

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD**

In re U.S. Patent No. 7,931,082 B2

Filed: October 16, 2007

Issued: April 26, 2011

Inventor(s): Jim B. Surjaatmadja

Assignee: Halliburton Energy Services, Inc.

Title: Method and System for Centralized Well Treatment

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I, Michael Nikolaou, make this declaration in connection with the petition for *inter partes* review submitted by Petitioners for U.S. Patent No. 7,931,082. All statements made herein of my own knowledge are true, and all statements made herein based on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, under Section 1001 of Title 18 of the United States Code. Although I am being compensated for my time in preparing this declaration, the opinions expressed herein are my own, and I have no stake in the outcome of this proceeding or any related litigation or administrative proceedings.

Date: October 3, 2023

A handwritten signature in dark ink, appearing to read "Michael Nikolaou", with a horizontal line extending to the right.

Michael Nikolaou, Ph.D.

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I. INTRODUCTION

1. I am making this declaration at the request of ProFrac Holding Corp. and U.S. Well Services, LLC (collectively, “Petitioners”) in the matter of the Post Grant Review of U.S. Patent No. 7,931,082 (the “’082 patent”) to Surjaatmadja, assigned to Halliburton Energy Services (“Patent Owner” or “Halliburton”). I understand that Petitioners have been sued by Patent Owner in *Halliburton Energy Services et al. v U.S. Well Services, LLC, ProFrac Holding Corp.*, Case No. 6:22-cv-00905 (W.D. Tex.), where it has accused Petitioners of infringing the ’082 patent.

2. In the preparation of this declaration, I have reviewed the following documents:

Exhibit No.	Description
1001	U.S. Patent No. 7,931,082
1002	File History of U.S. Patent No. 7,931,082
1004	Curriculum Vitae of Dr. Michael Nikolaou
1005	U.S. Patent Application Publication No. 2009/0114392 to Tolman et al. (“Tolman”)
1006	U.S. Patent Application Publication No. 2005/0166961 to Means et al. (“Means”)
1007	U.S. Patent No. 6,236,894 to Stoisits et al. (“Crawford”)
1008	U.S. Patent Application Publication No. 2004/0050550 to Lehman et al. (“Lehman”)
1009	U.S. Patent No. 9,410,410 to Broussard et al.
1010	U.S. Patent App. Pub. No. 2012/0255734 to Coli et al.
1011	U.S. Patent App. Pub. No. 2013/0306322 to Sanborn et al.
1012	S. Dalvi, Fundamentals of Oil & Gas Industry for Beginners (Notion Press 2015) (excerpts)
1013	RESERVED
1014	U.S. Patent No. 3,560,053 to Ortloff
1015	U.S. Patent No. 3,664,422 to Bullen

Exhibit No.	Description
1016	International Publication Number WO 2005/111369 to Crossley et al.

3. In forming my opinions expressed below, I have considered the documents listed immediately above and my knowledge and experience based on my work in this area as described below.

4. The earliest application that resulted in the issuance of the '082 patent was filed on October 16, 2017. EX-1001, Cover. I am familiar with the technology at issue and am aware of the state of the art around this time. It is my opinion that, as of October 16, 2017, a person of ordinary skill in the art ("POSITA") pertinent to the subject matter of the '082 patent would have had at least a bachelor of science in chemical engineering, mechanical engineering, materials science, or metallurgical engineering or an equivalent field and at least two years of academic or industry experience in the oil and gas industry, including experience with process control systems. Further, it is my opinion that someone with additional education but less professional experience, and vice versa, may qualify as a POSITA. My analysis and opinions below are given from the perspective of a POSITA in this technological field in the relevant time frame, unless stated otherwise.

II. QUALIFICATIONS AND COMPENSATION

5. I am a Professor and Associate Chair of Chemical and Biomolecular Engineering in the Cullen College of Engineering at the University of Houston.

6. I graduated with a diploma in chemical engineering from the National Technical University in Athens, Greece in 1984. I then earned a Ph.D. in chemical engineering at the University of California, Los Angeles in 1989. Prior to coming to the University of Houston, I was an Assistant (and then Associate) Professor at Texas A&M University for eight years. After my promotion to Associate Professor and tenure at Texas A&M, I took a sabbatical leave as a Visiting Scientist at MIT. I have taught at the University of Houston for over 20 years.

7. In my role as a professor at the University of Houston I teach both undergraduate and graduate courses every year. At the undergraduate level, these courses include Analytical Methods for Chemical Engineers, Numerical Methods for Chemical Engineers, Plant Economics, Plant Design, Thermodynamics, Statistical Methods in Chemical Engineering, Statistical Quality Control Methods, and Chemical Process Control. At the graduate level, I teach Mathematical Methods in Chemical Engineering, Advanced Process Control, and Natural Gas Engineering. I also routinely advise both undergraduate and graduate (master and Ph.D.) students.

8. I have extensive experience in process systems engineering and mathematical modeling. My research interests are in computer-aided systems engineering, i.e., development and use of computer-based methods for the design, optimization, monitoring, and automatic control of various kinds of systems, in a diverse array of industries, including the oil and gas industry.

9. In my 30 years of academic and industrial consulting experience I have worked on problems in several industries, including the oil and gas industry and oil refining and petrochemicals. Much of my work tackles fundamental research issues and is described in a number of publications, as discussed below. A substantial portion of my work is directed to concrete solutions to problems faced by industrial partners and has resulted in specific commercial products (e.g., for Lam Research, <https://www.lamresearch.com/>), patents, and the formation (by the corresponding project's managers) of a small company that was eventually bought by Schlumberger, a major global oilfield services company (http://www.slb.com/services/drilling/drilling_services_systems/directional_drilling/slider.aspx).

10. In addition to teaching, I have also served as a consultant for various oil and gas companies over the past 27 years, working with both major companies and smaller, independent companies, both “upstream” (i.e., oil and gas exploration and production) and “downstream” (oil and gas transportation, oil refining, and chemicals). I have consulted on a variety of matters for ENI, Schlumberger, WildHorse / RotoSlide, Synergy Fluid Services, XGas/EPT, IQPC Oil & Gas, Intelligent Agents Corporation, Landmark, ECOPETROL, Lam Research, Shell Global Solutions, Noble Drilling, AspenTech, General Electric, Simulation

Sciences, Bryan Research & Engineering, Frito-Lay, Shell Development, and Union Pacific Resources.

11. I have published over 150 peer-reviewed publications in journals and conference proceedings in the area of computer-aided systems engineering. My publications focus on applications to the design, optimization, monitoring, and automatic control of various kinds of systems, in oil and gas, oil refining and petrochemicals, snack food production, semiconductor manufacturing, and development and administration of antibiotics against resistant infections. Three of my refereed journal publications have been featured on the cover of high-impact journals (*AIChE Journal*, 2011; *IEEE Control Systems Magazine*, 2006; *PLoS Computational Biology*, 2011).

12. I have also presented my work as a speaker at numerous academic conferences, whether in regular sessions, invited sessions, or as a keynote speaker. As an example, I have been invited twice (in 1996 and 2011) to give presentations in the flagship conference on Chemical Process Control, held every five years (CPC-V and CPC-VIII), and was a keynote speaker at the 2017 International Petroleum & Petrochemical Technology Conference (IPPTC) in Beijing, China. I have also published five book chapters on various aspects of computer-aided systems engineering. Finally, I serve regularly as a peer reviewer at several major engineering and scientific journals (including *Automatica*, *PLoS*, *AIChE Journal*,

SPE Journal, Journal of Process Control, Computers & Chemical Engineering) as well as at federal and international funding agencies, including National Science Foundation (NSF), Petroleum Research Fund (PRF), National Institutes of Health (NIH), and the Qatar National Research Fund (QNRF).

13. I am a member of the American Institute of Chemical Engineers, the Society of Petroleum Engineers, and Omega Chi Epsilon. I serve as a co-organizer or co-chair of several major international conferences, including the AIChE Annual Meeting and the AIChE Spring Meeting.

14. I have received numerous teaching awards from both Texas A&M and University of Houston, including the Dow Excellence in Teaching Award, and the Cullen College of Engineering Teaching Award. I have also been named a Top Reviewer by *Automatica*, and, in 2007, I received the Computing & Systems Technology (CAST) Directors Award from the American Institute of Chemical Engineering. In 2017, I received the Abraham E. Dukler Distinguished Engineering Faculty Award at the University of Houston, which is given to a faculty that has made significant contributions to society and whose accomplishments and careers have brought credit to the University of Houston Cullen College of Engineering. In 2019, I received the Fluor Corp. Faculty Excellence Award at the Cullen College of Engineering. This award is the highest distinction bestowed to faculty of this college.

15. My curriculum vitae, which includes a complete list of my publications, is included as EX-1004.

16. I have previously given testimony in the following cases:

a) *Eurecat United States, Inc. v. Soren Marklund, Douglas Wene, and Chem 32 LLC*, Trial Ct. Cause No. 2012-5700, Harris Cty. Ct. (Tex.).

b) *TDE Petroleum Data Solutions, Inc. v. AKM Enterprise, Inc. DBA Mobilize, Inc.*, Case No. 4:15-cv-01821 (S.D. TEX-2015).

c) *Arrona et al. v. Bluestone Natural Resources, LLC*, Case No. 4:15-cv-02680 (S.D. TEX-2017).

d) *Sunoco Partners Marketing & Terminals L.P. v. Powder Springs Logistics, LLC, et al.*, Case No. 1:17-cv-01390 (D. Del. 2017).

e) *Magellan Midstream Partners L.P. v. Sunoco Partners Marketing & Terminals*, Case No. IPR2019-00024 (U.S. Patent No. 9,494,948).

f) *Magellan Midstream Partners L.P. v. Sunoco Partners Marketing & Terminals*, Case No. IPR2019-00025 (U.S. Patent No. 9,606,548).

17. I am being compensated in this matter at my standard consulting hourly rate of \$700 per hour. My compensation is not dependent on the substance of my statements in this declaration.

18. I am over the age of 18 and am competent to write this declaration. I have personal knowledge, or have developed knowledge, of the technologies

discussed in this declaration based upon my education, training, or experience with the matters discussed herein.

III. RELEVANT LEGAL STANDARDS

A. Obviousness

19. I understand that obviousness is analyzed from the perspective of a POSITA at the time of the alleged invention. I also understand that a POSITA is presumed to have been aware of all pertinent prior art at the time of the alleged invention.

20. I understand that an obviousness analysis involves comparing a claim to the prior art to determine whether the claimed invention as a whole would have been obvious to a POSITA in view of the prior art and in light of the general knowledge of the art at the time the invention was made. I also understand that the invention may be deemed obvious when a POSITA would have reached the claimed invention through routine experimentation.

21. I understand that obviousness can be established by combining or modifying the disclosures of the prior art to achieve the claimed invention. It is also my understanding that where there is a reason to modify or combine the prior art to achieve the claimed invention, there must also be a reasonable expectation of success in so doing to render the claimed invention obvious. I understand that the reason to combine prior art references can come from a variety of sources, not just the prior

art itself or the specific problem the patentee was trying to solve. I also understand that the references themselves need not provide a specific hint or suggestion of the alteration needed to arrive at the claimed invention; the analysis may include recourse to logic, judgment, and common sense available to a POSITA.

22. I understand that when there is some recognized reason to solve a problem, and there are a finite number of identified, predictable solutions, a POSITA has good reason to pursue the known options within his or her technical grasp. If such an approach leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In such a circumstance, when a patent simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, the combination is obvious.

23. I understand that when considering the obviousness of an invention, one should also consider whether there are any objective indicia that support the non-obviousness of the invention. I further understand that objective indicia of non-obviousness, also known as “secondary considerations,” include failure of others, copying, unexpected results, information that “teaches away” from the claimed subject matter, perception in the industry, commercial success, and long-felt but unmet need. I also understand that for objective indicia of non-obviousness to be applicable, the indicia must have some sort of nexus to the subject matter in the claim

that was not known in the art. I understand that this nexus includes a factual connection between the patentable subject matter of the claim and the objective indicia alleged. I also understand that an independently made invention that is made within a comparatively short period is evidence that the claimed invention was the product of ordinary skill.

24. Finally, I understand that patent examiners at the U.S. Patent and Trademark Office (“PTO”) rely upon certain exemplary rationales in reviewing patent applications to understand whether the subject matter of the claims is obvious. I understand that the following is the list of exemplary rationales relied upon by patent examiners at the PTO: (i) combining prior art elements according to known methods to yield predictable results; (ii) simple substitution of one known element for another to obtain predictable results; (iii) use of a known technique to improve similar devices (methods, or products) in the same way; (iv) applying a known technique to a known device (method, or product) ready for improvement to yield predictable results; (v) “obvious to try”—choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and (vi) known work in one field of endeavor 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 are predictable to one of ordinary skill in the art.

B. Construing the Meaning of Claim Terms

25. I understand that a post grant review (“PGR”) is a proceeding before the PTO for evaluating the validity of issued patent claims. I understand that, in a PGR, a claim term is interpreted in a manner consistent with the standard used in patent litigation, as set forth in a case known as *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). That standard generally construes the claims according to their “ordinary and customary” meaning in view of the claim language, specification, file history, and, where applicable, relevant other evidence.

26. I understand that a patent’s “specification” includes all the figures, written descriptions, and claims within the patent. I understand that the PTO will look to the specification and prosecution history to see if there is a definition for a given claim term and, if not, will apply the ordinary and customary meaning from the perspective of a POSITA at the time in which the alleged invention was made.

27. As discussed above and detailed in my curriculum vitae, I was very familiar with hydraulic fracturing processes at both the individual well and oil-field level, as well as control systems for such processes and well treatment methods, technologies and was aware of the state of the art as of the earliest claimed priority date of the ’082 patent. I believe that I would qualify as understanding the knowledge and skill of a POSITA as of October 16, 2007, and I have a sufficient level of

knowledge, experience, and expertise to provide an expert opinion in the field of the '082 patent.

IV. BACKGROUND OF THE TECHNOLOGY

28. The following paragraphs regarding hydraulic fracturing are based on prior art to the '082 patent. For purposes of this declaration, I have been asked to assume that the earliest priority date of the '082 patent is October 16, 2007.

29. The specification of the '082 patent acknowledges that electric frac pumps were known prior art in the background section: “[i]n the oil and gas industry, electric frac pumps are often controlled in order to achieve certain downhole environment responses.” EX-1001, 1:11–13. After describing how electric frac pumps were typically used in the industry, the '082 patent states “[i]t is with these observations in mind, among others, that aspects of the present disclosure were concerned and developed.” Id., 1:27–29. It is, therefore, appropriate to examine the state of the art regarding the following three sections—that is, (i) Oil and Gas Extraction from Wells, (ii) Hydraulic Fracturing, and (iii) Control Systems for Hydraulic Fracturing Operations—before the assumed October 16, 2007, priority date of the '082 patent.

A. Oil and Gas Extraction from Wells

30. Retrieving hydrocarbons, such as oil and gas, from the earth has been done for centuries. *See* S. Dalvi, *Fundamentals of Oil & Gas Industry for Beginners*

(Notion Press 2015) (“Dalvi”) (EX-1012.013) (disclosing that oil drilling began in Azerbaijan in 1848, and two large pipelines hundreds of kilometers long were built to transport oil from the wellsites). The process starts with searching for potential petroleum reservoirs. These oil and gas reservoirs are subsurface pools of hydrocarbons contained in porous rock formations. They formed when the naturally occurring hydrocarbons were trapped among rock formations with lower permeability. Oil and natural gas are contained in the tiny pore spaces in these rocks like how water is contained in a sponge. *Id.*, 029.

31. Most reservoirs contain oil, gas, and water. Because of gravity, these fluids separate according to their density—that is, gas on top, followed by oil, and then water. *Id.*, 030. After discovering a reservoir, the rock formation is punctured by drilling a bore through it followed by tubing being inserted into the rock to extract the hydrocarbons. *Id.*; *see id.*, 056 (“An oil well can also be described as a hole pierced through reservoir rock and pipes inserted to extract the hydrocarbon content of the reservoir.”). Early on, oil wells were drilled by hammering a cable tool into the earth. But these were soon replaced by rotary drills, which could drill boreholes to much greater depths in less time. *Id.*, 057. Drilling equipment on a wellsite is referred to as a rig. *Id.*

32. Oil wells are nowadays typically drilled at an angle other than vertical to reach different parts of the formation, which is referred to as deviation drilling.

Id., 067. Drilling this way makes it possible to reach subsurface areas laterally remote from the point where the drill bit enters the earth. A well that has sections more than 80 degrees from vertical is called a horizontal well, which can extend for kilometers and thus achieve higher production. *Id.* The image below illustrates deviation drilling:

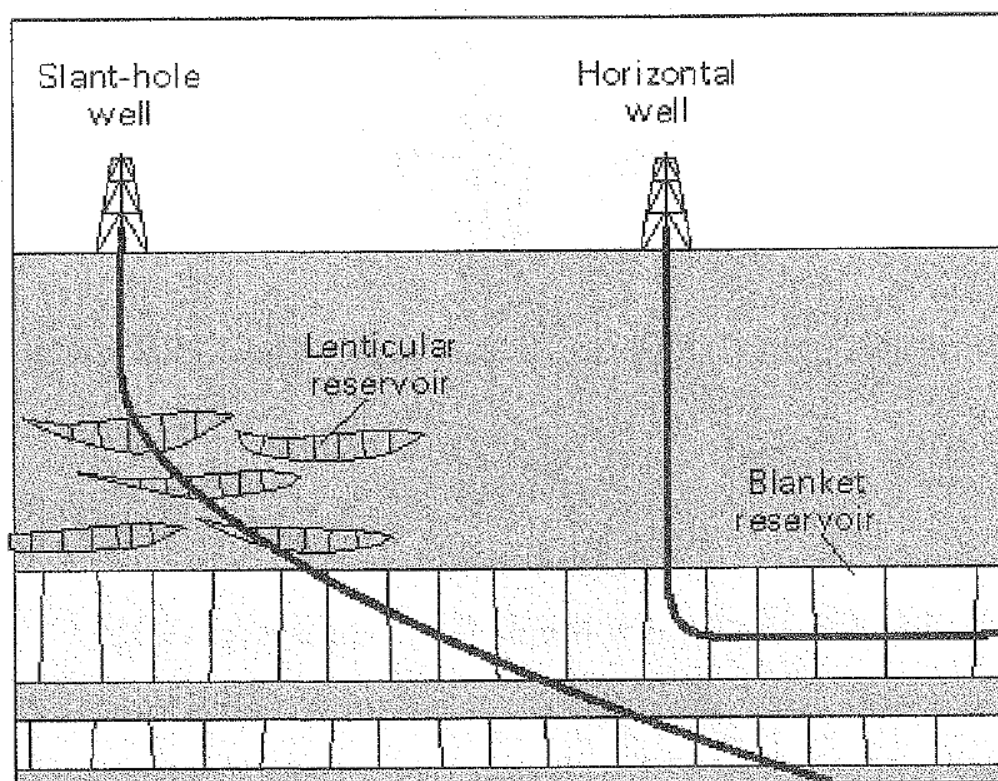


Fig.3.9: 37p Deviation Drilling for drilling at an angle

Dalvi, Fig. 3.9: 37 p – Drilling at an Angle (EX-1012.067)

33. After the well is drilled, it needs to be cased. Part of this process includes reinforcing and providing structural integrity to the well, creating a barrier

to debris falling into the well. *Id.*, 059. At this point, underground formations have sufficient pressure to cause the hydrocarbons to come to the surface on their own. *Id.*, 074. Once the well is cased, the well opening is closed at the surface by installing the wellhead and production tree, which control the formation pressure and flow. *Id.* The production tree is connected to a network of pipes that carries the oil/gas to a metering station, and from there to tanks for supplying product to refineries or natural gas compressor stations. *Id.*, 075.

34. Next, a well engineer measures data from the well to determine the maximum number of hydrocarbons that the well can produce in a 24-hour period. *Id.* 074. This data is used to determine the “most efficient recovery rate,” or “MER.” As hydrocarbons are extracted, the MER will decline because the reservoir will lose its pressure. This is known as the “decline rate.” *Id.* Using this information, calculations can be made to determine when the well will need enhanced recovery methods in its lifespan. *Id.* A well will also need “treatment” to ensure a smooth flow of hydrocarbons. The treatment may include injecting acid, water, or gases into the well to open the formation and allow the petroleum to flow through the formation more easily. *Id.*

B. Hydraulic Fracturing

35. Hydraulic fracturing—commonly called “frac’ing” or “fracking”—is a process for increasing the flow of oil or gas from a well. U.S. Patent Appl. Publ’n

No. 2013/0306322 (“Sanborn”), ¶ 0003 (EX-1011). This process has been in use for decades. U.S. Patent No. 9,410,410 [1:8–14] (“Broussard”) (EX-1009). Frac’ing involves pumping fluid into a well under high enough pressures to fracture the rock formation and form fissures therein. Sanborn, EX-1011, ¶ 0003; Broussard, EX-1009 [1:14–21]. Fissures or openings create space to allow oil and gas to move through the wellbore to the surface. Sanborn, EX-1011, ¶ 0003. Sanborn describes this process as follows:

A hydraulic fracture is typically formed by pumping the fracturing fluid into the wellbore at a rate sufficient to create a downhole pressure that exceeds the fracture gradient of the surrounding rock. The rock cracks, and the fracture fluid continues farther into the rock, extending the crack into the depth of the well. Often, a proppant . . . is added into the injected fluid, to prevent the fractures from closing when the injection is stopped. The fracture that remains open is permeable enough to allow the flow of the desired gas or oil to the well, and eventually, to the surface for collection.

Id., ¶ 0004. One commonly used example of a proppant is sand. *Id.*, ¶ 0026; Broussard, EX-1009 [4:46–50].

36. The proppant and fluid are typically mixed (along with other additives) using a blender to form a “slurry” or “fracturing fluid.” This slurry or fracturing fluid is then pumped into the wellbore. Broussard, EX-1009 [2:48–54], [4:48–67], [6:54–58]; Sanborn, EX-1011, ¶ 0005 (describing the “injection and movement of the slurry (water, proppants, and chemical additives), through thousands of feet of earth

and rock”); ¶ 0036 (“Pre-selected proportions of the fracturing fluid components (including chemical additives) and proppants are directed into at least one blender/mixing unit. . . .”); *see* U.S. Patent Appl. Publ’n No. 2012/0255734 (“Coli”), EX-1010, ¶ 0035 (“In a conventional fracturing operation, a ‘slurry’ of fluids and additives is injected into a hydrocarbon bearing rock formation at a wellbore to propagate fracturing. . . . The majority of the fluids injected will be flowed back through the wellbore and recovered, while the sand will remain in the newly created fracture, thus ‘propping’ it open and providing a permeable membrane for hydrocarbon fluids and gases to flow through so they may be recovered.”).

37. Hydraulic fracturing operations require massive amounts of fracturing fluid components, such as water, proppants, and other additives, on-site at the well. Sanborn describes equipment typically used during hydraulic fracturing operations:

Hydraulic fracturing equipment that is used in oil and natural gas fields includes a large number of components. Blenders, high-volume fracturing pumps, monitoring units, material tanks, hoses, electronics systems, and power units are just some of the components required for these operations. In a typical fracturing operation currently practiced, a large number of tractor trailers are used to support individual sets of diesel engines and fracturing pumps, along with associated equipment, such as transmission systems.

Sanborn, EX-1011, ¶ 0005; *see also* ¶¶ 0025–0031 (describing in detail the equipment and materials needed at a fracturing site). For fracturing fluid materials, Sanborn describes that hydraulic fracturing operations need “supply containers for

fracturing fluid components” (§ 0026) and “blending equipment for blending the fracturing fluid/solid components” (§ 0027); *see* Broussard, EX-1009 [6:4–10] (describing the need for “sand transporting vehicles,” “acid transporting vehicles,” “hydration units,” “blenders,” “water tanks,” “conveyor belts,” and other equipment). Manifolds, which are well-known in the art, are used to direct these mixed fluids to the wellbore. *See* EX-1014 (USP 3,560,053 to Ortloff), 3:25–36 (describing using manifolds to direct fracturing fluid in the 1970s), 3:50–54 (same); *see also* EX-1015 (USP 3,664,422 to Bullen) Fig. 6, 5:1–10 (describing Figure 6 as a fracturing manifold that may be used to inject the fluids into the well bore” in 1970s).

38. After extracting fluid from the wells, hydraulic fracturing operations often also use centralized material processing facilities. Crawford provides, “as is well known in the art, modern large oil and gas production fields may include hundreds of wells and a complex network of surface-deployed pipelines (‘surface lines’) that interconnect these wells with centralized processing facilities. Conventional central processing facilities include such equipment as separators, gas compressors, and the like.” EX-1007, 1:19–26.

V. U.S. PATENT NO. 7,931,082

39. In this Section, I consider the disclosure in the ’082 patent along with relevant information from the prosecution history of the ’082 patent.

A. Background

40. The '082 Patent, titled "Method and System for Centralized Well Treatment," is directed toward servicing multiple well locations from a central location. EX-1001, Cover, Abstract. This service includes configuring a central location for distribution of well development task fluids to centralized service factories through fluid lines, preparing treatment fluids at centralized service factories, and treating wells with the treatment fluids. *Id.* at Abstract.

41. The '082 Patent discloses a system for centralized well treatment operations that includes a centralized well treatment center which pumps well development task fluids to centralized service factories, a plurality of systems with well development mechanisms, a first and second connection between a well and the centralized service factories wherein the connections are directed to flowing and recovering treatment fluids respectively, and a third and fourth connection between a well and the centralized service factories wherein the connections are also directed to flowing and recovering treatment fluids respectively. EX-1001, Abstract. The '082 Patent's Figure 3 illustrates an embodiment of this system. *Id.* at Fig. 3.

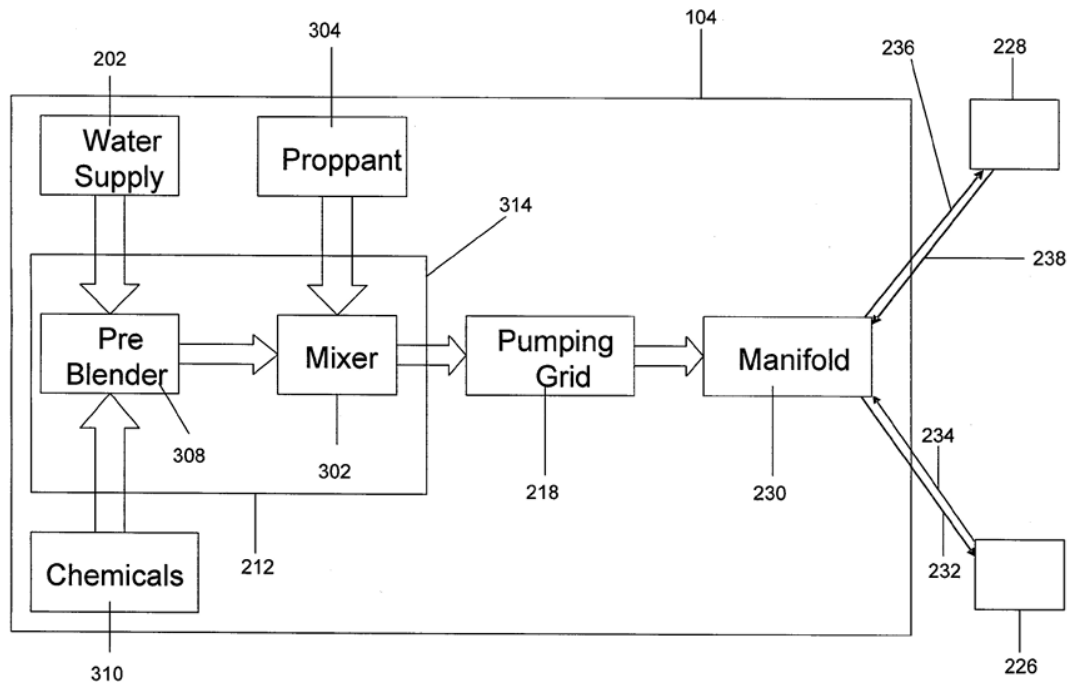


FIG. 3

'082 Patent, Fig. 3 (EX-1001)

42. In Figure 3, the centralized service factory 104 is configured to flow fracturing fluid. EX-1001, 7:11–12. The blending module 212 is connected to a chemical storage module 310, proppant storage module 304, water source 202, and the pumping grid 2018. *Id.* at 7:12–15. The blending module may prepare a fracturing fluid, complete with proppant and chemical additives or modifiers, by mixing and blending fluids and chemicals. *Id.* at 7:15–18. Fracturing fluid is directed to pumping grid 218 and subsequently directed to central manifold 230, which can connect and direct the fracturing fluid via connections 236 and 232 to multiple wells 228 and 226 simultaneously. *Id.* at 7:44–47.

B. The Prosecution History

43. The Examiner considered both Tolman (EX1005) and Crawford (referred to as Stoitsits) (EX1007) during prosecution. Crawford was made of record by the examiner, but not relied upon in a rejection. EX-1002, p. 550. After rejecting the claims several times, the Examiner rejected the claims over Tolman as anticipating the claims:

Tolman et al. discloses, with respect to claim 17, a system for centralized distributing, receiving, and treating fluids for a plurality of wells, the system comprising: a centralized well treatment fluid center 100; one or more centralized service factories 106, 206; a plurality of distribution lines (from 202) coupled between the centralized well treatment fluid center and the one or more centralized service factories, wherein the plurality of distribution lines are adapted to flow one or more well development task fluids; and a plurality of return lines 228 coupled between the centralized well treatment fluid center and the one or more centralized service factories, wherein the plurality of return lines are adapted to flow one or more recovered well treatment fluids. With respect to the depending claims, the reference teaches the limitations as claimed. See

Tolman et al. discloses, with respect to claim 17, a system for centralized distributing, receiving, and treating fluids for a plurality of wells, the system comprising: a centralized well treatment fluid center 100; one or more centralized service factories 106, 206; a plurality of distribution lines (from 202) coupled between the centralized well treatment fluid center and the one or more centralized service factories, wherein the plurality of distribution lines are adapted to flow one or more well development task fluids; and a plurality of return lines 228 coupled between the centralized well treatment fluid center and the one or more centralized service factories, wherein the plurality of return lines are adapted to flow one or more recovered well treatment fluids. With respect to the depending claims, the reference teaches the limitations as claimed. See

the entire document, especially Figs. 1-2, and pars. [0027-0031], [0037]. With respect to method claims 1-16, the reference teaches the associated method

EX-1002 p. 777–778. To overcome this rejection, Patent Owner distinguished Tolman over the claims as follows:

In contrast, Tolman merely discloses connecting multiple wells to a stimulation fluid pumping system via a pumping system manifold. Tolman, paragraph [0020]. This pumping system manifold contains multiple valves to enable stimulation fluid to be pumped into any selected well, while the other remaining wells are hydraulically isolated from the pressure and energy created by the stimulation fluid pumping system. Tolman, paragraph [0020].

The Office Action identifies item 100 of Tolman as the centralized well treatment fluid center; items 106 and 206 as the centralized service factories, item 202 as the distribution

line and item 228 as the return line. (Office Action, at 2). Applicants respectfully disagree with this characterization of Tolman.

Specifically, with respect to items 100 and 106, Tolman states:

Turning now to the drawings, and referring initially to FIG. 1, an exemplary production system 100 having multiple wells located at a single surface pad in accordance with certain aspects of the present techniques is illustrated. In the production system 100, a surface pad 102 has two or more wells 104a-104n. Each of the wells 104a-104n has an oil field tree 106a-106n located over the wellbore 108a-108n and are positioned in a specific configuration.

Tolman, paragraph [0021] (emphasis added). Similarly, with respect to item 206, Tolman states:

To couple the stimulation fluid pumping system 202 to the trees 106a-106c, the pumping system manifold 206 is utilized.

Tolman, paragraph [0030].

Accordingly, Tolman merely discloses a production system 100 with a single pad. Moreover, both the oil field tree 106 and the pumping system manifold 206 which couples the stimulation fluid pumping system 202 to the oil field tree 106 are located in, and are part of the production system 100. Accordingly, assuming *arguendo*, that as the Office Action suggests, the production system 100 is analogous to the centralized well treatment fluid center of the present application, then Tolman does not disclose a centralized service factory as recited in independent claims 1 and 17. Specifically, the oil field tree 106 and the pumping system manifold 206 of Tolman are part of the production system 100 and there are no distribution lines or return lines coupled between the production system 100 (identified in the Office Action as the centralized well treatment fluid center) and the oil field tree 106 or the pumping system manifold 206 (identified in the Office Action as the centralized service factory) as recited in independent claim 1. Similarly, Tolman at least fails to disclose flowing from a centralized well treatment fluid center (identified as item 100 in the Office Action) to one or more centralized service factories (identified as item 106 or item 206 in the Office Action) one or more well development task fluids and flowing from the one or more centralized service factories to the centralized well treatment fluid center the one or more recovered well treatment fluids, as recited in independent claim 17.

EX-1002, pp. 813–814. The Examiner, in response, issued a notice of allowance.

