

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FMC TECHNOLOGIES, INC.,
Petitioner,

v.

ONESUBSEA IP UK LIMITED,
Patent Owner.

Case IPR2016-00907
Patent 8,573,306 B2

Before JOSIAH C. COCKS, CARL M. DEFRANCO, and
MICHELLE N. WORMMEESTER, *Administrative Patent Judges*.

WORMMEESTER, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

FMC Technologies, Inc. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting *inter partes* review of claims 1, 10–12, 17–19, 21–23, 25–29, 31–39, and 41 of U.S. Patent No. 8,573,306 B2 (Ex. 1001, “the ’306 patent”). We instituted an *inter partes* review of all the challenged claims because Petitioner demonstrated a “reasonable likelihood” of prevailing on “at least 1 of the claims challenged in the petition.” Paper 7 (“Inst. Dec.”); *see* 35 U.S.C. § 314(a).

After institution of trial, OneSubsea IP UK Limited (“Patent Owner”) filed a Patent Owner Response (Paper 9, “PO Response”), and Petitioner filed a Reply (Paper 12, “Pet. Reply”). With our authorization, Patent Owner subsequently filed a Sur-Reply (Paper 15, “PO Sur-Reply”). We conducted an oral hearing on July 13, 2017, and a copy of the transcript is included in the record (Paper 20, “Tr.”).

We have jurisdiction under 35 U.S.C. § 6(b). For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 1, 10–12, 17–19, 21–23, 25–29, 31–35, 38, 39, and 41 of the ’306 patent are unpatentable. Petitioner, however, has not made such a showing with respect to claims 36 and 37. This final written decision is issued pursuant to 35 U.S.C. § 318(a).

II. BACKGROUND

A. *Related Proceedings*

The parties identify the following federal district court case involving the ’306 patent: *OneSubsea IP UK Limited v. FMC Technologies, Inc.*, Case

No. 4:16-cv-00051 (S.D. Tex.). Pet. 1; Paper 5, 1. Patent Owner also identifies several related requests for *inter partes* review. Paper 5, 1–2.

B. The '306 Patent

The '306 patent is titled “Apparatus and Method for Recovering Fluids from a Well and/or Injecting Fluids into a Well.” Ex. 1001, at [54]. According to the '306 patent, “[w]ells and trees are often active for a long time, and wells from a decade ago may still be in use today.” *Id.* at 2:25–26. For these older wells, providing subsea processing of fluids (which has since become desirable) may involve breaking existing pipework to insert new pipework leading to the processing equipment. *Id.* at 2:26–36. Yet disconnecting pipework that has been in place for a considerable period of time and that was never intended to be disconnected has many associated risks. *Id.* at 2:36–39. For example, “due to environmental regulations, no produced fluids are allowed to leak out into the ocean, and any such unanticipated and unconventional disconnection provides the risk that this will occur.” *Id.* at 2:39–42. Alternative solutions have resulted in “a waste of energy,” “a difficult operation, for which production must cease,” or an operation that is “even more expensive than breaking the subsea or seabed pipework.” *Id.* at 2:43–62. To address these challenges, the invention of the '306 patent provides a diverter assembly for a manifold of an oil or gas well. *Id.* at 2:66–3:1.

According to one embodiment of the invention, the diverter assembly diverts production fluids out of a wellhead tree to a subsea processing apparatus for treatment and then returns the fluids to the tree for recovery.

Id. at [57]. Figure 2 of the '306 patent, which illustrates such a diverter assembly, is reproduced below.

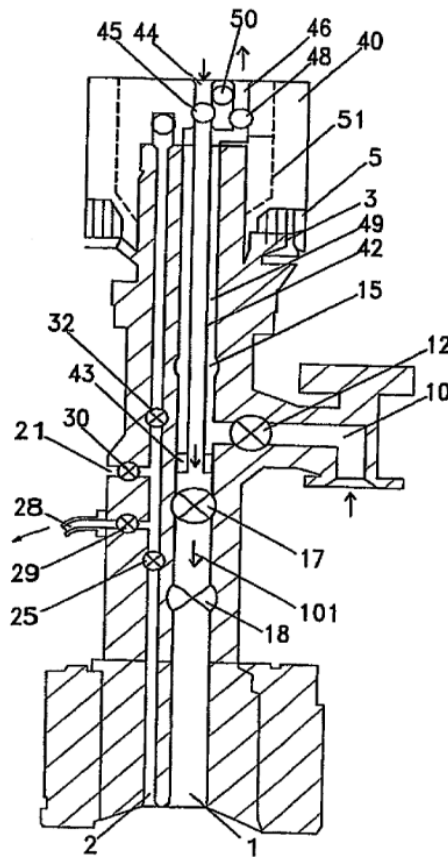


Fig. 2

Figure 2 shows a side view of a tree with a diverter cap. *Id.* at 12:8–9. Wellhead cap 40 has conduit 42 with seals 43 that can seal the outside of conduit 42 against the inside walls of production bore 1, diverting production fluids flowing in through branch 10 into the annulus between conduit 42 and production bore 1 and through outlet 46. *Id.* at 14:3–9. Outlet 46 leads to a processing apparatus, such as a pump for boosting the pressure of the fluid or a measurement apparatus. *Id.* at 14:10–14, 53–54. Once the fluids are processed, they are returned to production inlet 44, which leads to the bore of conduit 42. *Id.* at 15:1–3. From there, the fluids pass into the well bore. *Id.* at 15:3–4.

C. Illustrative Claim

Claims 1, 11, 22, and 32 are independent claims. Each of claims 10, 12, 17–19, 21, 23, 25–29, 31, 33–39, and 41 depends from one of claims 1, 11, 22, and 32. Claim 1 is illustrative of the subject matter at issue, and is reproduced below (with alternate spacing provided for ease of reading).

1. A diverter assembly for a manifold of an oil or gas well, the manifold having a production bore and a wing branch communicating with the production bore, comprising

a housing disposed on the wing branch and having an internal passage,

wherein the diverter assembly comprises a first path in a first direction to divert flow of a fluid from the wing branch of the manifold or from a flowline communicating with the wing branch, and a second path in a second direction to return flow of the fluid to the other of the wing branch or the flow line,

wherein the first and second paths are coaxial paths not passing through the production bore and the first direction is opposite to the second direction.

D. The Instituted Grounds

Petitioner asserts in its Petition various grounds that include anticipation under 35 U.S.C. § 102 and obviousness under 35 U.S.C. § 103. Pet. 4–5. We instituted *inter partes* review on all the challenged claims and on all the asserted grounds. Inst. Dec. 8, 11. The instituted grounds are as follows.

Reference(s)	Basis	Claims Challenged
Kelly ¹	§ 102	11, 12, 17–19, 22, 25–28, 32–36, 39, and 41
Kelly and Fenton ²	§ 103	28, 29, and 36–39
Kelly and Bednar ³	§ 103	11, 12, 17–19, 22, 25–28, 32–36, and 41
Kelly, Bednar, and Fenton	§ 103	28, 29, and 36–38
Clair ⁴	§ 102	1, 10–12, 17–19, 21–23, 25–28, 31–36, and 41
Clair and Fenton	§ 103	28, 29, 32–38, and 41

In support of the instituted grounds, Petitioner proffers the declaration of Robert Herrmann (Ex. 1003). With its Response, Patent Owner submits the declaration of George Boyadjieff (Ex. 2006). The transcript of the deposition of Mr. Herrmann is entered in the record as Exhibits 2004 and 2005, and the transcript of the deposition of Mr. Boyadjieff is entered in the record as Exhibits 1015 and 1016.

III. ANALYSIS

A. APA Due Process

We instituted *inter partes* review of the challenged claims because, pursuant to 35 U.S.C. § 314(a), Petitioner demonstrated a “reasonable likelihood” of proving that “at least 1 of the claims challenged in the petition” is unpatentable, namely, claims 1 and 11. Inst. Dec. 5–11. After deciding that claims 1 and 11 met the threshold for institution, we exercised

¹ Kelly, U.S. Patent No. 4,589,493, issued May 20, 1986 (Ex. 1004).

² Fenton, U.S. Publ’n No. 2002/0070026 A1, published June 13, 2002 (Ex. 1005).

³ Bednar, U.S. Patent No. 5,010,956, issued Apr. 30, 1991 (Ex. 1007).

⁴ Clair, U.S. Patent No. 2,638,917, issued May 19, 1953 (Ex. 1006).

our discretion under 37 C.F.R. § 42.108(b) to institute on *all* the challenged claims. *Id.* (citing *Intex Recreation Corp. v. Bestway Inflatables & Material Corp.*, IPR2016-00180, Paper 13, at 8–11 (PTAB Jun. 6, 2016)).

Patent Owner argues that we overstepped our statutory authority and violated its due process rights “[b]y failing to perform a claim-by-claim analysis” for all the claims in our institution decision and by failing to provide it with “notice of the facts and arguments” in support thereof. PO Resp. 79–81. Citing 35 U.S.C. § 314, Patent Owner argues that “[t]he Board must first determine that petitioner has a reasonable likelihood of prevailing with respect to *the challenged claims*” before instituting an *inter partes* review. *Id.* at 80 (emphasis added). We disagree.

Patent Owner fails to recognize the critical language of the statute. The statute does not require that the threshold for institution must be met for “the challenged claims,” as Patent Owner urges. Instead, the statute requires simply that the threshold must be met with respect to “*at least 1* of the claims challenged in the petition.” 35 U.S.C. § 314(a) (emphasis added). Thus, contrary to what Patent Owner argues, we did not need to analyze all the challenged claims individually, for the statutory threshold need only be applied to one claim, not all the claims.

Nor did we need to analyze all the asserted grounds individually, for, again, the statute requires simply that one claim “in the petition” meet the threshold, not one claim in each ground. *Id.* Indeed, section 314(a) of the statute omits the term “ground” altogether, despite its express mention in preceding sections of the statute. *See, e.g.*, 35 U.S.C. § 311(b) (“a petitioner . . . may request to cancel . . . claims of a patent only on a *ground* that could be raised under section 102 or 103”) (emphasis added); 35 U.S.C. § 312(a)

(“A petition . . . may be considered only if— . . . the petition identifies . . . *the grounds* on which the challenge to each claim is based.”) (emphasis added). That clear omission of the term “ground” from section 314(a) supports that the threshold for institution need only be met for one claim in the petition, not one claim in each ground. As such, our substantive analysis of only a subset of the challenged claims as a precursor to exercising our discretion to institute on all the challenged claims satisfies our statutory obligation of determining a reasonable likelihood for “at least 1 of the claims challenged in the petition.”

Our discretionary decision to institute on all the challenged claims after analyzing only some of those claims is also consistent with our regulatory authority. For instance, 37 C.F.R. § 42.108(c) tracks the language of the statute and precludes institution on “a ground of unpatentability unless the Board decides that *the petition* supporting the ground would demonstrate that there is a reasonable likelihood that at least one of the claims challenged in *the petition* is unpatentable.” (Emphasis added.) Like 35 U.S.C. § 314(a), the purpose of that rule is simple—it sets a minimum threshold for exercising our discretion to institute an *inter partes* review. While subsections (a) and (b) of the rule permit us discretion to institute on “all or some” of the claims and grounds, subsection (c) limits that discretion by requiring that “at least one claim in the petition” satisfy the “reasonable likelihood” standard. In other words, the rule is permissive—it does not state that we *must* address the merits of each challenged claim and asserted ground, only that we do so for at least one claim in *the petition*.

Had the rule meant to invoke a more stringent requirement that one claim *in each ground* meet the threshold, the rule would have omitted

reference to “the petition” and, instead, required “*the ground* would demonstrate that there is a reasonable likelihood” and “one of the claims challenged *in the ground* is unpatentable.” It does not. An interpretation that emphasizes mention of “the ground” over “the petition,” in essence, reduces the latter term to nothing more than unnecessary surplus verbiage. We cannot interpret our rules in a manner that renders words meaningless.⁵ As such, 37 C.F.R. § 108(c) is best understood to require that at least one claim in the petition meet the minimum threshold, not one claim in each asserted ground.

In exercising our discretion under 37 C.F.R. § 42.108, we grouped the grounds in the Petition along the lines of where we perceived a significant overlap or meaningful distinction in terms of the references relied upon. *Cf. Shaw Indus. Grp., Inc. v. Automated Creel Sys., Inc.*, 817 F.3d 1293, 1298–99 (Fed. Cir. 2016) (expressing concern with the Board’s exercise of discretion where it “made no specific findings that the three grounds overlapped with one another”). We found that some grounds overlapped significantly in terms of the primary reference relied upon, while other grounds differed sufficiently despite some overlap of secondary references. Specifically, we divided the grounds into two groups—(1) the “Kelly-based grounds,” where the grounds overlap with Kelly as a primary reference, and

⁵ Each word must have meaning and purpose. An interpretation that would render a word in our rules redundant or meaningless is rarely, if ever, correct. *See Buckley v. U.S.*, 51 Fed. Cl. 174, 192 (Fed. Cl. 2001) (“the rules of statutory construction are equally applicable to the interpretation of administrative regulations,” and “the court must avoid an interpretation of a clause or word which renders other provisions of the statute inconsistent, meaningless, or superfluous”).

(2) the “Clair-based grounds,” where the grounds overlap with Clair as a primary reference. Inst. Dec. 5, 9. We analyzed the merits of one claim in each of the groups—claim 11 as challenged in the Kelly-based grounds, (*id.* at 5–9), and claim 1 as challenged in the Clair-based grounds, (*id.* at 9–11)—and found that they met the “reasonable likelihood” standard for institution.

Upon determining that at least one claim in each group met the statutory threshold, we then explained our reason for exercising discretion to institute on all the remaining claims under challenge—to achieve consistency and efficiency between the related district court action and the instant proceeding. *See id.* at 8–9, 11; *cf. Shaw Indus.*, 817 F.3d at 1304 (concurring op.) (expressing concern that the Board’s institution decision “say[s] nothing about efficiency” as rationale for exercising discretion); *see also Synopsys, Inc. v. Mentor Graphics Corp.*, 814 F.3d 1309, 1325 (Fed. Cir. 2016) (dissenting op.) (expressing concern that partial institution “negates the AIA’s purpose of providing an alternative and efficient forum for resolving patent validity issues”). We further explained that “concerns of fairness and efficiency in this case” persuade us to institute on grounds of anticipation *and* obviousness that rely primarily on Kelly or Clair as a basis of the challenge. Inst. Dec. 9 (citing *HP Inc. v. MPHJ Tech. Inv., LLC*, 817 F.3d 1339, 1347 (Fed. Cir. 2016) (holding that petitioner was “not estopped from raising the obviousness of claim 13 in a subsequent court or Board proceeding” where Board instituted only on grounds of anticipation of claim 13)); *see also id.* at 11.

An analysis of each and every claim, and each and every ground, in the petition is not a prerequisite to institution. *See Genzyme Therapeutic*

Prods. Ltd. v. Biomarin Pharm. Inc., 825 F.3d 1360, 1366 (Fed. Cir. 2016) (“There is no requirement, either in the Board’s regulations, in the APA, or as a matter of due process, for the institution decision to anticipate and set forth every legal or factual issue that might arise in the course of the trial.”) (citing *Boston Carrier, Inc. v. ICC*, 746 F.2d 1555, 1560 (D.C. Cir. 1984) (quotation omitted)). In granting institution, we addressed Petitioner’s first ground and explained why Kelly sufficed as proof of a reasonable likelihood of anticipation of claim 11. Inst. Dec. 5–9. And, because that first ground overlapped significantly with Petitioner’s other grounds relying primarily on Kelly, we exercised our discretion under 37 C.F.R. § 42.108 to institute on *all* claims challenged within those grounds, namely, claims 11, 12, 17–19, 22, 25–29, 32–39, and 41. *Id.* at 8–9. Similarly, with respect to Petitioner’s fifth ground, we explained how Clair sufficed to show a reasonable likelihood of anticipation with respect to claim 1, and again exercised our discretion to review *all* the claims challenged within that ground as well as the overlapping ground relying primarily on Clair, namely, claims 1, 10–12, 17–19, 21–23, 25–29, 31–38, and 41. *Id.* at 11. Our decision to streamline the institution proceeding by analyzing substantively only a subset of the challenged claims is fully within our statutory and regulatory authority, as discussed above, and, thus, is reasonable.

Moreover, our institution decision provided the parties with full notice of “the matters of fact and law asserted” to permit them “to submit rebuttal evidence, and to conduct such cross-examination as may be required for a full disclosure of the facts.” *See Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1080 (Fed. Cir. 2015) (citations omitted). The Board is not precluded from “relying on arguments made by a party and doing its job, as

adjudicator, of drawing its own inferences and conclusions from those arguments . . . *subject, of course, to the provision of adequate notice and opportunity to be heard.*” *Rovalma, S.A. v. Bohler-Edelstahl Gmbh & Co. KG*, Appeal No. 2016-2233, slip op. at 14 (Fed. Cir. May 11, 2017) (emphasis added). In the preliminary proceeding, we considered the parties’ arguments and concluded they warranted exercising our discretion to institute on all the challenged claims. That our institution decision came at the outset of the proceeding and informed the parties of the claims and grounds on which trial would center gave the parties adequate notice and opportunity to be heard on the pertinent facts and issues that would be ultimately resolved at trial. *See* Inst. Dec. 12 (“Order” specifying grounds for trial).

Our final written decision today does not depart from, nor is it inconsistent with, the initial theory laid out in our institution decision. *See Belden*, 805 F.3d at 1080 (“‘[A]n agency may not change theories in midstream without giving respondents reasonable notice of the change’ and ‘the opportunity to present argument under the new theory.’” (quoting *Rodale Press, Inc. v. FTC*, 407 F.2d 1252, 1256–57 (D.C. Cir. 1968))).

