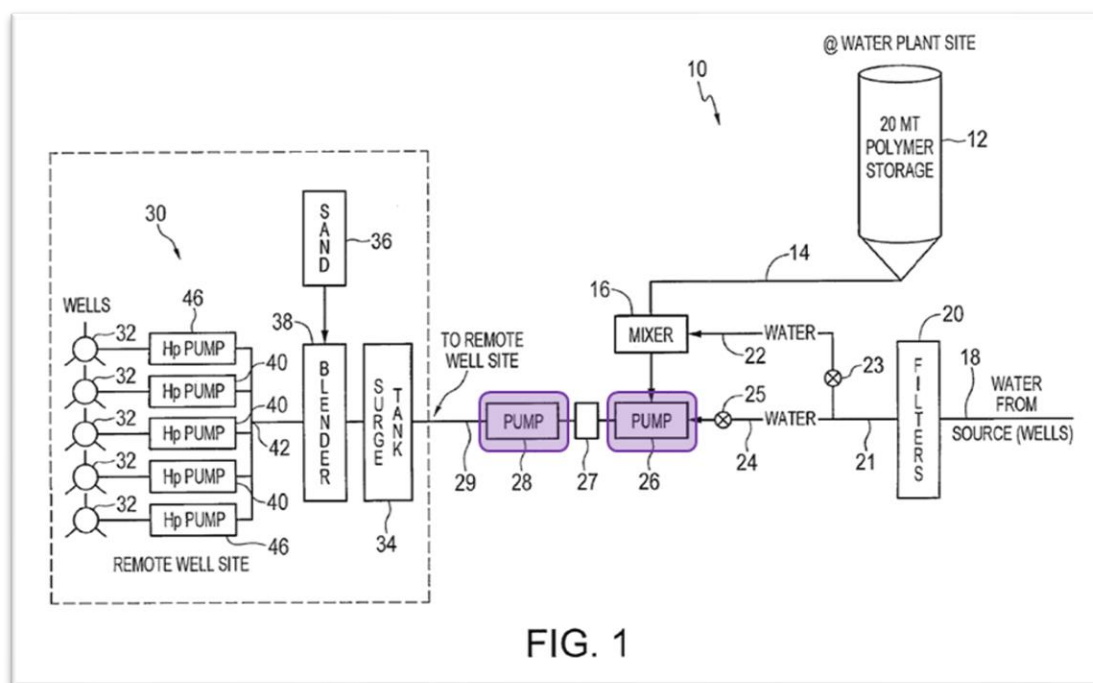
Patent. *DeFosse* was not cited by the examiner during prosecution of the '955 Patent, nor is it listed as one of the references considered by the examiner during prosecution of the '955 Patent.

2. Summary of *DeFosse*

117. *DeFosse* relates to hydraulic fracturing, and more particularly, to a process allowing for the formation of fracturing fluid at a central location ,which can then be readily transported to an oil or gas well formation.¹¹⁰ *DeFosse* discloses a fracturing fluid preparation/blending system having two pumps (purple below) arranged in fluid series:¹¹¹

¹¹⁰ EX1008, Abstract, 1:10-13.

¹¹¹ EX1008, Fig. 1 (annotated to show pumps in purple), 4:65-5:1, 5:23-27.



118. *DeFosse* discloses “pumping the friction-reduced hydraulic fracturing fluid through a series of pumps and pipelines to the wellsite.”¹¹² The practice and benefits of using pumps in series (as depicted in Fig. 1 of *DeFosse* above) was well known throughout all aspects of the fracturing industry at the time of the ‘955 Patent. *DeFosse* was not prior art of record during prosecution of the ‘955 Patent.

XI. ASSERTED GROUNDS OF INVALIDITY

A. Ground 1: Claims 1 and 11-12 are anticipated or rendered obvious by *Van Vliet*

¹¹² EX1008, Abstract.

1. Claim 1

119. *Van Vliet* discloses, or in view of the knowledge of a POSITA at the time of the ‘955 Patent, at least teaches each limitation of Claim 1, as described in the sections below. Accordingly, *Van Vliet* anticipates, or at least renders obvious Claim 1 of the ‘955 Patent.

a. Claim 1[p]: “A distribution station comprising:”

120. To the extent the preamble is limiting, *Van Vliet* discloses “[a] distribution station.”¹¹³, ¹¹⁴ *Van Vliet* discloses “a fuel delivery system [that] may be contained on a single trailer.”¹¹⁵ A POSITA would have recognized that the “fuel delivery system” of *Van Vliet* to be a “distribution station” as the preamble claims. Accordingly, *Van Vliet* discloses a distribution station.

121. For at least these reasons, *Van Vliet* discloses the preamble.¹¹⁶

¹¹³ I understand that the preambles may not be limiting. However, I include analyses of preambles for Claim 1 and Claim 17 out of an abundance of caution.

¹¹⁴ EX1004, [0003], [0014].

¹¹⁵ EX1004, [0014].

¹¹⁶ EX1004, [0003], [0014].

b. Claim 1[a]: “a container including first and second opposed side walls that join first and second opposed end walls;”

122. *Van Vliet* discloses a “fuel delivery system 14 [that] may be contained on a single trailer.”¹¹⁷ *Van Vliet* teaches that a commercially-available trailer may be used, which a POSITA would have understood includes a back wall and a front wall joined by 2 opposed side walls.¹¹⁸ *Van Vliet* also discloses that the trailer has walls (“trailer walls”) on which other components may be mounted and having openings through which hoses on the trailer may be routed.¹¹⁹ Further, *Van Vliet* discloses “The trailer **14** may be of the type made by Sea-Can Containers of Edmonton, Canada.”¹²⁰ A POSITA would have recognized trailers manufactured by “Sea-Can Containers” to be a type of trailer constructed utilizing an intermodal container as described in *Supra* Section VIII.E. This would have been verified by a POSTIA by referencing the Sea-can website as early as Jun, 2006 and seeing references to

¹¹⁷ EX1004, [0014].

¹¹⁸ EX1004, [0024].

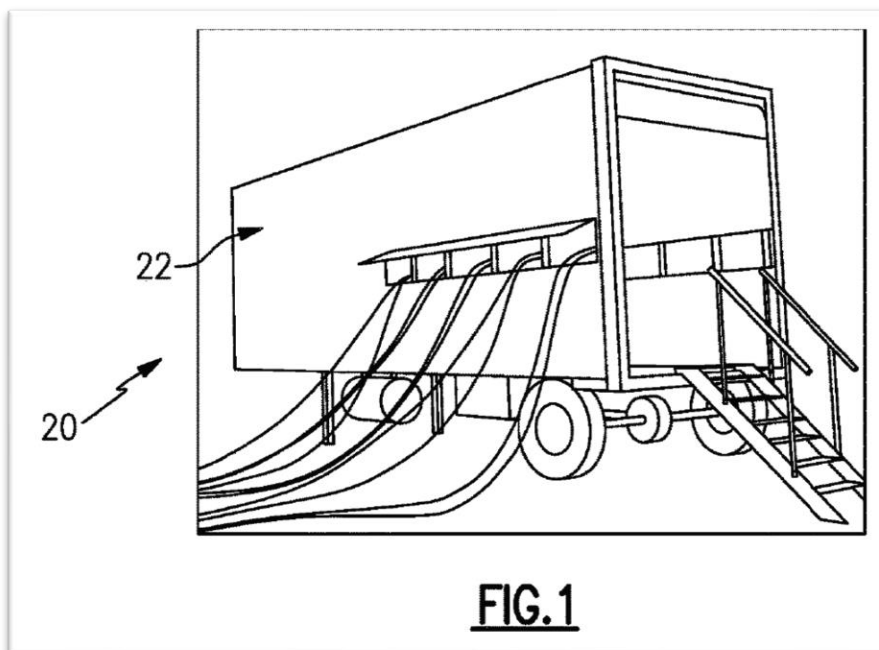
¹¹⁹ EX1004, [0024] & [0026].

¹²⁰ EX1004, [0024].

Intermodal Cargo Containers for “Marine, Rail and Truck Transport”.¹²¹

Accordingly, a POSITA would have understood that the “trailer” of *Van Vliet* is a container having side walls and end walls as described in Claim 1[a].

123. Like the “container” of *Van Vliet*, the ‘955 Patent’s “container” is a trailer.¹²² FIG. 1 of the ‘955 Patent shows mobile distribution station **20** comprising “mobile trailer 22” in an embodiment.¹²³



¹²¹ http://web.archive.org/web/20080110231900/http://www.sea-can.com/products_cargocontainers.shtml.

¹²² Compare EX1001, Fig. 1 & 2:24-32, with EX1004, [0014].

¹²³ EX1001, FIG.1.

124. The ‘955 Patent teaches “The mobile trailer **22** may have wheels that permit the mobile trailer **22** to be moved by a vehicle from site to site to service different hot-refueling operations.”¹²⁴ The ‘955 Patent describes “a container that has first and second opposed side walls that join first and second opposed end walls.”¹²⁵ Similarly, the ‘955 Patent’s mobile trailer “has first and second opposed trailer side walls **W1** and **W2** that join first and second opposed trailer end walls **E1** and **E2**”.¹²⁶ A POSITA would have understood the disclosure of *Van Vliet*’s “trailer walls” to be the same as the ‘955 Patent’s “trailer side walls **W1** and **W2**” as well as “end walls **E1** and **E2**”. This would have been a common arrangement of a “commercially-available trailer” as disclosed by *Van Vliet*.

125. To the extent that the claim terms require the use of a shipping container, such as an ISO or ANSI shipping container, separate from a trailer such a configuration would have been obvious to a POSITA. Initially, the reference in *Van Vliet* to trailers made by “Sea-Can Containers of Edmonton, Canada” would lead to this conclusion, as described above. Similarly, to the extent that *Van Vliet* does not explicitly disclose side walls and end walls, such a configuration would have been

¹²⁴ EX1001 3:24-32.

¹²⁵ EX1001 1:34-37.

¹²⁶ EX1001 2:25-27.

obvious to a POSITA. As described in Section VIII.E above, the use of containers, separate from or on trailers, in various industrial uses, including to house equipment in oil and gas operations, was well-known at the time of the '955 Patent. It would have been obvious to use such a modified container to house the equipment of *Van Vliet*, including hoses, reels, pumps, etc.

126. Accordingly, *Van Vliet*, either alone or in view of the knowledge of a POSITA, discloses or at least renders obvious the limitations of Claim 1[a].¹²⁷

c. Claim 1[b]: “a pump in the container;”

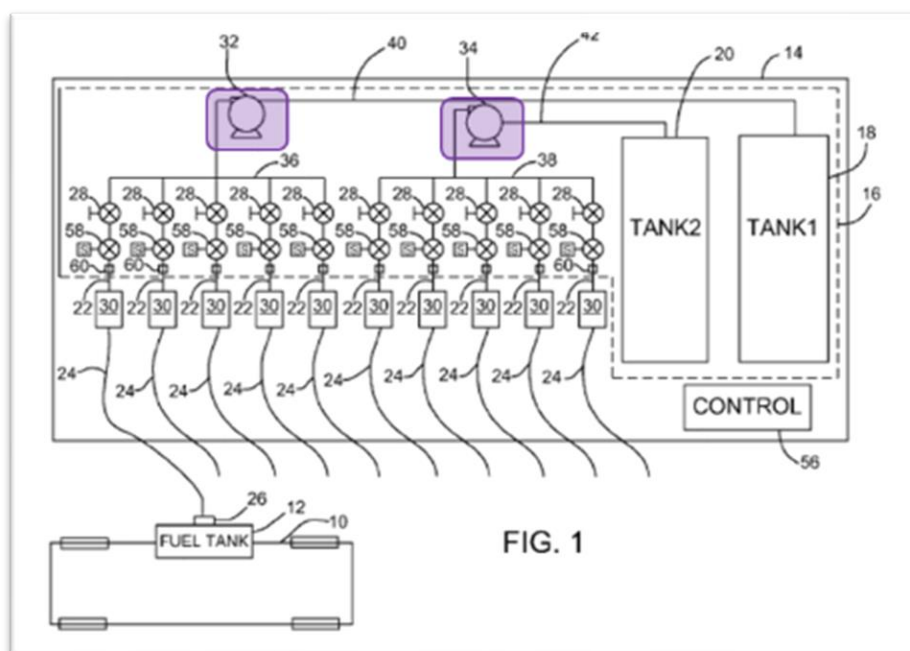
127. *Van Vliet* discloses “a pump in the container.” As discussed above regarding Claim 1[a], *Van Vliet* teaches “the fuel delivery system **14** may be contained on a single trailer,”¹²⁸ and the trailer would have side walls and end walls, or at least this would have been obvious to a POSITA.¹²⁹ As shown in FIG. 1 of *Van Vliet*, the fuel delivery system **14** includes tanks **18** and **20** that are each “connected to respective pumps **32, 34** and then to respective manifolds **36, 38** via lines **40, 42**. The fuel outlets **22** are located on the manifolds **36, 38**.”¹³⁰

¹²⁷ EX1004, [0014].

¹²⁸ EX1004, [0014].

¹²⁹ *see Supra* Section XI.A.1.b.

¹³⁰ EX1004, [0016]; FIG. 1 (annotated to show pumps highlighted in purple).



128. Because pumps 32, 34 are part of the “fuel delivery system 14” that “may be contained on a single trailer,” and the trailer comprises a container, they are, either individually or together, “a pump in the container”¹³¹ A POSITA would have understood that the pumps in *Van Vliet* are mounted on the trailer (or, equivalently, the van truck.) and provide the same function as the pump(s) in the ‘955 Patent, i.e. pumping fluids out of the tanks into the discharge lines.

129. Because pumps 32, 34 are part of the “fuel delivery system 14” that “may be contained on a single trailer,” either or both of those pumps are “in the

¹³¹ EX1004, [0008], [0014] & FIG. 1.

container” of *Van Vliet*.¹³² A POSITA would have understood that the pumps in *Van Vliet* are “in” the container of *Van Vliet*, as opposed to being mounted to the roof or other location outside the container. Alternatively, to the extent that *Van Vliet* does not expressly disclose that the pumps **32, 34** are located inside the trailer, such an arrangement would have been an obvious design choice for a POSITA. *Van Vliet* discloses “[t]he spatial orientation of the control station **56**, reels **30**, manifolds **36, 38**, tanks **18, 20**, and other equipment such as the generators is a matter of design choice for the manufacturer and will depend on space requirements.”¹³³ Accordingly, a POSITA would have been motivated to mount the pumps inside the container of *Van Vliet* to, for example, protect the pumps from weather. A POSITA would have known that oil and gas locations are often located in areas with extreme weather, and the container of *Van Vliet* (or, alternatively, the modified containers known to a POSITA) are wind and watertight and would protect from the effects of the extreme weather.¹³⁴

130. Accordingly, *Van Vliet* discloses, or at least in the light of knowledge of a POSITA renders obvious, the limitations in Claim 1[b].

¹³² EX1004, [0008], [0014], & FIG. 1.

¹³³ EX1004, [0027].

¹³⁴ *see Supra* Section VIII.E.

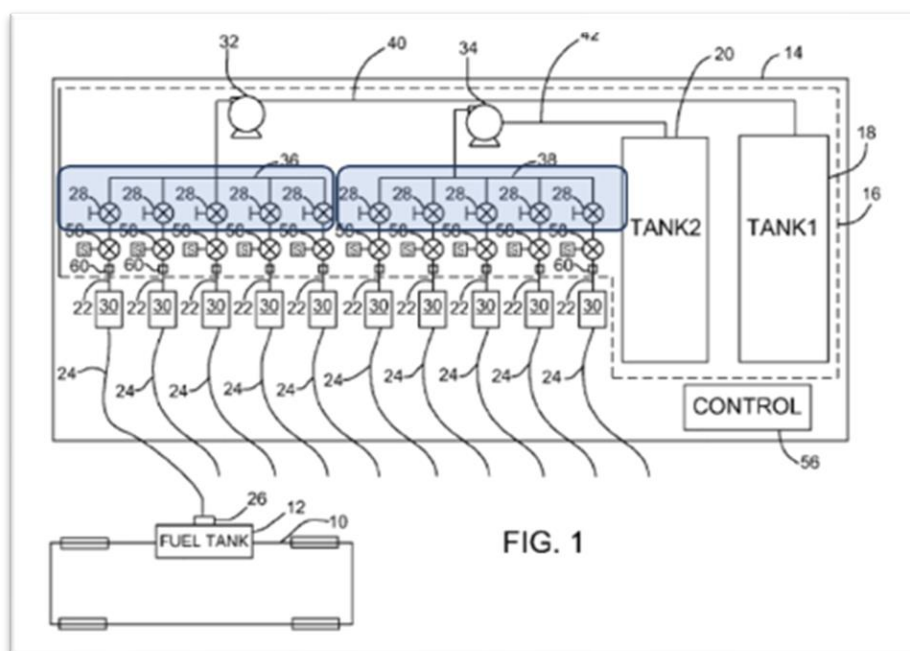
d. Claim 1[c]: “first and second manifolds in the container and fluidly connected with the pump;”¹³⁵

131. *Van Vliet* discloses “first and second manifolds in the container and fluidly connected with the pump.” *Van Vliet* describes that the fuel delivery system 14 includes “one or more manifolds with associated pumps and fuel line or lines.”¹³⁶ Further, as described above regarding Claim 1[a], *Van Vliet*’s trailer comprises a container, or at least such an arrangement would have been obvious to a POSITA.¹³⁷

¹³⁵ I have applied *Van Vliet* to the claimed “manifolds” based on its use of the same terminology as the ’805 Patent claims. I also understand that Patent Owner has alleged in a pending lawsuit against Petitioners that certain structures in the systems accused of infringing the ’805 Patent constitute “manifolds.” I have considered those allegations in my analysis applying the disclosures of *Van Vliet* to the claimed “manifolds.” However, I do not concede that any other structure, even one having a schematic like that shown or described in *Van Vliet*, would be considered a “manifold” by a POSITA, absent the information described above.

¹³⁶ EX1004, [0003], Fig. 1 (annotated to show manifolds in blue)].

¹³⁷ *see Supra* Section XI.A.1.b.



132. In the schematic shown in FIG. 1,¹³⁸ manifolds **36** and **38** are connected to pumps **32** and **34**.¹³⁹ Further, in describing Figure 1, *Van Vliet* discloses “each tank **18**, **20** is connected to respective pumps **32**, **34** and then to respective manifolds **36**, **38** via lines **40**, **42**.”¹⁴⁰ A POSITA would have understood that the connection between *Van Vliet*’s manifolds and the associated pumps would be a fluid connection because the pumps and manifold distribute liquid fuel (*i.e.*, a fluid). Accordingly, a POSITA would have understood that *Van Vliet* discloses limitation 1[c].

