

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PROFRAC HOLDING CORPORATION
and
U.S. WELL SERVICES, LLC,
Petitioners,

v.

HALLIBURTON ENERGY SERVICES, INC.,
Patent Owner

IPR2023-01318
U.S. Patent No. 7,931,082

**PETITION FOR *INTER-PARTES* REVIEW OF
U.S. PATENT NO. 7,931,082 B2**

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
II.	COMPLIANCE WITH IPR REQUIREMENTS.....	1
	A. Certification – Grounds for Standing.....	1
	B. Mandatory Notices.....	2
	1. Real Party-in-Interest	2
	2. Related Matters	2
	C. Lead and Back-up Counsel and Service Information.....	2
III.	THE CHALLENGED CLAIMS.....	3
IV.	THE '082 PATENT.....	3
	A. Effective Filing Date.....	3
	B. Person of Ordinary Skill in the Art.....	3
	C. Technology Overview	4
	D. Prosecution History.....	4
V.	CLAIM CONSTRUCTION.....	7
VI.	THE PRINCIPAL PRIOR ART	7
	A. Tolman.....	7
	B. Means	8
	C. Crawford	9
	D. Lehman.....	10
	E. The Combination of Tolman and Means	10
VII.	CLAIMS 1-15 and 17-31 ARE UNPATENTABLE.....	16
	A. Ground 1: Claims 1–3, 5–7, 9–15, 17–18, 21–24, and 26–28 of the '082 Patent Are Obvious Over Tolman, Means, and Crawford.....	16
	1. Claim 1	17
	i. Limitation [1pre]	17
	ii. Limitation [1A]	21
	iii. Limitation [1B].....	24

iv.	Limitation [1C].....	27
v.	Limitation [1D]	29
vi.	Limitation [1E].....	31
2.	Independent Claim 17	38
i.	Limitation 17[pre].....	38
ii.	Limitation 17[A].....	39
iii.	Limitation 17[B].....	39
iv.	Limitation 17[C].....	41
v.	Limitation 17[D].....	43
3.	Claim 2	45
4.	Claim 3	46
i.	3[A] “ <i>disposing . . . at the centralized well treatment fluid center</i> ”	46
ii.	3[B] “ <i>wherein . . . configurable to dispose . . the one or more recovered well treatment fluids</i> ”	48
5.	Claim 5	48
6.	Claim 6	49
i.	6[A] “ <i>receiving a production fluid . . . wherein . . . configurable to receive the production fluid</i> ”	49
ii.	6[B] “ <i>wherein</i> ”	50
7.	Claim 7	52
8.	Claim 9	56
9.	Claim 10.....	58
10.	Claim 11.....	59
12.	Claim 13.....	60
13.	Claim 14.....	61
14.	Claim 15.....	61
15.	Claim 18.....	62
i.	Limitation 18[A].....	62

ii.	Limitation 18[B].....	63
iii.	Limitation 18[C].....	65
iv.	Limitation 18[D].....	67
16.	Claim 21.....	68
17.	Claim 22.....	69
18.	Claim 23.....	70
19.	Claim 24.....	71
20.	Claim 26.....	72
i.	Limitation 26[a].....	72
ii.	Limitation 26 [b]	73
iii.	Limitation 26 [c].....	73
iv.	Limitation 26 [d]	73
v.	Limitation 26 [e].....	73
21.	Claim 27.....	73
i.	Limitation 27[a].....	73
ii.	Limitation [27b]	74
iii.	Limitation 27[c].....	75
iv.	Limitation 27[d]	75
v.	Limitation 27[e].....	75
vi.	Limitation 27[f].....	76
22.	Claim 28.....	77
i.	Limitation [28a].....	77
ii.	Limitation 28[b]	77
iii.	Limitation 28[c].....	78
B.	Ground 2: Claims 3–4, 7–9, 11, 19, 20, 25, and 29–31 are Obvious Over Crossley and Albers, in further view of Lehman.....	79
1.	The Combination of Tolman/Mean/Crawford and Lehman ..	79
2.	Claims 3 and 20.....	83

3.	Claims 4 and 19.....	84
4.	Claim 7.....	85
5.	Claim 8.....	85
6.	Claim 9.....	85
7.	Claim 11.....	86
8.	Claim 25.....	86
9.	Claim 29.....	91
10.	Claim 30.....	92
11.	Claim 31.....	94
VIII.	THE BOARD SHOULD NOT EXERCISE ITS DISCRETION UNDER §314(a) OR §315(d).....	97
A.	314(a) – <i>Fintiv</i>	97
B.	325(d).....	97
IX.	CONCLUSION.....	99

TABLE OF AUTHORITIES

Page(s)

Cases

<i>Halliburton Energy Services, Inc. v. U.S. Well Services, LCC and ProFrac Holding Corp.</i> , Case No. 6:22-cv-00905-ADA (W.D. Tex.).....	2
<i>KSR International Co. v. Teleflex Inc.</i> , 550 U.S. 398 (2007)	1
<i>Vivid Techs., Inc. v. Am. Sci. & Eng'g Inc.</i> , 200 F.3d 795, 803 (Fed. Cir. 1999).....	7

Statutes

35 U.S.C. §102 (b).....	8, 9, 10
35 U.S.C. §102 (e).....	7
35 U.S.C. §103.....	3
35 U.S.C. §314(a).....	97

Other Authorities

37 C.F.R. §42.100(b).....	7
<i>Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation</i> (June 21, 2022).....	97
<i>Ecobee Techs. v. Causam Enterprises, Inc.</i> , IPR2022-01339, Paper No. 20 (PTAB March 22, 2023).....	99
<i>Sony v. MZ Audio Scis., LLC</i> , IPR2022-01544, Paper No. 12 (PTAB April 21, 2023).....	98

CLAIM LISTING

Claim 1
1[PRE] A method of providing centralized well development services to a plurality of wells, comprising the steps of:
1[A] 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;
1[B] 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;
1[C] 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;
1[D] 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
1[E] 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.
Claim 2
2. The method of claim 1, wherein at least two well development task fluids are provided and they comprise different compositions.
Claim 3
3[A] The method of claim 1, further comprising the step of: disposing of at least one of the one or more recovered well treatment fluids at the centralized well treatment fluid center,
3[B] 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.

Claim 4

4. The method of claim 1, further comprising the step of: 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 5

5. The method of claim 1, 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.

Claim 6

6[A] The method of claim 1, further comprising the steps of: 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

6[B] 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.

Claim 7

The method of claim 6, further comprising the step of: 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.

Claim 8

8[A] The method of claim 7, further comprising the steps of: 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

8[B] 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.

Claim 9

9. The method of claim 7, further comprising: 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.

Claim 10

10[A] The method of claim 1, further comprising the steps of: flowing from the centralized well treatment fluid center to the one or more centralized service factories one or more other well development task fluids, wherein the one or more centralized service factories are selectively configurable to receive the one or more other well development task fluids;

10[B] flowing from the one or more centralized service factories to the at least one of the plurality of wells the one or more other well treatment fluids, wherein the one or more centralized service factories is selectively configurable to flow the one or more other well treatment fluids;

10[C] recovering from the at least one of the plurality of wells the one or more other 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 other well treatment fluids; and

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

Claim 11

11. The method of claim 1, further comprising the step of: 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.

Claim 12

12. The method of claim 1, further comprising the step of: 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.

Claim 13

13. The method of claim 12, further comprising the step of: 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.

Claim 14

14. The method of claim 1, further comprising the step of: 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.

Claim 15

15[A] The method of claim 1, further comprising the steps of: 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

15[B] 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.

Claim 17

17[PRE] A system for centralized distributing, receiving, and treating fluids for a plurality of wells, the system comprising:
17[A] a centralized well treatment fluid center;
17[B] one or more centralized service factories;
17[C] 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 are adapted to flow one or more well development task fluids; and
17[D] 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 are adapted to flow one or more recovered well treatment fluids.
Claim 18
18[A] The system of claim 17, further comprising: a plurality of modules disposed about each of the one or more centralized service factories;
18[B] 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
18[C] 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;
18[D] 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.
Claim 19
19. The system of claim 18, 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.
Claim 20
20. The system of claim 18, further comprising 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.

Claim 21
21. The system of claim 18, further comprising 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.
Claim 22
22. The system of claim 18, further comprising 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.
Claim 23
23. The system of claim 18, further comprising 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.
Claim 24
24. The system of claim 17, wherein each of the plurality of distribution lines are adapted to flow one or more well treatment fluids.
Claim 25
25[A] The system of claim 17, wherein the centralized well treatment center is configurable to: flow the one or more well development task fluids;
25[B] receive the one or more recovered well treatment fluids;
25[C] recondition the one or more recovered well treatment fluids; and
25[D] receive production fluids.
Claim 26
26[A] The system of claim 17, 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;
26[B] prepare the one or more well treatment fluids from the one or more well development task fluids;
26[C] flow the one or more well treatment fluids to the plurality of wells;
26[D] receive the one or more recovered well treatment fluids from the plurality of wells; and

26[E] receive production fluids from the plurality of wells.
Claim 27
27[A] The system of claim 17, wherein the plurality of modules comprise: one or more blending modules;
27[B] 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;
27[C] 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;
27[D] one or more pumping grids, wherein the one or more pumping grids are operable to connect to the one or more blending modules;
27[E] one or more manifolds, wherein the one or more manifolds are operable to connect to the one or more blending modules; and
27[F] 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.
Claim 28
28[A] The system of claim 27, further comprising: 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;
28[B] 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
28[C] 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.
Claim 29
29[A] The system of claim 28, further comprising: 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

29[B] 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.

Claim 30

30. The system of claim 29, further comprising: 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.

Claim 31

31. The system of claim 30, further comprising: 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.

EXHIBIT LIST

No.	Exhibit Description
1001	U.S. Patent No. 7,931,082
1002	File History of U.S. Patent No. 7,931,082
1003	Declaration of Dr. Michael Nikolaou
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 Stoitsits 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
1016	International Publication Number WO 2005/111369 to Crossley et al.
1017	WD Texas Statistics

I. INTRODUCTION

Petitioners ProFrac Holding Corporation and U.S. Well Services, LLC (“Petitioners”) request *inter partes* review of claims 1–15 and 17–31 (“challenged claims”) of U.S. Patent No. 7,931,082. The ’082 patent is directed to oil and gas well operations, including methods and systems for servicing multiple wells from a central location. EX-1001, Abstract, 1:44–46. But as demonstrated below, centralized well-operations and well-stimulation are not new, but rather “[t]he combination of familiar elements according to known methods.” *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007).

II. COMPLIANCE WITH IPR REQUIREMENTS

A. Certification – Grounds for Standing

Petitioners certify that the ’082 Patent is available for *inter partes* review. Petitioners are not barred or estopped from requesting an *inter partes* review challenging the claims on the identified grounds herein. Neither Petitioners nor any real party in interest has filed a civil action challenging the validity of a claim of the ’082 Patent. This petition is being filed no more than 1 year after the date on which Petitioners or real parties in interest or privies of Petitioners were served with a complaint alleging infringement of the ’082 Patent.

B. Mandatory Notices**1. Real Party-in-Interest**

The real parties-in interest are ProFrac Holding Corporation and U.S. Well Services, LLC (“Petitioners”).

2. Related Matters

U.S. Patent No. 7,931,082, along with several other patents, has been asserted by Halliburton Energy Services, Inc. (“Halliburton” or “PO”), Halliburton US Technologies, Inc., and Halliburton Group Technologies, Inc. in the case *Halliburton Energy Services, Inc. v. U.S. Well Services, LCC and ProFrac Holding Corp.*, Case No. 6:22-cv-00905-ADA (W.D. Tex.) filed September 1, 2022.

C. Lead and Back-up Counsel and Service Information

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III. THE CHALLENGED CLAIMS

Ground 1: Claims 1–3, 5–7, 9–15, 17–18, 21–24, and 26–28 are unpatentable as obvious under 35 U.S.C. §103 based on Tolman (EX-1005) in view of Means (EX-1006), and in further View of Crawford (EX-1007).

Ground 2: Claims 3–4, 7–9, 11, 19, 20, 25, and 29–31 are unpatentable as obvious under 35 U.S.C. §103 based on Tolman (EX-1005), Means (EX-1006), and Crawford (EX-1007), in further View of Lehman (EX-1008).

IV. THE '082 PATENT

A. Effective Filing Date

The earliest filing date claimed by the '082 Patent is October 16, 2007, which Petitioners apply below. EX-1001, Cover.

B. Person of Ordinary Skill in the Art

A person of ordinary skill in the art (“POSITA”) pertinent to the subject matter of the '082 patent and during the relevant timeframe 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. A person having education but less professional experience, and vice versa, may qualify also qualify as a POSITA. EX-1003-¶4.

C. Technology Overview

The '082 Patent was filed on October 16, 2007, and issued on April 26, 2011, and is directed toward servicing multiple wells from a central location. EX-1001, Abstract. More specifically, the '082 Patent describes 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.*, Abstract.

D. Prosecution History

During prosecution, the Examiner considered both Tolman (EX-1005) and Crawford (referred to as Stoitsits) (EX-1007). The Examiner included Crawford in the record but did not rely on the reference in any rejection. EX-1002, p. 550. After several rounds, the Examiner rejected the claims over Tolman:

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

view of Means and Crawford, nor did the Examiner benefit from the analysis of Dr. Dr. Michael Nikolaou. Critically, the Examiner’s analysis erred in its mapping of Tolman against the claim elements of the 082 Patent analyzed below, including Tolman’s production system 100 to the claimed “*centralized well treatment fluid center.*”

V. CLAIM CONSTRUCTION

Claims are given their “ordinary and customary meaning” as understood by a POSITA and the prosecution history pertaining to the patent. 37 C.F.R. §42.100(b). Because a POSITA would find the challenged claims unpatentable under any interpretation consistent with their plain and ordinary meaning in the context of the ’082 patent, the Board need not expressly construe any claim terms. *See Vivid Techs., Inc. v. Am. Sci. & Eng. ’g. Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

VI. THE PRINCIPAL PRIOR ART

A. Tolman

U.S. Patent Application Publication No. 2009/0114392 to Tolman et al. (“Tolman”) (EX-1005) was filed on July 24, 2006. EX-1005, Cover. Tolman is prior art under at least 35 U.S.C. §102 (e).

Tolman discloses systems and methods associated with reliable and cost-effective execution of simultaneous wellbore preparation and stimulation

operations in multiple wellbores from a single surface location. EX-1005, [0006]. Figure 2 demonstrates that stimulation fluid from a Stimulation Fluid Storage System 204 (“Storage System 204”) passes through piping 203 to a Stimulation Fluid Pumping System 202 (“Pumping System 202”), which pumps stimulation fluid through a manifold 206 to the desired oil field tree 106a–106c, where corresponding wells 104a–104c are stimulated. EX-1005, Fig. 2. The wells 104a–104c produce hydrocarbons through respective oil field trees 106a–106c, which are coupled to piping 228a–228c, flowback manifolds 230a–230c, flowlines 234a–234c, 236a–236c, and 238a–238c, which may also be coupled to flowback pits, flow test units, sales lines, tankage, oil/gas/water separating and processing units, and/or other similar devices. EX-1005, Fig. 2, [0028].

B. Means

U.S. Patent Application Publication No. 2005/0166961 to Means et al. (“Means”) (EX-1006) was published on August 4, 2005. Means is prior art under at least 35 U.S.C. §102 (b).

Means discloses a closed-loop system that injects additives into formation fluids recovered through wellbores. EX-1006, Abstract. Figure 3 demonstrates multiple additives are directed into mixer 310 by pumps 314a–314m, and meters 316a–316m measure the amount of additives sent to the mixer. EX-1006, Fig. 3, [0047]. Based on these measurements, the amount of additives are adjusted in

the mixture. EX-1006, [0047]. Pump 318 directs the mixed treatment fluid from mixer 310 into well 50. EX-1006, [0047].

C. Crawford

U.S. Patent No. 6,236,984 to Crawford et al. (“Crawford”) (EX-1007) was published on May 22, 2001. Crawford is prior art under at least 35 U.S.C. § 102 (b).

Crawford discloses optimizing the operating conditions of a petroleum production field in which several wells are arranged and connected to one or more central processing facilities. EX-1007, Abstract. Figure 1 of Crawford depicts multiple drill sites 2, with each supporting wells 4 which are connected to a central processing facility 6 via surface lines SL. EX-1007, Fig. 1, 6:29–34. “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, 5:55–59. Figure 4 of Crawford shows that control valves located at each well site control the reception of fluid at the central processing facility 6 from multiple drill sites. EX-1007, Fig. 4, 7:44–48.

D. Lehman

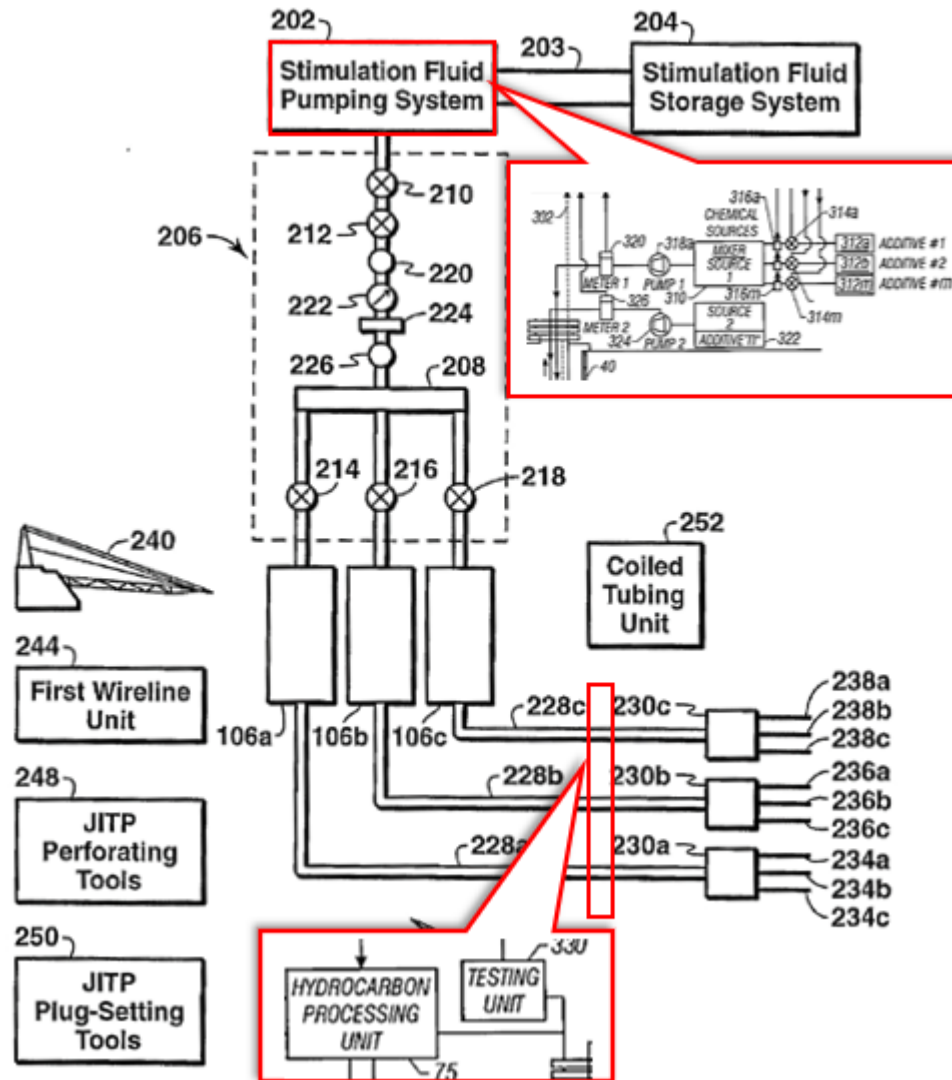
U.S. Patent Application Publication No. 2004/0050550 to Lehman et al. (“Lehman”) published on March 18, 2004. Lehman qualifies as prior art under at least 35 U.S.C. §102 (b).