EX-1002, p. 824. But the Examiner did not consider Tolman in combination Means

and Crawford, which as I explain below render obvious the claims of the '082 Patent. In addition, and as shown by the excerpts above, the Examiner's analysis mapped different elements of Tolman to satisfy the claim elements of the '082 patent from my analysis below, such as Tolman's production system 100 to the claimed "centralized well treatment fluid center," and did not consider the same mapping of the Tolman/Means/Crawford system, explained below.

C. The Challenged Claims

44. I understand that for purposes of this proceeding, Petitioners are challenging the validity of claims 1–15 and 17–31 of the '082 patent.

45. Claim 1 of the '082 patent is representative of the challenged claims and shown below:

1. A method of providing centralized well development services to a plurality of wells, comprising the steps of:

flowing from a centralized well treatment fluid center to one or more centralized service factories one or more well development task fluids, wherein the one or more centralized service factories are selectively configurable to receive the one or more well development task fluids;

preparing, at the one or more centralized service factories, one or more well treatment fluids from the one or more well development task fluids, wherein the one or more centralized service factories are selectively configurable to prepare the one or more well treatment fluids;

flowing from the one or more centralized service factories to at least one of the plurality of wells the one or more well treatment fluids, wherein the one or more centralized

service factories are selectively configurable to flow the one or more well treatment fluids;

recovering from the at least one of the plurality of wells the one or more well treatment fluids at the one or more centralized service factories, wherein the one or more centralized service factories are selectively configurable to receive the one or more recovered well treatment fluids; and

flowing from the one or more centralized service factories to the centralized well treatment fluid center the one or more recovered well treatment fluids, wherein the one or more centralized service factories are selectively configurable to flow the one or more recovered well treatment fluids, and wherein the centralized well treatment fluid center is selectively configurable to receive the one or more recovered well treatment fluids.

VI. CLAIM CONSTRUCTION

46. I understand that Petitioners reserve the right to assert in litigation that certain claim constructions are proper and that certain terms are indefinite, and I do not concede, by providing my opinions herein, that the challenged claims are of definite scope or accurately described.

47. For purposes of this declaration, I will apply the plain and ordinary meaning for every term to all terms. However, I reserve the right to supplement my opinions if Patent Owner offers a construction of any term in the '082 patent.

VII. GROUNDS OF INVALIDITY

A. GROUND 1: Claims 1–3, 5–7, 9–15, 17–18, 21–24, and 26–31 of the '082 Patent Are Obvious Based on Tolman (EX-1005) in View of Means (EX-1006) in Further View of Crawford (EX-1007)

48. It is my opinion that a POSITA would have found claims 1–3, 5–7, 9–15, 17–18, 21–24, and 26–31 of the '082 patent obvious over U.S. Patent Application Publication No. 2009/0114392 to Tolman et al. (“Tolman”) (EX-1005) in view of U.S. Patent Application Publication No. 2005/0166961 to Means et al. (EX-1006), in further view of U.S. Patent No. 6,236,984 to Crawford et al. (“Crawford”) (EX-1007). I briefly describe Tolman, Means, and Crawford next, followed by a detailed explanation of how the combination of these three references renders obvious each limitation found in those claims.

1. Overview of Tolman

49. The application leading to Tolman was filed on July 24, 2006, and claims priority to a provisional application filed on August 19, 2005. EX-1005, Cover.

50. Tolman, titled “Method and Apparatus Associated with Stimulation Treatments for Wells,” discloses systems and methods associated with the production of hydrocarbons. EX-1005, Cover, Abstract. Tolman addresses how while having multiple wells at a single location is beneficial, certain combinations of operations are complicated, restricted, or prevented by the presence of multiple wells, such as stimulation operations only being performed on a single well at a time.

Id. at [0005]. Tolman looks to reduce the time and cost associated with stimulation treatments by enabling reliable and cost-effective execution of concurrent or simultaneous wellbore preparation and stimulation operations in multiple wellbores located at a single surface location. *Id.* at [0006].

51. Tolman discloses a production system for two or more wells 104a–104n. EX-1005, [0021]. Each of the wells 104a–104n has an oil field tree 106a–106n located over the wellbore 108a–108n. *Id.*

52. Figure 2 of Tolman illustrates an exemplary surface pad configuration with equipment and wells for JITP hydraulic proppant fracture stimulation of three wells 104a–104c. EX-1005, [0027], Fig. 2. Each of the wells has a corresponding oil field tree 106a–106c over its wellbore. *Id.*

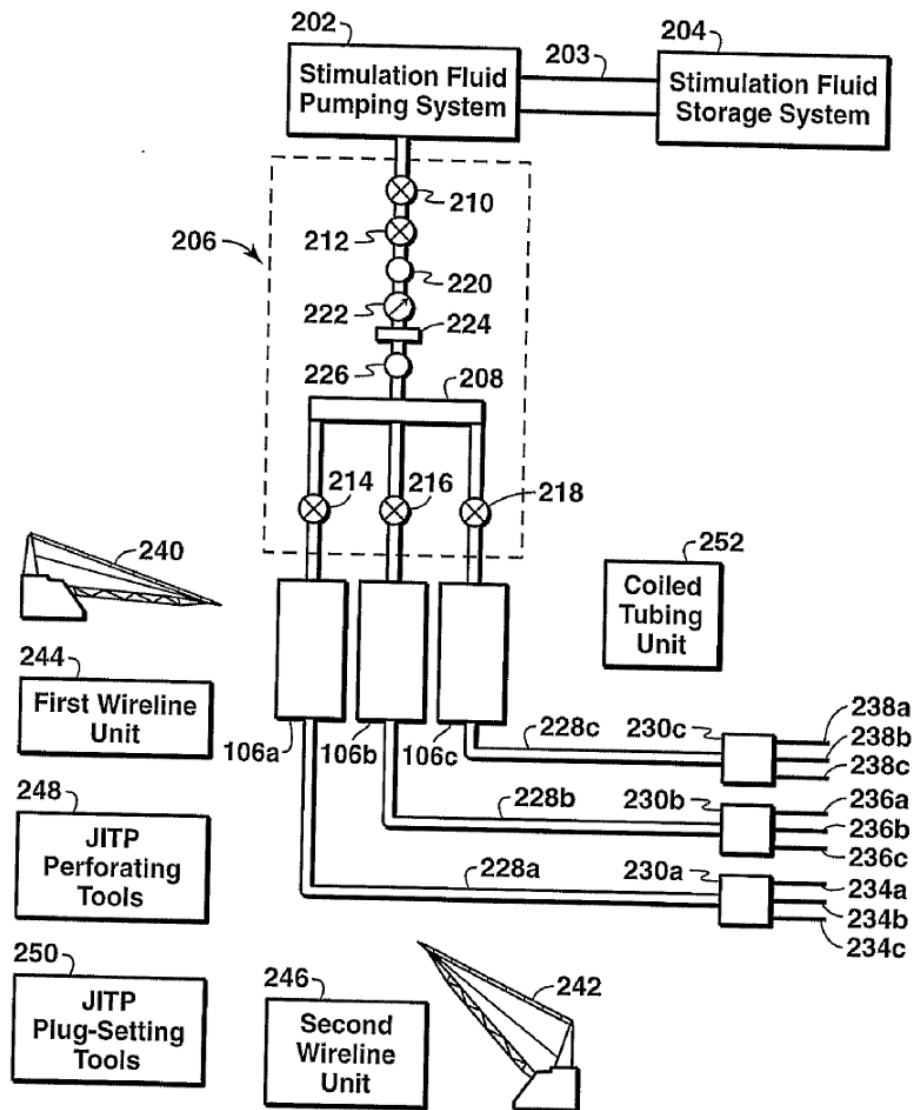


FIG. 2

Tolman, Fig. 2 (EX-1005)

53. To support the JITP hydraulic proppant fracture stimulation operations, the equipment on the surface pad may include a Stimulation Fluid Pumping System 202, a Stimulation Storage System 204, a well coupling system such as a pumping

system manifold 206, and flowback manifolds 230a–230c. EX-1005, [0027]. The Stimulation Storage System 204 couples to that Stimulation Fluid Pumping System 202 via piping 203. *Id.* at [0029], Fig. 2. The Stimulation Fluid Pumping System couples to the pumping system manifold 206. *Id.* at Fig. 2. The pumping system manifold 206 may include a set of pipes 208 to interface with each of the oil field trees 106a–106c to manage access to the wells 104a–104c. *Id.* at [0030], Fig. 2.

54. Figure 3 of Tolman shows an “exemplary flow chart of operations that may be performed on the wells 104a–104c” as shown below:

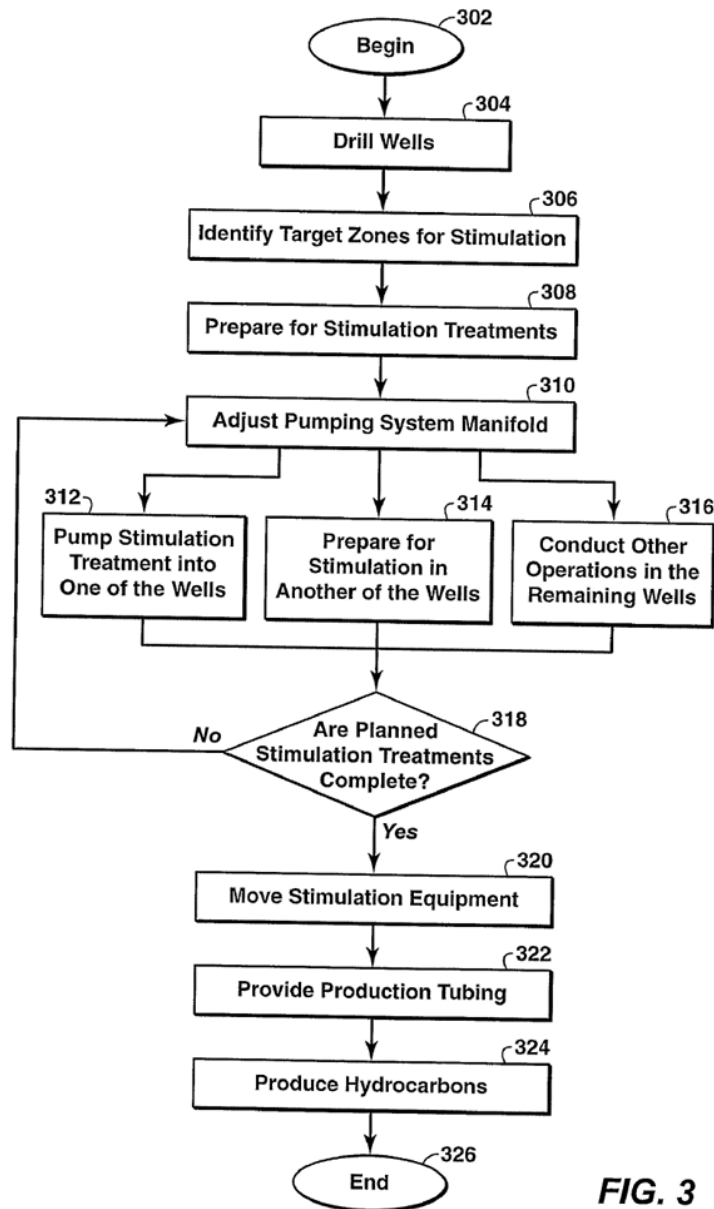


FIG. 3

Tolman, Fig. 3 (EX-1005)

With equipment in place, the pumping system manifold 206 may be adjusted to prepare a specific well to receive the stimulation treatment while other wells are isolated from the stimulation treatment. EX-1005, [0037]. Once the pumping system manifold 206 is configured, a stimulation fluid may be pumped into one of the wells,

and concurrently another well may be prepared for stimulation treatments while other operations may be conducted in the remaining wells. *Id.* at [0038].

55. During stimulation, stimulation fluid from the Stimulation Fluid Storage System 204 may pass through piping 203 to the Stimulation Fluid Pumping System, which pumps stimulation fluid through the pumping system manifold 206 to the desired oil field tree 106a–106c, where corresponding well 104a–104c is stimulated. *See* EX-1005, Fig. 2. The wells 104a–104c produce hydrocarbons through respective oil field trees 106a–106c coupled to piping 228a–228c, in turn coupled to flowback manifolds 230a–230c. *Id.* at [0028], Fig. 2. The flowback manifolds 230a–230c may also be coupled to one or more flowlines 234a–234c, 236a–236c, and 238a–238c, respectively. *Id.* These flowlines 234a–234c, 236a–236c, and 238a–238c may be coupled to flowback pits, flow test units, sales lines, tankage, oil/gas/water separating and processing units, and/or other similar devices. *Id.* at [0028].

56. Certain method steps, such as steps 312–316 of Figure 3, involve coordination of processing for multiple wells and those steps may happen simultaneously to improve efficiency. EX-1005, [0026], [0038].

2. Overview of Means

57. The application leading to Means was filed on February 7, 2005, and claims priority to a provisional application filed on September 10, 1999. EX-1006,

Cover. Means was published on August 4, 2005, which is two years before the filing of the '082 patent. EX-1006, Cover.

58. Means, titled “Closed Loop Additive Injection and Monitoring System for Oilfield Operations,” discloses a system that monitors injection of additives into formation fluids recovered through wellbores and controls the supply of such additives. EX-1006, Abstract. Means states that it is important and economically beneficial to have additive injection systems which can supply precise amounts of additives. EX-1006, [0007]. Means’ closed-loop additive injection system addresses the problem of incorrect amounts of additives being injected by providing an additive injection system which dispenses precise amounts of additives. EX-1006, [0006]–[0008].

59. Figure 3 of Means illustrates a closed-loop additive injection system:

pumps the required amount of additive n from source 322 into the well 50, and a meter 326 measures the amount of dispensed additive n. *Id.*

60. A testing unit 330 may provide measurements regarding the characteristics of wellbore fluid retrieved from the surface. EX-1006, [0048], Fig. 3. Means' closed-loop additive injection system may also use a processing unit 75 at the wellsite. *Id.* at [0050]. The processing unit may be of the type that processes produced fluid received at the surface 69 to remove solids and certain other materials such as hydrogen sulfide, or that processes the fluid to produce semi-refined to refined products. *Id.* at [0039].

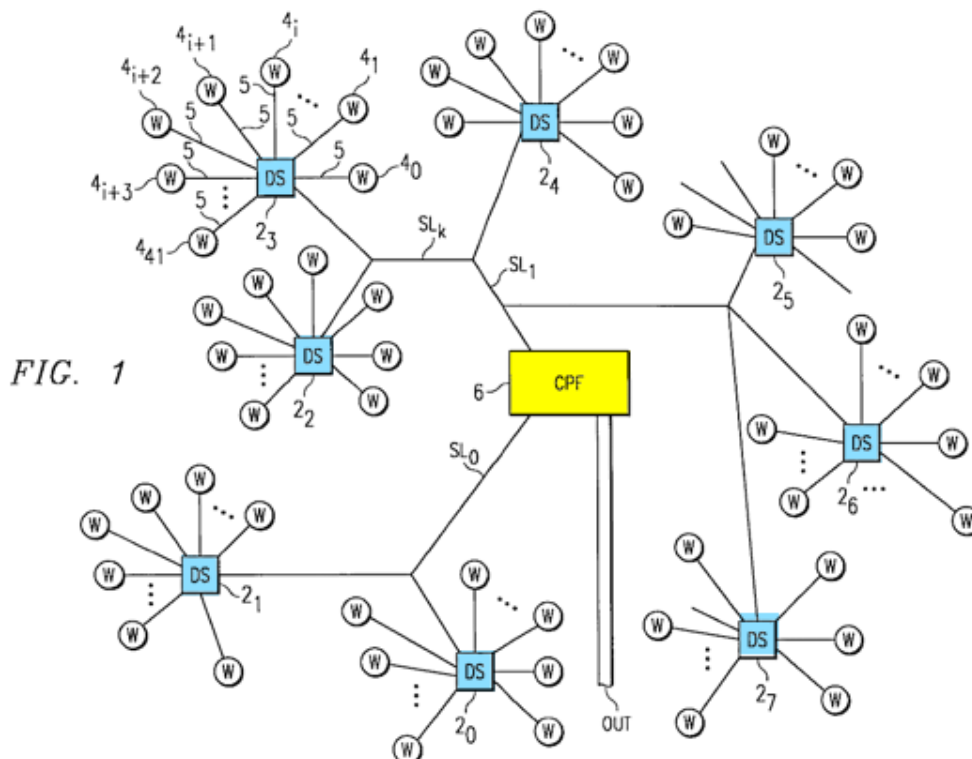
3. Overview of Crawford

61. The application leading to Crawford was filed on December 19, 1997, and published on May 22, 2001, which is X years before the filing of the '082 patent. EX-1007, Cover.

62. Crawford, titled "Petroleum Production Optimization Utilizing Adaptive Network and Genetic Algorithm Techniques," discloses a computer system and method to optimize the operating conditions of a petroleum production field in which a plurality of wells is arranged and connected to one or more central processing facilities. EX-1007, Cover, Abstract. Crawford indicates that production field operation is often constrained by the capacity of the centralized processing facilities. *Id.* at 1:58–59. Crawford's invention is directed toward efficiently

optimizing the operation of a complex and large oil and gas production field in which discontinuous operation of individual wells or productive zones within the wells of the field are considered and optimized. *Id.* at 4:48–56.

63. Crawford discloses multiple drill sites that pump a well output fluids to a central processing facility 6. *See* EX-1007, 6:31–34. Figure 1 of Crawford illustrates how multiple drill sites (highlighted in green) are connected to this central processing facility (highlighted in yellow) via surface lines:



Crawford, Fig. 1 (EX-1007) (annotated)

As shown above, “[e]ach drill site 2 may support many wells 4; for example, drill site 2₃ is illustrated in FIG. 1 as supporting forty-two wells 4₀ through 4₄₁.” EX-1008, 6:29–32. “Each drill site 2 gathers the output from its associated wells 4, and forwards the gathered output to central processing facility 6 via one of surface lines SL.” EX-1008, 6:31–34. “Central processing facility 6 receives oil, water, and gas (including both recycled lift gas and formation gas) phases from drill sites 2 via surface lines SL, and includes the appropriate separation and compression equipment for separating the desired phases from one another.” EX-1007, 6:55–59.

64. To control the reception of fluid at the central processing facility 6 from multiple drill sites, Crawford uses control valves located at each well site. Figure 4 of Crawford depicts a shut off valve 13 at an individual well, highlighted below:

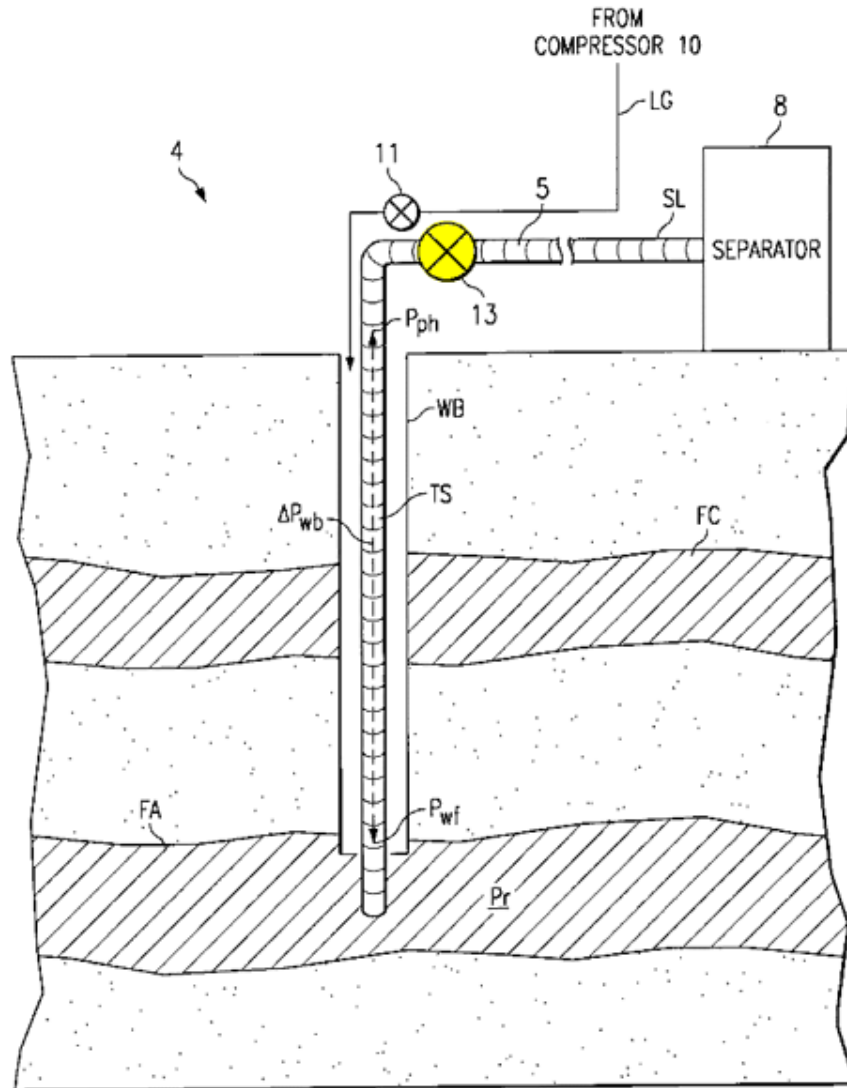


FIG. 4

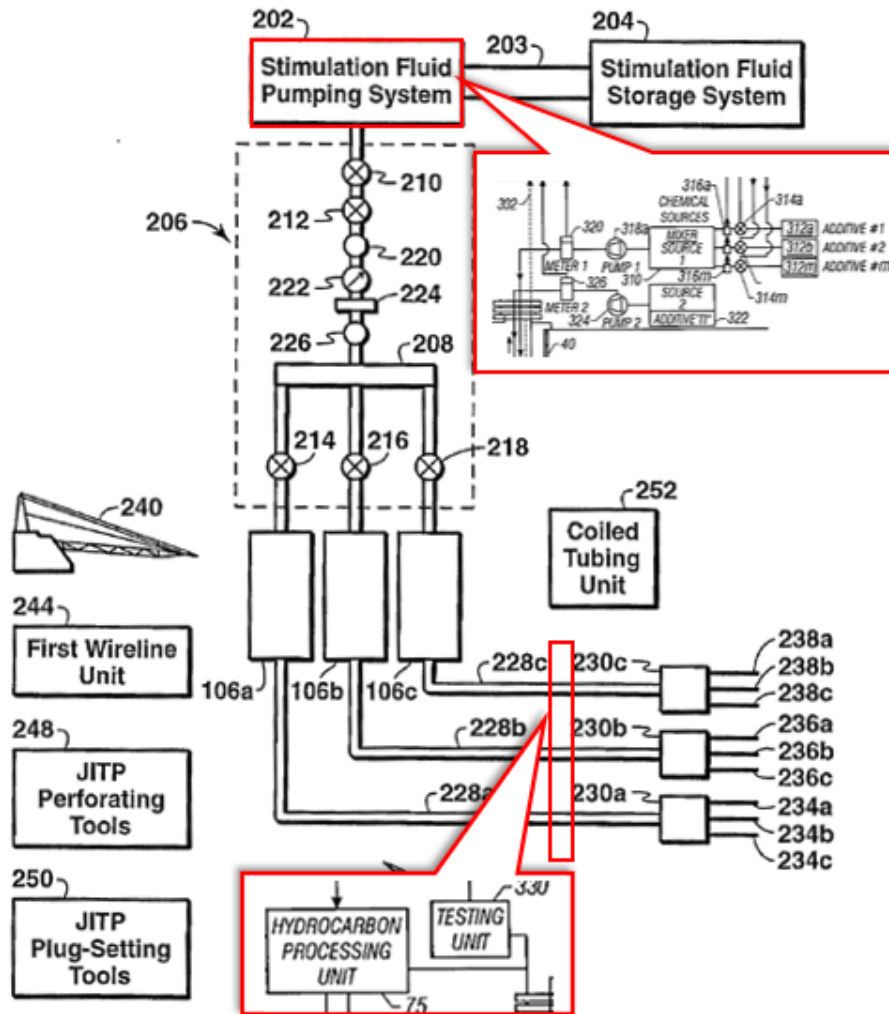
Crawford, Fig. 4 (EX-1007) (annotated)

EX-1007, 7:44–48 (“Fluid from formations FC and FA flows into tubing string TS and thus to separator 8 via surface lines 5, SL, under the control of control valve 13. Control valve 13, in this example, will shut-in well 4 when closed, and will permit production when open.”). Using these control valves, Crawford selectively

configures the flow of fluid through all surface lines (SL), which delivers fluid to central processing facility 6. EX-1008, 8:33–49.

4. It Would Have Been Obvious to a POSITA to Combine Mean's Teaching Concerning a Closed-Loop Additive Injection System for Multiple Wells with Tolman's Well Stimulation Treatment System

65. It would have been obvious to modify Tolman's system to use Means' closed-loop additive injection system with Tolman's system for the reasons explained below. In particular, in the Tolman system as modified by Means, Means' mixer, pumps 314–a through 314m, and meters in Tolman's Stimulation Fluid Pumping System 202 along with any necessary sensors and controls, depicted in the system below.



Tolman, Fig. 2 (EX-1005) (annotated)

66. Both Tolman and Means are analogous art to the '082 patent for two reasons. First, Tolman and Means are both directed toward the same field of endeavor of the '082 patent—that is, well operations. EX-1001, 1:6–10; EX-1005, Abstract, (“In one embodiment, the method describes connecting multiple wells to a stimulation fluid pumping system via a pumping system manifold.”); *id.*, [0008] (“The method describes connecting multiple wells to a stimulation fluid pumping

system via a pumping system manifold. The pumping system manifold is adjusted to provide a first well flow path from the stimulation fluid pumping system to a first well. Then, a first stimulation treatment is pumped into the first well. Concurrently with the pumping of the first stimulation treatment, a second well is prepared for a second stimulation treatment.”); EX-1006, [0003] (“This invention relates generally to oilfield operations and more particularly to a remotely/network-controlled additive injection system for injecting precise amounts of additives or chemicals into wellbores, wellsite hydrocarbon processing units, pipelines, and chemical processing units.”). Second, both Tolman and Means are pertinent to a problem described by the ’082 patent: to “conserve labor, infrastructure, and environmental impact.” See EX-1001, 1:10–11; EX-1005, [0005] (“As a result, equipment and personnel are not efficiently utilized at the surface pad.”); *id.*, [0006]; EX-1006, [0007] (“It is important and economically beneficial to have additive injection systems which can supply precise amounts of additives.”). For either reason, a POSITA would have understood that both Tolman and Means are analogous art.

67. In its fracturing operations, Tolman discloses using fracturing equipment including pumps. In particular, Figure 2 of Tolman discloses a system utilized to perform the stimulation treatments that includes Stimulation Fluid Pumping System 202 (highlighted in yellow) below:

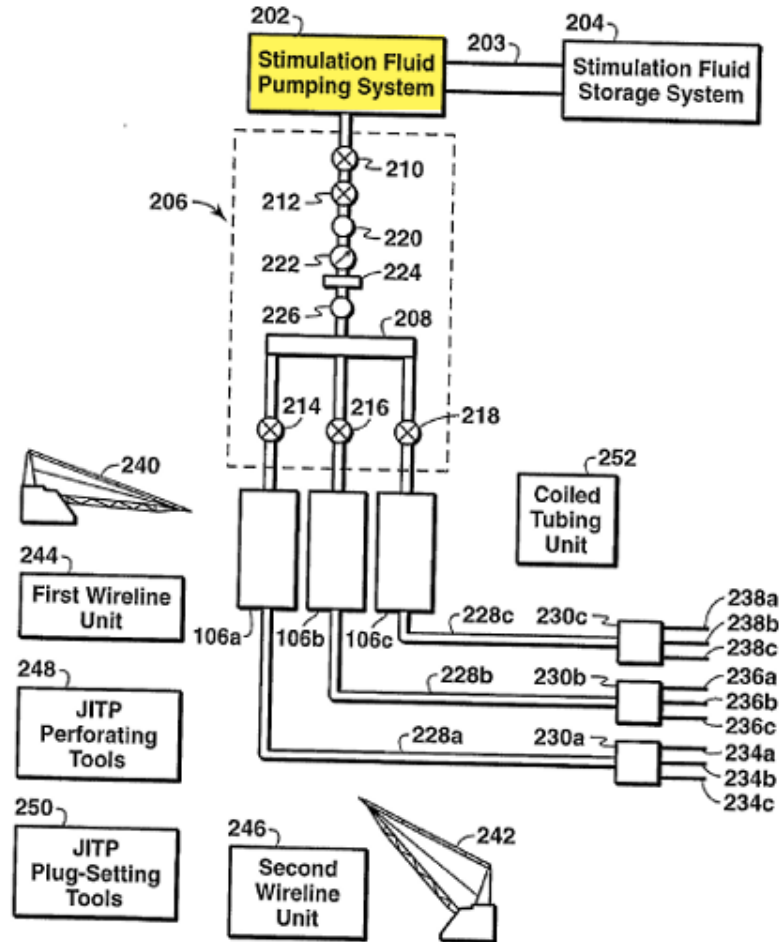


FIG. 2

Tolman, Fig. 2 (EX-1005) (annotated)

Stimulation fluid storage system 204 “is a vessel that holds a sufficient volume of fluid for the planned stimulation treatments.” EX-1005, [0029]. Tolman discloses that this storage system 204 provides “via piping 203” this fluid to Stimulation Fluid Pumping System 202. *Id.* Pumping System 202 provides the stimulation treatment to selected oil field trees 230a–230c using a pumping system manifold 206. *Id.*,

[0030] (“To couple the stimulation fluid pumping system 202 to the trees 106 a–106c, the pumping system manifold 206 is utilized.”).

68. Means discloses a closed-loop additive injection system used along with oilfield pumps, like those in Tolman. Figure 3 of Means illustrates a closed-loop additive injection system includes a mixer 310 for mixing and combining multiple additives stored in sources 312a–312m, shown below:

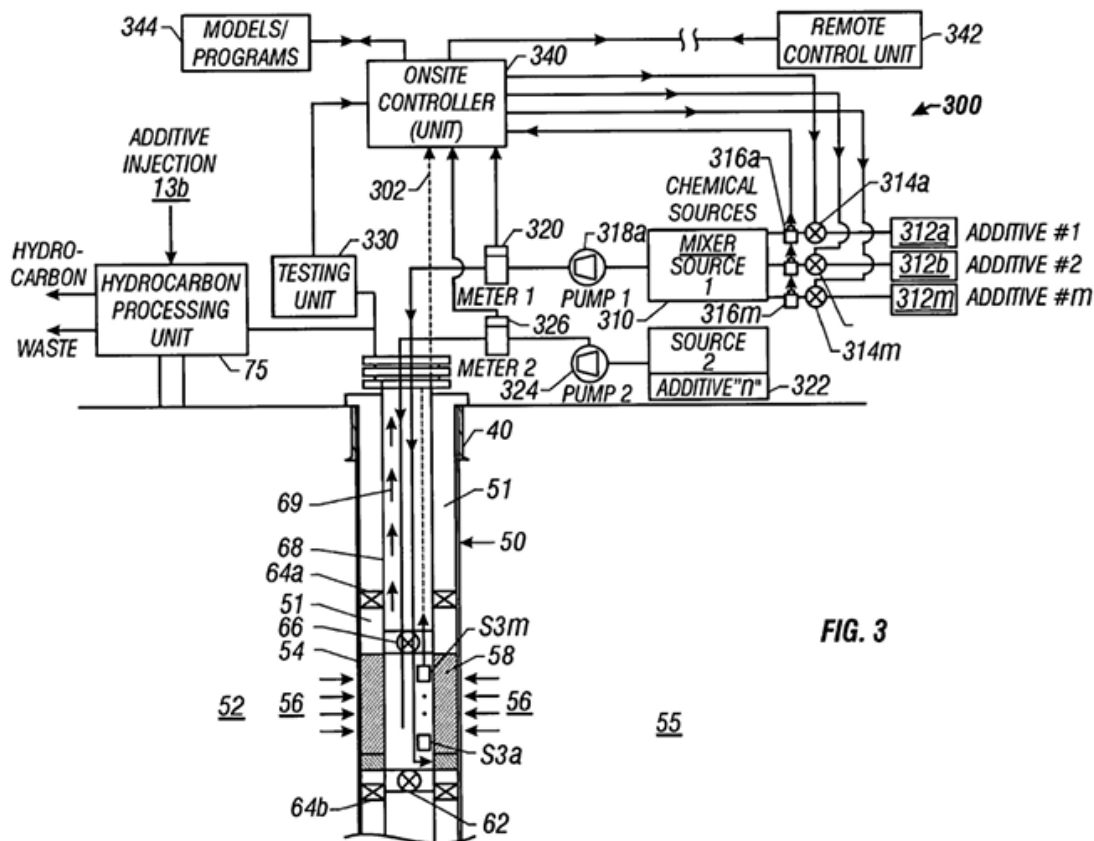


FIG. 3

Means, Fig. 3 (EX-1006)

EX-1006, [0047] (“The system 300 may include a mixer 310 for mixing or combining at the wellsite a plurality of additive #1–additive #m stored in sources

312a–312m respectively. . . . Additives may be shipped in concentrated form and combined with diluents at the wellsite prior to injection into the well 50.”). Meters “measure the amounts of the additives from sources 312a–312m and provide corresponding signals to the control unit 340, which controls the pumps 314a–341m to accurately dispense the desired into the mixer 310.” *Id.*, [0047]. Using downhole sensors and testing unit 330, Means’ system “can administer the optimum amounts of the various additives to the wellbore or pipeline to maintain the various parameters of interest within their respective limits or ranges, thereby, on the one hand, avoid excessive use of the additives, which can be very expensive and, on the other hand, take prompt corrective action by altering the amounts of the injected additives to avoid formation of harmful elements.” *Id.*, [0050].