¹³⁸ A schematic in this context is a high-level representation and is not intended to depict the physical appearance or form. See EX1022 (describing the definition of schematic as “represented in simplified or symbolic form”).

¹³⁹ EX1004, [0015], FIG. 1.

¹⁴⁰ EX1004, [0016].

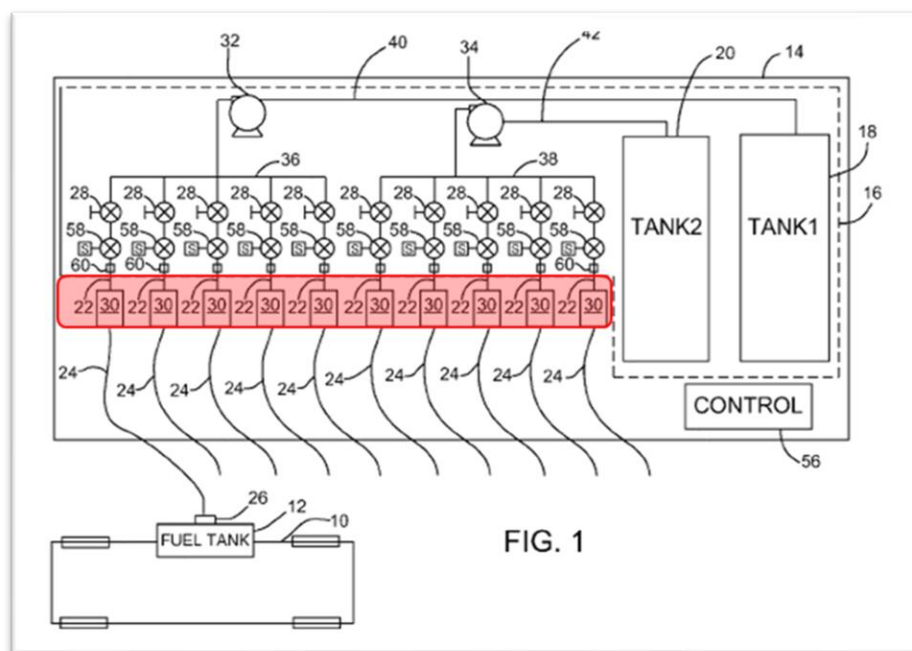
133. Alternatively, to the extent that claim 1[c] requires that both the first and second manifolds be connected to a single pump, modifying *Van Vliet* to connect manifolds **36** and **38** to a single pump would have been an obvious design choice for a POSITA to implement, and a POSITA would have been motivated to do so, for example, to minimize the amount of components needed in *Van Vliet*'s system. The use of multiple manifolds connected to a single pump or pumping source was known. Further, *Van Vliet* teaches that, in an embodiment, "the fuel outlets **22** may each be supplied fuel through a corresponding pump, one pump for each outlet **22** []." However, using a manifold **36, 38** makes for a simpler system."¹⁴¹ A POSITA would have understood to take the teaching of *Van Vliet* to the next step, using multiple manifolds with a single pump makes for an even simpler system, and one with fewer components (i.e., pumps and valves). Accordingly, the limitations of Claim 1[c] are disclosed by *Van Vliet*, or at the least rendered obvious, by *Van Vliet*, in light of the knowledge of a POSITA.

e. Claim 1[d]: "a plurality of reels in the container;"

134. *Van Vliet* discloses "a plurality of reels in the container." In *Van Vliet*'s fuel delivery system **14** of FIG. 1, "[t]he hoses **24** are preferably stored on reels

¹⁴¹ EX1004, [0016].

30.”¹⁴² As discussed above regarding Claim 1[a] *Van Vliet*’s trailer is a container, or the use of a container to house the equipment of *Van Vliet* would have been an obvious configuration. Accordingly, *Van Vliet* discloses, or in light of the knowledge of a POSITA at least teaches, “a plurality of reels in the container.”¹⁴³



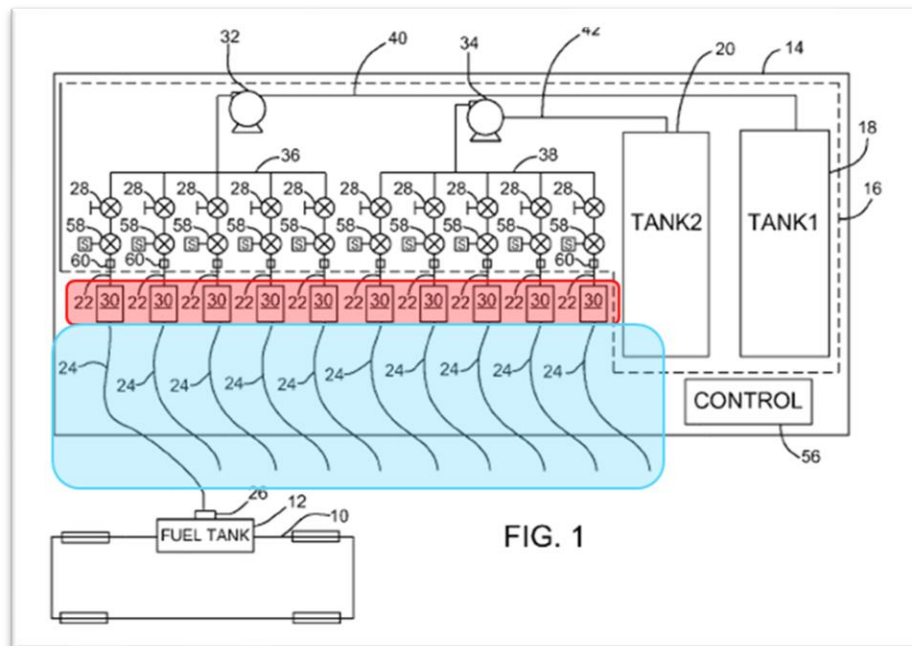
135. Thus, a POSITA would have understood that *Van Vliet* discloses, or at least renders obvious the limitations of Claim 1[d].

¹⁴² EX1004, [0015].

¹⁴³ EX1004, [0008], [0014], Fig. 1 (annotated to show reels 30 highlighted in red).

f. Claim 1[e]: “a plurality of hoses, each said hose connected with a different one of the reels, wherein a portion of the reels are connected to be fed from the first manifold and another portion of the reels are connected to be fed from the second manifold;”

136. *Van Vliet* discloses a plurality of hoses, with one hose **24** stored on and extending from each reel **30**.¹⁴⁴



Van Vliet discloses “[r]espective hoses **24** are connected individually to each fuel outlet **22**.”¹⁴⁵ *Van Vliet* also discloses “The hoses **24** are preferably stored on reels

¹⁴⁴ EX1004, [0015] & Fig. 1. (annotated to show reels 30 highlighted in red and hoses 24 highlighted in blue).

¹⁴⁵ EX1004 [0022].

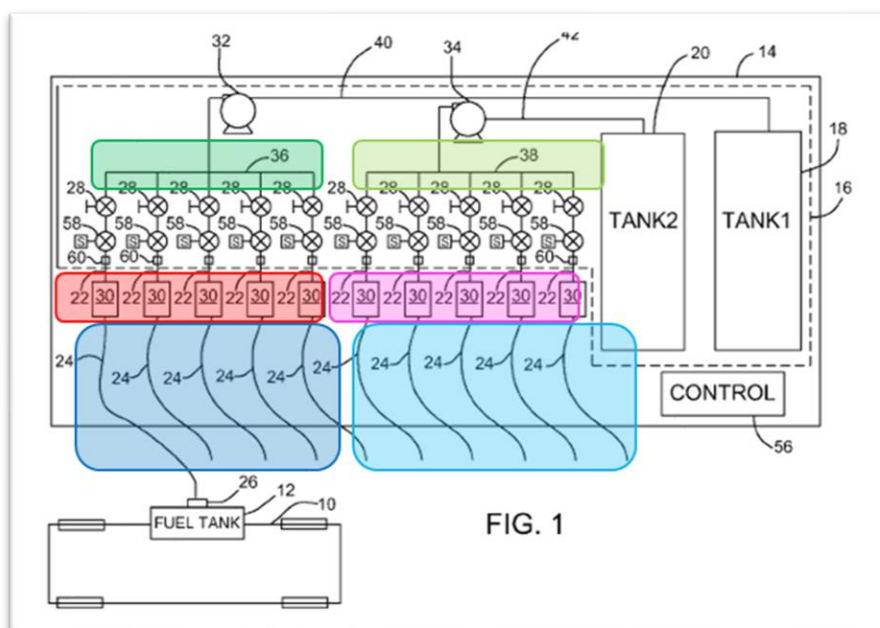
30. As shown in FIG.1 above, reels **30** are located between hoses **24** and connectors **22**. *Van Vliet* further discloses a spill containment pan “may be positioned to catch fluids leaking from each or both manifolds, and hose reels **30**.”¹⁴⁶ A POSITA would have understood that in order for fluids to leak from hose reel **30** then fluids must be flowing through hose reel **30**. Thus a POSITA would have understood that each hose is connected to the reel and the reel is connected to a manifold.¹⁴⁷

137. Further, *Van Vliet* discloses “a portion of the reels are connected to be fed from the first manifold and another portion of the reels are connected to be fed from the second manifold” as claimed in 1[c].¹⁴⁸

¹⁴⁶ EX1004 [0022].

¹⁴⁷ see EX1004, Fig. 1. *Supra* Section XI.A.7.

¹⁴⁸ EX1004, Fig. 1 (Annotated).



138. As depicted above, hoses **24** on the left (dark blue) are connected to a first set of reels **30** (red), and the hoses **24** on the right (light blue) are connected to another set of reels **30** (pink). One portion of the hoses **24** on the left (dark blue) are connected via fluid outlets **22** to receive fuel from manifold **36** on the left (dark green). A second portion of the hoses **24** on the right (light blue) are connected via fluid outlets **22** to receive fuel from manifold **38** (light green). *Van Vliet* discloses “The number of outlets **22** on a manifold **36**, **38** may vary and depends largely on space restrictions. Five outlets **22** per manifold **36**, **38** is convenient for a typical large fracturing job and not all the outlets **22** need be used. Using more than one manifold permits redundancy in case one manifold develops a leak. Accordingly, a POSITA would have understood that *Van Vliet* discloses element 1[e].

139. Claims 1[e], 11[d], and 11[e] do not require that the hoses or the manifolds are *fluidly* connected with or through the reels, nor does the ‘955 Patent disclose such an arrangement. Indeed, claims 1 and 11 separately and expressly recite that the manifolds are “fluidly connected with” the pump, a disclosure that is missing from the claim regarding the reels, and the ‘955 Patent’s disclosure of how the hoses are “connected with” the reels mirrors that of *Van Vliet*.¹⁴⁹

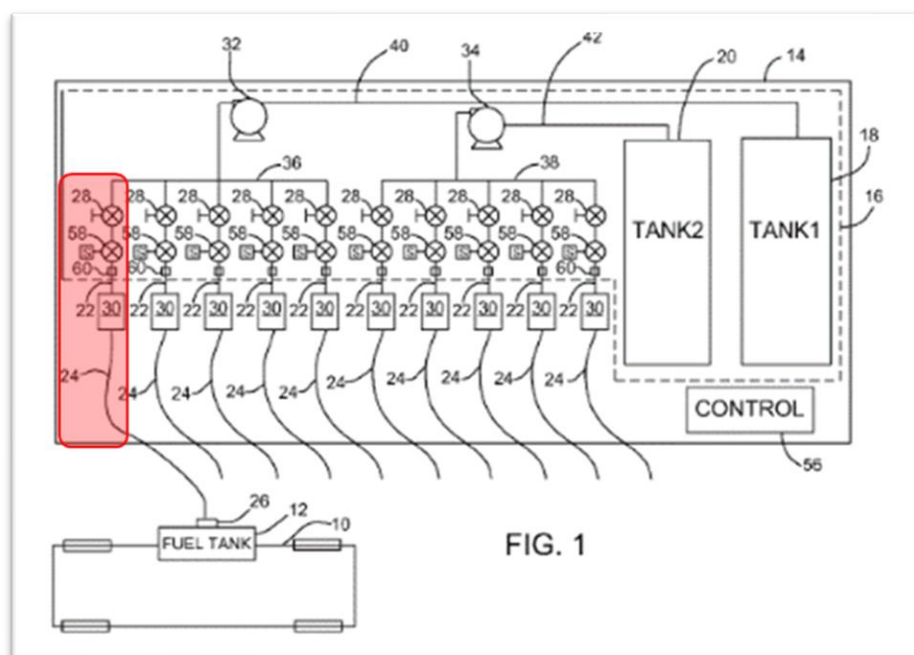
140. However, to the extent Patent Owner argues that the claimed hoses or manifolds must be fluidly connected with the reels, such an arrangement is disclosed by *Van Vliet*, and further would have been an obvious design choice for a POSITA to implement in the systems of *Van Vliet* and *Cable*, as the intent of both references is to deliver hydrocarbons from tanks and pumps to hoses on reels, and one known method was to use reels which are fluidly connected to the hoses mounted thereon.¹⁵⁰

141. Additionally, as discussed above, hoses 24 are connected through reel 30 to connector 22, which are in turn connected to the manifolds, as shown in FIG. 1 of *Van Vliet*.¹⁵¹

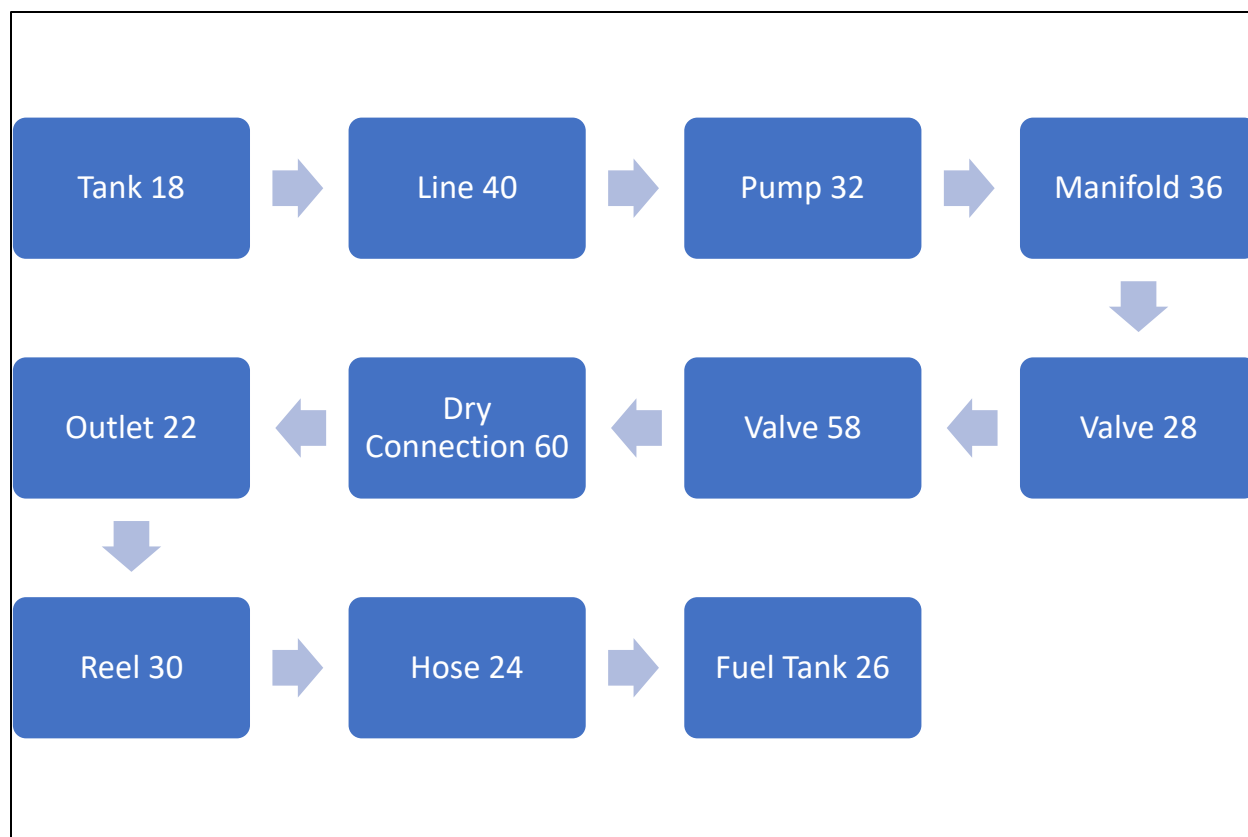
¹⁴⁹ EX1001, 3:1-4.

¹⁵⁰ *see Supra* Section VIII.C.

¹⁵¹ EX1004 FIG. 1 (Annotated).



142. In the annotated FIG. 1 above, a single fluid stream is annotated in red. In this fluid stream, reel **30** is shown in series with the stream, in between outlet **22** and hose **24** (and downstream of manifold 36). A POSITA would have understood, based on this diagram, that fluid flow is as follows:

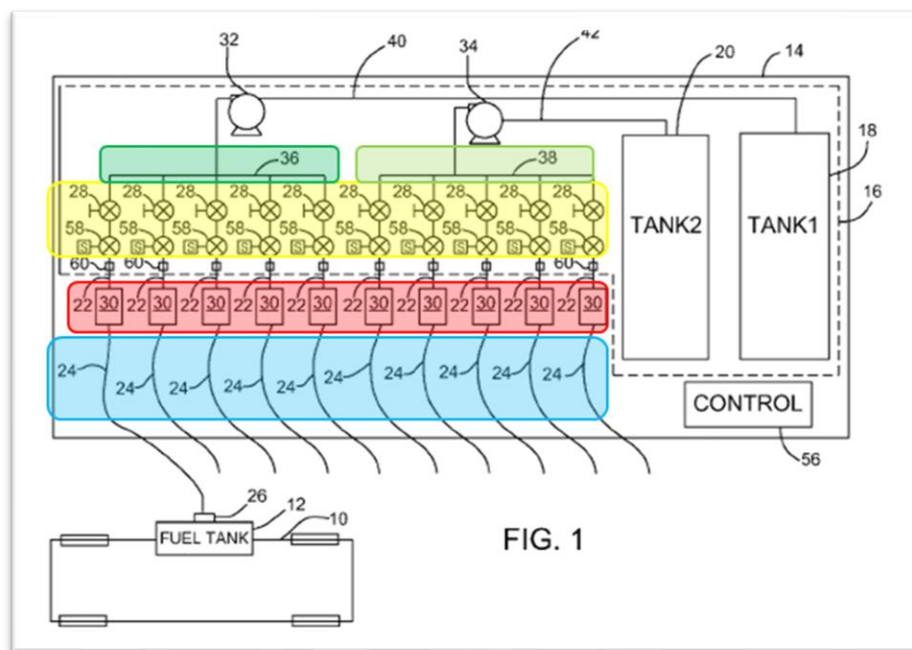


143. Accordingly, a POSITA would have understood that the reel **30** is part of the fluid stream, and is, therefore, fluidly connected to both the manifold and the hose. The same is true for each of the streams identified in FIG. 1 (though the pump, tank and manifold numbers may change).