B. Claim Construction

For an *inter partes* review, we construe claims in an unexpired patent by applying the broadest reasonable interpretation in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs. LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard). Under that standard, claim terms generally are given their ordinary and

customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). A “claim term will not receive its ordinary meaning if the patentee acted as his own lexicographer,” however, and clearly set forth a definition of the claim term in the specification. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002).

Petitioner does not propose any claim terms for construction in its Petition. *See* Pet. 5–6. Patent Owner, in turn, proposes five terms for construction in its Response. PO Resp. 7–11. Petitioner responds in its Reply.⁶ Pet. Reply 1–6. In light of the parties’ arguments, we address the following claim terms: “assembly,” “diverter assembly,” and “branch.”

1. “assembly”

Independent claims 1, 11, 22, and 32 recite the term “diverter assembly.” The Petition addresses neither the term “diverter assembly” nor the term “assembly.” Because Patent Owner raises them in its Response, we consider first the proper construction of the term “assembly” and next the proper construction of the term “diverter assembly.”

⁶ Patent Owner argues that Petitioner had the opportunity to construe the disputed terms in its Petition and that Petitioner’s “affirmative constructions in [its] Reply are untimely.” PO Sur-reply 2. We disagree. Our rules provide that “[a] reply may only respond to arguments raised in the corresponding opposition, patent owner preliminary response, or *patent owner response*.” 37 C.F.R. § 42.23(b) (emphasis added). Accordingly, we consider Petitioner’s arguments in response to Patent Owner’s proposed claim constructions.

Patent Owner argues that the term “assembly” should be interpreted as “a *complete structure* composed of fitted together parts.” PO Resp. 7 (emphasis added). As support, Patent Owner proffers a general definition of “assembly” from Webster’s Dictionary—“the fitting together of manufactured parts into a complete machine, structure, or unit of a machine.” *Id.* (citing Ex. 2008, 69). Patent Owner also proffers a definition of “assembly” from an oil industry handbook—“[a] term to describe a number of special pieces of equipment fitted together to perform a particular function” *Id.* (citing Ex. 2007, 18).

Petitioner replies that Patent Owner’s construction is “narrower” than an interpretation of “assembly” proposed by Patent Owner in the related district court action. Pet. Reply 3. There, Patent Owner represented that the term “diverter assembly” means simply “a multipart device for directing,” whereas Patent Owner now argues for a more comprehensive meaning—“a complete structure composed of fitted together parts for directing fluid.” *Compare* Ex. 1021, 2–4, *with* PO Resp. 8–10. In that regard, Petitioner complains that Patent Owner is attempting to interpret “assembly” as a “unitary structure.” Pet. Reply 3; *see also* PO Resp. 2–3 (“[t]he ’306 patent’s diverter assembly is a unitary structure”).

At the outset, we note that Patent Owner’s citation from Webster’s Dictionary leaves out the additional definition of “assembly” as “a collection of parts.” *See* Ex. 2008, 69. That definition is more in alignment with the one Patent Owner proffers from the oil industry handbook, which defines “assembly” as “a number of special pieces of equipment fitted together to perform a particular function” *See* Ex. 2007, 18. Neither of those definitions requires that an “assembly” be a “complete structure,” as Patent

Owner now urges. Even Patent Owner's expert admitted that the term "complete" is an "arbitrary" term that adds nothing "about what [to] decide is going to be an assembly and what's not going to be an assembly." Ex. 1015, 80:1–5, *cited in* Pet. Reply 4. As such, Patent Owner's addition of the term "complete" sheds no light on how a skilled artisan would have understood the relationship of parts that make up an "assembly." We reject Patent Owner's attempt now to construe the term more narrowly than it did in the district court action. Accordingly, we construe "assembly" as "a multipart device."

2. "diverter assembly"

With respect to the term "diverter assembly," Petitioner argues it means "a multipart device *for directing*" because that was the interpretation Patent Owner proposed in the district court action. Pet. Reply 5; *see id.* at 3 (citing Ex. 1021, 2–4). Patent Owner argues that the term should be construed as "a complete structure composed of fitted together parts *for directing fluid*." PO Resp. 9–10. Patent Owner's construction, however, is premised on its previous construction of the term "assembly" as a "complete structure," which we have already rejected. Thus, the only remaining issue is construction of the term "diverter."

Both parties agree that the term "diverter" means "directing." PO Resp. 9 ("both parties agree that the ordinary meaning of the term 'divert' means 'direct'"); Pet. 9 ("directed, i.e., diverted"); *see also* Pet. Reply 3 ("the parties do not disagree on the meaning of 'diverter' under BRI").⁷ We

⁷ BRI stands for "broadest reasonable interpretation."

note that the district court construed the term “divert,” after conducting a *Markman* hearing, to mean “the direction of the fluid’s flow is forced to change from its current flowpath to a different flowpath.”⁸ Ex. 2012, 8. That construction is consistent with the plain and ordinary meaning of “divert” as “to turn in opposite directions . . . to turn aside : DEVIATE . . . to turn from one course or use to another : DEFLECT.” Ex. 3001, 339 (Merriam-Webster’s Collegiate Dictionary). While the terms “forced” and “different flowpath” may not be necessary under our BRI standard, neither party explains why we should disregard the district court’s construction entirely. We view the parties’ proposed construction of “diverter,” i.e., “directing,” as unreasonably broad when viewed in the context of the claims and specification as a whole. Accounting for the district court’s construction, with an eye toward the BRI standard of our proceedings, we construe the term “diverter assembly” to mean “a multipart device that changes the course or direction of a fluid’s current flow path.”

3. “branch”

Independent claims 1, 11, 22, and 32 also recite the term “branch.” We note that, in a *Markman* ruling, the district court construed the term “branch” to mean “an offshoot from a flowpath such as the production bore or the annulus bore, but does not include the production bore or the annulus bore.” Ex. 2012, 7, *cited in* PO Resp. 10. That construction is consistent with the definition in the specification of the ’306 patent, which explains that

⁸ The district court only had an opportunity to construe several but not all of the terms in dispute here before the case was stayed pending completion of our proceedings.

“[b]y ‘branch’ we mean any branch of the manifold, other than a production bore of a tree. . . . typically a lateral branch of the tree.” Ex. 1001, 3:16–18. It is also consistent with the plain and ordinary meaning of the term—“a secondary shoot or stem (as a bough) arising from a main axis (as of a tree) . . . something that extends from or enters into a main body.” Ex. 3001, 138 (Merriam-Webster’s Collegiate Dictionary). Accounting for the district court’s construction and keeping in mind the BRI standard or our proceedings, we construe the term “branch” to mean “an offshoot that is distinct from a main flow path or axis of a tree, such as a production bore or annulus bore, that encompasses but is not necessarily limited to a portion extending laterally from the main flow path or axis.”

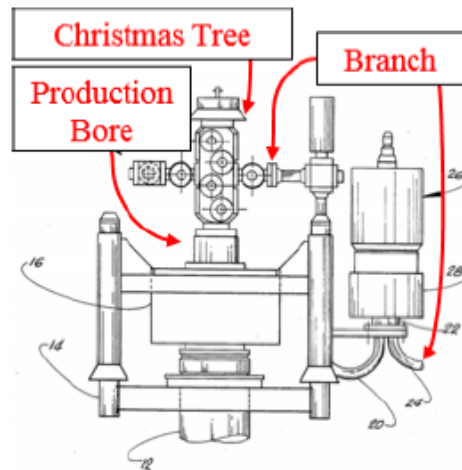
C. Anticipation by Kelly

Petitioner argues that Kelly anticipates claims 11, 12, 17–19, 22, 25–28, 32–36, 39, and 41. Pet. 6–26. For the reasons explained below, we determine that Petitioner has demonstrated by a preponderance of the evidence that Kelly anticipates claims 11, 12, 17–19, 22, 25–28, 32–35, and 41. Regarding claims 36 and 39, however, we determine that Petitioner has not demonstrated by a preponderance of the evidence that Kelly anticipates these claims.

1. Independent Claim 11

Kelly describes a subsea wellhead production apparatus. Ex. 1004, at [57]. Petitioner explains in its Petition how Kelly discloses each element of claim 11. See Pet. 6–12. Based on the record before us, we are persuaded by Petitioner’s explanations.

For example, claim 11 recites a “branch.” Claim 11 requires the branch to be connected to a production bore of a christmas tree and to a flowline. Claim 11 also requires the branch to have a “first internal passage to flow a fluid between the production bore and flowline.” For these limitations, Petitioner directs us to an annotated version of Figure 1 of Kelly, which is reproduced below. *Id.* at 7.



Kelly, FIG. 1 (annotated)

Figure 1 of Kelly shows a deep subsea wellhead. Ex. 1004, 2:6–8. Petitioner points out that Christmas tree 18 has a production bore extending vertically from the well. Pet. 7 (citing Ex. 1004, 2:21–22); *see also* Ex. 1004, Fig. 1. Petitioner identifies the piping extending from Kelly’s Christmas tree 18 to the end of line 24 as a “branch.” Pet. 7 (citing Ex. 1004, Fig. 1). That piping includes lines 20 and 24. Ex. 1004, Fig. 1. According to Petitioner, that piping also provides a “first internal passage” that lets fluid from the well flow from the production bore to a flowline connected at the end of line 24. Pet. 7–8 (citing Ex. 1004, 2:22–25 (“line 24 connects . . . to the subsea flowline (not shown)”).

Petitioner's identification of Kelly's lines 20 and 24 as a "branch" comports with the specification of the '306 patent, which provides that "[b]y 'branch' we mean any branch of the manifold, other than a production bore of a tree." See Ex. 1001, 3:16–17. Consistent with that definition, we find that the flow paths in Kelly extending laterally and vertically from tree 18, including lines 20 and 24, disclose the recited "branch."

Claim 11 further recites a "diverter assembly." Claim 11 requires the diverter assembly to be "coupled to the branch." In addition, claim 11 requires the diverter assembly to have a "housing" with a "second internal passage." Claim 11 also requires the diverter assembly to have a "first flow path in a first direction through the branch to divert flow of the fluid" as well as a "second flow path in a second direction through the branch to return flow of the fluid." Finally, claim 11 requires the diverter assembly to "form[] a passage from the first internal passage to the flowline without passing through the production bore."

For these limitations, Petitioner directs us to a different annotated version of Figure 1 of Kelly, which is reproduced below. Pet. 8.

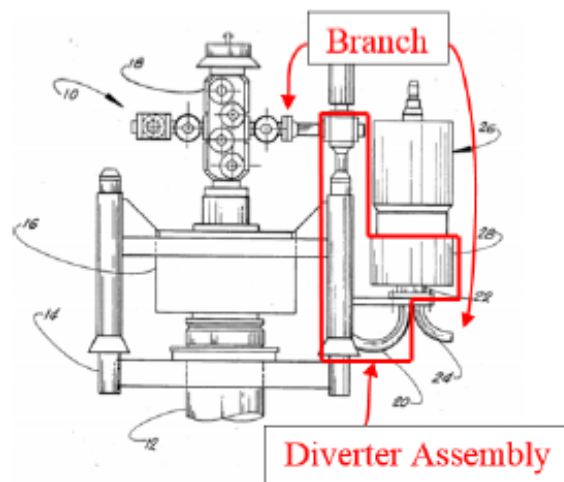
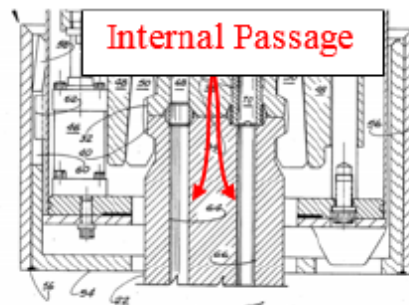


Fig. 1
Kelly, FIG. 1 (annotated)

Again, Figure 1 of Kelly shows a deep subsea wellhead. Ex. 1004, 2:6–8. Petitioner identifies Kelly’s collet body 22 and line 20 as a “diverter assembly,” where collet body 22 provides a “housing.” Pet. 8, 10. Petitioner also explains that “[t]he diverter assembly may alternatively be read to also include choke assembly 26.” *Id.* at 8. As shown in Figure 1 of Kelly, collet body 22 is coupled between branch lines 20 and 24. Ex. 1004, 2:22–25, Fig. 1.

Referring to an annotated version of Figure 3 of Kelly, which is reproduced below, Petitioner argues that collet body 22 also provides a “second internal passage” including Kelly’s passages 64 and 66, which Petitioner identifies as a “first flow path” and a “second flow path,” respectively. Pet. 8–11.



first internal passage to the flowline without passing through the production bore.” *Id.* at 12.

As discussed above in the “Claim Construction” section, we construe “diverter assembly” to mean “a multipart device that changes the course or direction of a fluid’s current flow path.” In that regard, Petitioner explains that, “[r]ather than flowing directly from the ‘Christmas tree 18’ to the outlet of ‘line 24,’ the flow of fluids is turned, i.e. diverted, by ‘line 20’ and ‘collet body 22’ to flow into ‘subsea choke assembly 26,’ and fluids exiting ‘subsea choke assembly 26’ are returned by ‘collet body 22’ to the branch at ‘line 24.’” *Id.* at 9. We agree.

As illustrated in Figures 1 and 3 of Kelly, fluids that would normally flow in a *direct* pathway from branch line 20 to branch line 24, and thereupon exit to the production flowline (not shown) at the outlet of line 24, instead are turned in a different direction to flow upward through choke assembly 26 before returning in an opposite direction and exiting through the outlet of branch line 24 to the production flowline. *See* Ex. 1003 ¶ 22 (“The separate flow paths of ‘collet body 22’ prevent direct flow between the branch inlet and the branch outlet by directing flow into ‘subsea choke assembly 26’ and from there to a portion of the branch near the end of ‘line 24’ in communication with the branch outlet.”). That evidence persuades us that Kelly’s collet body 22, which changes the flow path of the fluid in opposite directions, is a “diverter assembly,” as properly construed. Below, we further address the parties’ dispute as to whether Kelly discloses the recited “diverter assembly.”

Patent Owner does not dispute that Kelly discloses most elements recited in claim 11. *See* Paper 8, 6 (“The patent owner is cautioned that any

arguments for patentability not raised in the response will be deemed waived.”). Patent Owner contends, however, that “[Kelly] fails to disclose at least ‘a diverter assembly,’ ‘a diverter assembly [] coupled to the branch,’ and a ‘diverter assembly compris[ing] a first flow path in a first direction through the branch to divert the flow of fluid and a second flow path in a second direction through the branch to return flow of the fluid.’” PO Resp. 31. We address these three limitations in turn.

a. “diverter assembly”

As discussed above, Petitioner identifies Kelly’s collet body 22 and line 20, either alone or together with choke assembly 26, as a “diverter assembly.” Pet. 8.

In response, Patent Owner argues that “these individual parts are not a complete structure.” PO Resp. 32. Even if this were true, Patent Owner’s argument does not adequately rebut Petitioner’s persuasive evidence and argument that Kelly discloses a “diverter assembly.” Patent Owner’s argument is based on its proposed construction of the term “assembly,” which we rejected as discussed above in the “Claim Construction” section. As explained in that section, we construe the term “assembly” to mean “a multipart device,” and we further construe the term “diverter assembly” to mean “a multipart device that changes the course or direction of a fluid’s current flow path.” For the reasons given above, we find that Kelly’s collet body 22 discloses the recited “diverter assembly.” Namely, we note Figures 1 and 3 of Kelly showing fluids that would normally flow in a *direct* pathway from branch line 20 to branch line 24, and thereupon exit to the production flowline (not shown) at the outlet of line 24, instead are turned in

a different direction to flow upward through choke assembly 26 before returning in an opposite direction and exiting through the outlet of branch line 24 to the production flowline. Ex. 1004, Figs. 1, 3. That is, Kelly's collet body 22 changes the flow path of the fluid in opposite directions.

Patent Owner further argues that "Petitioner and its expert even admit that these discrete components are not a diverter assembly." PO Resp. 32. As support, Patent Owner points to Mr. Herrmann's testimony that Kelly's line 20 is part of a "production discharge line." *Id.* at 32–33 (citing Ex. 2005, 248:13–249:2). Patent Owner also points to Petitioner's explanation in its Petition that "[l]ine 20 connects from the well production string to production flowline body or collet body 22." *Id.* at 33 (citing Pet. 8); *see also id.* ("collet body 22 is an independent component consisting of two flow passages that are connected to the production flowlines 20 and 24"). That line 20 is part of a production discharge line or that it connects from the well production string to collet body 22 does not preclude collet body 22 and line 20 from being a diverter assembly. Indeed, as discussed above, we find that collet body 22 changes the flow path of the fluid in opposite directions, thereby providing, together with line 20, "a multipart device that changes the course or direction of a fluid's current flow path." *See also* Ex. 2006 ¶ 83 (Patent Owner's expert testifying that "[t]he production discharge line is simply a flowline that takes fluid from the tree and, in the case of Kelly, takes the fluid to a choke installed on the flowline"). Accordingly, Patent Owner's argument here also does not adequately rebut Petitioner's persuasive evidence and argument that Kelly discloses a "diverter assembly."

b. “the diverter assembly is coupled to the branch”

For this limitation, Petitioner argues that “[t]he diverter assembly is coupled to the branch such that fluid flowing in the branch enters and exits the diverter assembly on the branch.” Pet. 8. Petitioner explains that Kelly’s “[l]ine 20,’ although partially obscured in FIG. 1, connects at the horizontal piping extending from the vertical portion of ‘Christmas tree 18’ above the wellhead.” *Id.* Petitioner also explains that “[l]ine 20’ and ‘collet body 22’ . . . direct fluid flowing through the branch into ‘subsea choke assembly 26’ before returning the fluid to the branch at ‘line 24.’” *Id.* at 8–9.