69. A POSITA would have understood that the Tolman/Means system would include storing Means’ additive sources in in Tolman’s Stimulation Fluid Storage System 204. Means explains that additives 1–3 were stored in sources 312a–312m. EX-1006, [0047] (“The system 300 may include a mixer 310 for mixing or combining at the wellsite a plurality of additive #1–additive #m stored in sources 313[sic]a–312m respectively.”). Similarly, Tolman’s stimulation fluid is also stored in its fluid storage system 204. EX-1005, [0029] (“The stimulation fluid storage system 204 is a vessel that holds a sufficient volume of fluid for the planned stimulation treatments. It is noted that the stimulation fluid storage system 204 may

include tanks located on the surface pad 102, a pit dug on the surface pad 102, and/or a pond, lake, river or water storage facility located in close proximity to the surface pad 102.”). Accordingly, a POSITA would have understood that the proposed combination would include the storage of Means’ additives in Tolman’s storage system. Means explains why a POSITA would be motivated to store additives unmixed when away from the wellsite for safety reasons. EX-1006, [0047] (“In some situations, it is desirable to transport certain additives in their component forms and mix them at the wellsite for safety and environmental reasons. For example, the final or combined additives may be toxic, although while the component parts may be non-toxic. Additives may be shipped in concentrated form and combined with diluents at the wellsite prior to injection into the well 50.”). To get the additives to the wellsite, a POSITA would have further recognized that the combined system would use pipes 203 to deliver both additives needed by the Tolman/Mean system and any other stimulation fluid needed for well operations.

70. A POSITA would have been motivated to incorporate Means’ teachings concerning the benefits of additive injection in Tolman’s well-operation system for at least four reasons.

71. Means provides three reasons to use additive injection systems in well pumps. First, Means explains that its additive systems prevent “[i]nsufficient amounts of treatment additives can increase the formation of corrosion, scale,

paraffins, emulsion, hydrates etc., thereby reducing hydrocarbon production, the operating life of the wellbore equipment and the life of the wellbore itself, requiring expensive rework operations or even the abandonment of the wellbore.” EX-1006, [0006]. Second, Means also explains that it is “economically beneficial” to use additive injection systems like Means because they “can supply precise amounts of additives and which systems are adapted to periodically or continuously monitor the actual amount of the additives being dispensed, determine the impact of the dispersed additives, vary the amount of dispersed additives as needed to maintain certain desired parameters of interest within their respective desired ranges or at their desired values, communicate necessary information with offsite locations and take actions based in response to commands received from such offsite locations.” EX-1006, [0007]. Third, Means additionally explains that its additive injection system is an improvement over conventional pumps by providing “an additive injection system which dispenses precise amounts of additives, monitors the dispensed amounts, communicates with remote locations, takes corrective actions locally, and/or in response to commands received from the remote locations.” *Id.*, [0008].

72. A POSITA would have also recognized that using Means closed loop additive system in place of Tolman’s system would have been a design choice. A POSITA would have weighed the trade-offs and advantages of each of these choices. Such a person might have recognized that Mean’s additive system would increase

cost, but that cost may be mitigated based on the improved well efficiency attained by fine-tuning the mixture of additives. EX-1006, [0006]–[0008]. This trade-off would be important if a wellsite was in subsea environment as explained by Means. EX-1006, [0006] (“Excessive corrosion in a pipeline, especially a subsea pipeline, can rupture the pipeline, contaminating the environment. Repairing subsea pipelines can be cost-prohibitive.”).

73. For the reasons above, it would have been obvious for a POSITA to incorporate the teachings in Means of using its additive injection system in Tolman’s well treatment system.

B. The Combination of Tolman, Means, and Crawford Renders Obvious Claims 1–3, 5–7, 9–15, 17–18, 21–24, and 26–31.

74. As I explain below, the combination of Tolman and Means renders obvious all limitations of claims 1–3, 5–7, 9–15, 17–18, 21–24, and 26–31.

1. Independent Claim 1

i. [Ipre] “A method of providing centralized well development services to a plurality of wells, comprising the steps of:”

75. Tolman discloses a “method of providing centralized well development services to a plurality of wells” EX-1005, Abstract (“[T] the method describes connecting multiple wells to a stimulation fluid pumping system via a pumping system manifold. . . .”); *see also id.*, Figs. 1 and 3. Figure 3 of Tolman shows an

“exemplary flow chart of operations that may be performed on the wells 104a–104c located on the surface pad 102 of FIG. 1” which includes the following steps:

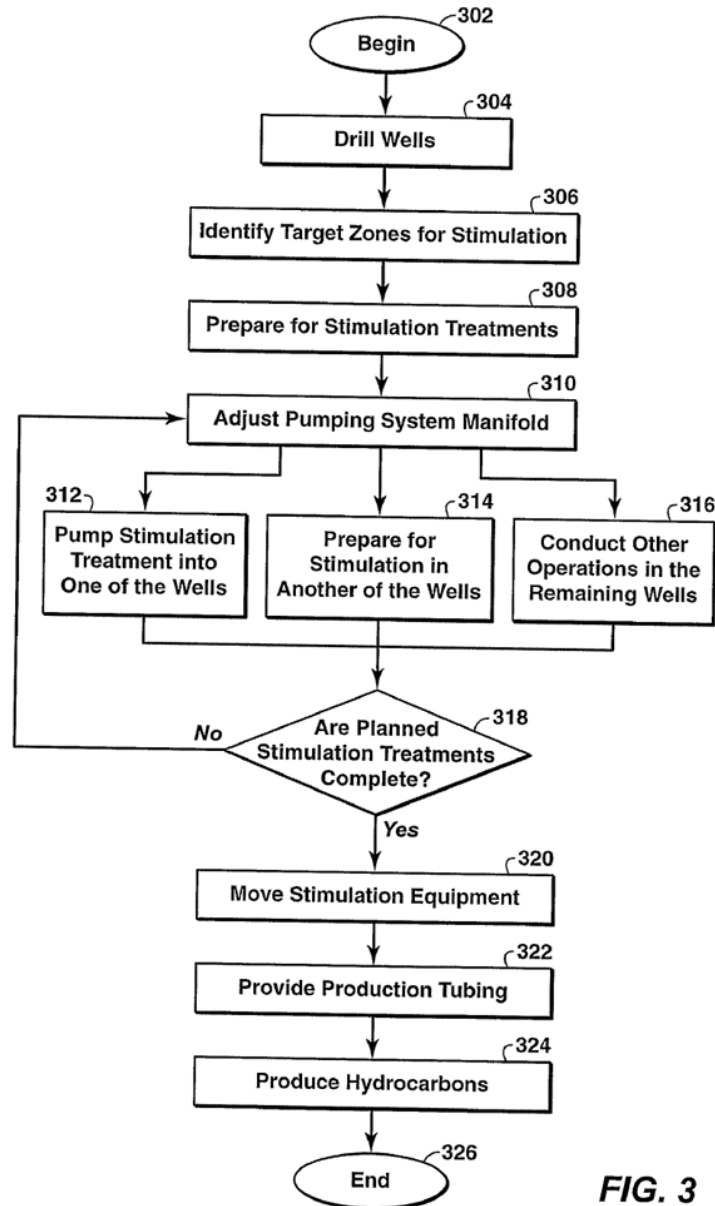


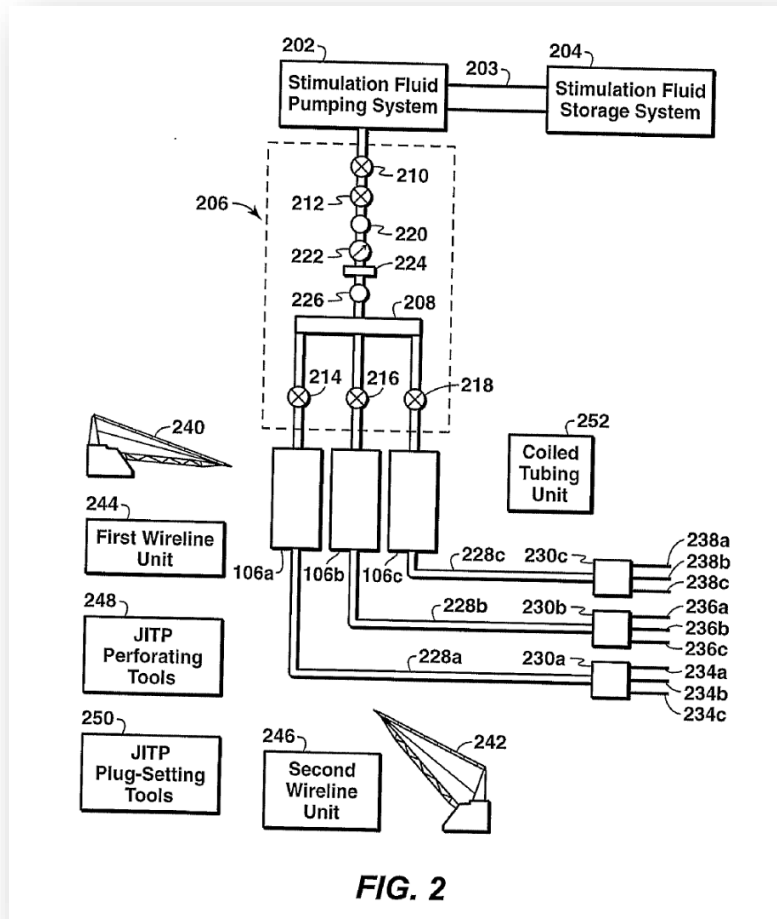
FIG. 3

Tolman, Fig. 3 (EX-1005)

EX-1005, [0033]. Certain steps, such as 312–316 of Figure 3, involve the coordination of processing for multiple wells and those steps are configured to

operate simultaneously to improve efficiency. EX-1005, [0026] (“To enhance the stimulation, completion and production process from these wells on a surface pad, the operations performed on the individual wells may be coordinated and utilize mechanisms to perform these operations in an efficient manner.”); *id.*, [0038] (“Once the pumping system manifold 206 is configured, a stimulation treatment may be pumped into the one of the wells, as shown in block 312. Concurrently, with the stimulation treatment of one of the wells, another well may be prepared for stimulation treatments, as shown in block 314, while other operations may be conducted in the remaining wells, as shown in block 316.”). This processing for multiple wells is “centralized” because the system providing the processing is for wells located at “a single unique surface area (i.e. pad) or two or more surface pads in sufficiently close proximity for performing the drilling, stimulation, completion, and production operations objectives.” EX-1005, [0064], [0010] (“Further, the wells, stimulation fluid pumping system, and pumping system manifold may be located on a single surface pad.”), [0020], [0026]; *see also id.*, Figure 2, below (depicting Tolman’s “centralized well development services to a plurality of wells”). Based on these disclosures, a POSITA would have understood that that Tolman discloses “*centralized well development services to a plurality of wells.*”

Tolman, Fig. 2 (EX-1005)



Tolman, Fig. 2 (EX-1005)

Tolman's Figure 2 shows that manifold 206 distributes the generated and pressurized stimulation fluid to a plurality of wells 104a–104c through corresponding oil field trees 106a–106c. EX-1005, [0030]. This distribution from the “centralized” system to a plurality of wells is achieved at the pumping system manifold 206 by piping 208

to manifold well valves 214, 216, and 218, each of which is connected to a corresponding tree 106a-106c. *Id.*

76. For these reasons, it is my opinion that a POSITA would have understood that Tolman discloses the preamble of claim 1 to the extent that it is limiting.

ii. *[1A] “flowing from a centralized well treatment fluid center to one or more centralized service factories one or more well development task fluids, wherein the one or more centralized service factories are selectively configurable to receive the one or more well development task fluids;”*

77. The Tolman/Means system renders this limitation obvious. *See* § VII.A.4. Figure 2 of Tolman discloses surface pad configuration with different equipment that may be utilized to perform the stimulation treatments, shown below:

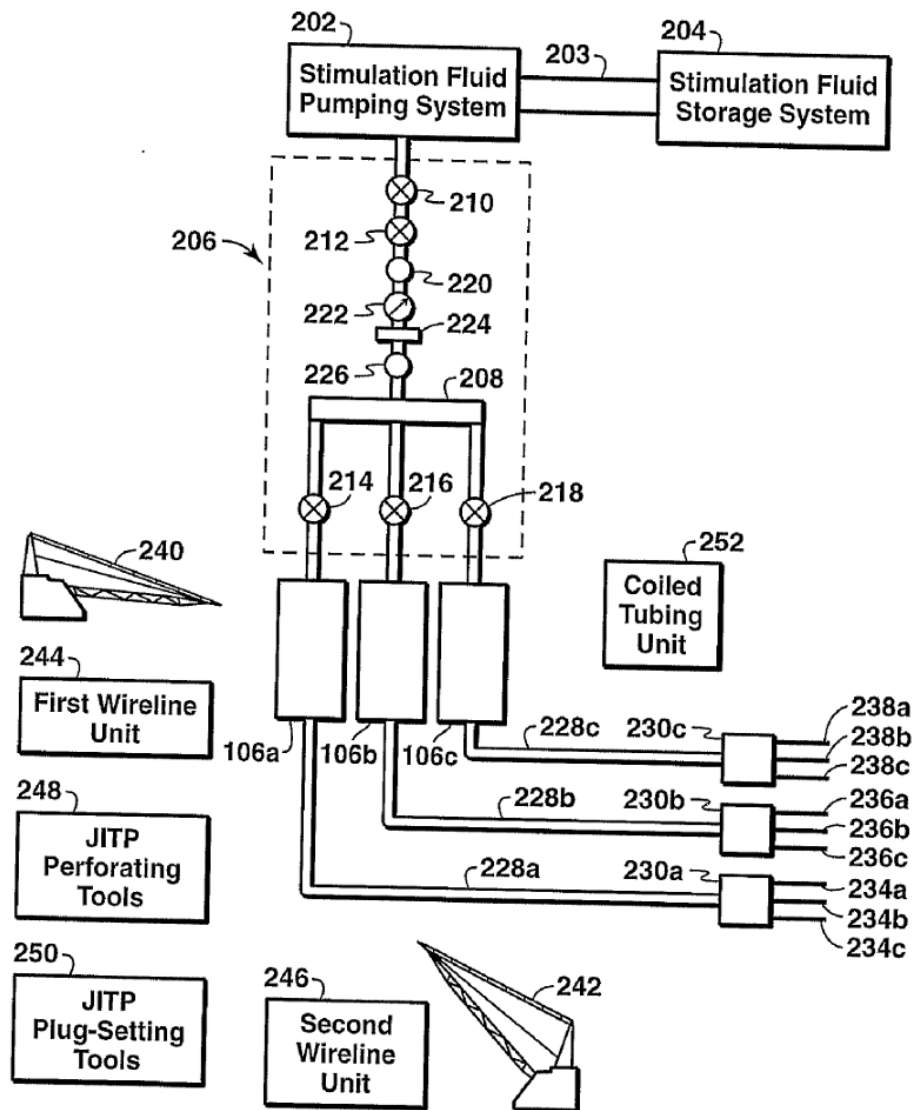


FIG. 2

Tolman, Fig. 2 (EX-1005)

As shown above, a stimulation fluid storage system 204 “is a vessel that holds a sufficient volume of fluid for the planned stimulation treatments.” EX-1005, [0029].

Tolman discloses that this storage system 204 “may include tanks located on the

surface pad 102, a pit dug on the surface pad 102, and/or a pond, lake, river or water storage facility located in close proximity to the surface pad 102.” *Id.* The storage system is coupled to the Stimulation Fluid Pumping System 202 “via piping 203, which may be high pressure steel lines or low pressure hoses depending on the specific application.” *Id.* The fluid for the planned stimulation treatments (“*well development task fluids*”) “*flow*” from the Storage System 204 (“*centralized well treatment fluid center*”) to the Pumping System 202 (part of “*the one or more centralized service factories*”) through piping 203 because they are connected and Pumping System 202 creates pressure differences.

78. The stimulation storage system 204 in the Tolman/Means system contains both additives and other necessary well treatment fluids needed for well treatment. Stimulation Fluid Pumping System 202 in the Tolman/Means system would include “a mixer wherein different additives are mixed or combined at the wellsite and the combined mixture is injected by a common pump and metered by a common meter. The onsite controller controls the amounts of the various additives into the mixer.” EX-1006, [0026]. After mixing, the stimulation treatment fluid is provided to selected oil field trees 106a–106c using a pumping system manifold 206. *Id.*, [0030] (“To couple the stimulation fluid pumping system 202 to the trees 106 a–106c, the pumping system manifold 206 is utilized.”).

79. As shown in Figure 2 above, “pumping system manifold 206 may include various components utilized to manage access to the wells 104a–104c from the stimulation fluid pumping system 202.” EX-1005, [0030]. To do so, manifold 206 directs the flow using different valves (e.g., valves 210–218) to deliver treatment fluid to specific oil wells:

To manage the flow paths through the pipes 208, a main manifold valve 210 and a manifold check valve 212 may be located near the stimulation fluid pumping system 202, while a first manifold well valve 214, second manifold well valve 216, and a third manifold well valve 218 may be located near each of the trees 106a–106c, respectively. Each of the trees 106a–106c may be connected to the first manifold well valve 214, second manifold well valve 216, and a third manifold well valve 218, respectively, or utilize other devices to couple to the trees 106a–106c. Valves 210, 214, 216 and 218 may be any type of valve, including those routinely used in oil-field applications, such as gate valves or ball valves, while the manifold check valve 212 may be configured to allow fluid flow from the stimulation fluid pumping system 202, but to prevent reverse flow of fluids into the stimulation fluid pumping system 202. These valves 210, 214, 216 and 218 may be actuated or positioned to a full-open or full-closed position to provide hydraulic isolation between individual wells 104a–104c and the stimulation fluid pumping system 202.

EX-1005, [0030]. “Once the pumping system manifold 206 is configured, a stimulation treatment may be pumped into the one of the wells, as shown in block 312.” EX-1005, [0038].

80. A POSITA would have understood that both Tolman and Means describe “*well development task fluids*.” Tolman, for example, describes “fluid for

the planned stimulation treatment (“*well development task fluids*”). EX-1005, [0029]. A POSITA would likewise have understood that in the Tolman/Means system would include additives and other materials needed for stimulation treatment, which also satisfy “*well development task fluids*.” EX-1006, [0005]. Such a person would have understood that piping 203 delivers Mean’s additives to the Stimulation Fluid Pump system 202 in the Tolman/Means system, which then mixes the various additives. Before mixing, the additives satisfy “*well development task fluids*” because they are used in well treatment. EX-1006, [0047]. The ’082 Patent confirms that additives described by Means satisfy well development task fluids by being fluids used to treat a well. *See* Ex. 1001, 8:1–4 (“the fluids in 410 are well development task fluids [and] [t]he type of well development task fluid depends in part on the type of treatment to be performed on the plurality of wells.”); Ex. 1006, [0006] (referring to additives as “treatment additives.”). Alternatively, other fluids described by Tolman and Means also satisfy well development task fluids, such as “fluid for planned stimulation treatment,” EX-1005, [0029], and wellbore fluid for treatment using additives, EX-1006, [0040] (“Sensors which determine properties of the wellbore fluid can provide information of the treatment effectiveness of the additive being injected, which information can then be used to adjust the additive flow rate as more fully described below in reference to FIG. 3.”). After the wellbore fluid and additives are mixed, a POSITA would have understood that the treatment

fluids described above by Tolman and Mean satisfies the claimed “*well treatment fluid*” that are pumped down the well. EX-1005, [Abstract], [0044]–[0046]; EX-1006, [0047]–[0048].

81. Based on the above disclosures, a POSITA would have understood that Stimulation Fluid Storage System 204 satisfies a “*centralized well treatment fluid center*” by storing “a sufficient volume of fluid for the planned stimulation treatments.” EX-1005, [0059]. The storage system 204 in the Tolman/Means system also stores additives described by Means, which satisfy “*well development task fluids*.” Both fluids flow via piping 203 to the Stimulation Fluid Pumping System 202 and pumping system manifold 206 (collectively, “*one or more centralized service factories*”). EX-1005, [0029] (“The stimulation fluid pumping system 202 couples to the stimulation fluid storage system 204 via piping 203, which may be high pressure steel lines or low pressure hoses depending on the specific application.”).

82. Further, a POSITA would also have understood that Stimulation Fluid Pumping system 202 and pumping system manifold 206 collectively satisfy “*one or more centralized service factories*.” These components selectively receive “fluid[s] for the planned stimulation treatment” from Stimulation Fluid Storage System 204. EX-1005, [0029], *id.*, [0030] (“To manage the flow paths through the pipes 208, a main manifold valve 210 and a manifold check valve 212 may be located near the

stimulation fluid pumping system 202, while a first manifold well valve 214, second manifold well valve 216, and a third manifold well valve 218 may be located near each of the trees 106a–106c, respectively.”). A POSITA would have understood that the Tolman/Means system would include Means’ pumps 314a–314m and meters 316a–316m in Stimulation Fluid Pumping System 202 and used to selectively increase, decrease, or shut off the reception of additives 1–m. EX-1006, [0047] (“Meters 316a–316m measure the amounts of the additives from sources 312a–312m and provide corresponding signals to the control unit 340, which controls the pumps 314a–314m to accurately dispense the desired amounts into the mixer 310.”). In doing so, Stimulation Fluid Storage System 204 would be “*selectively configurable*” to “*receive one or more well development task fluids.*” After doing so, pumping system 202 and manifold 206 direct the stimulation treatment fluids to the appropriate well using valves 210–218. EX-1005, [0030].

83. For these reasons, I believe a POSITA would have understood that the combination of Tolman and Means renders this limitation obvious.

iii. [1B] “*preparing, at the one or more centralized service factories, one or more well treatment fluids from the one or more well development task fluids, wherein the one or more centralized*”

service factories are selectively configurable to prepare the one or more well treatment fluids;

84. The Tolman/Means system uses Means' closed-loop additive injection system with Tolman's Stimulation Fluid Pumping system 202.

85. A POSITA would have understood that the Tolman/Means system would develop "*well treatment fluids*" from "*well development task fluids*," such as Means' additives and/or other fluids needed for stimulation treatment.

86. Such a person would have understood that piping 203 in the Tolman/Means system delivers Mean's additives ("*well treatment fluids*") to the Tolman's Stimulation Fluid Pump system 202, which then mixes the various additives. EX-1006, [0047]. Means describes such additives as follows:

A variety of chemicals (also referred to herein as "additives") are often introduced into producing wells, wellsite hydrocarbon processing units, oil and gas pipelines and chemical processing units to control, among other things, corrosion, scale, paraffin, emulsion, hydrates, hydrogen sulfide, asphaltenes and formation of other harmful chemicals.

EX-1006, [0005]. Accordingly, a POSITA would have understood that Means' additives satisfy "*well development task fluids*" before they are mixed along with other fluids.

87. Pump system 203 in the Tolman/Means system mixes these additives using Means' mixer, meters 316 a–316m, and pumps 314a–314m to selectively

control the amount of additives included in the mixture. Means describes a closed-loop feedback system uses a mixer along with sensors and pumps to control the amounts of various additives:

The additive injection of the present invention may also utilize a mixer wherein different additives are mixed or combined at the wellsite and the combined mixture is injected by a common pump and metered by a common meter. The onsite controller controls the amounts of the various additives into the mixer. The additive injection system may further include a plurality of sensors downhole which provide signals representative of one or more parameters of interest relating to the characteristics of the produced fluid, such as the presence or formation of sulfites, hydrogen sulfide, paraffin, emulsion, scale, asphaltenes, hydrates, fluid flow rates from various perforated zones, flow rates through downhole valves, downhole pressures and any other desired parameter.

EX-1006, [0024]. Means also suggests that different additive compositions might be used at different well depths. EX-1006, [0034] (“The same or different injection lines may be used to supply additives to different production zones. In FIG. 1, line 14 is shown extending to a production zone below the zone 52. Separate injection lines allow injection of different additives at different well depths.”). By using Means’ closed-loop feedback system in Tolman’s Stimulation Fluid Pumping System 202, the system can selectively increase, decrease, or shut off the reception of additives 1–m. EX-1006, [0047] (“Meters 316a–316m measure the amounts of the additives from sources 312a–312m and provide corresponding signals to the control unit 340, which controls the pumps 314a–314m to accurately dispense the

desired amounts into the mixer 310.”). Using this feedback, pumping system 202 in the Tolman/Means selectively increases, decreases, or shuts off the reception of additives #1–m. Accordingly, the combination of Tolman and Means includes a pump system 203 that “*selectively configurable to prepare the one or more well treatment fluids.*”

88. After mixing, a POSITA would have understood the combined fluid results in a stimulation fluid that is pumped down the well. Tolman explains that the “stimulation fluid may be injected into one or more of the wells.” EX-1005, [0031]. Similarly, Means explains that the resulting mixed fluid, referred to as wellbore fluid. EX-1006, [0048] (“The wellbore fluid reaching the surface may be tested on site with a testing unit 330.”); *see id.*, [0047] (“A pump 318 pumps the combined additives from the mixer 310 into the well 50, while the meter 320 measures the amount of the dispensed additive and provides the measurement signals to the controller 340.”). A POSITA would have understood that this stimulation fluid described by both Tolman and Means satisfies the claimed “*well treatment fluid.*” Stimulation/treatment fluids satisfies the claimed “*one or more well treatment fluids*” because hydrocarbons are produced from the plurality of wells once the stimulation treatments have been performed by providing the stimulation fluid. EX-1005, [0009].

89. For these reasons, I believe a POSITA would have understood that Tolman and Means render this limitation obvious.

iv. [1C] *“flowing from the one or more centralized service factories to at least one of the plurality of wells the one or more well treatment fluids, wherein the one or more centralized service factories are selectively configurable to flow the one or more well treatment fluids;”*

90. Tolman discloses this limitation. Tolman describes a pumping system manifold 206 (part of “*one or more centralized service factories*”) that directs (or “*flows*”) stimulation and/or treatment fluid various to oil field trees. See EX-1005, [0030] (“For instance, the pumping system manifold 206 may include a set of pipes 208 to interface each of the trees 106a–106c with the stimulation fluid pumping system 202.”). To do so, the Tolman/Means system controls the valves, such as valves 214–218, in manifold 206 to “*selectively configure*” the manifold 206 (part of “*the one or more centralized service factories*”) to “*flow*” stimulation fluid into the appropriate well(s) in oilfield trees 106a-106c. Figure 2 of Tolman illustrates these valves, shown below:

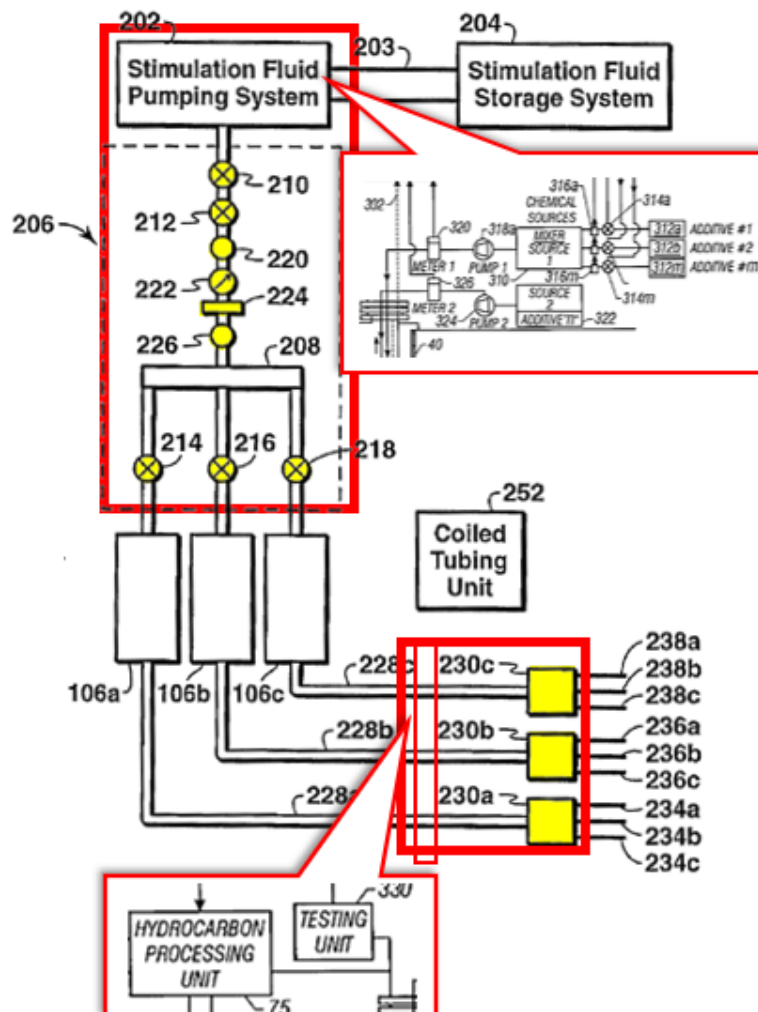


FIG. 2

Tolman, Fig. 2 (EX-1005) (annotated)

91. As shown above, Tolman's valves are configured to allow fluid from the stimulation pumping system 202 to be directed toward individual wells:

Each of the trees 106a–106c may be connected to the first manifold well valve 214, second manifold well valve 216, and a third manifold well valve 218, respectively, or utilize other devices to couple to the trees 106a–106c. Valves 210, 214, 216 and 218 may be any type of valve, including those routinely used in oil-field applications, such as gate

valves or ball valves, while the manifold check valve 212 may be configured to allow fluid flow from the stimulation fluid pumping system 202, but to prevent reverse flow of fluids into the stimulation fluid pumping system 202. These valves 210, 214, 216 and 218 may be actuated or positioned to a full-open or full-closed position to provide hydraulic isolation between individual wells 104a–104c and the stimulation fluid pumping system 202.

EX-1005, [0030];

Through the coupling of the valves 210, 212, 214, 216 and 218, flow paths may be provided through the pumping system manifold 206. Because the first manifold well valve 214, second manifold well valve 216, and a third manifold well valve 218 may be set to an open or closed position, stimulation fluid may be injected into one or more of the wells 104a–104c, while the other wells 104a–104c may be isolated by at least one of the valves 214–218 from the stimulation fluid pumping system 202. To enhance reliability, it may be preferred that two valves, such as a manifold well valve 214–218 and a valve (not shown) on the tree 106a–106c, are closed during any given isolation from the other wells.

EX-1005, [0031];

Accordingly, the surface pad 102 is prepared for the stimulation operations, as shown in block 308. The preparations may include coupling the piping 228a–228c, manifold valves 230a–230c and flowlines 234a–234c, 236a–236c and 238a–238c together and coupling the pumping system manifold 206 to the trees 106a–106c and the stimulation fluid pumping system 202. The pumping system manifold 206 may be coupled to any number of wells with the appropriate valves, flow measurements devices, flow control devices.

EX-1005, [0037]. Based on the above disclosures, fluid pumping system 202 pumps

(“flowing from the one or more centralized service factories”) the treatment fluid

(“the one or more well treatment fluids”) toward individual wells *(“to at least one of the plurality of wells”)* via manifold 206. EX-1005, [0030]–[0031], [0037]. Stated another way, pumping system manifold 206 (part of the *“centralized service factory”*) directs stimulation fluid *(“one or more well treatment fluids”)* various to oil field trees *(“flowing from the one or more centralized service factories to at least one of the plurality of wells.”)*. Further, and based on the same disclosures, such a person would have understood that controlling the valves in manifold 206 allows the Tolman/Mean system to *“selectively configur[e]”* which of the wells *“to flow the one or more well treatment fluids.”*

92. For these reasons, I believe a POSITA would have understood that Tolman discloses this limitation.

v. [1D] *“recovering from the at least one of the plurality of wells the one or more well treatment fluids at the one or more centralized service factories, wherein the one or more centralized service factories are selectively configurable to receive the one or more recovered well treatment fluids;”*

93. Tolman describes that the recovered well treatment fluid return through manifold valves 230a–230c. *See* EX-1005, [0028] [0051], [0053]. Specifically, Tolman explains that the recovery of fluids from wells travel through manifolds 230a–230c (part of the *“centralized service factory”*) for further processing:

Generally, the wells 104a–104c produce hydrocarbons through piping 228a–228c that is coupled between the respective oil field trees 106a–106c and the flowback manifolds 230a–230c. The piping 228a–228c may include high pressure steel lines utilized in oil field applications. The flowback manifolds 230a–230c may also be coupled to one or more flowlines 234a–234c, 236a–236c and 238a–238c, respectively. These flowlines 234a–234c, 236a–236c and 238a–238c may be coupled to flowback pits, flow test units, sales lines, tankage, oil/gas/water separating and processing units and/or other similar devices. Thus, the hydrocarbons from the wells 104a–104c typically flow through the flowback manifolds 230a–230c for further processing or sales.