144. Further, the entire purpose of the systems of *Van Vliet* and *Cable* is to deliver fluid through the hoses to the delivery point (i.e., external vehicle or equipment). Delivery of fluid through the hoses would require that the hoses be fluidly connected to the pumps and the manifolds. Accordingly, *Van Vliet* discloses the limitations of Claim 1[e].

g. Claim 1[f]: “a plurality of valves in the container, each said valve situated between one of the first or second manifolds and a respective different one of the reels;”

145. As depicted below, *Van Vliet* discloses a plurality of valves **58** (yellow). The fuel delivery system (including valves **58**) is on a mobile trailer (which is or would obviously be a container). Each of the valves **58** (yellow) is illustrated schematically downstream of one of first manifold **36** (dark green) or second manifold **38** (light green).¹⁵²



146. As depicted above, *Van Vliet* discloses a plurality of valves **28** and **58** (yellow). The fuel delivery system (including valves **28** and **58** in yellow) is on a

¹⁵² EX1004, Fig. 1 (Annotated).

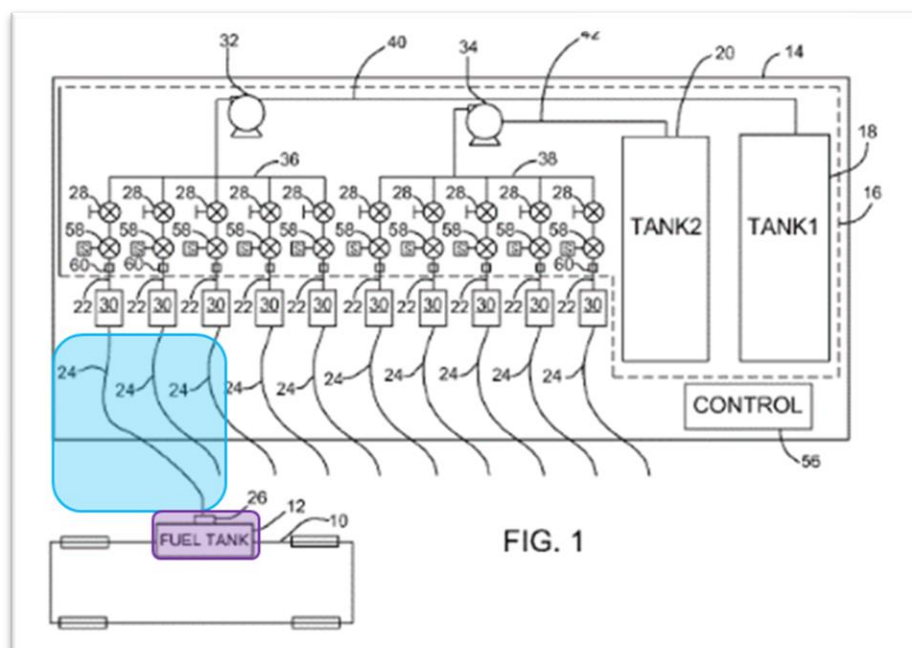
mobile trailer. Each of the valves **28** and **58** (yellow) is situated downstream of one of manifold **36** (dark green) and manifold **38** (light green).¹⁵³ Furthermore, each of the valves **28** and **58** (yellow) is situated upstream of a respective different one of the hoses **24** (blue). *Van Vliet* provides a description of the arrangement shown in FIG. 1: “Each tank **18**, **20** is connected to respective pumps **32**, **34** and then to respective manifolds **36**, **38** via lines **40**, **42**. The fuel outlets **22** are located on the manifolds **36**, **38** and fluid flow through the fuel outlets **22** is controlled preferably at least by the manual valves **28**.” Further, “A valve arrangement, comprising for example valve **28** and/or valve **58**, is provided at each fuel outlet **22** to control fluid flow through the hose **24** connected to each respective fuel outlet **22** to permit independent operation of each hose **24**.”¹⁵⁴ Accordingly, a POSITA would have understood that *Van Vliet* discloses “a plurality of valves in the container, each of the valves situated between one of the first or second manifolds and a respective different one of the hoses” as claimed in Claim element 1[f].

¹⁵³ EX1004, FIG. 1.

¹⁵⁴ EX1004, [0015].

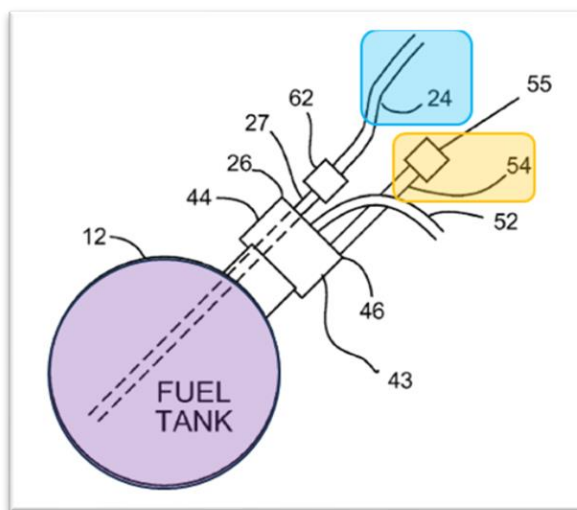
h. Claim 1[g]: “a plurality of fluid level sensors, each said fluid level sensor being associated with a different one of the hoses;”

147. *Van Vliet* discloses “a plurality of fluid level sensors, each of the fluid level sensors being associated with a different one of the hoses.” In *Van Vliet*, each hose leads to a fuel tank on a separate piece of equipment, as shown in FIG. 1:¹⁵⁵



¹⁵⁵ EX1004, FIG. 1 (annotated to show hoses 24 highlighted in blue and fuel tank 12 highlighted in purple).

148. According to *Van Vliet*, each fuel tank **12** has a fuel cap **26** secured thereon that is connected to both one of the hoses **24** and a fuel level sensor **54**, as shown in Figure 2 below:¹⁵⁶



149. *Van Vliet* further describes the sensors: “The fuel level sensor **54** may be any suitable sensor such as float sensor, vibrating level switch, or pressure transducer.”¹⁵⁷ A POSITA would have understood that the float sensor and the vibrating level switch would each be used to obtain information about the level of fuel in the fuel tank and would, accordingly, be “fluid level sensors” as the term is used in the claim. The specification of the ‘955 Patent, when discussing an

¹⁵⁶ EX1004, FIG. 2 (annotated to show hose 24 highlighted in blue, fuel level sensor 54 highlighted in orange, and fuel tank 12 highlighted in purple).

¹⁵⁷ EX1004, [0017].

embodiment of the claims, states “The sensor **50d** may be any type of sensor that is capable of detecting fluid or fuel level in a tank.”¹⁵⁸ Each of *Van Vliet*’s hoses is associated with a respective fuel level sensor **52**, as claimed in 1[g]. Accordingly, *Van Vliet* discloses the limitations claimed in Claim element 1[g].

i. **Claim 1[h]: “a controller configured to individually open and close the valves responsive to the fluid level sensors.”**

150. As discussed above with respect to Claim 1[g], *Van Vliet* discloses fuel level sensors for detecting fluid levels.¹⁵⁹ *Van Vliet* further discloses a controller in communications with a fluid level sensors: “The sensor **54** preferably communicates with the control station **56** on the trailer **14** via a wireless communication channel, though a wired channel may also be used.”¹⁶⁰ *Van Vliet*’s “controller **56**” uses data from the sensor “to provide control signals to the respective automatically operable valves **58**” to start or stop fuel flow through the hoses to each respective fuel tank (i.e., open and close the valves).¹⁶¹ A POSITA would have understood that starting and stopping flow requires opening and closing valve 58 respectively. *Van Vliet*

¹⁵⁸ EX1001 7:22-23.

¹⁵⁹ EX1004, Fig. 2 & [0017].

¹⁶⁰ EX1004 [0018].

¹⁶¹ EX1004, [0020].

discloses the controller **56** “is responsive to is responsive to a low fuel level signal from each fuel tank **12** to start fuel flow to the fuel tank **12** independently of flow to other fuel tanks **12** and to a high level signal from each fuel tank **12** to stop fuel flow to the fuel tank **12** independently of flow to other fuel tanks **12**. That is, commencement of fuel delivery is initiated when fuel in a fuel tank is too low and stopped when the tank is full.”¹⁶²

151. A POSITA would have understood that either the “low fuel level signal”, or the “high level signal” corresponds to a “fluid level threshold” within the meaning of the ‘955 Patent.¹⁶³ *Van Vliet*’s controller **56** operates valve **58** in response to either of these fluid thresholds, i.e. to open the valve and start fuel flow when the fuel level in the tank is too low and to stop fuel delivery when the tank is “full” (when the high level signal is received). To the extent that *Van Vliet* does not explicitly disclose that the “low level signal” and “high level signal” are “fluid level thresholds” and that the controller responds to these thresholds in order to control fluid flow to the hoses, the teachings of *Van Vliet* would render such a configuration obvious. Thus, a POSITA would have understood that the controller would individually open and close each of the valves **58**.

¹⁶² EX1004, [0020].

¹⁶³ EX1004, [0020].

152. Accordingly, a POSITA would have understood that *Van Vliet* discloses, or at least renders obvious, the limitations of Claim 1[h].

2. Claim 11

153. *Van Vliet* discloses, or in view of the knowledge of a POSITA at the time of the '955 Patent, at least teaches each limitation of Claim 11, as described in the sections below. Accordingly, *Van Vliet* anticipates, or at least renders obvious Claim 11 of the '955 Patent.

a. Claim 11[p]: “A distribution station comprising:”

154. The preamble is identical to the preamble of Claim 1 and is disclosed by *Van Vliet* for the same reasons as those set forth in Section XI.A.1 above, and incorporated herein by reference. Accordingly, the preamble is disclosed by *Van Vliet*.

b. Claim 11[a]: “a container including first and second opposed side walls that join first and second opposed end walls;”

155. Claim 11[a] is identical to Claim 1[a] and is disclosed, or at least rendered obvious, by *Van Vliet* for the same reasons as those set forth in Section XI.A.1.b above and incorporated herein by reference. Accordingly Claim 11[a] is disclosed by *Van Vliet* or at least rendered obvious *Van Vliet* in view of the knowledge of a POSITA.

c. Claim 11[b]: “at least one pump in the container;”

156. Claim 11[b] is similar to Claim 1[b]. Claim 1[b] claims “a pump in the container”, while Claim 11[b] claims “at least one pump in the container.” As discussed above in Section XI.A.1.c above and incorporated herein, *Van Vliet* discloses at least two pumps in the trailer which is “at least one pump” and *Van Vliet’s* trailer comprises a container, or at least such a configuration would have been obvious to a POSITA. Accordingly Claim 11[b] is disclosed by *Van Vliet* or at least rendered obvious by *Van Vliet* in view of the knowledge of a POSITA for the same reasons as those discussed regarding Claim 1[b].

d. Claim 11[c]: “at least one manifold in the container and fluidly connected with the at least one pump;”

157. Claim 11[c] is similar to Claim 1[c]. Claim 1[c] claims “first and second manifolds in the container and fluidly connected with the pump”, while Claim 11[c] claims “at least one manifold in the container and fluidly connected with the at least one pump.” As discussed above in Section XI.A.1.d above and incorporated herein by reference, *Van Vliet* discloses at least two manifolds in the trailer which is “at least one manifold”, and *Van Vliet’s* trailer comprises a container, or at least such a configuration would have been obvious to a POSITA. Further, as discussed regarding claim 1[c], the manifolds are fluidly connected to the pumps of *Van Vliet*. Accordingly Claim 11[c] is disclosed by *Van Vliet* or at least rendered obvious by

Van Vliet in view of the knowledge of a POSITA for the same reasons as those discussed regarding Claim 1[c].

e. **Claim 11[d]: “a plurality of reels in the container, each said reel individually connected with the at least one manifold;”**

158. As explained with respect to Claim 1[d] above, and incorporated herein by reference, *Van Vliet* anticipates or renders obvious “a plurality of reels in the container.”

159. As further explained with respect to Claim 1[e] above, and incorporated herein by reference, *Van Vliet* discloses a plurality of hoses, with one hose **24** stored on and extending from each reel **30**, and each reel is individually connected with at least one manifold.¹⁶⁴

¹⁶⁴ EX1004, [0015] & Fig. 1. (annotated to show reels 30 highlighted in red and one reel individually connected to manifold 36 (purple) via a flow path annotated in blue and another reel individually connected to manifold 38(pink) via a flow path annotated in green).

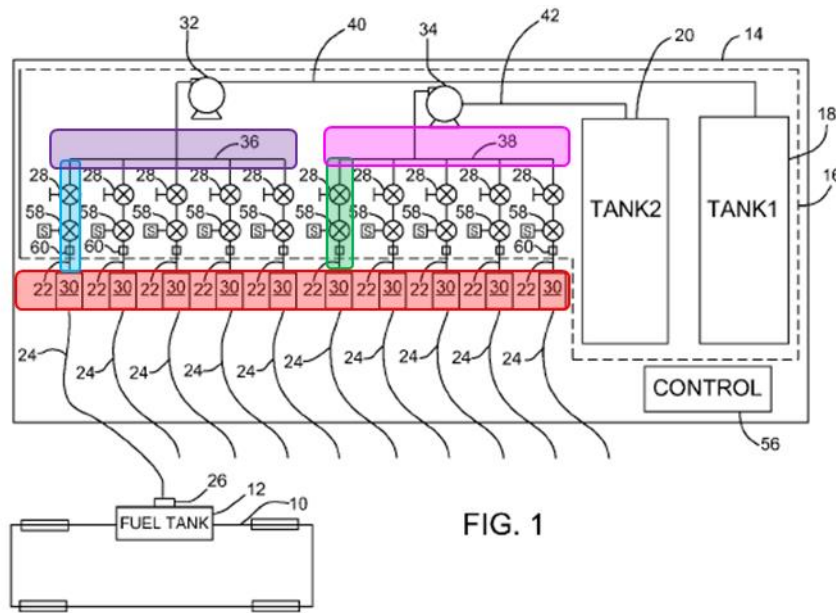


FIG. 1

160. As shown in FIG. 1 above, *Van Vliet* discloses a plurality of reels **30** (red). Each reel is individually connected, through valves **28/58**, to one of manifolds **36** (purple) and **38** (pink) (see blue and green annotations).

161. Accordingly, *Van Vliet* discloses, or at least renders obvious in light of the knowledge of POSITA, the limitations of Claim 11[d].

f. Claim 11[e]: “a plurality of hoses, each said hose connected with a different one of the reels;”

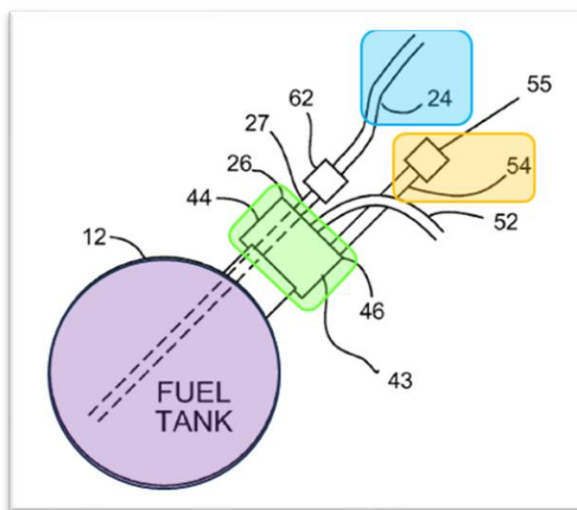
162. Claim 11[e] comprises a portion of Claim 1 [e]. As explained with respect to Claim 1[e] above, and incorporated herein by reference, *Van Vliet* discloses a plurality of hoses **24** and each hose is connected to a reel **30**. Accordingly, *Van Vliet* anticipates or renders the limitations of Claim 11[e] obvious.

g. Claim 11[f]: “a plurality of valves in the container, each said valve situated between the at least one manifold and a respective different one of the reels;”

163. Claim 11[f] is identical to Claim 1[f] and is disclosed, or at least rendered obvious, by *Van Vliet* for the same reasons as those set forth in Section XI.A.1.g above and incorporated herein by reference. Accordingly, Claim 11[f] is disclosed by *Van Vliet* or at least rendered obvious *Van Vliet* in view of the knowledge of a POSITA.

h. Claim 11[g]: “a plurality of fluid level sensors, each said fluid level sensor connectable to an end of a different one of the hoses; and”

164. Claim 11[g] is similar to Claim 1[g]. Claim 1[g] claims the fluid sensors are “associated with a different one of the hoses”, while Claim 11[g] claims the fluid sensors are “connectable to an end of a different one of the hoses”. As discussed above in Section XI.A.1.h above and incorporated herein by reference, *Van Vliet* discloses sensors that are connected to the end of a different one of the hoses, and accordingly are “connectable”.



165. Fig. 2 of *Van Vliet* shows fuel hose **24** (annotated in blue) connected to fuel cap **26** (annotated in green). FIG. 2 further shows fuel sensor **54** connected to fuel cap **26**. Accordingly, fuel sensor **54** is connected to (and connectable to) the end of fuel hose **24** through fuel cap **26**.

166. Accordingly Claim 11[g] is disclosed by *Van Vliet* or at least rendered obvious by *Van Vliet* in view of the knowledge of a POSITA for the same reasons as those discussed regarding Claim 1[g].

i. **Claim 11[h]: “a controller configured to individually open and close the valves responsive to the fluid level sensors.”**

167. Claim 11[h] is identical to Claim 1[h] and is disclosed, or at least rendered obvious, by *Van Vliet* for the same reasons as those set forth in Section XI.A.1.i above and incorporated herein by reference. Accordingly Claim 11[h] is disclosed by *Van Vliet* or at least rendered obvious *Van Vliet* in view of the knowledge of a POSITA.