In response, Patent Owner argues that Kelly’s diverter assembly cannot be “coupled to the branch” as it is “attached to flowlines 20 and 24 and not the branch of Kelly’s tree because they extend outside the subsea tree.” PO Resp. 36. We disagree. Patent Owner’s argument is premised on Kelly’s lines 20 and 24 not comprising a “branch” of the tree. *See also id.* at 34 (“fundamental error: calling Kelly’s subsea production flowline (lines 20 and 24) a branch”). As discussed above in the “Claim Construction” section, we construe the term “branch” to mean “an offshoot from a main flow path or axis of a tree, such as a production bore or annulus bore, that encompasses but is not necessarily limited to a portion extending laterally from the main flow path or axis.” Our construction is consistent with the specification of the ’306 patent, which equates a “branch of the manifold” to a “branch extension” or “pipework coupled to the manifold, instead of within the manifold itself,” where the manifold may comprise a tree. Ex. 1001, 3:25–32. In other words, the “branch” is not limited necessarily to the confines of the tree, but may encompass pipework coupled

to the tree. Here, Kelly's lines 20 and 24 comprise a branch because they are pipework coupled to and extending from tree 18. Ex. 1004, Fig. 1. Thus, Kelly's lines 20 and 24 comprise a "branch" of tree 18 to which Kelly's collet body 22 (i.e., "diverter assembly") is coupled.

We note Patent Owner's further argument that lines 20 and 24 of Kelly cannot be a branch "because they extend outside the subsea tree." See PO Resp. 36; *see also id.* at 39 ("they are pipelines extending outside the tree"). According to Patent Owner, Kelly's tree is defined by guide base 14. *See id.* at 43 ("Kelly's tree frame provides the boundary of what [a person of ordinary skill in the art] would consider the tree"); *id.* at 44–45 (annotated Figures 1 and 2 of Kelly labeling "Subsea Tree Frame"). We disagree. Kelly states that "adjustable chokes could be installed directly onto the subsea trees" and identifies collet body 22 as the place where choke 26 is installed. Ex. 1004, 1:35–36, 2:26–27, Fig. 1. That Kelly's choke is installed on collet body 22, which lies outside guide base 14, runs counter to Patent Owner's definition of the bounds of a tree. *Id.* at Figs. 1, 2 (depicting collet body 22 outside of guide base 14). As such, we find that Patent Owner's argument does not adequately rebut Petitioner's persuasive showing that Kelly's lines 20 and 24 correspond to the recited "branch" or that Kelly's collet body 22 is "coupled to the branch."

We also note Patent Owner's further argument that the parties "agree that a 'tree' is, and its branches are, bound by its connections to the wellhead on one end and the flowline on the other end," where "a flowline is 'a pipeline extending *outboard of the terminus of a subsea tree.*'" PO Resp. 35 (emphasis added). According to Patent Owner, "[Petitioner] agree[s] that lines 20 and 24 are flowlines." *Id.* at 36; *see also id.* at 37 ("Petitioner's

expert admits that line 20 is not a branch of Kelly's tree but, rather, that line 20 is a 'production discharge line' (*i.e.*, a flowline)").

Petitioner replies that, in the context of defining a tree, "the flowline marking the terminus of the 'tree' is not merely a line for carrying flow, as understood under BRI, but particularly the external pipeline, or export line, connected to the installed tree that transports flow to the surface or another subsea tree structure." Pet. Reply 11 (citing Ex. 2006 ¶ 31). In that regard, Petitioner points out that Kelly discloses that "line 24 connects from collet body 22 ***to the subsea flowline.***" *Id.* at 13 (citing Ex. 1004, 2:18–25).

We agree with Petitioner. While each of Kelly's lines 20 and 24 may be *a* flowline, neither line appears to be *the* flowline extending from the terminus of the tree. Rather, Kelly's subsea flowline (not shown) appears to be *the* flowline. See Ex. 1004, 2:18–25. Thus, we find that Patent Owner's argument here also does not adequately rebut Petitioner's persuasive showing that Kelly's lines 20 and 24 comprise a "branch" or that Kelly's collet body 22 is "coupled to the branch."

- c. "diverter assembly comprises a first flow path in a first direction through the branch to divert the flow of fluid, and a second flow path in a second direction through the branch to return flow of the fluid"*

For this limitation, Petitioner identifies Kelly's passage 64 of collet body 22 as a "first flow path" and Kelly's passage 66 of collet body 22 as a "second flow path." Pet. 11. Petitioner explains that "[p]assage 64' directs flow in an upward direction from 'line 20' to inlet 68' of 'subsea choke assembly 26,' while 'passage 66' directs flow in a downward direction from 'outlet 70 of 'choke assembly 26' as fluid is returned to 'line 24.'" *Id.*

(citing Ex. 1004, 2:58–3:11, Fig. 3). As support, Petitioner relies on the declaration testimony of Mr. Herrmann. *Id.* (citing Ex. 1003 ¶ 18).

In response, Patent Owner argues that Kelly does not disclose the disputed limitation because “[Petitioner’s] ‘first flow path’ and ‘second flow path’ do not go through the *branch*, but rather go between production flowlines 20 and 24.” PO Resp. 46 (emphasis added). According to Patent Owner, “these flow paths are attached to, and pass through, the *flowlines* 20 and 24.” *Id.* (emphasis added).

We disagree with Patent Owner. Again, Patent Owner’s argument is premised on Kelly’s lines 20 and 24 not comprising a “branch” of the tree. As discussed above, we find that Kelly’s lines 20 and 24 disclose a “branch” to which Kelly’s collet body 22 (i.e., “diverter assembly”) is coupled. Moreover, as Petitioner points out, Kelly’s passage 64 (i.e., “first flow path”) directs flow in a “first direction,” namely an upward direction, *from* line 20, and Kelly’s passage 66 (i.e., “second flow path”) directs flow in a “second direction,” namely a downward direction, *to* line 24. Pet. 11; Ex. 1004, Fig. 3. Each of Kelly’s passages 64 and 66 therefore provides a portion of the flow path that extends through the branch. *See also* Ex. 1004, 2:58–60 (“The structure of collet body 22 includes passage 64 which is connected to line 20 and passage 66 which is connected to line 24.”), *cited in* PO Resp. 33. Accordingly, we find that Kelly discloses a “diverter assembly [that] comprises a first flow path in a first direction through the branch to divert the flow of fluid, and a second flow path in a second direction through the branch to return flow of the fluid.”

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that Kelly anticipates claim 11.

2. Independent Claim 22

Independent claim 22 is similar to claim 11. For example, claim 22 recites a “manifold.” Claim 22 requires the manifold to have a production bore communicating with a “branch” that has a “branch inlet” and a “branch outlet.” For these limitations, Petitioner identifies Kelly’s Christmas tree 18 and line 24 as a “manifold.” Pet. 16. Petitioner explains that Kelly’s tree 18 “includes a production bore extending vertically from the wellhead and in communication with a branch.” *Id.* at 17. As with claim 11, Petitioner further explains that the piping extending from a vertical portion of Kelly’s tree 18 to the end of line 24 corresponds to a “branch.” *Id.* (citing Ex. 1004, 2:21–25, Fig. 1). That piping includes lines 20 and 24. Ex. 1004, Fig. 1. According to Petitioner, that piping also “includes a branch inlet (at an interface between vertical piping of ‘Christmas tree 18’ above the wellhead and the horizontal branch) and a branch outlet (at an interface between ‘line 24’ and the ‘flowline’).” Pet. 17 (citing Ex. 1004, 2:21–25, Fig. 1). As support, Petitioner relies on the declaration testimony of Mr. Herrmann. *Id.* (citing Ex. 1003 ¶ 21).

Petitioner’s identification of Kelly’s tree as a “manifold” and Kelly’s lines 20 and 24 as a “branch” comports with the specification of the ’306 patent, which provides that “the manifold may comprise a christmas tree” and that “[b]y ‘branch’ we mean any branch of the manifold, other than a production bore of a tree.” Ex. 1001, 3:15–17. Consistent with those

definitions, we find that Kelly's tree 18 comprises a "manifold" and that the flow paths extending laterally and vertically from tree 18, including lines 20 and 24, represent a branch of the tree, which connects with a production flowline at the outlet of line 24.

Claim 22 also recites a "diverter assembly." Claim 22 requires the diverter assembly to be "disposed on the branch between the branch inlet and branch outlet." Claim 22 further requires the diverter assembly to have "a first path in a first direction to divert flow of a fluid from the branch inlet or from the branch outlet" and "a second path in a second direction to return flow of the fluid to the other of the branch inlet or branch outlet." Lastly, claim 22 requires the diverter assembly to form "a passage between the branch inlet and the branch outlet without passing through the production bore."

Regarding these limitations, Petitioner identifies Kelly's collet body 22 and line 20, either alone or together with choke assembly 26, as a "diverter assembly." For the reasons given above with respect to claim 11, we agree with Petitioner and find that Kelly's collet body 22 discloses a "diverter assembly." Namely, we note Figures 1 and 3 of Kelly showing fluids that would normally flow in a *direct* pathway from branch line 20 to branch line 24, and thereupon exit to the production flowline (not shown) at the outlet of line 24, instead are turned in a different direction to flow upward through choke assembly 26 before returning in an opposite direction and exiting through the outlet of branch line 24 to the production flowline. Ex. 1004, Figs. 1, 3. That is, Kelly's collet body 22 changes the flow path of the fluid in opposite directions.

Petitioner further argues that the “diverter assembly” in Kelly “is disposed on the branch, mounted to the branch piping, between the branch inlet and the branch outlet so that fluid enters the diverter assembly from the branch at ‘line 20’ and returns to the branch at ‘line 24.’” Pet. 17. We note that Figure 1 of Kelly shows collet body 22 (i.e. “diverter assembly”) disposed on the “branch” between lines 20 and 24, and, more specifically, between the “branch inlet” (i.e., the interface between vertical piping of tree 18 above the wellhead and the horizontal branch) and the “branch outlet” (i.e., the interface between line 24 and the flowline). Ex. 1004, Fig. 1. Accordingly, we agree with Petitioner and find that Kelly discloses a diverter assembly “disposed on the branch between the branch inlet and branch outlet.”

Referring to Petitioner’s discussion with respect to claim 11, Petitioner further argues that Kelly’s passage 64 provides a “first path” and that Kelly’s passage 66 provides a “second path.” Pet. 18. For the reasons explained above, we agree with Petitioner and find that Kelly’s passages 64 and 66 correspond to the recited first and second paths. Namely, we note Kelly’s passage 64 (i.e., “first flow path”) directs flow in a “first direction,” namely an upward direction, *from* line 20, and Kelly’s passage 66 (i.e., “second flow path”) directs flow in a “second direction,” namely a downward direction, *to* line 24. Pet. 11; Ex. 1004, Fig. 3. Each of passages 64 and 66 therefore provides a portion of the flow path that extends through the branch from at least the “branch inlet” at the interface between vertical piping of tree 18 above the wellhead and the horizontal branch and the “branch outlet” at the interface between line 24 and the flowline. *See also* Ex. 1004, 2:58–60 (“The structure of collet body 22 includes

passage 64 which is connected to line 20 and passage 66 which is connected to line 24.”).

Lastly, referring again to its discussion with respect to claim 11, Petitioner points out that “Kelly teaches that its diverter assembly forms a passage between the branch inlet (provided at the interface between the vertical piping of ‘Christmas tree 18’ and the horizontal branch) and the branch outlet (provided at the interface between ‘line 24’ and the ‘flowline’) without passing through the production bore, such that fluids can flow through the branch from the branch inlet to a flowline.” Pet. 18. We note that Figures 1 and 3 of Kelly show each of Kelly’s passages 64 and 66 providing a portion of the flow path that extends from at least the “branch inlet” to the “branch outlet” without passing through the production bore (i.e., vertical portion of tree 18 extending from the wellhead). Ex. 1004, Figs. 1, 3. Accordingly, we agree with Petitioner and find that Kelly discloses a diverter assembly “forming a passage between the branch inlet and the branch outlet without passing through the production bore.”

In response, Patent Owner contends that “Kelly fails to disclose at least ‘a diverter assembly disposed on the branch between the branch inlet and the branch outlet,’ the ‘diverter assembly compris[ing] a first path in a first direction to divert flow of a fluid from the branch inlet or from the branch outlet, and a second path in a second direction to return flow of the fluid to the other of the branch inlet or branch outlet’ and the ‘diverter assembly forming a passage between the branch inlet and the branch outlet without passing through the production bore.’” PO Resp. 48–49. In particular, Patent Owner makes two arguments, which we address below.

First, relying on its discussion with respect to claim 11, Patent Owner argues that “Kelly does not teach a diverter assembly.” *Id.* at 49. As explained above with respect to claim 11, however, we find that Kelly’s collet body 22 discloses a “diverter assembly.” Accordingly, Patent Owner’s argument here does not adequately rebut Petitioner’s persuasive evidence and argument that Kelly discloses a “diverter assembly.”

Second, Patent Owner argues that “Kelly’s diverter assembly is coupled to two flowlines 20 and 24 and thus the first and second flow paths do not connect to a branch, let alone a branch inlet or outlet.” *Id.* This argument is premised on Kelly’s lines 20 and 24 not comprising a “branch.” As explained above, we find that Kelly’s lines 20 and 24 disclose a “branch” on which Kelly’s collet body 22 (i.e., “diverter assembly”) is disposed between a “branch inlet” and a “branch outlet.” Patent Owner’s argument therefore does not adequately rebut Petitioner’s persuasive evidence and argument that Kelly discloses the recited “diverter assembly.”

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that Kelly anticipates claim 22.

3. Independent Claim 32

Independent claim 32 also is similar to claim 11. For example, claim 32 recites a “branch.” Claim 32 requires the branch to be on a christmas tree and to have a “first bore” that communicates with the production bore of the tree as well as a “second bore” that communicates with a flowline. For these limitations, Petitioner identifies Kelly’s piping extending from a vertical portion of tree 18 to line 24 as a “branch.” Pet. 21.

Petitioner explains that the “horizontal piping [extending from the vertical portion of tree 18] defines a first bore and line 24 defines a second bore, both of which the production fluids flow through to the ‘subsea flowline.’” *Id.* at 21–22 (citing Ex. 1004, 2:21–25). As support, Petitioner relies on the declaration testimony of Mr. Herrmann. *See id.* (citing Ex. 1003 ¶ 15). Petitioner also relies on its discussion with respect to claim 11, where Petitioner identifies the vertical portion of Kelly’s tree 18 as a production bore of the tree. *See id.* at 7, 22; *see also* Ex. 1004, Fig. 1.

For the reasons given above, we find that Kelly’s flow paths extending laterally and vertically from tree 18, including the horizontal piping extending from the vertical portion of tree 18 as well as line 24, represent a branch of the tree. In particular, we note that the specification of the ’306 patent provides that “[b]y ‘branch’ we mean any branch of the manifold, other than a production bore of a tree.” Ex. 1001, 3:15–17. Moreover, we note that Kelly shows the aforementioned horizontal piping (i.e., “first bore”) extending from the production bore of tree 18 in Figure 1 and further discloses that line 24 (i.e., “second bore”) connects to the subsea flowline. Ex. 1004, 2:24–25, Fig. 1.

Claim 32 further recites a “diverter assembly.” Claim 32 requires the diverter assembly to be “coupled to the branch between the first and second bores.” Claim 32 also requires the diverter assembly to have a “first path” that communicates with the first bore and a “second path” that communicates with the second bore. Lastly, claim 32 requires the diverter assembly to form a passage between the first and second bores without passing through the production bore.

For these limitations, Petitioner relies on its discussion with respect to claims 11 and 22. Pet. 22. In those discussions, Petitioner identifies Kelly's collet body 22 as a "diverter assembly." For the reasons given above, we find that Kelly's collet body 22 corresponds to the recited "diverter assembly." Namely, we note Figures 1 and 3 of Kelly showing fluids that would normally flow in a *direct* pathway from branch line 20 to branch line 24, and thereupon exit to the production flowline (not shown) at the outlet of line 24, instead are turned in a different direction to flow upward through choke assembly 26 before returning in an opposite direction and exiting through the outlet of branch line 24 to the production flowline. Ex. 1004, Figs. 1, 3. In addition, we note that Figure 1 further shows collet body 22 is coupled between lines 20 and 24. *Id.* at 2:22–25, Fig. 1. We also note Figures 1 and 3 of Kelly showing passage 64 (i.e., "first path") communicating with the horizontal piping (i.e., "first bore") extending from the vertical portion of tree 18 (via line 20) and passage 66 (i.e., "second path") communicating with line 24. *Id.* at Figs. 1, 3. Lastly, we note Figures 1 and 3 of Kelly additionally show each of Kelly's passages 64 and 66 providing a portion of the flow path that extends from at least the "first bore" to the "second bore" without passing through the production bore of tree 18 (i.e., vertical portion of tree 18 extending from the wellhead). *Id.*

Claim 32 additionally recites a "choke" that communicates with the first and second paths. For this limitation, Petitioner identifies Kelly's subsea choke assembly 26 as a "choke." Pet. 22. Petitioner explains that "[p]roduction fluids' flow through 'passage 64' of the diverter assembly to enter 'subsea choke assembly 26' and through 'passage 66' of the diverter assembly after exiting 'subsea choke assembly 26,' indicating the choke is in

communication with the first and second paths of the diverter assembly.” *Id.* at 23. Figures 1 and 3 of Kelly support Petitioner’s explanation. *See* Ex. 1004, Figs. 1, 3; *see also id.* at 1:43–59, 2:66–3:9, *cited in* Pet. 22–23. Accordingly, we find that Kelly’s choke assembly 26 corresponds to the recited “choke.”