Lehman discloses treating fluid production and compositions for treating fluids that reuse prior treating fluid. EX-1008, Abstract. Figure 2 of Lehman shows that used polymer 32, new polymer 34, water 36, and other constituents 38 are blended into a second fracturing fluid. EX-1008, Fig. 2, [0054]. In another example in Figure 3, new polymer concentrates held in storage vessels 34a and 34b feed a concentrate skid 42. EX-1008, Fig. 2, [0055]. The new polymer concentrates from concentrate skid 42, used polymers from storage tanks 32a-32e, and fresh water from water tanks 36a-36i all feed to a blender 30. *Id.*

E. The Combination of Tolman and Means

It would have been obvious to modify Tolman’s centralized stimulation fluid pumping system with Means’s teachings describing a closed-loop additive injection system (“Tolman/Means”) for the reasons explained below. As Dr. Nikolaou explain, a POSITA would have understood that by combining the teachings of Tolman with Means, improved well efficiency could be attained by fine-tuning the mixture of additives. EX-1003-¶¶65-68, EX-1006, [0006]–[0008]. In the Tolman/Means system, Means’s mixer, pumps 314–a through

314m, and relevant meters would be implemented in Tolman's Pumping System 202, along with any necessary sensors and controls, as shown below.



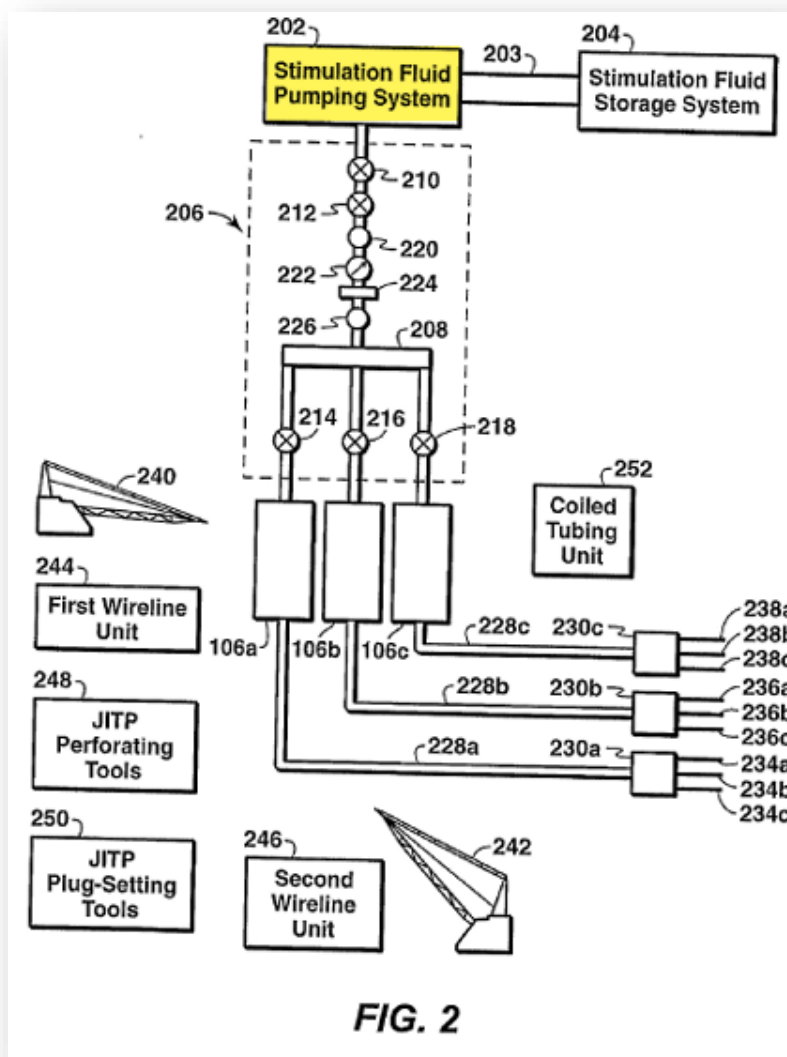
Tolman, Fig. 2 (EX-1005) (annotated); EX-1003-¶65.

Further, a POSITA would have understood that Tolman/Means would include storing Means's additive sources in Tolman's Storage System 204. EX-1003-¶69. EX-1006, [0047]. Similarly, Tolman's treatment fluid is stored in its Storage System 204. EX-1005, [0029]. Means further explains that it is desirable

to store additives unmixed when away from the wellsite for safety reasons. EX-1006, [0047]. Accordingly, Dr. Nikolaou explains that to get the additives to the wellsite, a POSITA would have recognized that the combined system would use pipes 203 to deliver both additives and any other stimulation fluid needed for well operations. EX-1003-¶69.

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: well operations. EX-1001, 1:6–10; EX-1005, Abstract, [0008]; EX-1006, [0003]. *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], [0006]; EX-1006, [0007]. For either reason, Dr. Nikolaou explains that Tolman and Means are analogous art. EX-1003-¶66.

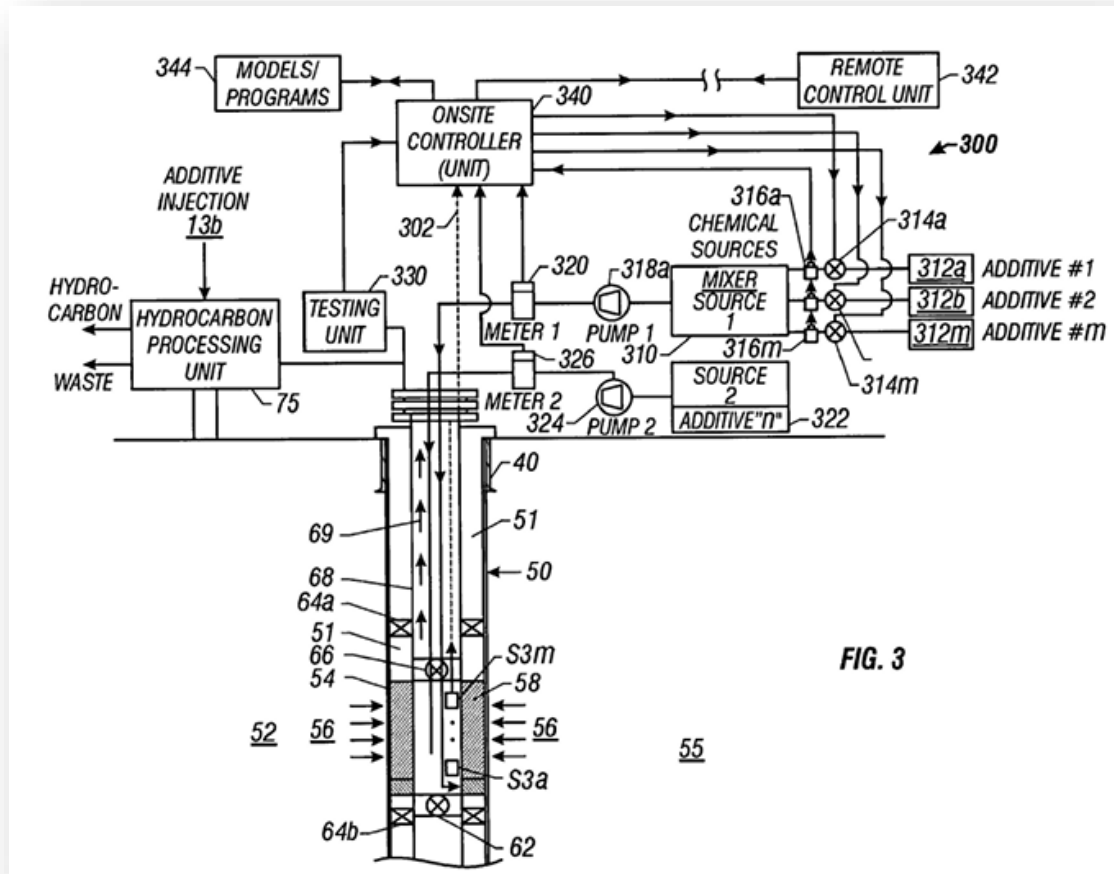
Tolman discloses using fracturing equipment and pumps. Figure 2 of Tolman depicts a stimulation treatment system that includes Pumping System 202 (highlighted in yellow) below:



Tolman, Fig. 2 (EX-1005) (annotated); EX-1003-¶67.

Storage System 204 in Tolman “is a vessel that holds a sufficient volume of fluid for the planned stimulation treatments,” EX-1005, [0029], that provides provides “via piping 203” fluid to Pumping System 202. EX-1005. Pumping System 202 then provides the stimulation treatment to selected oil field trees 230a–230c using a pumping system manifold 206. EX-1005, [0030]. EX-1003-¶67.

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 313a–312m, shown below:



Means, Fig. 3 (EX-1006)

EX-1006, [0047]. In Means, 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.” EX-1006., [0047]. Using downhole sensors and testing unit 330, Means’s system “can administer the optimum amounts of the various additives to the wellbore or pipeline. . . . [and] avoid excessive use of the additives, which can be very expensive[,] [along with] tak[ing] prompt corrective action by altering the amounts of the injected additives to avoid formation of harmful elements.” EX-1006, [0050].

Dr. Nikolaou explains that a POSITA would have been motivated to incorporate Means’s teachings addressing the benefits of additive injection in Tolman’s centralized well-operations system for at least four reasons. EX-1003-¶¶70-73.

First, Means provides an express reason to do so, EX-1003-¶71, in explaining 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” by “periodically or continuously monitor[ing] the actual amount of the additives being dispensed.” EX-1006, [0007]. *Third*, Means also explains that his 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]; EX-1003-¶71.

Fourth, Dr. Nikolaou explains that a POSITA would have also recognized that using Means’s closed-loop additive system teachings in Tolman would have been a beneficial design choice. EX-1003-¶72. Dr. Nikolaou further explains that a POSITA would have weighed the trade-offs and advantages of each of these choices, and that although a POSITA would have recognized that Means’s additive system would increase costs, such costs would be mitigated based on the improved well efficiency attained by fine-tuning the mixture of additives. *E.g.*, EX-1006, [0006]–[0008]; EX-1003-¶72. This trade-off would also be important if a wellsite was in subsea environment. EX-1006, [0006]. EX-1003-¶72.

VII. CLAIMS 1-15 and 17-31 ARE UNPATENTABLE

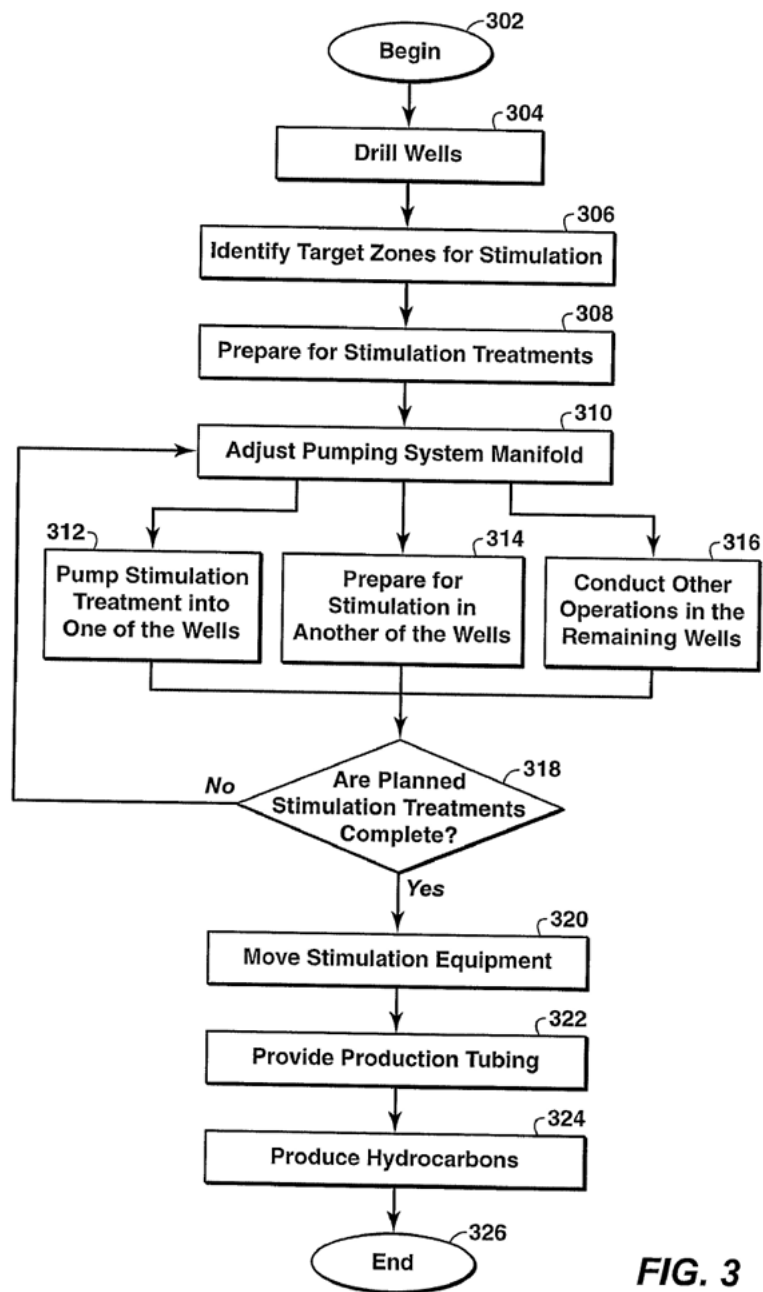
A. Ground 1: Claims 1–3, 5–7, 9–15, 17–18, 21–24, and 26–28 of the ’082 Patent Are Obvious Over Tolman, Means, and Crawford

The combination of Tolman, Means, and Crawford renders obvious claims 1–3, 5–7, 9–15, 17–18, 21–24, and 26–28, shown below.

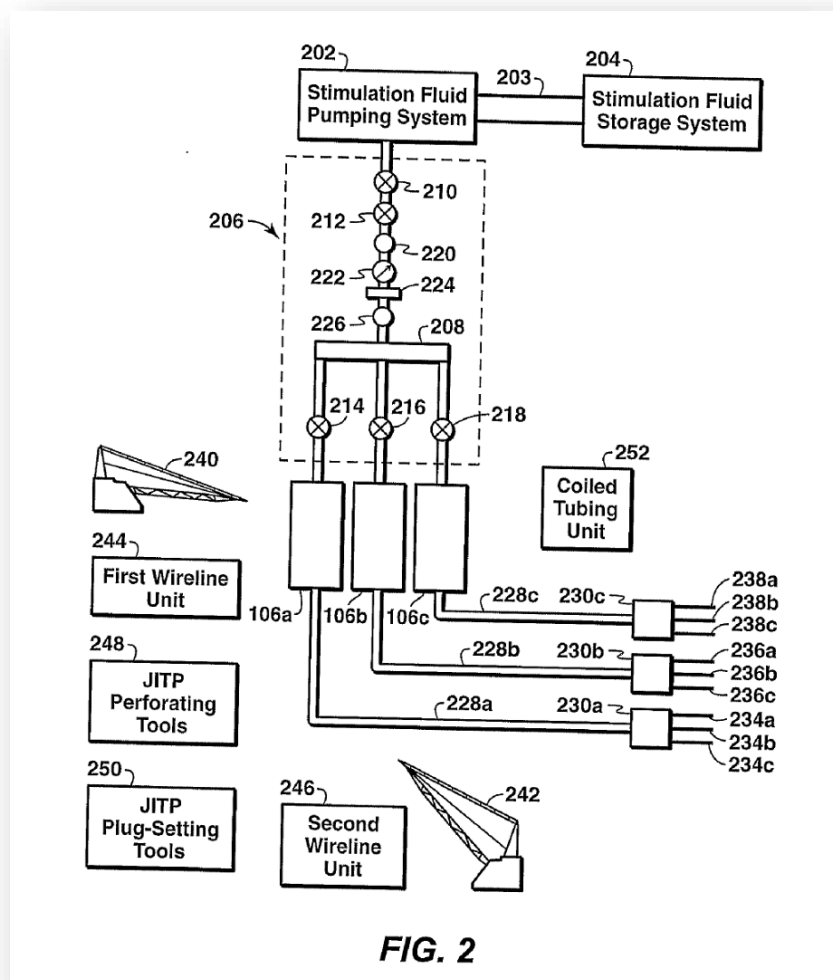
1. Claim 1

- i. Limitation [1pre]

Tolman discloses a “*method of providing centralized well development services to a plurality of wells.*” EX-1005, Abstract; Figs. 1 and 3. Figure 3 of Tolman shows a flow chart of well operations performed on wells 104a–104c in Figure 1:

**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 (“*well development services to a plurality of wells*”) and those steps are configured to operate simultaneously to improve efficiency. EX-1003-¶75. EX-1005, [0026]; *id.*, [0038]. This processing for multiple wells is “*centralized*” because the system providing the processing is located on a single pad or between multiple pads. EX-1005, [0010], [0064]; *see also* [0020], [0026]; *see also* Figure 2, *below* (depicting Tolman’s “*centralized well development services to a plurality of wells*”); EX-1003-¶75.



