

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BAKER HUGHES INCORPORATED and
BAKER HUGHES OILFIELD OPERATIONS, INC.,
Petitioner,

v.

PACKERS PLUS ENERGY SERVICES, INC.,
Patent Owner.

Case IPR2016-00657
Patent 9,074,451 B2

Before SCOTT A. DANIELS, NEIL T. POWELL, and
CARL M. DEFRANCO, *Administrative Patent Judges*.

POWELL, *Administrative Patent Judge*.

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

I. INTRODUCTION

Petitioner filed a Petition challenging claims 1–8 of U.S. Patent 9,074,451 (“the ’451 patent”). Paper 1 (“Pet.”). Patent Owner filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). On September 1, 2016, we instituted *inter partes* review with an Institution Decision. Paper 9 (Inst. Dec.). Subsequently, Patent Owner filed a Patent Owner Response (Paper 25, “PO Resp.”), and Petitioner filed a Reply (Paper 30, “Reply”).

We have jurisdiction over these proceedings under 35 U.S.C. § 6(b). After considering the evidence and arguments of the parties, we determine that Petitioner has proven by a preponderance of the evidence that claims 1–8 of the ’451 patent are unpatentable. *See* 35 U.S.C. § 316(e). We issue this Final Written Decision pursuant to 35 U.S.C. § 318(a).

II. BACKGROUND

A. *The ’451 Patent*

The ’451 patent describes a method and apparatus for selective control of flow to a wellbore for fluid treatment. Ex. 1001, 1:24–27. Typically, a tubing string is run into a wellbore as a conduit for oil and gas products to flow to the surface. *Id.* at 1:31–51. But when natural formation pressure is insufficient, a well “stimulation” technique is employed, which involves injecting fracturing fluids into the formation surrounding the wellbore to enlarge existing channels and thereby improve inflow into the wellbore. *Id.* at 1:38–42. To inject fluid into the formation, a tubing string disposed in the wellbore may have ports that discharge treatment fluid into the wellbore. *See id.* at 1:60–67.

The ’451 patent shows an apparatus for wellbore fluid treatment in Figure 6, reproduced below.

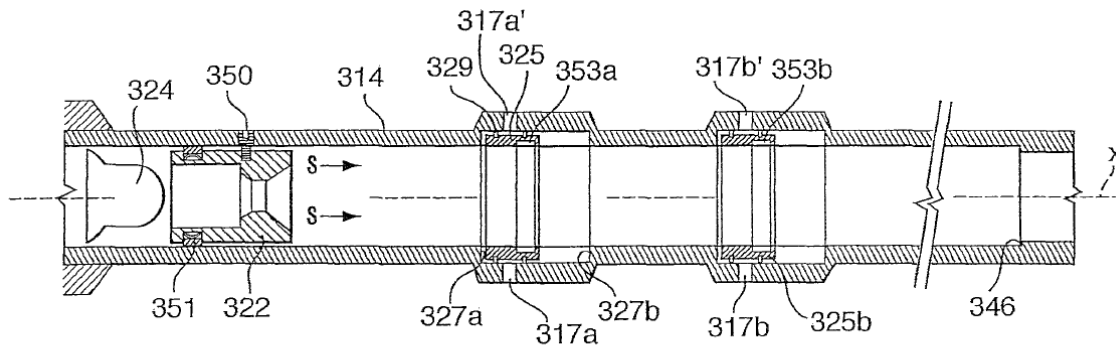


FIG. 6

Figure 6 shows tubing string 314, which has normally closed ports 317a, 317a', 317b, 317b'. *Id.* at 9:49–52. Port-closing sleeve 325 is covering ports 317a, 317a'. *Id.* at 9:63–64. Port-closing sleeve 325b is covering ports 317b, 317b'. *Id.* at 9:64–65. In this state, port-closing sleeves 325, 325b seal against fluid flow through ports 317a, 317a', 317b, 317b'. *Id.* at 9:63–67.

Sleeve 322 is initially mounted inside tubing string 314 by shear 350. *Id.* at 9:49–59. When plug 324 seats inside sleeve 322, fluid pressure can cause shear 350 to shear, allowing sleeve 322 to be driven along tubing string 314. *Id.* at 9:59–62. Sleeve 322 includes outwardly biased dogs 351. *Id.* at 10:25–26. As sleeve 322 travels along tubing string 314, it engages and moves port-closing sleeves 325, 325b. *Id.* at 10:21–24. Specifically, when sleeve 322 travels through tubing string 314, sleeve 322 and its dogs 351 engage sleeve 325 and move it away from ports 317a, 317a'. *See id.* at 10:21–35. Then, continued application of pressure causes dogs 351 to collapse, allowing sleeve 322 to move out of engagement with port-closing sleeve 325 and on to port-closing sleeve 325b. *See id.* at 10:35–42.

B. The Related District Court Action

The '451 patent is involved in a concurrent district court action, *Rapid Completions LLC v. Baker Hughes Incorporated*, No. 6:15-cv-00724 (E.D. Tex.), which was filed July 31, 2015. Paper 5.

C. The Challenged Claims

Of the challenged claims, claims 1, 2, and 6 are independent. Claim 1 is illustrative, and is reproduced below.

1. An apparatus for fluid treatment of a borehole, the apparatus comprising:
a tubing string having a long axis and a wall defining an inner bore and an outer surface of the tubing string; and
a plurality of sleeve closures accessible in the inner bore of the tubing string, each of the plurality of sleeve closures being actuatable by a first plug moveable through the tubing sting, each of the plurality of sleeve closures being actuatable from a covering position over a port through the wall to an open position exposing the port, the covering position preventing fluid communication through the port between the inner bore and the outer surface and the open position permitting fluid communication through the port between the inner bore and the outer surface, and each of the plurality of sleeve closures in the open position allowing the first plug to pass therethrough.

Ex. 1001, 11:37–12:3.

D. The Pending Grounds

The pending grounds in this *inter partes* review are (Inst. Dec. 30):

Ground	Reference(s)	Challenged Claims
§ 102	Themig ¹	1–8
§ 102	Flores ²	1–8
§ 103	Flores	1–8
§ 103	Flores and Whiteley ³	1–8

¹ U.S. Patent No. 7,108,067 B2, iss. Sept. 19, 2006 (“Themig”) (Ex. 1002).

² U.S. Patent No. 8,215,411 B2, iss. July 10, 2012 (“Flores”) (Ex. 1003).

Ground	Reference(s)	Challenged Claims
§ 103	Echols ⁴ and Thomson ⁵	1–8
§ 103	Echols, Thomson, and Whiteley	1–8

As further support, Petitioner proffers Declarations of Ali Daneshy, Ph.D. (Exs. 1006, 1033). Patent Owner relies on a Declaration of Harold E. McGowen, III (Ex. 2006).

III. ANALYSIS

A. *Claim Construction*

We interpret claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b). We presume a claim term carries its “ordinary and customary meaning,” which is “the meaning that the term would have to a person of ordinary skill in the art in question” at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007) (citation and quotations omitted). This presumption, however, is rebutted when the patentee acts as his own lexicographer by giving the term a particular meaning in the specification with “reasonable clarity, deliberateness, and precision.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

In the Petition, Petitioner proposed constructions for certain claim terms. Pet. 13–18. In its Preliminary Response, Patent Owner also proposed constructions for certain claim terms. Prelim. Resp. 7–14.