3. Claim 12: “The distribution station as recited in claim 11, wherein the at least one pump includes two pumps.”

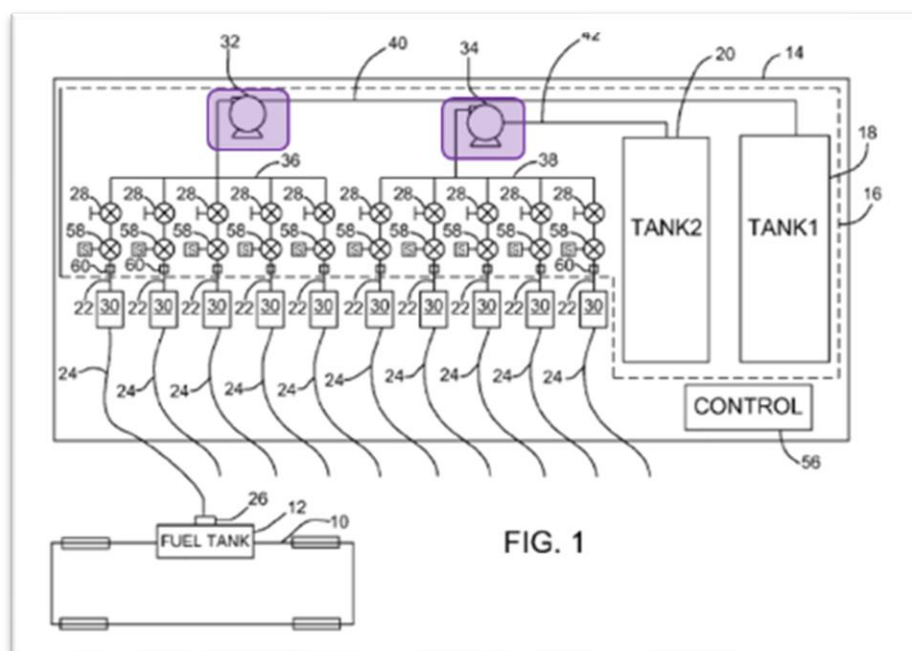
168. As discussed above regarding Claim 1[a] and Claim 1[b], and incorporated herein by reference, *Van Vliet* teaches “the fuel delivery system **14** may be contained on a single trailer.”¹⁶⁵ And the trailer would have side walls and end walls, or at least this would have been obvious to a POSITA.¹⁶⁶ Accordingly, the “trailer” is a “container” as the term is used in the ‘955 Patent, or it would have been obvious to use a container for the system of *Van Vliet*. As shown in FIG. 1 of *Van Vliet*, the fuel delivery system **14** includes tanks **18** and **20** that are each “connected to respective pumps **32**, **34** and then to respective manifolds **36**, **38** via lines **40**, **42**. The fuel outlets **22** are located on the manifolds **36**, **38**.”¹⁶⁷ ¹⁶⁸

¹⁶⁵ EX1004, [0014].

¹⁶⁶ *see Supra* Section XI.A.1.b.

¹⁶⁷ EX1004, [0016].

¹⁶⁸ EX1004, FIG. 1 (annotated to show pumps highlighted in purple).



169. Because pumps 32, 34 are part of the “fuel delivery system 14” that “may be contained on a single trailer,” and the trailer comprises a container, they are, either individually or together, “a pump in the container”¹⁶⁹ A POSITA would have understood that the pumps in *Van Vliet* are mounted in the trailer (or, equivalently, the van truck.) and provide the same function as the pump(s) in the ‘955 Patent, i.e. pumping fluids out of the tanks into the discharge lines.

170. Because pumps 32, 34 are part of the “fuel delivery system 14” that “may be contained on a single trailer,” either or both of those pumps are “in the

¹⁶⁹ EX1004, [0008], [0014], FIG. 1.

container” of *Van Vliet*.¹⁷⁰ A POSITA would have understood that the pumps in *Van Vliet* are “in” the container of *Van Vliet*, as opposed to being mounted to the roof or other location outside the container. Alternatively, to the extent that *Van Vliet* does not expressly disclose that the pumps **32, 34** are located inside the trailer, such an arrangement would have been an obvious design choice for a POSITA. *Van Vliet* discloses “[t]he spatial orientation of the control station **56**, reels **30**, manifolds **36, 38**, tanks **18, 20**, and other equipment such as the generators is a matter of design choice for the manufacturer and will depend on space requirements.”¹⁷¹ Accordingly, a POSITA would have been motivated to mount the pumps inside the container of *Van Vliet* to, for example, protect the pumps from weather. A POSITA would have known that oil and gas locations are often located in areas with extreme weather, and the container of *Van Vliet* (or, alternatively, the modified containers known to a POSITA) are wind and watertight and would protect from the effects of the extreme weather.¹⁷²

171. Accordingly, *Van Vliet* discloses, or at least in the light of knowledge of a POSITA renders obvious, the limitations in Claim 12.

¹⁷⁰ EX1004, [0008], [0014], & Fig. 1.

¹⁷¹ EX1004, [0027].

¹⁷² see *Supra* Section VIII.E.

B. Ground 2: Claims 1-5 and 11-12 are rendered obvious by *Van Vliet* in view of *Cable*

1. Rationale and Motivation for Combining *Van Vliet* and *Cable*

172. Both *Van Vliet* and *Cable* describe a mobile truck/trailer system for delivery of fuel, lubricants or other hydrocarbons. Further, both references use deployable hoses stored on reels, arranged so that multiple hoses can deliver fuel or other fluids to the receiving equipment at the same time. In both references, to deliver the fluids, the hoses are “pulled out” from the reels and extending to the receiving equipment, and then “reeled up” onto the reels for storage or transportation. A POSITA would have been motivated to combine *Cable* and *Van Vliet* due to their commonalities. Further, a POSITA would have been motivated to apply *Cable*’s teaching of a walkable reel deployment compartment with a central aisle walkway, and reels deployed on opposing sides of the walkway adjacent to the sidewalls, to the trailer of *Van Vliet* to allow *Van Vliet*’s system to be more easily traversable by operators for the purpose of repairs, maintenance, and/or physical inspection. Further, a POSITA would have been motivated to apply *Cable*’s teaching of an occupant compartment separated by an interior wall, and accessible via the interior walkway (and exterior doors at the rear of the truck/trailer) at least to provide a separate occupant compartment without direct exposure to the fluids stored in the compartment with tanks.

173. Both *Van Vliet* and *Cable* are in the same field of endeavor and directed to solving the same problem as each other and the ‘955 Patent—distributing hydrocarbon fluids—and are therefore analogous art both to each other and to the challenged claims.¹⁷³ The references are similar. Both *Van Vliet* and *Cable* include (1) storage tanks;¹⁷⁴ (2) reels;¹⁷⁵ (3) hoses on the reels;¹⁷⁶ (4) pumps coupled to the storage tanks;¹⁷⁷ and (5) valves for controlling the flow of a fluid.¹⁷⁸ Both references describe the combination of these individual elements in a similar manner to deliver fluids to equipment not located on the truck/trailer.¹⁷⁹ While *Van Vliet* is largely silent on the details of the physical arrangement of components in its trailer, instead leaving the arrangement up to the designer. *Cable* provides such details of physical orientation including a central walkway, reels arranged on opposed sides of the walkway adjacent to sidewalls, orientation of pumps and manifolds, use of stacked

¹⁷³ EX1001, 1:34-48; *see also* EX1004, [0003], [0014], Abstract; EX1005, 1:40-65.

¹⁷⁴ EX1004, [0003], [0014]; *see also* EX1005, 1:40-65.

¹⁷⁵ EX1004, [0014], [0015]; *see also* EX1005, 1:40-65.

¹⁷⁶ EX1004, [0014], [0015]; *see also* EX1005, 1:40-65.

¹⁷⁷ EX1004, [0014]; *see also* EX1005, 1:40-65.

¹⁷⁸ EX1004, [0003], [0014]; *see also* EX1005, 4:22-46.

¹⁷⁹ EX1004, [0014]; *see also* EX1005 Abstract, 1:62-65.

rows of reels arranged on racks, and the like. A POSITA would have recognized the advantages of the central aisle with equipment located on opposed sides of the aisle, for example to easily traverse the tank compartment for maintenance or operations. Further, a POSITA would have recognized the advantage of locating equipment on both sides of the aisle to make delivery of fluids to vehicles in multiple locations (such as on both sides of the trailer) easier and more efficient. *Van Vliet* already teaches that “one manifold **36** may supply fluid to equipment **10** lined up on one side of a well, while another manifold **38** may supply fluid to equipment **10** lined up on the other side [of the well].”¹⁸⁰ A POSITA would have recognized the obvious benefits of the spatial orientation taught by *Cable* so that equipment on one side of the well (such as the passenger’s side of the vehicle) are fueled from reels on the same side of the vehicle, while equipment on the other side of the well is fed from reels on the opposed side of the vehicle. This would allow the vehicle to be backed or pulled in directly opposite (or facing) the well and allow for deployment of hoses to equipment on both sides of the well with limited crossing or tangling of hoses.

174. Further, *Van Vliet* contains an express motivation to combine. *Van Vliet* states that “[t]he manual valves **28** should be readily accessible to an operator on the trailer **14**. This can be arranged with the manifolds **36**, **38** mounted on a wall of the

¹⁸⁰ EX1004, [0024].

trailer with the outlets **22** extending inward of the trailer wall.”¹⁸¹ To the extent that *Van Vliet* does not explicitly disclose an central aisle for access to the valves, *Van Vliet* does note that the spatial orientation of the reels **30**, manifolds **36** and **38**, tanks **18** and **20**, and other equipment shown “is a matter of design choice for the manufacturer and will depend on space requirements.”¹⁸² A POSITA would then look to other references, such as *Cable* for spatial configurations that allow for various equipment, such as valves, manifolds and pumps to be “readily accessible” as taught by *Van Vliet*. A POSITA, reading *Cable* would have easily understood that an aisle walkway, such as the one taught by *Cable* would be an effective and straightforward way to allow an operator easy access to manual valves inside the trailer, as taught by *Van Vliet*. A POSITA would have further understood that an outside door would be useful for accessing the aisle walkway from the outside of the trailer, and an inside door would be useful for accessing the aisle walkway from the driver’s compartment or control cabin.¹⁸³ Further, a POSITA would have understood that separating the compartment with tanks, valves and hoses from the occupant compartment, such as taught in *Cable* would not only be a conventional way of

¹⁸¹ EX1004, [0026].

¹⁸² EX1004, [0027].

¹⁸³ EX1005, [0031].

arranging a vehicle,¹⁸⁴ but would further have the advantage of separating the occupant from the combustible liquids contained in the tanks, and would keep any spills from directly impacting equipment, such as electrical or electronic equipment (e.g. *Van Vliet's* controller).). Lastly, a POSITA would have understood that positioning the reels on either side of the aisle walkway would allow an operator to access more reels at any given location on the walkway than a configuration with reels on only one side of the walkway. Accordingly, a POSITA would have been motivated to modify *Van Vliet's* system to include *Cable's* aisle configuration to be more easily traversable on foot and would have been motivated to incorporate *Cable's* door and wall configuration to gain the advantages of such a configuration described above.

175. A POSITA would have had a reasonable expectation of success in combining *Van Vliet* with *Cable*. As explained above, *Van Vliet* and *Cable* describe similar systems for delivering fluid from a mobile trailer via hoses to multiple destinations. Further, the elements incorporated into *Van Vliet* from *Cable* are either already present in *Van Vliet* (e.g., reels) or were simple elements well-known in the art at the time of the '955 Patent. Incorporating *Cable's* aisle walkway, doors, and

¹⁸⁴ EX1005 2:49-51 (“there is shown a conventional van truck 16 having a driver compartment as well as a rear compartment.”).

reel configuration into *Van Vliet*'s mobile fuel delivery system would merely involve combining prior art elements according to known methods to yield predictable results.

2. Claim 1

176. It is my opinion that *Van Vliet* discloses, or at least renders obvious, Claim 1 of the '955 Patent To the extent that the board determines *Van Vliet* does not render the entire Claim obvious, *Van Vliet* in view of *Cable*, along with the knowledge of a POSITA, renders Claim 1 obvious.

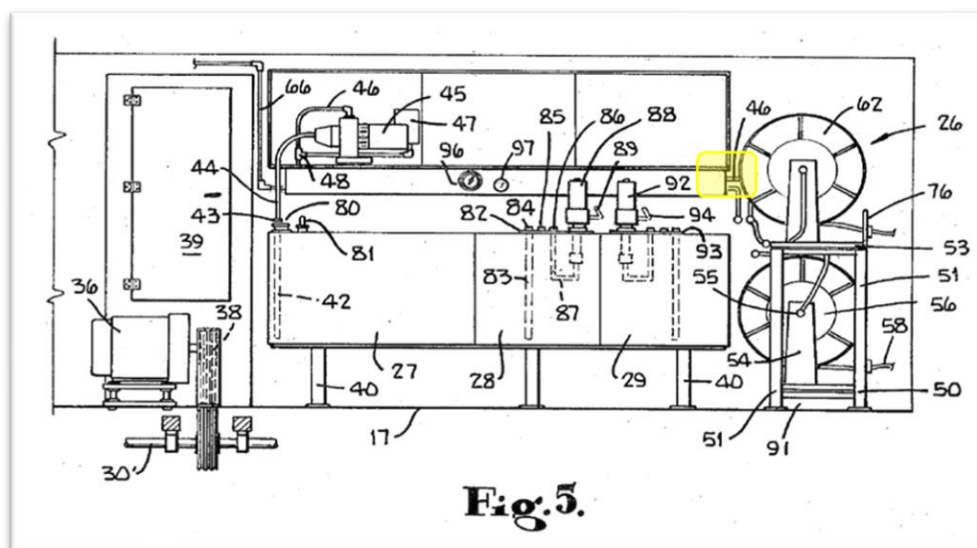
a. Claims 1[p] – 1[d]

177. For the same reasons discussed with respect to Ground 1 above, and incorporated herein by reference, *Van Vliet* discloses, or at least renders obvious, claim 1[p]-1[d]. Nothing in *Cable* teaches against the disclosure and/or teaching of *Van Vliet*. Accordingly, the combination of *Van Vliet* with *Cable* renders Claims 1[p]-1[d] obvious.

b. Claim 1[e]: “a plurality of hoses, each said hose connected with a different one of the reels, wherein a portion of the reels are connected to be fed from the first manifold and another portion of the reels are connected to be fed from the second manifold;”

178. It is my opinion that *Van Vliet* discloses the limitations of Claim 1[e] To the extent Patent Owner argues that Claim 1[e] requires that the claimed hoses or manifolds must be fluidly connected with or through the reels, and *Van Vliet* does

not explicitly disclose this arrangement, *Cable* discloses the arrangement. Fluids dispensed using *Cable*'s system are stored in tank 27 and flow out of "pump outlet tube 46" to one or more of the hoses (e.g., hoses 64 and 65) that are stored on reels (e.g., reels 62 and 63) in the van truck.¹⁸⁵ *Cable* describes that "[t]ube 46 is connected by a conventional reel rotatable coupling to hose 65."¹⁸⁶



179. A POSITA would have understood that a conventional reel rotatable coupling , otherwise known as a swivel joint, was a well-known component that allows for 360° rotation of a fitting while flowing fluid therein.¹⁸⁷ Further, a POSITA

¹⁸⁵ EX1005, 4:22-33.

¹⁸⁶ EX1005 4:33-36 & Fig. 5 (annotated to show tube 46 highlighted in yellow).

¹⁸⁷ see *Supra* Section VIII.C.

would have understood that swivel joints, or “reel rotatable couplings” were commonly used on hose reels long before the ‘955 Patent. Based on the teachings of *Cable*, a POSITA would have recognized that the “reel rotatable coupling” would have been connected to a flow path in the reel to allow fluid to flow through the reels into the hose. It would have been obvious design choice for a POSITA to implement this kind of connection to connect the hoses of *Van Vliet* to be fed by the manifolds. Accordingly, *Cable* discloses, and the combination of *Van Vliet* and *Cable*, along with the knowledge of the POSITA, render obvious the claim limitations in Claim 1[e].

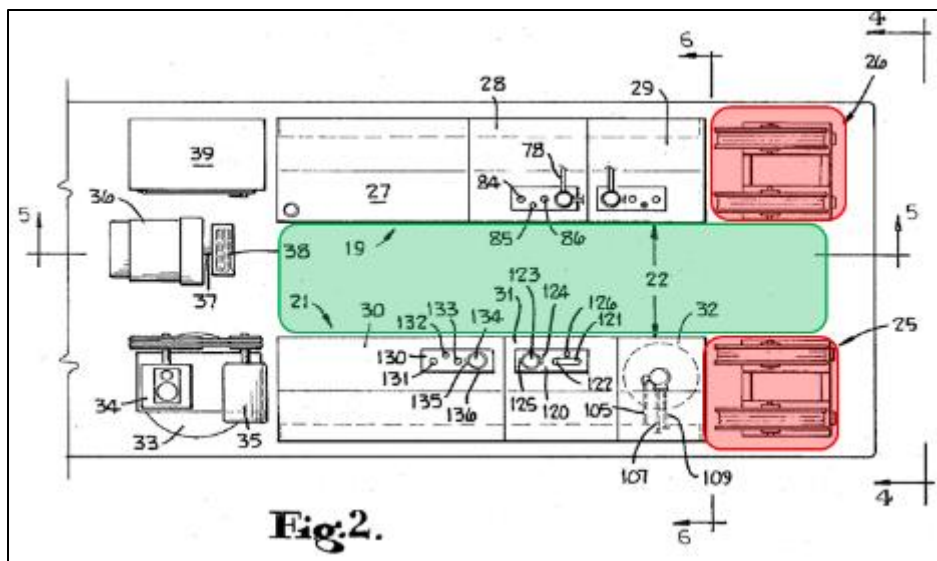
c. Claims 1[f] – 1[h]

180. For the same reasons discussed with respect to Ground 1 above, and incorporated herein by reference, *Van Vliet* discloses, or at least renders obvious, claim 1[f]-1[h]. Nothing in *Cable* teaches against the disclosure and/or teaching of *Van Vliet*. Accordingly, the combination of *Van Vliet* with *Cable*, renders Claims 1[f]-1[h] obvious.

3. Claim 2: “The distribution station as recited in claim 1, wherein the reels are arranged on first and second opposed sides in the container.”

181. For the same reasons discussed with respect to Ground 1 above, and incorporated herein by reference, *Van Vliet* discloses, or at least renders obvious, Claim 2. To the extent that the limitations of Claim 2 are not explicitly disclosed in

Van Vliet, Cable discloses “wherein the reels are arranged on first and second opposed sides in the mobile trailer, with an aisle walkway down the middle of the mobile trailer.” As depicted in Figure 2 below, the hose assemblies **25** and **26** that include reels (red) are located on opposed sides of the interior of the van truck.¹⁸⁸ Furthermore, an aisle walkway (green) is depicted between tank bays **19** and **21** along the length of the van truck and extending to the rear end of the van truck between the reels.¹⁸⁹



182. It would have been obvious to a POSITA to use the arrangement disclosed in *Cable* in the trailer of *Van Vliet*. *Van Vliet* contemplates various

¹⁸⁸ EX1005, FIG. 2.