Tolman, Fig. 2 (EX-1005)

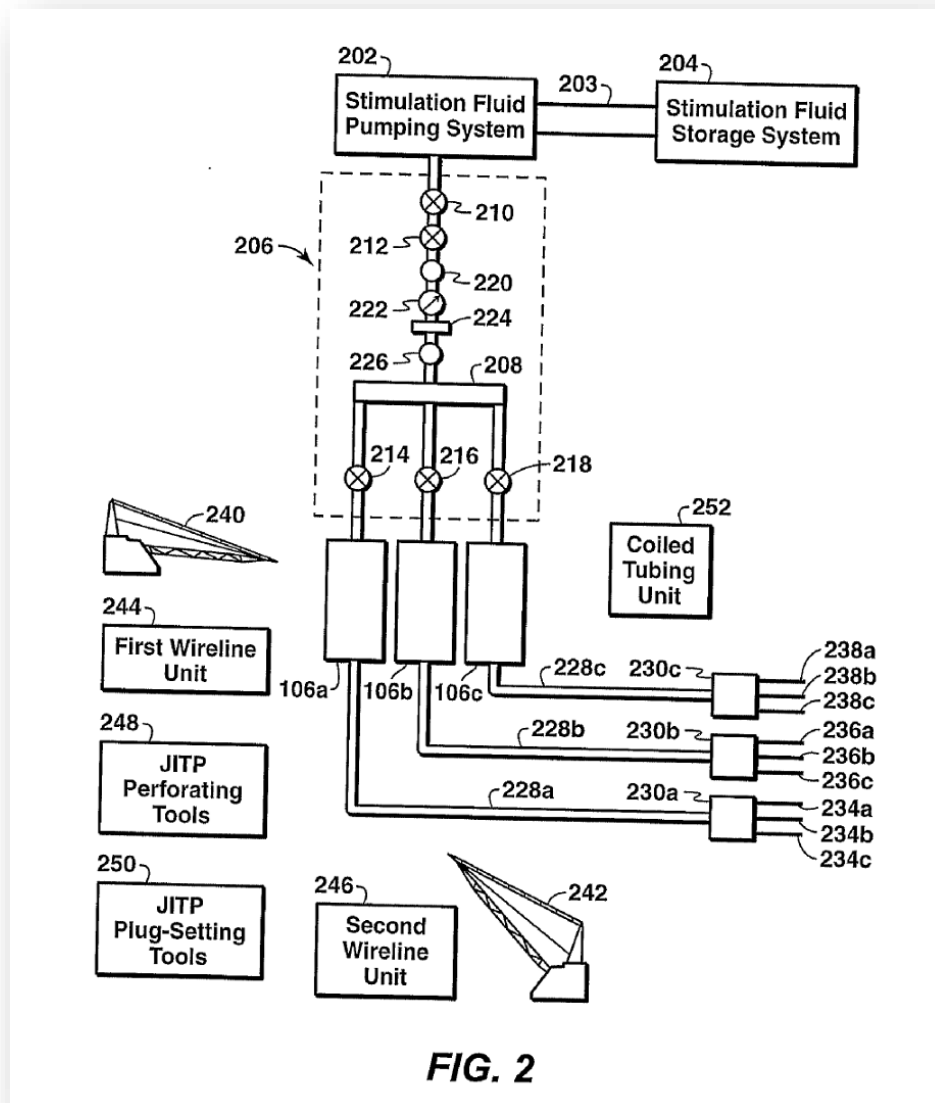
Referencing Figure 2, through manifold 206, the centrally generated and pressurized stimulation fluid is distributed to a plurality of wells 104a–104c through corresponding oil field trees 106a–106c. EX-1005, [0030]. This distribution from the “centralized” system to a plurality of wells is achieved 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.* EX-1003-¶75.

ii. Limitation [1A]

a. “flowing . . . well development task fluids”

Figure 2 of Tolman depicts the various equipment used to perform stimulation treatments:



Tolman, Fig. 2 (EX-1005)

For example, Storage System 204 (“*centralized well treatment fluid center*”) “is a vessel that holds a sufficient volume of fluid for the planned stimulation treatments” (“*well development task fluids*”). EX-1005, [0029]. The storage system is coupled to the Pumping System 202 (part of “*one or more centralized service factories*”) “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. EX-1003-¶77.

Further, Pumping System 202 in Tolman/Means is “*selectively configurable*” to “*receive*” “*well development task fluids*” because it includes “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]; EX-1003-¶78.

b. “*Well development task fluids*”

Tolman discloses “fluid for the planned stimulation treatment” (“*well development task fluids*”). EX-1005, [0029]. Further, the additives and other materials needed for stimulation treatment of Means also disclose “*well development task fluids*.” EX-1003-¶78; EX-1006, [0005]. Pump System 202 in the Tolman/Means system mixes the various additives—before mixing, the additives are “*well development task fluids*” because they are used in well treatment. EX-1006, [0047]; *see also* EX-1001, 8:1–4 (describing well development task fluids); Ex. 1006, [0006]; EX-1003-¶80.

Alternatively, other fluids described by Tolman and Means also satisfy “*well development task fluids*,” such as “additive #1–additive #m,” EX-1006, [0047], and wellbore fluid for treatment using additives, EX-1006, [0040]¹. EX-1003-¶80.

c. *Centralized Well Treatment Fluid Center and Service Factories*

Storage System 204 in Tolman/Means discloses a “*centralized well treatment fluid center*” because it stores “a sufficient volume of fluid for the

¹In Tolman/Means, after the wellbore fluid and additives are mixed the “*well treatment fluid[s]*” are pumped down the well. EX-1005, [Abstract], [0044]–[0046]; EX-1006, [0047]–[0048]. EX-1003-¶80.

planned stimulation treatments.” EX-1005, [0059]. Storage System 204 also stores additives described by Means, and both fluids “*flow*” via piping 203 to the Pumping System 202 and pumping system manifold 206 (collectively, “*one or more centralized service factories*”). EX-1005, [0029]. EX-1003-¶¶80-81.

Pumping System 202 and manifold 206 in Tolman/Means are part of “*one or more centralized service factories*.” EX-1003-¶82. For example, these components selectively receive “fluid[s] for the planned stimulation treatment” (“*well development task fluids*”) from Storage System 204. EX-1005, [0029], *id.*, [0030]. The Tolman/Means system would include Means’s pumps 314a–314m and meters 316a–316m in Tolman’s Pumping System 202 (part of “*the one or more centralized service factories*”) and be used to selectively increase, decrease, or shut off the reception of additives #1–m. EX-1006, [0047]. In doing so, Storage System 204 would “*selectively receive[s] one or more well development task fluids*.” EX-1003-¶82. Pumping system 202 and manifold 206 then direct the stimulation treatment fluids to the appropriate well using valves 210–218. EX-1005, [0030]. EX-1003-¶82.

iii. Limitation [1B]

a. “*Well treatment fluids*”

As discussed above, in Tolman/Means, after the additives and other fluids (“*well development task fluids*”) are mixed, the combined fluid results in a

stimulation/treatment fluids (“*one or more well treatment fluids*”). See §VII.A.1.ii.b; EX-1005, [Abstract], [0044]–[0046]; EX-1006, [0047]–[0048]. 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, is referred to as wellbore fluid. EX-1006, [0048]; *see id.*, [0047]. Dr. Nikolous further explains that the stimulation/treatment or wellbore 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]. EX-1003-¶88.

b. “*preparing . . .*”

The Tolman/Means system would “*prepar[e]*” “*well treatment fluids*” from “*well development task fluids*,” such as Means’s additives and/or other fluids needed for stimulation treatment, “*at the one or more centralized service factories.*” EX-1003-¶¶86-87. Piping 203 in Tolman/Means delivers both fluids and additives (“*well development task fluids*”) to the Pump System 202 (“*one or more centralized service factories*”), which then mixes (“*prepares*”) the various additives and fluids together (“*at the one or more centralized service factories*”). EX-1006, [0047]; EX-1003-¶86. 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]. As Dr. Nikolaou explains, Means's additives and other fluids disclose "*well development task fluids*" before they are mixed (or "*prepar[ed]*") together. EX-1003-¶86.

c. "*selectively configurable*"

Pumping System 202 in Tolman/Mean mixes these additives using Means's mixer, meters 316a–316m, and pumps 314a–314m to selectively control the amount of additives the mixture ("*selectively configurable to prepare the one or more well treatment fluids*"). EX-1003-¶87. 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]. By using Means's closed-loop feedback system in Tolman's Pumping System 202, Tolman/Mean selectively increases, decreases, or shuts off the reception of additives #1–m. EX-1006, [0047]. EX-1003-¶87.

iv. Limitation [1C]

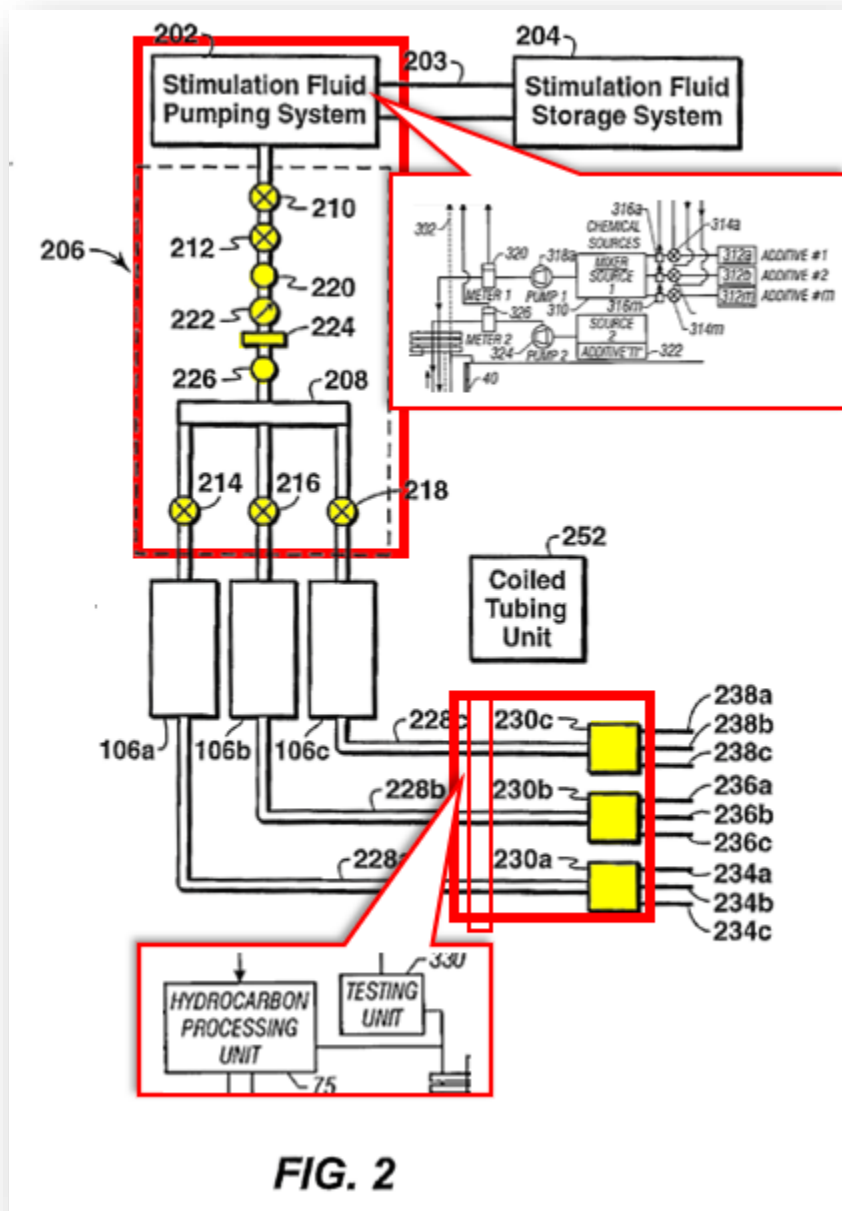
a. *“flowing . . . well treatment fluids”*

After being mixed, 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]; EX-1003-¶91. Tolman describes a pumping system manifold 206 directs this pumped stimulation treatment fluid to various to oil field trees 106a-106c (*“at least one of the plurality of wells”*). EX-1005, [0030]. EX-1003-¶91.

b. *“selectively configurable”*

Pumping system manifold 206 (part of the *“centralized service factory”*) is *“selectively configurable”* to direct or *“flow”* *“one or more well treatment fluids”* to various oil field trees 106a-106c. EX-1003-¶90. In particular, controlling the valves, such as valves 214–218, in manifold 206 *“selectively*

configure[es]” the manifold 206 (part of “*the one or more centralized service factories*”) to “*flow*” stimulation fluid. EX-1003-¶¶90-91. Figure 2 of Tolman illustrates this pumping system manifold 206 and its valves 214–218, shown below:



Tolman, Fig. 2 (EX-1005) (annotated); EX-1003-¶90.

v. Limitation [1D]

a. “recovering . . .”

As Dr. Nikolaou explains, Tolman describes “*recovering*” from wells 104a–104c (“*from the at least one of the plurality of wells*”) well treatment fluids (“*the one or more treatment fluids*”) through manifolds 230a–230c (“*at the one or more centralized service factories*”). EX-1003-¶93. Specifically, Tolman explains that the recovered hydrocarbons return (“*recovering*”) through manifold valves 230a–230c. EX-1005, [0028], [0051], [0053]. Tolman explains that the “*recovered*” hydrocarbons from wells (“*from the at least one of the plurality of wells*”) travel through manifolds 230a–230c (part of the “*centralized service factory*”) for further processing. EX-1005, [0028]; EX-1003-¶93. Tolman’s system recovers well treatment fluids (“*the one or more well treatment fluids*”) along with hydrocarbons via piping 228a–228c. EX-1003-¶93. For these disclosures, Dr. Nikolaou explains that Tolman’s is describing treatment fluid is “*recover[ed] from the at least one of the plurality of wells.*” EX-1003-¶93.

b. “*selectively configurable*”

Tolman explains that flowback manifolds 230a–230c (part of “*the one or more centralized service factories*”) are “*selectively configurable to receive*” the “*the one or more recovered well treatment fluids.*” EX-1003-¶94. Using

flowback manifolds 230a–230c (part of the “*centralized service factory*”), Tolman/Mean directs the output of one or multiple wells. EX-1005, [0028]; EX-1003-¶94. 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 manifolds 230a–230c for each well to both receive and direct recovered fluids, Tolman/Mean discloses its system is “*selectively configurable to receive the one or more recovered well treatment fluids.*” EX-1005, [0028]. EX-1003-¶94.

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. EX-1003-¶95. There are extensive regulations regarding the use and disposal of produced water, which is fluid returned to the surface from a hydraulic fracturing operation. *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]. It is beneficial to recover produced water for use in subsequent hydraulic fracturing operations as recycled water to reduce water supply costs. EX-1003-

¶95. At the time of the '082 patent's filing, 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. EX-1003-¶95; *See* EX-1008, [0009], [0039], [0052]. Flowback manifolds can be used to collect produced water. EX-1003-¶95. Based on these disclosures, Dr. Nikolaou explainst that it would have been obvious 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. EX-1003-¶95.

vi. Limitation [1E]

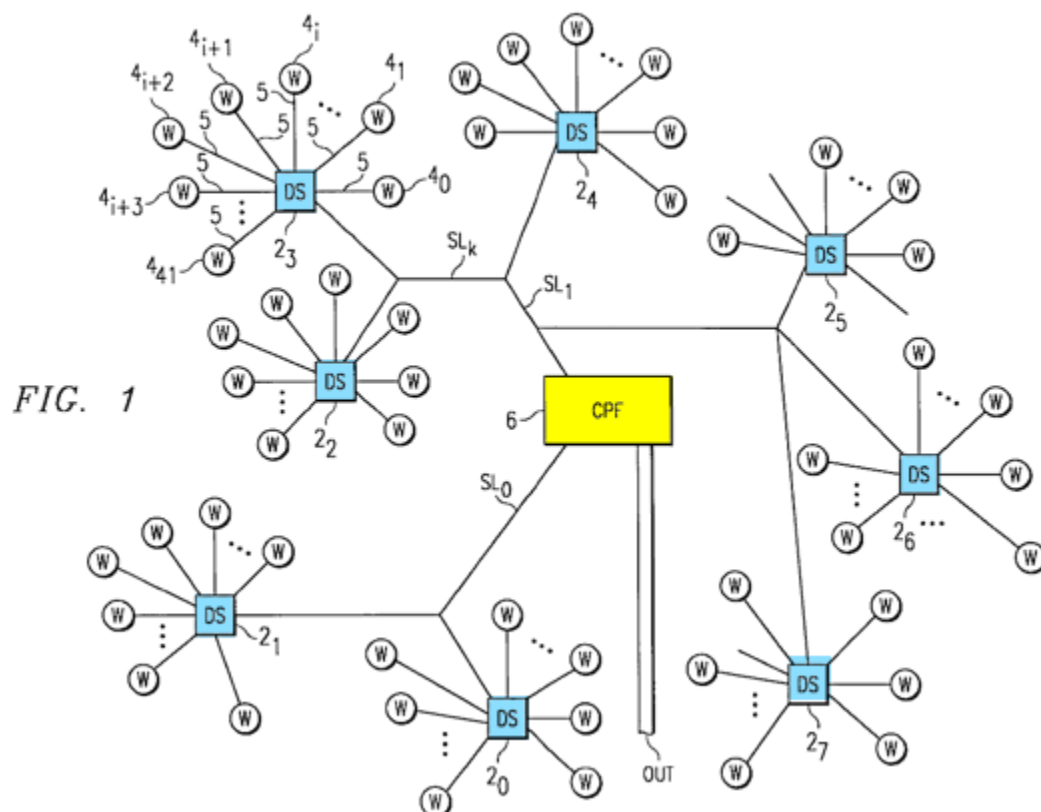
a. *“flowing . . . recovered well treatment fluids”*

Manifolds 230a–230c (part of *“the one or more centralized service factories”*) direct (*“flow”*) fluid (including *“the one or more recovered well treatment fluids”*) to various destinations. EX-1005, [0028], EX-1003-¶97. 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, Means, and Crawford render this feature obvious. EX-1003-¶98.

Crawford is analogous art to the '082 patent, Tolman, and Means for two reasons. *First*, Crawford is directed toward the same field of endeavor: well operations. EX-1001, 1:6–10; EX-1009, Abstract; *id.*, 1:16–18. *Second*, Crawford is pertinent to a problem described by the '082 patent: to “conserve

labor, infrastructure, and environmental impact.” EX-1001, 1:10–11; EX-1005, [0005]; *id.*, [0006]; EX-1007, 1:23–29; *id.*, 8:59–62. For either reason above, Crawford is analogous to these references and the challenged patent. EX-1003-¶99.

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*”). 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); EX-1003-¶100.

Figure 1 of Crawford shows that “[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-1007, 6:31–34. The output from the wells includes oil, gas, and water. EX-1007, 6:55–59; *See id.*, Fig. 2; 6:6–41. Based on these disclosures 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.*” EX-1003-¶100.

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. EX-1003-¶102. A POSITA would have recognized that such a modification would implement surface lines from Tolman’s flowback manifold. EX-1003-¶102. Notably, Tolman explains that multiple flowlines may be coupled to processing units, like the one described in Crawford. *See* EX-1005, [0028]. 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 Storage System 204, which provides fluids for stimulation treatment. *See* EX-1005, [0029]; EX-1008, Fig. 2, 6:36–41.

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. EX-1003-¶102.