³ U.S. Patent No. 6,006,838, iss. Dec. 28, 1999 (“Whiteley”) (Ex. 1022).

⁴ U.S. Patent No. 5,375,662 iss. Dec. 27, 1994 (“Echols”) (Ex. 1004).

⁵ D.W. Thomson et al., *Design and Installation of a Cost Effective Completion System for Horizontal Chalk Wells Where Multiple Zones Require Acid Stimulation*, SPE (Society for Petroleum Engineering) 37482 (1997) (“Thomson”) (Ex. 1005).

In our Institution Decision, we determined that each of independent claims 1, 2, and 6 requires an apparatus or method with a sleeve (or multiple sleeves) actuatable or opened by a plug, where the sleeve (or multiple sleeves) allows the plug to pass through the sleeve in the open position. Inst. Dec. 5–6. As we explained, independent claim 1 recites “each of the plurality of sleeve closures being actuatable by a first plug moveable through the tubing string” and “each of the plurality of sleeve closures in the open position allowing the first plug to pass therethrough.” Claim 6 recites very similar language. The plain meaning of this language is that multiple sleeve closures are actuatable by a single plug, i.e., the “first plug,” and that those sleeve closures allow that plug to pass through them in the open position. Independent claim 2 recites “changing the first sliding sleeve to an open position . . . by engaging the first plug on the first sliding sleeve” and “passing the first plug through the first sliding sleeve in the open position to the second sliding sleeve.” The plain meaning of this language requires a single plug, i.e., “the first plug” to open a first sliding sleeve, as well as 1) engage on the first sliding sleeve and change it to the open position, and 2) pass through the first sliding sleeve in its open position to the second sliding sleeve.

As we also explained in the Institution Decision, the plain meaning of the claims is consistent with the Specification. In the example disclosed in connection with Figure 6, sleeves 325a and 325b are actuatable by plug 324 seated in sleeve 322; sleeve 325a in its open position allows plug 324 seated in sleeve 322 to pass through sleeve 325a to sleeve 325b; and sleeve 325b in its open position also allows plug 324 seated in sleeve 322 to pass through. Ex. 1001, 9:59–62, 10:13–42.

As we explained in the Institution Decision, no other claim constructions were necessary to determine whether to institute trial. Inst. Dec. 5. Subsequent to the Institution Decision, neither Patent Owner's Response nor Petitioner's Reply present claim-construction arguments. See PO Resp. 5–6; Reply 1–15. Accordingly, we maintain our interpretation of claims 1, 2, and 6 as requiring an apparatus or method with a sleeve (or multiple sleeves) actuatable or opened by a plug, where the sleeve (or multiple sleeves) allows the plug to pass through the sleeve in the open position. No further claim constructions are necessary to resolve the disputes presented by the parties.

B. The Effective Filing Date of the Challenged Claims

The '451 patent claims priority to a number of earlier applications, including U.S. Patent Application 13/455,291 (hereafter, "the '291 application"), U.S. Patent Application 12/830,412 (hereafter, "the '412 application"), U.S. Patent Application 12/208,463 (hereafter, "the '463 application"), U.S. Patent Application 11/403,957 (hereafter, "the '957 application"), U.S. Patent Application 10/604,807 (hereafter, "the '807 application"), and U.S. Patent Application 60/404,783.

Petitioner argues that the claims of the '451 patent are not entitled to a priority date earlier than the July 5, 2010 filing date of the '412 application. Pet. 19–25. Petitioner asserts that the '807 application does not provide written description support for the challenged claims. *Id.* at 23–25. Patent Owner argues that the claims are entitled to the August 19, 2003 filing date of the '807 application, which matured into U.S. Patent No. 7,108,067 (hereafter, "the '067 patent"). PO Resp. 12–21.

Petitioner asserts that the embodiment shown in Figure 6 is the only disclosure in the '451 patent that meets the challenged claims of the '451 patent. Pet. 11. Petitioner notes that this embodiment involves plug 324 engaging sleeve 322 to move port-closing sleeves 325, 325b. *Id.* at 11–12. Petitioner refers to sleeve 322 as “port-**opening** sleeve 322.” *Id.* at 14. In the case of such an embodiment, where plug 324 engages sleeve 322 to move sleeves 325, 325b, Petitioner refers to the operation as “indirect actuation” of sleeves 325, 325b by plug 324. *See id.* at 1, 14–15. Petitioner indicates that, like the disclosure in the '451 patent, the only disclosure in the '807 application that meets the challenged claims is an embodiment that includes a port-opening sleeve. *See id.* at 22–23 (noting only “Port-Opening Sleeve Embodiment” disclosed in any application before the '412 application).⁶ Thus, Petitioner advances, the only disclosures in the '451 patent and the '807 application that fall within the claims include a port-opening sleeve. Additionally, Petitioner notes that the original claims of the '807 application all require a “port-opening sleeve.” *Id.* at 23 (“[E]very claim ever filed in these earlier applications required a port-opening sleeve.”).

In contrast, Petitioner notes that none of the challenged claims of the '451 patent recites a port-opening sleeve. *Id.* at 22. Instead, Petitioner notes that the challenged claims all encompass systems with or without a port-opening sleeve. *Id.* Petitioner likens this case to *ICU Medical Inc. v. Alaris Medical Sys., Inc.*, 558 F.3d 1368 (Fed. Cir. 2009). Pet. 19, 23–25. There,

⁶ Petitioner notes that the '412 application discloses embodiments—the “Yieldable Ball and Seat Embodiments”—that meet the claims without a port-opening sleeve. Pet. 21–22.

the specification of a patent describing only medical valves with spikes did not provide written description support for claims that did not recite the spike but encompassed medical valves with or without a spike. *ICU Medical*, 558 F.3d at 1378–1379. In other words, Petitioner asserts that, like the facts in *ICU Medical*, the narrow disclosure of a system with a port-opening sleeve in the '807 application does not provide written description support for the broader claims of the '451 patent, which encompass a system with or without a port-opening sleeve.

Patent Owner disagrees, noting that even Petitioner acknowledges the challenged claims cover the Figure 6 embodiment, which is disclosed in both the '451 patent and the '807 application. PO Resp. 12. Patent Owner also contends that “[a]dditional written description support for the claims is provided by figures 1, 4, and 7 and the corresponding descriptions of those figures . . . , which describe the invention more generally.” *Id.* at 12, n.2.

Patent Owner further argues that “[t]he invention of the ['451] patent is not limited to the specific preferred embodiment of figure 6.” PO Resp. 13. Patent Owner asserts that the '451 patent associates the port-opening sleeve and its locking dogs with the function of catching a plug to open a sleeve closure, and subsequently releasing the plug to allow it actuate another sleeve closure. *Id.* at 15. Patent Owner asserts that a person of ordinary skill in the art would not think it critical to use any particular mechanism to catch or release the plug. *Id.* at 14. Instead, Patent Owner contends, a person of ordinary skill in the art would recognize the possibility of making various design changes without compromising the function. *Id.* at 13–14.