¹⁸⁹ EX1005, 2:55-63 & FIG. 2 (annotated to show reels highlighted in red and aisle/walkway in green)).

arrangements of its on-trailer equipment, stating that “[t]he spatial orientation of the control station **56**, reels **30**, manifolds **36, 38**, tanks **18, 20**, and other equipment such as the generators is a matter of design choice for the manufacturer and will depend on space requirements.”¹⁹⁰ Accordingly, when determining the arrangement of on-trailer equipment, a POSITA would have looked at other, similar references to provide details of specific arrangements. *Cable* provides such details, including the arrangement of reels and a walkway. Thus, it would have been obvious to a POSITA to use *Cable*’s reel-and-aisle arrangement as a “matter of design choice” in the trailer of *Van Vliet*. A POSITA would have implemented the spatial arrangement of *Cable* to the trailer of *Van Vliet* to take advantage of the benefits of such an arrangement, including to allow *Van Vliet*’s system to be more easily traversable by operators for the purpose of repairs, maintenance, and/or physical inspection.

183. Further, a POSITA would have implemented the arrangement of *Cable* to *Van Vliet* to help meet *Van Vliet*’s goal of “[t]he manual valves **28** should be readily accessible to an operator on the trailer **14**. This can be arranged with the manifolds **36, 38** mounted on a wall of the trailer with the outlets **22** extending inward of the trailer wall.”¹⁹¹ The arrangement of *Cable*, with reels on opposed sides

¹⁹⁰ EX1004, [0027].

¹⁹¹ EX1004, [0026].

of the trailer and a walkway therebetween would provide a convenient method to meet *Van Vliet's* goal.

184. Finally, a POSITA would have implemented *Cable's* arrangement of reels and aisles in order to make it easier for the system to meet *Van Vliet's goal* that reels equipment on one side of the well (such as the passenger's side of the vehicle) are fed from reels on the same side of the vehicle, while equipment on the other side of the well are fed from reels on the opposed side of the vehicle, as discussed above in Section XI.A.1.¹⁹² The spatial orientation of *Cable* would allow separate manifolds to serve separate pieces of equipment on opposed sides of the well with minimal crossing of hoses, for example, if the trailer is pulled or backed directly towards the wellhead and hoses are fed from each side of the trailer.

185. A POSITA would have had no trouble implementing *Cable's* arrangement to the trailer of *Van Vliet*, as it is simply a predictable variation of the spatial orientation taught by *Cable*, using the known equipment and techniques of *Van Vliet*. Accordingly, the combination of *Van Vliet* and *Cable* discloses or at least renders obvious Claim 2.

¹⁹² EX1004 [0024].

4. Claim 3: “The distribution station as recited in claim 2, further comprising an aisle walkway down the middle of the container between the reels on the first and second opposed sides in the container.”

186. As discussed above regarding Claim 2, *Cable* discloses the claimed arrangement, including an aisle walkway down the middle of the container and reels on both first and second opposed sides of the container. Accordingly, the combination of *Van Vliet* and *Cable* renders Claim 3 obvious.

5. Claim 4: “The distribution station as recited in claim 3, further comprising a floor pan in the container.”

187. *Van Vliet* discloses that the distribution station “further compris[es] a floor pan in the mobile trailer.” *Van Vliet* describes “spill containment pans” on board the trailer. *Van Vliet* describes “[o]ne or more spill containment pans (not shown) [that] may be provided with the system.” *Van Vliet* discloses that the pans are sized to catch leaks in the trailer. For example, “a pan of sufficient size to catch leaking fluids from the system during use.”¹⁹³

188. Like the ‘955 Patent, *Van Vliet* describes that such pans may be positioned to catch fluids leaking from the manifolds and hose reels: “The pan or pans may be positioned to catch fluids from each or both manifolds, and hose reels
30. Each manifold may have a single pan, or a single pan may be used for both

¹⁹³ EX1004 [0022].

manifolds.”¹⁹⁴ These pans are described strikingly similarly to the pans in ‘955 Patent, which teaches the floor pan is sized and positioned “such that any fluid or fuel that leaks in the trailer is caught and contained in the floor pan.”¹⁹⁵

189. Further, codes and standards, including IFC-2015, require secondary containment and spill protection in locations that handle flammable and combustible liquids.¹⁹⁶ A POSITA would recognize the necessity of providing secondary containment and spill protection, such as a floor pan, in the system of *Van Vliet* and *Cable* to comply with industry codes and standards. Accordingly, a POSITA would have understood that the limitations of claim 16 are disclosed by *Van Vliet* and are rendered obvious by *Van Vliet* in view of *Cable* along with the knowledge of a POSITA regarding fire codes and standards.

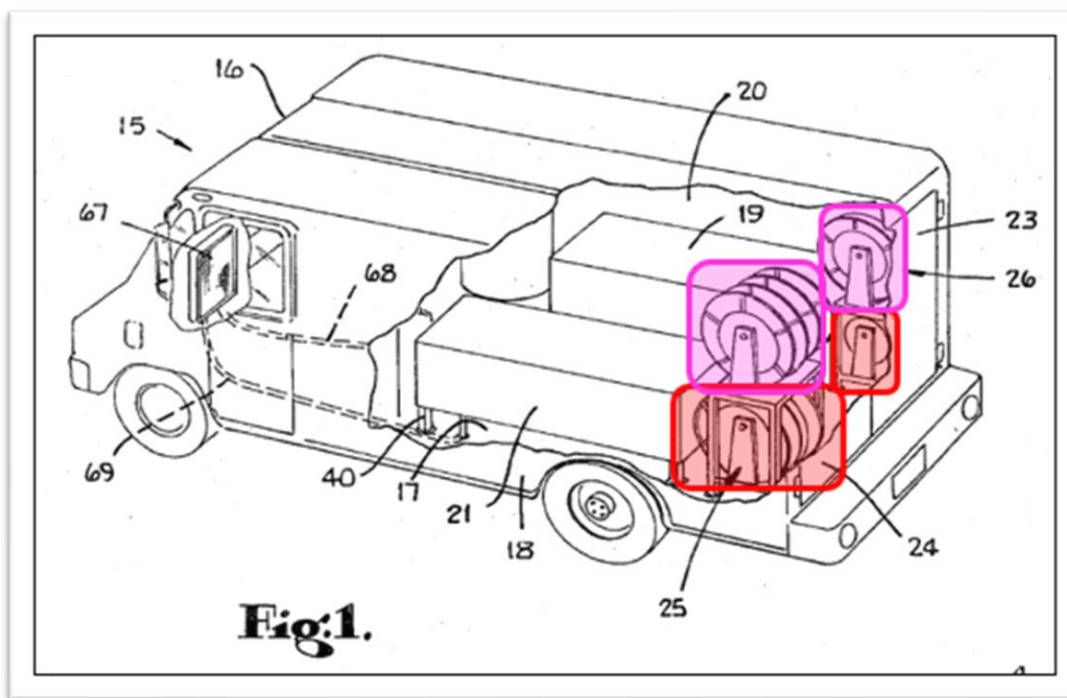
6. Claim 5: “The distribution station as recited in claim 1, wherein the reels on each of the first and second opposed sides are arranged in upper and lower rows of reels.”

¹⁹⁴ EX1004, [0022].

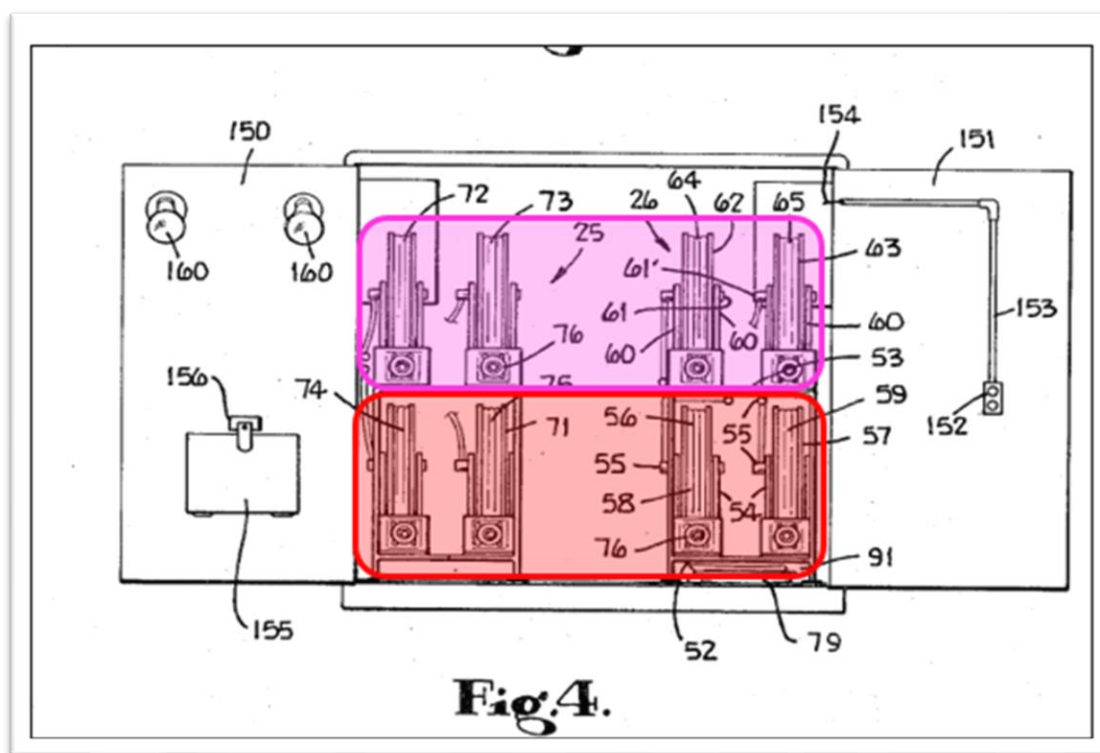
¹⁹⁵ EX1001, 8:19-25.

¹⁹⁶ *see Supra*. Section VIII.F.

190. *Cable* discloses “wherein the reels on each of the first and second opposed sides are arranged in upper and lower rows of reels.” Both FIG.1 and FIG.4 of *Cable* show just such an arrangement.¹⁹⁷



¹⁹⁷ EX1005, FIG. 1. (annotated to show lower row of reels highlighted in red and upper row of reels highlighted in pink), Fig); FIG. 4 (annotated: to show lower row of reels highlighted in red and upper row of reels highlighted in pink).



191. As depicted above, *Cable*'s mobile trailer includes two reels on the first side arranged in an upper row; two reels on the first side arranged in a lower row; two reels on the second side arranged in an upper row; and two reels on the second side arranged in a lower row. Further, *Cable* provides a description of the arrangement: "Each of the hose assemblies has a pair of upper reels and a pair of lower reels rotatably mounted to the frame of a wheel assembly."¹⁹⁸ "APOSITA would have implemented the arrangement of hoses and reels disclosed in *Cable* to the trailer of *Van Vliet* to take advantage, for example, of the space savings of such

¹⁹⁸ EX1005 2:67-3:3; see also EX1005, 4:1-5, 3:43-56.

an arrangement. Arranging the reels into an upper and lower configuration allows for twice as many reels to be disposed along the length of the trailer. Further, such an arrangement would have made it easier for the operator to access the valves and reels, as they would be arranged efficiently. Accordingly, *Cable* discloses “wherein the reels on each of the first and second opposed sides are arranged in upper and lower rows of reels”, and the combination of *Cable* and *Van Vliet* renders the claim limitation claimed in Claim 5 obvious.

7. Claim 11

192. It is my opinion that *Van Vliet* discloses, or at least renders obvious, Claim 11 of the ‘955 Patent To the extent that the board determines *Van Vliet* does not render the entire Claim obvious, *Van Vliet* in view of *Cable*, along with the knowledge of a POSITA, renders Claim 11 obvious.

a. Claims 11[p] – 11[c]

193. For the same reasons discussed with respect to Ground 1 above, and incorporated herein by reference, *Van Vliet* discloses, or at least renders obvious, claim 11[p]-11[c]. Nothing in *Cable* teaches against the disclosure and/or teaching of *Van Vliet*. Accordingly, the combination of *Van Vliet* with *Cable* renders Claims 11[p]-11[c] obvious.

b. Claim 11[d]” a plurality of reels in the container, each said reel individually connected with the at least one manifold;”

194. It is my opinion that *Van Vliet* discloses the limitations of Claim 11[d]. To the extent Patent Owner argues that Claim 11[d] requires that the claimed manifolds must be fluidly connected with or through the reels, and *Van Vliet* does not explicitly disclose this arrangement, *Cable* discloses the arrangement.

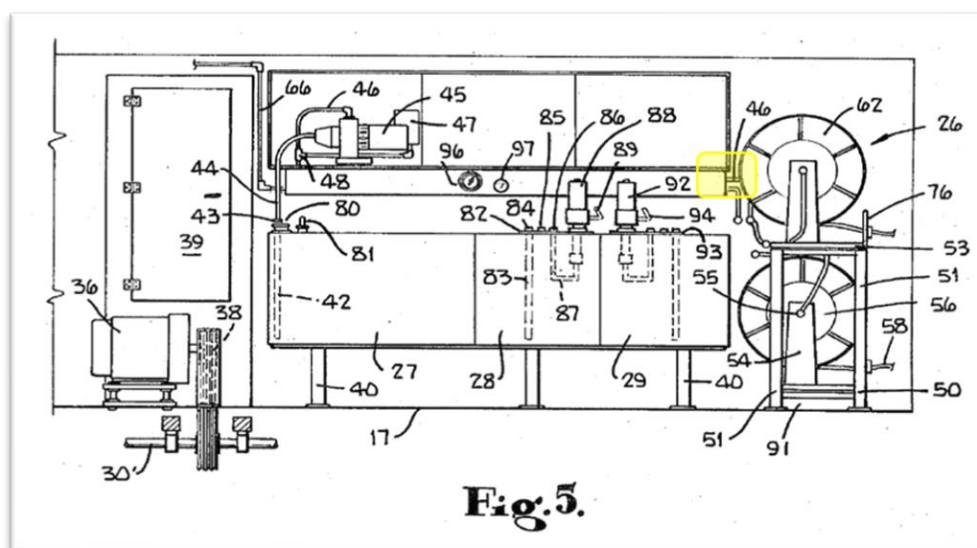
195. Initially, as discussed in Ground 1 regarding Claim 11[d],¹⁹⁹ *Van Vliet* discloses the presence of manifolds to distribute fuel from the pumps to a plurality of reels.²⁰⁰ Further, fluids dispensed using *Cable*’s system are stored in tank 27 and flow out of “pump outlet tube 46” to one or more of the hoses (*e.g.*, hoses 64 and 65) that are stored on reels (*e.g.*, reels 62 and 63) in the van truck.²⁰¹ *Cable* describes that “[t]ube 46 is connected by a conventional reel rotatable coupling to hose 65.”²⁰²

¹⁹⁹ Referring to Ground 1 Claim 1[c].

²⁰⁰ *see Supra* Section XI.A.2.e, referencing Section XI.A.1.e.

²⁰¹ EX1005, 4:22-33.

²⁰² EX1005, 4:33-36 & Fig. 5 (annotated to show tube 46 highlighted in yellow).



196. A POSITA would have understood that a conventional reel rotatable coupling, otherwise known as a swivel joint, was a well-known component that allows for 360° rotation of a fitting while flowing fluid therein.²⁰³ Further, a POSITA would have understood that swivel joints, or “reel rotatable couplings” were commonly used on hose reels long before the ‘955 Patent. Based on the teachings of *Cable*, a POSITA would have recognized that the “reel rotatable coupling” would have been connected to a flow path in the reel to allow fluid to flow through the reels into the hose. It would have been obvious design choice for a POSITA to implement this kind of connection to connect the hoses of *Van Vliet* to be fed by the manifolds. Accordingly, *Cable* discloses, and the combination of *Van Vliet* and *Cable*, along

²⁰³ see *Supra* Section VIII.C.

with the knowledge of the POSITA, render obvious the claim limitations in Claim 11[d].

c. Claim 11[e]: “a plurality of hoses, each said hose connected with a different one of the reels;”

197. It is my opinion that *Van Vliet* discloses the limitations of Claim 11[e]. To the extent Patent Owner argues that Claim 11[e] requires that the claimed manifolds must be fluidly connected with or through the reels, and *Van Vliet* does not explicitly disclose this arrangement, *Cable* discloses the arrangement, for the same reasons discussed above regarding Ground 2 Claim 11[d]. Accordingly, the combination of *Van Vliet* and *Cable* render obvious the limitations of Claim 11[e].

8. Claim 12: “The distribution station as recited in claim 11, wherein the at least one pump includes two pumps.”

198. For the same reasons discussed with respect to Ground 1 above, and incorporated herein by reference, *Van Vliet* discloses, or at least renders obvious, Claim 12. Nothing in *Cable* teaches against the disclosure and/or teaching of *Van Vliet*. Accordingly, the combination of *Van Vliet* with *Cable*, renders Claim 12 obvious.

C. Ground 3: Claims 6-10 and 14-20 are Rendered Obvious by *Van Vliet* in view of *LCR I* and/or *LCR II*.

1. Motivation to combine *Van Vliet*, *LCR I*, and *LCR II*

199. A POSITA would have been motivated to combine *LCR I* and/or *LCR II* with *Van Vliet*. *LCR I* and *II* are in the same field of endeavor as *Van Vliet* (as well

as the ‘955 Patent) and are directed to solving the same problem—delivering fuel in a vehicle based distribution station. *Van Vliet* discloses “a fuel delivery system [that] may be contained on a single trailer,”²⁰⁴ for use in refueling equipment during fracturing of a well. *LCR I* and *LCR II* teach “Practical Electronic Flowmeter Systems”²⁰⁵ which include a register and invoice system “for customer-direct fuel delivery”²⁰⁶ The Challenged Claims of the ‘955 Patent further relate to delivery of fuel “during hot-refueling operations” at a fracturing site. *LCR I* and *II* are therefore analogous art to *Van Vliet*, as well as the ‘955 Patent.²⁰⁷

200. A POSITA would have been motivated to combine *LCR I* and *LCR II* with *Van Vliet* at least to take advantage of *LCR I*’s and *II*’s abilities to meter fuel delivery and generate invoices. *LCR I* discloses a “Full Screen Electronic Registration with POS [Point of Sale] Capabilities.”²⁰⁸ Further, *LCR I* discloses the electronic register “is a microprocessor-based electronic meter register. Its primary

²⁰⁴ EX1004, [0014] & Abstract; *see also* Section XI.A.1 regarding Claim 1.

²⁰⁵ EX1007, 2.

²⁰⁶ EX1006, 2.

²⁰⁷ EX1001, 1:34-48 & 2:12-23; *see also* EX1004, [0003], [0020], & Abstract; *see also* EX1007, 3-5.