EX-1005, [0028]; *see id.*, [0051], [0053]. Based on this disclosure, a POSITA would have understood that Tolman’s system recovers well treatment fluids (“*recovered well treatment fluid*”) along with hydrocarbons via piping 228a–228c. Such a person would have recognized that this fluid is “*recover[ed] from the at least one of the plurality of wells.*”

94. Using flowback manifolds 230a–230c (part of the “*centralized service factory*”), the Tolman/Means system directs the output of one or multiple wells. EX-1005, [0028] (“the hydrocarbons from the wells 104a–104c typically flow through the flowback manifolds 230a–230c for further processing or sales.”). A POSITA would have understood that these flowback manifolds direct the recovered well fluid to the appropriate destination via flowlines 234a–238c, such as a “flowback pits, flow test units, sales lines, tankage, oil/gas/water separating and processing units and/or other similar devices.” EX-1005, [0028]. By using a manifolds 230a–230c

for each well to both receive and direct the recovered fluids, Tolman discloses its system is “*selectively configurable to receive the one or more recovered well treatment fluids.*” See EX-1005, [0028].

95. To the extent that one argues that Tolman’s flowback manifolds 230a–230c are not part of the “*centralized service factories,*” it would have been obvious to include them as part of Tolman’s factory. A POSITA would have understood that there are extensive regulations regarding the use and disposal of produced water, which is fluid returned to the surface from a hydraulic fracturing operation. Such a person would also have understood that it is beneficial to recover produced water for use in subsequent hydraulic fracturing operations as recycled water to reduce water supply costs. See EX-1008, [0009] (“Also, in many environmentally sensitive areas, the water based fracturing fluids containing polysaccharide gelling agents must be recovered from the well and disposed of by environmentally appropriate means, which increases the overall cost of the fracturing treatment.”); see *id.*, [0039], [0052]. At the time of the ’082 patent’s filing, a POSITA would also have understood that it was common in the industry to use recycled water in hydraulic fracturing operations to reduce regulation-driven disposal costs and operation-driven water supply costs. See EX-1008, [0009], [0039], and [0052]. Further, a POSITA would have understood that flowback manifolds can be used to collect produced water. See EX-1008, [0009], [0039], and [0052]. Accordingly, it would have been

obvious to a POSITA to use flowback manifolds to recover well treatment fluids from wells as part of centralized service factories to use the produced water in further hydraulic fracturing operations. *See* EX-1008, [0009], [0039], and [0052].

96. For these reasons, it is my opinion that this limitation would have been disclosed or rendered obvious by Tolman.

vi. [1E] “flowing from the one or more centralized service factories to the centralized well treatment fluid center the one or more recovered well treatment fluids, wherein the one or more centralized service factories are selectively configurable to flow the one or more recovered well treatment fluids, and wherein the centralized well treatment fluid center is selectively configurable to receive the one or more recovered well treatment fluids”

97. As I explained above, *see* § VII.B.1.i, the Tolman/Means system uses manifolds 230a–230c to both receive the recovered fluids from each well and direct those fluids to the appropriate destination. *See* EX-1005, [0028] (“The flowback manifolds 230a–230c may also be coupled to one or more flowlines 234a–234c, 236a–236c and 238a–238c, respectively.”). Tolman also discloses that these flowlines may be destined for “further processing or sales,” such as “flowback pits, flow test units, sales lines, tankage, oil/gas/water separating and processing units and/or other similar devices.” *Id.* By using these manifolds and flowlines, a POSITA

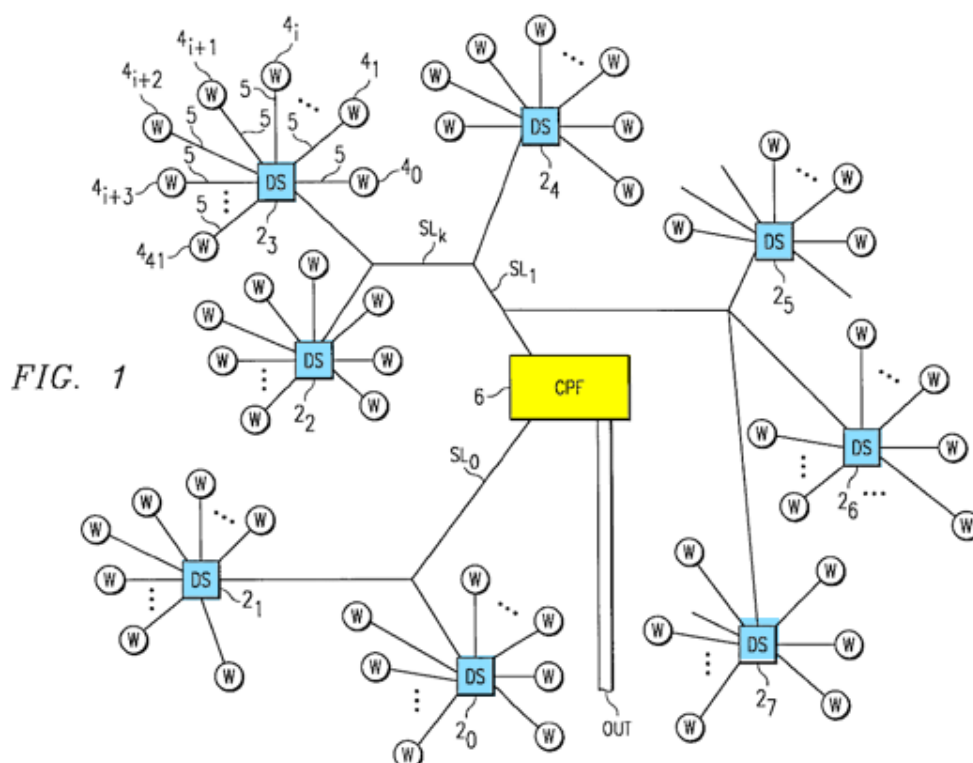
would have understood that the Tolman/Mean system discloses “*one or more centralized service factories are selectively configurable to flow the one or more recovered well treatment fluids.*”

98. Tolman explains that its manifold 230a–230c may direct fluid to various destinations. EX-1005, [0028]. But Tolman does not expressly disclose that these flowlines direct the recovered well fluid to the “*centralized well treatment fluid center.*” But the combination of Tolman (EX-1005), Means (EX-1006), and Crawford (EX-1007) render this feature obvious.

99. Crawford is analogous art for two reasons. First, Crawford is directed toward the same field of endeavor of the ’082 patent: well operations. EX-1001, 1:6–10; EX-1009, Abstract (“A computer system and method of operating the same to optimize the operating conditions of a petroleum production field, in which a plurality of wells is arranged according to drill sites, and connected to one or more central processing facilities, is disclosed. In this disclosed embodiment, gas compression capacity is a significant constraint on the operation of the complex production field, and surface line hydraulic effects of well production are to be considered in the optimization.”), *id.*, 1:16–18, (“This invention is in the field of oil and gas production, and is more specifically directed to production optimization from large production fields.”). Second, Crawford is pertinent to a problem described by the ’082 patent: to “conserve labor, infrastructure, and environmental

impact.” See EX-1001, 1:10–11; EX-1005, [0005] (“As a result, equipment and personnel are not efficiently utilized at the surface pad.”); *id.*, [0006]; EX-1007, 1:23–29 (“Conventional central processing facilities include such equipment as separators, gas compressors, and the like. While the primary production phase of operation may be effected in a relatively straightforward manner, later life operation of the production field requires important decisions for optimum production and economic return.”); *id.*, 8:59–62 (“The method according to the preferred embodiment of the present invention is intended to optimize the allocation of wells to production, and the allocation of lift gas to producing wells. . . .”). For either of these reasons, a POSITA would have understood that Crawford is analogous art.

100. Crawford discloses multiple drill sites (“*centralized service factories*”) that pump a well output fluids to a central processing facility 6 (a “*centralized well treatment fluid center*”). See EX-1008, 6:31–34. Figure 1 of Crawford illustrates how multiple drill sites (highlighted in blue) are connected to this central processing facility (highlighted in yellow) via surface lines:



Crawford, Fig. 1 (EX-1007) (annotated)

As shown above, “[e]ach drill site 2 may support many wells 4; for example, drill site 2₃ is illustrated in FIG. 1 as supporting forty-two wells 4₀ through 4₄₁.” EX-1008, 6:29–32. “Each drill site 2 gathers the output from its associated wells 4, and forwards the gathered output to central processing facility 6 via one of surface lines SL.” EX-1008, 6:31–34. A POSITA would have understood that the output from the wells includes oil, gas, and water. EX-1008, 6:55–59 (“Central processing facility 6 receives oil, water, and gas (including both recycled lift gas and formation gas) phases from drill sites 2 via surface lines SL, and includes the appropriate separation

and compression equipment for separating the desired phases from one another.”); *See id.*, Fig. 2; 6:6–41. Based on these disclosures, a POSITA would have understood that Crawford discloses “*flowing from the one or more centralized service factories to the centralized well treatment fluid center the one or more recovered well treatment fluids.*”

101. To control the reception of fluid at the central processing facility 6 from multiple drill sites, Crawford uses control valves located at each well site. Figure 4 of Crawford depicts a shut off valve 13 at an individual well, highlighted below:

configures the flow of fluid through all surface lines (SL), which delivers fluid to central processing facility 6:

Referring back to FIG. 1 by way of example, ***production operations are managed, generally on a day-to-day basis, by the selection of cutoff values for formation gas-oil ratio (FGOR) and incremental gas-oil ratio (IGOR) for wells 4 at a particular drill site 2, or alternatively over the entire field.*** The FGOR cutoff is a gas-oil ratio for non-gas-lifted wells that defines which wells 4 are to be shut-in completely (e.g., by closing control valve 13 of FIG. 4), while the IGOR cutoff is an incremental gas-oil ratio for gas-lifted wells that defines which wells 4 are to receive additional lift gas and which wells 4 are to have their lift gas reduced. It is contemplated that wells 4 may be present in the production field that have FGOR values below the FGOR cutoff (i.e., would not be selected for shut-in) but which will have IGOR values above the IGOR cutoff (i.e., would not be selected to receive any lift gas); such parameters would cause a well 4 to be operated, but not gas-lifted.

EX-1008, 8:33–49 (emphasis added); *see also id.*, 8:50–9:60. A POSITA would have also understood that Crawford’s technique centrally controls the production from multiple wells by using an optimization computer system 30 to adjust field operating parameters and these control valves. *See id.*, Fig. 6, 8:50–9:60. Based on these disclosures, a POSITA would have understood that Crawford discloses “*wherein the centralized well treatment fluid center is selectively configurable to receive the one or more recovered well treatment fluids.*”

102. A POSITA would have been motivated to incorporate Crawford’s teaching of a centralized processing of recovered well fluids in the combined system

of Tolman and Means. Such a person would have recognized that such a modification would implement surface lines from Tolman's flowback manifold. Notably, Tolman explains that multiple flowlines may be coupled to processing units, like the one described in Crawford. *See* EX-1005, [0028]. A POSITA also would have understood that because fluids like water may be reused for future stimulation treatment after being separated from other recovered well fluids, Crawford's centralized processing unit should be part of Tolman's stimulation fluid storage system 204, which provides fluids for stimulation treatment. *See* EX-1005, [0029] ("It is noted that the stimulation fluid storage system 204 may include tanks located on the surface pad 102, a pit dug on the surface pad 102, and/or a pond, lake, river or water storage facility located in close proximity to the surface pad 102."); EX-1008, Fig. 2, 6:36–41 ("As shown in FIG. 2, each drill site 2 receives multiple lines 5, each one of lines 5 being associated with one of wells 4. The combined output from lines 5 at drill site 2 includes three phases, namely oil, gas, and water, which are forwarded together to central processing facility 6 via surface line SL."). A POSITA would have understood that the Tolman/Means/Crawford system includes surface lines between Tolman's flowback manifolds and the Crawford's central processing facility carry the well treatment fluids recovered from Tolman's wells.

103. A POSITA would have been motivated to modify the combined system of Tolman and Means to incorporate a central processing unit from Crawford in the stimulation fluid storage system 204 along with any service lines for at least two reasons. In doing so, the Tolman/Means/Crawford system uses manifolds 230a–203c to direct fluids recovered from wells to the appropriate destination. The same valves also allow Tolman/Means/Crawford system to “*selectively configure*” which well that Crawford’s central processing unit (“*centralized well treatment fluid center*”) “*receives*” the “*one more more recovered well treatment fluids.*”

104. First, a POSITA would have understood that using one central processing unit over multiple processing units located at each well site would allow workers and a company to focus maintenance efforts on a single building. Tolman’s flowlines exiting a well can be destined for processing units, like Crawfords. EX-1005, [0028] (“The flowback manifolds 230a–230c may also be coupled to one or more flowlines 234a–234c, 236a–236c and 238a–238c, respectively. These flowlines 234a–234c, 236a–236c and 238a–238c may be coupled to flowback pits, flow test units, sales lines, tankage, oil/gas/water separating and ***processing units*** and/or other similar devices.”). A POSITA would have recognized that, by having multiple processing units, additional workers and resources will be needed to maintain those multiple units rather than a single, central processing unit. Such a person would have been motivated to use a single processing unit for multiple wells

and drilling sites in the combined system of Tolman and Means to better focus labor and resources to a single unit.

105. Second, a POSITA would have been motivated to make the modification to Tolman's system for the express reasons described in Crawford. Specifically, Crawford describes a process that optimizes well production using a central processing facility: EX-1007, 8:59–65 (“The method according to the preferred embodiment of the present invention is intended to optimize the allocation of wells to production, and the allocation of lift gas to producing wells, which in this example will be determined by optimization of the IGOR and FGOR cutoff values for maximum oil production, determined individually for each of drill sites 2.). Such a reason would have motivated a POSITA to use Crawford's central processing facility, surface lines, and optimization method in the combined system of Tolman and Means.

106. A POSITA would have understood that there are extensive regulations regarding the use and disposal of produced water, which is fluid returned to the surface from a hydraulic fracturing operation. Such a person would also have understood that it is beneficial to recover produced water for use in subsequent hydraulic fracturing operations as recycled water to reduce water supply costs. *See* EX-1008, [0009] (“Also, in many environmentally sensitive areas, the water based fracturing fluids containing polysaccharide gelling agents must be recovered from

the well and disposed of by environmentally appropriate means, which increases the overall cost of the fracturing treatment.”); *see id.*, [0039], [0052]. At the time of the ’082 patent’s filing, a POSITA would also have understood that it was common in the industry to use recycled water in hydraulic fracturing operations to reduce regulation-driven disposal costs and operation-driven water supply costs. *See* EX-1008, [0009], [0039], and [0052]. Further, a POSITA would have understood that flowback manifolds can be used to collect produced water. *See* EX-1008, [0009], [0039], and [0052]. Accordingly, a POSITA would have been motivated to use Crawford’s central processing facility, surface lines, and optimization method in the combined system of Tolman and Means to optimize cost reduction. *See* EX-1008, [0009], [0039], and [0052].

107. For any of the above reasons, a POSITA would have been motivated to incorporate a central processing unit and service lines, like those described in Crawford, in the combined system of Tolman and Means in the manner that I described in ¶¶ 100–103. Consequently, it is my opinion that this limitation would have been obvious to a POSITA reviewing Tolman, Means, and Crawford.

2. Independent Claim 17

i. *Preamble of Claim 17*

108. Claim 17 recites “[a] *system for centralized distributing, receiving, and treating fluids for a plurality of wells, the system comprising.*”

109. The Tolman/Mean system discloses the preamble of claim 17 for the same reasons that I explained above, *see* § VII.B.1.i. Specifically, Tolman discloses the use of Tolman’s Stimulation Fluid Pumping system 202 and pumping system manifold 206 to centralize distributing, receiving, and treating fluids. EX-1005, [0029], *id.*, [0030] (“To manage the flow paths through the pipes 208, a main manifold valve 210 and a manifold check valve 212 may be located near the stimulation fluid pumping system 202, while a first manifold well valve 214, second manifold well valve 216, and a third manifold well valve 218 may be located near each of the trees 106a–106c, respectively.”), [0028] (“The flowback manifolds 230a–230c may also be coupled to one or more flowlines 234a–234c, 236a–236c and 238a–238c, respectively. These flowlines 234a–234c, 236a–236c and 238a–238c may be coupled to flowback pits, flow test units, sales lines, tankage, oil/gas/water separating and processing units and/or other similar devices. Thus, the hydrocarbons from the wells 104a–104c typically flow through the flowback manifolds 230a–230c for further processing or sales.”); EX-1006, [0027] (“The system of the present invention is equally applicable to monitoring and control of additive injection into . . . wellsite fluid treatment units.”).

110. For these reasons, a POSITA would have understood that the combination of Tolman, Means, and Crawford render this claim limitation obvious.

i. *Limitation [17A]*

111. Claim 17 recites “*a centralized well treatment fluid center.*”

112. The Tolman/Means system renders this limitation obvious for the same reasons that I explain with respect to limitation 1A above. *See supra* § VII.B.1.i.

ii. *Limitation [17B]*

113. Claim 17 recites “*one or more centralized service factories.*”

114. The Tolman/Means system renders this limitation obvious for the same reasons that I explain with respect to limitation 1A above. *See supra* § VII.B.1.i. Tolman discloses a Stimulation Fluid Pumping System 202 and pumping system manifold 206, shown below:

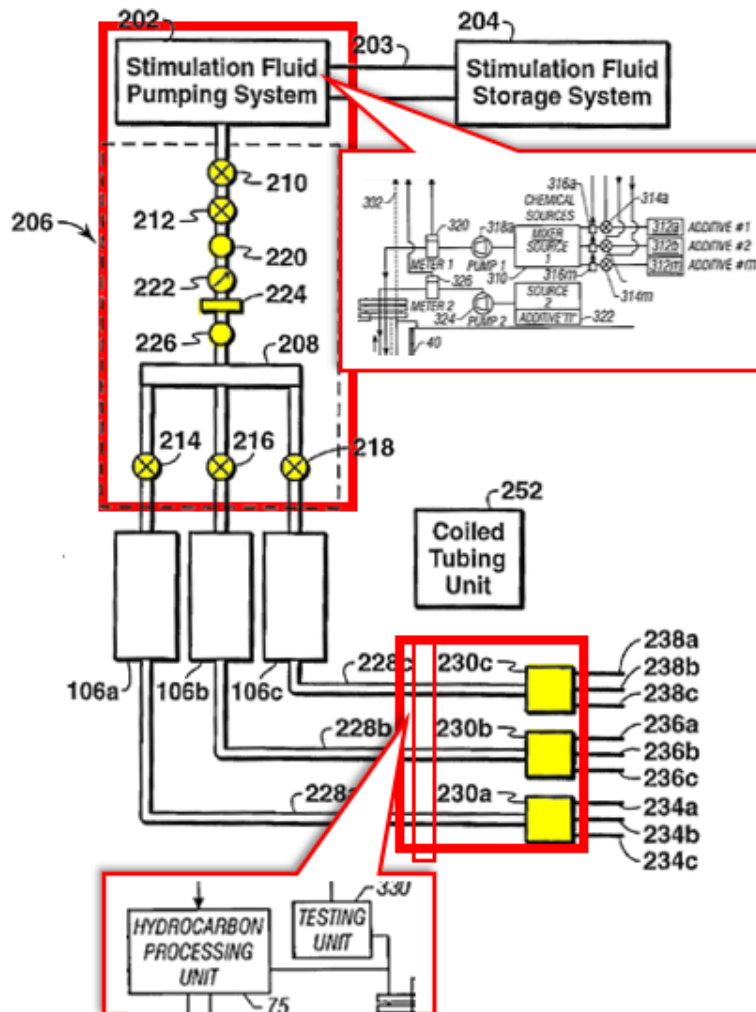


FIG. 2

Tolman, Fig. 2 (EX-1005) (annotated)

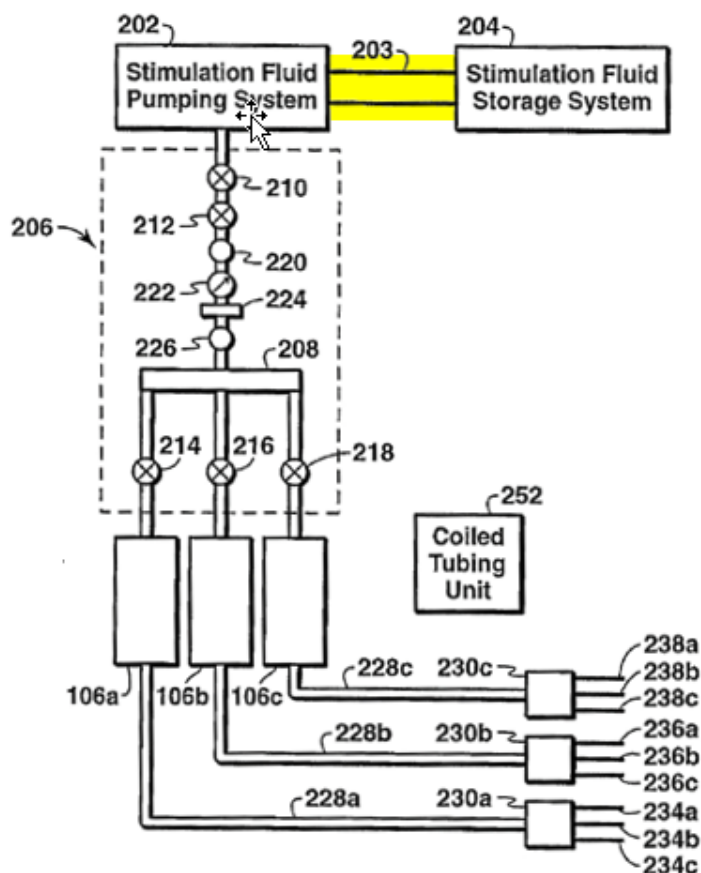
EX-1005, [0029] (“The stimulation fluid pumping system 202 couples to the stimulation fluid storage system 204 via piping 203, which may be high pressure steel lines or low pressure hoses depending on the specific application.”). A POSITA would have understood the Stimulation Fluid Pumping System 202 and system manifolds collectively satisfies “one or more centralized service factories.”

115. For these reasons, a POSITA would have understood that the combination of Tolman, Means, and Crawford render this claim limitation obvious.

iii. Limitation [17C]

116. Claim 17 recites “*a plurality of distribution lines coupled between the centralized well treatment fluid center and the one or more centralized service factories, wherein the plurality of distribution lines is adapted to flow one or more well development task fluid.*”

117. The Tolman/Means system renders this limitation obvious for the same reasons that I explain with respect to limitation 1A above. *See supra* § VII.B.1.i. The Tolman/Means/Crawford system includes piping 203 (“*a plurality of lines*”) coupled between its stimulation fluid storage system 204 and stimulation fluid pumping system 202, shown below:



Tolman, Fig. 2 (EX-1005) (annotated)

EX-1005, [0029] (“The stimulation fluid pumping system 202 couples to the stimulation fluid storage system 204 via piping 203, which may be high pressure steel lines or low pressure hoses depending on the specific application.”). A POSITA would have understood that this piping satisfies a “*plurality of lines*” between stimulation fluid storage system 204 (“*centralized well treatment fluid center*”) and stimulation fluid pumping system 202 (part of the “*one or more centralized service factories*”). As I explained with respect to limitation 1A above, *See supra* § VII.B.1.i, piping 203 in the Tolman/Means/Crawford system delivers

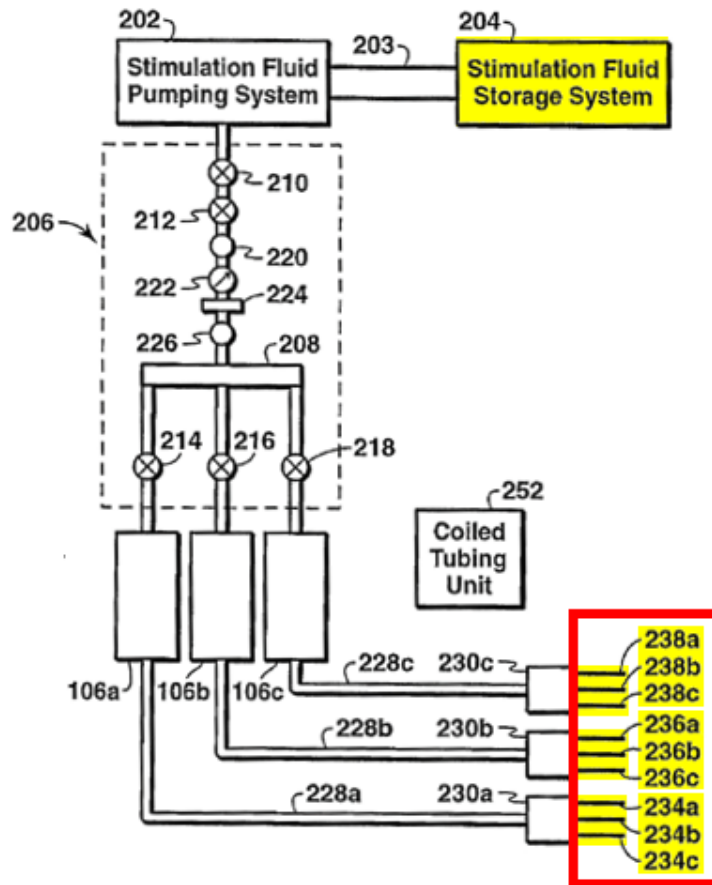
Mean's additives and/or other fluids (“*well development task fluid*”) to the Tolman's Stimulation Fluid Pump system 202, which then mixes the various additives.

118. For these reasons, a POSITA would have understood that the combination of Tolman, Means, and Crawford render this claim limitation obvious.

iv. *Limitation [17D]*

119. Claim 17 recites “*a plurality of return lines coupled between the centralized well treatment fluid center and the one or more centralized service factories, wherein the plurality of return lines is adapted to flow one or more recovered well treatment fluids.*”

120. The Tolman/Means/Crawford system renders this limitation obvious for the same reasons that I explain with respect to limitation 1D–E above. *See supra* §§VII.B.1.i–VII.B.1.ii. The Tolman/Means/Crawford system includes multiple flowlines 234a–238c (“*a plurality of return lines*”) coupled between its flowback manifolds 230a–230c and its stimulation fluid storage system 204, shown below:



Tolman, Fig. 2 (EX-1005) (annotated)

EX-1005, [0028] (“These flowlines 234a–234c, 236a–236c and 238a–238c may be coupled to flowback pits, flow test units, sales lines, tankage, oil/gas/water separating and processing units and/or other similar devices.”). A POSITA would have understood that these flowlines satisfy a “*plurality of return lines*” between flowback manifolds 230a–230c (another part of the “*one or more centralized service factories*”) and a centralized processing unit (part of a “*centralized well treatment fluid center*”) located at the stimulation fluid storage system 204. *See supra* §§VII.B.1.i–VII.B.1.ii.

3. Dependent Claim 2

121. Claim 2 depends from claim 1 and further recites “*wherein at least two well development task fluids are provided and they comprise different compositions.*”

122. Tolman discloses this limitation and/or the Tolman/Mean/Crawford system renders this limitation obvious.

123. Tolman describes using different compositions of well development task fluids for different wells. Specifically, claim 70 of Tolman recites “*wherein at least one of the stimulation fluid pumping system, the stimulation fluid supply system, and the pumping system manifold are configured to selectively deliver at least two different stimulation fluids to two or more wells.*” EX-1005, Claim 70 (emphasis added). A POSITA would have understood that two different stimulation fluids would be stimulation fluids with different compositions. *See* EX-1005, [0023] [0043]. Tolman thus describes providing “*two well development task fluids,*” each with their own “*composition.*”

124. Alternatively, Means explains that you might use “different additives at different well depths:”

The same or different injection lines may be used to supply additives to different production zones. In FIG. 1, line 14 is shown extending to a production zone below the zone 52. Separate injection lines allow injection of different additives at different well depths. The same also holds for

injection of additives in pipelines or surface processing facilities.

EX-1006, [0036]. A POSITA would have understood that using different additives would result in “*different compositions*” of “*well development task fluid*.” By using Means’ additive injection technique in the system of Tolman, the combined system of Tolman and Means also discloses “*two well development task fluids*,” each with their own “*composition*” based on Means use of different additives based on the depth of each well.

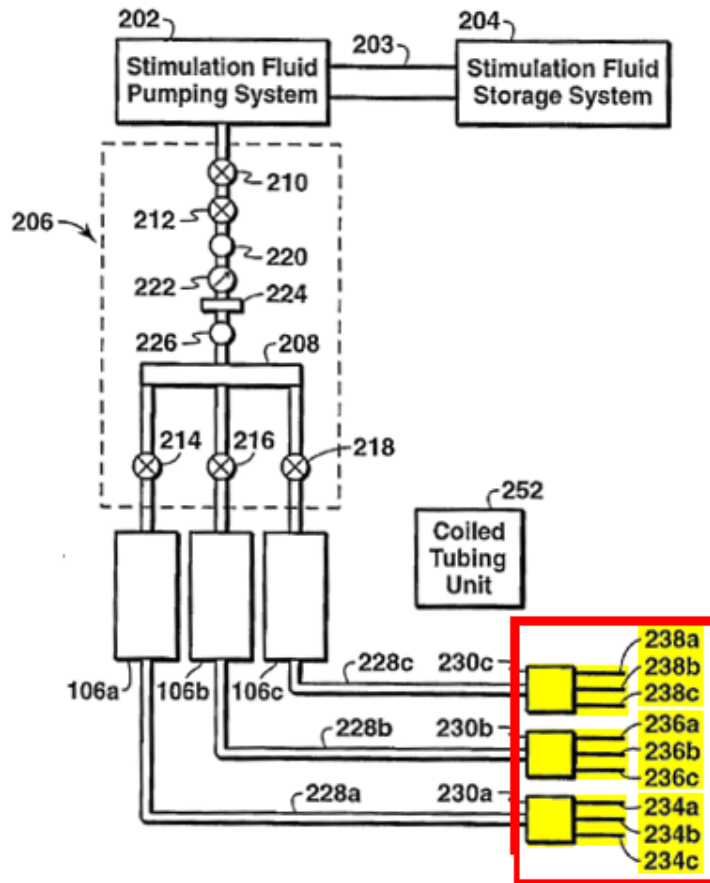
125. For these reasons, I believe a POSITA would have understood that the Tolman/Mean/Crawford system renders obvious this limitation.

4. Dependent Claim 3

126. Claim 3 depends from claim 1 and further recites “*disposing of at least one of the one or more recovered well treatment fluids at the centralized well treatment fluid center, wherein the centralized well treatment fluid center is configurable to dispose of the at least one of the one or more recovered well treatment fluids.*”

127. Tolman discloses disposing of at least one of the one or more recovered well treatment fluids at the centralized well treatment fluid center, wherein the centralized well treatment fluid center is configurable to dispose of the at least one of the one or more recovered well treatment fluids. For example, Tolman discloses that multiple flowlines 234a–238c (“*a plurality of return lines*”) are coupled to

Tolman's Stimulation Fluid Storage System through its flowback manifolds 230a–230c, shown below:



Tolman, Fig. 2 (EX-1005) (annotated)

EX-1005, [0028] (“The flowback manifolds 230a–230c may also be coupled to one or more flowlines 234a–234c, 236a–236c, and 238a–238c, respectively. These flowlines 234a–234c, 236a–236c and 238a–238c may be coupled to flowback pits, flow test units, sales lines, tankage, oil/gas/water separating and processing units and/or other similar devices.”). A POSITA would have understood that by coupling flowlines 234a–234c, 236a–236c and 238a–238c to flowback pits, flow test units,

sales lines, tankage, oil/gas/water separating and processing units and/or other similar devices, Tolman's Stimulation Fluid Storage System 204 would have disposed of at least one of the one or more recovered well treatment fluids. Further, such a person would have understood that flowback pits, flow test units, sales lines, tankage, oil/gas/water separating and processing units and/or other similar devices would have been located at Stimulation Fluid Storage System 204 in the Tolman/Means/Crawford system, *see* § VII.B.1.vi.

128. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, and Crawford renders this limitation obvious.

5. Dependent Claim 5

129. Claim 5 depends from claim 1 and further recites "*wherein at least one of the one or more well treatment fluids comprises a compound selected from the group consisting of drilling fluid, HMP, cement, gas, oil, water, proppant, fracturing fluid, gelling agents, friction reducers, acidizers, conformance fluids, cleaning fluids, brine, cutting abrasives and combinations thereof.*"

130. Tolman discloses using various well treatment fluids. For example, Tolman discloses using the following:

- proppant (EX-1005, [0023], [0027], [0043], [0065]).
- Both "hydraulic fracturing or acid stimulation in the production or injection wells." EX-1005, [0065], *see id.*
- A "guar-based gel fracture fluid" ("gelling agents"). EX-1005, [0043]

- Tolman Claim 5 of Tolman explains that its “treatment [is] selected from a hydraulic proppant fracture treatment, an acid fracture treatment, a matrix acid treatment,” which a POSITA would have understood that these treatments to include both acidizers and fracturing fluid;
- Tolman’s storage system 204 includes large supplies of water to provide to its stimulation fluid pumping system (“water”), (EX-1005 [0029]);
- oil/gas/water separating and processing units, which show “gas, oil, water” are all used in well treatment fluids. EX-1005, [0028].