In response to Petitioner’s evidence and arguments regarding claim 32, Patent Owner argues that “Kelly’s lines 20 and 24 are flowlines and thus its alleged diverter assembly is located between flowlines and thus not coupled to the branch.” PO Resp. 50. As with claims 11 and 22, Patent Owner’s argument is premised on Kelly’s lines 20 and 24 not comprising a “branch.” For the reasons given above, we find that Kelly’s lines 20 and 24 disclose a “branch” to which Kelly’s collet body 22 (i.e., “diverter assembly”) is coupled between the horizontal piping extending from tree 18 (i.e., “first bore”) and line 24 (i.e., “second bore”). *See* Ex. 1004, Fig. 1. Patent Owner therefore does not adequately rebut Petitioner’s persuasive evidence and argument that Kelly discloses the limitations recited in claim 32.

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that Kelly anticipates claim 32.

4. Dependent Claims 18 and 26

Claim 18 depends from claim 11, and claim 26 depends from claim 22. Each of claims 18 and 26 recites “a part of the diverter assembly is sealed inside the branch to block fluid communication between two separate regions of the diverter assembly.” For this limitation, Petitioner

designates Kelly's line 20 and passage 64 of collet body 22 as a first region of the diverter assembly and Kelly's passage 66 of collet body 22 as a second, separate region of the diverter assembly. Pet. 14. Petitioner explains that its designated first region is "sealed with a horizontal portion of the branch extending from vertical piping of 'Christmas tree 18' above the wellhead," and that its designated second region is "sealed with 'line 24' of the branch." *Id.* Thus, Petitioner points out, "'line 20 and passage 64,' and 'passage 66,' respectively, are sealed between two portions of the branch provided by the horizontal portion of the branch and 'line 24.'" *Id.* Petitioner further explains that "[f]luid communication between passages 64 and 66 is blocked such that fluids must exit the branch and enter 'subsea choke assembly 26' from 'line 20' and passage 64' before the fluid is able to return to the branch through 'passage 66' and continue towards 'line 24' and the branch outlet." *Id.* As support, Petitioner relies on the declaration testimony of Mr. Herrmann. *Id.* (citing Ex. 1003 ¶ 23). Based on the record before us, we find that Kelly discloses the limitation recited in claims 18 and 26.

In response, Patent Owner argues that "[Petitioner] completely ignores the explicit claim language that requires a part of the diverter assembly to be 'sealed inside the branch,'" instead "replac[ing] the word 'inside' with 'between.'" PO Resp. 51. Petitioner counters that "[u]nder BRI, 'sealed inside' encompasses 'between,' and Kelly's 'diverter assembly' is 'sealed inside' as claimed." Pet. Reply 18.

We agree with Petitioner. Figures 1 and 3 of Kelly show collet body 22, including its passages 64 and 66, coupled to the branch between the horizontal piping extending from the production bore of tree 18 and line 24.

See Ex. 1004, Figs. 1, 3. Thus, collet body 22 is within the bounds of the branch, which we consider to be “inside” the branch. Moreover, we note Mr. Herrmann’s testimony that “if ‘line 20’ and collet body 22’ were not sealed, the fluids passing through the branch would leak into the surrounding area.” Ex. 1003 ¶ 23. This is supported by Kelly’s disclosure of “suitable sealing means” for maintaining sealed communication between various connections. See Ex. 1004, 2:61–65. Accordingly, Patent Owner does not adequately rebut Petitioner’s persuasive showing that Kelly discloses the limitation recited in claims 18 and 26.

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that Kelly anticipates claims 18 and 26.

5. Dependent Claim 28

Claim 28 depends from claim 22 and recites “the manifold is connected to a processing apparatus via the diverter assembly external to the manifold.” For this limitation, Petitioner identifies Kelly’s subsea choke assembly 26 as a “processing apparatus.” Pet. 19. As shown in Figures 1 and 3 of Kelly, tree 18 (i.e., “manifold”) is connected to choke assembly 26 via collet body 22 (i.e., “diverter assembly”). Ex. 1004, Figs. 1, 3. Petitioner further explains that choke assembly 26 “processes fluid by affecting fluid flow and pressure.” Pet. 19 (citing Ex. 1004, 1:43–59, 2:66–3:19). As support, Petitioner relies on the declaration testimony of Mr. Herrmann. *Id.* (citing Ex. 1003 ¶ 26).

Petitioner also points to the claims of U.S. Patent No. 8,776,893 (“the ’893 patent”), which is directed to subsea Christmas trees with processing

apparatuses and lists the same inventors as the '306 patent. *Id.* (citing Ex. 1009). Claims 6 and 7 of the '893 patent recite a “processing apparatus” that encompasses a “pressure regulation apparatus.” Ex. 1009, 11:34–45.

In response, Patent Owner argues that “the '306 patent excludes a choke from being a processing apparatus.” PO Resp. 51. Patent Owner argues that “the '306 patent specification discusses both chokes and processing apparatus[es] extensively and separately,” and “it never states that a choke is a type of processing apparatus.” *Id.* at 51–52 (citing Ex. 1001, 23:36–38 (“Outlet 544 is coupled via conduit (not shown) to processing apparatus 550, which is in turn connected to an inlet of choke 540.”)). Patent Owner also contends that claims 32 and 36 recite a “choke” and a “processing apparatus,” respectively, thereby implying that those elements are distinct components of the patented invention. *Id.* (citing *Becton, Dickinson & Co. v. Tyco Healthcare Grp, LP*, 616 F.3d 1249, 1254 (Fed. Cir. 2010)). Patent Owner further contends that “a choke is simply a device that the operator can adjust to regulate how fast the oil/gas will flow from the well.” *Id.* at 53. In addition, Patent Owner notes that the '306 patent provides examples of processing apparatuses with functions that a choke does not perform. *Id.* (citing Ex. 1001, 4:66–5:7). Patent Owner relies on the declaration testimony of Mr. Boyadjieff to support its argument. *Id.* (citing Ex. 2006 ¶¶ 109–110).

Petitioner counters, pointing to “the admission by the '306 patent’s inventors that ‘processing apparatus’ includes a ‘pressure regulation apparatus.’” Pet. Reply 18. Petitioner also points to Mr. Boyadjieff’s deposition testimony that “[the ROV]’s adjusting the choke, which in turn

will change your pressure of the well control, control the pressure of the well.” *Id.* (citing Ex. 1016, 138:22–139:2).

Based on the record before us, we agree with Petitioner. That the ’306 patent may refer to a choke and a processing apparatus separately does not necessarily preclude a choke from being a processing apparatus. *See Becton*, 616 F.3d at 1254 (the use of different terms in the claims connotes different meanings in the *absence* of any evidence to the contrary). Indeed, given Patent Owner’s characterization of a choke as a means for regulating flow (*see* PO Resp. 53), the claims in the ’893 patent imply that a choke may be a type of processing apparatus (*see* Ex. 1009 (claims 6, 7)). Moreover, the “examples” of processing apparatuses provided in the ’306 patent are just examples; we find them to be non-limiting. *See* PO Resp. 53; *see also* Ex. 1001, 4:66–5:7 (“*Typically*, the processing apparatus is chosen from at least one of”) (emphasis added).

We note Patent Owner’s reasoning that a choke and a processing apparatus are distinct components of the patented invention because claims 32 and 36 recite these components separately. *See* PO Resp. 53. Although we agree with Patent Owner that a choke and a processing apparatus are distinct components of the invention recited in claims 32 and 36, we do not agree that a choke and a processing apparatus are necessarily distinct components of the invention recited in claims 22 and 28. Claims 22 and 28 do not recite these components separately. Indeed, they do not recite a choke at all.

In view of the foregoing, we find that Kelly’s choke assembly 26 discloses the “processing apparatus” recited in claim 28. Accordingly, we

determine that Petitioner has demonstrated by a preponderance of the evidence that Kelly anticipates claim 28.

6. *Dependent Claim 36*

Claim 36 depends from claim 32 and recites “a processing apparatus communicating with the first and second paths” of the diverter assembly. For this limitation, Petitioner identifies Kelly’s collet body 22 as providing a “processing apparatus.” Pet. 24–25. Petitioner explains that “Kelly’s system includes a thermal processing apparatus in which high pressure, high temperature incoming fluid passes through ‘passage 64’ near the lower pressure, lower temperature downstream fluid passing through ‘passage 66.’” *Id.* at 25. According to Petitioner, “[f]luid is processed by cooling the relatively hotter incoming fluid and heating the relatively cooler downstream fluid.” *Id.* Petitioner relies on the declaration testimony of Mr. Herrmann. *Id.* (citing Ex. 1003 ¶ 26). Mr. Herrmann testifies:

Also, because the fluid received into Kelly’s choke passes near the fluid leaving the choke as the fluid enters and exits through “collet body 22,” the higher temperature fluid entering the choke heats the fluid exiting the choke, which has been flashed and is at a lower temperature. “Collet body 22” thus additionally functions to process fluid through Kelly’s system by heating the exiting fluid.

Ex. 1003 ¶ 26.

In response, Patent Owner makes the same argument discussed above with respect to claim 28, namely that “the ’306 patent excludes a choke from being a processing apparatus.” PO Resp. 51–53; *see also id.* at 53 (“Claims 28 and 36 are thus further patentable over Kelly because Kelly’s choke cannot be the claimed processing apparatus.”). That argument does

not address Petitioner's identification of Kelly's collet body 22 as providing a "processing apparatus." *See id.* at 51 ("[Petitioner] points to Kelly's choke as the claimed 'processing apparatus'").

Based on the record before us, however, we find that Kelly fails to disclose the processing apparatus recited in claim 36. We note that claim 32 recites a "diverter assembly" comprising a "first path" and a "second path," and that claim 36 recites a "processing apparatus" that communicates with the first and second paths of the diverter assembly. Thus, claims 32 and 36 recite a "diverter assembly" and a "processing apparatus" as separate components.

As discussed above with respect to claim 32, Petitioner argues (and we find) that Kelly's collet body 22 corresponds to the "diverter assembly," where Kelly's passages 64 and 66 correspond to the "first and second paths." *See Pet. 22.* Petitioner further argues that Kelly's collet body 22 also corresponds to the "processing apparatus" recited in claim 36 (which depends from claim 12), where fluid is processed by heating low-temperature fluid passing through passage 66 with the high-temperature fluid passing through passage 64.

Petitioner's argument that the "diverter assembly" and the "processing apparatus" can be the same structure renders the claims nonsensical. Claim 36 requires the processing apparatus to be "communicating" with the first and second paths of the diverter assembly. If the processing apparatus and the diverter assembly are the same structure, then the processing apparatus must be "communicating" with itself. That does not make sense.

We note Petitioner's additional contention during oral argument that Kelly's "choke assembly . . . is the processing apparatus" and that Kelly's

“collet body provides the communication to and from the processing apparatus.” Tr. 16:24–17:12. That interpretation, however, is inconsistent with Petitioner’s position in its Petition that “‘collet body 22,’ as taught by Kelly, discloses [the ‘processing apparatus’].” Pet. 25; *see also id.* at 24 (“high temperature incoming fluid pass[ing] through ‘passage 64’ [of collet body 22] . . . heats the exiting fluid flowing through ‘passage 66’ [of collet body 22]”). Oral argument is not an opportunity to raise new arguments that were not briefed. *See* 37 C.F.R. 42.70(a) (“A party may request oral argument on an issue *raised in a paper* at a time set by the Board.”) (emphasis added); Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,768 (Aug. 14, 2012) (“No new evidence or arguments may be presented at the oral argument.”). Thus, we need not consider Petitioner’s additional contention here.

Nevertheless, even if we were to consider Petitioner’s contention that Kelly’s choke assembly discloses the recited “processing apparatus,” we would not be persuaded. As discussed above with respect to claim 32, Petitioner argues (and we find) that Kelly’s choke assembly corresponds to the recited “choke.” *See* Pet. 22. In the context of the ’306 patent, the “choke” and the “processing apparatus” are recited as two separate structures. Nothing in the claims suggests that these claim elements can be the same structure. Moreover, the only elements described in the specification as a “choke” are separate structures from the only elements described as a “processing apparatus.” *See, e.g.,* Ex. 1001, 23:36–38 (“processing apparatus 550, which is in turn connected to an inlet of choke 540”); *id.* at Fig. 22 (depicting choke 540 and processing apparatus 550 as separate structures). Thus, in the context of claim 36, we find that Kelly’s

choke assembly 26 cannot *also* correspond to the recited “processing apparatus.”⁹

In view of the foregoing, we determine that Petitioner has not demonstrated by a preponderance of the evidence that Kelly anticipates claim 36.

7. *Dependent Claim 39*

Claim 39 depends from claim 32 and recites “a treatment apparatus communicating with the first path” of the diverter assembly. For this limitation, Petitioner identifies “collet body 22” as a “treatment apparatus.” Pet. 25. Relying on the declaration testimony of Mr. Herrmann, Petitioner explains that “Kelly’s system includes a thermal treatment apparatus in which the high pressure, high temperature incoming fluid passes through ‘passage 64’ near to the lower pressure, lower temperature downstream fluid passing through ‘passage 66.’” *Id.* at 25 (citing Ex. 1003 ¶ 26). According to Mr. Herrmann, “the higher temperature fluid entering the choke heats the fluid exiting the choke, which has been flashed and is at a lower temperature.” Ex. 1003 ¶ 26. As such, Mr. Herrmann testifies, “[c]ollet body 22’ thus additionally functions to process fluid through Kelly’s system by heating the exiting fluid.” *Id.*

We are not persuaded by Petitioner’s argument. Claim 32 recites a “diverter assembly” comprising a “first path,” and claim 39 recites a

⁹ We recognize that, elsewhere in this Decision, we find that Kelly’s choke assembly can teach a “processing apparatus” as recited in other claims of the ’306 patent. Unlike claim 36 (which depends from claim 32), however, those claims do not require both a “choke” *and* a “processing apparatus.”

“treatment apparatus” that communicates with the first path of the diverter assembly. Thus, claims 32 and 39 recite a “diverter assembly” and a “treatment apparatus” as separate components. As discussed above with respect to claim 32, Petitioner argues (and we find) that Kelly’s collet body 22 corresponds to the “diverter assembly,” where Kelly’s passage 64 corresponds to the “first path.” *See* Pet. 22. In effect, Petitioner argues that the “diverter assembly” and the “treatment apparatus” can be the same structure. That reasoning renders the claims nonsensical. *See supra* discussion with respect to claim 36. We therefore find that Kelly does not disclose the recited “treatment apparatus.”

In view of the foregoing, we determine that Petitioner has not demonstrated by a preponderance of the evidence that Kelly anticipates claim 39.

8. Dependent Claims 12, 17, 19, 25, 27, 33–35, and 41

Petitioner argues that Kelly anticipates the limitations of dependent claims 12, 17, 19, 25, 27, 33–35, and 41. Pet. 12–14, 15–16, 18–19, 23–26. Patent Owner does not dispute Petitioner’s evidence of anticipation with respect to these claims except to argue that they are patentable “[f]or at least the reasons set forth above for independent claims 11, 22, and 32.”¹⁰ PO Resp. 53. We have considered fully the evidence and arguments presented by Petitioner explaining how Kelly discloses each of the limitations of these challenged dependent claims. *See* Pet. 12–13 (discussing claim 12) (citing

¹⁰ Patent Owner also includes claims 18, 26, 28, 36, and 39 within this argument; however, we address these claims separately from independent claims 11, 22, and 32, as discussed previously.

Ex. 1001, 2:14–16, 3:17–20; Ex. 1004, 2:21–25, Fig. 1; Ex. 1003 ¶ 20); *id.* at 13–14 (discussing claim 17) (citing Ex. 1004, 2:21–25, Fig. 1; Ex. 1003 ¶¶ 21–22); *id.* at 15–16 (discussing claim 19) (citing Ex. 1004, 3:5–11; Ex. 1003 ¶ 24);¹¹ *id.* at 18–19 (discussing claim 25) (citing previous discussion of claim 17); *id.* at 19 (discussing claim 27) (citing previous discussion of claim 19); *id.* at 23 (discussing claim 33) (citing Ex. 1004, 2:21–25; Ex. 1003 ¶ 28); *id.* at 23–24 (discussing claim 34) (citing previous discussion of claim 17 and Ex. 1003 ¶¶ 22–23); *id.* at 24 (discussing claim 35) (citing Ex. 1003 ¶ 29);¹² *id.* at 26 (discussing claim 41) (citing previous discussion of claim 33). Petitioner’s reasoning is persuasive. Thus, we determine that the preponderance of the evidence weighs in favor of Petitioner’s proof that Kelly anticipates dependent claims 12, 17, 19, 25, 27, 33–35, and 41.

D. Obviousness over Kelly and Fenton

Petitioner contends that claims 28, 29, and 36–39 would have been obvious over Kelly and Fenton. Pet. 26–30. For the reasons explained below, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 28, 29, 38, and 39 would have been obvious over Kelly and Fenton. Regarding claims 36 and 37, however, we determine that

¹¹ See also Ex. 1004, Fig. 3 (showing line 20 and passage 64 are connected to passage 66 via inlet 68 and outlet 70).

¹² See also Ex. 1004, 2:64–65 (“suitable sealing means . . . are provided to maintain sealed communication”), Fig. 1 (showing that line 20 is connected to horizontal piping extending from the vertical portion of tree 18).