²⁰⁸ EX1006, 2.

functions include configuring the meter system to the properties of the metered liquid, interfacing with the electronic components of the meter system (and external components such as pumps, injectors, and shutdown devices), and performing Weights & Measures approved custody transfer actions.”²⁰⁹ Further, *LCR I* discloses that its system can be configured with “industry specific custody transfer applications, such as Point-of-Sale (POS), for customer-direct fuel delivery”.²¹⁰ Further, *LCR II* discloses “Increased Profitability” over other custody transfer systems by eliminating “manual pricing errors” and “streamlin[ing] office operations.”²¹¹ Further, *LCR II* discloses that its flowmeter register system “combines metrological, customer and transaction data, prints a priced and taxed ticket, and transfers the data back to the office.”²¹² A POSITA would have understood that this would increase the speed of cash flow by generating an invoice on the spot and would increase the convenience of the fuel delivery system by performing operations that would have previously been done by hand.

²⁰⁹ EX1006, 2.

²¹⁰ EX1006, 2.

²¹¹ EX1007, 2.

²¹² EX1007, 7.

201. It would have been obvious to a POSITA to combine *LCR I*'s and *LCR II*'s teaching of an electronic register with *Van Vliet* in order to take advantage of the benefits of *LCR I* and *LCR II*, including those discussed above. *Van Vliet* discloses the use of hoses, sensors, pumps, and controllers.²¹³ *LCR I* and *LCR II* disclose a commercially available electronic flowmeter system including flowmeters, as well as a fuel register for use with hoses, sensors, pumps, and controllers.²¹⁴ A POSITA designing a system of *Van Vliet* would have looked to existing, commercially available fuel flowmeter and register systems to enable more convenient display of flow measurements, automatic generation of tickets, and consistency in data transferred to the office. A POSITA would have recognized the advantage of using *LCR I*'s and *LCR II*'s electronic register in *Van Vliet*'s mobile fuel delivery system to display the flow data of *Van Vliet*'s sensors and controllers, as well as to generate invoices and generate consistent data transfer to the office.

202. A POSITA would have had a reasonable expectation of success in combining *LCR I* and *LCR II* with *Van Vliet*. To combine *Van Vliet* with *LCR I* and *LCR II*, a POSITA would have needed only to connect the flowmeter and register of *LCR I* and *LCR II* to *Van Vliet*'s hoses and controller (to , for example, measure how

²¹³ EX1004, [0015] & [0020].

²¹⁴ EX1006, 2-3; EX1007, 3.

much fuel is going to each tank **12**), or placing *LCR I* and *LCR II*'s flowmeter and register between the pumps and manifolds of *Van Vliet* (to, for example, capture the total flow into each manifold). Incorporating the flowmeter system of *LCR I* and *LCR II* into *Van Vliet*'s mobile fuel delivery system would merely involve combining prior art elements according to known methods to yield predictable results—*e.g.*, enabling *Van Vliet*'s system to display fluid flow data via a screen and/or invoice.

2. Claim 6: “6. The distribution station as recited in claim 1, further comprising a register configured to measure an amount of fluid from the pump.”

203. *LCR I* and *II* each teach that the LectroCount LCR 600 comprises a register that measures an amount of fluid flowing through a conduit.²¹⁵ The flowmeters are installed downstream of a pump and send data to the register where it is displayed via either a screen or a generated invoice; thus, a POSITA would have understood that the fluid measured is fluid from the pump.²¹⁶ It would be obvious to a POSITA to install a register such as the LectroCount LCR 600 downstream of the pumps **32, 34** of *Van Vliet* to measure the amount of fuel being dispensed by that system. *LCR* specifically teaches the use of LC's flowmeters and registers for

²¹⁵ EX1007, 3; EX1006, 2.

²¹⁶ EX1006, 2; EX1007, 4.

“product delivery and ticket generation” including “fuel delivery operations”.

EX1006 Accordingly, *LCR I* and/or *II* discloses the limitations of Claim 6 and the combination of *Van Vliet* and *LCR I* and/or *II* render Claim 6 obvious.

3. Claim 7: “7. The distribution station as recited in claim 6, wherein the register is in communication with the controller.”

204. *LCR I* and/or *II* teaches the limitations of Claim 7. *LCR I* describes that the LectroCount LCR 600 can “control a meter system as a stand-alone unit or be used as a slave to a host controller such as a process controller or an in-cab data management system.”²¹⁷ A POSITA would have understood that a slave-to-host controller must be in communication with the controller.²¹⁸ For a POSITA using the LectroCount LCR 600 register of *LCR I* and *II* in the system of *Van Vliet*, it would be obvious to connect the register to the controller 56 of *Van Vliet*.

205. *LCR* describes that the LectroCount LCR 600 can “control a meter system as a stand-alone unit or be used as a slave to a host controller such as a process controller or an in-cab data management system.”²¹⁹ *LCR* teaches the LectroCount

²¹⁷ EX1006, 2; *see also* EX1007 (LCR 600’s primary functions include “interfacing with the electronic components of the meter system”).

²¹⁸ EX1006, 2.

has the ability to perform “Electronic valve control”.²²⁰ The controller of *Van Vliet* is configured to operate valves **28/58** responsive to a fuel level in an attached tank **12**.²²¹ Accordingly, a POSITA would recognize the need for a host-slave relationship between the LCR and *Van Vliet*’s controller in order for the *LCR* to perform “electronic valve control”, as well as the controller operating valves responsive to a fuel level sensor. In such a slave-host relationship, the LCR 600 would report to the controller data such as total flow or flow rate and the controller would operate the valves accordingly (e.g., when the total flow indicated that the tank was “full”), A POSITA would have understood that, in the combination of *Van Vliet* and *LCR*, an LCR register operating as a slave to a host controller would be a “slave” to the controller of *Van Vliet*. This would require that the *LCR* register be in communication with the controller.²²² Accordingly *LCR* in combination with *Van Vliet* discloses, or at least renders obvious the limitations of Claim 7. Therefore, Claim 7 is rendered obvious by the combination of *Van Vliet* and *LCR*.

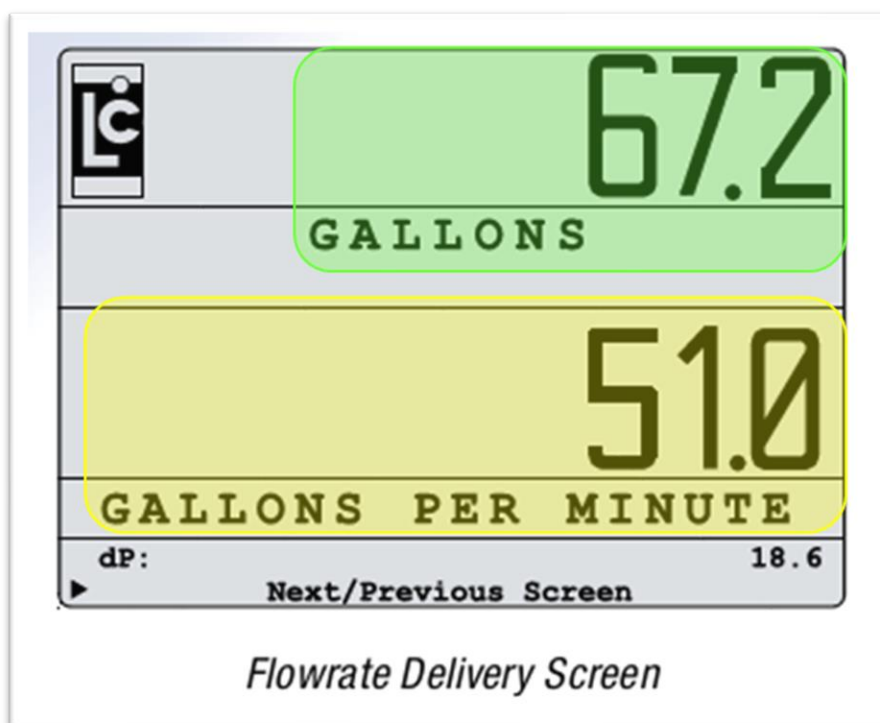
4. Claim 8: “8. The distribution station as recited in claim 7, wherein the controller is configured to track the amount of fluid provided from the pump over a selected time interval.

206. As explained with respect to Claims 6 and 7 above, and incorporated herein by reference, *LCR I* and *II* disclose a register that measures fluid flow from a pump and communicates the measurement to a controller.²²³

207. *LCR I* and/or *II* teaches that the LectroCount LCR 600 displays flow rate and total flow:²²⁴

²²³ *see Supra* Sections XI.C.2, XI.C.3.

²²⁴ EX1007, 5 (annotated to show flow rate in yellow; total flow (gallons) in green); *see* EX1006 (referring to “four delivery screens” and “flow rate” visible during delivery).



208. A POSITA would have understood that the displayed flow rate is calculated by measuring the gross quantity and dividing it by the amount of time (as determined by the internal clock) that has passed since fueling began. EX1007, 5. For example, in the figure, flowrate is displayed as “Gallons per Minute”, which is a calculation of how much fluid provided from the pump over one minute (the “selected time interval”).²²⁵ Thus, *LCR I* and/or *II* renders tracking a time interval of fluid flow from a pump obvious.

209. Therefore, the combination of *Van Vliet* and *LCR I* and/or *II* render Claim 8 obvious.

²²⁵ EX1007, 2.

5. Claim 9: “9. The distribution station as recited in claim 8, wherein the controller is configured to trigger generation of an invoice for the amount of fluid.

210. *LCR I* and *II* teach that the LCR 600 “reduce[s] delivery times and billing errors with priced and taxed delivery tickets” when used with a point-of-sale (POS) system.²²⁶ *LCR II* also describes POS systems and commercially-available printers provided by Liquid Controls to “combine[] metrological, customer, and transaction data, print[] a priced and taxed ticket, and transfer the data back to the office.”²²⁷ *LCR* describes that the LCR 600 can be used with a commercially available printer “to print completely priced tickets [that is, invoices] with complex tax and discount structures.”²²⁸ Further, the system of LCR “[r]educ[e]s postage and invoices costs by printing POS tickets at delivery sites.”²²⁹ The LCR 600 tracks fluid volume, and a POSITA would understand that fluid volume is a standard data output to include on a fuel invoice, as pricing for fuel is known to be based on the quantity of fuel delivered.²³⁰ Because the LCR 600 would be operating as “a slave to a host

²²⁶ EX1007, 5; EX1006, 2.

²²⁷ EX1007, 8; *see also id.* at 9, 11.

controller,” it would be obvious to a POSITA to use the controller 56 of Van Vliet to trigger the LCR 600 to generate an invoice for the measured amount of fluid delivered.²³¹

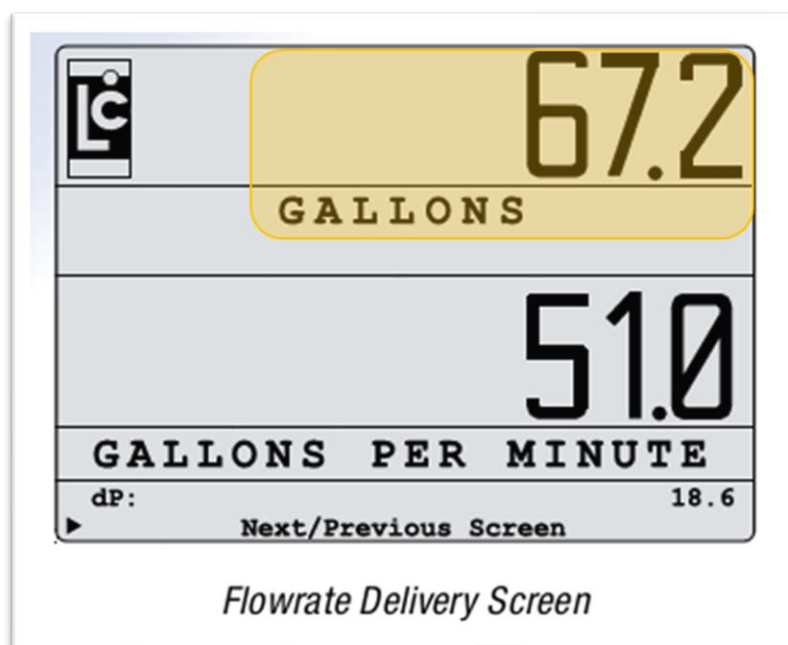
211. Accordingly, *LCR* discloses the limitations of Claim 9, and the combination of *Van Vliet* and *LCR* renders Claim 9 obvious.

6. Claim 10: “10. The distribution station as recited in claim 8, wherein the register is an electronic register that has a resolution of about 0.1 gallons.”

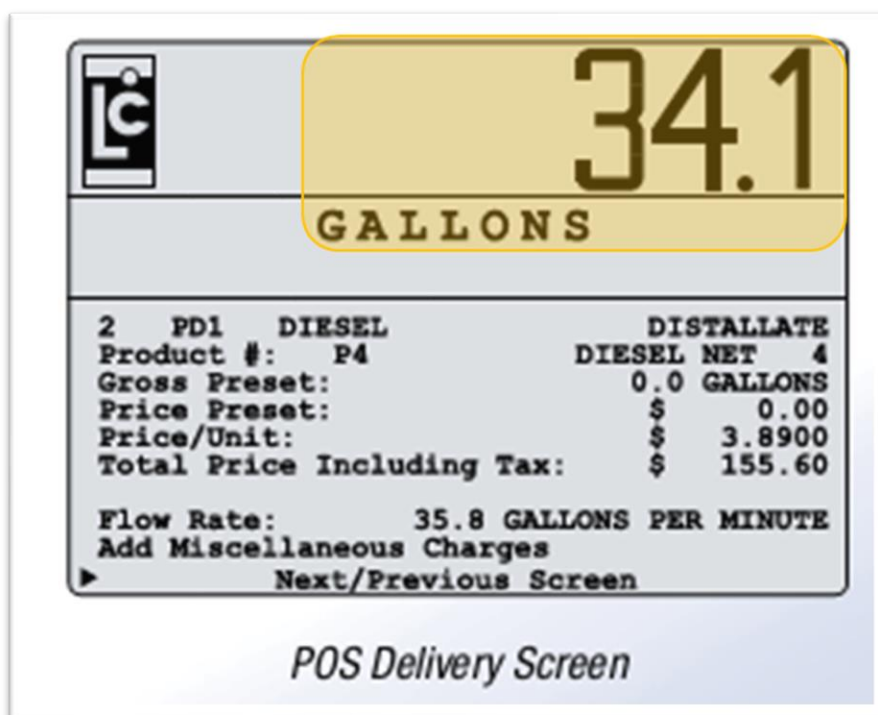
212. *LCR I* and *II* each teach that the LCR 600 is an electronic register (see EX1007, 4 (“the LectroCount LCR-II is the electronic register of choice for those who have experienced its performance in the field”); EX1006, 2 (“Full Screen Electronic Registration with POS Capabilities”) and has a resolution of 0.1 gallons as shown in various displays including:

Flowrate Delivery Screen²³²

²³² EX1007, 5 (annotated to show gallon measurement in orange).



POS [Point of Sale] Delivery Screen



LCR 600 Main Screen²³³



213. A POSITA, looking at the teachings of *LCR* would have immediately recognized that measurements such as “34.1 gallons”, “195.4” and “67.2 gallons” have a resolution of 0.1 gallons. Accordingly, *LCR* discloses the limitations of Claim 10, and the combination of *Van Vliet* and *LCR* renders Claim 10 obvious.

²³³ EX1006 annotated to show total flow (gallons) in pink.

7. Claim 14: “14. The distribution station as recited in claim 11, further comprising a register configured to measure an amount of fluid from the pump.”

214. Claim 14 is identical to Claim 6, with the exception of the referenced independent Claim. As explained with respect to Claim 6 above, and incorporated herein by reference, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 6 obvious.²³⁴ For the same reasons, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 14 obvious.

8. Claim 15: “15. The distribution station as recited in claim 14, wherein the register is in communication with the controller.

215. Claim 15 is identical to Claim 7, with the exception of the referenced independent Claim. As explained with respect to Claim 7 above, and incorporated herein by reference, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 7 obvious.²³⁵ For the same reasons, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 15 obvious.

9. Claim 16: “16. The distribution station as recited in claim 15, wherein the controller is configured to track the amount of fluid provided from the pump over a selected time interval.”

216. Claim 16 is identical to Claim 8, with the exception of the referenced independent Claim. As explained with respect to Claim 8 above, and incorporated

²³⁴ *see Supra* Section XI.C.2.

²³⁵ *see Supra* Section XI.C.3.

herein by reference, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 8 obvious.²³⁶

For the same reasons, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 16 obvious.

10. Claim 17: “17. The distribution station as recited in claim 16, wherein the controller is configured to trigger generation of an invoice for the amount of fluid.”

217. Claim 17 is identical to Claim 9, with the exception of the referenced independent Claim. As explained with respect to Claim 9 above, and incorporated herein by reference, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 9 obvious.²³⁷

For the same reasons, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 17 obvious.

11. Claim 18: “18. The distribution station as recited in claim 16, wherein the register is an electronic register that has a resolution of about 0.1 gallons.”

218. Claim 18 is identical to Claim 10, with the exception of the referenced independent Claim. As explained with respect to Claim 10 above, and incorporated herein by reference, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 10 obvious.²³⁸ For the same reasons, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 18 obvious.

²³⁶ *see Supra* Section XI.C.4.

²³⁷ *see Supra* Section XI.C.5.

²³⁸ *see Supra* Section XI.C.6.

12. Claim 19

219. For the reasons discussed in the sections below, the combination of *Van Vliet* and of *LCR I* and/or *II*, along with the knowledge of a POSITA renders obvious Claim 19.

a. **Claim 19[p]: “19. A distribution station comprising:”**

220. Claim 19[p] is identical to Claim 1[p]. As explained with respect to Ground 1 above, and incorporated herein by reference, *Van Vliet* discloses the limitations of Claim 1[p].²³⁹ For the same reasons, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 1[p] obvious.

b. **Claim 19[a]: “a container including first and second opposed side walls that join first and second opposed end walls;”**

221. Claim 19[a] is identical to Claim 1[a]. As explained with respect to Ground 1 above, and incorporated herein by reference, *Van Vliet* discloses, or at least renders obvious the limitations of Claim 1[a].²⁴⁰ For the same reasons, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 19[a] obvious.

²³⁹ see *Supra* Section XI.A.1.a.