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 Storage System 204 along with any service lines for at least two reasons. EX-1003-¶103. *First*, 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]. 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. EX-1003-¶104. A POSITA 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. EX-1003-¶104.

Second, a POSITA would have been motivated to make the modification to Tolman's system for the express reasons described in Crawford. EX-1003-¶105. Specifically, Crawford describes a process that optimizes well production using a central processing facility: EX-1007, 8:59–65. 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. EX-1003-¶105.

Moreover, there are extensive regulations regarding the use and disposal of produced water, which is fluid returned to the surface from a hydraulic fracturing operation. *See* EX-1008, [0009], [0039], [0052]. Dr. Nikolaou explains that a POSITA 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. EX-1003-¶106. 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. Flowback manifolds can be used to collect produced water. EX-1003-¶106. 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. EX-1003-¶106.

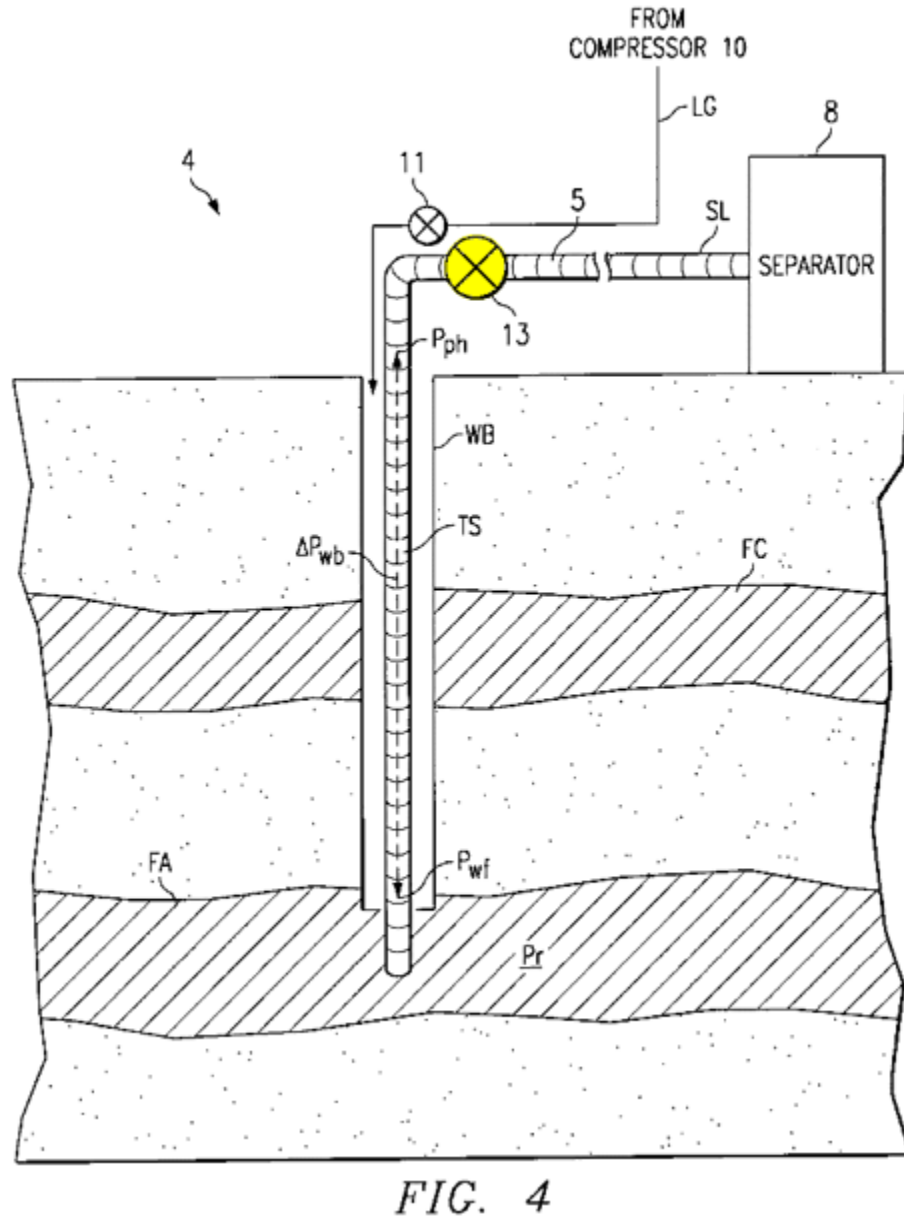
For any of these reasons, a POSITA would have been motivated to incorporate Crawford's central processing unit and service lines in the combined system of Tolman and Means. EX-1003-¶107.

b. “*selectively configurable to flow*”

As explained above, *see* §VII.A.1.v, Tolman/Means uses manifolds 230a–230c (part of “*the one or more centralized service factories*”), which are “*selectively configurable*” to both receive the recovered fluids from each well and direct those fluids to the appropriate destination (“*flow the one or more recovered well treatment fluids*”). EX-1005, [0028]; EX-1003-¶97. Tolman 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, Tolman/Means system includes “*one or more centralized service factories are selectively configurable to flow the one or more recovered well treatment fluids.*” EX-1003-¶97.

c. “*selectively configurable . . . to receive*”

To control (“*selectively configur[e]*”) the reception of recovered fluid (“*receive the one or more recovered well treatment fluids*”) at the central processing facility 6 (“*the centralized well treatment fluid center*”) from multiple drill sites, Crawford uses control valves located at each well site. EX-1003-¶101. Figure 4 of Crawford illustrates a shut off valve 13 at an individual well, highlighted below:



Crawford, Fig. 4 (EX-1007) (annotated); EX-1003-¶101.

EX-1007, 7:44–48. Using these control valves, Crawford selectively 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.**

EX-1008, 8:33–49 (emphasis added); 8:50–9:60. 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. *Id.*, Fig. 6, 8:50–9:60. EX-1003-¶101.

Alternatively, the Tolman/Mean/Crawford system uses manifolds 230a-203c to direct fluids recovered from wells to the appropriate destination. EX-1003-¶103. The same valves also allow Tolman/Mean/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*.” EX-1003-¶103.

2. Independent Claim 17

i. Limitation 17[pre]

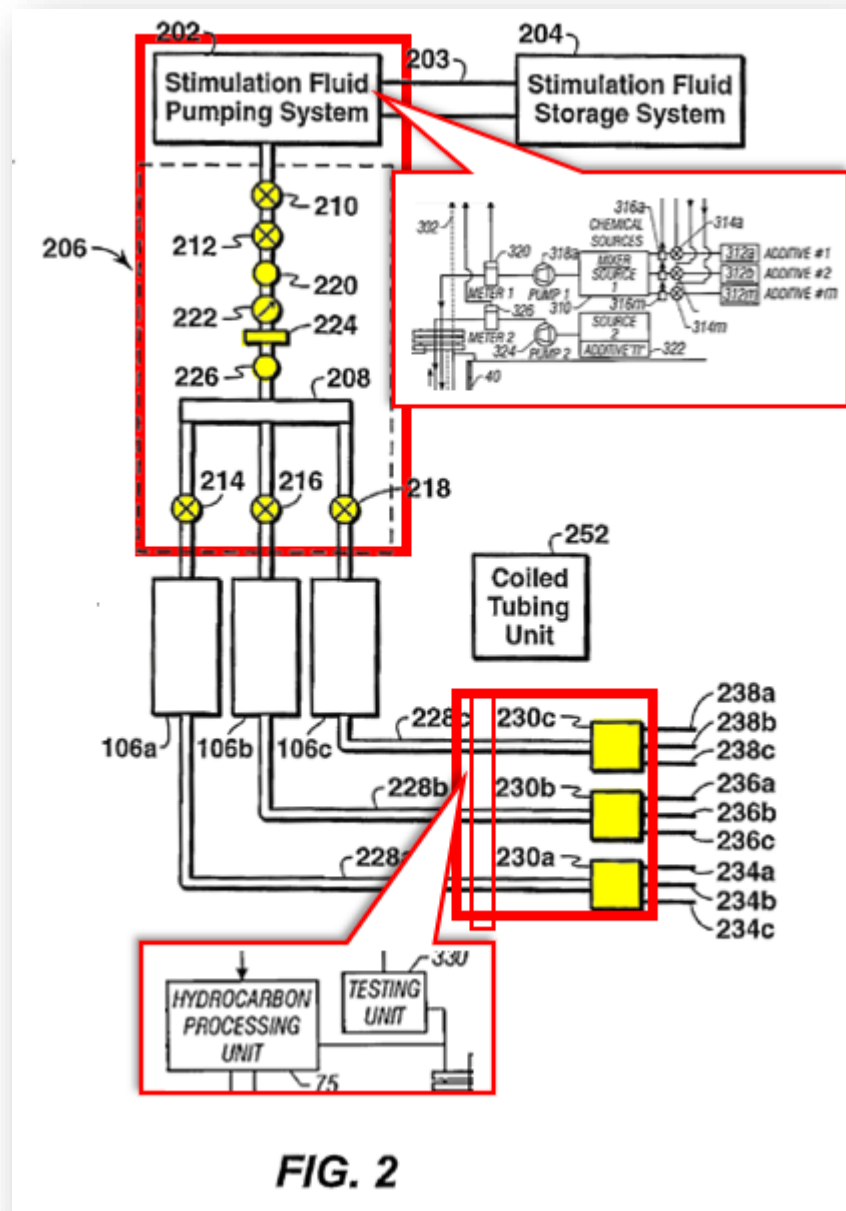
Tolman/Mean discloses the preamble of claim 17 for the same reasons explained above, *see* §VII.A.1.i; EX-1003-¶109. Specifically, Tolman discloses the use of Tolman’s Pumping System 202 and manifold 206 to centralize distributing, receiving, and treating fluids. EX-1005, [0029], *id.*, [0030], [0028]; EX-1006, [0027]. EX-1003-¶109.

ii. Limitation 17[A]

Tolman/Means system renders this limitation obvious for the same reasons as limitation 1A. *See* §VII.A.1.ii. EX-1003-¶¶112.

iii. Limitation 17[B]

Tolman/Means renders this limitation obvious for the same reasons as limitation 1A. *See* §VII.A.1.ii; EX-1003-¶114. Tolman discloses a Pumping System 202 and manifold 206, shown below:



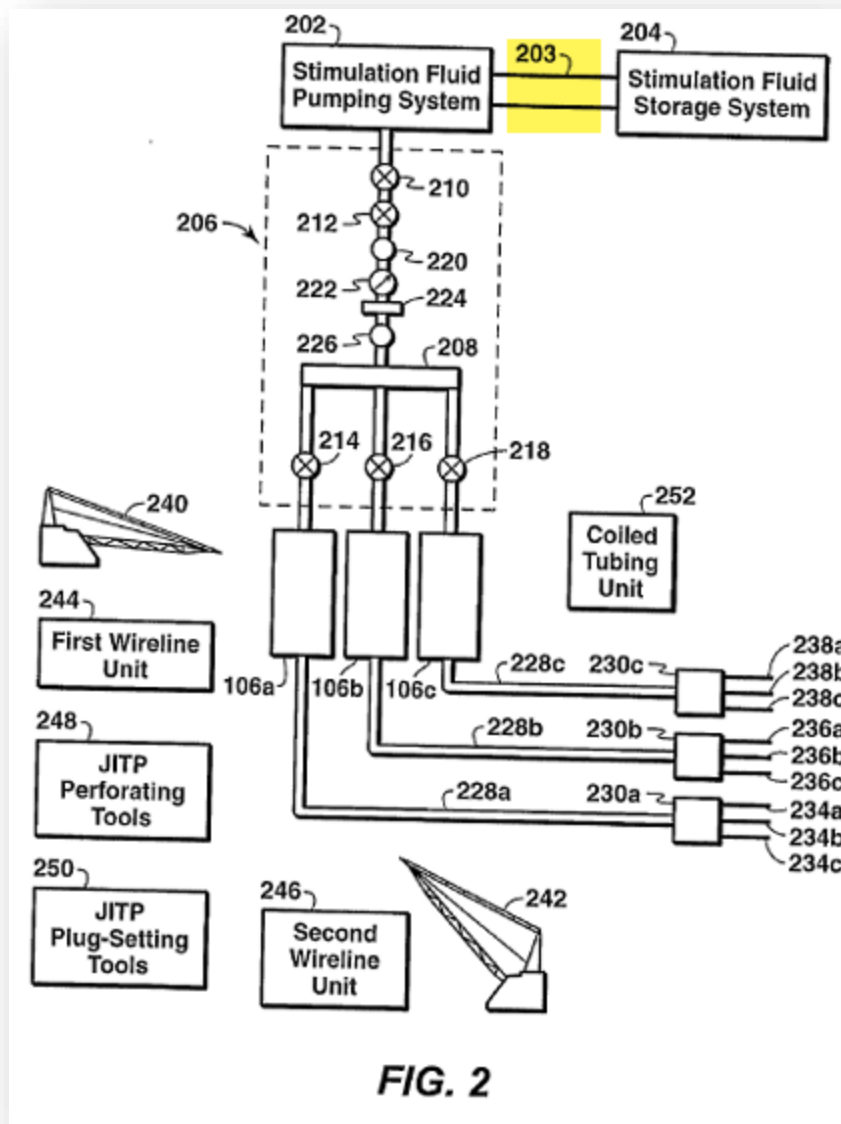
Tolman, Fig. 2 (EX-1005); EX-1003-¶114

EX-1005, [0029]. Pumping System 202 and these manifolds therefore satisfy “one or more centralized service factories.” EX-1003-¶114.

iv. Limitation 17[C]

a. “*a plurality of distribution lines*”

Tolman/Mean renders this limitation obvious for the same reasons as limitation 1A. See §VII.A.1.ii; EX-1003-¶117. Tolman/Mean includes piping 203 (“*a plurality of distribution lines*”) coupled between its Storage System 204 (“*the centralized well treatment fluid system*”) and Pumping System 202 (part of “*the one or more centralized service factories*”), shown below:



Tolman, Fig. 2 (EX-1005) (annotated); EX-1003-¶117.

EX-1005, [0029]. Based on these disclosures, this piping satisfies a “*plurality of distribution lines*” between Storage System 204 (“*centralized well treatment fluid center*”) and Pumping System 202 (part of the “*one or more centralized service factories*”). EX-1003-¶117.

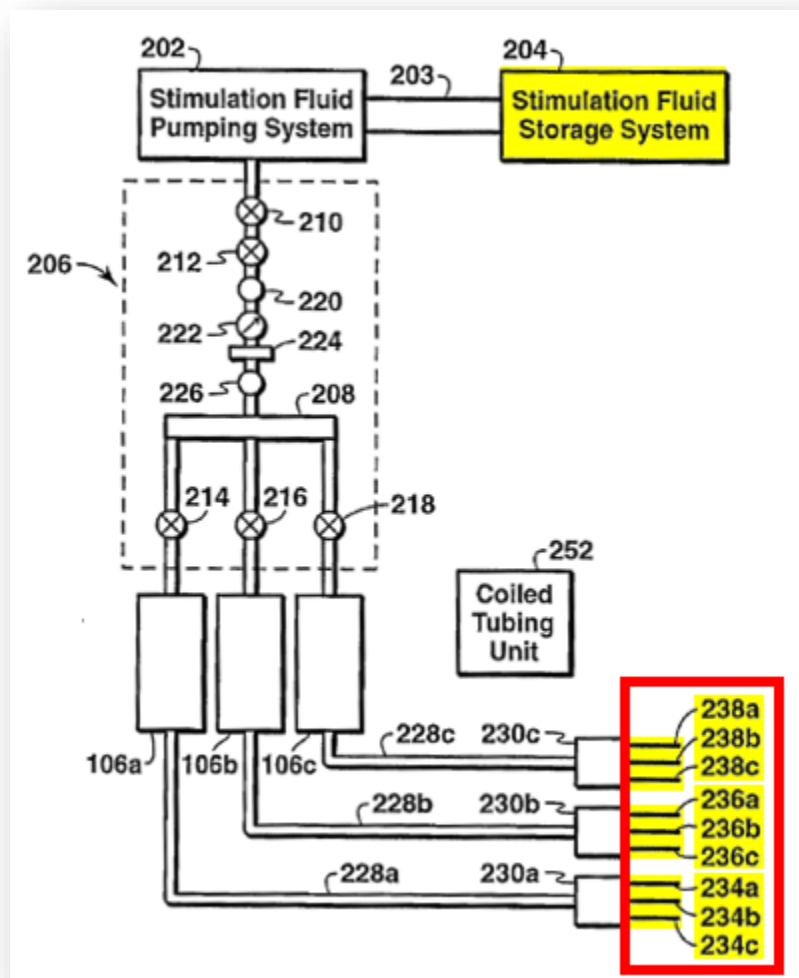
b. “*adapted to flow*”

As explained in addressing limitation 1A, *see* §VII.A.1.ii, piping 203 in Tolman/Means delivers (is “*adapted to flow*”) additives and/or other fluids (“*one or more well development task fluids*”) to Pump System 202, which then mixes the various additives. EX-1003-¶117.

v. Limitation 17[D]

a. “*a plurality of return lines*”

The Tolman/Means/Crawford system renders this limitation obvious for the same reasons as limitation 1D–E above. *See* §§VII.A.1.v–VII.A.1.vi; EX-1003-¶120. Tolman/Means/Crawford includes multiple flowlines 234a–238c (“*a plurality of return lines*”) coupled between its flowback manifolds 230a–230c (part of “*the one or more centralized service factories*”) and its Storage System 204 (“*the centralized well treatment fluid center*”), shown below:



Tolman, Fig. 2 (EX-1005) (annotated); EX-1003-¶120.

EX-1005, [0028]. These flowlines therefore 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 Storage System 204. See §§VII.A.1.v–VII.A.1.vi; EX-1003-¶120.

b. “*adapted to flow*”

As explained above, *see* §VII.A.1.v.b, the recovered well fluids are directed to the appropriate destination via flowlines 234a–238c (“*the plurality of return lines*”), such as a “flowback pits, flow test units, sales lines, tankage, oil/gas/water separating and processing units and/or other similar devices,” making the flowlines 234a–238c (“*the plurality of return lines*”) “*adapted to flow*” the “*recovered well treatment fluids*”. EX-1005, [0028]. EX-1003-¶120.

3. Claim 2

Tolman describes using different compositions of “*well development task fluids*” for different wells. EX-1003-¶123. 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). Two different stimulation fluids would be stimulation fluids with different compositions. EX-1005, [0023] [0043]. Tolman therefore describes providing “*two well development task fluids,*” each with their own “*composition.*” EX-1003-¶123.