Petitioner has not demonstrated by a preponderance of the evidence that they would have been obvious over Kelly and Fenton.

1. Dependent Claim 28

As discussed above, claim 28 depends from claim 22 and recites “the manifold is connected to a processing apparatus via the diverter assembly external to the manifold.” Although Petitioner argues that Kelly discloses this limitation as discussed above with respect to anticipation by Kelly, Petitioner alternatively relies additionally on Fenton for teaching a “processing apparatus” in the event that Kelly’s choke assembly 26 is not considered to be a “processing apparatus.” Pet. 26.

In particular, Petitioner relies on Fenton for teaching that processing apparatuses were “commonly used” in subsea wellhead installations. *Id.* For example, Petitioner points out, Fenton describes choke assembly 77, which is a component of production module 61 and includes “one or more temperature and pressure measurement devices (sensors) to monitor fluid flow such that the choke could be appropriately adjusted.” *Id.* (citing Ex. 1003 ¶¶ 30–31); Ex. 1005 ¶ 22, Fig. 2 (showing choke assembly 77 with pressure/temperature sensors 79, 81). Fenton teaches that production module 61 monitors and controls fluid flow using devices such as “a temperature or pressure sensor, a flow or multi-phase flow meter, or a choke.” Ex. 1005 ¶ 7, *cited in* Pet. 27; *see also id.* ¶ 18, *cited in* Pet. 27; *id.* ¶ 22. Based on the record before us, we find that Fenton’s production module 61, including choke assembly 77, teaches a “processing apparatus.” Namely, we note evidence discussed in our analysis of claim 28 above with respect to anticipation by Kelly indicating that a processing apparatus

encompasses a pressure regulation apparatus, as well as evidence indicating that Fenton's choke can be used to control flow.

In addition to showing that Fenton teaches a "processing apparatus," Petitioner must provide "some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *See In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). In that regard, Petitioner further argues that "[o]ne of skill in the art would have modified 'subsea choke assembly 26' of Kelly to include one or more of a pressure sensor, temperature sensor or flow sensor, or to substitute 'subsea choke assembly 26' with 'production module 61,' as taught by Fenton." Pet. 26–27. According to Petitioner, "[m]odifying Kelly's subsea choke assembly by adding one or more temperature sensors, pressure sensors, or flow meters as taught by Fenton would provide information related to fluid flow through the assembly and allow more precise control of the choke to achieve desired flow characteristics." *Id.* at 27. Petitioner relies on Mr. Herrmann's declaration testimony as support for its argument. *Id.* at 27–28 (citing Ex. 1003 ¶¶ 32–33). Petitioner also argues that "a person of ordinary skill would have modified Kelly's subsea apparatus in a second manner by substituting the entire 'subsea choke assembly 26' of Kelly with the entire 'production module 61' of Fenton," indicating that "[s]uch a modification would be a simple substitution . . . and would provide the advantages of the additional functionality present in Fenton's module." *Id.* at 28.

Based on the record before us, we are persuaded by Petitioner's proffered reasoning for modifying Kelly's choke assembly to include Fenton's temperature sensors, pressure sensors, or flow meters to allow for more precise control of the choke. We also are persuaded by Petitioner's

proffered reasoning for substituting Kelly’s choke assembly with Fenton’s production module. Thus, we find that Petitioner has provided adequately “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *See Kahn*, 441 F.3d at 988.

Patent Owner does not dispute Petitioner’s evidence and argument that claim 28 would have been obvious over Kelly and Fenton, except to rely on its “reasons . . . with respect to Kelly for claims 22 and 32.” PO Resp. 54. As discussed above, we find that Kelly anticipates claims 22 and 32. Accordingly, Patent Owner does not adequately rebut Petitioner’s persuasive evidence and arguments explaining how Kelly and Fenton teach the limitation recited in claim 28, and why a skilled artisan would have combined their teachings in the manner asserted.

In view of the foregoing, we determine that the preponderance of the evidence weighs in favor of Petitioner’s proof that claim 28 would have been obvious over Kelly and Fenton.

2. Dependent Claim 29

Claim 29 depends from claim 28 and requires the processing apparatus to be chosen from among a list of devices, including a “measurement apparatus,” a “temperature measurement apparatus,” and a “flow rate measurement apparatus.” For this limitation, Petitioner argues that “[t]he system of Kelly incorporating one or more temperature, pressure, or flow sensors, as taught by Fenton, discloses a processing apparatus chosen from at least a ‘measurement apparatus,’ ‘temperature measurement apparatus,’ and ‘flow rate measurement apparatus.’” Pet. 28–29. As discussed above, Fenton teaches that production module 61 monitors and

controls fluid flow using devices such as “a temperature or pressure sensor, a flow or multi-phase flow meter, or a choke,” and that choke assembly 77 includes pressure/temperature sensors 79, 81. Ex. 1005 ¶¶ 7, 18, Fig. 2. Based on the record before us, we find that Fenton teaches the limitation recited in claim 29.

Patent Owner does not dispute Petitioner’s evidence and argument that claim 29 would have been obvious over Kelly and Fenton, except to rely on its “reasons . . . with respect to Kelly for claims 22 and 32.” PO Resp. 54. As discussed above, we find that Kelly anticipates claims 22 and 32. Accordingly, Patent Owner does not adequately rebut Petitioner’s credible obviousness analysis as to claim 29.

In view of the foregoing, we determine that the preponderance of the evidence weighs in favor of Petitioner’s proof that claim 29 would have been obvious over Kelly and Fenton.

3. Dependent Claims 36 and 37

As discussed above, claim 36 depends from claim 32, reciting in particular “[t]he system of claim 32 further including a processing apparatus communicating with the first and second paths.” For this limitation, Petitioner refers us to its analysis of claim 28 with respect to obviousness over Kelly and Fenton. Pet. 29 (stating only, “See Ground 2, [28.0], *supra*”). For that analysis, Petitioner identifies Kelly’s modified choke or Fenton’s production module including a choke as the “processing apparatus.”

As explained above with respect to anticipation by Kelly, however, claims 32 and 36 respectively recite a “choke” and a “processing apparatus.”

Petitioner argues (and we find) that Kelly's choke assembly 26 corresponds to the "choke" recited in claim 32. *See* Pet. 22. For the reasons given above, we are not persuaded that Kelly's modified choke assembly teaches both the "choke" recited in claim 32 and the "processing apparatus" recited separately in claim 36. Namely, as discussed above, we conclude that claim 36 requires two separate structures in that respect.

In view of the foregoing, we determine that Petitioner has not demonstrated by a preponderance of the evidence that claim 36 would have been obvious over Kelly and Fenton. As claim 37 depends from claim 36, we also determine that Petitioner has not demonstrated by a preponderance of the evidence that claim 37 would have been obvious over Kelly and Fenton.

4. Dependent Claim 38

Claim 38 recites "[t]he system of claim 32 further including a flow rate measurement apparatus communicating with the first and second paths." For this limitation, Petitioner relies on Fenton, identifying Fenton's flow meter as a "flow rate measurement apparatus." Pet. 29. Petitioner argues that it would have been obvious to modify Kelly's choke assembly 26 to include Fenton's flow meter "to promote more precise control of the choke." *Id.* (citing Ex. 1003 ¶ 35; Ex. 1005 ¶ 18).

Based on the record before us, we find that Fenton's flow meter corresponds to the recited "flow rate measurement apparatus." We also are persuaded by Petitioner's proffered reasoning for modifying Kelly's choke assembly to include Fenton's flow meter to allow for more precise control of

the choke. Thus, we find that Petitioner has adequately articulated a reason to combine Kelly and Fenton.

Patent Owner does not dispute Petitioner's argument and evidence showing that claim 38 would have been obvious over Kelly and Fenton, except to rely on its "reasons . . . with respect to Kelly for claims 22 and 32." PO Resp. 54. As discussed above, we find that Kelly anticipates claims 22 and 32. Accordingly, Patent Owner does not adequately rebut Petitioner's credible obviousness analysis as to claim 38.

In view of the foregoing, we determine that the preponderance of the evidence weighs in favor of Petitioner's proof that claim 38 would have been obvious over Kelly and Fenton.

5. *Dependent Claim 39*

Claim 39 recites "[t]he system of claim 32 further including a treatment apparatus communicating with the first path." For this limitation, Petitioner relies on Fenton, identifying Fenton's pressure, temperature, or flow sensors as a "treatment apparatus." Pet. 30. Petitioner argues that it would have been obvious to modify Kelly's choke assembly 26 to include Fenton's flow meter to allow for more precise control of the choke. *See id.* (citing discussion of claim 28 with respect to obviousness over Kelly and Fenton); *id.* at 27 ("Modifying Kelly's subsea choke assembly by adding one or more temperature sensors, pressure sensors, or flow meters as taught by Fenton would provide information related to fluid flow through the assembly and allow more precise control of the choke to achieve desired flow characteristics."). Petitioner explains that "the inventors admitted that a 'treatment apparatus' includes a 'measurement apparatus' in U.S. Pat. Nos.

7,111,687 and 8,746,332 – patents also directed to subsea Christmas trees with treatment apparatuses, and also listing the two inventors and owned by the same entity as the '306 Patent.” *Id.* at 30 (citing Ex. 1011, claims 3, 4, 22; Ex. 1012, claim 11).

Based on the record before us, we find that any of Fenton’s sensors constitutes a “treatment apparatus.” We also are persuaded by Petitioner’s proffered reasoning for modifying Kelly’s choke assembly to include Fenton’s flow meter to allow for more precise control of the choke. Thus, we find that Petitioner has adequately articulated a reason to combine Kelly with Fenton.

Patent Owner does not dispute Petitioner’s argument and evidence showing that claim 39 would have been obvious over Kelly and Fenton, except to rely on its “reasons . . . with respect to Kelly for claims 22 and 32.” PO Resp. 54. As discussed above, we find that Kelly anticipates claims 22 and 32. Accordingly, Patent Owner does not adequately rebut Petitioner’s credible obviousness analysis as to claim 39.

In view of the foregoing, we determine that the preponderance of the evidence weighs in favor of Petitioner’s proof that claim 39 would have been obvious over Kelly and Fenton.

E. Obviousness over Kelly and Bednar

Petitioner contends that claims 11, 12, 17–19, 22, 25–28, 32–36, and 41 would have been obvious over Kelly and Bednar. Pet. 30–39. For the reasons explained below, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 11, 12, 17–19, 22, 25–28, 32–35, and 41 would have been obvious over Kelly and Bednar. Regarding

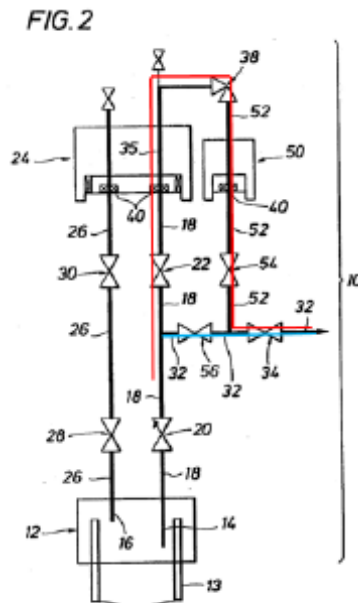
claim 36, however, we determine that Petitioner has not demonstrated by a preponderance of the evidence that this claim would have been obvious over Kelly and Bednar.

1. Independent Claims 11, 22, and 32

Although Kelly's collet body 22 may be a "diverter assembly" under the broadest reasonable interpretation of that claim limitation due to the flow path changing directions, as discussed above with respect to anticipation by Kelly, Petitioner nonetheless acknowledges that Kelly's system does not divert fluid "to flow directly" from branch line 20 to the outlet of branch line 24 without first passing through choke assembly 26. *See* Pet. 9. For the teaching that fluids may flow directly from Kelly's line 20 to line 24 or, alternatively, be diverted away from line 20 to flow through choke assembly 26, Petitioner turns to Bednar. *Id.* at 31–32.

Like Kelly, Bednar teaches a "subsea tree assembly" having a retrievable choke. Ex. 1007, 2:55–3:2, 3:61–4:10, 4:58–5:17, *cited in* Pet. 31. More specifically, Bednar teaches an "improved design and piping arrangement [to] allow a choke to be incorporated into or removed from a subsea tree without requiring significant changes in an existing, typical tree design." *Id.* at 2:57–61. In the "Background of Invention" section, Bednar mentions "Kelly" as an existing design in which the choke can be "removed . . . without requiring the entire tree to be retrieved." *Id.* at 1:42–55, *cited in* Pet. 31. While Kelly only has a single flow path through its removable choke, Bednar improves upon Kelly by providing a direct flow path to the production flow line in the event the subsea choke experiences a failure. *Id.* at 5:7–11. As explained by Bednar, its "improved design offers a significant

advantage” over Kelly and other removable chokes because it can “continue producing the well even after the choke experiences a failure, by isolating the failed choke from the main production flowstream.” *Id.* at 2:3–9. Bednar does this by providing alternative flow paths from the wellhead to the production flowline, which, as illustrated below in Petitioner’s annotated version of Figure 2 of Bednar, includes either a direct path to the production flowline (shown in blue) or an indirect path through the choke before proceeding to the production flowline (shown in red). See Pet. 31.



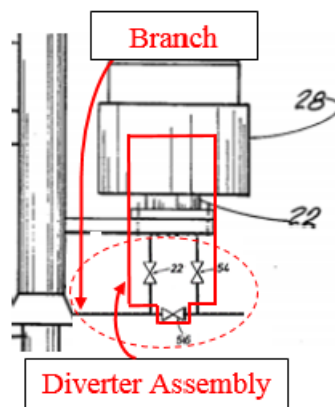
Bednar, FIG. 2 (annotated)

Annotated Figure 2 of Bednar depicts the alternative flow paths within Bednar’s subsea tree assembly. In particular, fluid from wellhead 13 can take a direct path (shown in blue) from “tree flow passage 18” to “production line 32” “directly through valves 20, 56, and 34,” or alternatively, fluid can be diverted along a different course (shown in red) through valve 22, choke assembly 38, “return line 52,” and valve 54 before

returning to “production line 32.” *Id.* at 2:66–3:2, 3:33–40, 3:61–4:10, 4:58–5:17, Fig. 2; Ex. 1003 ¶ 36.

Relying on Mr. Herrmann’s declaration testimony, Petitioner argues that a skilled artisan would have readily modified the system of Kelly to add an alternative, direct flow path, as taught by Bednar, because “it was commonly known to provide a selectively accessible alternative flow path in parallel with a retrievable choke to allow fluid production without passing through the choke.” Pet. 31–32 (citing Ex. 1003 ¶¶ 37–38). According to Mr. Herrmann, a skilled artisan “would have incorporated an additional conduit and a series of valves, such as Bednar’s ‘production crown valve 22,’ ‘hub isolation valve 54,’ and ‘flow loop isolation valve 56,’” between Kelly’s branch lines 20 and 24, so as to “allow[] fluid to flow directly to the flowline in the event ‘subsea choke assembly 26’ has failed.” Ex. 1003 ¶¶ 37–38.

Petitioner submits an annotated version of Figure 2 of Kelly, which is reproduced below, to illustrate how a skilled artisan would have modified Kelly’s lines 20 and 24 to provide a direct flow path to the production flowline, as taught by Bednar. Pet. 34.



Kelly in view of Bednar,
FIG. 2 (annotated)

Annotated Figure 2 of Kelly depicts Kelly's modified system incorporating Bednar's teaching of a direct flow path to the production flowline. As shown, the branch of Kelly's modified system provides either a direct flow path to the production flowline or a diverted flow path passing through collet body 22 in a first direction to choke assembly 26 before returning in a second direction through collet body 22 toward the branch. Ex. 1003 ¶¶ 37–40. We find that Kelly as modified by Bednar discloses a “diverter assembly” in the manner recited by claims 11, 22, and 32.

Petitioner further argues that a skilled artisan would have undertaken to modify Kelly's system with the direct flow path taught by Bednar because Kelly recognized the problem of “high wear rates” in wellhead chokes, and Bednar expressly describes that an advantage of its dual flow paths is to permit production “even after subsea choke 38 experiences a failure.” Pet. 32–33 (citing Ex. 1004, 1:17–19; Ex. 1007, 5:7–11). In other words, adding the additional flow path of Bednar would have enabled Kelly's system to continue to operate when the choke was worn or removed for replacement. Petitioner relies on the declaration testimony of Mr. Herrmann in support of its argument. *Id.* (citing Ex. 1003 ¶ 38).

We find Petitioner's reason to combine persuasive. A skilled artisan would have been motivated to modify the system of Kelly with the direct flow path of Bednar because Bednar teaches expressly the benefit of having such a path in a subsea choke system. Ex. 1007, 5:5–17. And, given the simplicity of the structure of a direct flow path, a skilled artisan would have reasonably expected to succeed in adding Bednar's direct flow path to the branch lines already found in Kelly. A simple modification of that sort would have resulted in increased production from the well, as confirmed by

Petitioner's expert. *See* Ex. 1003 ¶ 38 (citing Ex. 1007, 5:5–17).

Accordingly, we find that a skilled artisan would have combined Bednar's teaching of a direct flow path with Kelly's choke flow path and that, as modified, Kelly's system discloses a "diverter assembly" in the manner called for by claims 11, 22, and 32.