Patent Owner also argues that *ICU Medical* does not apply here. *Id.* at 16–20. Citing *ICU Medical* and *Crown Packaging Tech., Inc. v. Ball Metal Beverage Container Corp.*, 635 F.3d 1373, 1381 (Fed. Cir. 2011), Patent Owner elaborates that the court in *ICU Medical* rested its “decision on the unambiguous disclosure in the specification that a spike within the medical valve was necessary to the use of the claimed invention.” *Id.* at 16. Patent Owner argues Petitioner has not shown such a disclosure here. *Id.* Patent Owner adds that Petitioner’s reference to “indirectly” actuating sleeve closures fails “to identify any allegedly missing limitation that is analogous to the ‘spike’ limitation of *ICU Medical*.” *Id.* at 17–20.

Patent Owner also indicates that the disclosure in the ’412 application has no bearing on the issue at hand—whether the ’807 application provides written description support for the challenged claims of the ’451 patent. *Id.* at 20–21. Patent Owner cites *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1566 (Fed. Cir. 1991) as support.

The written description requirement of 35 U.S.C. § 112, first paragraph, requires that “the disclosure of the application relied upon reasonably convey[] to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). One shows “possession” by descriptive means such as words, structures, figures, diagrams, and formulas that set forth fully the claimed invention. *Lockwood v. American Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997). It is not sufficient for purposes of the written description requirement that “the disclosure, when combined with the knowledge in the art, would lead one to speculate as to modifications that the inventor might have envisioned, but

failed to disclose.” *Id.* “One shows that one is ‘in possession’ of *the invention* by describing *the invention*, with all its claimed limitations, not that which makes it obvious.” *Id.* “[T]he hallmark of written description is disclosure. . . . [T]he test requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art.” *Ariad*, 598 F.3d at 1351. Also, the claimed invention does not have to be described *in ipso verbi* in the specification to satisfy the written description requirement. *Union Oil Co. of California v. Atlantic Richfield Co.*, 208 F.3d 989, 1000 (Fed. Cir. 2000).

Petitioner persuades us that the ’807 application does not provide written description support for the challenged claims of the ’451 patent. Aside from the Figure 6 embodiment of the ’451 patent and ’807 application, no other disclosed embodiment falls within the scope of the challenged claims. As noted in our Institution Decision and in Section III.A above, each of the challenged claims requires an apparatus or method with a sleeve (or multiple sleeves) actuatable or opened by a plug, where the sleeve (or multiple sleeves) allows the plug to pass through the sleeve in the open position. Inst. Dec. 5–6. Aside from the Figure 6 embodiment, we do not find (and Patent Owner does not argue) that any of the other embodiments teaches a sleeve or sleeves that allow a plug to pass through in the open position of the sleeve or sleeves. In view of this, Petitioner persuades us that none of the disclosed embodiments other than Figure 6 of the ’807 application could potentially provide written description support for the challenged claims of the ’451 patent.

Petitioner also persuades us that the ’807 application does not provide written description support for claims that omit a port-opening sleeve.

Although the Specifications of the '451 patent and the '807 patent do not use the word “necessary,” we are persuaded that, just as a person of ordinary skill in the art would have understood that the spike was necessary in *ICU Medical*, a person of ordinary skill in the art would have understood that the port opening sleeve (i.e., sleeve 322) is necessary here. *See ICU Medical*, 558 F.3d at 1378; *see also LizardTech, Inc. v. Earth Res. Mapping, Inc.*, 424 F.3d 1336, 1344–45 (Fed. Cir. 2005) (The disclosure of only one way to create a seamless DWT—by maintaining updated sums—did not provide written description support for claims that did not recite maintaining updated sums.). As Petitioner explains, the original claims of the '807 application all require a “port-opening sleeve,” as recited in independent claims 1 and 15. Ex. 1019, 39–42; Pet. 23. Similarly, the Abstract of the '807 application describes a tubing string assembly that includes closures, in which “[t]he closures are openable by a sleeve drivable through the tubing string inner bore.” Ex. 1019, 43. These disclosures would have strongly suggested to a person of ordinary skill in the art that a port-opening sleeve was a necessary component in the invention. *See ICU Medical*, 558 F.3d at 1378 (noting claims omitting spike recitation not filed with original application, but added years later during prosecution).

Consistent with this, Petitioner persuades us that the only way the '807 application teaches the claimed requirement of allowing a plug to open and then pass through a sleeve or sleeves is by using a port-opening sleeve, such as sleeve 322. Pet. 25; Reply 7. Petitioner argues that the Figure 6 embodiment cannot function without the port-opening sleeve. Pet. 25. Petitioner explains that port-closure sleeves 325a, 325b “have an inner diameter that ‘is generally equal’ to the inner diameter of the tubing string,

meaning that any ball or plug that can traverse the tubing string will—in the absence of an intermediate port-opening sleeve—necessarily also pass through the port-closure sleeves [without opening them].” *Id.* (citing Ex. 1001, 10:5–10, Fig. 6); *see also* Ex. 1019, 34 (Disclosing that “sleeve 325a is selected to have an inner diameter that is generally equal to the tubing string inner diameter.”).

We find unpersuasive Patent Owner’s reliance on *Crown Packaging*. *See* PO Resp. 16. In *Crown Packaging*, the specification disclosed two ways to save metal in a can: 1) increasing the slope of the chuck wall on the can end, and 2) “limiting the width of the anti peaking bead” on the can end. *Id.* at 1375. The specification also discussed two ways of driving the can with a chuck engaged to the end of the can. The specification noted that in the prior art, cans had been driven with the chuck engaged inside the anti peaking bead. *Id.* at 1376, 1382. The specification also explained that the chuck could engage the can end outside of the anti peaking bead. *Id.* at 1376. The specification indicated that engaging the can outside the peaking bead would avoid damage to a narrowed anti peaking bead. *Id.* at 1377–1378. The independent claims did not recite a particular dimension for the anti peaking bead or engaging the chuck outside the anti peaking bead. *Id.* at 1378–1379. Thus the claims covered a chuck engaged either inside or outside of the anti peaking bead. *Id.*

Crown Packaging overturned the district court’s determination that the specification only provided written description support for a chuck driving the can outside of the anti peaking bead. *Id.* at 1379–1382. Noting that the specification disclosed two independent ways to save metal, the court held that the claims need not recite both of them. *Id.* at 1381. The

court observed that Crown's original claims clearly showed the applicants were claiming an increased slope of the chuck wall, without necessarily limiting the anti peaking bead or where the chuck engages the can. *Id.* Noting that the specification's discussion of the prior art showed a chuck engaged inside an anti peaking bead, the court also observed that it was not necessary for the chuck to engage the can outside of the anti peaking bead. *Id.* at 1382.

We find the facts of this case differ significantly from those in *Crown Packaging*. In contrast to *Crown Packaging*, the original claims of the '807 application strongly suggest that the applicants believed the port-opening sleeve to be a necessary component of the invention. Additionally, whereas Crown's specification disclosed multiple ways to achieve metal savings and to engage a chuck to a can end, the '807 application discloses only one way to achieve the function recited in the challenged claims—with a port-opening sleeve.