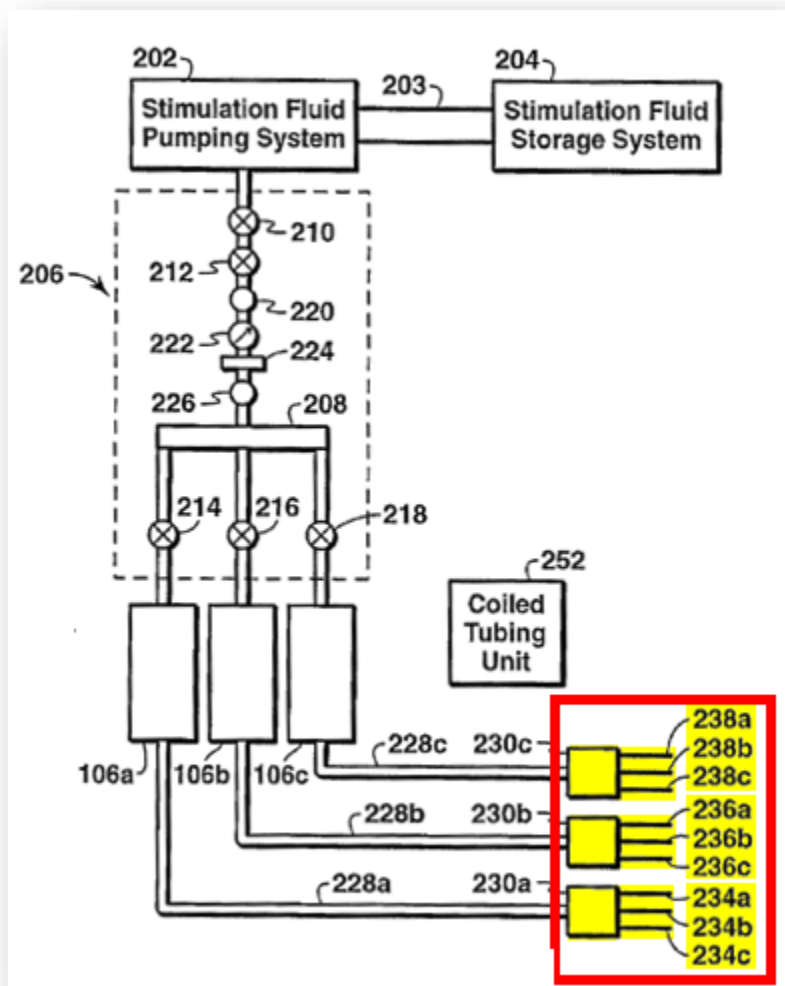
Alternatively, Means explains that “different additives” are used “at different well depths.” EX-1006, [0036]. Using different additives would result in “*different compositions*” of “*well development task fluid.*” EX-1003-¶124. Further, Dr.

Nikolaou explains that by using Means’s additive injection technique in Tolman, Tolman/Mean also discloses “*two well development task fluids*,” each with their own “*composition*” based on Means’s use of different additives based on well depth. EX-1003-¶124.

4. Claim 3

- i. 3[A] “*disposing . . . at the centralized well treatment fluid center*”
 - a. “*disposing of . . . recovered well treatment fluids*”

Tolman discloses that multiple flowlines 234a–238c are coupled the Storage System 204 (“*the centralized well treatment fluid center*”) through its flowback manifolds 230a–230c, shown below:



Tolman, Fig. 2 (EX-1005) (annotated); EX-1003-¶127.

EX-1005, [0028]. 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, Storage System 204 (“*the centralized well treatment fluid center*”) would “*dispos[e] of*” the “*at least one of the one or more recovered well treatment fluids.*” EX-1003-¶127.

b. *“at the centralized well treatment fluid center”*

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 Storage System 204 (*“at the centralized well treatment fluid center”*) in Tolman/Means/Crawford. Accordingly, *“disposing of at least one of the one or more recovered well treatment fluids”* would be *“at the centralized well treatment fluid center.”* EX-1003-¶127.

ii. 3[B] *“wherein . . . configurable to dispose . . . the one or more recovered well treatment fluids”*

As discussed above, *see* §VII.A.4.a, Storage System 204 (*“the centralized well treatment fluid center”*) would *“dispos[e] of”* the *“at least one of the one or more recovered well treatment fluids.”* EX-1003-¶127. For Storage System 204 in the Tolman/Meas system to dispose of recovered well treatment fluids, it would have been configurable to do so. EX-1003-¶127.

5. Claim 5

Tolman discloses using the following, *see* EX-1003-¶130:

- 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].

6. Claim 6

- i. 6[A] “*receiving a production fluid . . . wherein . . . configurable to receive the production fluid*”

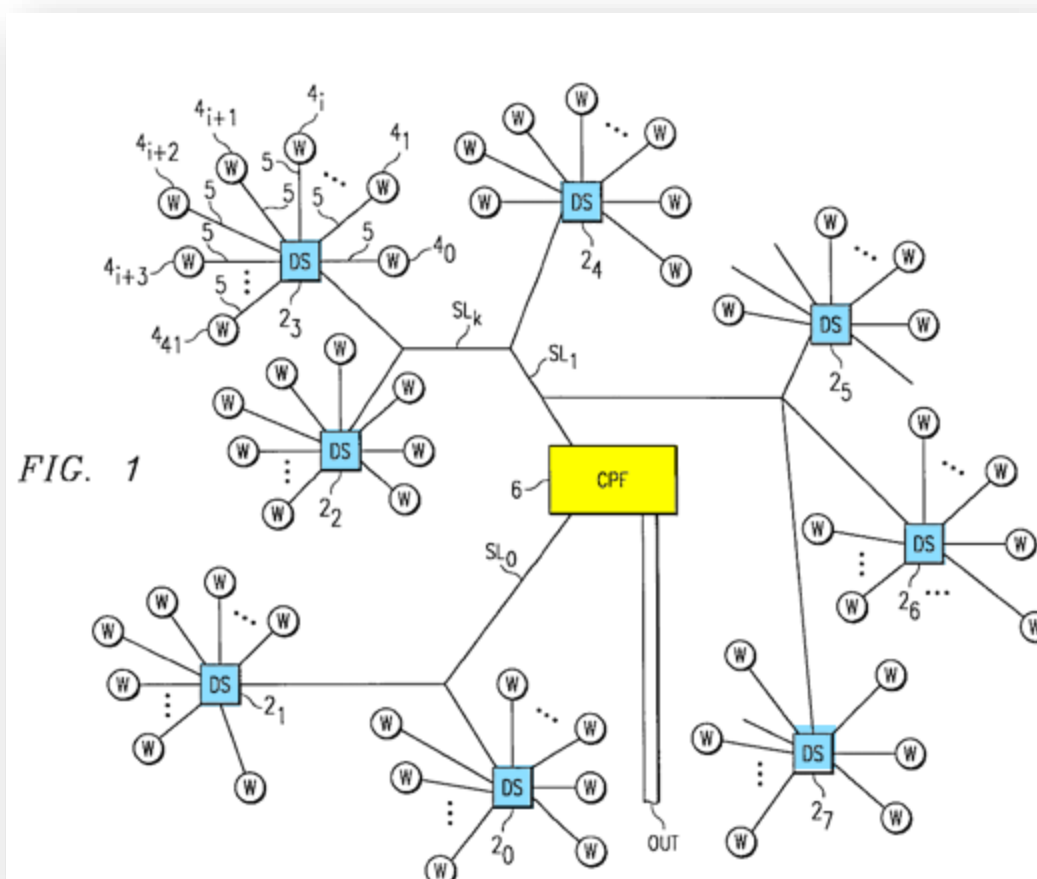
Tolman/Means/Crawford renders this limitation obvious for the same reasons as Claim 1. *See* §VII.A.1.vi.

Tolman discloses that recovered hydrocarbons from wells travel through manifolds 230a–230c (part of the “*one or more centralized service factories*”) for further processing. EX-1005, [0028]; EX-1003-¶133. The Tolman/Means/Crawford system therefore recovers (“*receiv[es]*”) well treatment fluids along with hydrocarbons (collectively, “*a production fluid*”) at the flowback manifolds 230a–230c (“*at one or more of the one or more centralized service factories*”) from flowlines 234a–234c, 236a–236c, and 238a–238c (“*from the at least one of the plurality of wells*”). EX-1003-¶133. Dr. Nikolaou also explains that the flowback manifolds 230a–230c (part of the “*one or more centralized service factories*”) are necessarily “*configurable to receive*” the recovered well treatment fluids and hydrocarbons (“*the production fluid*”). EX-1003-¶133.

ii. 6[B] “*wherein*”

Tolman/Means/Crawford further receives recovered well treatment fluids (“*the production fluid*”) at 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*”). EX-1003-¶134.

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 Storage System 204. EX-1008, 6:31–34; §VII.A.1.vi.a; EX-1003-¶135. 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); EX-1003-¶135.

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. The output from the wells includes oil, gas, and water. EX-1008, 6:55–59; Fig. 2; 6:6–41. Crawford thus 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.” EX-1003-¶135. Further, Storage System 204 in Tolman/Means/Crawford includes the central processing facility (“*the centralized well treatment fluid center*”) and is configurable to receive recovered well treatment fluids (“*the production fluid*”) from flowback manifolds 230a–230c (part of “*the one or more of the one or more centralized service factories*”). EX-1003-¶135.

7. Claim 7

Means’s closed loop additive system separates the production fluid into at least two or more second production fluids. EX-1006, [0039]. Based on this disclosure, 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. EX-1003-¶138. 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. EX-1003-¶138.

Moreover, Storage System 204 of Tolman/Means/Crawford (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. EX-1003-¶139. 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. Storage System 204 in

Tolman/Means/Crawford would incorporate a separator 8 from Crawford's central processing facility 6 ("*the centralized well treatment center*"), making Tolman's Storage System 204 configurable to separate the production fluid into at least two or more second production fluids. EX-1003-¶139.

To the extent that one argues the Tolman/Means/Crawford system includes a 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. EX-1003-¶140.

First, a POSITA would have found it obvious to incorporate a separator 8 from Crawford's central processing facility 6 into Tolman's Storage System 204 for the same reasons it would be obvious to combine Crawford and Tolman described above, *see* §VI.E, given that the separator 8 is included in Crawford's central processing facility that is incorporated into Tolman's system. EX-1003-¶140.

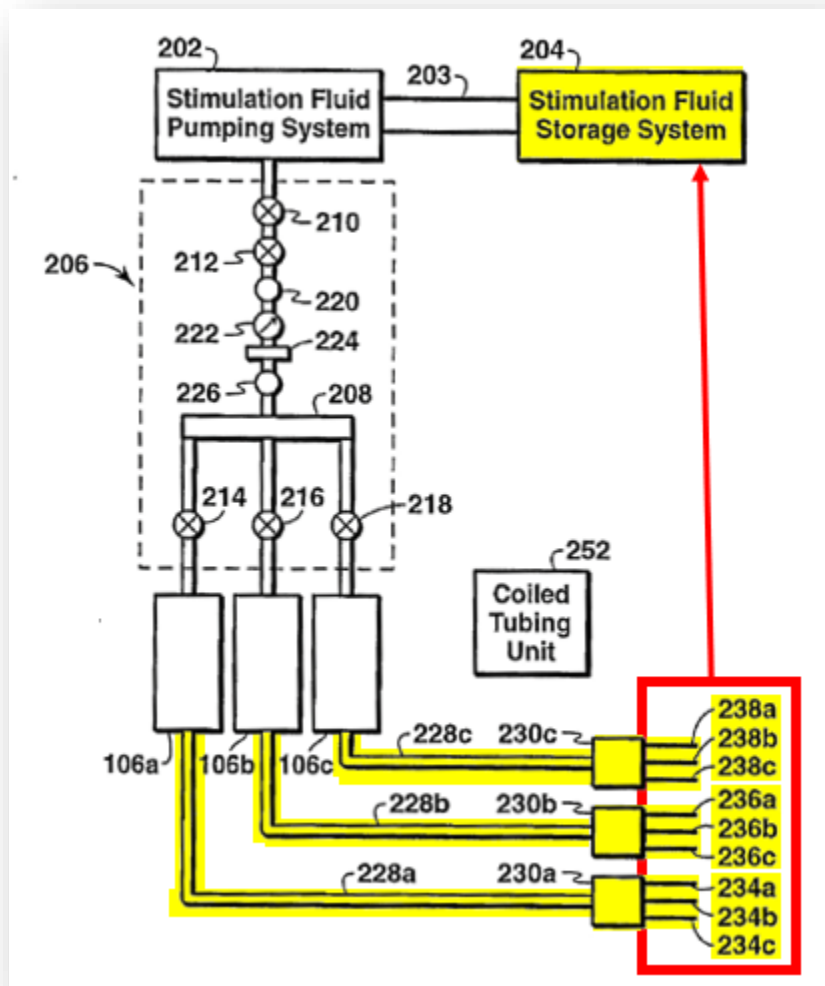
Alternatively, the Tolman/Means/Crawford system includes Means's closed-loop additive injection system discloses separating the production fluid into at least two or more second production fluids. EX-1006, [0039]. Such separation would be completed by a treatment unit or processing unit 75 from Means closed-loop additive injection system. EX-1003-¶141.

Means discloses additives and other materials needed for stimulation treatment. EX-1006, [0005]. Delivering additives and other materials needed for

stimulation treatment is treating fluid for the planned stimulation treatment. EX-1005, [0029]. In addition, a POSITA would have found it obvious to use a treatment unit or processing unit 75 from Means's closed-loop additive injection system to treat or process the production fluid rather than just treating fluid for the planned stimulation treatment. EX-1003-¶142. Such use of a treatment unit or processing unit 75 to treat or process the production fluid includes separating the production fluid into at least two or more production fluids. EX-1003-¶142.

The production fluid is delivered to Storage System 204. Tolman discloses that recovered stimulation fluid (“*the production fluid*”) is recovered from the wells. EX-1006, [0046]–[0047], [0051], [0053].

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

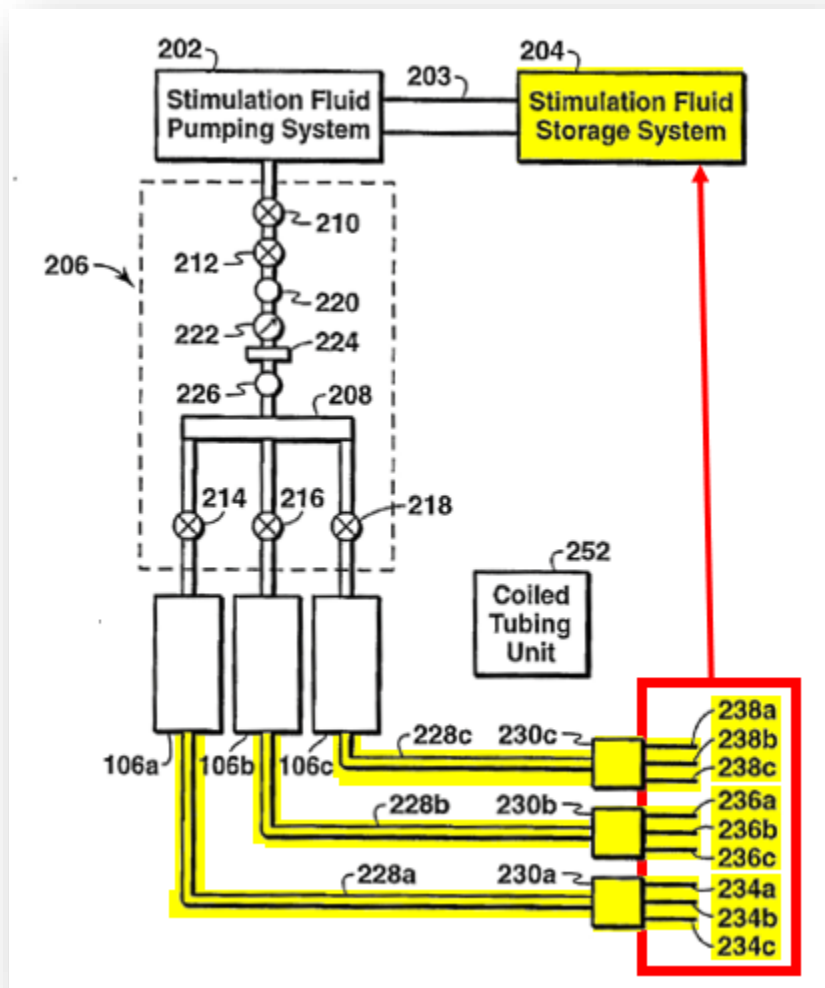


Tolman, Fig. 2 (EX-1005) (annotated); EX-1003-¶144.

Moreover, Dr. Nikolaou explains that it would be understood the path that the recovered fluid would flow back from wells in oil field trees 106a–106c would be through the corresponding Tolman’s flowlines 234a–234c, 236a–236c and 238a–238c destined for Storage System 204 (“*the centralized well fluid treatment center*”) for further processing in the Tolman/Means/Crawford system. EX-1003-¶145; see §VII.A.2.v.

8. Claim 9

The Tolman/Mean/Crawford system includes Storage System 204 (“*the centralized well treatment fluid center*”) which is configurable to flow at least two or more second production fluids to sales lines (“*a distribution center*”). EX-1003-¶148. Annotated Figure 2 of Tolman discloses that multiple flowlines 228a–228c that would be coupled to Storage System 204 via its flowback manifolds 230a–230c, shown below:



Tolman, Fig. 2 (EX-1005) (annotated); EX-1003-¶148.

EX-1005, [0028]. Tolman discloses that the flowlines 234a–234c, 236a–236c, and 238a–238c may be coupled to sales lines. *Id.*

These sales lines would terminate at “*a distribution center*” in the Tolman/Means/Crawford system. For the reasons discussed in §VII.A.7, two or more second production fluids at Storage System 204 in the Tolman/Means/Crawford system allows recovered well treatment fluid (“*the at least two or more second production fluids*”) 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 Storage System 204 (“*the centralized well treatment fluid center*”). EX-1003-¶149; *see* §VII.A.7; EX-1007 6:59–64. Based on these teachings, 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. EX-1003-¶149. Accordingly, the 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*.” EX-1003-¶149. 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*.” EX-1003-¶149.

9. Claim 10

Claim 10 depends from claim 1 and recites similar limitations to those in claim 1—the sole difference is that claim 10 recites “*other*” well development task fluids.

As explained above, the Tolman/Means/Crawford system uses multiple well treatment development task fluids and well treatment fluids, *i.e.*, other “*recovered well treatment fluids*.” EX-1003-¶151. As explained in §VII.A.1.ii.b, the Tolman/Means/Crawford system includes Means’s additives (multiple “*well development task fluids*”) and other fluids needed for stimulation treatment, and these additives may be mixed with different compositions and/or other additives resulting in different “*well treatment fluids*.” See §VII.A.3. By using these “*other*” well treatment fluids, the recovered stimulation fluid from the well would be “*other recovered well treatment fluid*.” Accordingly, Tolman/Means/Crawford render obvious this limitation obvious for the same reasons as Claim 1. See §VII.A.1; EX-1003-¶151.