²⁴⁰ see *Supra* Section XI.A.1.b.

c. Claim 19[b]: “at least one pump in the container;”

222. Claim 19[b] is similar to Claim 1[b]. Claim 1[b] claims “a pump in the container”, while Claim 19[b] claims “at least one pump in the container.” As discussed regarding Ground 1, and incorporated herein, *Van Vliet* discloses at least two pumps in the trailer which is “at least one pump” and *Van Vliet’s* trailer comprises a container, or at least such a configuration would have been obvious to a POSITA.²⁴¹ Accordingly Claim 19[b] is disclosed by *Van Vliet* or at least rendered obvious by *Van Vliet* in view of the knowledge of a POSITA for the same reasons as those discussed regarding Claim 1[b]. Therefore, the combination of *Van Vliet* and of *LCR I* and/or *II* render Claim 19[b] obvious.

d. Claim 19[c]: “at least one manifold in the container and fluidly connected with the at least one pump;”

223. Claim 19[c] is similar to Claim 1[c]. Claim 1[c] claims “first and second manifolds in the container and fluidly connected with the pump”, while Claim 19[c] claims “at least one manifold in the container and fluidly connected with the at least one pump.” As discussed regarding Ground 1, and incorporated herein, *Van Vliet* discloses at least two manifolds in the trailer which is “at least one manifold” and *Van Vliet’s* trailer comprises a container, or at least such a configuration would have

²⁴¹ *see Supra* Section XI.A.1.c.

been obvious to a POSITA.²⁴² Accordingly Claim 19[c] is disclosed by *Van Vliet* or at least rendered obvious by *Van Vliet* in view of the knowledge of a POSITA for the same reasons as those discussed regarding Claim 1[c]. Therefore, the combination of *Van Vliet* and of *LCR I* and/or *II* render Claim 19[c] obvious.

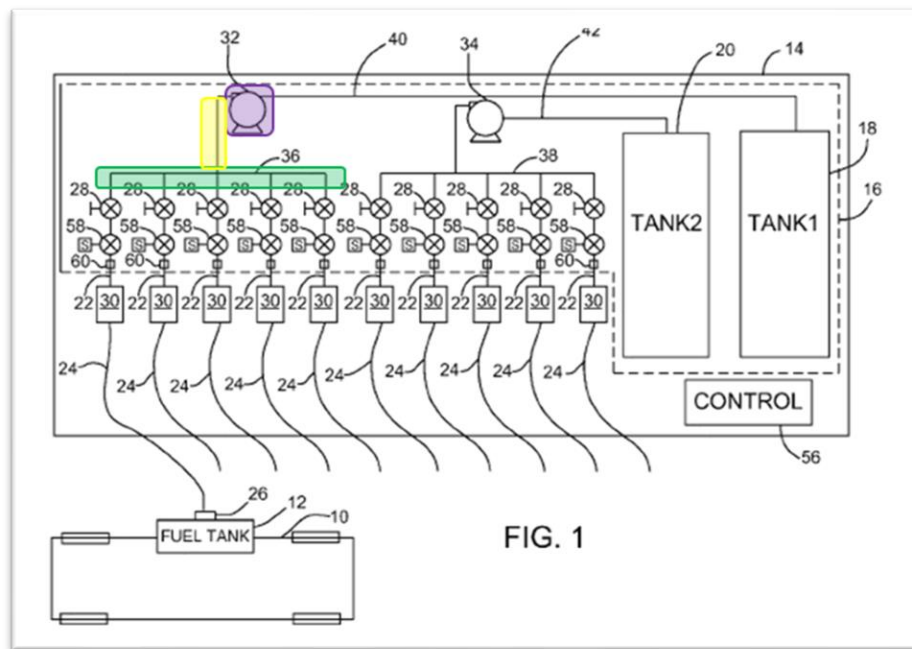
e. Claim 19[d]: “a register between the at least one pump and the at least one manifold;”

224. The LectroCount LCR 600 of *LCR* is an electronic register designed to be installed downstream of a pump.²⁴³ As shown in Figure 1 below, *Van Vliet* discloses a fuel distribution system with at least one pump 34 (purple) connected to at least one manifold 36 (green) by a flow line (yellow).²⁴⁴

²⁴² *see Supra* Section XI.A.1.d.

²⁴³ EX1006, 3.

²⁴⁴ EX1004, FIG.1 (Annotated).



225. A POSITA would have understood that a register installed downstream of a pump **32** would be installed between pump **32** and manifold **36** in order to capture all of the fluid that was flowing out of pump **32**.²⁴⁵ A POSITA would have further understood that when incorporating the register of *LCR* with the fuel distribution station of *Van Vliet*, a second register would have been installed between pump **34** and manifold **38**, to capture total flow delivered from pump **34**. The total fuel delivered, then, would be the sum of the measurements of the two registers.

226. Alternatively, to the extent that installing a register between the pumps and manifolds is not explicitly disclosed in *Van Vliet*, installing a register that is

designed to measure flow from a pump directly downstream of the pump is an obvious design choice. In fact, such a configuration would be appropriate in order to capture the total amount of fuel delivered, such as for invoicing purposes. There are a limited number of locations in the system of *Van Vliet* where installing the LCR 600 flowmeter / register would be feasible. The line between the pump and the manifold would at least be obvious to try. In either case, it would be obvious to a POSITA to install the register of *LCR* in the yellow flow path area of the version of *Van Vliet*'s Fig. 1 provided above (and in the similar location between pump **34** and manifold **38**). The yellow flow path area for the register is between pump **32** and the manifolds **36**. Accordingly, the combination of *Van Vliet* and *LCR I* and/or *LCR II* renders Claim 19[d] obvious.

f. Claim 19[e]: “a plurality of reels in the container and connected with the at least one manifold;”

227. Claim 19[e] is similar to Claim 11[d]. Claim 11[d] claims “a plurality of reels in the container, each said reel individually connected with the at least one manifold”, while Claim 19[e] claims “a plurality of reels in the container and connected with the at least one manifold.” As discussed regarding Ground 1, and incorporated herein by reference, *Van Vliet* discloses a plurality of reels connected to at least two manifolds, which is “at least one manifold”, and *Van Vliet*'s trailer comprises a container, or at least such a configuration would have been obvious to

a POSITA.²⁴⁶ Accordingly Claim 19[e] is disclosed by *Van Vliet* or at least rendered obvious by *Van Vliet* in view of the knowledge of a POSITA for the same reasons as those discussed regarding Claim 11[d]. Therefore, the combination of *Van Vliet* and *LCR I* and/or *II* render Claim 19[e] obvious.

g. Claim 19[f]: “a plurality of hoses, each said hose connected with a different one of the reels;”

228. Claim 19[f] is identical to Claim 11[e]. As explained with respect to Ground 1 above, and incorporated herein by reference, *Van Vliet* discloses, or at least renders obvious the limitations of Claim 11[e].²⁴⁷ For the same reasons, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 19[f] obvious.

h. Claim 19[g]: “a plurality of valves in the container, each said valve situated between the at least one manifold and a respective different one of the reels;”

229. Claim 19[g] is identical to Claim 11[f]. As explained with respect to Ground 1 above, and incorporated herein by reference, *Van Vliet* discloses, or at least renders obvious the limitations of Claim 11[f].²⁴⁸ For the same reasons, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 19[g] obvious.

²⁴⁶ see *Supra* Section XI.A.1.e.

²⁴⁷ see *Supra* Section XI.A.1.f.

²⁴⁸ see *Supra* Section XI.A.1.g.

i. **Claim 19[h]: “a plurality of fluid level sensors, each said fluid level sensor being associated with a different one of the hoses; and”**

230. Claim 19[h] is identical to Claim 1[g]. As explained with respect to Ground 1 above, and incorporated herein by reference, *Van Vliet* discloses, or at least renders obvious the limitations of Claim 1[g].²⁴⁹ For the same reasons, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 19[h] obvious.

j. **Claim 19[i]: “a controller configured to individually open and close the valves responsive to the fluid level sensors.”**

231. Claim 19[i] is identical to Claim 11[h]. As explained with respect to Ground 1 above, and incorporated herein by reference, *Van Vliet* discloses, or at least renders obvious the limitations of Claim 11[h].²⁵⁰ For the same reasons, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 19[i] obvious.

13. Claim 20: “20. The distribution station as recited in claim 19, wherein the register is configured to generate measurement data representative of an amount of fluid provided from the at least one pump, and the register is in communication with the controller to send the measurement data to the controller.”

232. As explained with respect to Claims 6-7 above, and incorporated herein by reference, *Van Vliet* in view of *LCR I* and/or *II* discloses, or at least renders

²⁴⁹ *see Supra* Section XI.A.1.h.

²⁵⁰ *see Supra* Section XI.A.1.i.

obvious, the limitations of Claim 20.²⁵¹ Accordingly, the combination of *Van Vliet* and *LCR I* and/or *II* renders Claim 20 obvious.

D. Ground 3A: Claims 6-10 and 14-20 are rendered obvious by *Van Vliet* in view of *Cable* and *LCR I* and/or *LCR II*

1. Motivation to Combine the references

233. The motivation to combine *Van Vliet* and *Cable* is the same as that discussed with regard to Ground 2 above. Further, the motivation to combine *Van Vliet*, *LCR I*, and *LCR II* is the same as that explained with regard to Ground 3 above. A POSITA would have been further motivated to combine *LCR I* and/or *II* with *Van Vliet*, as modified by *Cable*. *LCR I* and *II* are in the same field of endeavor as *Cable* (as well as the ‘955 Patent and *Van Vliet*) and are directed to solving the same problem—delivering fuel in a vehicle based distribution station. There is nothing in *Cable* that teaches against the disclosures of *LCR I* and *II*. Accordingly, a POSITA would have been motivated to combine *LCR I* and *II* with the system of *Van Vliet* (as modified by *Cable*) at least to take advantage of *LCR I*’s and *LCR II*’s abilities to meter fuel delivery and generate invoices, as discussed above with regard to Ground 3. *LCR I* and *LCR II* teach “Practical Electronic Flowmeter Systems”²⁵²

²⁵¹ see *Supra* Section XI.C.2 – XI.C.3.

²⁵² EX1007, 2.

which include registers that display total flow, flow rate, and can generate on-site (or in-office) invoices.

234. A POSITA would have had a reasonable expectation of success in combining *LCR I* and *II* with *Van Vliet* (as modified by *Cable*). To combine *Van Vliet* (as modified by *Cable*) with *LCR I* and *II*, a POSITA would have needed only to connect *LCR I*'s and *LCR II*'s flowmeter system (including register) to *Van Vliet*'s piping and controller. Incorporating *LCR I*'s and *LCR II*'s register into *Van Vliet*'s mobile fuel delivery system (as modified by *Cable*) would merely involve combining prior art elements according to known methods to yield predictable results—*e.g.*, enabling *Van Vliet*'s system (as modified by *Cable*) to display fluid flow data via a screen and/or invoice.

2. Claims 6 – 10

235. As explained with respect to Ground 3 above, and incorporated herein by reference, *Van Vliet* in view of *LCR I* and/or *II* renders Claims 6-10 obvious.²⁵³ Accordingly, for the same reasons, *Van Vliet* in view of *I* and/or *II* , further in view of *Cable*, render Claims 6-10 obvious.

²⁵³ *see Supra* Sections XI.C.2 – XI.C.6.

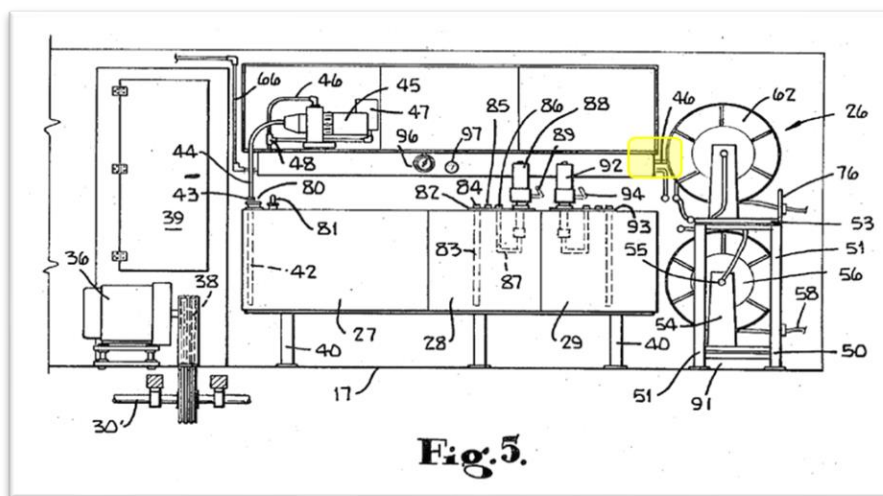
3. Claims 14-18

236. As explained with respect to Ground 3 above, and incorporated herein by reference, *Van Vliet* in view of *I* and/or *II* renders Claims 14-18 obvious.²⁵⁴ To the extent that To the extent Patent Owner argues that Claims 1[e], 11[d], and 11[e] for claim dependency require that the claimed hoses or manifolds must be fluidly connected with or through the reels, *Cable* discloses that arrangement. As explained above with respect to Ground 2, fluids dispensed using *Cable*'s system are stored in tank 27 and flow out of "pump outlet tube 46" to one or more of the hoses (*e.g.*, hoses 64 and 65) that are stored on reels (*e.g.*, reels 62 and 63) in the van truck.²⁵⁵ *Cable* describes that "[t]ube 46 is connected by a conventional reel rotatable coupling to hose 65."²⁵⁶

²⁵⁴ *see Supra* Sections XI.C.7-Xi.C.11.

²⁵⁵ EX1005, 4:22-33.

²⁵⁶ EX1005, 4:33-36 & Fig. 5 annotated to show tube 46 in yellow.



237. A POSITA would have understood that a conventional reel rotatable coupling, otherwise known as a swivel joint, was a well-known component that allows for 360° rotation of a fitting while flowing fluid therein.²⁵⁷ Further, a POSITA would have understood that swivel joints, or “reel rotatable couplings” were commonly used on hose reels long before the ‘955 Patent. Based on the teachings of *Cable*, a POSITA would have recognized that the “reel rotatable coupling” would have been connected to a flow path in the reel to allow fluid to flow through the reels into the hose. It would have been obvious design choice for a POSITA to implement this kind of connection to connect the hoses of *Van Vliet* to be fed by the manifolds. Accordingly, for the same reasons, *Van Vliet* in view of *LCR I* and/or *II*, further in

²⁵⁷ see *Supra* Section VIII.C.

view of *Cable*, render Claims 1[e], 11[d], and 11[e] for claim dependency, and Claims 14-18 obvious.

4. Claim 19

238. As explained with respect to Ground 3 above, and incorporated herein by reference, *Van Vliet* in view of *LCR I* and/or *II* renders Claim 19 obvious.²⁵⁸ As explained in the sections below, to the extent Patent Owner argues that Claims 19[e] and 19[f] require that the claimed hoses or manifolds must be fluidly connected with or through the reels, *Cable* discloses that arrangement. Accordingly, the combination of *Van Vliet*, *Cable* and *LCR I* and/or *II* renders Claim 19 obvious.

a. Claims 19[p] – 19[d]

239. For the same reasons discussed with respect to Ground 3 above, and incorporated herein by reference, *Van Vliet* in view of *Cable* discloses, or at least renders obvious, claim 19[p]-1[d].²⁵⁹ Nothing in *LCR I* or *II* teaches against the disclosure and/or teaching of *Van Vliet* as modified by *Cable*. Accordingly, the combination of *Van Vliet* with *Cable*, further combined with *LCR I* and/or *II*, renders Claims 19[p]-19[d] obvious.

²⁵⁸ see *Supra* Section XI.C.12.

²⁵⁹ see *Supra* Section XI.C.12.a – XI.C.12.e.

b. Claims 19[e] and 19[f]

240. It is my opinion that the combination of *Van Vliet* and *Cable* render Claims 19[e] and 19[f] obvious. To the extent Patent Owner argues that Claims 19[e] and 19[f] require that the claimed hoses or manifolds must be fluidly connected with or through the reels, *Cable* discloses that arrangement. Accordingly, the combination of *Van Vliet*, *Cable* and *LCR I* and/or *II* renders Claim 19 obvious. As explained above with respect to Ground 2, fluids dispensed using *Cable*'s system are stored in tank 27 and flow out of "pump outlet tube 46" to one or more of the hoses (e.g., hoses 64 and 65) that are stored on reels (e.g., reels 62 and 63) in the van truck.²⁶⁰ *Cable* describes that "[t]ube 46 is connected by a conventional reel rotatable coupling to hose 65."²⁶¹

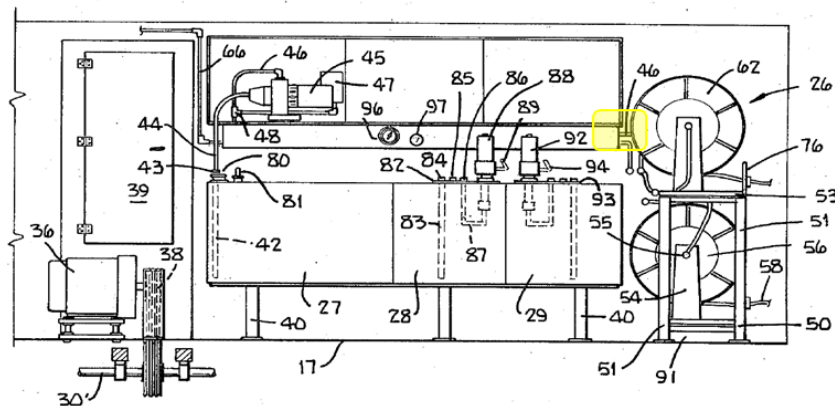


Fig. 5.

²⁶⁰ EX1005, 4:22-33.

²⁶¹ EX1005 4:33-36 & Fig. 5 annotated to show tube 46 in yellow.

A POSITA would have understood that a conventional reel rotatable coupling, otherwise known as a swivel joint, was a well-known component that allows for 360° rotation of a fitting while flowing fluid therein.²⁶² Further, a POSITA would have understood that swivel joints, or “reel rotatable couplings” were commonly used on hose reels long before the ‘955 Patent. Based on the teachings of *Cable*, a POSITA would have recognized that the “reel rotatable coupling” would have been connected to a flow path in the reel to allow fluid to flow through the reels into the hose. It would have been obvious design choice for a POSITA to implement this kind of connection to connect the hoses of *Van Vliet* to be fed by the manifolds. Accordingly, for the same reasons, *Van Vliet* in view of *LCR I* and/or *II*, further in view of *Cable*, render Claims 19[e] and 19 [f] obvious.

5. Claim 19[g] – 19[i]

241. For the same reasons discussed with respect to Ground 3 above, and incorporated herein by reference, *Van Vliet* in view of *Cable* discloses, or at least renders obvious, claim 19[g]-19[i].²⁶³ Nothing in *LCR I* or *II* teaches against the disclosure and/or teaching of *Van Vliet* as modified by *Cable*. Accordingly, the

²⁶² see *Supra* Section VIII.C.

²⁶³ see *Supra* Section XI.C.12.h-XI.C.12.i.

combination of *Van Vliet* with *Cable*, further combined with *LCR I* and/or *II*, renders Claims 19[g]-19[i] obvious.

6. Claim 20

242. For the same reasons discussed with respect to Ground 3 above, and incorporated herein by reference, *Van Vliet* in view of *Cable* discloses, or at least renders obvious, Claim 20.²⁶⁴ Nothing in *LCR I* or *II* teaches against the disclosure and/or teaching of *Van Vliet* as modified by *Cable*. Accordingly, the combination of *Van Vliet* with *Cable*, further combined with *LCR I* and/or *II*, renders Claim 20 obvious.