In response, Patent Owner faults Petitioner's proposed combination of Kelly and Bednar, explaining that (1) a skilled artisan would not have combined the references, and (2) the combination fails to teach the claimed "diverter assembly." PO Resp. 54–70. We address each argument in turn.

a. Reasons to Combine

In arguing that a skilled artisan would not have combined Bednar with Kelly, Patent Owner asserts that the modification of Kelly's flow path to include Bednar's direct flow path is not "a simple combination" because of Bednar's identification of the valves and piping in its arrangement of a subsea choke system. PO Resp. 55–56 ("[Petitioner] takes the tree flow passage 18 . . . and the production crown valve 22 from Bednar and adds them to Kelly's system" and "also[] tries to repurpose those components, even though they have well-known functions . . . and are not simply arbitrary components that can be cut-and-pasted into another tree system"). We disagree.

Patent Owner's focus on labels disregards Bednar's broader suggestion of utilizing an alternative flow path to maintain flow from the well bore in the event of a choke failure. *See* Pet. 32–33. The combination would not require "reincorporating . . . components in Kelly at a different location when they already exist," as Patent Owner urges. *See* PO Resp. 55.

Patent Owner’s own expert admits that a valve has a particular name only because of its location, and just because valve 22 serves as a crown valve in Bednar would not constrain a skilled artisan to only see it as a crown valve in another context. Ex. 1015, 71:8–72:4. The same reasoning applies to Bednar’s flow passage 18. Further, Patent Owner’s own expert illustrates that the selection of “pipes, valves, and fittings” to provide a flow path is routine. *Id.* at 19:4–23.

Ultimately, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference, but rather what the combined teachings of those references would have suggested as a whole to the skilled artisan. *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). Bednar expressly suggests an alternative, direct flow path in parallel with a diverter flow path such as Kelly’s, even referencing Kelly in the process. Contrary to what Patent Owner argues, we find persuasive the testimony of Petitioner’s expert that a skilled artisan would have easily understood the appropriate “pipes, valves, and fittings” necessary to create such a direct flow path in Kelly without undue experimentation. *See* Ex. 1003 ¶¶ 36–39.

Patent Owner next argues that a skilled artisan would not incorporate Bednar’s alternative flow path into Kelly’s system because “Kelly teaches away from operating its system without a choke.” PO Resp. 59. According to Patent Owner, “Kelly’s system is designed to *always* operate with a choke” in order “to permit the combination of each well’s production flowlines into a single, subsea gathering flowline.” *Id.* at 58–59. In support of this argument, Patent Owner relies on the declaration testimony of Mr. Boyadjieff, explaining further that a skilled artisan “would not be motivated

to build a flow path around Kelly's choke, because when the choke needed to be replaced, Kelly's well would have been shut down and the choke retrieved to the surface." *Id.* at 59 (citing Ex. 2006 ¶¶ 118–119).

We do not find Mr. Boyadjieff's testimony persuasive because Kelly states, at the outset, that the purpose of its retrievable choke is to avoid "the time and expense involved in 'killing' the well and retrieving the tree." Ex. 1004, 1:13–17. Nowhere does Mr. Boyadjieff address Kelly's express disclosure of using "redundant pressure containing valves" to avoid turning off the well when the choke is in need of repair. *See id.* Nor does Mr. Boyadjieff address Kelly's express recognition that, depending on the well, different arrangements of flowlines "would be routed from the subsea tree, along the ocean floor, to a gathering ship or platform." *See id.* at 1:20–24. In that regard, Kelly recognizes that "since various wells in a given field may not all have the same pressure[,] their production cannot be commingled into one flow line." *Id.* at 1:24–27. Although Kelly mentions one advantage of its choke assembly is that it can be used where wells are comingled into a "single gathering line," (*id.* at 1:35–40), Kelly does not foreclose its use in a multiple gathering system where flowlines "cannot be comingled," (*id.* at 1:24–27). In other words, Kelly leaves open the possibility of using its retrievable choke in either a single line gathering system or a multiple line gathering system. Mr. Boyadjieff does not address Kelly's recognition of the latter type of system. As such, we are not persuaded by his testimony that Kelly's system has no need for an alternative path because the system would have been shut down.

Patent Owner further argues that Bednar "explicitly rejected" the idea of its alternative flow path being used with Kelly's system. PO Resp. 60.

We disagree, as the evidence indicates otherwise. In the “Background of Invention” section, Bednar discusses two prior art subsea trees, one by “Kelly” and another by “Lochte,” in which the choke assembly can be “removed . . . without requiring the entire tree to be retrieved.” Ex. 1007, 1:42–55. Bednar then concludes that its “improved design offers a significant advantage” over those prior art subsea chokes because it can “continue producing the well even after the choke experiences a failure, by isolating the failed choke from the main production flowstream.” *Id.* at 2:3–9; *see also id.* at 5:7–17 (“the advantages of the arrangement shown in FIG. 2 is that the wellbore may be produced through tree assembly 10 even after subsea choke 38 experiences a failure”). We do not view Bednar’s disclosure as discouraging its combination with Kelly. Certainly, Bednar finds fault with Kelly’s system, but Bednar offers a solution—“isolating the failed choke from the main production flowstream.” *Id.* at 2:3–9. In that regard, a skilled artisan would have understood Bednar to be suggesting application of his solution to the only two retrievable choke assemblies mentioned in the background of invention, namely Kelly and Lochte. Thus, we find that Bednar’s solution has clear application to Kelly and that a skilled artisan would have viewed it as such.

b. “diverter assembly”

Referring to claim 11, Patent Owner next argues that Kelly and Bednar fail to disclose the claimed “diverter assembly” because their “individual components are neither a complete structure nor are they fitted together.” PO Resp. 61. That argument hinges on Patent Owner’s proposed construction of the term “assembly,” which we rejected as discussed above

in the “Claim Construction” section. In any event, Patent Owner mischaracterizes Petitioner’s combination of Kelly and Bednar as “arbitrarily designating several individual, unconnected parts” to be an assembly. *Id.* In doing so, Patent Owner focuses on the *entire* arrangement of parts making up Bednar’s system, without ever addressing Petitioner’s actual assertion of combining simply the few parts making up Bednar’s alternative flow path with Kelly’s clear disclosure of a complete and integral assembly of fitted together parts. *Id.* at 61–64. Patent Owner ignores that a skilled artisan would have understood the importance of maintaining the integrity and relationship of Kelly’s assembly when incorporating Bednar’s alternative flow path, as attested to by Petitioner’s expert. *See* Ex. 1003 ¶¶ 38–39. Accordingly, we reject Patent Owner’s argument that a skilled artisan would not have understood how to combine Kelly and Bednar to form a “diverter assembly” in the manner recited by claim 11.

Patent Owner further argues that Kelly and Bednar do not teach a diverter assembly that is “coupled to the branch” and that “comprises a first flow path in a first direction through the branch . . . and a second flow path in a second direction through the branch,” as required by claim 11. PO Resp. 64–67. According to Patent Owner, “Kelly’s removable choke is not coupled to the branch, but is coupled to flowlines, and consequently, [Petitioner’s] ‘first flow path’ and ‘second flow path’ do not go through the branch, but rather go between production flowlines 20 and 24.” *Id.* at 65. That argument is premised on Kelly’s lines 20 and 24 not comprising a “branch.” As explained above with respect to anticipation by Kelly, we find that Kelly’s lines 20 and 24 comprise a “branch” to which Kelly’s collet body 22 (i.e., “diverter assembly”) is coupled. Also as explained above, we

additionally find that each of Kelly’s passage 64 (i.e., “first flow path”) and passage 66 (i.e., “second flow path”) provides a portion of the flow path that extends through the branch. *See* Ex. 1004, Fig. 3. Accordingly, Patent Owner does not adequately rebut Petitioner’s persuasive evidence and argument that Kelly and Bednar teach a diverter assembly “coupled to the branch” and comprising “a first flow path in a first direction through the branch . . . and a second flow path in a second direction through the branch.”

Regarding independent claims 22 and 32, Patent Owner relies on its arguments with respect to claim 11. PO Resp. 68–70. For the reasons given above, we are not persuaded by those arguments in connection with claim 11, and similarly are not persuaded with respect to claims 22 and 32.

In view of the foregoing, we determine that the preponderance of the evidence weighs in favor of Petitioner’s case that claims 11, 22, and 32 are unpatentable for obviousness over Kelly and Bednar.

2. Dependent Claims 18 and 26

Dependent claims 18 and 26 require that “a part of the diverter assembly is sealed inside the branch to block fluid communication between two separate regions of the diverter assembly.” For this limitation, Petitioner points to Kelly’s modified system and the incorporation of Bednar’s flow loop isolation valve 56 as the part of the diverter assembly that blocks the flow of fluid between separate regions. Pet. 36, 38; *see also id.* at 34 (annotated Figure 2 of Kelly). This is consistent with the ’306 patent, which discloses a valve as part of the diverter assembly—“fluids . . . cannot pass into through [sic] the wing branch 1114 *because of the V2 valve*

which is closed, and they are instead diverted into the cap 1140.” Ex. 1001, 31:33–36.

Patent Owner responds that neither Kelly nor Bednar teaches that valve 56 would have been “sealed inside the branch.” PO Resp. 70. We disagree. As described expressly in Bednar, the assembly of “passages and valves” directs fluids along flow paths that use “sealing devices suitable for . . . subsea environments.” Ex. 1007, 3:50–65. Like Bednar, Kelly also discloses “suitable sealing means” for maintaining sealed communication between various connections. *See, e.g.*, Ex. 1004, 2:61–65. Those disclosures persuade us that a skilled artisan would have appreciated the importance of fluid tight connections in a subsea environment and thus would have equipped the flow loop isolation valve in Kelly’s modified system with sealing devices to prevent fluid leakage between the separate regions. This would have been the natural inference arising from the teachings of both Kelly and Bednar. Moreover, we note that valve 56 of Kelly’s modified system is within the bounds of the branch, which we consider to be “inside” the branch. *See* Pet. 34 (annotated Figure 2 of Kelly).

In view of the foregoing, we determine that Petitioner has shown by preponderant evidence that claims 18 and 26 are unpatentable for obviousness over Kelly and Bednar.

3. Dependent Claim 28

Claim 28 requires that “the manifold is connected to a processing apparatus via the diverter assembly external to the manifold.” For this limitation, Petitioner identifies Kelly’s choke assembly 26 as a “processing

apparatus,” relying on its argument with respect to anticipation by Kelly.
Pet. 38. Petitioner explains that Kelly’s choke assembly 26 is “a processing apparatus that processes fluid by affecting fluid flow and pressure.” *Id.* at 19.

In response, Patent Owner relies on its argument with respect to anticipation by Kelly, asserting that “the ’306 patent excludes a choke from being a processing apparatus.” PO Resp. 71–72.

For the reasons given above, we find that Kelly’s choke assembly 26 corresponds to the recited “processing apparatus.” Namely, we note the evidence of record indicating that adjusting Kelly’s choke will control the pressure of the well, (*see* Ex. 1016, 138:22–139:2), and also showing that a processing apparatus includes a pressure regulation apparatus, (Ex. 1009, 11:34–45). Accordingly, we determine that Petitioner has shown by a preponderance of the evidence that claim 28 would have been obvious over Kelly and Bednar.

4. Dependent Claim 36

Claim 36 requires “a processing apparatus communicating with the first and second paths” of the diverter assembly. For this limitation, Petitioner directs us to its argument with respect to anticipation by Kelly, where Petitioner identifies Kelly’s collet body 22 as providing a “processing apparatus.” Pet. 24–25, 39. As explained above, however, we find that Kelly does not teach the “processing apparatus” recited in claim 36. Namely, we note that Petitioner’s argument that the “diverter assembly” and the “processing apparatus” can be the same structure renders the claims nonsensical. Accordingly, we determine that Petitioner has not

demonstrated by a preponderance of the evidence that claim 36 would have been obvious over Kelly and Bednar.

5. Dependent Claims 12, 17, 19, 25, 27, 33–35, and 41

Petitioner argues that claims 12, 17, 19, 25, 27, 33–35, and 41 would have been obvious over Kelly and Bednar. Pet. 35–36, 38–39. Patent Owner does not dispute Petitioner’s evidence of obviousness with respect to these claims except to argue that they are patentable “[f]or at least the reasons set forth . . . for independent claims 11, 22, and 32.”¹³ PO Resp. 72. We have considered fully the evidence and arguments presented by Petitioner explaining how each of the limitations of these challenged dependent claims would have been obvious over Kelly and Bednar. *See* Pet. 12–13, 35 (discussing claim 12) (citing Ex. 1001, 2:14–16, 3:17–20; Ex. 1004, 2:21–25, Fig. 1; Ex. 1003 ¶ 20); *id.* 35–36 (discussing claim 17) (citing Ex. 1001, 31:33–36; Ex. 1003 ¶ 40);¹⁴ *id.* at 15–16, 36 (discussing claim 19) (citing Ex. 1004, 3:5–11; Ex. 1003 ¶ 24);¹⁵ *id.* at 38 (discussing claim 25) (citing previous discussion of claim 17); *id.* at 38 (discussing claim 27) (citing previous discussion of claim 19); *id.* at 23, 39 (discussing claim 33) (citing Ex. 1004, 2:21–25; Ex. 1003 ¶ 28); *id.* at 23–24, 39 (discussing claim 34) (citing previous discussion of claim 17 and Ex. 1003

¹³ Patent Owner also includes claims 18, 26, 28, and 36 within this argument; however, we address these claims separately from independent claims 11, 22, and 32, as discussed previously.

¹⁴ *See also* Pet. 34 (annotated Figure 2 of Kelly).

¹⁵ *See also* Ex. 1004, Fig. 3 (showing line 20 and passage 64 are connected to passage 66 via inlet 68 and outlet 70).

¶¶ 22–23);¹⁶ *id.* at 24, 39 (discussing claim 35) (citing Ex. 1003 ¶ 29);¹⁷ *id.* at 26, 39 (discussing claim 41) (citing previous discussion of claim 33). We find Petitioner’s reasoning persuasive. Thus, we determine that the preponderance of the evidence weighs in favor of Petitioner’s proof that dependent claims 12, 17, 19, 25, 27, 33–35, and 41 would have been obvious over Kelly and Bednar.

F. Obviousness over Kelly, Bednar, and Fenton

Petitioner contends that claims 28, 29, and 36–38 would have been obvious over Kelly, Bednar, and Fenton. Pet. 39. For the reasons explained below, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 28, 29, and 38, would have been obvious over Kelly, Bednar, and Fenton. As to claims 36 and 37, however, we determine that Petitioner has not demonstrated by a preponderance of the evidence that they would have been obvious over Kelly, Bednar, and Fenton.

1. Dependent Claims 28 and 29

Claim 28 depends from claim 22 and requires a “processing apparatus.” Claim 29, which depends from claim 28, lists a number of examples of processing apparatuses, including a “measurement apparatus,” a “temperature measurement apparatus,” and a “flow rate measurement apparatus.” Relying on its arguments with respect to obviousness over Kelly

¹⁶ See also Pet. 35–36 (citing Ex. 1001, 31:33–36; Ex. 1003 ¶ 40).

¹⁷ See also Ex. 1004, 2:64–65 (“suitable sealing means . . . are provided to maintain sealed communication”), Fig. 1 (showing that line 20 is connected to horizontal piping extending from the vertical portion of tree 18).

and Fenton, Petitioner argues that the combination of Kelly, Bednar, and Fenton teaches these limitations. Pet. 39. Namely, Petitioner identifies Kelly's modified choke as the "processing apparatus." *Id.* at 27–29. Petitioner additionally explains that "[a] person of ordinary skill would have incorporated one or more sensors as taught by Fenton, into the system of Kelly modified in view of Bednar, because it would provide critical flow, pressure or temperature data allowing more precise control of the system." *Id.* at 39. As discussed above, these sensors are components of Fenton's choke assembly 77, which, in turn, is a component of Fenton's production module 61. Ex. 1005 ¶¶ 7, 18, 22, Fig. 2. According to Petitioner, "[t]he modification amounts to a simple combination of prior art elements according to known methods to yield predictable results." *Id.* As support, Petitioner relies on the declaration testimony of Mr. Herrmann ¶ 42.

For the reasons explained above with respect to obviousness over Kelly and Fenton, we find that Fenton's production module 61, including choke assembly 77 with pressure/temperature sensors 79 and 81, teaches the "processing apparatus" recited in claims 28 and 29. Namely, we note evidence discussed in our analysis of claim 28 above with respect to anticipation by Kelly indicating that a processing apparatus encompasses a pressure regulation apparatus, as well as evidence indicating that Fenton's choke can be used to control flow. We also are persuaded by Petitioner's proffered reasoning for changing Kelly's modified system to include Fenton's sensors to allow for more precise control of the choke, and thus find that Petitioner has adequately articulated a reason to combine the references.

In its Response, Patent Owner argues that, “at least for the reasons . . . with respect to Kelly in view of Bednar, claims 28, 29 . . . are patentable over Kelly in view of Bednar and Fenton.” PO Resp. 72. Claims 28 and 29 depend from claim 22. As discussed above, we determine that claim 22 would have been obvious over Kelly and Bednar. Accordingly, Patent Owner does not adequately rebut Petitioner’s persuasive evidence and arguments that Kelly, Bednar, and Fenton teach the limitations recited in claims 28 and 29.

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 28 and 29 would have been obvious over Kelly, Bednar, and Fenton.

2. Dependent Claims 36 and 37

Claims 36 and 37 depend from claim 32 and require a “processing apparatus” in addition to the “choke” and the “diverter assembly” recited in claim 32. Claim 37 depends directly from claim 36. For claim 36, Petitioner relies on its arguments with respect to obviousness over Kelly and Fenton, where Petitioner identifies Kelly’s modified choke as the “processing apparatus.” Pet. 27–29; *id.* at 39 (referring to “Ground 2, [36.0],” which refers to “Ground 2, [28.0]”). Petitioner also relies on its arguments with respect to anticipation by Kelly, where Petitioner identifies Kelly’s collet body 22 as the “processing apparatus.” *Id.* at 24–25; *id.* at 39 (referring to “Ground 3, [11.0], [36.0],” which refers to “Ground 1, [36.0]”).