Alternatively, Tolman discloses these “*other*” fluids in an embodiment with a surface pad 102 which may include two or more stimulation fluid pumping systems. EX-1005, [0067]; EX-1003-¶152. Such a system includes two of each of stimulation fluid pumping systems 202, stimulation storage systems 204, pumping system

manifolds 206, and multiple wells stimulated concurrently or simultaneously. EX-1003-¶152. 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. EX-1003-¶152.

10. Claim 11

As discussed above, 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.A.6. Further, Tolman’s 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.A.6; EX-1003-¶155.

Tolman discloses that Storage System 204 is configured to store well treatment fluids, EX-1005, [0029], so Dr. Nikolaou explains that it would been obvious to store the one or more recovered well treatment fluids there (*i.e.*, “*the centralized well treatment fluid center*”). EX-1003-¶156.

11. Claim 12

Storage System 204 (“*centralized well treatment fluid center*”) in the Tolman/Means/Crawford system uses piping 203 to carry fluids and additives to Pumping System 202. EX-1005, [0029]. Tolman/Means/Crawford includes pipes 203 to carry both fluids, *see* EX-1005, [0029], and Means’s additives and other materials, *see* EX-1006, [0047], each of which satisfy additional “*well development task fluids*.” *See* §VII.A.1.ii.b; EX-1003-¶159. As Dr. Nikolaou explains, the combined system results in Storage System 204 (“*the centralized well treatment fluid center*”) being configurable to both send and receive fluids, additives, and other materials “*substantially simultaneously*” using pipes 203 to Pumping System 202 (“*centralized service factories*”). EX-1003-¶159.

12. Claim 13

Pumping System 202 (part of a “*centralized service factory*”) in Tolman/Means/Crawford simultaneously pumps “*well treatment fluid*” into wells 104a–104c via manifold 206 (also part of a “*centralized service factory*”). EX-1006, [0019]; Claim 56 (describing simultaneous pumping). EX-1003-¶162. Tolman explains that, by using manifold well valves 210–218, “stimulation fluid may be injected into one or more of the wells 104a–104c, while other wells 104a–104c may be isolated by at least one of the valves 214–218 from the [Pumping System 202].” EX-1005, [0031]; Fig. 2. In sum, Pumping System 202 (a “*centralized service*

factory”) simultaneously pumps “*well treatment fluid*” into multiple wells 10 (“*flowing to a first*” and “*second well of the plurality of wells*”) by “*configuring*” valves in manifold 206. EX-1003-¶162.

As explained above, Pumping System 202 in Tolman/Means/Crawford prepares “*one or more well treatment fluids*” from multiple “*well development task fluids*.” See §VII.A.1.iii; EX-1003-¶163.

13. Claim 14

The only difference between claim 14 and claim 1 is claim 14 replaces the term “a” in claim 1 with the word “the” three times. Claim 14 is thus obvious for the same reasons as Claim 1. See §VII.A.1; EX-1003-¶¶166-167.

14. Claim 15

As explained, see §VII.A.12, Pumping System 202 (a “*centralized service factory*”) in Tolman/Means/Crawford simultaneously pumps “*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. EX-1003-¶169.

Tolman also discloses that, after stimulation treatment, flowback manifolds 230a–230c recover hydrocarbons produced from the well via piping 228a–228c. *E.g.*, EX-1005, [0028]; see §VII.A.1. In Tolman/Means/Crawford, “*well treatment fluid*” would also be recoverable by piping via Tolman’s flowback manifolds. EX-1003-¶170.

15. Claim 18i. Limitation 18[A]

Tolman's manifold 206 directs fluid to different oil field trees. EX-1005, [0030]. Figure 2 of Tolman illustrates these valves:

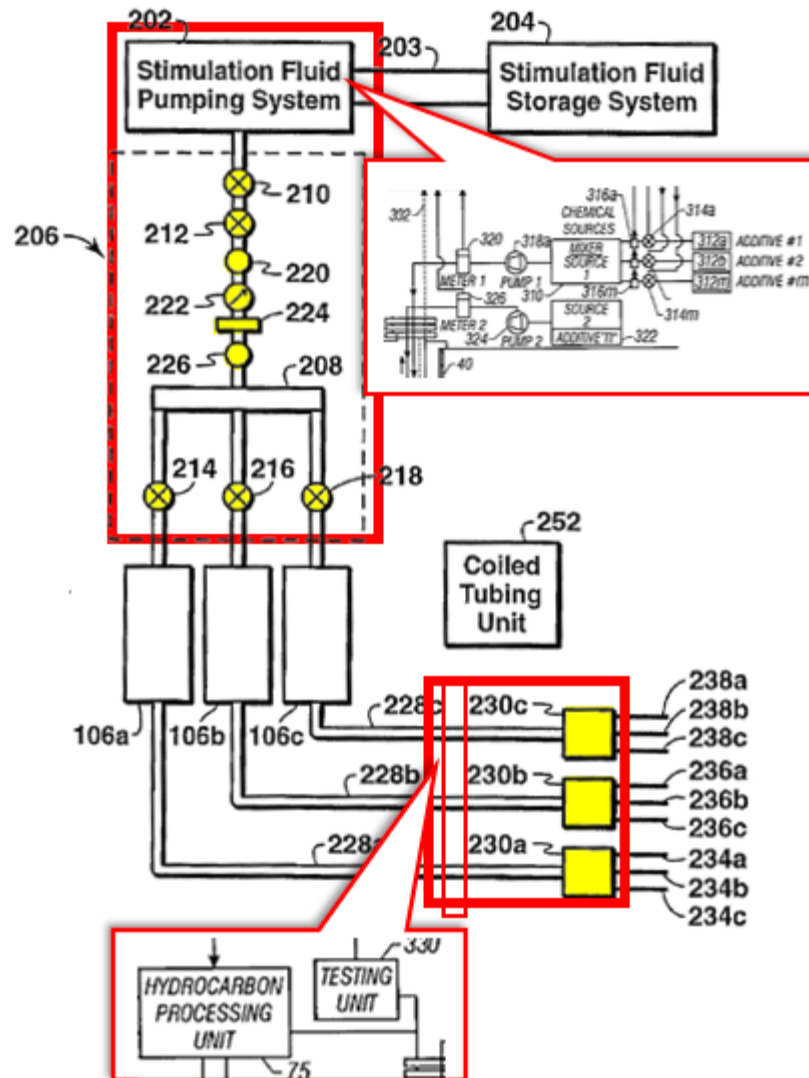


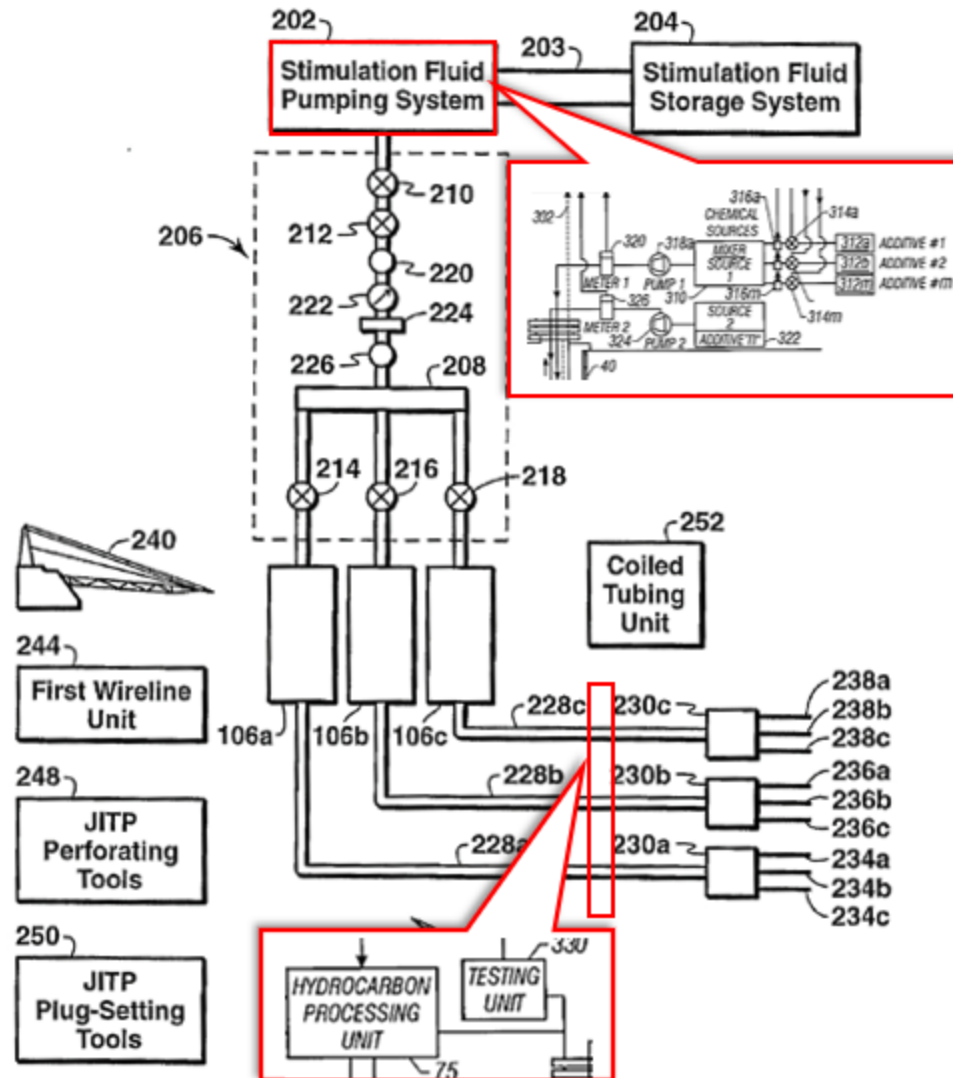
FIG. 2

Tolman, Fig. 2 (EX-1005) (annotated); EX-1003-¶173.

Tolman's valves are configured to allow fluid from the Pumping System 202 to be directed toward individual wells in oil filed trees 106a-106c. EX-1005, [0030]-[0031], and [0047]. In Tolman/Means/Crawford, Means's 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. EX-1003-¶176.

ii. Limitation 18[B]

The Tolman/Means/Crawford system includes modules from Means's closed-loop additive system that would be disposed throughout. EX-1003-¶179; *see* §§VII.A.15.i.



Tolman, Fig. 2 (EX-1005) (annotated); EX-1003-¶180.

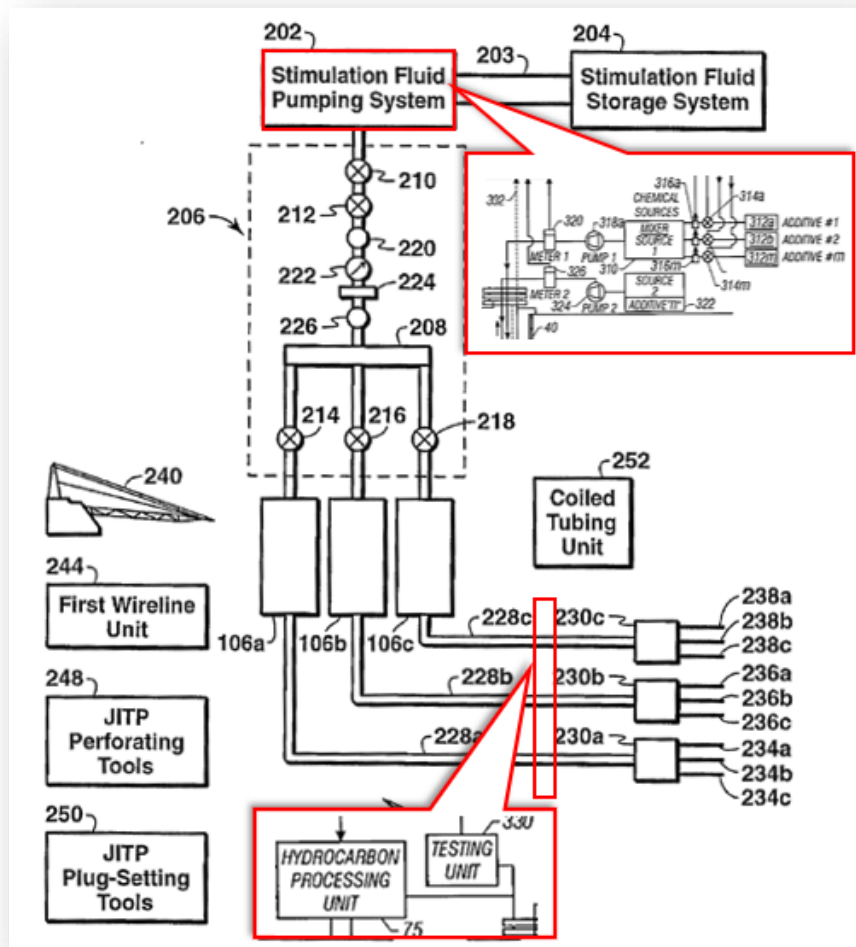
As shown above, Tolman/Means/Crawford would incorporate Means's modules (i.e., pumps 318 and 324, meters 320 and 326, mixer source 1 310, source 2 322, additive sources 312a-312m, additive associated pumps 314a-314m, and additive meters 316a-316m) (*"the plurality of modules"*) in Pumping System 202, which would be coupled to Tolman's flowlines with manifolds 214, 216, and 218. EX-1003-¶180. Also, and as shown above, each of Tolman's flowlines that include

manifold valves 214 through 218 would be coupled between a corresponding well in oil field trees 106a–106c (“*at least one of the plurality of wells*”) and Means’s pumps 318 and 324, meters 320 and 326, mixer source 1310, and source 2322 (“*any of the plurality of modules*”). EX-1003-¶180. Each of these three lines would satisfy the “*first fluid flow line*.” EX-1003-¶180.

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 well treatment fluids*” to one of the wells in oil field trees 106a–106c (“*the at least one of the plurality of wells*”). EX-1003-¶181. A fluid conduit would be operable to flow more than one type of fluid, as already explained. EX-1003-¶181; *see* §VII.A.3.

iii. Limitation 18[C]

In Tolman/Means/Crawford, each of 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’s 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. EX-1003-¶183; *see* § VII.A.15.ii.



Tolman, Fig. 2 (EX-1005) (annotated); EX-1003-¶183.

Because they are located between a well in oil field 106 and Means's modules, flowlines 228a-228c in the Tolman/Means/Crawford system would each satisfy a "second fluid flow line." EX-1003-¶183.

Moreover, as previously discussed, flowlines 228a-228c ("the second fluid flow line") in Tolman/Means/Crawford are 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 §VII.A.15.ii; EX-1003-¶184.

Tolman explains that the recovered hydrocarbons return through flowback manifolds 230a–230c. EX-1005, [0028]. Further, as discussed above, Tolman’s system recovers stimulation fluids (“*the one or more well treatment fluids*”). EX-1003-¶185; see §VII.A.1.v. 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. EX-1003-¶185.

iv. Limitation 18[D]

As discussed above, 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*”). EX-1003-¶187.

A fluid conduit would be operable to flow more than different type of fluids. EX-1003-¶181; see §VII.A.3. 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-1003-¶188; EX-1006, [0036]. Moreover, valves 214-218 are configured to direct the appropriate fluid down a respective well 106a-106c. EX-1003-¶188; *see* VII.A.15.ii.

A POSITA would have thus understood that there would be both (1) different configurations of modules used in Tolman/Means/Crawford to make different stimulation treatment fluids and (2) different configurations of valves 214-218 to direct fluid down the appropriate well(s). EX-1003-¶188. In one exemplary configuration, a POSITA 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. EX-1003-¶188. 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. EX-1003-¶188.

16. Claim 21

Tolman discloses that its invention is applicable to “offshore-based wells” located on a moveable “single offshore platform.” (“*a base is operable to move*”). EX-1005, [0004], [0020]. In that embodiment, 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.*” EX-1003-¶191.

To the extent that one argues the Tolman/Means/Crawford combination do not disclose this limitation, incorporating a foundation or a base coupled to a storage unit or an operating unit would have been obvious because it customary practice in the chemical arts to provide stability, mobility, and compartmentalization. EX-1003-¶192; *see* EX-1005, [0004], [0020] (describing offshore, movable platforms); EX-1033 [Crossley], Fig. 1, [0024] (describing a floating vessel to support undersea wells). 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 would be coupled to a base a customary practice. *See* EX-1005, [0004], [0020]; EX-1033 [Crossley], Fig. 1, [0024]. As Dr. Nikolaou explains, such a base would be operable to move Means’s 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*”). EX-1003-¶192; EX-1005 at [0036] (mentioning “moving equipment on the surface pad”); EX-1005, [0004], [0020]; EX-1033 [Crossley], Fig. 1, [0024]. These references teach that having mobile industrial equipment is standard practice in the industry. EX-1003-¶192.

17. Claim 22

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

Means discloses that certain additives are used to help clean the flow lines. EX-1006, [0005], [0024]; [0006]. Means also discloses cleaning produced fluid. EX-1006, [0029]. This cleaning described by Tolman and which would be performed in the Tolman/Mean/Crawford system would be performed on fluid flow lines. EX-1003-¶195.

Dr. Nikolaou also explains that a POSITA would have found it obvious to use a filter or certain 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*”). EX-1003-¶196. A POSITA would also have understood that the filter (“*cleaning module*”) would be operable to clean flowlines, such as flowlines 234a–234c, 236a–236c and 238a–238c (“*any fluid flow line*”). EX-1003-¶196.

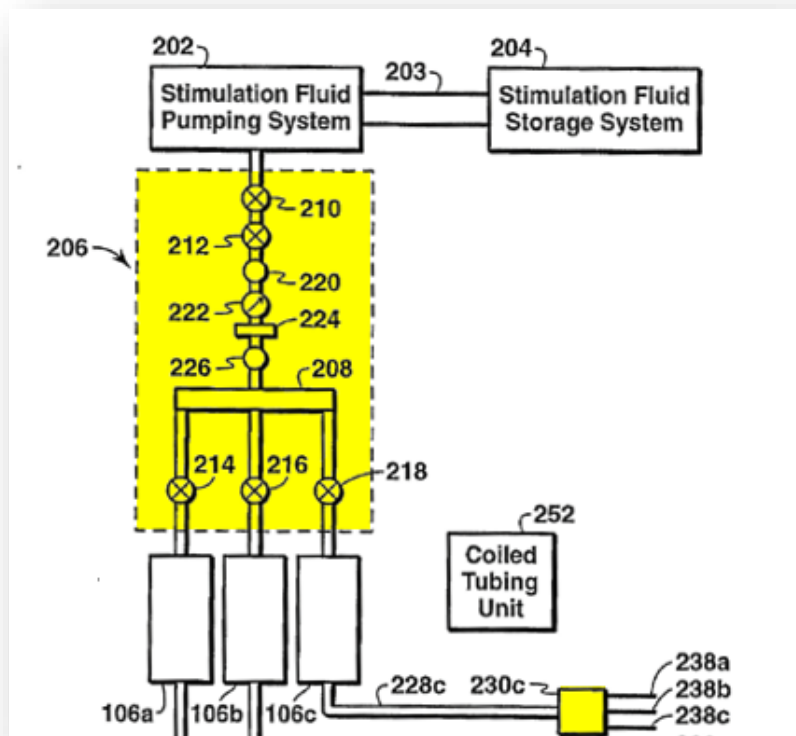
18. Claim 23

The Tolman/Mean/Crawford system receives recovered well treatment fluids (“*production fluid*”) at Storage System 204 from flowback manifolds 230a–230c (“*at least one of the one or more centralized service factories*”). See §VII.A.6. Means also discloses receiving “*production fluid*” 69 at the surface, which is sent to a treatment unit or processing unit 75 (“*production fluid module*”). EX-1006, [0039].