E. Ground 4: *Van Vliet* in view of *DeFosse* renders Claim 13 obvious.

1. Rationale and Motivation for Combining *Van Vliet* and *DeFosse*

243. A POSITA would have been motivated to combine *DeFosse* with *Van Vliet*. *DeFosse* is in the same field of endeavor as *Van Vliet* (as well as the ‘955 Patent) and is directed to solving the same problem—continuous fracturing operations. *DeFosse* is therefore analogous art to *Van Vliet* as well as the Challenged

²⁶⁴ *see Supra* Section XI.C.13.

Patents of the '955 Patent.²⁶⁵ Although *DeFosse* is discussing pumps used to pump fracturing fluid and *Van Vliet* is discussing using pumps to pump fuel to fracturing pump tanks, a POSITA would have understood that the teaching regarding pumps would be the same, and the benefits of a series pumping system pumping slurry in a hydraulic fracturing context would accrue to the pumping of fuel in a hydraulic fracturing context (or, in fact, in any pumping context).

244. A POSITA would have recognized that the benefits of a series pumping system are multifold. First, a series pumping system helps prevent cavitation of the pumps. Cavitation is the condition where bubbles form in the liquid because the vapor pressure of the liquid is higher than the suction pressure at the intake of the pump. When the bubbles collapse, such as when as the piston reaches the bottom of its stroke in a piston pump or the bubbles strike the impeller blades in a centrifugal pump, then noise, vibration and damaging forces are created. In order to avoid cavitation, and the associated problems, the suction pressure must be maintained higher than the vapor pressure of the fluid (e.g., fuel). This is referred to as maintaining a Net Positive Suction Head (NPSH).

²⁶⁵ EX1001, 1:17-30 & 1:34-48; *see also* EX1004, [0003], & [0014]; *see also* EX1008, 2:21-32 & 5:16-37.

245. Techniques to maintain an NPSH are equally as important in a fuel delivery application (such as the system of *Van Vliet*) than they are in a water-based system (such as the system of *DeFosse*). The vapor pressures of fuels are comparable to that of water. For comparison, the vapor pressure of water (at 20°C or 68°F) is 2.33 kPa (~0.34 psig). The vapor pressure for diesel is 2.17 mmHg (0.042 psig).²⁶⁶ The vapor pressure for gasoline is 39 – 200 mmHg (0.73 – 5.8 psig).²⁶⁷ Accordingly, the suction pressure into a pump would have to be maintained at similar levels for pumping water and pumping fuels.

246. One common method of maintaining NPSH on a discharge pump is through the use of a “boost pump”. The boost pump intakes fluid at (nearly) atmospheric pressure from the storage vessel and discharges it to the suction side of the discharge pump. The boost pump raises the pressure to a point where the suction pressure at the intake to the discharge pump is maintained above the vapor pressure for the fluid, reducing cavitation.

247. The second, related, benefit of a two-stage pumping is the ability to discharge at increased pressures. The boost pump raises the pressure by some, relatively small, amount. The discharge pump then increases the fluid pressure to the

²⁶⁶ <https://www.osha.gov/chemicaldata/909>.

²⁶⁷ <https://www.osha.gov/chemicaldata/701>.

desired discharge pressure. This allows a higher discharge pressure, without the risk of cavitation, than would be reasonable with a single stage pumping system. The higher discharge pressure is valuable, particularly when fluids must travel a significant distance through a relatively small hose, such as would be necessary when fueling fracturing pump tanks which may be a significant distance from the distribution station.

248. Third, the use of pumps in series (a two-stage pumping system) allows each physical pump to be smaller, while still developing the pressures and flowrates necessary for the distribution station. Particularly for centrifugal pumps, the pressure and flowrate are directly proportional to the size of the impeller, given the same input conditions. A multi-stage pumping system allows for higher pressures, and associated flowrates, to be available using smaller diameter pumps, which would be valuable in a mobile distribution system.

249. Finally, the use of a multistage pumping system allows for faster response of the system as a whole. As a pump is energized (e.g., through a motor), it must go through a “wind up” or startup phase where flowrate and pressure are reduced, until the system is up to speed and pressure has built. The speed of transition through this startup phase is a function of the inertia of the pump impeller system (along with the inertia of the motor). Smaller diameter pumps, which would be used

in a multi-stage pumping system, are “up to speed” and build pressure faster than a single stage pumping system would, given the same input and output conditions.

250. A POSITA would have been motivated to combine the teachings of *DeFosse* with the pumping system of *Van Vliet* at least to take advantage of the multi-fold benefits available from the multi-stage, series pumping system of *DeFosse*, as described above.

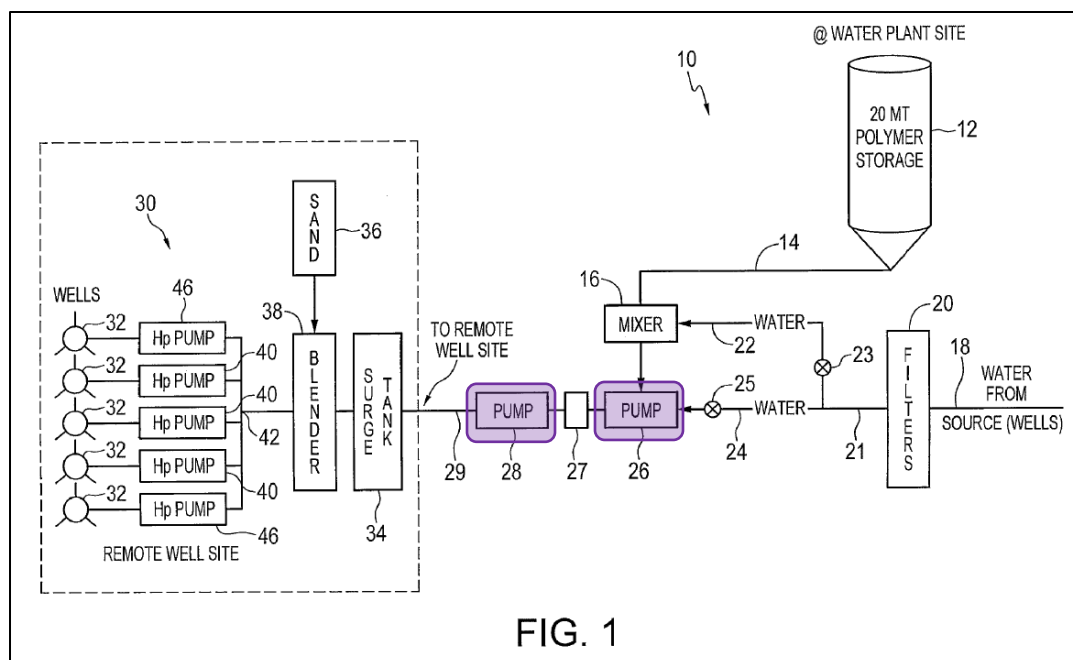
251. It would have been obvious to a POSITA to combine *DeFosse*’s teaching of pumps arranged in series with *Van Vliet*, at least to take advantage of the benefits of *DeFosse*’s series pumping system. *Van Vliet* discloses the use of pumps for pumping hydrocarbons.²⁶⁸ *DeFosse* discloses pumps arranged in series in a hydrocarbon application. (i.e., fracturing).²⁶⁹ A POSITA designing a system of *Van Vliet* would have looked to existing pumping systems, for example in the context of fracturing, to gain the benefits of a multi-stage pumping system to be used cohesively. A POSITA would have recognized the advantage of using pumps in series in order, for example, to produce sufficient pumping pressures using two or more pumps that would individually fall below the necessary pumping pressure, or

²⁶⁸ EX1004, [0003], & [0014].

²⁶⁹ EX1008, Fig. 1.

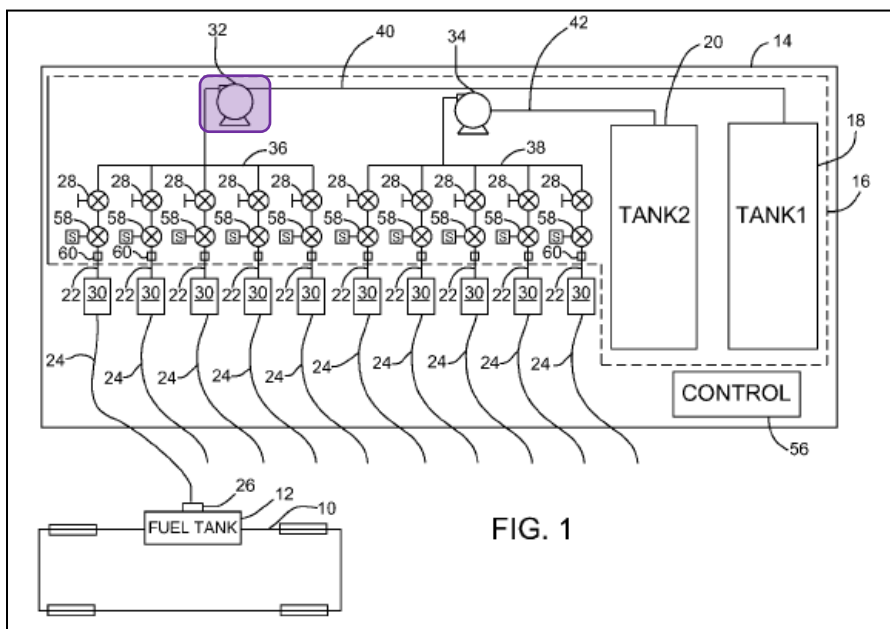
to take advantage of the fast startup and protection from cavitation that such a system would provide.

252. A POSITA would have had a reasonable expectation of success in combining *DeFosse* with *Van Vliet*. To combine *Van Vliet* with *DeFosse*, a POSITA would have needed only to use *DeFosse*'s pumping arrangement in *Van Vliet*'s fuel distribution system. The portion of *DeFosse*'s pumping arrangement needed to incorporate series pumping is highlighted in purple below:²⁷⁰



²⁷⁰ EX1008, Fig. 1 (Annotated).

253. A POSITA would have understood that pumps **26, 28** of *DeFosse* would be implemented in place of pump **32** (purple) of *Van Vliet* in order to take advantage of the benefits of such a multi-stage pumping system:²⁷¹

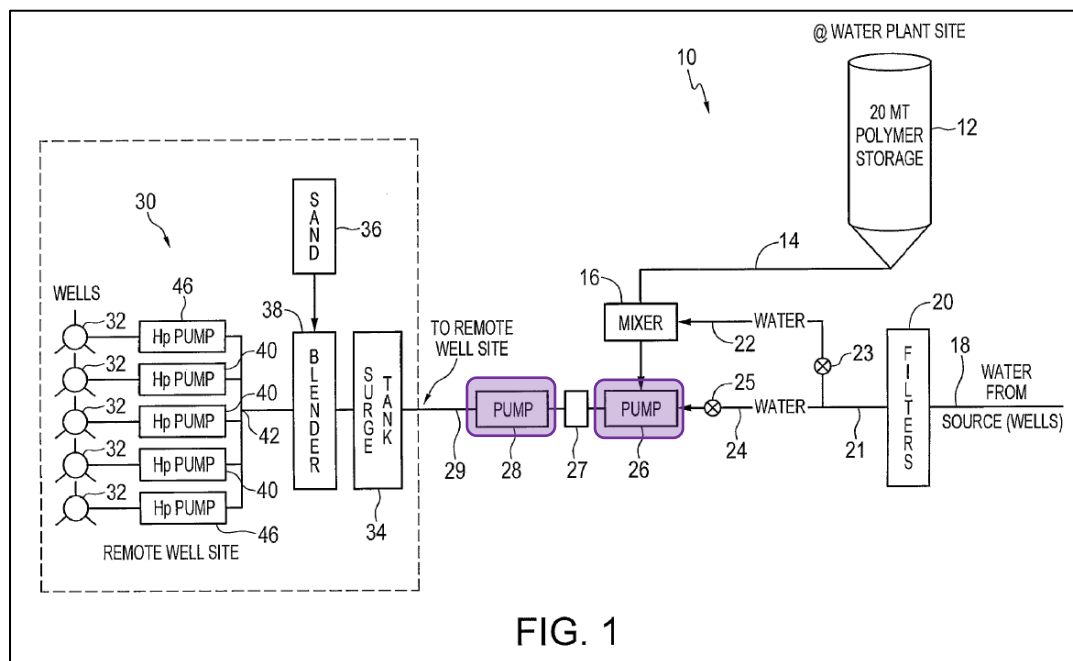


254. A POSITA would be aware of series pumping given its common use in the fracturing industry (and many other industries) and would understand that using pumps in series is a simple modification with known benefits. Incorporating *DeFosse*'s series pumping into *Van Vliet*'s fuel delivery system would merely involve combining prior art elements according to known methods to yield predictable results—that is, enabling *Van Vliet*'s system to pump in series.

2. Claim 13: “The distribution station as recited in claim 12, wherein the two pumps are arranged in fluid series.”

²⁷¹ EX1004, Fig. 1 (Annotated).

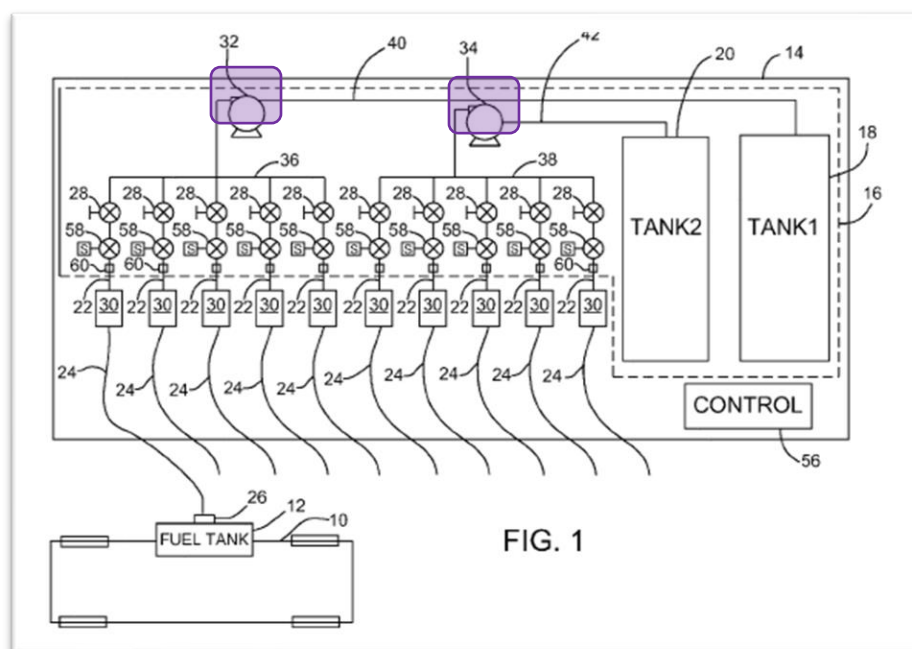
255. *DeFosse* discloses a fracturing fluid preparation/blending system having two pumps (purple below) arranged in fluid series:²⁷²



256. *Van Vliet* also discloses two pumps **32** and **34** in its fuel distribution system, one for each of manifolds **36** and **38**:²⁷³

²⁷² EX1008, Fig. 1 (Annotated), 4:65-5:1, 5:23-27.

²⁷³ EX1004, Fig. 1 annotated to show pumps **32**, **34** highlighted in purple.



257. *DeFosse* demonstrates that using pumps in fluid series was a known concept in the fracturing industry at the time of the '955 Patent, and a POSITA using the systems of *Van Vliet* to deliver fuel at fracturing sites would have been exposed to or otherwise known about systems like those of *DeFosse* for preparing fracturing fluids. Accordingly, it would have been obvious to a POSITA to arrange the pumps **32, 34** of *Van Vliet* in fluid series if only one of manifold **36** or **38** was used, or to add another pump in fluid series with either or both of pumps **32** and **34**, *e.g.* to increase discharge pressure, have a faster startup, and to protect against cavitation. Accordingly, the combination of *Van Vliet* and *DeFosse* render Claim 13 obvious.

F. Ground 4A: *Van Vliet* in view of *Cable* further in view of *DeFosse* renders Claim 13 obvious.

1. Motivation to combine the references

258. The motivation to combine *Van Vliet* and *Cable* is the same as those discussed regarding Ground 2 above, and incorporated herein by reference.²⁷⁴ A POSITA would have been motivated to combine *Van Vliet* (as modified by *Cable*) with *DeFosse* for the same reasons as those discussed regarding Ground 4 above, and incorporated herein by reference.²⁷⁵ Nothing in *DeFosse* teaches against the combination with *Cable*. A POSITA then, would be motivated to combine *DeFosse* with the system of *Van Vliet* (as modified by *Cable*) in order to take advantage of the multifold benefits of a series (i.e. multi-stage) pumping system. Such benefits include reduction in cavitation, higher pressures, smaller equipment and faster startup.

2. Claim 13: “The distribution station as recited in claim 12, wherein the two pumps are arranged in fluid series.”

259. As explained with respect to Grounds 2 and 4 above, and incorporated herein by reference, *Van Vliet* in view of *DeFosse* and *Cable* renders Claim 13 obvious. As explained regarding Ground 2, the combination of *Van Vliet* and *Cable* renders obvious Claim 12.²⁷⁶ Further, as explained regarding Ground 4, the

²⁷⁴ *see Supra* Section XI.B.1.

²⁷⁵ *see Supra* Section XI.E.1.

²⁷⁶ *See Supra* Section XI.B.8.

combination of *Van Vliet* and *DeFosse* render obvious the limitations of Claim 13.²⁷⁷

Accordingly, the combination of *Van Vliet*, *Cable* and *DeFosse* render Claim 13 obvious.

XII. SECONDARY CONSIDERATIONS

260. I am not aware of any secondary indicia applicable to the claimed invention. However, should the Patent Owner put forth any alleged evidence of secondary considerations in this proceeding or the related litigation, I reserve the right to consider such evidence, to consider whether any such evidence has a nexus to any claims of the Challenged Patent, and to update my analysis.

XIII. CONCLUSION

261. In my opinion the '955 Patent does not claim a novel or non-obvious invention. For all the reasons explained above, *the prior art* anticipates or renders obvious the Challenged Claims.

XIV. DECLARATION

262. I hereby declare that all the statements made in this Declaration are of my own knowledge and true; 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

²⁷⁷ *see Supra* Section XI.E.2.

DECLARATION OF DR. ROBERT DURHAM
IN SUPPORT OF PETITION FOR INTER PARTES REVIEW
OF U.S. PATENT NO. 10,974,955

imprisonment, or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Executed in Tulsa, OK on August 7, 2023.

/Robert A. Durham/

Robert A. Durham