We also find unpersuasive Patent Owner's arguments that a person of ordinary skill in the art would have recognized the possibility of making various design changes. *See* PO Resp. 13–16. Patent Owner rests this argument on the testimony on page 12 of Mr. McGowen's declaration, where he opines about various design changes that could be made. *See id.* We afford this particular testimony little weight because Mr. McGowen does not cite any underpinning evidence for his assertions about the possible variations. *See* Ex. 2006, 12; 37 C.F.R. § 42.65 ("Expert **testimony** that does not disclose the underlying facts or data on which the opinion is based is entitled to **little** or no **weight**."). We also note that this testimony discusses a number of possible variations, but does not discuss omitting the

port-opening sleeve as a possible variation. *See id.* Thus, even if we credit Mr. McGowen's testimony, it provides limited support for the proposition that the '807 application demonstrates possession of a system without a port-opening sleeve. Moreover, as Petitioner notes, Mr. McGowen indicated the variations he discussed would have been "obvious," which is not enough to establish written description support. *See ICU Medical*, 558 F.3d at 1378–1379.

The '957 application is a continuation of the '807 application, containing the same disclosure as the '807 application. *See* Ex. 1001, 1; Ex. 1018. Similarly, the '463 application is a continuation of the '957 application, containing the same disclosure as the '957 application and the '807 application. *See* Ex. 1001, 1; Ex. 1017. Accordingly, we are persuaded that the '957 application and the '463 application also lack written description support for the challenged claims of the '451 patent. Thus, we are persuaded that the effective filing date of the challenged claims of the '451 patent is not before the July 5, 2010 filing date of the '412 application.claim.”).

C. Alleged Anticipation of Claims 1–8 by Themig

Given its assertion that the challenged claims are not entitled to an effective filing date earlier than July 5, 2010, Petitioner asserts that Themig constitutes prior art to the challenged claims under 35 U.S.C. § 102(b). Pet. 3. Petitioner asserts that Themig discloses all of the limitations of claims 1–8. Pet. 25–29.

Our analysis focuses on the challenge against independent claims 1, 2, and 6 as anticipated by Themig. The challenge of claims 3–5, 7, and 8 as

anticipated by Themig stems from the foundational premise that Themig anticipates the independent claims. 26.

Themig discloses a tubing string in Figure 6, reproduced below.

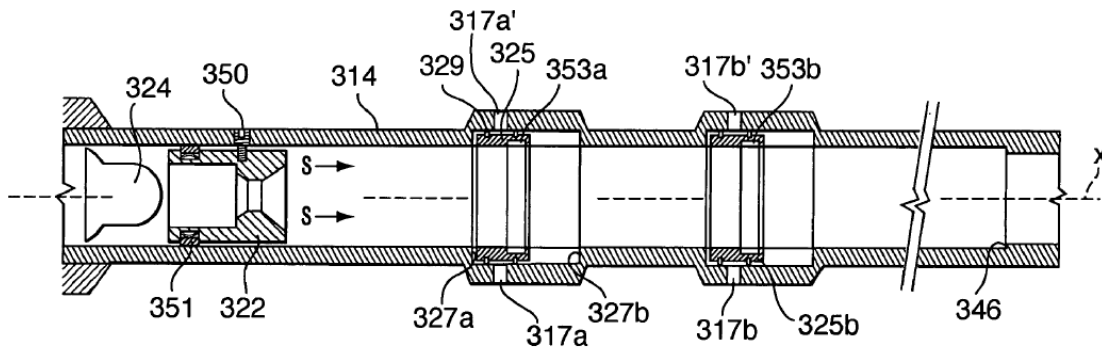


FIG. 6

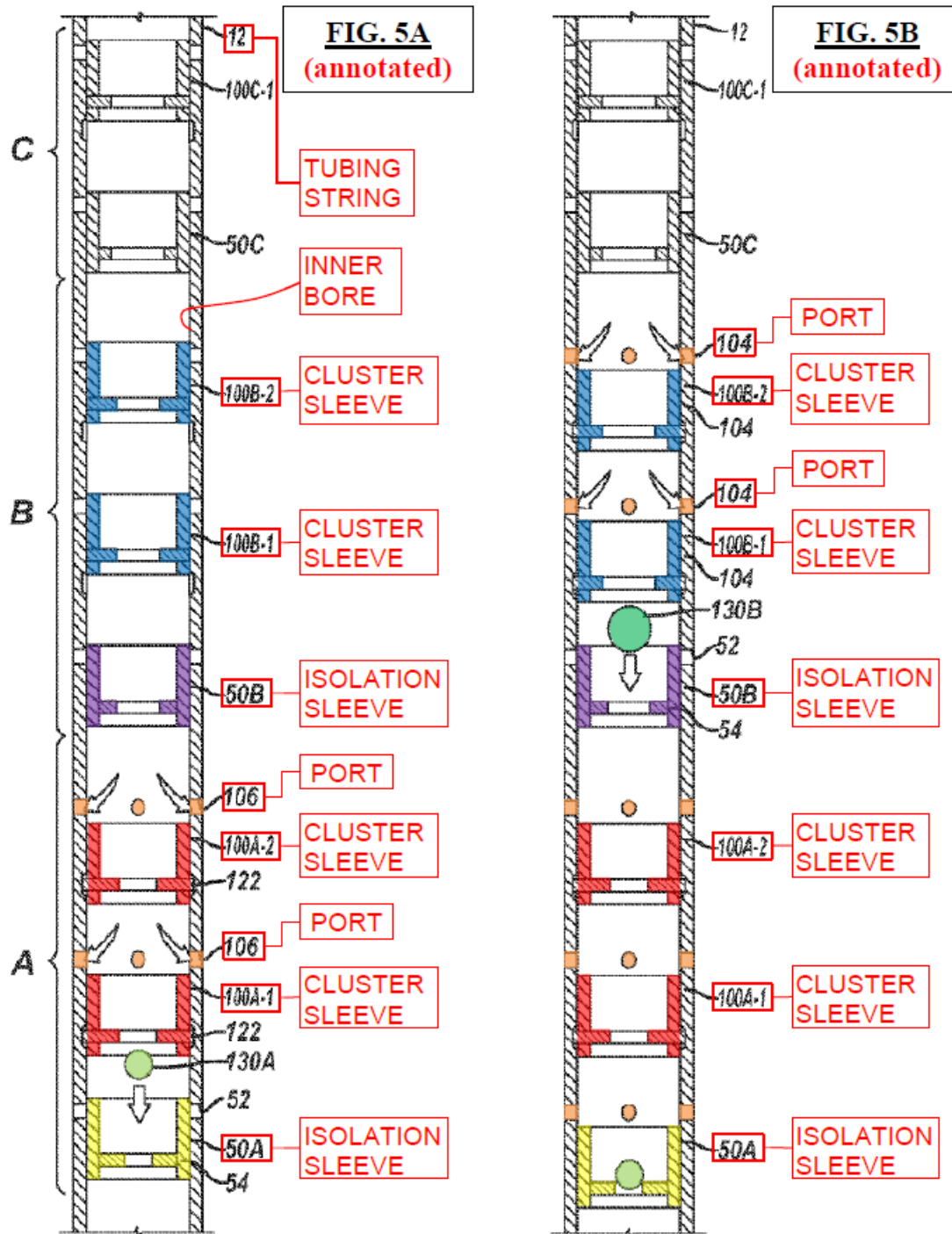
Figure 6 of Themig shows tubing string 314, which includes moveable sleeve 322, as well as port-closing sleeves 325 and 325b. Ex. 1002, 9:44–60. In the state shown in Figure 6, port-closing sleeve 325 covers ports 317a and 317a', and port-closing sleeve 325b covers ports 317b and 317b'. *Id.* at 9:58–60. With plug 324 seated in sleeve 322, fluid pressure can move sleeve 322 through tubing string 314. *Id.* at 9:53–57. As plug 324 and sleeve 322 move through tubing string 314, they move sleeve 325 to uncover ports 317a, 317a', and plug 324 and sleeve 322 pass through sleeve 325 to sleeve 325b. *Id.* at 9:53–57, 10:16–37. Plug 324 and sleeve 322 then move sleeve 325b to uncover ports 317b, 317b', and plug 324 and sleeve 322 pass through sleeve 325b. *Id.*