Based on these disclosures, the Tolman/Means/Crawford includes treatment unit or processing unit 75 (*“production fluid module”*) that is be operable to receive production fluid via flowback manifolds 230a–230c. EX-1003-¶199.

19. Claim 24

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]; EX-1003-¶202. Such pipes 208 (*“the plurality of distribution lines”*) would then necessarily be adapted to flow stimulation fluids (*“one or more well treatment fluids”*). EX-1003-¶202. 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); EX-1003-¶202.

Tolman further discloses that the “stimulation fluid may be injected into one or more of the wells.” EX-1005, [0031]. For a stimulation fluid (“*one or more well treatment fluids*”) to flow downhole, the stimulation fluid flows through pipes 208 (“*the plurality of distribution lines*”) to flowlines 234a–234c, 236a–236c, and 238a–238c to the wells 104a–104c. EX-1005, Fig. 2; EX-1003-¶203.

20. Claim 26

i. Limitation 26[a]

See §VII.A.1.ii.

ii. Limitation 26 [b]

See §VII.A.1.iii.

iii. Limitation 26 [c]

See §VII.A.1.iv.

iv. Limitation 26 [d]

See §§VII.A.1.v, VII.A.1.vi.

v. Limitation 26 [e]

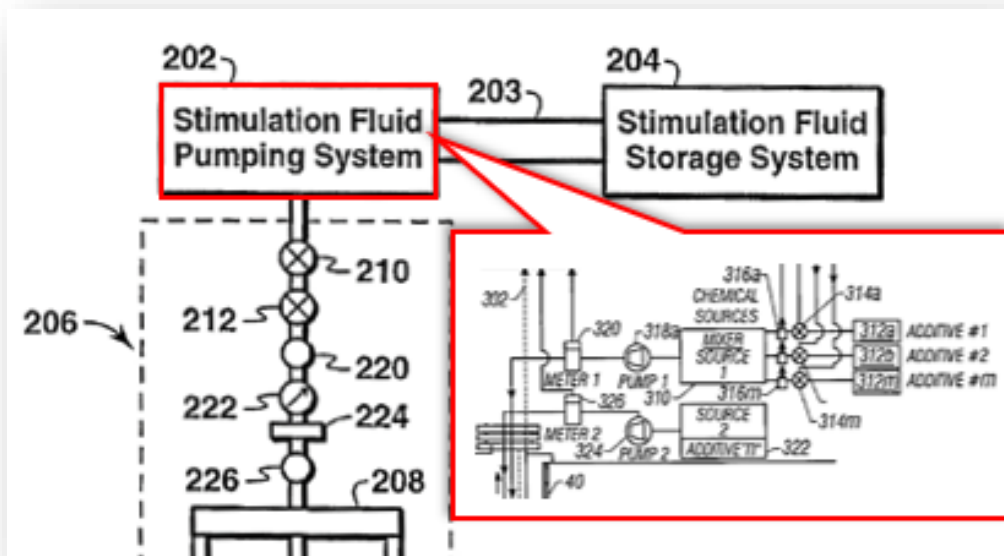
See §VII.A.1.vi.

21. Claim 27

i. Limitation 27[a]

Tolman/Means/Crawford renders this limitation obvious for the same reasons described for claim 18. *See* §§ VII.A.15; EX-1003-¶220.

As discussed above, Means's 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 before the downhole stream. *See* §VII.A.15.i; EX-1006 Fig. 1, Fig. 3, [0047]; EX-1003-¶221. These modules would be included in Tolman/Means/Crawford as depicted below:



Tolman, Fig. 2 (EX-1005) (annotated); EX-1003-¶221.

Thus, Tolman/Means/Crawford . would have included the “*the plurality of modules*” disposed before the downhole stream, which includes a mixer source 310 (“*one or more blending modules*”). EX-1003-¶222; *see* §VII.A.15.i. Moreover, for the reasons explained above, a POSITA would have found it obvious to modify Tolman’s system to include the modules described in Means. EX-1003-¶222; *see* §VII.A.15.

ii. Limitation [27b]

The Tolman/Means/Crawford system has the “*the plurality of modules*” disposed just before the downhole stream, which would have included additive sources 312a–312m (“*one or more additive storage modules*”). EX-1003-¶225; *see* §VII.A.15.i. Moreover, such additive sources 312a–312m would be operable to

connect to mixer source 310 (“*one or more blending modules*”). EX-1006, [0047], Fig. 3; EX-1003-¶225.

iii. Limitation 27[c]

The Tolman/Means/Crawford system has the “*the plurality of modules*” disposed just before the downhole stream, which would include Means’s additive associated pumps 314a–314m (“*one or more liquid additive pumps*”). EX-1003-¶228, *see* §VII.A.15.i. Such pumps 314a–314m are operable to connect to mixer source 1 310 (“*one or more blending modules*”). EX-1006, [0047], Fig. 3; EX-1003-¶228.

iv. Limitation 27[d]

The Tolman/Means/Crawford system has the “*the plurality of modules*” disposed before the downhole stream, which would have included pumps 318 (“*one or more pumping grids*”) and mixer source 1 310 (“*one or more blending modules*”). EX-1003-¶231; *see* §VII.A.15.i. In the combined system, such pumps 318 (and 324), are operable to connect to mixer source 1 310 (“*one or more blending modules*”). EX-1006, [0047], Fig. 3; EX-1003-¶231.

v. Limitation 27[e]

The Tolman/Means/Crawford system includes “*the plurality of modules*” described in Means disposed before the downhole stream, which includes mixer source 310 (“*one or more blending modules*”). EX-1003-¶XX; *see* §VII.A.15.i. In

Tolman/Means/Crawford, Means's mixer source would be connected to manifold 206 (part of the "*one or more centralized service factories*"). EX-1003-¶234. Tolman's manifold 206 ("*one or more manifolds*") would be operable to connect to Means's system 300, including mixer source 1 310 ("*one or more blending modules*"). EX-1003-¶234.

vi. Limitation 27[f]

Means discloses that a system 300 and its modules are powered "at least in part using solar power." Means, [0029]; Claim 4. Accordingly, a POSITA would have recognized that implementing Means's 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 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. EX-1003-¶236. Accordingly, as explained by Dr. Nikolaou, the combined Tolman/Means/Crawford system discloses "*a power grid*" "*operable to*" connect to the one or more of the "*modules*" described in Means. EX-1003-¶236.

22. Claim 28

i. Limitation [28a]

Tolman/Means/Crawford renders this limitation obvious for the same reasons as limitation 18B. *See* §VII.A.15.ii.

As explained, each of flowlines passing through manifold valves 214, 216, and 218 (each “*the one or more manifolds*”) and continuing to a corresponding well in oil-field tree 106a–106c (each satisfying “*a second plurality of wells*”). EX-1003-¶241. For example, a flowline with valve 216 satisfies a “*third fluid flow line*.” EX-1003-¶241; *see* §VII.A.15.ii. As explained for limitation 18B, 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. EX-1003-¶XX; *see* §VII.A.15.ii. This fluid conduit would be operable to flow more than one type of fluid. EX-1003-¶241, *see* §VII.A.3.

ii. Limitation 28[b]

In Tolman/Means/Crawford, 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). EX-1003-¶244. In such configurations, valves 214-218 are configured to direct the appropriate fluid down multiple respective wells 106a-106c. EX-1003-¶244; *see* §VII.A.15.ii.

In a third exemplary configuration, Tolman/Means/Crawford would direct the same type of stimulation treatment fluid down multiple wells, such as one well in oil field 106b using valve 216 and another well in oil field tree 106c using valve 218. EX-1003-¶244. In such a configuration, Tolman/Means/Crawford would include both a flowline with valve 216 and another flowline with valve 218, which would have satisfied the “*third*” and “*second fluid flow lines*²,” respectively. EX-1003-¶244. By using the same stimulation treatment fluid, both these wells would have simultaneously received the same fluid. EX-1003-¶244.

iii. Limitation 28[c]

The Tolman/Means/Crawford system renders this limitation obvious for the same reasons as limitations 18C and 28A above. *See* §§VII.A.15.iii, VII.A.22.i.

As explained above, Tolman/Means/Crawford include flowlines 228a–228c (“*the fourth fluid flow line*”) adapted to flow one or more stimulation fluids from (“*recover the one or more well treatment fluids*”) the corresponding well 106a–106c (“*second plurality of the plurality of wells*”). EX-1003-¶247; *see* §VII.A.15.iii. Tolman, for example, describes that the recovered hydrocarbons return through

² Claim 28 does not depend from claim 18 so the requirements specified in claim 18 for a “*second fluid flow line*” and a “*plurality of wells*” do not apply to the same terms in claim 28.

flowback manifolds 230a–230c. EX-1005, [0028]. 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. EX-1003-¶247; *see* §VII.A.15.iii.

B. Ground 2: Claims 3–4, 7–9, 11, 19, 20, 25, and 29–31 are Obvious Over Crossley and Albers, in further view of Lehman

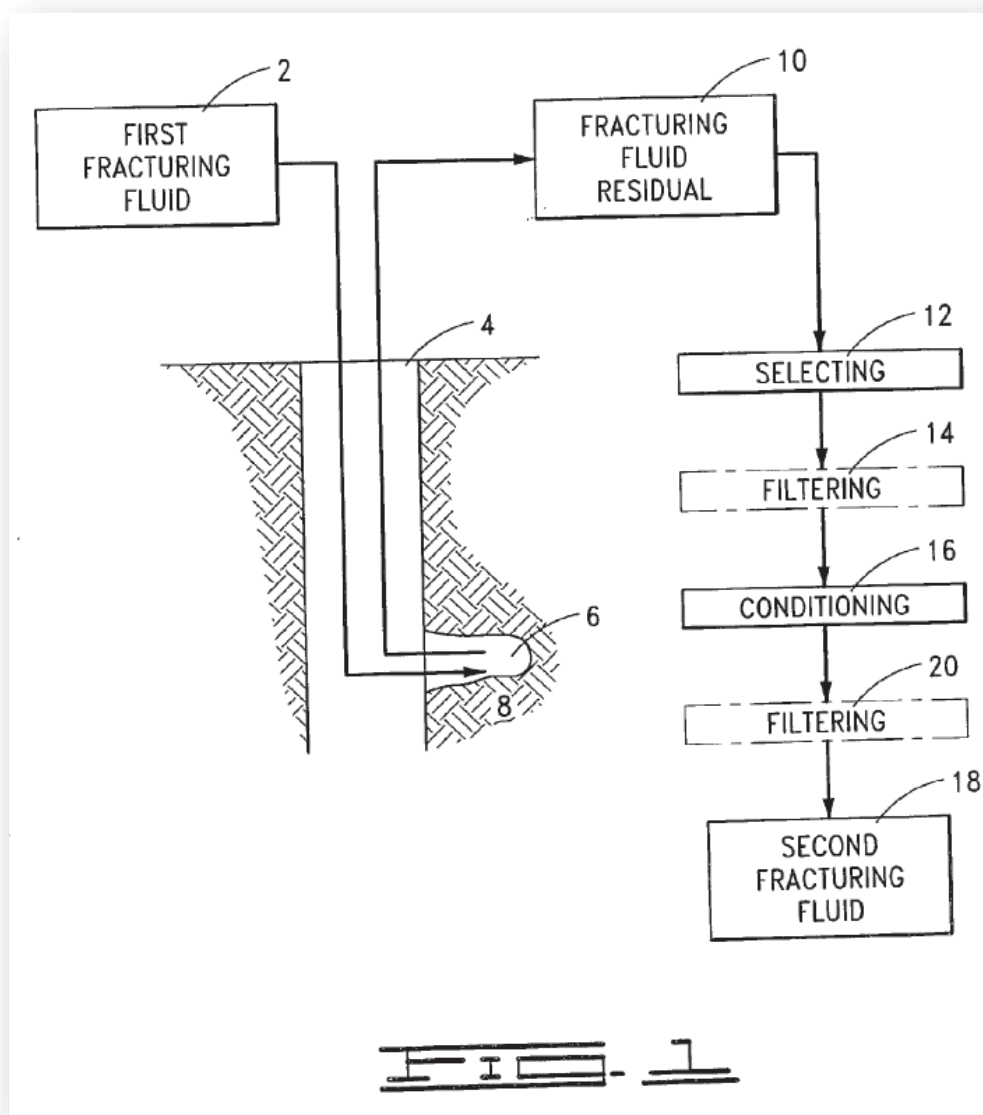
1. The Combination of Tolman/Means/Crawford and Lehman

It would have been obvious to modify the Tolman/Means/Crawford system to use Lehman’s teaching of re-using parts of recovered treatment fluid for the reasons explained below. Dr. Nikolaou explains that by combining Tolman/Means/Crawford with Lehman, the combined system would create a second fracturing fluid, such as a fluid with certain additives, from Tolman’s recovered well treatment fluid from its first well. EX-1003-¶256.

Lehman is analogous to the ’082 patent and Tolman/Means/Crawford for two reasons. *First*, Lehman is directed toward the same field of endeavor: well operations. *See* §§VI.E, VII.A.vi; EX-1008, Abstract, [0001]. *Second*, Lehman is pertinent to a problem described by the ’082 patent and Tolman/Means/Crawford: to reduce costs of well operations. *See* §§VI.E, VII.A.vi; EX-1008, [0016], [0017]. For either reason, a POSITA would have thus understood that Lehman is analogous art to these references and the ’082 patent. EX-1003-¶255.

Lehman's technique uses well treatment fluids similar to those described in Tolman. By using Lehman's technique, the combined system of Tolman would 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]; *see id.*, [0012]; EX-1003-¶256. This second fracturing fluid may be subsequently used in other wells, such as those in other oil tree fields in the Tolman/Mean/Crawford system. EX-1003-¶256.

Dr. Nikolaou explains that 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, Mean, and Crawford. EX-1003-¶257. Such a modification would have included storing the recovered well treatment fluids in storage units, such as the additive storage unit, at the Storage System 204 in the Tolman/Mean/Crawford system. EX-1008, [0036]–[0037], [0046]; EX-1003-¶257. There, well treatment fluids would undergo, selecting, filtering, and conditioning described in Figure 1 of Lehman, shown 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], [0040]–[0045]; *see id.*, [0019]–[0020]. This process results constituents used to make a second fracturing fluid for treating other wells. EX-1008, Abstract; *see id.*, [0019], [0039]–[0040].

Dr. Nikolaou explains that 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 the following reasons. EX-1003-¶258.

First, a POSITA would have been motivated to use Lehman’s technique to reduce costs of well operations. EX-1003-¶259. Lehman explains that his technique results in cost savings during well operation by re-using materials to make well-treatment fluid. EX-1008, [0016]. Dr. Nikolaou explains that this cost reduction would motivate a POSITA to reuse part of Tolman’s treatment fluid to reduce expenses for treating multiple wells. EX-1003-¶259.

Second, a POSITA would have been motivated to use Lehman’s technique for the express reasons described in Lehman. EX-1003-¶260. 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]. Dr. Nikolaou explains that

satisfying these problems with conventional systems would have motivated a POSITA to use Lehman's technique in the combined system. *See id.*, EX-1003-¶260.

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. EX-1003-¶261.

2. Claims 3 and 20

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

The Tolman/Means/Crawford/Lehman system would include disposing of recovered well treatment fluids. EX-1008, [0039]; *see id.*, [0009]. As explained above, *see* §VII.B.1, the Tolman/Means/Crawford/Lehman system would select whether to dispose of the recovered well treatment fluid at a central processing unit in the Storage System 204, like that described in Crawford, in the combined system of Tolman, Means, Crawford, and Lehman. EX-1003-¶264. 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 “*disposal module*.” EX-1003-¶264, EX-1001, 4:26–28.

3. Claims 4 and 19

The Tolman/Means/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], [0040]–[0045]. Because the recovered well fluid was immediately selected for filtering and conditioning, Lehman’s “reconditioning” of “well treatment fluids” happened “substantially simultaneously with recovering” the “well treatment fluids.” EX-1003-¶267. As explained above, *see* §VII.B.1, the Tolman/Means/Crawford/Lehman 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 Storage System 204 in the combined system of Tolman, Means, Crawford, and Lehman. EX-1003-¶267. 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-1003-¶267; EX-1001, 4:26–28.

4. Claim 7

The Tolman/Means/Crawford/Lehman system would include selecting recovered well treatment fluids for conditioning or disposal based on its viscosity. EX-1008, [0039]. EX-1003-¶270; If a fluid is not selected to be filtered and conditioned, then the fluid will be disposed of. EX-1008, [0039]; [0009]. As explained above, *see* §VII.B.1, Tolman/Means/Crawford 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 Storage System 204 in the combined system of Tolman, Means, Crawford, and Lehman. EX-1003-¶270.

5. Claim 8

The Tolman/Means/Crawford/Lehman system renders this claim obvious for the same reasons as limitation 1A and Claim 3–4. EX-1003-¶¶273-274; *see* §§VII.A.1.ii., VII.B.1–VII.B.3.

6. Claim 9

The Tolman/Means/Crawford/Lehman system renders this limitation obvious for the same reasons as Claim 9 in Ground 1 above. EX-1003-¶277; *see* §VII.A.8.

Lehman further explains that its production fluid may be stored “at some more convenient, possibly centralized location.” Ex.1008, [0046]. Based on the above teaching, a POSITA would have directed and stored recovered wellbore treatment

fluids described in Lehman in a centralized storage, which would be Stimulation Fluid Storage System in the Tolman/Means/Crawford/Lehman system. EX-1003-¶278; *see* §VII.A.8.

7. Claim 11

The Tolman/Means/Crawford/Lehman system would include storing recovered well treatment fluids to be later disposed of or filtered and conditioned. EX-1008, [0039], [0036]–[0037], [0046]. As explained, *see* §VII.B.1, Tolman/Means/Crawford/Lehman would store the recovered well treatment fluid at a central processing unit located in the Storage System 202 in the combined system. EX-1003-¶281. Moreover, the same combination renders this limitation obvious for the same reasons as Claim 4 above. EX-1003-¶281; *see* §VII.B.3.