As explained above with respect to anticipation by Kelly, however, we are not persuaded that Kelly’s choke assembly teaches the “processing apparatus” recited in claim 36. We note in particular our finding that

Kelly's choke assembly cannot teach both the "choke" recited in claim 32 and the "processing apparatus" recited in claim 36 (which depends from claim 32), as these claim elements must be two separate structures.

In addition, as explained above with respect to anticipation by Kelly, we also are not persuaded that Kelly's collet body teaches the "processing apparatus" recited in claim 36. Namely, we note that Petitioner's argument that the "diverter assembly" recited in claim 32 and the "processing apparatus" recited in claim 36 can be the same structure renders the claims nonsensical.

In view of the foregoing, we determine that Petitioner has not demonstrated by a preponderance of the evidence that claim 36 would have been obvious over Kelly, Bednar, and Fenton. As claim 37 depends from claim 36, we further determine that Petitioner has not demonstrated by a preponderance of the evidence that claim 37 would have been obvious over Kelly, Bednar, and Fenton.

3. Dependent Claim 38

Claim 38 requires a "flow rate measurement apparatus." For this limitation, Petitioner relies on its argument with respect to obviousness over Kelly and Fenton. Pet. 39. Namely, Petitioner identifies Fenton's flow meter as a "flow rate measurement apparatus" and argues that it would have been obvious to modify Kelly's choke assembly to include Fenton's flow meter "to promote more precise control of the choke." *Id.* at 29. As explained above, we find that Fenton's flow meter corresponds to the recited "flow rate measurement apparatus" and that Petitioner has adequately articulated a reason to combine the references.

Patent Owner does not dispute Petitioner's evidence and argument that claim 38 would have been obvious over Kelly, Bednar, and Fenton, except to rely on its "reasons . . . with respect to Kelly in view of Bednar." PO Resp. 72. Claim 38 depends from claim 32. As discussed above, we determine that claim 32 would have been obvious over Kelly and Bednar. Accordingly, Patent Owner does not adequately rebut Petitioner's persuasive evidence and argument that Kelly, Bednar, and Fenton teach the limitation recited in claim 38.

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that claim 38 would have been obvious over Kelly, Bednar, and Fenton.

G. Anticipation by Clair

Petitioner argues that Clair anticipates claims 1, 10–12, 17–19, 21–23, 25–28, 31–36, and 41. Pet. 40–55. For the reasons explained below, we determine that Petitioner has demonstrated by a preponderance of the evidence that Clair anticipates claims 1, 10–12, 17–19, 21–23, 25–28, 31–35, and 41. As to claim 36, however, we determine that Petitioner has not demonstrated by a preponderance of the evidence that Clair anticipates this claim.

1. Independent Claim 1

Clair describes a reduction choke for oil and gas well systems. Ex. 1006, 1:1–5. Petitioner explains in its Petition how Clair discloses each element of claim 1. See Pet. 40–44. For example, claim 1 recites a "manifold." Claim 1 requires the manifold to have a "production bore" and

a “wing branch” that communicate with each other. For these limitations, Petitioner identifies Clair’s Christmas tree 31 as a “manifold,” pointing out that “the ’306 Patent indicates[] a ‘manifold may comprise a Christmas tree.’” Pet. 41–42 (citing Ex. 1001, 3:13–15); *see also* Ex. 1006, Fig. 6. Petitioner further identifies Clair’s connection 32, valve 3, warming chamber 5, and discharge pipe 14 collectively as a “wing branch.” Pet. 42; *see also* Ex. 1006, Fig. 6. Petitioner explains that “[t]he wing branch is in fluid communication with the production bore through the center of tree 31, so that produced fluids can flow from the production bore and through the wing branch.” Pet. 42.

Clair’s branch is substantially similar to the branch in Figure 22 of the ’306 patent at issue here in that both depict a fluid flow path extending laterally from a vertical main axis of the wellhead and leading to a cylindrical chamber of coaxial flow paths for further processing of the fluid. *Compare* Ex. 1001, Fig. 22, *with* Ex. 1006, Figs. 6, 7. While the tubular chamber in Clair is positioned horizontally and the tubular chamber in the ’306 patent is positioned vertically, that difference does not change the fact that both comprise a branch or offshoot from the main axis of the wellhead.

Based on the record before us, we find that Clair discloses the recited “manifold” having a “production bore” and a “wing branch” that communicate with each other.

Claim 1 further recites a “diverter assembly” for the manifold. Claim 1 requires the diverter assembly to comprise a “housing” that is “disposed on the wing branch” and to have an “internal passage.” In addition, claim 1 requires the diverter assembly to have a “first path” to divert the flow of fluids from the wing branch or from a flowline in a first

Annotated Figure 7 further shows that the first and second paths are coaxial paths through which fluids flow in opposite directions relative to one another. *See id.* at 44. Petitioner explains that the fluids enter expansion chamber 12 from choke cylinder 8 and proceed to a discharge pipe 14 and a flowline downstream of the discharge pipe. *Id.* (citing Ex. 1003 ¶ 49).

Based on the record before us, we find that Clair discloses the recited “diverter assembly.” Patent Owner does not dispute that Clair discloses most of the limitations recited in claim 1. Patent Owner contends, however, that “Clair does not include at least a ‘diverter assembly . . . comprising a housing disposed on the wing branch.’” PO Resp. 73.

In particular, Patent Owner argues that claim 1 requires the diverter assembly “to be installed mid-branch, *i.e.*, prior to the branch outlet,” whereas Clair’s diverter assembly “is attached to the branch outlet.” *Id.*; *see also id.* at 74 (“the elements [Petitioner] points to as Clair’s alleged wing branch are located after Clair’s branch outlet, 4”); Ex. 1006, Fig. 6. We disagree.

Patent Owner’s contention that Clair does not teach the “housing disposed on the wing branch” is premised on a misrepresentation of the location of Clair’s branch outlet. What Patent Owner purports to be a branch outlet in Figure 6 of Clair is actually identified as an “inlet” by Clair. PO Resp. 74 (labeling element 4 in Figure 6 of Clair as “Branch Outlet”). Specifically, Clair states that “gas and/or oil at 2000 lbs., or more, bottom hole pressure, *enters inlet connection 4* at one side of the end of cylindrical warming chamber 5 and is directed in a spiral path around tubular expansion chamber 12 . . . from which the flow is directed into discharge pipe 14.” Ex. 1006, 4:74–5:15 (emphasis added). Thus, Patent Owner does not

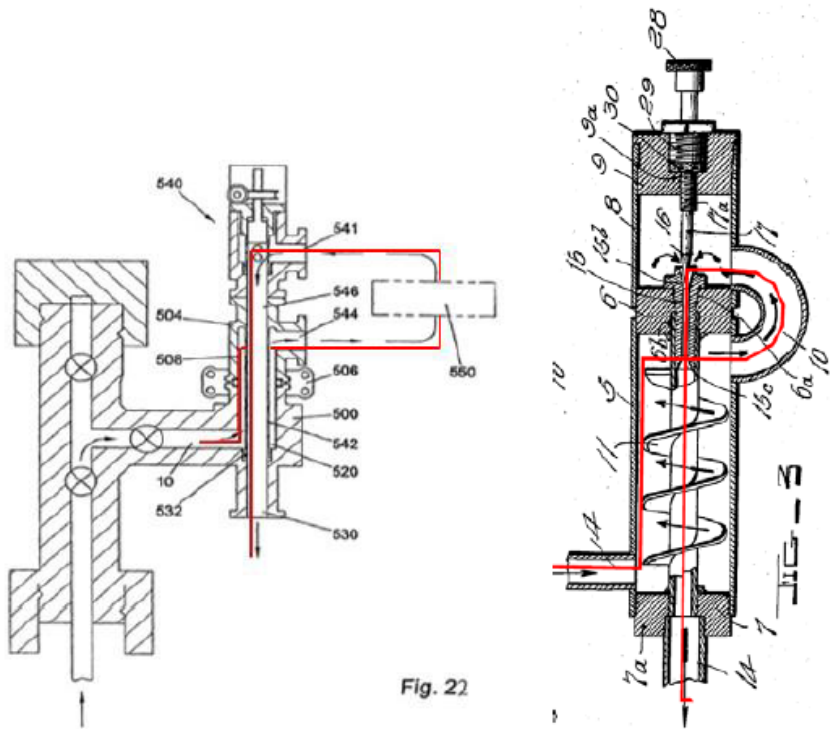
adequately rebut Petitioner's persuasive evidence and argument with its attempt to characterize element 4 of Clair as an outlet when Clair itself calls it an "inlet," and, indeed, identifies a different element, discharge pipe 14, as the outlet of the branch. In addition, we note that Figure 6 of Clair shows clearly that the flow path comprising Clair's branch is positioned before discharge pipe 14, not after it, as Patent Owner urges. *Compare* PO Resp. 73 ("Clair's alleged diverter assembly receives the flow of oil/gas after it has already exited the branch"), *with* Ex. 1006, Fig. 6.

Patent Owner further argues that "[Petitioner's] expert unequivocally stated that Clair's choke and warming chamber assembly is attached to the branch outlet at the end of pipe 4." PO Resp. 74. That argument also does not adequately rebut Petitioner's persuasive evidence and argument, however, because it is based on Mr. Herrmann's deposition testimony in response to a hypothetical that modifies Clair in a manner that removes the key feature of Clair's invention, namely, the warming chamber that includes the choke, as well as the first and second flow paths, for the oil and gas. *See id.* at 74–75 (citing Ex. 2005, 299:22–300:9 (response of Petitioner's expert to the question: "If Clair's invention were not incorporated into the manifold [of] Figure 6")). In other words, Mr. Herrmann was not testifying about what Clair actually discloses but rather some proposed modification that took his response outside the context of Clair's invention.

Patent Owner additionally argues that a skilled artisan "would not consider Clair's choke to be part of Clair's Christmas tree." *Id.* at 75. That argument is similarly based on a hypothetical that modifies Clair in a manner that again removes a key feature of Clair's invention, namely, the choke. *See id.* ("Mr. Boyadjieff explains that the branch outlet of Clair's

tree is at the end of pipe 4—*i.e.*, that if Clair’s choke were removed from the described Christmas tree, that the flowline would connect directly to pipe 4.”); Ex. 2006 ¶ 140 (“the end of the tree is where the flowline connects to the tree”). Accordingly, Patent Owner does not adequately rebut Petitioner’s persuasive evidence and argument.

Lastly, we note that Clair depicts a branch in substantially the same manner as the claimed invention of the ’306 patent. To illustrate this, annotated versions of Figure 22 of the ’306 patent and Figure 3 of Clair are reproduced below.



’306 patent, Fig. 22 (annotated)

Clair, Fig. 3 (annotated)

Each of the above annotated figures depicts the flow path (red) of an oil and gas system comprising a branch on which a diverter assembly is located. Patent Owner fails to explain credibly why pipe 10 and coaxial flow paths 520, 542, which lead to choke 540 and outlet 530, comprise a branch

in the '306 patent at issue, while the substantially same configuration comprising inlet connection 4 and the coaxial flow paths of cylindrical chamber 5, which likewise lead to choke 8 and discharge pipe 14, in Clair's system is not a branch. Ultimately, given the substantial similarity between the flow path configurations of Clair and the '306 patent, we are not persuaded by Patent Owner's argument that Clair's diverter assembly is somehow located after the branch outlet while the claimed diverter assembly is not. Thus, we find that Clair discloses a "diverter assembly . . . comprising a housing disposed on the wing branch," as claimed.

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that Clair anticipates claim 1.

2. Independent Claim 11

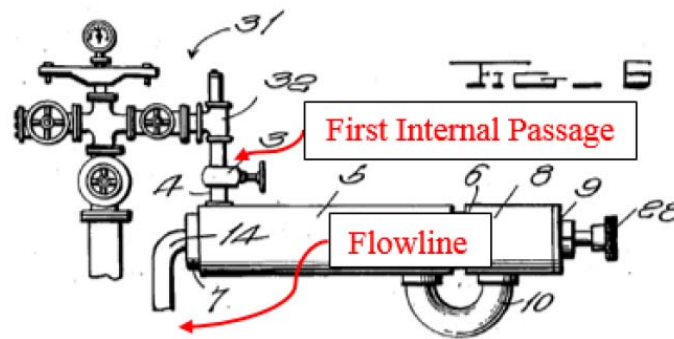
Independent claim 11 is similar to claim 1. For example, claim 11 recites a "branch." Claim 11 requires the branch to be connected to a production bore of a christmas tree and to a flowline. Claim 11 also requires the branch to have a "first internal passage to flow a fluid between the production bore and flowline." For these limitations, Petitioner identifies Clair's connection 32, valve 3, warming chamber 5, and discharge pipe 14 as a "branch." Pet. 45–46; *see also* Ex. 1006, Fig. 6. Relying on the declaration testimony of Mr. Herrmann, Petitioner further explains that "[t]he branch is in fluid communication with the production bore through the center of tree 31, so that produced 'gas and/or oil' can flow from the production bore through the branch, and extends from 'Christmas tree 31'

through ‘chamber 5’ and discharge pipe 14’ to a flowline downstream of the discharge pipe.” *Id.* at 46 (citing Ex. 1003 ¶ 46).

Based on the record before us, and for the reasons given above with respect to claim 1, we find that Clair discloses the recited “branch.” Namely, we note that, like the tubular chamber in the ’306 patent, the tubular chamber in Clair comprises a branch or offshoot from the main axis of the wellhead. We also note that Figure 6 of Clair shows the branch providing a flow path between the production bore and a flowline (not shown), which is downstream of discharge pipe 14. *See also id.* at 47 (annotated Figure 6 of Clair labeling “First Internal Passage”).

Claim 11 further recites a “diverter assembly.” Claim 11 requires the diverter assembly to be “coupled to the branch.” In addition, claim 11 requires the diverter assembly to have a “housing” with a “second internal passage.” Claim 11 also requires the diverter assembly to have a “first flow path in a first direction through the branch to divert flow of the fluid” as well as a “second flow path in a second direction through the branch to return flow of the fluid.” Finally, claim 11 requires the diverter assembly to “form[] a passage from the first internal passage to the flowline without passing through the production bore.”

For these limitations, Petitioner directs us to an annotated version of Figure 6 of Clair, which is reproduced below. Pet. 47.



Clair, FIG. 6 (annotated)

Figure 6 of Clair is a side view of a reduction choke. Ex. 1006, 1:1–5, 2:36–37. Petitioner identifies Clair’s warming chamber 5, coupling 6, header 7, and expansion chamber 12 as a “diverter assembly.” *Id.* Alternatively, Petitioner explains that the chamber 5, coupling 6, expansion chamber 12, and tube turn 10 may provide the “diverter assembly.” *Id.* As shown in Figure 6 of Clair, the diverter assembly is coupled between connection 32 and discharge pipe 14, and provides a flow path that does not pass through the production bore. *See also* Ex. 1006, Fig. 7. In addition, as discussed above with respect to claim 1, Petitioner’s annotated version of Figure 7 of Clair shows first and second paths through which fluids flow in opposite directions relative to one another. *See* Pet. 43.

Petitioner further identifies Clair’s coupling 6 as a “housing” with “a second internal passage accommodating the ‘choke seat 15.’” Pet. 46–47; *see also id.* at 42–43 (regarding claim 1, explaining that coupling 6 accommodates the flow of fluids between choke cylinder 8 and expansion chamber 12); Ex. 1006, Fig. 7.

Based on the record before us, and for the reasons given above with respect to claim 1, we find that Clair discloses the recited “diverter assembly.” Patent Owner does not dispute that Clair discloses most of the

limitations recited in claim 11. Patent Owner contends, however, that “Clair fails to disclose at least a ‘diverter assembly compris[ing] a first flow path in a first direction *through the branch* to divert the flow of fluid and a second flow path in a second direction *through the branch* to return flow of the fluid,’ because the italicized terms require the diverter assembly to be located mid-branch.” PO Resp. 75–76. Patent Owner relies on its arguments with respect to claim 1.

For the reasons explained above, we find that Patent Owner does not adequately rebut Petitioner’s persuasive evidence and argument that Clair discloses the recited “diverter assembly.” For example, we find that Clair’s discharge pipe 14 (not element 4 of Clair) provides the branch outlet. Further, as explained above, we note that Clair depicts a branch in substantially the same manner as the claimed invention of the ’306 patent.

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that Clair anticipates claim 11.

3. Independent Claim 22

Independent claim 22 also is similar to claim 1. For example, claim 22 recites a “manifold.” Claim 22 requires the manifold to have a “production bore” and a “branch” that communicate with each other. Claim 22 further requires the branch to have a “branch inlet” and a branch outlet.” For these limitations, Petitioner relies on its discussion with respect to claim 1. Pet. 50. Petitioner further explains that Clair’s branch has a “branch inlet” where the horizontal branch of tree 31 extends laterally from the vertical portion above the wellhead as well as a “branch outlet” at the

opening at the end of discharge pipe 14. *Id.* at 48 (annotated Figure 6 of Clair labeling “Branch Inlet” and “Branch Outlet”); Ex. 1003 ¶ 53, *cited in* Pet. 48. Based on the record before us, and for the reasons give above with respect to claim 1, we find that Clair discloses the recited “manifold” with a “production bore” and a “branch” that communicate with each other. We note in particular the substantial similarities between Clair’s branch and the branch in Figure 22 of the ’306 patent.