Petitioner's assertions and evidence persuade us that Themig anticipates each of claims 1–8. Patent Owner's sole argument that Themig does not anticipate claims 1–8 is that the claims are entitled to the filing date of the '807 application, such that Themig is not prior art to claims 1–8. PO

Resp. 21. For the reasons, explained above in Section II.B, we find this argument unpersuasive.

D. Alleged Anticipation of Claims 1–8 by Flores

Given its assertion that the challenged claims are not entitled to an effective filing date any earlier than July 5, 2010, Petitioner asserts that Flores constitutes prior art to the challenged claims under 35 U.S.C. § 102(e). Pet. 3. In connection with annotated versions of Figures 5A and 5B of Flores, depicted below, Petitioner discusses aspects of Flores’s disclosure that allegedly meet the limitations of the challenged claims. Pet. 30–37.



Figures 5A and 5B of Flores show tubing string 12 with cluster sleeves 100 and isolation sleeves 50. Ex. 1003, 4:42–46. A first zone A includes isolation sleeve 50A, cluster sleeve 100A-1, and cluster sleeve 100A-2. *Id.*

at 4:51–53. At the stage shown in Figure 5A ball 130A has opened cluster sleeves 100A-1, 100A-2 and moved to isolation sleeve 50A. *Id.* at 4:60–63. Fluid can flow out of ports 106. *Id.* at 4:63–65.

Petitioner’s assertions and evidence persuade us that Flores anticipates each of claims 1–8. Pet. 30–37. Patent Owner’s sole argument that Flores does not anticipate claims 1–8 is that the claims are entitled to the filing date of the ’807 application, such that Flores is not prior art to claims 1–8. PO Resp. 21. For the reasons, explained above in Section III.B, we find this argument unpersuasive.

E. Alleged Obviousness of Claims 1–8 over Flores

In addition to its assertion that these claims are anticipated by Flores, Petitioner asserts that certain limitations of these claims would have been obvious over Flores. Pet. 37–38. Because Petitioner persuades us that Flores anticipates these claims, we are persuaded that these claims would have been obvious over Flores. *See In re McDaniel*, 293 F.3d 1379, 1385 (Fed. Cir. 2002) (“It is well settled that ‘anticipation is the epitome of obviousness’”).⁷ We also find persuasive Petitioner’s alternative reasons for asserting that certain limitations of claims 1–8 would have been obvious over Flores. *See* Pet. 37–38; Ex. 1006 ¶¶ 40, 66–67. Aside from asserting that Flores does not constitute prior art to the challenged claims, Patent Owner does not dispute Petitioner’s assertions that claims 1–8 would have been obvious over Flores.

⁷ We note the record does not contain evidence of objective indicia of nonobviousness.

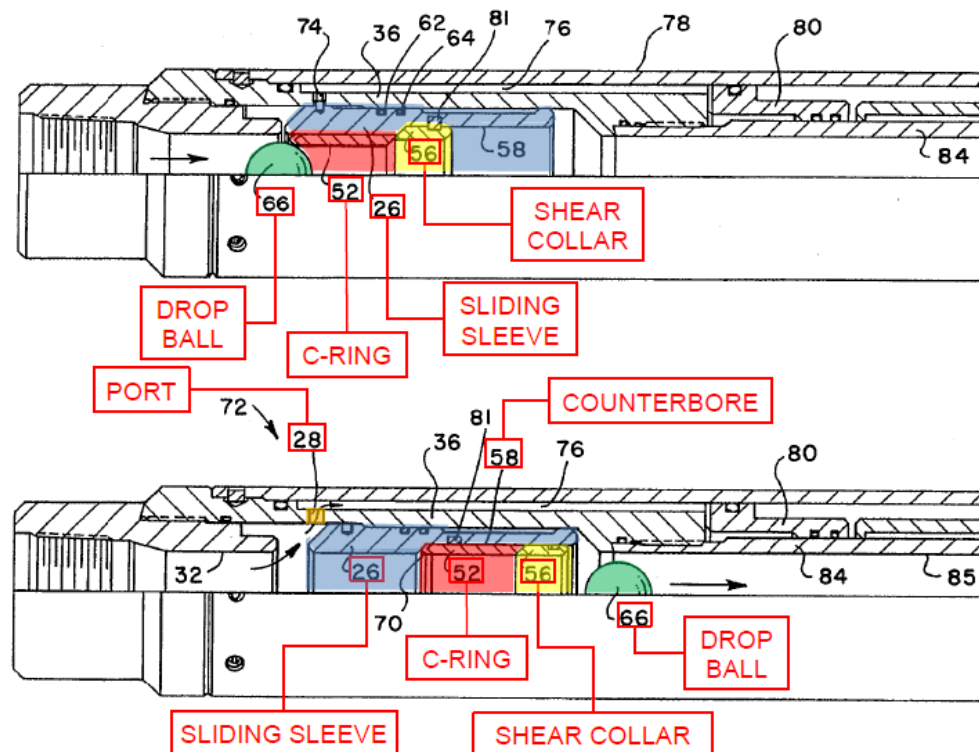
F. Alleged Obviousness of Claims 1–8 over Flores and Whiteley

In addition to its assertion that these claims are anticipated by Flores, Petitioner asserts that certain limitations of these claims would have been obvious over Flores and Whiteley. Pet. 37–38. Because Petitioner persuades us that Flores anticipates these claims, we are persuaded that these claims would have been obvious over Flores and Whiteley. *See In re McDaniel*, 293 F.3d 1379, 1385 (Fed. Cir. 2002) (“It is well settled that ‘anticipation is the epitome of obviousness’”).⁸ We also find persuasive Petitioner’s alternative reasons for asserting that certain limitations of claims 1–8 would have been obvious over Flores and Whiteley. *See* Pet. 37–38; Ex. 1006 ¶¶ 40, 66–67; Ex. 1022, 5:43–47. Aside from asserting that Flores does not constitute prior art to the challenged claims, Patent Owner does not dispute Petitioner’s assertions that claims 1–8 would have been obvious over Flores and Whiteley.

G. Alleged Obviousness of Claims 1–8 over Echols and Thomson

Petitioner also asserts that claims 1–8 are unpatentable for obviousness over Echols and Thomson. Pet. 38–50. Petitioner argues that Echols discloses a sliding sleeve arrangement allowing for one plug to actuate multiple sliding sleeves. Pet. 38–40. Petitioner discusses this in connection with annotated versions of Echols’s Figures 7 and 8, depicted below. *Id.*

⁸ We note the record does not contain evidence of objective indicia of nonobviousness.