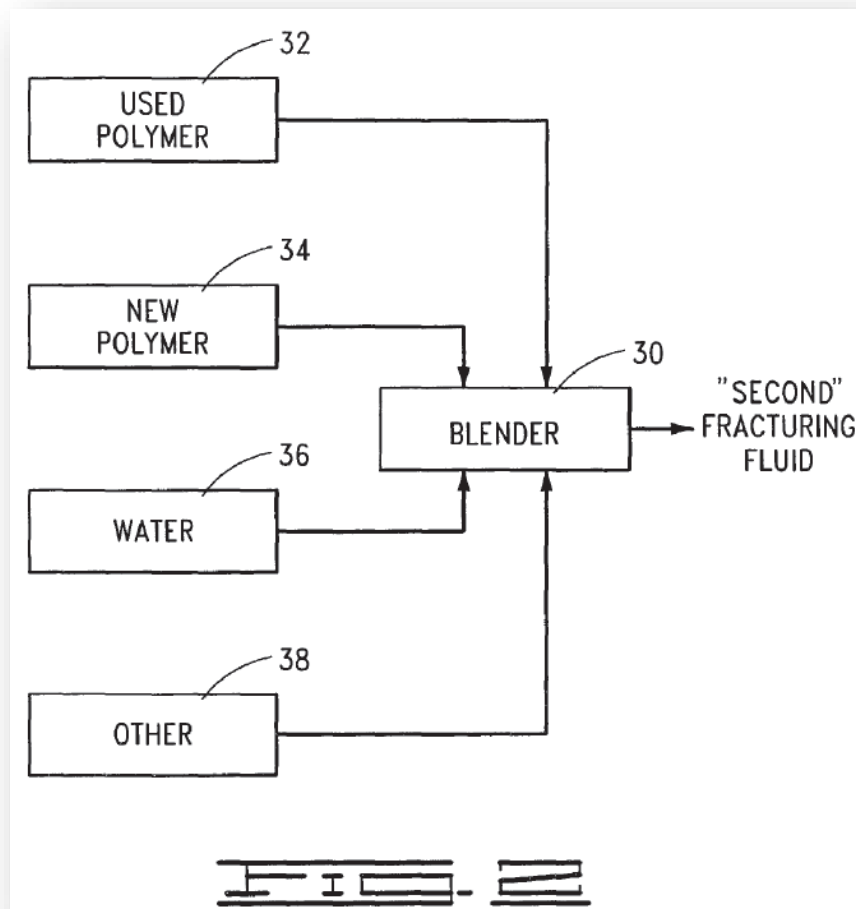
8. Claim 25

The Tolman/Means/Crawford/Lehman system renders this limitation obvious for the same reasons as 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*. EX-1003-¶284; *see* §§VII.B.1, VII.B.3, VII.B.5, VII.B.6.

As explained, Tolman describes “fluid for the planned stimulation treatment (“*well development task fluids*”). EX-1005, [0029]; EX-1003-¶285; *see* §VII.A.1.ii. Additives and other materials needed for stimulation treatment in the combined

system would also satisfy “*well development task fluids*.” EX-1006, [0005]; EX-1003-¶285; *see* §VII.A.1.ii.

Lehman discloses used polymer, new polymer, water, and “other constituents” which also satisfy “*well development task fluids*.” EX-1003-¶286; EX-1008, [0054]. 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:

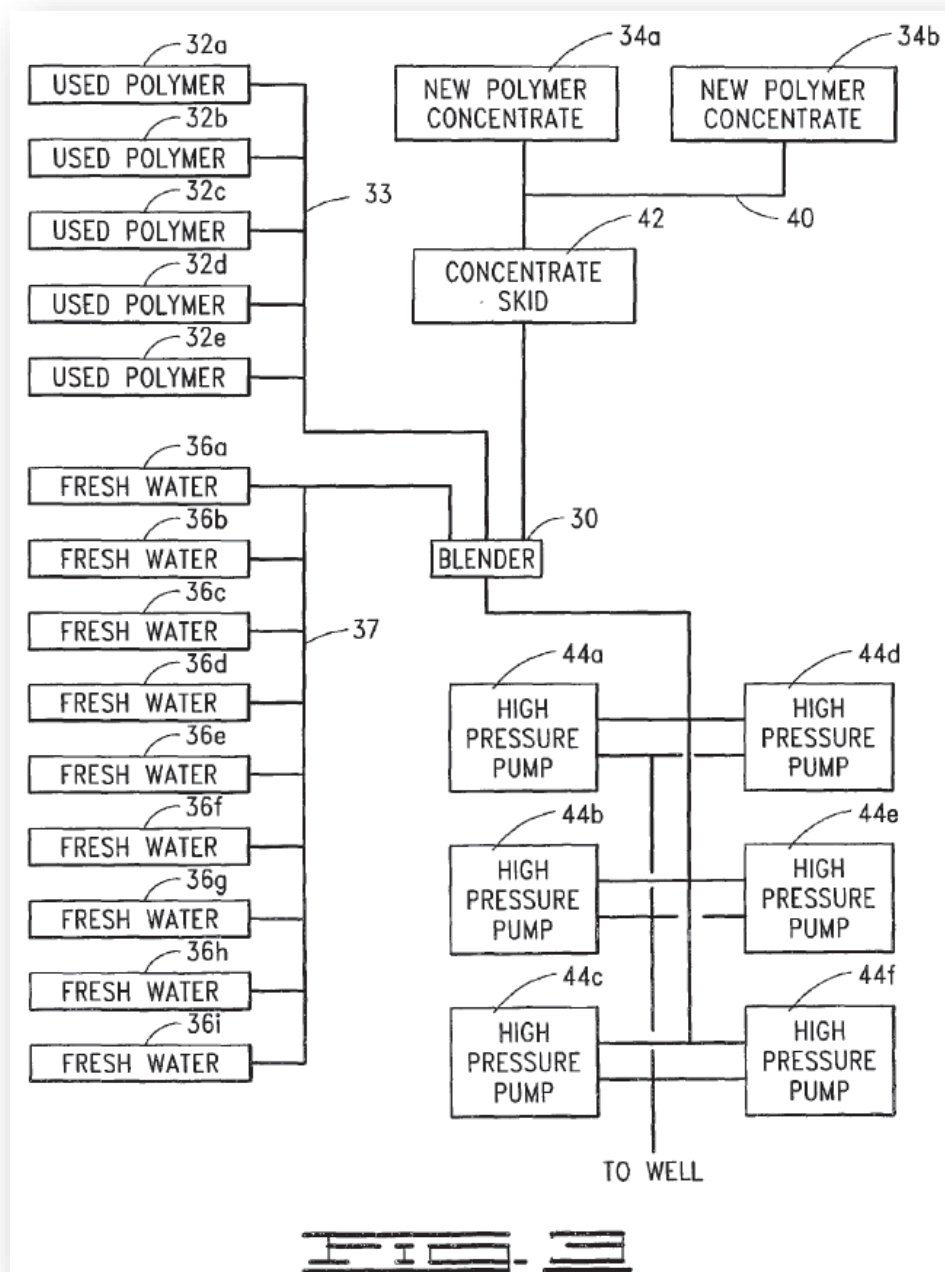


Lehman Fig. 2 (EX-1008).

Lehman also explains 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). Dr. Nikolaou explains that each of the above additives are also “*well development task fluids.*” EX-1003-¶287.

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:



Lehman, Fig. 3 (EX-1008).

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 Storage System 204 (*“the centralized well treatment center”*), while high pressure pumps 44a–44f correspond to Tolman's Pumping System 202. He also explains that a POSITA would have found it obvious to modify Tolman's 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] and [0055]. EX-1003-¶289.

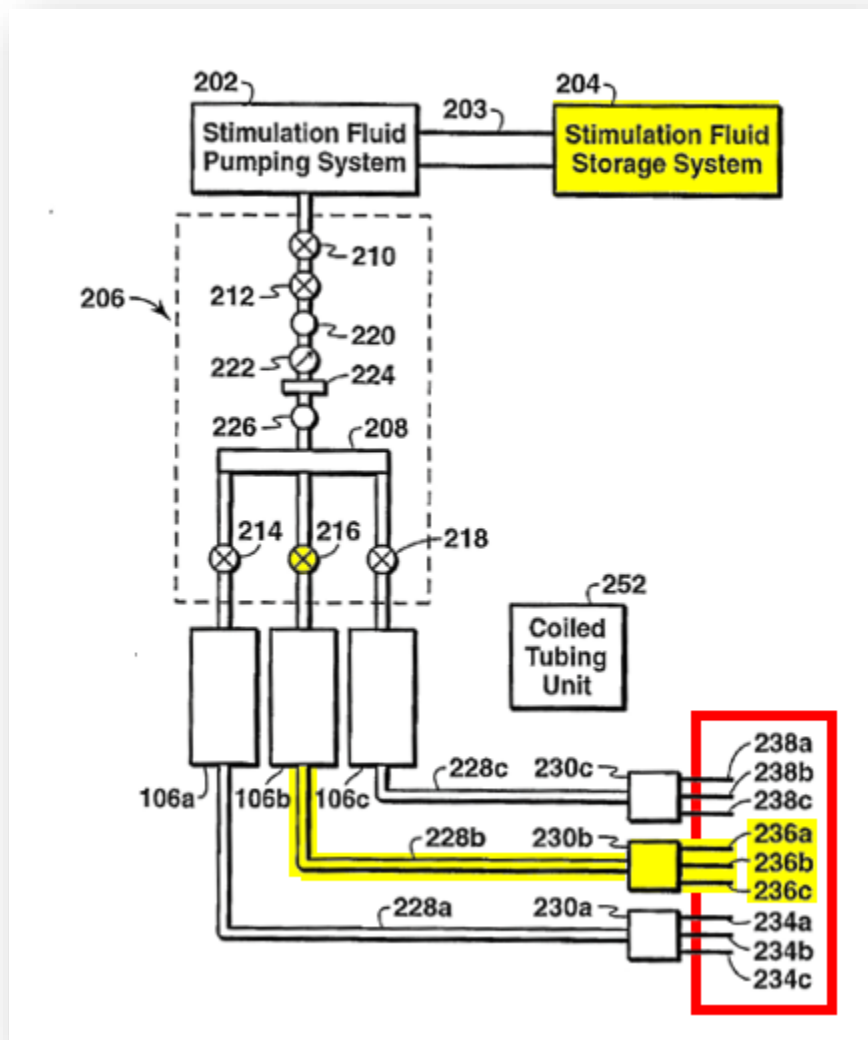
A POSITA would have found it obvious for the Tolman/Means/Crawford/Lehman system to at Tolman's Storage System 204 (*“the centralized well treatment center”*) receive recovered well stimulation fluid (*“receive the one or more recovered well treatment fluids”*), recondition the recovered well stimulation 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 Pumping System 202. EX-1003-¶290; *see* §§VII.B.1, VII.B.3, VII.B.5, VII.B.6, VII.A.6.

9. Claim 29

As explained, *see* §VII.B.3, the Tolman/Mean/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 Storage System 204 (“the centralized well treatment fluid center”). EX-1003-¶293.

The Tolman/Mean/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 (“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 Storage System 204 in the Tolman/Mean/Crawford/Lehman system. EX-1003-¶294; *see* §VII.A.22.i.

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



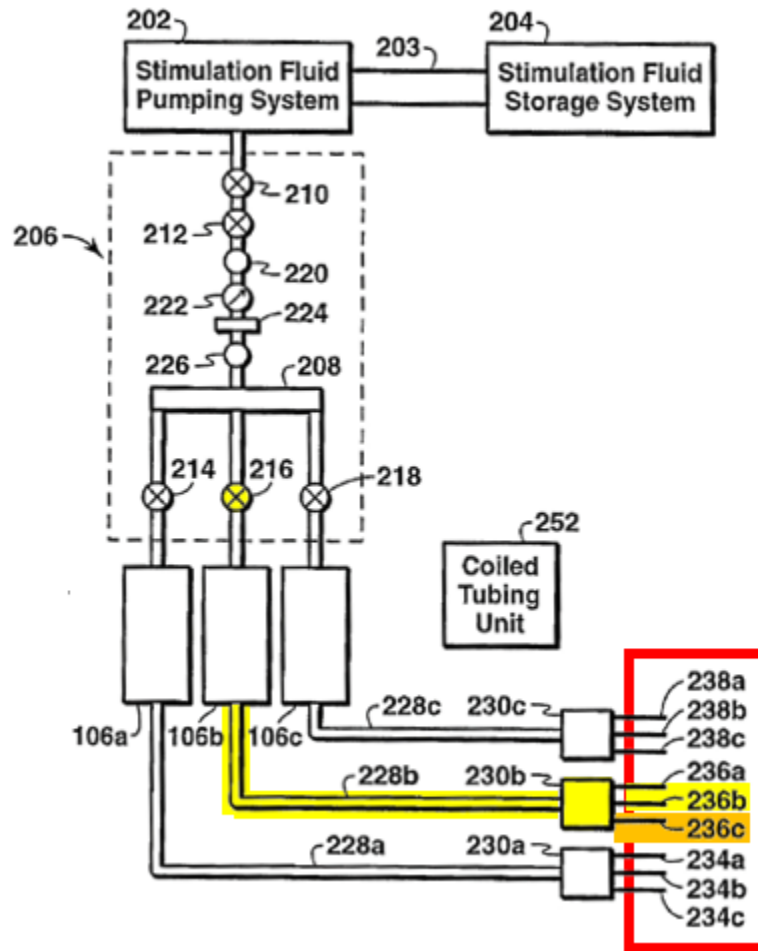
Tolman, Fig. 2 (EX-1005) (annotated); EX-1003-¶295.

10. Claim 30

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

As explained above, see VII.A.15.iii, Means's 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. EX-1003-¶299. 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. See EX-1008, [0039]. In doing so, this testing unit (“*one or more of the plurality of modules*”) would instruct manifold 230 which 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.B.1, shown below:



Tolman, Fig. 2 (EX-1005) (annotated); EX-1003-¶299.

A POSITA would thus have understood that The Tolman/Means/Crawford/Lehman system includes a “*sixth*” flowline between testing unit 330 (“*one or more of the plurality of modules*”) and the “*fluid reconditioning module.*” EX-1003-¶299.

11. Claim 31

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

As discussed, both the fluid reconditioning module and the additive storage module would both be located at the Storage System 204 in the Tolman/Means/Crawford/Lehman system. A POSITA 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*”). EX-1003-¶303; *see* §VII.B.9.

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]. After conditioning, additives may be added to the residual fluid to attain certain pH levels. *See* EX-1008, [0045]; *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* §VI.E. Based on these disclosures, Lehman’s reconditioning method, as implemented in the Tolman/Means/Crawford/Lehman system, would use residual fluid with additives with using more additives on the fly, if needed. EX-1003-¶304.

The Tolman/Means/Crawford/Lehman system includes additive sources 312a–312m (“*an additive storage module*”) are operable to store additives. EX-1006, [0047]. Reconditioned stimulation fluid (“*the reconditioned well treatment*

fluids”) would include additives. EX-1003-¶305. Additive sources 312a–312m (“*the additive storage module*”) are operable to store recovered stimulation fluid that had been processed (“*the reconditioned well treatment fluids*”). EX-1003-¶305.

In doing so, and according to Dr. Nikolaou, 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. EX-1003-¶306. Given that these are later combined, a POSITA would have been motivated to be store the residual fluid along with other additives in the additive storage module. Dr. Nikolaou also explains that a POSITA would have found such storage to be a design choice with different benefits and costs. EX-1003-¶306. For example, a POSITA would have recognized that such storage would reduce water supply costs and produced water disposal costs. See EX-1008, [0009]. 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. EX-1003-¶306.

VIII. THE BOARD SHOULD NOT EXERCISE ITS DISCRETION UNDER §314(a) OR §315(d)**A. 314(a) – *Fintiv***

Discretionary denial under 35 U.S.C. §314(a) is not warranted. The parallel litigation involving the '082 Patent was filed on September 1, 2022, and the median time to trial in the Western District of Texas is 29.5 months as of March. *See* EX-1017; Director Memorandum, *Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation* (June 21, 2022) (stating that in applying the *Fintiv* factors the Board must consider “the median time from filing to disposition of the civil trial for the district in which the parallel litigation resides”). Further, as demonstrated herein, the merits presented in this Petition are compelling. *See* Director Memorandum at 2 (holding that the Board “will not rely on the *Fintiv* factors to discretionarily deny institution in view of parallel district court litigation where a petition presents compelling evidence of unpatentability.”). For at least these reasons, the Board should not discretionarily deny this petition.

B. 325(d)

The grounds raised by this Petition are not the same or substantially the same as the art and arguments raised during prosecution. Neither Means nor Lehman were considered during prosecution. Crawford was only made of record by the examiner, but it was not relied upon in a rejection. EX-1002, p. 550. Accordingly, the

Examiner did not meaningfully consider three of the four references used in Grounds of this Petition.

The Examiner rejected the claims over Tolman as anticipating the claims, but the Examiner did not consider Tolman in combination with any other reference. EX-1002, p. 777-778. The Examiner did not consider Means and Crawford, which render obvious the limitations that Patent Owner argued Tolman does not disclose—that is, a “centralized service factory” and “flowing from the one or more centralized service factories recovered well treatment fluid.” EX-1002, pp. 813-814. Consequently, the Petition does not presents prior art combinations that are meaningfully different from those considered during prosecution.

Even if one were to assert any of these references were substantially the same or cumulative of the art and arguments raised during prosecution, this Petition’s Grounds identify reference combinations that are not substantially the same as any considered references. *Sony v. MZ Audio Scis., LLC*, IPR2022-01544, Paper No. 12, *7 (§325(d) discretion improper where “Examiner did not consider the specific combination of references asserted”). Further, the Examiner’s analysis mapped different elements of Tolman to satisfy the claim elements of the ’082 patent from Dr. Nikolous’ analysis, 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, or the Tolman/Means/Crawford/Lehman

system. In addition, the Examiner also did not have the benefit of Dr. Nikolaou's detailed expert testimony and the further evidence of record.

Even if the same or substantially the same art or arguments were considered, the Examiner materially erred by not rejecting the Claims for the reasons discussed in §IV.D. The Examiner otherwise “did not expressly consider” any art with substantially the same teachings as the art in this Petition, rendering it “impossible . . . to determine the consideration the Examiner gave” to such references, and demonstrating that “the Office erred in a manner material to patentability.” *Ecobee Techs. v. Causam Enterprises, Inc.*, IPR202201339, Paper No. 20, *20–21 (declining to exercise §325(d) discretion).

IX. CONCLUSION

The challenged claims are unpatentable for the reasons above.

CERTIFICATE OF COMPLIANCE

I hereby certify that this brief complies with the type-volume limitations of 37 C.F.R. §42.24, because it contains 13,965 words (as determined by the Microsoft Word word-processing system used to prepare the brief), excluding the parts of the brief exempted by 37 C.F.R. §42.24.

Dated: October 4, 2023

Respectfully Submitted,

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §42.6(e), I hereby certify that on this 4th day of October, 2023, I caused to be served a true and correct copy of the foregoing and any accompanying exhibits by federal express on the following counsel:

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