Based on the above disclosures, a POSITA would have understood that Tolman discloses this limitation.

131. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, and Crawford renders this limitation obvious.

6. Dependent Claim 6

132. Claim 6 depends from claim 1. It further recites “*receiving a production fluid at one or more of the one or more centralized service factories from the at least one of the plurality of wells, wherein the one or more of the one or more centralized service factories is configurable to receive the production fluid; and receiving the production fluid at the centralized well treatment fluid center from the one or more of the one or more centralized service factories, wherein the centralized well treatment fluid center is configurable to receive the production fluid from the one or more of the one or more centralized service factories.*”

133. The combination of Tolman, Means, and Crawford renders this limitation obvious for the same reasons that I explain with respect to Claim 1 above. *See supra* § VII.B.1.vi. For example, Tolman discloses that the recovered

hydrocarbons from wells travel through manifolds 230a–230c (part of the “*one or more centralized service factories*”) for further processing:

Generally, the wells 104a–104c produce hydrocarbons through piping 228a–228c that is coupled between the respective oil field trees 106a–106c and the flowback manifolds 230a–230c. The piping 228a–228c may include high pressure steel lines utilized in oil field applications. The flowback manifolds 230a–230c may also be coupled to one or more flowlines 234a–234c, 236a–236c and 238a–238c, respectively. These flowlines 234a–234c, 236a–236c and 238a–238c may be coupled to flowback pits, flow test units, sales lines, tankage, oil/gas/water separating and processing units and/or other similar devices. Thus, the hydrocarbons from the wells 104a–104c typically flow through the flowback manifolds 230a–230c for further processing or sales.

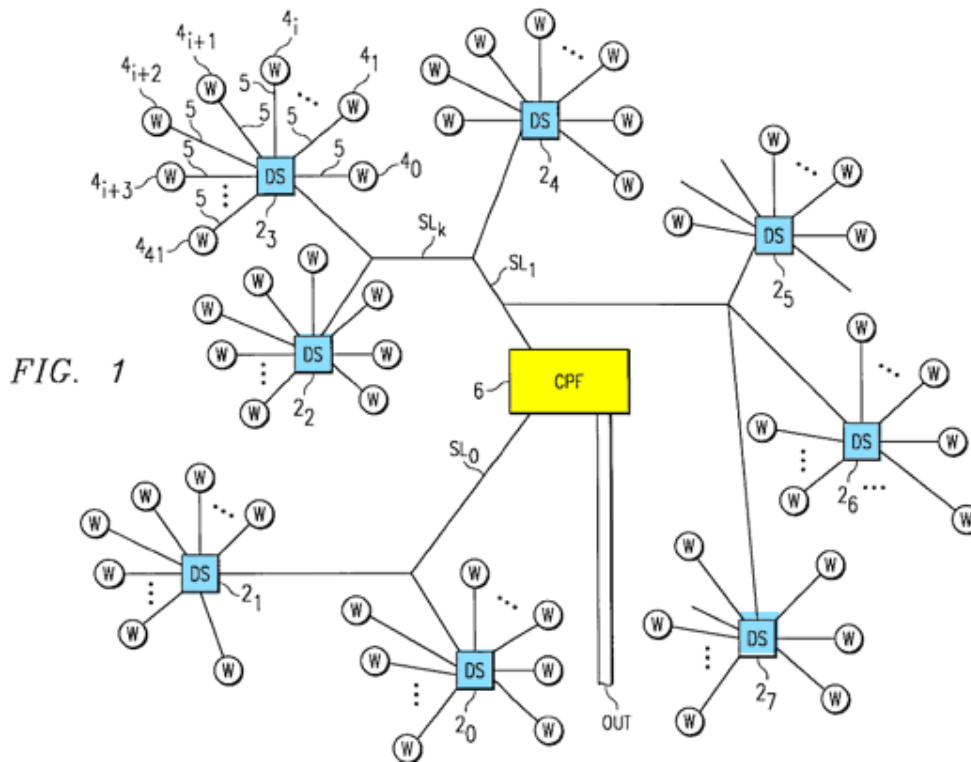
EX-1005, [0028]. Based on this disclosure, a POSITA would have understood that the Tolman/Means/Crawford system recovers well treatment fluids along with hydrocarbons (collectively, “*a production fluid*”) at the flowback manifolds 230a–230c (part of the “*one or more of the one or more centralized service factories*”) from flowlines 234a–234c, 236a–236c, and 238a–238c (“*the at least one of the plurality of wells*”). Such a person would have recognized that the flowback manifolds 230a–230c (part of the “*one or more centralized service factories*”) is configurable to receive the well treatment fluids and hydrocarbons (“*the production fluid*”).

134. The Tolman/Means/Crawford system further receives recovered well treatment fluids and hydrocarbons (“*the production fluid*”) at Stimulation Fluid

Storage System 204 (“*the centralized well treatment fluid center*”) from flowback manifolds 230a–230c (part of “*the one or more of the one or more centralized service factories*”).

135. Tolman explains that its manifold 230a–230c may direct fluid to various destinations. EX-1005, [0028]. The Tolman/Means/Crawford system would direct output fluid from multiple wells (“*centralized service factories*”) to a central processing facility 6 (“*centralized well treatment fluid center*”) located at Fluid Storage system. See EX-1008, 6:31–34, VII.B.1.vi. Figure 1 of Crawford illustrates how multiple drill sites (highlighted in green) are connected to this

central processing facility (highlighted in yellow) via surface lines:



Crawford, Fig. 1 (EX-1007) (annotated)

As shown above, “[e]ach drill site 2 may support many wells 4; for example, drill site 2₃ is illustrated in FIG. 1 as supporting forty-two wells 4₀ through 4₄₁.” EX-1008, 6:29–32. “Each drill site 2 gathers the output from its associated wells 4, and forwards the gathered output to central processing facility 6 via one of surface lines SL.” EX-1008, 6:31–34. A POSITA would have understood that the output from the wells includes oil, gas, and water. EX-1008, 6:55–59 (“Central processing facility 6 receives oil, water, and gas (including both recycled lift gas and formation gas)

phases from drill sites 2 via surface lines SL, and includes the appropriate separation and compression equipment for separating the desired phases from one another.”); *See id.*, Fig. 2; 6:6–41. Based on these disclosures, a POSITA would have understood that Crawford discloses “*receiving the production fluid at the centralized well treatment fluid center from the one or more of the one or more centralized service factories.*” Further, a POSITA would have understood that the Stimulation Fluid Storage System 204 in the Tolman/Means/Crawford system includes the central processing facility (“*the centralized well treatment fluid center*”) is configurable to receive recovered well treatment fluids and hydrocarbons (“*the production fluid*”) from flowback manifolds 230a–230c (part of “*the one or more of the one or more centralized service factories*”).

136. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, and Crawford renders this limitation obvious.

7. Dependent Claim 7

137. Claim 7 depends from claim 6 and recites “*separating the production fluid into at least two or more second production fluids, wherein the centralized well treatment fluid center is configurable to separate the production fluid into at least two or more second production fluids.*”

138. The combination of Tolman, Means, and Crawford renders this limitation obvious. For example, Means’s closed loop additive system separates the

production fluid into at least two or more second production fluids. EX-1006, [0039] (“the produced fluid 69 received at the surface is processed by a treatment unit or processing unit 75. The surface processing unit 75 may be of the type that processes the fluid 69 to remove solids and certain other materials such as hydrogen sulfide, or that processes the fluid 69 to produce semi-refined to refined products.”). Based on this disclosure, a POSITA would have understood that processing the produced fluid 69 (“*the production fluid*”) to remove solids and certain other materials would include separating the production fluid into at least two or more second production fluids as part of the processing procedures. Such a person also would have understood that processing the fluid 69 to produce semi-refined to refined products would necessitate separating the production fluid into at least two or more second production fluid as part of the processing procedures.

139. Moreover, a POSITA would have understood that, in the Tolman/Mean/Crawford system, Stimulation Fluid Storage System 204 (and “*the centralized well treatment center*”) includes the central processing facility 6 from Crawford and is configurable to separate the production fluid into at least two or more second production fluids. Crawford’s central processing facility 6 is configurable to separate the production fluid into at least two or more second production fluids. EX-1007 6:66–7:2 (“As illustrated in FIG. 3, separator 8 receives surface lines SL from drill sites 2, and is realized by conventional equipment for

separating the water, oil, and gas phases from the flow received from drill sites 2.”). A POSITA would have understood that Stimulation Fluid Storage System 204 in the Tolman/Means/Crawford system would incorporate a separator 8 from Crawford’s central processing facility 6 (“*the centralized well treatment center*”), making Tolman’s Stimulation Fluid Storage System 204 configurable to separate the production fluid into at least two or more second production fluids.

140. To the extent that one argues that, the Tolman/Means/Crawford system includes Stimulation Fluid Storage System 204 that is not configurable to separate the production fluid into at least two or more second production fluids, such a feature would have been obvious based on the above teachings of Tolman, Means, and Crawford. First, a POSITA would have found it obvious to incorporate a separator 8 from Crawford’s central processing facility 6 into Tolman’s Stimulation Fluid Storage System 204 for the same reasons it would be obvious to combine Crawford and Tolman described above, *see* § VII.B.1.vi, given that the separator 8 is included in Crawford’s central processing facility that is incorporated into Tolman’s system.

141. Alternatively, a POSITA would have understood that the Tolman/Means/Crawford system includes Means closed-loop additive injection system discloses separating the production fluid into at least two or more second production fluids. EX-1006, [0039] (“the produced fluid 69 received at the surface is processed by a treatment unit or processing unit 75. The surface processing unit

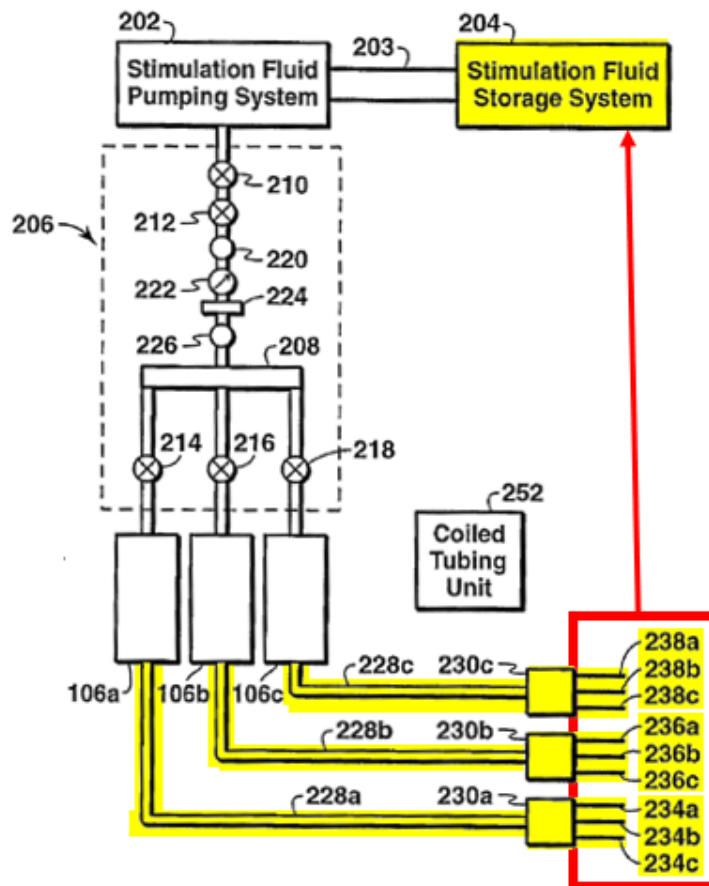
75 may be of the type that processes the fluid 69 to remove solids and certain other materials such as hydrogen sulfide, or that processes the fluid 69 to produce semi-refined to refined products.”). A POSITA also would have understood that such separation would be completed by a treatment unit or processing unit 75 from Means closed-loop additive injection system.

142. A POSITA also would have understood that Means discloses additives and other materials needed for stimulation treatment. EX-1006, [0005]. Such a person also would have understood that delivering additives and other materials needed for stimulation treatment is treating fluid for the planned stimulation treatment. *See* EX-1005, [0029]. In addition, a POSITA would have found it obvious to use a treatment unit or processing unit 75 from Means closed-loop additive injection system to treat or process the production fluid rather than just treating fluid for the planned stimulation treatment. Such a person would have understood such use of a treatment unit or processing unit 75 to treat or process the production fluid to include separating the production fluid into at least two or more production fluids.

143. A POSITA would have understood that the production fluid is delivered to Tolman’s Stimulation Fluid Storage System 204. Tolman discloses that recovered stimulation fluid and hydrocarbons (“*the production fluid*”) is recovered from the wells. EX-1006, [0046] (“flowback operations may be performed to force close the proppant fractures 422, 424, 426, 428 and 430 and recover the stimulation fluid . . .

.), [0047] (“However, in FIG. 1, the first well 104a is being flowed back . . . to force close the proppant fractures 404, 46, 502, 504 and 506 and recover the stimulation fluid . . .”), [0051] (“Accordingly, the second well 104b is flowed back . . . to force close the fractures and recover the stimulation fluid used . . .”), [0053] (“Accordingly, each well receiving the stimulation treatment may be flowed back overnight for several hours of stimulation fluid recovery and for oil and gas sales”).

144. The subsequent path of recovered stimulation fluid is shown in Figure 2 below:



Tolman, Fig. 2 (EX-1005) (annotated)

145. Specifically, a POSITA person would have further understood the path that the recovered fluid takes to be flowing from wells in oil field trees 106a–106c through the corresponding of Tolman’s flowlines 234a–234c, 236a–236c and 238a–238c destined for the Stimulation Fluid Storage System 204 (“*the centralized well fluid treatment center*”) for further processing in the Tolman/Means/Crawford system. See § VII.B.1.vi.

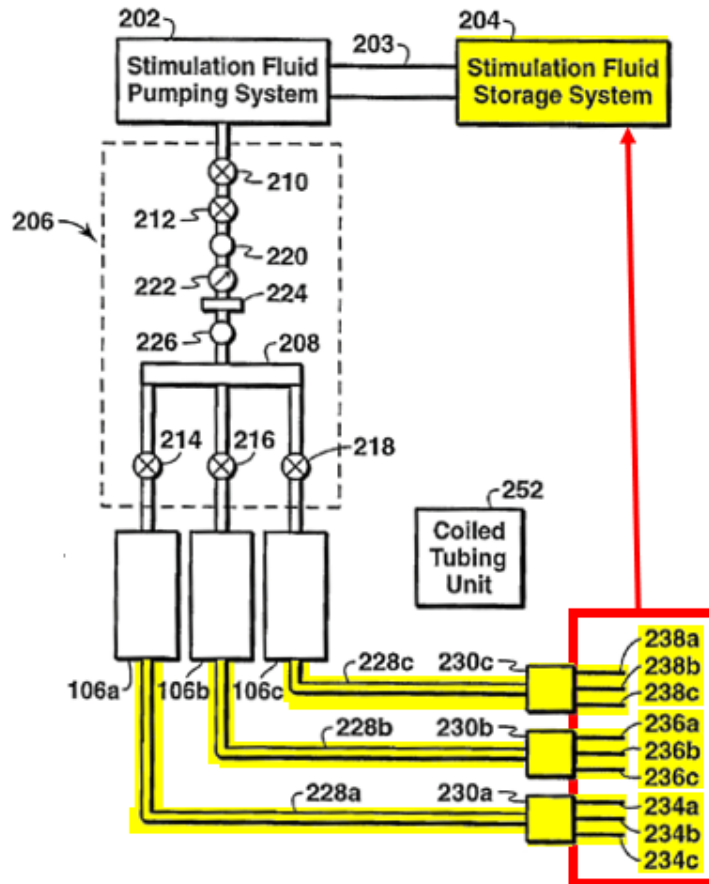
146. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, and Crawford renders this limitation obvious.

8. Dependent Claim 9

147. Claim 9 depends from claim 7 and further recite “*flowing the at least two or more second production fluids to a distribution center, wherein the centralized well treatment fluid center is configurable to flow the at least two or more second production fluids to the distribution center.*”

148. The Tolman/Means/Crawford system includes Stimulation Fluid Storage System 204 (“*the centralized well treatment fluid center*”) that is configurable to flow the at least two or more second production fluids to sales lines (“*a distribution center*”). Tolman’s Figure 2 discloses that multiple flowlines 228a–228c that would be coupled to Stimulation Fluid Storage System 204 in the

Tolman/Means/Crawford system via its flowback manifolds 230a–230c, shown below:



Tolman, Fig. 2 (EX-1005) (annotated)

EX-1005, [0028] (“The flowback manifolds 230a–230c may also be coupled to one or more flowlines 234a–234c, 236a–236c, and 238a–238c, respectively. These flowlines 234a–234c, 236a–236c and 238a–238c may be coupled to flowback pits, flow test units, sales lines, tankage, oil/gas/water separating and processing units and/or other similar devices.”). Tolman discloses that the flowlines 234a–234c, 236a–236c, and 238a–238c may be coupled to sales lines. *Id.*

149. These sales lines would terminate at “*a distribution center*” in the Tolman/Means/Crawford system. For the reasons discussed in § VII.B.7, two or more second production fluids at Stimulation Fluid Storage System 204 in the Tolman/Means/Crawford system allows recovered well treatment fluid (separated into “*the at least two or more second production fluids*,” *see supra* § VII.B.7) to flow from a central point through pipeline OUT to a large-scale pipeline, shipping port, or storage facility (“*a distribution center*”) from the central processing facility inside the Stimulation Fluid Storage System 204 (“*the centralized well treatment fluid center*”). *See supra* § VII.B.7; EX-1007 6:59–64 (“The oil output is presented by central processing facility 6 on pipeline OUT illustrated in FIG. 1. Pipeline OUT may connect into a large scale pipeline, may feed a shipping port, or may forward the oil to a storage facility, as appropriate in the particular production operation.”). Based on these teachings, a POSITA would have understood that for central processing facility 6 to flow recovered well treatment fluids to a large-scale pipeline, shipping port, or storage facility, central processing facility 6 must necessarily have been configurable to flow recovered well treatment fluids to a large-scale pipeline, shipping port, or storage facility. Accordingly, the Stimulation Fluid Storage System 204 (“*the centralized well treatment fluid center*”) in the Tolman/Means/Crawford system is configurable to flow the at least two or more second production fluids to sales lines terminating at “*a distribution center*.” With a system configured to do so,

a POSITA would have found it obvious to utilize said configuration to flow the at least two or more second production fluids to a sales line to a “*distribution center*.”

150. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, and Crawford renders this limitation obvious.

9. Dependent Claim 10

151. Claim 10 depends from claim 1. Claim 10 recites limitations very similar to those in claim 1. Notably, the sole difference between these claims is that claim 10 recites “other” well development task fluids, shown below:

Claim 1	Claim 10
flowing from a centralized well treatment fluid center to one or more centralized service factories one or more well development task fluids, wherein the one or more centralized service factories are selectively configurable to receive the one or more well development task fluids;	flowing from the centralized well treatment fluid center to the one or more centralized service factories one or more <i>other</i> well development task fluids, wherein the one or more centralized service factories are selectively configurable to receive the one or more <i>other</i> well development task fluids;
flowing from the one or more centralized service factories to at least one of the plurality of wells the one or more well treatment fluids, wherein the one or more centralized service factories are selectively configurable to flow the one or more well treatment fluids;	flowing from the one or more centralized service factories to the at least one of the plurality of wells the one or more <i>other</i> well treatment fluids, wherein the one or more centralized service factories is selectively configurable to flow the one or more <i>other</i> well treatment fluids;
recovering from the at least one of the plurality of wells the one or more well treatment fluids at the one or	recovering from the at least one of the plurality of wells the one or more <i>other</i> well treatment fluids at the one

Claim 1	Claim 10
more centralized service factories, wherein the one or more centralized service factories are selectively configurable to receive the one or more recovered well treatment fluids; and	or more centralized service factories, wherein the one or more centralized service factories are selectively configurable to receive the one or more recovered <i>other</i> well treatment fluids; and
flowing from the one or more centralized service factories to the centralized well treatment fluid center the one or more recovered well treatment fluids, wherein the one or more centralized service factories are selectively configurable to flow the one or more recovered well treatment fluids, and wherein the centralized well treatment fluid center is selectively configurable to receive the one or more recovered well treatment fluids.	flowing from the one or more centralized service factories to the centralized well treatment fluid center the one or more <i>other</i> recovered well treatment fluids, wherein the one or more centralized service factories are selectively configurable to flow the one or more <i>other</i> recovered well treatment fluids, and wherein the centralized well treat fluid center is selectively configurable to receive the one or more <i>other</i> recovered well treatment fluids.

As I explained above, the Tolman/Means/Crawford system uses multiple well treatment development task fluids and well treatment fluids, which would result in other “recovered well treatment fluids.” For example, and as I explained in §§ VII.B.1.ii–VII.B.1.iii above, the Tolman/Means system includes Means’ additives and/or other fluids (multiple “*well development task fluids*”) needed to improve or perform stimulation treatment. Such a person that these various additives may be mixed with different compositions and/or additives resulting in different “*well treatment fluids*.” See § VII.B.3. A POSITA would have understood that, by using

these “*other*” well treatment fluids, the recovered stimulation fluid from the well would be “*other recovered well treatment fluid*.” Accordingly, Tolman, Means, and Crawford renders this limitation obvious for the same reasons that I explain with respect to Claim 1 above. *See supra* § VII.B.1.

152. Alternatively, Tolman discloses these “other” fluids in an embodiment with a surface pad 102 which may include two or more stimulation fluid pumping systems. *See* EX-1005, [0067]. Tolman discloses as follows:

For instance, a surface pad may include two stimulation fluid pumping system, which are stimulation fluid pumping system 202 of FIG. 2. This configuration for the surface pad may also include two stimulation storage systems 204, two pumping system manifolds 206, and other associated piping. Each of the stimulation storage systems, pumping system manifolds, and other associated piping may each be associated with two different groups or sets of wells. In this manner, two wells may be stimulated concurrently or simultaneously. That is, one well associated with each of the stimulation fluid pumping systems may receive stimulation treatments, while other wells from the well groups may be prepared for stimulation treatments.

In this disclosure, with two of each of stimulation fluid pumping systems 202, stimulation storage systems 204, pumping system manifolds 206, and multiple wells stimulated concurrently or simultaneously, each system uses at least one well development task fluids, well treatment fluid, and recovered well treatment fluid, such that there is at least one first well development task fluid, well treatment fluid,

and recovered well treatment fluid, and one “other” well development task fluid, well treatment fluid, and recovered well treatment fluid.

153. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, and Crawford renders this limitation obvious.

10. Dependent Claim 11

154. Claim 11 depends from claim 1 and further recites “*storing the one or more recovered well treatment fluids at the centralized well treatment fluid center, wherein the centralized well treatment fluid center is configurable to store the one or more recovered well treatment fluids.*”

155. As discussed supra, Crawford discloses “receiving the production fluid at the centralized well treatment fluid center from the one or more of the one or more centralized service factories.” See § VII.B.6. Further, a POSITA would have understood that Tolman’s Stimulation Fluid Storage System 204 (“the centralized well treatment fluid center”) is configurable to receive recovered well treatment fluids from flowback manifolds 230a–230c (part of “the one or more of the one or more centralized service factories”). See § VII.B.6.

156. Tolman discloses that Stimulation Fluid Storage System 204 is configured to store fluids. EX-1005, [0029] (“The stimulation fluid storage system 204 is a vessel that holds a sufficient volume of fluid for the planned stimulation treatments. It is noted that the stimulation fluid storage system 204 may include tanks

located on the surface pad 102, a pit dug on the surface pad 102, and/or a pond, like, river or water storage facility located in close proximity to the surface pad 102.”). A POSITA would have understood that Tolman’s Stimulation Fluid Storage System 204 is configured to store the one or more recovered well treatment fluids. Understanding that Tolman’s Stimulation Fluid Storage System 204 is configured to store the one or more recovered well treatment fluids, it would be obvious to a POSITA to store the one or more recovered well treatment fluids at Tolman’s Stimulation Fluid Storage System 204 (*“the centralized well treatment fluid center”*).

157. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, and Crawford renders this limitation obvious.

11.Dependent Claim 12

158. Claim 12 depends from claim 1 and further recites *“flowing from the centralized well treatment fluid center substantially simultaneously two or more well development task fluids to at least one of the one or more centralized service factories, wherein the centralized well treatment fluid center is configurable to flow substantially simultaneously the two or more well development task fluids, and wherein the at least one of the one or more centralized service factories are configurable to receive substantially simultaneously the two or more well development task fluids.”*

159. Storage system 204 (“*centralized well treatment fluid center*”) in the Tolman/Means/Crawford system uses piping 203 to carry fluid and additives to stimulation fluid pumping system 202. EX-1005, [0029] (“The stimulation fluid pumping system 202 couples to the stimulation fluid storage system 204 via piping 203, which may be high pressure steel lines or low pressure hoses depending on the specific application. The stimulation fluid storage system 204 is a vessel that holds a sufficient volume of fluid for the planned stimulation treatments.”). The Tolman/Means/Crawford system includes pipes 203 to carry Tolman’s fluids, *see* EX-1005, [0029], as well as Means additives and other fluids, *see* EX-1006, [0040] and [0047]–[0048], each of which satisfy additional “*well development task fluids*.” *See* §§ VII.B.1.ii–VII.B.1.iii. A POSITA would thus have understood that the combined system results in storage system 204 (“*the centralized well treatment fluid center*”) is configurable to send fluids, additives, and other materials “*substantially simultaneously*” using pipes 203 to the stimulation fluid pumping system 202 (“*centralized service factories*”). Such a person would have further recognized that stimulation pumping system in the Tolman/Means/Crawford system would be configured to receive these fluids, additives, and other materials via piping 203.

160. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, and Crawford renders this limitation obvious.

12. Dependent Claim 13

161. Claim 13 depends from claim 12 and further recites “*flowing to a first well of the plurality of wells from the at least one of the one or more centralized service factories any of the one or more well treatment fluids prepared from the two or more well development task fluids substantially simultaneously with flowing to a second well of the plurality of wells from the at least one of the one or more centralized service factories any of the one or more well treatment fluids prepared from the two or more well development task fluids, wherein the at least one of the one or more centralized service factories is configurable to flow substantially simultaneously at least two of the one or more well treatment fluids.*”

162. Pumping System 202 (part of a “*centralized service factory*”) in the Tolman/Means/Crawford system simultaneously pumps stimulation fluid (“*well treatment fluid*”) into multiple wells 104a–104c via pumping system manifold 206 (also part of a “*centralized service factory*”). EX-1006, [0019] (“That is, the present techniques provide mechanisms to enhance production economics ***by enabling simultaneous or concurrent operations in the stimulation of multiple wells*** in a manner that reduces non-productive time for equipment, material, and/or personnel.”) (emphasis added). To do so, Tolman describes that, by using manifold well valves 210–218, “stimulation fluid may be injected into one or more of the wells 104a–104c, while the other wells 104a–104c may be isolated by at least one of the

valves 214–218 from the stimulation fluid pumping system 202.” EX-1005, [0031]; *see id.*, Fig. 2. Based on these disclosures, a POSITA would have understood that stimulation fluid pumping system 202 in the Tolman/Means/Crawford system simultaneously stimulates multiple wells 104a–104c. Claim 56 confirms this understanding of Tolman. *See* EX-1006, Claim 56 (reciting “pumping a first stimulation treatment fluid into a first well through a first fluid line connected to the pumping system manifold; and ***simultaneously pumping*** a second stimulation treatment fluid into a second well through a second line connected to the pumping system manifold.”) (emphasis added). Based on these disclosures, a POSITA would have understood that stimulation fluid pumping system 202 (a “*centralized service factory*”) simultaneously pumps treatment fluid (“*well treatment fluid*”) into multiple wells 10 (“*flowing to a first*” and “*second well of the plurality of wells*”) by “*configuring*” valves in pumping system manifold 206.

163. As I explained above, the stimulation fluid pumping system 202 in the Tolman/Means/Crawford system prepares “*one or more well treatment fluids*” from multiple “*well development task fluids*.” *See* §§ VII.B.1.ii–VII.B.1.iii.

164. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, and Crawford renders this limitation obvious.

13. Dependent Claim 14

165. Claim 14 depends from claim 9 and further recites “*flowing from the centralized well treatment fluid center to the one or more centralized service factories the one or more well treatment fluids, wherein the one or more centralized service factories are selectively configurable to receive the one or more well treatment fluids.*”

166. Claim 14 depends from claim 1. Claim 14 recites limitations very similar to those in claim 1. Notably, the sole difference between these claims is that claim 14 recites adding the word “the” three times, shown below:

Claim 1	Claim 14
flowing from a centralized well treatment fluid center to one or more centralized service factories one or more well development task fluids, wherein the one or more centralized service factories are selectively configurable to receive the one or more well development task fluids;	flowing from <i>the</i> centralized well treatment fluid center to <i>the</i> one or more centralized service factories <i>the</i> one or more well treatment fluids, wherein the one or more centralized service factories are selectively configurable to receive the one or more well treatment fluids.

167. The combination of Tolman and Means renders this limitation obvious for the same reasons that I explain with respect to Claim 1 above. *See supra* § VII.B.1.

14. Dependent Claim 15

168. Claim 15 depends from claim 1 and further recites “*flowing to two or more wells of the plurality of wells substantially simultaneously the one or more well treatment fluids from at least one of the one or more centralized service factories, wherein the at least one of the one or more centralized service factories is configurable to flow substantially simultaneously the one or more well treatment fluids to the two or more wells of the plurality of wells; and recovering from the two or more wells of the plurality of wells substantially simultaneously the one or more well treatment fluids at the at least one of the one or more centralized service factories, wherein the at least one of the one or more centralized service factories is configured to recover substantially simultaneously the one or more well treatment fluids.*”

169. As I explained above, *see* § VII.B.12, stimulation fluid pumping system 202 (a “*centralized service factory*”) in the Tolman/Means/Crawford system simultaneously pumping stimulation fluid (“*well treatment fluid*”) into multiple wells 10 (“*flowing to a first*” and “*second well of the plurality of wells*”) by “*configuring*” valves in pumping system manifold 206.

170. Tolman also discloses that, after stimulation treatment, flowback manifolds 230a–230c recover hydrocarbons produced from the well via piping 228a–228c. *see e.g.*, EX-1005, [0028], (“Generally, the wells 104a–104c produce

hydrocarbons through piping 228a–228c that is coupled between the respective oil field trees 106a–106c and the flowback manifolds 230a–230c.”); *see* § VII.B.1. Given that Tolman discloses simultaneous treatment of multiple wells, a POSITA would have understood that Tolman likewise discloses simultaneously recovering treatment fluid from multiple wells. EX-1005, [0028] (“Thus, the hydrocarbons from the wells 104a–104c typically flow through the flowback manifolds 230a–230c for further processing or sales.”). Claim 59 confirms this understanding of Tolman. EX-1005, Claim 59 (reciting “producing hydrocarbons from the plurality of wells.”). Based on these disclosures, a POSITA would have understood that the Tolman/Mean/Crawford system discloses that Tolman’s flowback manifolds are configured to “*recover[] from the two or more wells of the plurality of wells substantially simultaneously the one or more well treatment fluids at the at least one of the one or more centralized service factories.*”

171. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, and Crawford renders this limitation obvious.