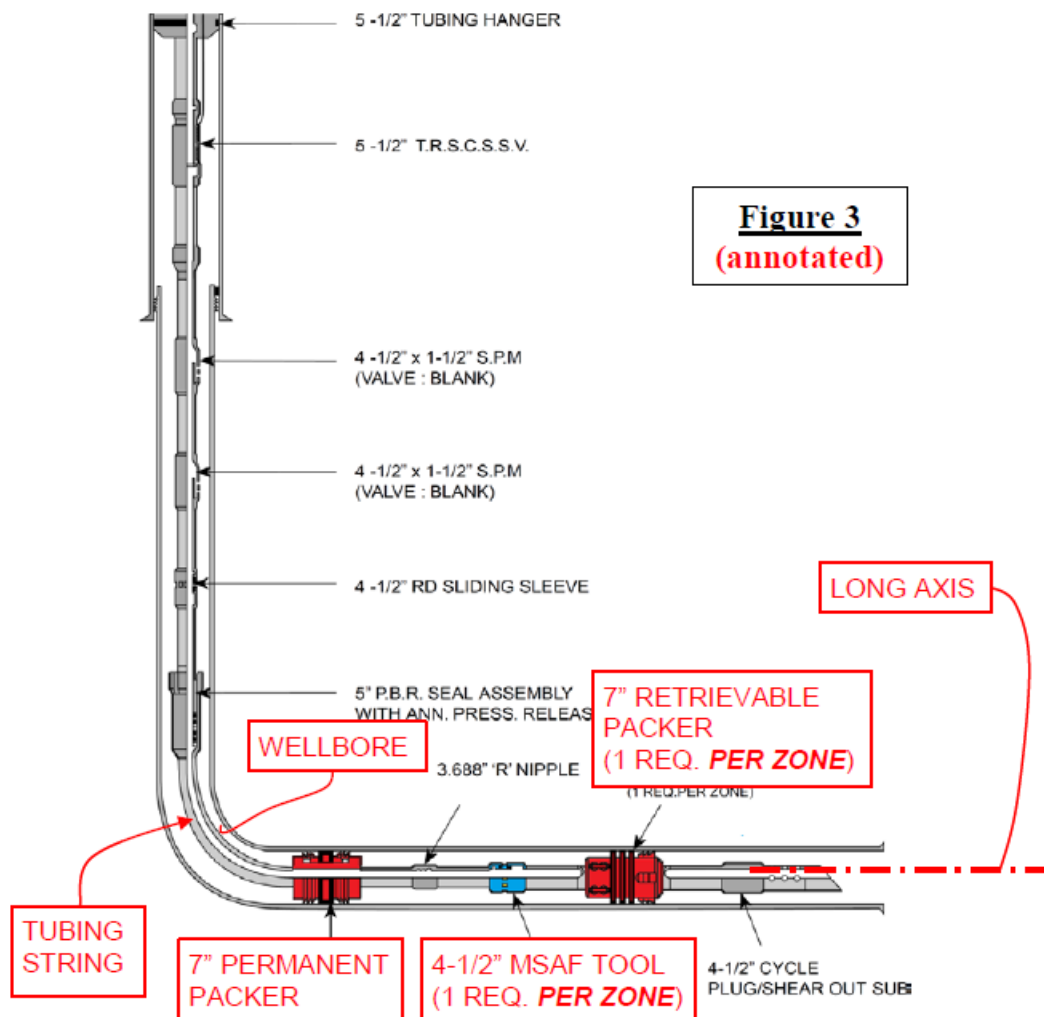


Excerpts of Figures 7 & 8
(annotated)

Figures 7 and 8 of Echols show setting apparatus 72 with isolation sleeve 26. Ex. 1004, 5:52–58. Shear screw 74 (labeled in Figure 7) initially seals port 28 (labeled in Figure 8). *Id.* at 5:55–56. In Figure 7, drop ball 66 is in sealing engagement with C-ring 52. *See id.* at Fig. 7, 6:14–16. To transition from the state shown in Figure 7 to the state shown in Figure 8, “hydraulic pressure is increased until the hollow shear screws 74 separate, thus opening the setting port 74 and permitting the isolation sleeve 26 to be shifted along the smooth bore of the guide tube 36 to the uncovered position as shown in Fig. 8.” *Id.* at 6:16–21. “When the setting port 28 is opened, hydraulic fluid is pumped into the pressure chamber 76.” *Id.* at 6:22–23. Hydraulic pressure also causes separation of shear pins 81, allowing C-ring 52 and shear collar 56 to be moved into isolation sleeve counterbore 58. *Id.* at

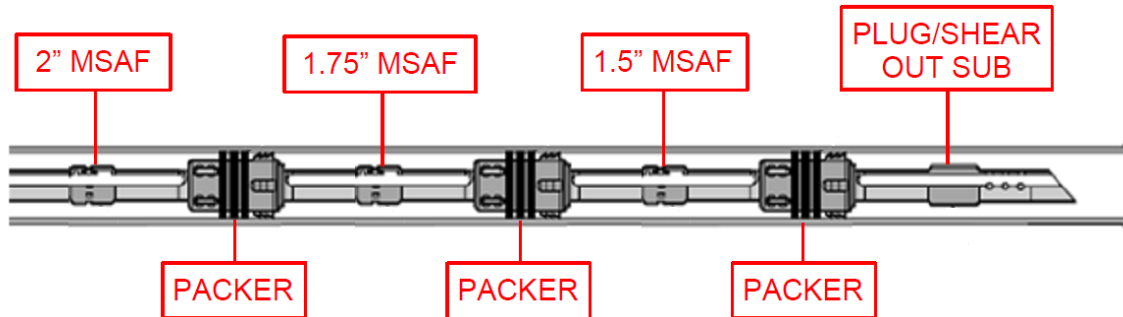
6:30–33. This allows drop ball 66 to be flowed through the setting tool. *Id.* at 6:30–37.

Petitioner asserts that “Thomson describes a successful well completion for selectively treating multiple formation zones.” Pet. 40. Petitioner discusses the disclosure of Thomson in connection with an annotated version of Thomson’s Figure 3, depicted below.



As shown, annotated Figure 3 depicts a tubing string within a borehole of an oil well. The tubing string is equipped with solid body packers (shown in red) on each side of a so-called “MSAF tool” (shown in blue), which Thomson describes as a “sliding sleeve.” Ex. 1005, 1–2. Petitioner explains

that each pair of packers isolate the zone between them. Pet. 41. Petitioner further asserts that Thomson indicates its tubing string may include multiple pairs of packers with an MSAF tool disposed in the zone between each pair of packers. *Id.* Petitioner has created an unlabeled drawing, reproduced below, illustrating such a configuration of Thomson's tubing string.