Claim 22 also recites a “diverter assembly.” Claim 22 requires the diverter assembly to be “disposed on the branch between the branch inlet and branch outlet.” Claim 22 further requires the diverter assembly to have “a first path in a first direction to divert flow of a fluid from the branch inlet or from the branch outlet” and “a second path in a second direction to return flow of the fluid to the other of the branch inlet or branch outlet.” Lastly, claim 22 requires the diverter assembly to form “a passage between the branch inlet and the branch outlet without passing through the production bore.” For these limitations, Petitioner relies on its discussions with respect to claims 1 and 11. Pet. 50. We note that Figure 6 of Clair shows the diverter assembly is located on the branch between the branch inlet (where the horizontal branch of tree 31 extends laterally from the vertical portion above the wellhead) and the branch outlet (the opening at the end of discharge pipe 14), and provides a flow path without passing through the production bore. Based on the record before us, and for the reasons explained above with respect to claims 1 and 11, we find that Clair discloses the “diverter assembly” recited in claim 22.

In response, Patent Owner argues that claim 22 is patentable over Clair because “Clair does not disclose a first or second flow path diverting

fluid from a branch inlet to a branch outlet, or vice versa, as required in claim 22.” PO Resp. 76–77. Relying on its discussion with respect to claim 1, Patent Owner explains that “Clair’s diverter assembly is coupled to the end of a branch and is not located mid-branch.” *Id.* at 76. For the reasons explained above, we find that Patent Owner does not adequately rebut Petitioner’s persuasive evidence and argument that Clair discloses the recited “diverter assembly.” Namely, we find that Clair’s discharge pipe 14 (not element 4 of Clair) provides the branch outlet. Thus, Clair’s diverter assembly is located on the branch between the branch inlet and the branch outlet. Further, as explained above, we note that Clair depicts a branch in substantially the same manner as the claimed invention of the ’306 patent.

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that Clair anticipates claim 22.

4. Independent Claim 32

Claim 32 is also similar to claim 1. For example, claim 32 recites a “branch.” Claim 32 requires the branch to be on a christmas tree and to have a “first bore” that communicates with the production bore of the tree as well as a “second bore” that communicates with a flowline. For these limitations, Petitioner relies on its discussion with respect to claim 1, where Petitioner identifies Clair’s connection 32, valve 3, warming chamber 5, and discharge pipe 14 as a “branch.” Pet. 42, 52; *see also id.* at 53 (describing Clair’s branch as “including the horizontal piping and ‘discharge pipe 14’”). Petitioner explains that the “first bore” of Clair’s branch “extend[s] at least partially between the interface of the vertical piping and horizontal piping of

‘Christmas tree 31’ and ‘inlet 4,’” and that the “second bore” of Clair’s branch is “defined through ‘discharge pipe 14’ and in communication with a flowline.” *Id.* at 52 (citing Ex. 1006, Fig. 7). Petitioner also explains that Clair’s tree 31 is a christmas tree, and that the center bore of tree 31 is a production bore. *Id.* As shown in Figure 6 of Clair, the branch is located on tree 31. Ex. 1006, Fig. 6. Based on the record before us, and for the reasons given above with respect to claim 1, we find that Clair teaches the “branch” recited in claim 32. Namely, we note that Clair’s branch is substantially similar to the branch in Figure 22 of the ’306 patent.

Claim 32 further recites a “diverter assembly.” Claim 32 requires the diverter assembly to be “coupled to the branch between the first and second bores.” Claim 32 also requires the diverter assembly to have a “first path” that communicates with the first bore and a “second path” that communicates with the second bore. Lastly, claim 32 requires the diverter assembly to form a passage between the first and second bores without passing through the production bore. For these limitations, Petitioner relies on its discussions with respect to claims 1, 11, and 22. Pet. 53. We note that Figures 6 and 7 of Clair show the diverter assembly is coupled to the branch between the first and second bores. Ex. 1006, Figs. 6–7. We also note Petitioner’s identification of Clair’s annular path between chamber 5 and chamber 12 as the “first path” as well as Petitioner’s identification of Clair’s path through chamber 12 as the “second path.” Pet. 43–44. Based on the record before us, and for the reasons given above as to claims 1, 11, and 22, we find that Clair discloses the “diverter assembly” recited in claim 32.

Lastly, claim 32 recites a “choke” that communicates with the “first and second paths” of the diverter assembly. For this limitation, Petitioner

identifies Clair's reduction choke, which includes choke cylinder 8, choke seat 15, and valve 16, as a "choke." Pet. 53. We note Clair's disclosure that gas or oil flows in a spiral path around chamber 12 (i.e., "first path") into one side of the end of choke cylinder 8, and from there is admitted in a selected quantity by choke valve 16 for release into chamber 12 (i.e., "second path"). Ex. 1006, 4:74–5:15. Based on the record before us, we find that Clair's reduction choke corresponds to the recited "choke."

In response, Patent Owner argues that Clair "does not disclose 'a diverter assembly coupled to the branch between the first and second bores.'" PO Resp. 77. Relying on its discussion with respect to claim 1, Patent Owner explains that "claim [32] also requires the diverter assembly to be located mid-branch." *Id.* According to Patent Owner, "[Petitioner] points to 'the interface of the vertical piping and horizontal piping of 'Christmas tree 31' and 'inlet 4' as defining the first bore and 'discharge pipe 14' as defining the second bore," but "Clair's 'inlet 4' is actually the branch outlet and thus the section of Clair [Petitioner] points to as an alleged branch is beyond the branch outlet and thus cannot constitute part of the branch." *Id.*

For the reasons explained above with respect to claim 1, we find that Patent Owner does not adequately rebut Petitioner's persuasive evidence and argument that Clair discloses the recited "diverter assembly." Namely, we find that Clair's discharge pipe 14 (not element 4 of Clair) provides the branch outlet. Thus, Clair's diverter assembly is located on the branch between the first and second bores. Further, as explained above, we note that Clair depicts a branch in substantially the same manner as the claimed invention of the '306 patent.

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that Clair anticipates claim 32.

5. Dependent Claim 36

Claim 36 depends from claim 32 and further recites a “processing apparatus.” For this limitation, Petitioner relies on its discussion of claim 28, where Petitioner directs us to Clair’s reduction choke. Pet. 51, 55.

Based on the record before us, we are not persuaded by Petitioner’s argument that Clair discloses the “processing apparatus” recited in claim 36. Claim 32 recites a “choke,” and claim 36 further recites a “processing apparatus.” These claim elements are recited as two separate structures. As discussed above with respect to claim 32, Petitioner argues (and we find) that Clair’s reduction choke corresponds to the “choke” recited in claim 32. *See* Pet. 53–54. Given that the “choke” and the “processing apparatus” are two separate structures, Clair’s reduction choke cannot also correspond to the “processing apparatus” recited in claim 36.

In view of the foregoing, we determine that Petitioner has not demonstrated by a preponderance of the evidence that Clair anticipates claim 36.

6. Dependent Claims 10, 12, 17–19, 21, 23, 25–28, 31, 33–35, and 41

Petitioner argues that Clair anticipates claims 10, 12, 17–19, 21, 23, 25–28, 31, 33–35, and 41. Pet. 44–45, 48–52, 54–55. Patent Owner does not dispute Petitioner’s evidence of anticipation with respect to these claims except to argue that they are unpatentable “[f]or at least the reasons . . . for

independent claims 1, 11, 22, and 32.”¹⁸ PO Resp. 78. We have considered fully the evidence and arguments presented by Petitioner explaining how Kelly anticipates claims 10, 12, 17–19, 21, 23, 25–28, 31, 33–35, and 41. *See* Pet. 44–45 (discussing claim 10) (citing Ex. 1003 ¶ 51); *id.* at 48 (discussing claim 12) (citing previous discussion of claim 1); *id.* at 48–49 (discussing claim 17) (citing Ex. 1001, 5:8–15; Ex. 1003 ¶¶ 53–55); *id.* at 49–50 (discussing claim 18) (citing Ex. 1003 ¶ 56; Ex. 1006, 6:22–29); *id.* at 50 (discussing claim 19) (citing Ex. 1003 ¶ 57; Ex. 1006, 3:52–60); *id.* (discussing claim 21) (citing previous discussion of claim 1); *id.* at 51 (discussing claim 23);¹⁹ *id.* (discussing claim 25) (citing previous discussion of claim 17); *id.* (discussing claim 26) (citing previous discussion of claim 18); *id.* (discussing claim 27) (citing previous discussion of claim 19); *id.* (discussing claim 28) (citing Ex. 1001, 23:39–43; Ex. 1003 ¶ 58);²⁰ *id.* at 52 (discussing claim 31) (citing previous discussion of claim 1); *id.* at 54 (discussing claim 33) (citing Ex. 1003 ¶ 59); *id.* at 54–55 (discussing claim 34) (citing previous discussion of claim 17 and Ex. 1006, 5:75–6:21, Fig. 9); *id.* at 55 (discussing claim 35) (citing Ex. 1003 ¶ 60; Ex. 1006, 3:38–55, 5:75–6:21, 6:25–29, Fig. 9); *id.* (discussing claim 41) (citing previous discussion of claim 33). We find Petitioner’s reasoning persuasive. Thus, we determine that the preponderance of the evidence weighs in favor of

¹⁸ Patent Owner also includes claim 36 within this argument; however, we address this claim separately from independent claims 11, 22, and 32, as discussed previously.

¹⁹ *See also* Ex. 1006, Figs. 6–7.

²⁰ *See also* Ex. 1001, Fig. 22; Ex. 1006, Figs. 6–7.

Petitioner's proof that Clair anticipates dependent claims 10, 12, 17–19, 21, 23, 25–28, 31, 33–35, and 41.

H. Obviousness over Clair and Fenton

Petitioner contends that claims 28, 29, 32–38, and 41 would have been obvious over Clair and Fenton. Pet. 55–60. For the reasons explained below, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 28, 29, 32–35, 38, and 41 would have been obvious over Clair and Fenton. As to claims 36 and 37, however, we determine that Petitioner has not demonstrated by a preponderance of the evidence that they would have been obvious over Clair and Fenton.

1. Dependent Claims 28 and 29

As discussed above with respect to the Kelly-based grounds, claim 28 depends from claim 22 and recites “the manifold is connected to a processing apparatus via the diverter assembly external to the manifold.” Claim 29, which depends from claim 28, lists a number of examples of processing apparatuses. For these limitations, Petitioner relies on Fenton as teaching that processing apparatuses were “commonly used” in subsea wellhead installations. Pet. 56. For example, Fenton describes a choke assembly that includes one or more temperature and pressure measurement devices (sensors) to monitor fluid flow such that the choke could be appropriately adjusted. Ex. 1005, at [57], ¶¶ 3, 5–7, 11–14. Petitioner's expert, Mr. Herrmann, testifies that a skilled artisan would have modified Clair's choke to add a pressure, temperature, or flow sensor, as taught by Fenton, because Clair recognized expressly the problems associated with

“accumulation of frost and ice” and “reduction of pressure and temperature in oil and gas well systems.” Ex. 1003 ¶¶ 63–64 (citing Ex. 1006, 2:46–3:37).

Patent Owner does not dispute Petitioner’s evidence and arguments that claims 28 and 29 would have been obvious over Clair and Fenton, except to rely on its “reasons . . . with respect to Clair for claim[] 22.” PO Resp. 79. We have considered fully the evidence and arguments presented by Petitioner explaining how Clair and Fenton teach each of the limitations of claims 28 and 29, and why a skilled artisan would have combined their teachings in the manner asserted. *See* Pet. 55–58 (citing Ex. 1003 ¶¶ 62–64; Ex. 1005 ¶¶ 7, 11–14, 17–18; Ex. 1006, 3:16–29, 6:50–57). We find Petitioner’s reasons persuasive. *See also supra* discussion of claims 28 and 29 with respect to obviousness over Kelly and Fenton. Accordingly, we determine that the preponderance of the evidence shows that dependent claims 28 and 29 would have been obvious over Clair and Fenton.

2. Independent Claim 32

Independent claim 32 recites “a branch on the christmas tree comprising a first bore communicating with the production bore and a second bore communicating with a flowline.” As discussed above, Petitioner argues (and we determine) that Clair anticipates claim 32. *See* Pet. 52–54. Petitioner further argues, however, “[e]ven if the flowline of claim 32 is narrowly interpreted such that Clair is considered to not expressly disclose this element . . . , it would have been obvious to employ a flowline communicating with the second bore, as flowlines were commonly used with wellhead installations.” Pet. 58. For example, Petitioner points

out, “Fenton describes an outlet of a tree ‘communicating with a flowline.’” *Id.* at 59 (citing Ex. 1005 ¶¶ 7, 21). According to Petitioner, a skilled artisan “would have chosen to modify Clair’s system in view of Fenton[] because . . . adding a flowline in fluid communication with ‘discharge pipe 14’ would provide flexibility in delivering fluids to or from the ‘separator or the storage tanks,’ as taught by Clair.” *Id.* (citing Ex. 1006, 4:5–8). As support, Petitioner relies on the declaration testimony of Mr. Herrmann. *Id.* (citing Ex. 1003 ¶ 65).

Based on the record before us, we find that Fenton teaches a flowline. *See* Ex. 1005 ¶¶ 7, 21. In addition, we are persuaded by Petitioner’s proffered reasoning for modifying Clair’s system to include Fenton’s flowline, and thus also find that Petitioner has adequately articulated a reason to combine Clair and Fenton.

Patent Owner does not dispute Petitioner’s evidence and arguments that claim 32 would have been obvious over Clair and Fenton, except to rely on its “reasons . . . with respect to Clair for claim[] . . . 32.” PO Resp. 79. As explained above with respect to anticipation by Clair, however, we are persuaded that Clair discloses the disputed limitations. Accordingly, we find that Patent Owner does not adequately rebut Petitioner’s persuasive evidence and arguments.

In view of the foregoing, we determine that Petitioner has demonstrated by a preponderance of the evidence that claim 32 would have been obvious over Clair and Fenton.

3. Dependent Claims 33–35, 38, and 41

Petitioner argues that claims 33–35, 38, and 41 would have been obvious over Clair and Fenton. Pet. 59–60. Patent Owner does not dispute Petitioner’s evidence of obviousness with respect to these claims except to argue that they are patentable “for the reasons discussed . . . with respect to Clair for claim[] . . . 32.”²¹ PO Resp. 79. We have considered fully the evidence and arguments presented by Petitioner explaining how each of the limitations of these challenged dependent claims would have been obvious over Clair and Fenton. See Pet. 59 (discussing claims 33–35) (citing previous discussions of claims 33–35 with respect to anticipation by Clair, respectively); *id.* at 60 (discussing claim 38) (citing Ex. 1003 ¶ 66; Ex. 1005 ¶ 18); *id.* (discussing claim 41) (citing previous discussion of claim 33 with respect to anticipation by Clair). We are persuaded by Petitioner’s reasoning. Thus, we determine that the preponderance of the evidence weighs in favor of Petitioner’s proof that dependent claims 33–35, 38, and 41 would have been obvious over Clair and Fenton.

4. Dependent Claims 36 and 37

As discussed above, claims 36 and 37 depend from claim 32 and require a “processing apparatus” in addition to the “choke” recited in claim 32. Claim 37 depends directly from claim 36. For claim 36, Petitioner relies on its discussion of claim 28. Pet. 59. In that discussion,

²¹ Patent Owner also includes claims 32, 36, and 37 within this argument; however, we address these claims separately from independent claim 32.

Petitioner identifies Clair's reduction choke modified in view of Fenton as the "processing apparatus." *Id.* at 57–58.

We are not persuaded by Petitioner's argument. As explained above with respect to anticipation by Clair, claims 32 and 36 respectively recite a "choke" and a "processing apparatus." Petitioner argues (and we find) that Clair's reduction choke corresponds to the "choke" recited in claim 32. *See* Pet. 53–54; *id.* at 59 (citing previous discussion of claim 32 with respect to anticipation by Clair). For the reasons given above, we are not persuaded that Clair's modified reduction choke teaches both the "choke" recited in claim 32 and the "processing apparatus" recited separately in claim 36.

In view of the foregoing, we determine that Petitioner has not demonstrated by a preponderance of the evidence that claim 36 would have been obvious over Clair and Fenton. As claim 37 depends from claim 36, we also determine that Petitioner has not demonstrated by a preponderance of the evidence that claim 37 would have been obvious over Clair and Fenton.

IV. CONCLUSION

For the foregoing reasons, we determine that Petitioner has demonstrated by a preponderance of the evidence that: (1) claims 11, 12, 17–19, 22, 25–28, 32–35, and 41 are unpatentable under 35 U.S.C. § 102 as anticipated by Kelly; (2) claims 28, 29, 38, and 39 are unpatentable under 35 U.S.C. § 103 as obvious over Kelly and Fenton; (3) claims 11, 12, 17–19, 22, 25–29, 32–35, and 41 are unpatentable under 35 U.S.C. § 103 as obvious over Kelly and Bednar; (4) claims 28, 29, and 38 are unpatentable under 35 U.S.C. § 103 as obvious over Kelly, Bednar, and Fenton; (5) claims 1, 10–

12, 17–19, 21–23, 25–28, 31–35, and 41 are unpatentable under 35 U.S.C. § 102 as anticipated by Clair; and (6) claims 28, 29, 32–35, 38, and 41 are unpatentable under 35 U.S.C. § 103 as obvious over Clair and Fenton.

Petitioner has not shown by a preponderance of the evidence that claims 36 and 37 are unpatentable.

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1, 10–12, 17–19, 21–23, 25–29, 31–35, 38, 39, and 41 of the '306 patent are held *unpatentable*;

FURTHER ORDERED that claims 36 and 37 have not been shown to be unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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