15. Dependent Claim 18

172. Claim 18 depends from claim 17 and further recites “*a plurality of modules disposed about each of the one or more centralized service factories; a first fluid flow line coupled between the at least one of the plurality of wells and any of the plurality of modules, wherein the first fluid flow line is adapted to flow one or*

more well treatment fluids to the at least one of the plurality of wells; and a second fluid flow line coupled between the at least one of the plurality of wells and one or more of the plurality of modules, wherein the second fluid flow line is adapted to recover the one or more well treatment fluids from the at least one of the plurality of wells; wherein a first configuration of the plurality of modules is operable to flow a first well treatment fluid to the at least one of the plurality of wells; and wherein a second configuration of the plurality of modules is operable to flow a second well treatment fluid to the at least one of the plurality of wells.”

i. [18A] “a plurality of modules disposed about each of the one or more centralized service factories”

173. The combination of Tolman, Means, and Crawford renders this limitation obvious. Tolman describes a pumping system manifold 206 that directs fluid various to oil field trees. *See* EX-1005, [0030] (“For instance, the pumping system manifold 206 may include a set of pipes 208 to interface each of the trees 106a–106c with the stimulation fluid pumping system 202.”). Figure 2 of Tolman illustrates these valves, shown below:

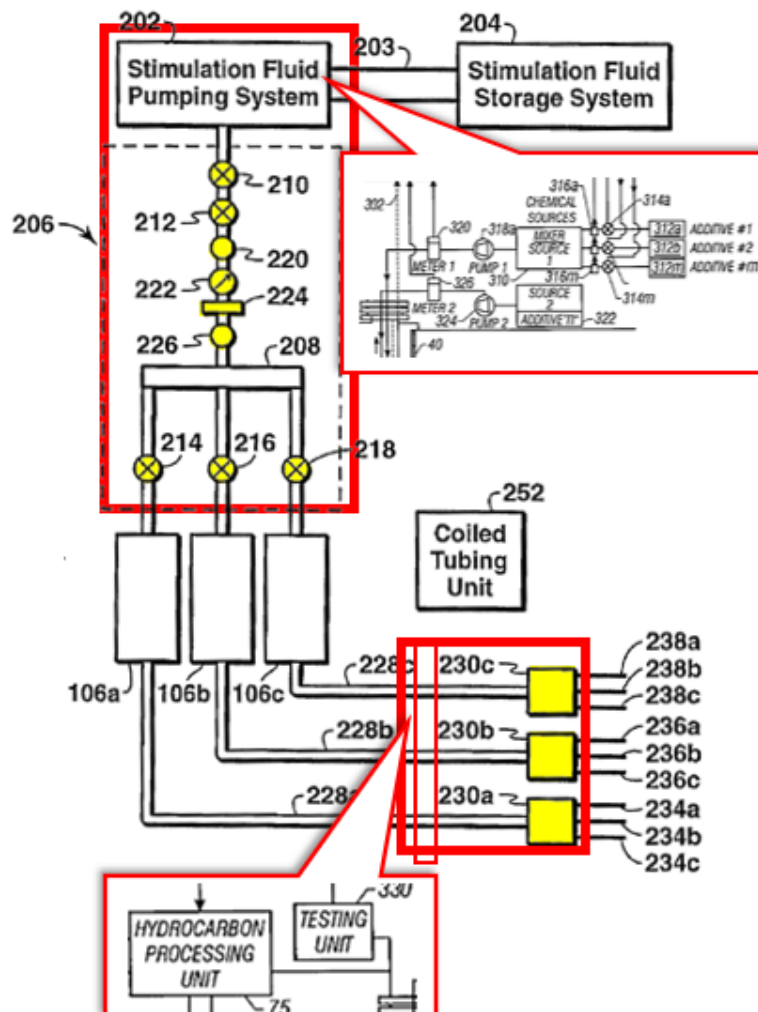


FIG. 2

Tolman, Fig. 2 (EX-1005) (annotated)

174. As shown above, Tolman's valves are configured to allow fluid from the stimulation pumping system 202 to be directed toward individual wells:

Each of the trees 106a–106c may be connected to the first manifold well valve 214, second manifold well valve 216, and a third manifold well valve 218, respectively, or utilize other devices to couple to the trees 106a–106c. Valves 210, 214, 216 and 218 may be any type of valve, including those routinely used in oil-field applications, such as gate

valves or ball valves, while the manifold check valve 212 may be configured to allow fluid flow from the stimulation fluid pumping system 202, but to prevent reverse flow of fluids into the stimulation fluid pumping system 202. These valves 210, 214, 216 and 218 may be actuated or positioned to a full-open or full-closed position to provide hydraulic isolation between individual wells 104a–104c and the stimulation fluid pumping system 202.

EX-1005, [0030];

Through the coupling of the valves 210, 212, 214, 216 and 218, flow paths may be provided through the pumping system manifold 206. Because the first manifold well valve 214, second manifold well valve 216, and a third manifold well valve 218 may be set to an open or closed position, stimulation fluid may be injected into one or more of the wells 104a–104c, while the other wells 104a–104c may be isolated by at least one of the valves 214–218 from the stimulation fluid pumping system 202. To enhance reliability, it may be preferred that two valves, such as a manifold well valve 214–218 and a valve (not shown) on the tree 106a–106c, are closed during any given isolation from the other wells.

EX-1005, [0031];

Accordingly, the surface pad 102 is prepared for the stimulation operations, as shown in block 308. The preparations may include coupling the piping 228a–228c, manifold valves 230a–230c and flowlines 234a–234c, 236a–236c and 238a–238c together and coupling the pumping system manifold 206 to the trees 106a–106c and the stimulation fluid pumping system 202. The pumping system manifold 206 may be coupled to any number of wells with the appropriate valves, flow measurements devices, flow control devices.

EX-1005, [0037]. Based on the above disclosures, a POSITA would have understood that Tolman’s pumping system manifold 206 (part of the “*centralized service factory*”) directs stimulation fluid to various oil field trees (“*the plurality of wells.*”).

176. Means discloses a plurality of modules disposed just before the downhole stream. EX-1006 Fig. 1, Fig. 3, [0047]. Several of these modules are shown in Figure 3 below:

FIG. 3

Means, Fig. 3 (EX-1006)

EX-1006, Fig. 3. As shown in Figure 3, system 300 is located before fluid goes downhole. *See* EX-1006, [0047]. A POSITA would have understood this system 300, as modifying Tolman, to be disposed about the manifolds 206 and 230a–230c. Means discloses a plurality of modules as part of system 300:

The system 300 may include a mixer 310 for mixing or combining at the wellsite a plurality of additive #1–additive #m stored in sources 313[sic]a–312m respectively. In some situations, it is desirable to transport certain additives in their component forms and mix them at the wellsite for safety and environmental reasons. For example, the final or combined additives may be toxic, although while the component parts may be non-toxic. Additives may be shipped in concentrated form and combined with diluents at the wellsite prior to injection into the well 50. In one embodiment of the present invention, additives to be combined, such as additives additive #1–additive #m are metered into the mixer by associated pumps 314a–314m. Meters 316a–316m measure the amounts of the additives from sources 312a–312m and provide corresponding signals to the control unit 340, which controls the pumps 314a–314m to accurately dispense the desired amounts into the mixer 310. A pump 318 pumps the combined additives from the mixer 310 into the well 50, while the meter 320 measures the amount of the dispensed additive and provides the measurement signals to the controller 340. A second additive required to be injected into the well 50 may be stored in the source 322, from which source a pump 324 pumps the required amount of the additive into the well. A meter 326 provides the actual amount of the additive dispensed from the source 322 to the controller 340, which in turn controls the pump 324 to dispense the correct amount.

EX-1006, [0047]. A POSITA would have understood all these pumps 318 and 324, meters 320 and 326, mixer source 1 310, source 2 322, additive sources 312a–312m, additive associated pumps 314a–314m, and additive meters 316a–316m satisfy the claimed “*modules*” and would be disposed about each of the manifolds 206 and 230a–230c.

177. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, and Crawford renders this limitation obvious.

- ii. *[18B] a first fluid flow line coupled between the at least one of the plurality of wells and any of the plurality of modules, wherein the first fluid flow line is adapted to flow one or more well treatment fluids to the at least one of the plurality of wells*

178. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, and Crawford renders this limitation obvious. Tolman describes a pumping system manifold 206 that directs stimulation fluid various to oil field trees using valves. *See* EX-1005, [0030] (“For instance, the pumping system manifold 206 may include a set of pipes 208 to interface each of the trees 106a–106c with the stimulation fluid pumping system 202.”). Figure 2 of Tolman illustrates these valves 214-218, shown below:

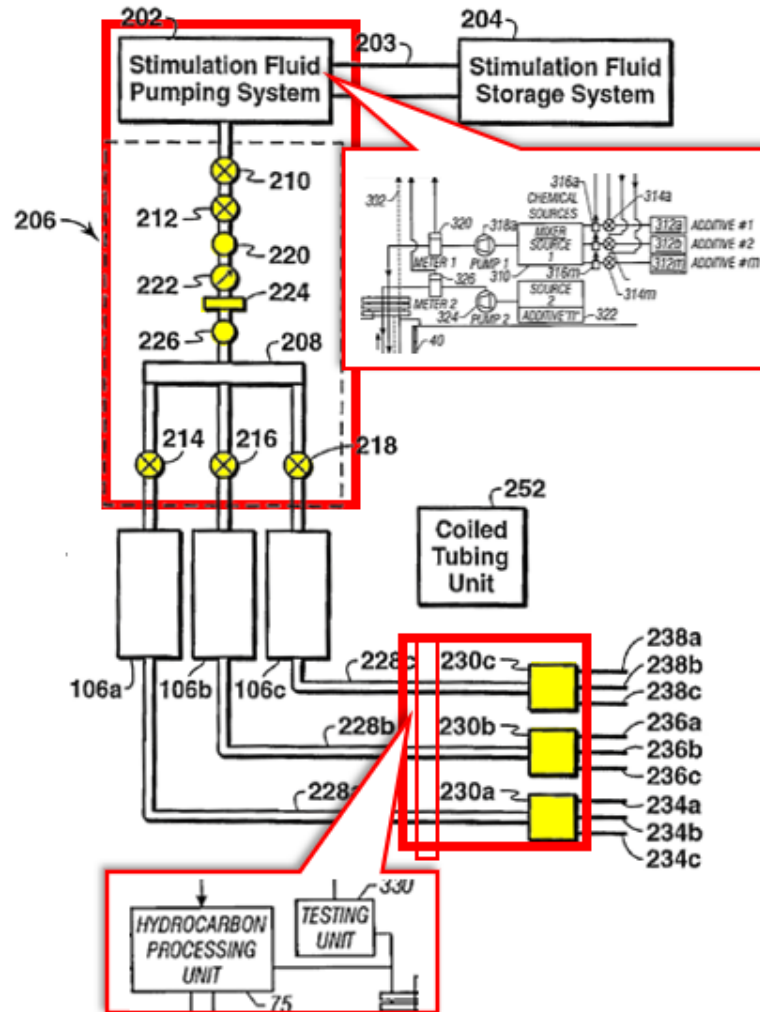
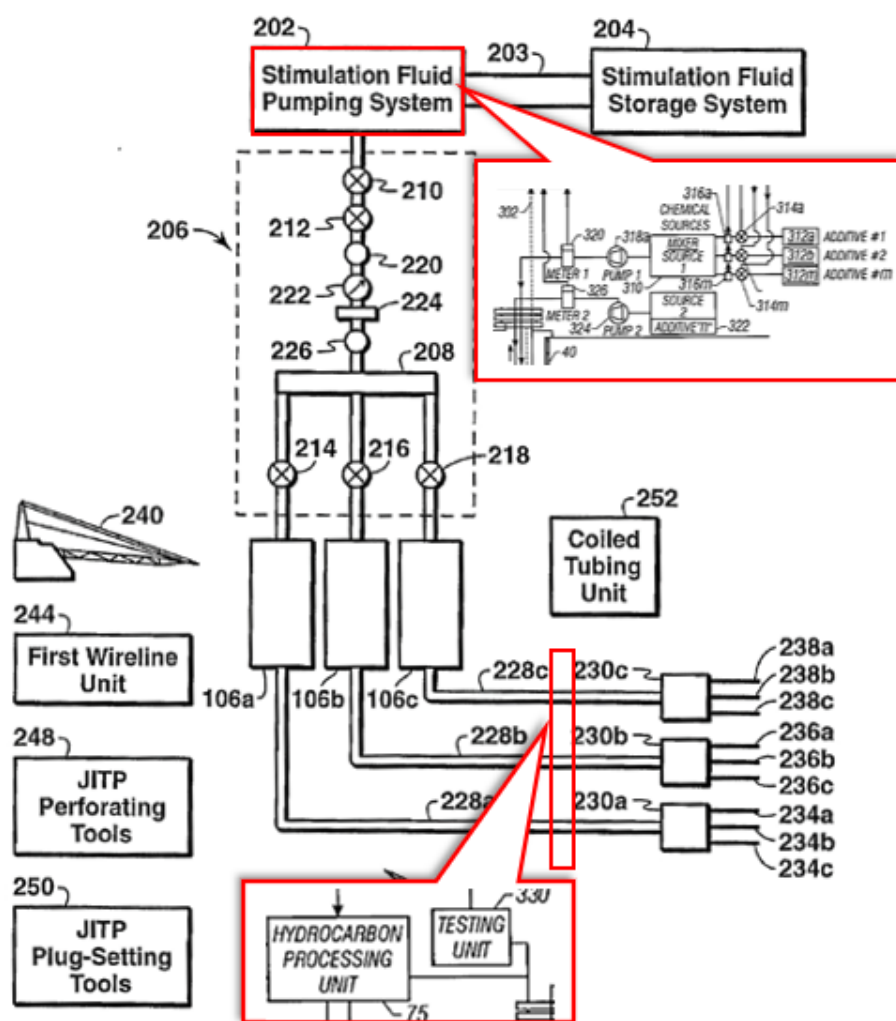


FIG. 2

Tolman, Fig. 2 (EX-1005) (annotated)

As shown above, Tolman's valves 214-218 are configured to allow fluid from the stimulation pumping system 202 to be directed toward individual wells in oil field trees 106a-106 c. EX-1005, [0030], [0031], [0037]. Based on the above disclosures, a POSITA would have understood that Tolman's pumping system manifold 206

180. The Tolman/Means/Crawford system would include several of Means' modules—that is, pumps 318 and 324, meters 320 and 326, mixer source 1 310, source 2 322, additive sources 312a–312m, additive associated pumps 314a–314m, and additive meters 316a–316m (*“the plurality of modules”*)—inside Tolman's Stimulation Fluid Pumping system 202, which would be coupled to Tolman's flowlines with manifolds 214, 216, and 218, as shown below:



Tolman, Fig. 2 (EX-1005) (annotated)

As shown above, a POSITA would have understood each of Tolman’s flowlines that include manifold valves 214 through 218 would be coupled between a corresponding well 104a–104c (“*at least one of the plurality of wells*”) and Means’ pumps 318 and 324, meters 320 and 326, mixer source 1310, and source 2322 (“*any of the plurality of modules*”). Such a person would have understood that each of these three lines would satisfy the “*first fluid flow line*.”

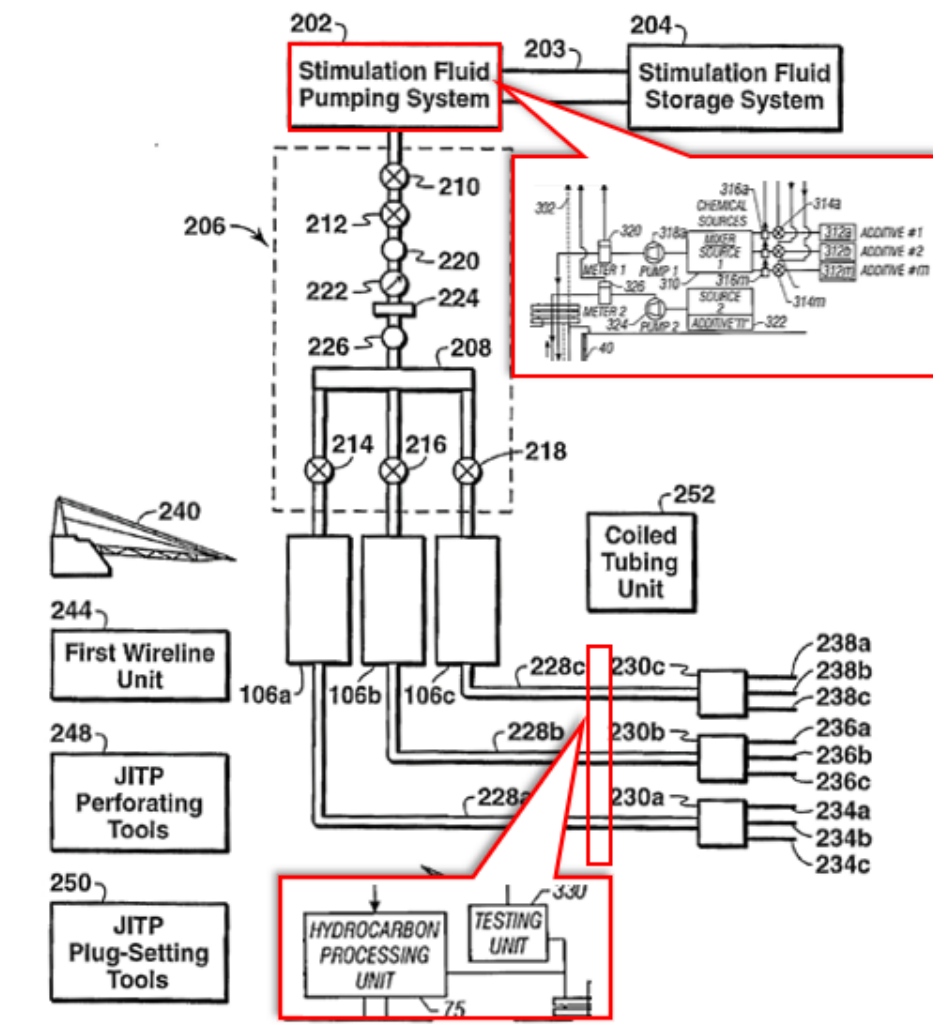
181. A POSITA would further have thus understood that Tolman’s flowlines include valves 214 through 218, each belonging to a line that would satisfy “*the first fluid flow line*” that is adapted to flow one or more stimulation fluids (“*one or more well treatment fluids*”) to one of the wells in oil field trees 106a–106c (“*the at least one of the plurality of wells*”). Such a person would have understood that a fluid conduit would be operable to flow more than one type of fluid, as explained above. See § VII.B.3.

182. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, and Crawford renders this limitation obvious.

iii. [18C] and a second fluid flow line coupled between the at least one of the plurality of wells and one or more of the plurality of modules, wherein the second fluid flow line is adapted to recover

the one or more well treatment fluids from the at least one of the plurality of wells

183. A POSITA would have understood each of Tolman’s flowlines 228a-228c, (“*a second fluid flow line*”) would be coupled between a corresponding well 106a–106c (“*at least one of the plurality of wells*”) and Means’ modules—such as testing unit 330 and processing unit 75—(“*one or more of the plurality of modules*”) would be disposed about the manifolds 230a–230c in the Tolman/Mean/Crawford system. *See supra* §§ VII.A.4, VII.B.15.ii.



Tolman, Fig. 2 (EX-1005) (annotated)

By being located between a well and Means' modules, a POSITA would have understood that flowlines 228a–228c in the Tolman/Means/Crawford system would each satisfy a “*second fluid flow line.*”

184. Also as discussed *supra*, a POSITA would have understood that flowlines 228a–228c in the Tolman/Means/Crawford system (“*the second fluid flow line*”) is adapted to flow one or more stimulation fluids from (or “*recover the one or*

more well treatment fluids” from) the corresponding well 106a–106c (“*the at least one of the plurality of wells*”). *See supra* § VII.B.15.ii.

185. Tolman describes that the recovered hydrocarbons return through flowback manifolds 230a–230c. *See* Ex. 1005, [0028]. Further as discussed *supra*, A POSITA would have understood that Tolman’s system recovers stimulation fluids (“*the one or more well treatment fluids*”). *See supra* § VII.B.1.v. A POSITA would have understood that the recovered stimulation fluid would be recovered through the same fluid flowlines 228a–228c (“*the second fluid flow line*”) from the corresponding well 106a–106c (“*the at least one of the plurality of wells*”) and that accordingly the fluid flowline is adapted to conduct this recovery.

186. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, and Crawford renders this limitation obvious.

iv. [18D] wherein a first configuration of the plurality of modules is operable to flow a first well treatment fluid to the at least one of the plurality of wells and wherein a second configuration of the plurality of modules is operable to flow a second well treatment fluid to the at least one of the plurality of wells

187. As discussed *supra*, a POSITA would further have thus understood that the Tolman/Means/Crawford system includes flowlines with valves 214 through 218, each belonging to a line that would satisfy “*the first fluid flow line*” that is

adapted to flow one or more stimulation fluids (“*one or more well treatment fluids*”) to one of the wells in oil field trees 106a–106c (“*the at least one of the plurality of wells*”).

188. Such a person would have understood that a fluid conduit would be operable to flow more than different type of fluids. *See* § VII.B.3. A POSITA would have understood that the Tolman/Means/Crawford system includes pumps 318 and 324, meters 320 and 326, mixer source 1 310, source 2 322, additive sources 312a–312m, additive associated pumps 314a–314m, and additive meters 316a–316m (“*the plurality of modules*”) must necessarily have a different configuration to make different stimulation treatment fluids, such as varying the types and amounts of additives used depending on well depth. EX-1006, [0036]. Such a person would have also understood that valves 214–218 are configured to direct the appropriate fluid down a respective well 106a–106c. *See* § VII.B.15.ii. A POSITA would have understood that there would be both (1) different configurations of modules used in the Tolman/Means/Crawford system to make different stimulation treatment fluids and (2) different configurations of valves 214–218 to direct fluid down the appropriate well (or wells). In one exemplary configuration, such a person would have recognized that a first configuration of the Tolman/Means/Crawford system would direct one type of stimulation treatment fluid down well in oil field 106a using

valve 214. In another configuration, the Tolman/Means/Crawford system would use valve 216 to direct a different stimulation treatment fluid down well in oil field 106b.

189. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, and Crawford renders this limitation obvious.

16. Dependent Claim 21

190. Claim 21 depends from claim 18. It further recites “*a base coupled to at least one of the one or more modules, wherein the base is operable to move the at least one of the one or more modules.*”

191. Tolman discloses that its invention is applicable to “offshore-based wells” located on a moveable “single offshore platform.” (“*a base is operable to move*”). See EX-1005, [0004], [0020]. The Tolman/Means/Crawford system would be included on an offshore platform be “*coupled to*” and “*operable to move*” the “*at least one of the one or more modules.*”

192. To the extent that one argues the combination of Tolman, Means, and Crawford do not disclose this limitation, a POSITA would have found that a foundation or a base coupled to a storage unit or an operating unit is customary practice in the chemical arts to provide stability, mobility, and compartmentalization. See EX-1005 at [0036] (mentioning “moving equipment on the surface pad”); See EX-1005, [0004], [0020] (describing offshore, movable platforms); Ex. 1033 [Crossley]. Such a person would have understood that the

Means pumps 318 and 324, meters 320 and 326, mixer source 1310, and source 2322 (“*at least one of the one or more modules*”) are operating units that are customary practice to couple to a base. *See* EX-1005, [0004], [0020] (describing offshore, movable platforms); Ex. 1033 [Crossley]. A POSITA would further have understood that such a base would be operable to move the Means pumps 318 and 324, meters 320 and 326, mixer source 1310, source 2322, additive sources 312a–312m, additive associated pumps 314a–314m, and additive meters 316a–316m (“*at least one of the one or more modules*”). *See* EX-1005 at [0036] (mentioning “moving equipment on the surface pad”); *See* EX-1005, [0004], [0020] (describing offshore, movable platforms); Ex. 1033 [Crossley]. Based on these disclosures, a POSITA would have understood that this is standard practice to have moveable, industrial equipment.

193. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

17. Dependent Claim 22

194. Claim 22 depends from claim 18, and further recites “*a cleaning module coupled to at least one of the one or more modules, wherein the cleaning module is operable to clean any fluid flow line.*”

195. Tolman discloses that the flowback operations may include filtering (“*cleaning*”) the flowlines (“*any fluid flow line*”). EX-1005, [0035] (“The flowback

operations may include flowing back the well, manipulating choke manifold valves; producing gas to the sales line; and/or venting and flaring gas to the atmosphere. Logistical coordination operations may include water recycling pumping and filtering; proppant delivery; chemical delivery; water hauling; and/or communicating with crews via cellular phones or radios.”). Similarly, Means discloses that certain additives are used to help clean the flow lines. *See* Ex. 1006, [0005] (“A variety of chemicals (also referred to herein as “additives”) are often introduced into producing wells, wellsite hydrocarbon processing units, oil and gas pipelines and chemical processing units to control, among other things, corrosion, scale, paraffin, emulsion, hydrates, hydrogen sulfide, asphaltenes and formation of other harmful chemicals.”); [0024] (“The additive injection system may further include a plurality of sensors downhole which provide signals representative of one or more parameters of interest relating to the characteristics of the produced fluid, such as the presence or formation of sulfites, hydrogen sulfide, paraffin, emulsion, scale, asphaltenes, hydrates, fluid flow rates from various perforated zones, flow rates through downhole valves, downhole pressures and any other desired parameter.”); *see id.*, [0006] (“Insufficient amounts of treatment additives can increase the formation of corrosion, scale, paraffins, emulsion, hydrates etc., thereby reducing hydrocarbon production, the operating life of the wellbore equipment and the life of the wellbore itself, requiring expensive rework operations or even the

abandonment of the wellbore.”); Means also discloses cleaning produced fluid. EX-1006, [0029] (“Still referring to FIG. 1, the produced fluid received at the surface is processed by a treatment unit or processing unit 75. The surface processing unit 75 may be of the type that processes the fluid 69 to remove solids and certain other materials such as hydrogen sulfide”). Based on these disclosures, a POSITA would have understood that this cleaning described by Tolman or performed in the Tolman/Mean/Crawford system would be done at any point on the fluid flow line.

196. A POSITA would have found it obvious to use a filter or specific additive storage/blender (“*cleaning module*”) coupled to the Means pumps 318 and 324, meters 320 and 326, mixer source 1 310, source 2 322, additive sources 312a–312m, additive associated pumps 314a–314m, and additive meters 316a–316m (“*at least one of the one or more modules*”) to filter (“*clean*”) their corresponding flowline 234a–234c, 236a–236c and 238a–238c (“*any fluid flow line*”). A POSITA would also have understood that the filter (“*cleaning module*”) would be operable to clean any other of the flowlines 234a–234c, 236a–236c and 238a–238c (“*any fluid flow line*”). As explained above, a POSITA would have found it obvious to modify Tolman’s system to include modules described in Means. *See* § VII.B.15 above.

197. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

18. Dependent Claim 23

198. Claim 23 depends from claim 18. It further recites “*a production fluid module, wherein the production fluid module is operable to receive production fluid from at least one of the one or more centralized service factories.*”

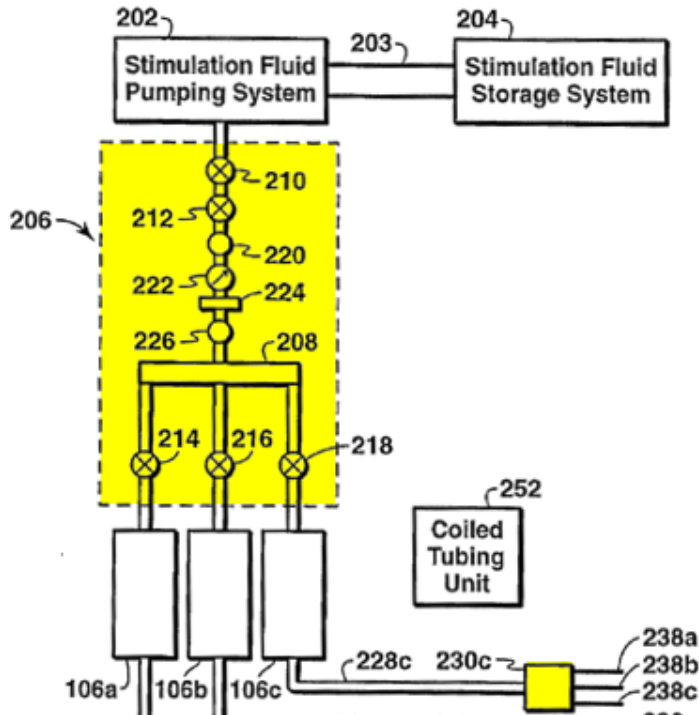
199. The Tolman/Mean/Crawford system receives recovered well treatment fluids and hydrocarbons (“*production fluid*”) at Stimulation Fluid Storage System 204 from flowback manifolds 230a–230c (“*at least one of the one or more centralized service factories*”). See *supra* § VII.B.6. Mean likewise discloses receiving produced fluid 69 (“*production fluid*”) at the surface, then a treatment unit or processing unit 75 (“*production fluid module*”). EX-1006, [0039] (“the produced fluid received at the surface is processed by a treatment unit or processing unit 75 . . .”). A POSITA would have understood that the Tolman/Mean/Crawford includes flowback manifolds 230a–230c and Mean’s treatment unit or processing unit 75 (“*production fluid module*”), which would be operable to receive production fluid. As explained above, a POSITA would have understood the Tolman/Mean/Crawford system includes the modules described in Mean. See § VII.B.15 above.

200. For the above reasons, the combination of Tolman, Mean, and Crawford renders this limitation obvious.

19. Dependent Claim 24

201. Claim 24 depends from claim 17, and further recites “*wherein each of the plurality of distribution lines are adapted to flow one or more well treatment fluids.*”

202. Tolman discloses that pipes 208 (“*the plurality of distribution lines*”) direct (“*flows*”) stimulation fluid (“*one or more well treatment fluids*”) to various oil field trees. *See* EX-1005, [0030] (“For instance, the pumping system manifold 206 may include a set of pipes 208 to interface each of the trees 106a–106c with the stimulation fluid pumping system 202.”). A POSITA would have understood that such pipes 208 (“*the plurality of distribution lines*”) would then necessarily be adapted to flow one or more stimulation fluids (“*one or more well treatment fluids*”). The stimulation fluid is pumped through pipes 208 down the trees 106a–106c to flowlines 234a–234c, 236a–236c, and 238a–238c to corresponding wells 104a–104c as shown below:



Tolman, Fig. 2 (EX-1005) (annotated)

203. Tolman further discloses that the “stimulation fluid may be injected into one or more of the wells.” EX-1005, [0031]. A POSITA would have understood that for a stimulation fluid (“*one or more well treatment fluids*”) to flow downhole, the stimulation fluid must necessarily flow through pipes 208 (“*the plurality of distribution lines*”) to flowlines 234a–234c, 236a–236c, and 238a–238c to the wells 104a–104c. *See* EX-1005, Fig. 2.

204. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

20.Dependent Claim 26

205. Claim 26 depends from claim 17, and further recites “*wherein the one or more centralized service factories is configurable to: receive the one or more well development task fluids from the centralized well treatment fluid center; prepare the one or more well treatment fluids from the one or more well development task fluids; flow the one or more well treatment fluids to the plurality of wells; receive the one or more recovered well treatment fluids from the plurality of wells; and receive production fluids from the plurality of wells.*”

206. As discussed *supra*, the Tolman/Mean/Crawford system discloses this claim. *See supra* § VII.B.1.

i. *wherein the one or more centralized service factories is configurable to: receive the one or more well development task fluids from the centralized well treatment fluid center*

207. The Tolman/Mean/Crawford system renders this limitation obvious for the same reasons that I explain with respect to limitation 1A above. *See supra* § VII.B.1.ii.

208. For the above reasons, the combination of Tolman, Mean, and Crawford renders this limitation obvious.

ii. prepare the one or more well treatment fluids from the one or more well development task fluids;

209. The Tolman/Means/Crawford system renders this limitation obvious for the same reasons that I explain with respect to limitation 1B above. *See supra* § VII.B.1.iii.

210. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

iii. flow the one or more well treatment fluids to the plurality of wells;

211. The Tolman/Means/Crawford system renders this limitation obvious for the same reasons that I explain with respect to limitation 1C above. *See supra* § VII.B.1.iv.

212. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

iv. receive the one or more recovered well treatment fluids from the plurality of wells;

213. The Tolman/Means/Crawford system renders this limitation obvious for the same reasons that I explain with respect to limitations 1D and 1E above. *See supra* §§ VII.B.1.v, VII.B.1.vi.

214. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

v. and receive production fluids from the plurality of wells.

215. The Tolman/Mean/Crawford system renders this limitation obvious for the same reasons that I explain with respect to limitation 1E above. *See supra* § VII.B.1.vi.

216. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

217. For the above reasons, the combination of Tolman, Means, and Crawford renders this claim obvious.

21.Dependent Claim 27

218. Claim 27 depends from claim 17, and further recites “*wherein the plurality of modules comprise: one or more blending modules; one or more additive storage modules, wherein the one or more additive storage modules are operable to connect to the one or more blending modules; one or more liquid additive pumps, wherein the one or more liquid additive pumps are operable to connect to the one or more blending modules; one or more pumping grids, wherein the one or more pumping grids are operable to connect to the one or more blending modules; one or more manifolds, wherein the one or more manifolds are operable to connect to the one or more blending modules; and a power grid, wherein the power grid is operable to connect to the one or more blending modules, the one or more additive storage*

modules, the one or more liquid additive pumps, the one or more pumping grids, and the one or more manifolds.”