Id. Petitioner's drawing shows multiple pairs of packers isolating multiple zones within a wellbore. *Id.* One MSAF tool is disposed within each zone between a pair of packers. *Id.* Specifically, one zone includes a 1.5" MSAF tool, another zone includes a 1.75" MSAF tool, and another zone includes a 2" MSAF tool. *See id.*

Petitioner suggests that Thomson teaches using one ball to open the 1.5" MSAF tool, then another ball to open the 1.75" MSAF tool, and then another ball to open the 2" MSAF tool. *See id.* at 41–42. Petitioner further indicates that opening each MSAF tool allows treatment fluid to flow from the open MSAF tool to that zone of the wellbore. *Id.*

Petitioner asserts that it would have been obvious to modify Thomson's system by adding multiple examples of Echols's dual-sleeve arrangement. Pet. 43. Petitioner argues that Echols expressly "suggests using its sleeve for injection treatment fluids like Thomson's." *Id.* Petitioner elaborates that "[a]fter describing its invention as an arrangement for setting packers, Echols explains that its dual-sleeve arrangement 'may

also be used for injecting completion chemicals through the exposed port into the annulus surrounding the tubing string.” *Id.* (citing Ex. 1005, 6:45–53).

Petitioner provides “Figure A,” reproduced below, to illustrate the manner in which Petitioner alleges that it would have been obvious to modify Thomson’s system by adding multiple instances of Echols’ sliding sleeve. *Id.* at 43.

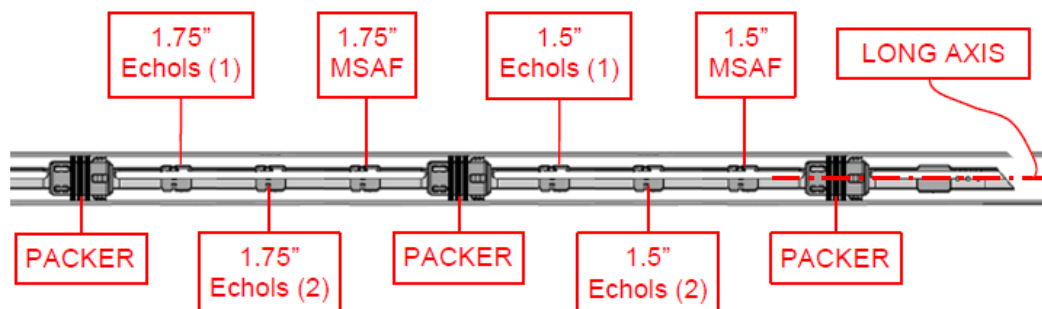


Figure A
(Thomson-Echols)

Petitioner’s “Figure A” illustrates Thomson’s system modified to include a number of Echols’s dual-sleeve arrangements. *Id.* Petitioner asserts that:

A POSITA would have been motivated to include multiple ones of Echols’ dual-sleeve arrangement sized for a 1.5-inch ball above Thomson’s 1.5-inch MSAF tool, and multiple ones of Echols’ dual-sleeve arrangement sized for a 1.75 inch ball above Thomson’s 1.75-inch MSAF tool, to provide additional injection points above Thomson’s MSAF tools in each of these zones. Ex. 1006 at ¶¶ 78-80. In this modified Echols-Thomson system, both the 1.5-inch Echols sleeves and the 1.5-inch MSAF tool could be actuated by a single 1.5-inch ball. *Id.* Similarly, both the 1.75-inch Echols sleeves and the 1.75-inch MSAF tool could be actuated by a single 1.75-inch ball. A POSITA would have expected this modified Echols-Thomson system to be beneficial for treating longer zones, or zones with larger thicknesses, to provide additional fractures or porosity at both sleeves to improve porosity and thus production from the formation. *Id.*

Pet. 43–44. Petitioner adds that “[i]t was well known at the relevant time that increasing the number of fracture points in a given zone could increase the productivity of that zone.” *Id.* at 44.

Patent Owner argues that Petitioner has not provided rational underpinning for its assertion that it would have been obvious to combine Echols and Thomson in the manner suggested. PO Resp. 21–25. Patent Owner asserts that Thomson discloses an approach where the wellbore is cemented and cased. *Id.* at 24. In other words, Patent Owner contends that the wall of Thomson’s wellbore is lined with cement. Patent Owner further asserts that in Thomson’s system, perforations are created in the cement casing, such that fluid, such as fracturing fluid, can only escape the wellbore to the surrounding formation through the perforations in the casing. *Id.* at 24.

In view of this, Patent Owner argues that the reasons presented by Petitioner would not have motivated a person of ordinary skill in the art to add multiple examples of Echols’ sleeves between the sleeves already present in Thomson’s system. PO Resp. 24–25. Patent Owner quotes Mr. McGowen’s explanation that:

It would be immediately clear to a POSITA the use of multiple Echols sleeves in a Thomson zone would not provide additional injection points into the formation. The only injection points into the casing are through perforations. If a POSITA wanted to modify Thomson to add additional injection points, he or she could add additional perforations in the casing, but there would be no reason to add additional sliding sleeves in a particular zone.

Ex. 2006, 13; PO Resp. 24. In other words, with the perforations in the cement casing dictating the number of points where fluid can enter the formation, Patent Owner contends that a person of ordinary skill in the art

would not consider that additional sleeves inside a given zone inside the cement casing would provide a benefit due to additional injection points.

Petitioner responds that “this argument incorrectly presumes that Grounds 5-6 *require* casing.” Reply 12. Noting that the challenged claims do not require a cased well, Petitioner asserts that it did not contend the modified Thomson system had to be used in a cased hole. *Id.*

Petitioner also points to additional statements in the Petition as providing rational underpinning for its obviousness contentions. *Id.* at 12–13. Petitioner argues that it “explained that a [person of ordinary skill in the art] would have expected the additional injection points in zones with larger thicknesses ‘to provide additional fractures or porosity at both sleeves to improve porosity and thus production from the formation.’” *Id.* (citing Pet. 50). Petitioner also argues that it explained that adding multiple instances of Echols’ sleeves within a zone would allow actuating all sleeves in that zone with a single-sized ball. *Id.* at 13 (citing Pet. 43–44).

Petitioner also argues that Patent Owner errs in assuming that increasing the number of perforations in a well’s cement casing would increase the number of fracture points in the formation surrounding the casing. *Id.* at 13–15. Petitioner elaborates that a technique called “limited entry” actually involves reducing the number of perforations in a well’s cement casing, for the purpose of improving fracturing. *Id.*

Patent Owner persuades us that Petitioner has not provided rational underpinning for its contention that it would have been obvious to add multiple examples of Echols’ sleeve to each interval of Thomson’s system. We find unpersuasive Petitioner’s argument that neither the claims nor the challenge requires a cement casing in the well. Regardless of what the

claims require, Petitioner chose Thomson and Echols as the prior art to support its obviousness contention. On this record, we are persuaded that Thomson discloses using its tubing string in a well lined with a cement casing. Thomson discloses that “[b]efore running the completion, each well was perforated with tubing-conveyed perforating (TCP) guns.” Ex. 1005, 3. Thomson also discusses “installation into the horizontal section of the liner,” and admonishes that “[t]he well in general and liner in particular needs to be properly cleaned and conditioned. This is essential for running ten packers in a horizontal liner.” *Id.* at 3–4. These disclosures indicate that Thomson’s system includes a cement liner in the wellbore. Consistent with this, Figure 3 of Thomson, reproduced below, appears to show a liner at the periphery of the wellbore.