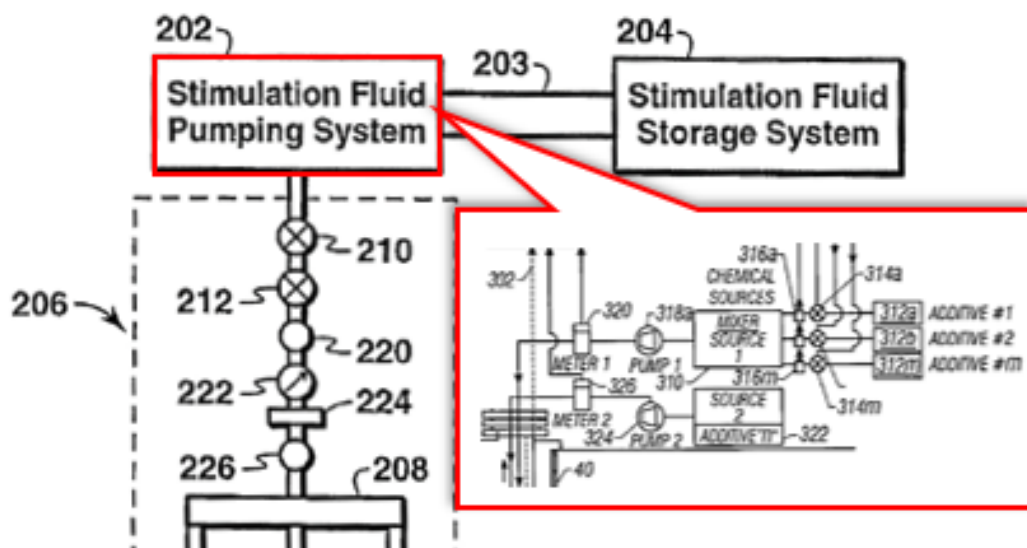
219. The Tolman/Means/Crawford system renders this claim obvious.

i. *wherein the plurality of modules comprise: one or more blending modules;*

220. The Tolman/Means/Crawford system renders this limitation obvious.

See §§ VII.A.4, VII.B.15above.

221. As discussed above, Means’ closed-loop additive injection system includes pumps 318 and 324, meters 320 and 326, mixer source 1 310, source 2 322, additive sources 312a–312m, additive associated pumps 314a–314m, and additive meters 316a–316m (“*the plurality of modules*”) disposed just before the downhole stream. *See supra* § VII.B.15.i; EX-1006 Fig. 1, Fig. 3, [0047]. Several of these modules would be included in the Tolman/Means/Crawford system shown below:



Tolman, Fig. 2 (EX-1005) (annotated)

222. Means further discloses a plurality of modules as part of system 300:

The system 300 may include a mixer 310 for mixing or combining at the wellsite a plurality of additive #1–additive #m stored in sources 313[sic]a–312m respectively. In some situations, it is desirable to transport certain additives in their component forms and mix them at the wellsite for safety and environmental reasons. For example, the final or combined additives may be toxic, although while the component parts may be non-toxic. Additives may be shipped in concentrated form and combined with diluents at the wellsite prior to injection into the well 50. In one embodiment of the present invention, additives to be combined, such as additives additive #1–additive #m are metered into the mixer by associated pumps 314a–314m. Meters 316a–316m measure the amounts of the additives from sources 312a–312m and provide corresponding signals to the control unit 340, which controls the pumps 314a–314m to accurately dispense the desired amounts into the mixer 310. A pump 318 pumps the combined additives from the mixer 310 into the well 50, while the meter 320 measures

the amount of the dispensed additive and provides the measurement signals to the controller 340. A second additive required to be injected into the well 50 may be stored in the source 322, from which source a pump 324 pumps the required amount of the additive into the well. A meter 326 provides the actual amount of the additive dispensed from the source 322 to the controller 340, which in turn controls the pump 324 to dispense the correct amount.

EX-1006, [0047]. A POSITA would have understood that the Tolman/Mean/Crawford system would have included the plurality of modules (“*the plurality of modules*”) disposed just before the downhole stream, which have included a mixer source 310 (“*one or more blending modules*”). See *supra* § VII.B.15.i. As I explained above, a POSITA would have found it obvious to modify Tolman’s system to include the modules described in Means. See §§ VII.A.4, VII.B.15 above.

223. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

ii. *one or more additive storage modules, wherein the one or more additive storage modules are operable to connect to the one or more blending modules;*

224. The Tolman/Mean/Crawford system renders this limitation obvious. See §§ VII.A.4, VII.B.15 above.

225. As discussed *supra*, Means discloses a plurality of modules (“*the plurality of modules*”) disposed just before the downhole stream. *See supra* § VII.B.15.i; EX-1006 Fig. 1, Fig. 3, [0047]. A POSITA would have understood that the Tolman/Means/Crawford system has the plurality of modules (“*the plurality of modules*”) disposed just before the downhole stream, which would have included additive sources 312a–312m (“*one or more additive storage modules*”). *See supra* § VII.B.15.i. Such a person would have recognized that additive sources 312a–312m (“*one or more additive storage modules*”) described in Means are operable to connect to mixer source 310 (“*one or more blending modules*”). EX-1006, [0047] (“The system 300 may include a mixer 310 for mixing or combining at the wellsite a plurality of additive #1–additive #m stored in sources 313[sic]a–312m respectively. . . . In one embodiment of the present invention, additives to be combined, such as additives additive #1–additive #m are metered into the mixer by associated pumps 314a–314m.”), Fig. 3. As I explained above, a POSITA would have found it obvious to modify Tolman’s system to include modules, like those above, described in Means. *See* §§ VII.A.4, VII.B.15 above.

226. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

iii. *one or more liquid additive pumps, wherein the one or more liquid additive pumps are operable to connect to the one or more blending modules;*

227. The Tolman/Means/Crawford system renders this limitation obvious. Although Tolman does not expressly disclose “*a plurality of modules*” disposed in the system of Tolman, the combination of Tolman (EX-1005), Means (EX-1006), and Crawford (EX-1007) render this feature obvious. *See* §§ VII.A.4, VII.B.15 above.

228. As I discussed above, Means discloses a plurality of modules (“*the plurality of modules*”) disposed before the downhole stream. *See supra* § VII.B.15.i; EX-1006 Fig. 1, Fig. 3, [0047]. A POSITA would have understood that the Tolman/Means/Crawford system has the plurality of modules (“*the plurality of modules*”) disposed just before the downhole stream, which would have included additive associated pumps 314a–314m (“*one or more liquid additive pumps*”). *See supra* § VII.B.15.i. Such a person would have understood that the additive associated pumps 314a–314m (“*one or more liquid additive pumps*”) described in Means are operable to connect to mixer source 1 310 (“*one or more blending modules*”). EX-1006, [0047] (“The system 300 may include a mixer 310 for mixing or combining at the wellsite a plurality of additive #1–additive #m stored in sources 313[sic]a–312m respectively. . . . In one embodiment of the present invention, additives to be

combined, such as additives additive #1–additive #m are metered into the mixer by associated pumps 314a–314m.”), Fig. 3. As I explained above, a POSITA would have found it obvious to modify Tolman’s system to include modules, like those above, described in Means. *See* §§ VII.A.4, VII.B.15 above.

229. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

iv. one or more pumping grids, wherein the one or more pumping grids are operable to connect to the one or more blending modules;

230. The Tolman/Means/Crawford system renders this limitation obvious. Although Tolman does not expressly disclose “*a plurality of modules*” disposed about each of the manifolds 230a–230c (part of the “*one or more centralized service factories*”) the combination of Tolman (EX-1005), Means (EX-1006), and Crawford (EX-1007) render this feature obvious. *See* §§ VII.A.4, VII.B.15 above.

231. As I discussed above, Means discloses a plurality of modules (“*the plurality of modules*”) disposed just before the downhole stream. *See supra* § VII.B.15.i; EX-1006 Fig. 1, Fig. 3, [0047]. A POSITA would have understood that the Tolman/Means/Crawford system has the plurality of modules (“*the plurality of modules*”) disposed just before the downhole stream, which would have included these pumps 318 (“*one or more pumping grids*”) and mixer source 1 310 (“*one or more blending modules*”). *See supra* § VII.B.15.i. Such a person would have further

understood that that pumps 318 (“*one or more pumping grids*”) and 324, as described by Means, are operable to connect to mixer source 1 310 (“*one or more blending modules*”). EX-1006, [0047] (“A pump 318 pumps the combined additives from the mixer 310 into the well 50 . . .”), Fig. 3. A POSITA would have found it obvious to modify Tolman’s system to include modules, like those above, described in Means. *See* §§ VII.A.4, VII.B.15 above.

232. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

v. one or more manifolds, wherein the one or more manifolds are operable to connect to the one or more blending modules;

233. The Tolman/Means/Crawford system renders this limitation obvious. Although Tolman does not expressly disclose “*a plurality of modules*” disposed about each of the manifolds 230a–230c (part of the “*one or more centralized service factories*”), the combination of Tolman (EX-1005), Means (EX-1006), and Crawford (EX-1007) render this feature obvious. *See* §§ VII.A.4, VII.B.15 above.

234. As I discussed above, Means discloses a plurality of modules (“*the plurality of modules*”) disposed just before the downhole stream. *See supra* § VII.B.15.i; EX-1006, Fig. 1, Fig. 3, [0047]. A POSITA would have understood that the Tolman/Means/Crawford system includes the plurality of modules (“*the plurality of modules*”) described in Means disposed before the downhole stream,

which includes mixer source 310 (“*one or more blending modules*”). *See supra* § VII.B.15.i. In the Tolman/Mean/Crawford system, Means’ mixer source would be connected to manifold 206 (part of the “*one or more centralized service factories*”). A POSITA would have understood that Tolman’s manifold 206 (“*one or more manifolds*”) would be operable to connect to Means’ system 300, including mixer source 1 310 (“*one or more blending modules*”).

235. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

vi. and a power grid, wherein the power grid is operable to connect to the one or more blending modules, the one or more additive storage modules, the one or more liquid additive pumps, the one or more pumping grids, and the one or more manifolds.

236. The Tolman/Mean/Crawford system renders this limitation obvious. Means discloses that a system 300 and its modules are powered “at least in part using solar power.” Means, [0029] (“Solar power is then used to provide electricity to the electronics. In a preferred embodiment, batteries or another device useful for accumulating electromotive force (emf) for later use are used to drive the system during periods of darkness. In one preferred embodiment, solar power generated emf is used to drive and power all parts of the injection system.”). Claim 4 of Means discloses “a solar power array is used to power the system.” *Id.*, Claim 4.

Accordingly, a POSITA would have recognized that, by implementing Means closed-loop additive system in Tolman's system, would include a solar power source ("power grid"), such as a solar power array, that is operable to power all of the modules described in Means, which would include those that I described above, e.g., pumps 318 and 324 ("*one or more pumping grids*"), mixer source 1 310 ("*one or more blending modules*"), additive sources 312a–312m ("*one or more additive storage modules*"), additive associated pumps 314a–314m ("*one or more liquid additive pumps*"), additive meters 316a–316m, etc. A POSITA would have thus understood that the combination of Tolman and Means disclose "*a power grid*" "*operable to*" connect to the one or more of the "*modules*" listed above and described in Means.

237. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

22.Dependent Claim 28

238. Claim 28 depends from claim 27, and further recites "*a third fluid flow line between at least one of a second plurality of wells and the one or more manifolds, wherein the third fluid flow line is directed to delivering at least one of the one or more well treatment fluids; wherein the one or more manifolds is operable to deliver substantially simultaneously any of the one or more well treatment fluids through the third fluid flow line and any of the one or more well treatment fluids*

through the second fluid flow line; and a fourth fluid flow line between the second plurality of wells and the one or more manifolds, wherein the fourth fluid flow line is directed to recovering the one or more well treatment fluids from the at least one of the second plurality of wells.”

239. The Tolman/Means/Crawford system discloses this claim.

- i. a third fluid flow line between at least one of a second plurality of wells and the one or more manifolds, wherein the third fluid flow line is directed to delivering at least one of the one or more well treatment fluids;***

240. The Tolman/Means/Crawford system renders this limitation obvious for the same reasons that I explain with respect to limitation 18B above. *See supra* § VII.B.15.ii.

241. As explained with respect to limitation 18B, A POSITA would have understood that each of flowlines passing through manifold valves 214, 216, and 218 (each satisfying “*the one or more manifolds*”) and continuing to a corresponding well in oil-field tree 106a–106c (each satisfying “*a second plurality of wells*”). For example, a flowline with valve 216 would have satisfied a “*third fluid flow line*.” *See supra* § VII.B.15.ii. Also as I explained with respect to limitation 18B, a POSITA would further have understood that these lines are adapted to flow (or “*deliver*”) one or more stimulation treatment fluids to the corresponding well 104a–

104c in oil field trees 106a-106c. *See supra* § VII.B.15.ii. A POSITA would have understood that this fluid conduit would be operable to flow more than one type of fluid. *See* § VII.B.3.

242. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

ii. wherein the one or more manifolds is operable to deliver substantially simultaneously any of the one or more well treatment fluids through the third fluid flow line and any of the one or more well treatment fluids through the second fluid flow line;

243. The Tolman/Means/Crawford system renders this limitation obvious for the same reasons that I explain with respect to claim 18[D] above. *See supra* § VII.B.14.

244. As I explained above, a POSITA would have understood that there would be both (1) different configurations of modules used in the Tolman/Means/Crawford system to make different stimulation treatment fluids and (2) different configurations of valves 214-218 to direct fluid down the appropriate well (or wells). Such a person would have also understood that valves 214-218 are configured to direct the appropriate fluid down multiple respective wells 106a-106c. *See* § VII.B.15.ii. In a third exemplary configuration, such a person would have recognized that a configuration of the Tolman/Means/Crawford system would direct

the same type of stimulation treatment fluid down multiple wells, such as one well in oil field 106b using valve 216 another well in oil field tree 106c using valve 218. In such a configuration, a POSITA would have understood that the Tolman/Means/Crawford system included both a flowline with valve 216 and another flowline with valve 218, which would have satisfied the “*third*” and “*second fluid flow lines*¹,” respectively. Such a person would have also recognized that, by using the same stimulation treatment fluid, that both these wells would have simultaneously received the same fluid.

245. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

iii. and a fourth fluid flow line between the second plurality of wells and the one or more manifolds, wherein the fourth fluid flow line is directed to recovering the one or more well treatment fluids from the at least one of the second plurality of wells.

246. The Tolman/Means/Crawford system renders this limitation obvious for the same reasons that I explain with respect to limitations 18C and 28A above. *See supra* §§ VII.B.15.iii, VII.B.22.i.

¹ I note that claim 28 does not depend from claim 18, which specifies additional requirements of a “*second fluid flow line*” and a “*plurality of wells*.” Consequently, those additional requirements are not required by claim 28.

247. As explained *supra*, a POSITA would have understood that the Tolman/Means/Crawford system include flowlines 228a–228c in the Tolman/Means/Crawford system (“*the fourth fluid flow line*”) is adapted to flow one or more stimulation fluids from (or “*recover the one or more well treatment fluids*” from) the corresponding well 106a–106c (“*the second plurality of the plurality of wells*”). See *supra* §§ VII.B.15.iii. Tolman, for example, describes that the recovered hydrocarbons return through flowback manifolds 230a–230c. See Ex. 1005, [0028]. A POSITA would have understood that the recovered stimulation fluid would be recovered through the same fluid flowlines 228a–228c (“*the fourth fluid flow line*”) from the corresponding well 106a–106c (“*the at least one of the plurality of wells*”) and that accordingly the fluid flowline is adapted to conduct this recovery. See *supra* §§ VII.B.15.iii.

248. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

C. GROUND 2: Claims 3–4, 7–9, 11, 19, 20, 25, and 29–31 of the ’082 Patent Are Obvious Based on Tolman (EX-1005), Means (EX-1006), and Crawford (EX-1007) in Further View of Lehman (EX-1008)

249. It is my opinion that a POSITA would have found claims 3–4, 7–9, 11, 19, 20, and 25 of the ’082 Patent obvious over Tolman in view of Means in further view of Crawford and in further view of U.S. Patent Application Publication No. 2004/0050550 to Lehman et al. (“Lehman”) (EX-1008). I briefly describe Lehman

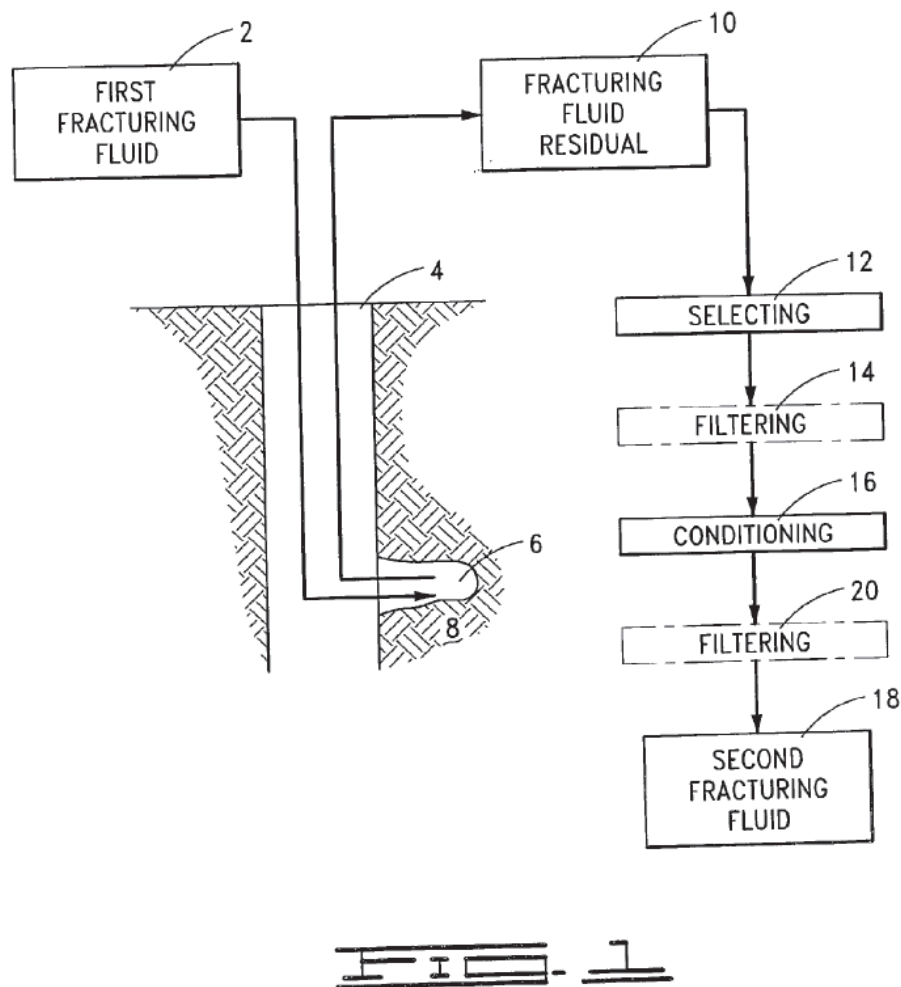
next, followed by a detailed explanation of how the combination of these four references renders obvious each limitation found in those claims.

1. Overview of Lehman

250. U.S. Patent Application Publication No. 2004/0050550 to Lehman et al. (“Lehman”) was filed on September 16, 2002, and published on March 18, 2004. EX-1008, Cover.

251. Lehman, titled “Re-Use Recovered Treating Fluid,” discloses treating fluid production, subterranean formation treating methods, and compositions for treating fluids that reuse at least part of a prior treating fluid. EX-1008, Cover, Abstract. Lehman indicates needs regarding using depolymerized polymer so that prior treating fluid can be reused in a later-prepared treating fluid to reduce cost of treating fluid, as well as disposal of prior treating fluid reusability; selecting and maintaining a reusable portion of a prior fracturing fluid; how to prepare prior fracturing fluid for reuse; and reducing the cost for reusing prior fracturing fluid. EX-1008, [0016]–[0017]. Lehman's invention meets these needs by providing novel and improved treating fluid production and subterranean formation treating methods, as well as compositions for treating fluids, all of which relate to reuse of at least part of a prior treating fluid. *Id.* at [0017].

252. Lehman discloses how well treatment fluids would undergo selecting, filtering, and conditioning as described in Figure 1 below:



Lehman, Fig. 1 (EX-1008)

EX-1008, [0034]–[0046]. As shown above, the process begins with whether fracturing fluid is selected or not based on a cost analysis dependent on the “viscosity of flow-back fluid.” EX-1008, [0039]. If a fluid is not selected, then the fluid will be disposed of. EX-1008, [0039]; *see id.*, [0009]. If, instead, the fluid is selected, it is filtered and conditioned. EX-1008, [0037] (describing filtering), [0040]–[0045] (describes conditioning); *see id.*, [0019]–[0020]. This process results in constituents

used to make a second fracturing fluid for treating other wells. EX-1008, Abstract; *see id.*, [0019], [0039]–[0040].

253. Lehman discloses use of used polymer, new polymer, water, and “other constituents.” EX-1008, [0054]. The process for blending used polymer 32, new polymer 34, water 36, and other constituents 38 into “second” fracturing fluid is shown below.

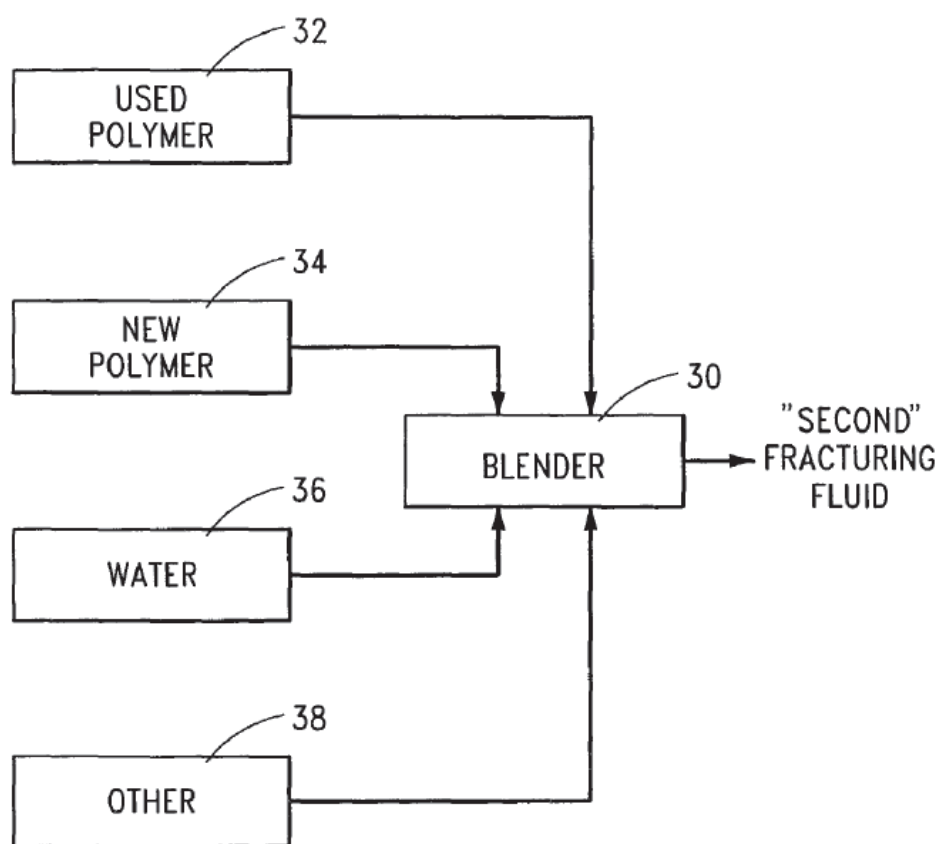


FIG. 2

Lehman, Fig. 2 (EX-1008)

254. Lehman further expounds upon other constituents 38 and discloses a variety of other additives included in a concentrate. EX-1008, [0061]–[0078]. Lehman further discloses a particular implementation of the general system illustrated in Figure 2 as represented in Figure 3. EX-1008, [0055]. The implementation represented in Figure 3 shows the flow lines for the used polymer, new polymer, water and other constituents and additives and, after blending at blender 30, “second” fracturing fluid to the wells as shown below:

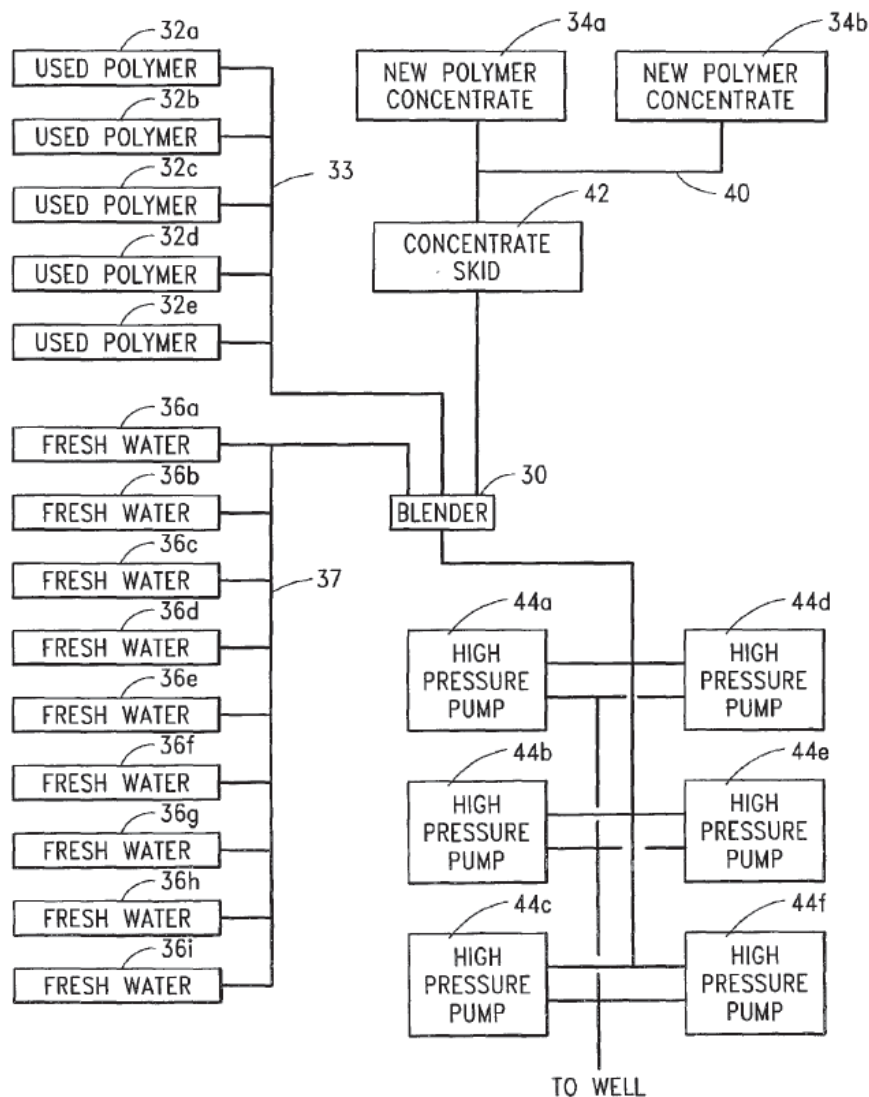


FIG. 3

Lehman, Fig. 3 (EX-1008)

2. It Would Have Been Obvious to a POSITA to Combine Lehman's Teaching Concerning Re-using Recycled Wellsite Treatment Fluids Injection System With the combined system of Tolman, Means, and Crawford

255. Lehman is analogous art to the '082 patent for two reasons. First, Lehman is directed toward the same field of endeavor of the '082 patent: well

operations. EX-1001, 1:6–10; EX-1008, Abstract (“Treating fluid production and subterranean formation treating methods as well as compositions for treating fluids reuse at least part of a prior treating fluid, particularly a fluid having one or more constituents that can be relinked.”), *id.*, [0001], (“This invention relates generally to treating fluid production and subterranean formation treating methods, as well as compositions for treating fluid, particularly as they include at least part of previously used treating fluid. “Treating” is used as understood in the oil and gas industry. . . . [T]he overall explanation and broader aspects of the invention should be considered in the context of well stimulation or well treatment in general.”). Second, Lehman is pertinent to a problem described by the ’082 patent: to reduce costs of well operations. See EX-1001, 1:10–11; EX-1008, [0016] (“This may reduce cost of treating fluid itself as well as of disposal of it, and it may reduce exposure to volatile markets or supplies of fluid constituents and to quality assurance issues. Cost reduction due to reuseability [sic] of part of a prior treating fluid can make otherwise more expensive treating fluids accessible to more wells.”); *id.*, [0017] (“[T]here are additional needs, such as how to accomplish this reusability and what type of composition to provide for reuse. Particular needs include how to select and maintain a reusable portion of a prior fracturing fluid and how to prepare it for reuse. Another need includes pricing for such reuse.”). For either reason, a POSITA would have understood that Lehman is analogous to the ’082 patent.

256. Lehman discloses using similar well treatment fluids to those described in Tolman. By using Lehman's technique, the combined system of Tolman would be able to create a second fracturing fluid, such as fluid with certain additives, from Tolman's recovered well treatment fluid from in its first well. EX-1008, [0007] ("The water based fracturing fluids including gelled and crosslinked polysaccharide gelling agents have had significantly reduced fluid loss as compared to other fracturing fluids which reduces or eliminates the need for costly fluid loss additives."); *see id.*, [0012]. This second fracturing fluid can then be subsequently used in other wells, such as those described by Tolman.

257. It would have been well within the skill of a POSITA to incorporate Lehman's technique of re-using recovered treatment fluid in the combined system of Tolman, Means, and Crawford. Such a modification would have included storing the recovered well treatment fluids in storage units, such as the additive storage unit, at the Stimulation Fluid Storage System 204 in the Tolman/Means/Crawford system. EX-1008, [0036]–[0037] (explaining that the recovered and conditioned fluid are put in storage vessels), [0046] ("[I]f the reuse is to occur in the same vicinity, the selected fluid may likely be stored at the original well site or at some more convenient, possibly centralized location; or if the reuse is to occur somewhere else or at a then unidentified time or place, the selected fluid may be stored wherever is

deemed appropriate.”). There, well treatment fluids would undergo, selecting, filtering, and conditioning described in Figure 1 of Lehman, shown below:

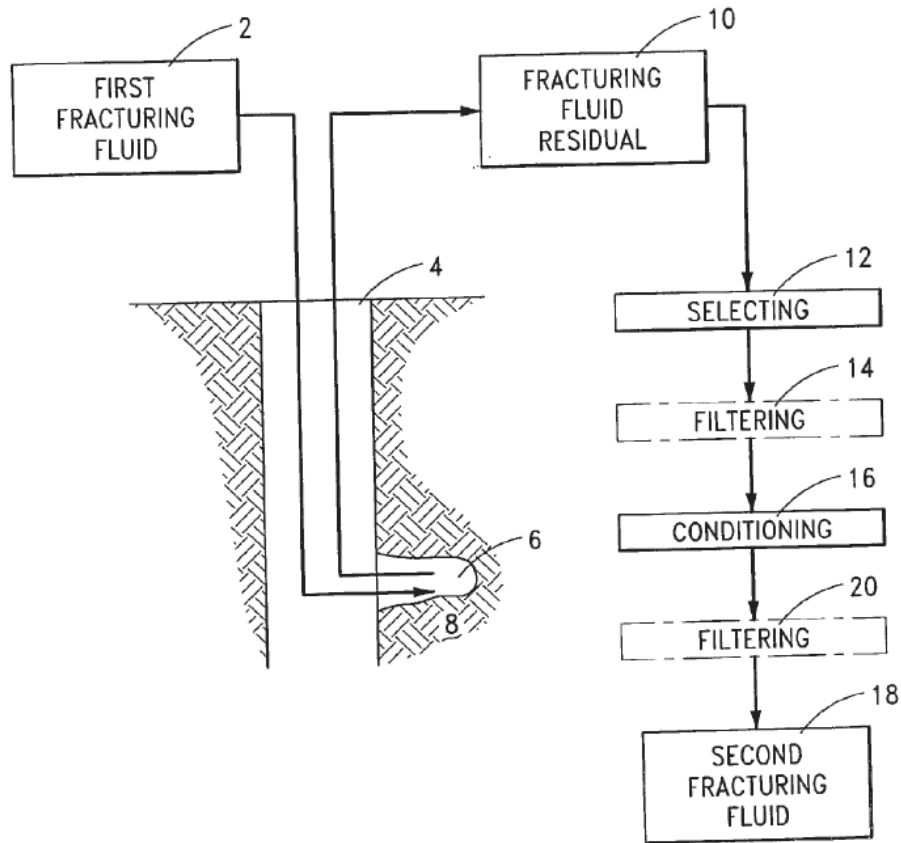


FIG. 1

Lehman, Fig. 1 (EX-1008)

EX-1008, [0034]–[0046]. As shown above, the process begins with whether fracturing fluid is selected or not based on a cost analysis dependent on the “viscosity of flow-back fluid.” EX-1008, [0039]. If a fluid is not selected, then the fluid will be disposed of. EX-1008, [0039] (“Making such a determination may include making

a cost analysis that includes fracturing fluid new constituent costs and flow-back fluid disposal costs. . . . [T]he overall cost may be lower when considering how much it would cost to dispose of the flow-back fluid that would otherwise not be selected or when considering the cost of obtaining more fresh water, for example.”); *see id.*, [0009]. If, instead, the fluid is selected, it is filtered and conditioned (“*reconditioned*”). EX-1008, [0037] (describing filtering), [0040]–[0045] (describes conditioning); *see id.*, [0019]–[0020]. This process results constituents used to make a second fracturing fluid for treating other wells. EX-1008, Abstract (“This includes conditioning a selected at least partially delinked flow-back fluid, recovered from a first treating fluid pumped into a well, such that the conditioned selected at least partially delinked flow-back fluid provides a constituent for a second treating fluid.”); *see id.*, [0019], [0039]–[0040].

258. A POSITA would have been motivated to incorporate Lehman’s technique of re-using recovered treatment fluid in the combined system of Tolman, Means, and Crawford for economic and environmental reasons.

259. First, a POSITA would have been motivated to use Lehman’s technique to reduce costs of well operations. Lehman explains that its technique results in cost savings during well operation by re-using materials to make well-treatment fluid. EX-1008, [0016] (“Cost reduction due to reuseability [sic] of part of a prior treating fluid can make otherwise more expensive treating fluids accessible to more wells.”),

see id. Accordingly, this cost reduction would motivate a POSITA to reuse part of Tolman’s treatment fluid to reduce expenses for treating multiple wells.

260. Second, a POSITA would have been motivated to use Lehman’s technique for the express reasons described in Lehman. Specifically, Lehman provides the following reasons to use the disclosed invention: “[T]here are additional needs, such as how to accomplish this reusability and what type of composition to provide for reuse. Particular needs include how to select and maintain a reusable portion of a prior fracturing fluid and how to prepare it for reuse. Another need includes pricing for such reuse.” EX-1008, [0017]. Satisfying these problems with conventional systems would have motivated a POSITA to use Lehman’s technique in the combined system. *See id.*

261. For any of the above reasons, a POSITA would have been motivated to incorporate Lehman’s technique of re-using recovered treatment fluid in the combined system of Tolman, Means, and Crawford as I described above.

**D. The Combination of Tolman, Means, Crawford and Lehman
Renders Obvious Claims 3–4, 7–9, 11, 19, 20, and 25.**

1. Dependent Claims 3 and 20

262. Claim 3 depends from claim 1. It further recites “*disposing of at least one of the one or more recovered well treatment fluids at the centralized well treatment fluid center, wherein the centralized well treatment fluid center is configurable to dispose of the at least one of the one or more recovered well*

treatment fluids.” Similarly, Dependent Claims 20 depends from claim 18 and further recites “a disposal module coupled to at least one of the one or more modules, wherein the disposal module is operable to dispose of the recovered well treatment fluids.”

263. To the extent that the combination of Tolman, Mean, and Crawford do not render this claim obvious, the same combination in further view of Lehman does so.

264. The Tolman/Means/Crawford/Lehman system would include disposing of recovered well treatment fluids. EX-1008, [0039] (“Making such a determination may include making a cost analysis that includes fracturing fluid new constituent costs and flow-back fluid disposal costs. . . . [T]he overall cost may be lower when considering how much it would cost to dispose of the flow-back fluid that would otherwise not be selected or when considering the cost of obtaining more fresh water, for example.”); *see id.*, [0009]. As I explained above, *see* § VII.B.4, the Tolman/Means/Crawford system would select whether to dispose of the recovered well treatment fluid at a central processing unit in the Stimulation Fluid Storage System 204, like that described in Crawford, in the combined system of Tolman, Means, Crawford, and Lehman. A POSITA would have understood that, because the task of disposing of recovered well treatment fluid occurred in the central processing unit, that unit would include all the necessary equipment, connections, couplings,

and controls necessary to perform such a task, which satisfies a “*module*.” EX-1001, 4:26–28 (“The modules generally comprise the equipment, connections, couplings, and controls necessary to perform a selected well development task.”)

265. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, Crawford, and Lehman renders this limitation obvious.

2. Dependent Claims 4 and 19

266. Claim 4 depends from claim 18. It further recites “*reconditioning at least one of the one or more recovered well treatment fluids at the centralized well treatment fluid center, wherein the centralized well treatment fluid center is configurable to recondition the at least one of the one or more recovered well treatment fluids.*” Claim 19 depends from claim 1, and likewise recites “*wherein at least one of the one or more modules is directed to reconditioning the one or more well treatment fluids substantially simultaneously with recovering the one or more well treatment fluids.*”

267. The Tolman/Mean/Crawford/Lehman system would include conditioning recovered well treatment fluids (“*reconditioning at least one of the one or more recovered well treatment fluids*”). EX-1008, [0019] (“A treating fluid production method in accordance with the present invention comprises conditioning a selected at least partially delinked flow-back fluid, recovered from a first treating

fluid pumped into a well, such that the conditioned selected at least partially delinked flow-back fluid provides a constituent for a second treating fluid.”); *see id.*, [0040]–[0045]. Because the recovered well fluid was immediately selected for filtering and conditioning, a POSITA would have understood that Lehman’s “*reconditioning*” of “*well treatment fluids*” happened “*substantially simultaneously with recovering*” the “*well treatment fluids*.” As I explained above, *see* § VII.B.3, the Tolman/Mean/Crawford system would select whether to filter and condition the recovered well treatment fluid (“*reconditioning the one or more well treatment fluids substantially simultaneously with recovering the one or more well treatment fluids*”) at a Crawford’s central processing unit located in Stimulation Fluid Storage System 204 in the combined system of Tolman, Mean, Crawford, and Lehman. A POSITA would have understood that, because the task of filtering and conditioning occurred in the central processing unit, the central processing unit would include all the necessary equipment, connections, couplings, and controls necessary to perform such a task thereby satisfying a “*module is directed to reconditioning the one or more well treatment fluids*” (or a “*fluid reconditioning module*.”). EX-1001, 4:26–28 (“The modules generally comprise the equipment, connections, couplings, and controls necessary to perform a selected well development task.”)

268. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, Crawford, and Lehman renders this limitation obvious.

3. Dependent Claim 7

269. Claim 7 depends from claim 6 and recites “*separating the production fluid into at least two or more second production fluids, wherein the centralized well treatment fluid center is configurable to separate the production fluid into at least two or more second production fluids.*”

270. The Tolman/Mean/Crawford/Lehman system would include selecting recovered well treatment fluids for conditioning or disposal based on its viscosity. EX-1008, [0039] (“In a preferred embodiment, selecting 12 includes determining what viscosity of flow-back fluid is to be obtained in the storage vessel. . . . The lower viscosity one accepts in the residual to be reused, the more new material may need to be added to formulate a second fracturing fluid having a sufficient viscosity.”). If a fluid is not selected to be filtered and conditioned, then the fluid will be disposed of. EX-1008, [0039] (“Making such a determination may include making a cost analysis that includes fracturing fluid new constituent costs and flow-back fluid disposal costs. . . . [T]he overall cost may be lower when considering how much it would cost to dispose of the flow-back fluid that would otherwise not be selected or when considering the cost of obtaining more fresh water, for example.”);

see id., [0009]. As I explained above, *see* §VII.D.1, the Tolman/Mean/Crawford system would make this selection—that is, whether to dispose or filter and condition the recovered well treatment fluid—at a central processing unit, like that described in Crawford, in the Stimulation Fluid Storage System 204 in the combined system of Tolman, Means, Crawford, and Lehman.

271. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, Crawford, and Lehman renders this limitation obvious.

4. Dependent Claim 8

272. Claim 8 depends from claim 7. It further recite “*conditioning the at least two or more second production fluids, wherein the centralized well treatment fluid center is configurable to condition the at least two or more second production fluids; and disposing of at least one of the at least two or more second production fluids, wherein the centralized well treatment fluid center is configurable to dispose of the at least one of the at least two or more second production fluids.*”

273. The Tolman/Mean/Crawford system renders this claim obvious for the same reasons that I explain with respect to limitation 1A above. *See supra* § VII.B.1.i.

274. The combination of Tolman, Means, Crawford, and Lehman renders this limitation obvious for the same reasons that I explain with respect to Claim 3–4 above. *See supra* §§ VII.D.1–VII.D.2.

275. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, Crawford, and Lehman renders this limitation obvious.

5. Dependent Claim 9

276. Claim 9 depends from claim 7 and further recite “*flowing the at least two or more second production fluids to a distribution center, wherein the centralized well treatment fluid center is configurable to flow the at least two or more second production fluids to the distribution center.*”

277. The combination of Tolman, Means, Crawford, and Lehman renders this limitation obvious for the same reasons that I explain with respect to Claim 9 in Ground 1 above. *See supra* § VII.B.8.

278. Lehman further explains that its production fluid may be stored “at some more convenient, possibly centralized location”:

Whereas the aforementioned selecting typically occurs at the site of the well 4, as the flow-back out of the well occurs and the residual is received there, the conditioning can occur there or elsewhere. That is, once residual fluid has been selected, it can be further used wherever desired. For example, if the reuse is to occur at the same well, the selected fluid may likely be stored there; or if the reuse is to occur in the same vicinity, the selected fluid may likely

be stored at the original well site or at some more convenient, possibly centralized location; or if the reuse is to occur somewhere else or at a then unidentified time or place, the selected fluid may be stored wherever is deemed appropriate.

Ex.1008, [0046]. Based on the above teaching, a person of ordinary skill in the art of using wellbore treatment fluids would have understood that the fluids described in Lehman may be stored at centralized storage, such as the Stimulation Fluid Storage System in the Tolman/Mean/Crawford system. *See supra* § VII.B.8.

279. For these reasons, I believe a POSITA would have understood that the combination of Tolman, Means, Crawford, and Lehman renders this claim obvious.

6. Dependent Claim 11

280. Claim 11 depends from claim 1 and further recites “*storing the one or more recovered well treatment fluids at the centralized well treatment fluid center, wherein the centralized well treatment fluid center is configurable to store the one or more recovered well treatment fluids.*”

281. As I explained above, *see* § VII.C.2, a POSITA would have found it obvious to incorporate Lehman’s technique of re-using parts of recovered treatment fluid in the combined system of Tolman, Means, and Crawford. Such a modification would include storing recovered well treatment fluids to be later disposed of or filtered and conditioned. EX-1008, [0039] EX-1008, [0036]–[0037] (explaining that the recovered and conditioned fluid are put in storage vessels), [0046] (“[I]f the reuse

is to occur in the same vicinity, the selected fluid may likely be stored at the original well site or at some more convenient, possibly centralized location; or if the reuse is to occur somewhere else or at a then unidentified time or place, the selected fluid may be stored wherever is deemed appropriate.”). As I explained above, *see* § VII.C.2, the Tolman/Mean/Crawford system would store the recovered well treatment fluid at a central processing unit, like that described in Crawford, in the combined system of Tolman, Mean, Crawford, and Lehman.

282. The combination of Tolman, Mean, Crawford, and Lehman renders this limitation obvious for the same reasons that I explain with respect to Claim 4 above. *See supra* § VII.D.2.

7. Dependent Claim 25

283. Claim 25 depends from claim 17, and further recites “*wherein the centralized well treatment center is configurable to: flow the one or more well development task fluids; receive the one or more recovered well treatment fluids; recondition the one or more recovered well treatment fluids; and receive production fluids.*”

284. The combination of Tolman, Mean, Crawford, and Lehman renders this limitation obvious for the same reasons that I explain with respect to Claims 3 (“*receive the one or more recovered well treatment fluids*”), 4 (“*recondition the one or more recovered well treatment fluids*”), and 8 and 9 (“*and receive production*

fluids”) above as well as the reasons explained *infra*. See *supra* §§ VII.D.1, VII.D.2, VII.D.4, VII.D.5.

285. As I explained above, a POSITA would have understood that Tolman describes “fluid for the planned stimulation treatment (*“well development task fluids”*). EX-1005, [0029]; see *supra* § VII.B.1.ii. Also as explained *supra*, a POSITA would likewise have understood that the Tolman/Means/Crawford system, would use additives and other materials needed for stimulation treatment, which also satisfy “*well development task fluids.*” EX-1006, [0005]; see *supra* § VII.B.1.ii.

286. A POSITA would likewise have understood that Lehman discloses used polymer, new polymer, water, and “other constituents” which also satisfy “*well development task fluids.*” EX-1008, [0054] (“The system of FIG. 2 includes a conventional blender 30 of a type suitable for blending the selected materials to form a fracturing fluid. Used polymer as described above is provided from one or more vessels 32. New polymer is provided from one or more vessels 34, with water coming from one or more sources 36 to provide the aqueous base for the fracturing fluid. Other constituents come from one or more respective sources 38 as known in the art.”). The process for blending used polymer 32, new polymer 34, water 36, and other constituents 38 (*“well development task fluids”*) into “second” fracturing fluid (*“well treatment fluids”*) is shown below:

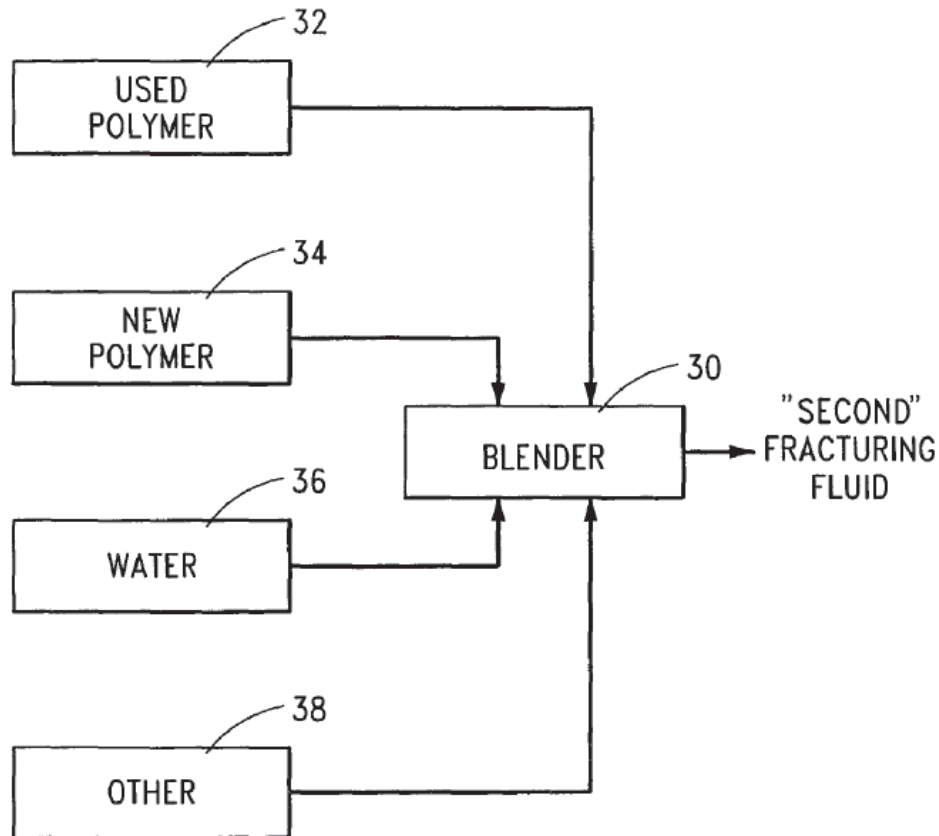


FIG. 2

Lehman Fig. 2 (EX-1008)

287. Lehman further expounds upon other constituents 38 and discloses a variety of other additives included in a concentrate such as pH adjusting compounds, pH buffers, surfactants, clay stabilizers, crosslinking agents, substantially fully hydrated depolymerized polymers, buffers, fluid loss control agents, scale inhibitors, demulsifiers, bactericides, and breaker activators, which also satisfy “well development task fluids.” EX-1008, [0061] (disclosing pH adjusting compounds),

[0062] (disclosing pH buffers), [0063] (disclosing surfactants), [0064] (disclosing clay stabilizers), [0066] (disclosing crosslinking agents), [0068] (disclosing substantially fully hydrated depolymerized polymers), [0069] (disclosing examples of crosslinking agents), [0070] (disclosing examples of pH adjusting compounds), [0073] (disclosing buffers), [0074] (disclosing examples of surfactants), [0075] (disclosing examples of clay stabilizers), [0076] (disclosing fluid loss control agents), [0078] (disclosing scale inhibitors, demulsifiers, bactericides, and breaker activators). Each of the above additives also satisfy “*well development task fluids*.”

288. Lehman further discloses a particular implementation of the general system illustrated in Figure 2 as represented in Figure 3. EX-1008, [0055]. The implementation represented in Figure 3 shows the flow lines for the used polymer, new polymer, water and other constituents and additives (“*the one or more well development task fluids*”) and, after blending at blender 30, “second” fracturing fluid (“*well treatment fluids*”) to the wells as shown below:

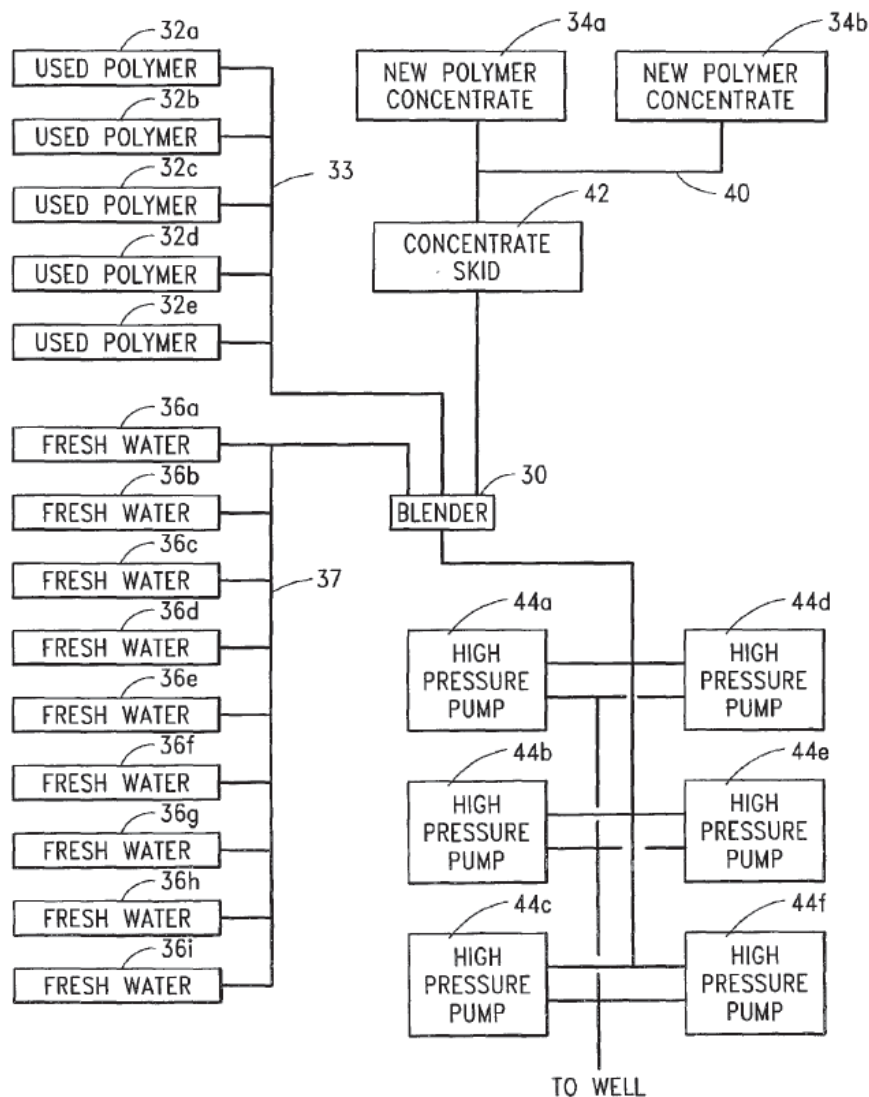


Fig. 3

Lehman, Fig. 3 (EX-1008)

289. A POSITA would have understood that the location of Lehman's storage tanks 32a–32e, manifold 33, storage vessels 34a and 34b, water tanks 36a–36i, manifold 37, manifold 40, concentrate skid 42 and blender 30 as shown in Figure 3 correspond to Tolman's Stimulation Fluid Storage System 204 (*"the centralized*

well treatment center”), while high pressure pumps 44a–44f correspond to Tolman’s Stimulated Fluid Pumping System 202. A POSITA would have found it obvious to modify Tolman’s Stimulation Fluid Storage System 204 (“*the centralized well treatment center*”) such that it is configurable to flow the used polymer, new polymer, water and other constituents and additives (“*the one or more well development task fluids*”) as shown in Lehman’s Figure 2, Figure 3, and disclosed in Lehman [0054] (“Used polymer as described above is provided from one or more vessels 32. New polymer is provided from one or more vessels 34, with water coming from one or more sources 36 to provide the aqueous base for the fracturing fluid. Other constituents come from one or more respective sources 38 as known in the art.”) and [0055] (“Used polymer, such as in accordance with the present invention, is held in five storage tanks 32a–32e connected, such as through a manifold 33, to the blender 30. New polymer concentrate, such as the type from the group defined above, is obtained from either or both of storage vessels 34a, 34b, which may provide outputs through a manifold 40, for example, to a concentrate skid 42 of a type known in the art, for example. Nine fresh water tanks 36a–36i are illustrated in FIG. 3 as providing the aqueous base to the blender 30 through manifold 37. The foregoing provide their flows into blender 30 whose output is provided to inlets of six high pressure pumps 44a–44f.”).

290. As discussed *supra*, a POSITA would have found it obvious for the Tolman/Means/Crawford/Lehman system to at Tolman's Stimulation Fluid Storage System 204 (*"the centralized well treatment center"*) receive recovered well stimulation fluid (*"receive the one or more recovered well treatment fluids"*), recondition the recovered well stimulation fluid into a "second" fracturing fluid, (*"recondition the one or more recovered well treatment fluids"*), and receive production fluids (*"and receive production fluids"*) from flowback manifolds 320 through Stimulation Fluid Pumping System 202. *See supra See supra* §§ VII.D.1, VII.D.2, VII.D.4, VII.D.5, VII.B.6.

291. For the above reasons, the combination of Tolman, Means, Crawford, and Lehman renders this limitation obvious.

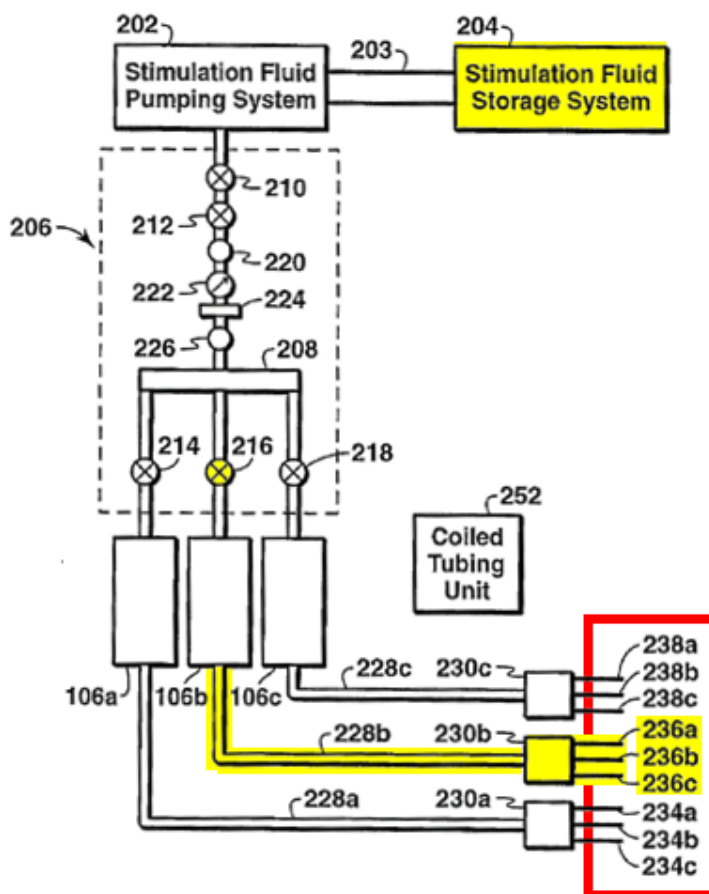
8. Dependent Claim 29

292. Claim 29 depends from claim 28, and further recites *"a fluid reconditioning module disposed about the centralized well treatment fluid center, wherein the fluid reconditioning module is operable to recondition at least one of the one or more recovered well treatment fluids; and a fifth fluid flow line between the fluid reconditioning module and the third fluid flow line so as to receive the one or more recovered well treatment fluids from the at least one of the one or more centralized service factories."*

293. The combination of Tolman, Means, Crawford, and Lehman renders this claim obvious. As I explained above, *see* § VII.D.2, the Tolman/Means/Crawford/Lehman system includes “*a fluid reconditioning module*” that “*is operable to recondition at least one of the one or more recovered well treatment fluids*” and disposed in the Stimulation Fluid Storage System 204 (“*the centralized well treatment fluid center*”).

294. A POSITA would have understood that the Tolman/Means/Crawford/Lehman system delivers stimulation treatment fluids pumped into corresponding well in oil-field tree 106b via flowline with valve 216 (“*a third fluid flow line*”) via flowline 228b (satisfying “*a fifth fluid flow line*”) and a flowback manifolds 230b (part of “*at least one of the one or more centralized service factories*”) to the “*fluid reconditioning module*” located in the Stimulation Fluid Storage System 204 in the Tolman/Means/Crawford/Lehman system. *Supra* § VII.B.22.i.

295. The subsequent path of recovered stimulation fluid is shown in Figure 2 below:



Tolman, Fig. 2 (EX-1005) (annotated)

296. For the above reasons, the combination of Tolman, Means, and Crawford renders this claim obvious.

9. Dependent Claim 30

297. Claim 30 depends from claim 29, and further recites “*a sixth fluid flow line between the fluid reconditioning module and any of the one or more modules so as to flow the reconditioned well treatment fluids to the one or more centralized service factories.*”

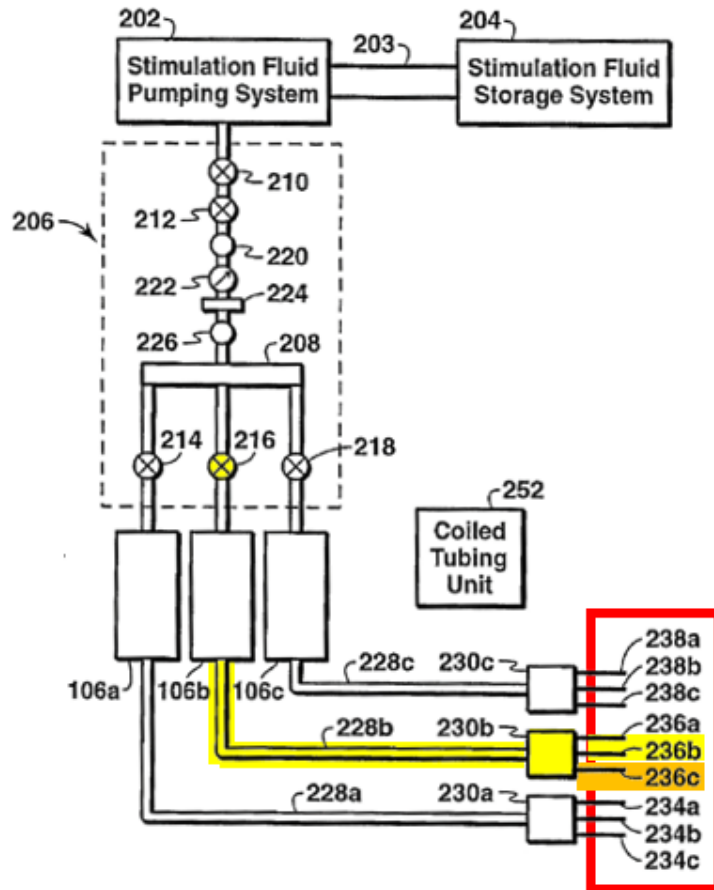
298. The Tolman/Means/Crawford/Lehman system renders this limitation obvious.

299. As I explained above, *see* § VII.B.15.iii, a POSITA would have understood Means' testing unit 330 and processing unit 75 ("*one or more of the plurality of modules*") would be disposed about the manifolds 230a–230c in the Tolman/Means/Crawford/Lehman system. The testing unit 330 and downhole sensors are used to measure the stimulation treatment fluids after they leave the well. *See* EX-1007 [0050]. The Tolman/Means/Crawford/Lehman system would use the same testing unit 330 to perform a costs analysis from Lehman's reconditioning method:

Making such a determination may include making a cost analysis that includes fracturing fluid new constituent costs and flow-back fluid disposal costs. For example, before the first fracturing treatment illustrated in FIG. 1 begins, one determines how low of a viscosity is to be allowed to be selected from the flow-back fluid or residual. The lower viscosity one accepts in the residual to be reused, the more new material may need to be added to formulate a second fracturing fluid having a sufficient viscosity. Using more new additive materials would be more expensive than not using them; however, the overall cost may be lower when considering how much it would cost to dispose of the flow-back fluid that would otherwise not be selected or when considering the cost of obtaining more fresh water, for example.

EX-1008, [0039]. In doing so, a POSITA would have understood that this testing unit ("*one or more of the plurality of modules*") would instruct manifold 230 would

direct fluid to be either reused via one flowline (e.g., flowline 236b) (“a sixth fluid flow line”) destined for the “fluid reconditioning module” or to be disposed of via another flowline (e.g., flowline 236c) destined for a “disposal module,” see § VII.D.2–VII.D.1, shown below:



Tolman, Fig. 2 (EX-1005) (annotated)

A POSITA would thus have understood that The Tolman/Mean/Crawford/Lehman system includes a “sixth” flowline between testing unit 330 (“one or more of the plurality of modules”) and the “fluid reconditioning module.”

300. For the above reasons, the combination of Tolman, Means, and Crawford renders this limitation obvious.

10.Dependent Claim 31

301. Claim 31 depends from claim 30, and further recites “*a seventh fluid flow line between the fluid reconditioning module and an additive storage module, wherein the additive storage module is operable to store the reconditioned well treatment fluids.*”

302. The Tolman/Means/Crawford/Lehman system renders this limitation obvious.

303. As discussed *supra*, a POSITA would have understood that both the fluid reconditioning module and the additive storage module would both be located at the Stimulation Fluid Storage System 204 in the Tolman/Means/Crawford/Lehman system. Such a person would have recognized that (“*recondition*”) recovered stimulation fluid (“*the one or more recovered well treatment fluids*”) into a new reconditioned stimulation fluid (“*the reconditioned well treatment fluids*”). *See supra* § VII.B.23.

304. Lehman’s reconditioning method, as implemented in the Tolman/Means/Crawford/Lehman system, explains that resulting residual treating fluid use additives and may add more on the fly. EX-1008, [0027] (“Also provided by the present invention is a composition for a treating fluid, which composition

comprises a treating fluid residual recovered from a well, wherein the treating fluid residual includes delinked polymer and the treating fluid residual has a stored pH in the range between about 7 and about 13. This may further comprise an additive added to the treating fluid residual such that the composition has an initial re-use pH less than about 7 and in particular an initial re-use pH between about 5 and about 6.5.”). After conditioning, additives may be added to the residual fluid to attain certain pH levels. *See* EX-1008, [0045] (“The present invention provides a further composition using the foregoing one and further comprising an additive added to the treating fluid residual such that the composition has an initial re-use pH less than about 7. In a particular implementation the initial re-use pH is between about 5 and about 6.5.”); *see id.*, [0061]–[0065]. Incorporating additives into residual fluid allows for “real time changes in the properties of the treating fluid as it is being pumped possible.” EX-1008, [0066]. Means closed-loop additive system, like Lehman’s reconditioning method, also changes the level of additives on the fly. *See* § VII.A.4. Based on these disclosures, a skilled artisan would have understood that Lehman’s reconditioning method, as implemented in the Tolman/Mean/Crawford/Lehman system, would use residual fluid with additives with using more additives on the fly, if needed.

305. The Tolman/Mean/Crawford/Lehman system includes additive sources 312a–312m (“*an additive storage module*”) are operable to store additives.

EX-1006, [0047] (“The system 300 may include a mixer 310 for mixing or combining at the wellsite a plurality of additive #1–additive #m stored in sources 313[sic]a–312m respectively. . . . Meters 316a–316m measure the amounts of the additives from sources 312a–312m”). A POSITA would have understood that reconditioned stimulation fluid (*“the reconditioned well treatment fluids”*) would include additives. Accordingly, a POSITA would have understood additive sources 312a–312m (*“the additive storage module”*) are operable to store recovered stimulation fluid that had been processed (*“the reconditioned well treatment fluids”*).

306. In doing so, a POSITA would have found it obvious to use fluid flow lines (*“a seventh fluid flow line”*) to direct residual fluid from the *“fluid reconditioning module”* to the additive storage module in the Tolman/Means/Crawford/Lehman system. Given that these are later combined, such a person would have been motivated to store the residual fluid along with other additives in the additive storage module. A POSITA would have found such storage to be a design choice with different benefits and costs. For example, a POSITA would have recognized that such storage would reduce water supply costs and produced water disposal costs. *See* EX-1008, [0009] (“Also, in many environmentally sensitive areas, the water based fracturing fluids containing polysaccharide gelling agents must be recovered from the well and disposed of by environmentally appropriate means, which increases the overall cost of the

fracturing treatment.”). Given that residual water and additives are mixed together, *see* EX-1008, [0045], [0061]–[0065], it would have been obvious to store them in the same place to reduce costs in transporting them to the same place to be mixed. For either of these reasons, a POSITA would have stored both the residual fluid and additives in the additive storage module in the Tolman/Means/Crawford/Lehman system.

307. For the above reasons, the combination of Tolman, Means, Crawford, and Lehman renders this limitation obvious.