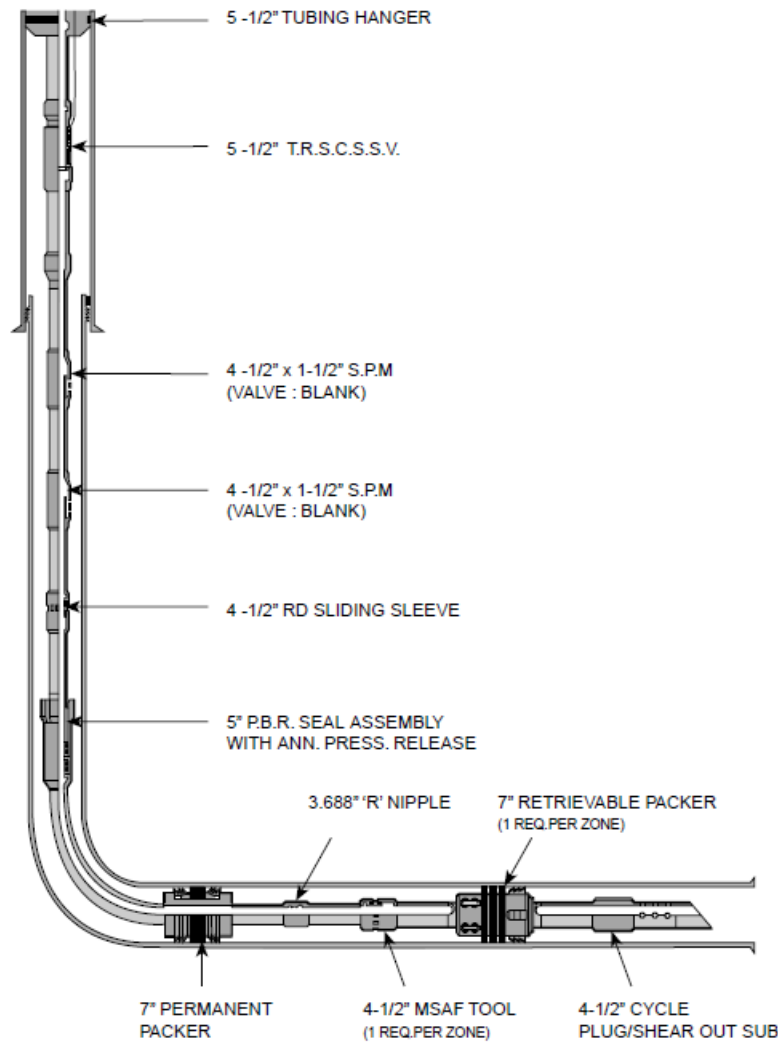


Fig. 3 — Schematic of a Typical Joanne Completion

Figure 3 of Thomson “is a schematic of a typical Joanne completion” with a tubing hanger, packers, and MSAF tool, and various other components.

Ex. 1005, 2.

Consistent with these portions of Thomson indicating that its system includes a cement casing, Mr. McGowen testifies that “Thomson describes fracturing through perforations in cemented casing.” Ex. 2006, 15. And

Petitioner has not disputed that Thomson teaches that its system includes a cement casing in the wellbore.

For multiple reasons, we find unpersuasive the assertion advanced in Petitioner's Reply that Petitioner did not contend that the modified system had to be used in a cased wellbore. *See* Reply 12. The Petition asserts that "[i]t would have been obvious to add Echols' dual-sleeve arrangement to Thomson's system." Pet. 43. Given that Thomson appears to disclose its system includes a cement casing, the foregoing assertion from the Petition would appear to include the cement casing in the combination. Consistent with this, Petitioner's "Figure A" shows the allegedly obvious modified version of Thomson's system, and includes what appears to be the cement casing at the periphery of the wellbore. *See id.* Thus, the Petition does not suggest implementing Thomson's system without its cement casing, much less provide persuasive evidence that it would have been obvious to do so. And neither Petitioner nor we can ignore the teachings of the Thomson as whole. *See W.L. Gore Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1550 (Fed. Cir. 1983).

In view of this, Patent Owner persuades us that Petitioner does not provide rational underpinning for a contention that it would have been obvious to add multiple examples of Echols' sleeves inside of Thomson's cased and perforated wellbore. Petitioner does not dispute that the number and location of casing perforations discharging treatment fluid determines where the fluid will enter the surrounding formation, thereby affecting how the surrounding formation will fracture. *See, e.g.*, Reply 13–15. Indeed, regardless of how many sleeves discharge fluid into a given zone inside the

cement casing, the perforations in the casing seemingly would control how and where that fluid flows to and fractures the surrounding formation.

Given this, Petitioner has not provided evidence persuading us that a person of ordinary skill in the art would have thought adding sleeves inside the wellbore casing would improve fracturing. Petitioner does not provide persuasive evidence to explain or otherwise support a contention that adding injection points inside a wellbore casing that constrains fluid discharge to certain perforations would somehow “provide additional fractures or porosity at both sleeves to improve porosity and thus production from the formation.” *See* Pet. 43–44; Reply 12–13.

As to Petitioner’s argument that the “limited entry” technique of reducing casing perforations can improve fracturing, Petitioner does not cite persuasive evidence that a desire to reduce casing perforations would motivate increasing the number of sleeves. *See* Reply 13–15. At the oral hearing, when asked why reducing the number of perforations allegedly would motivate increasing the number of sleeves, Petitioner asserted that the primary reason would have been to increase flow rate into the casing. Tr. 19:8–20:18. Petitioner has not cited persuasive evidence that increasing flow rate inside of a constricted casing would have motivated a person of ordinary skill in the art to include additional sleeves.

At the oral hearing, Petitioner also posited that “it’s also true that if you wanted you could attempt to line up the injection points with the perforations. That’s not something that we discussed in the papers, but it’s something that would be clear to an operator.” *Id.* at 20:19–22. Here again, Petitioner does not provide persuasive evidence for this belated contention.

We also find unpersuasive Petitioner's argument that adding Echols' sleeves to Thomson's system would "allow actuation of all sleeves in that zone by a single-sized ball." Reply 13. Thomson already allows actuation of all sleeves in each zone with a single-sized ball. Specifically, each of Thomson's zones includes one sleeve (i.e., MSAF tool), and that sleeve is actuated by a single-sized ball. *See* Ex. 1005, 1, 3, Fig. 3. Accordingly, a desire to actuate all sleeves in a given zone with a single-sized ball would not appear to provide any reason to modify Thomson's system.

For the foregoing reasons, we are persuaded that Petitioner has not provided rational underpinning for its assertion that it would have been obvious to combine the disclosures of Echols and Thomson in the manner suggested. Accordingly, Petitioner has not persuaded us that claims 1–8 would have been obvious in view of Echols and Thomson.

H. Alleged Obviousness of Claims 1–8 over Echols, Thomson, and Whiteley

When explaining how claims 1–8 are allegedly obvious over Echols, Thomson, and Whiteley, Petitioner builds from its assertions of obviousness of these same claims over Echols and Thomson. *See* Pet. 50. In doing so, Petitioner does not cure the above-discussed deficiencies in the assertion of obviousness over Echols and Thomson. Accordingly, we are not persuaded that claims 1–8 would have been obvious over Echols, Thomson, and Whiteley.

IV. CONCLUSION

For the reasons expressed above, we determine that Petitioner has shown by a preponderance of the evidence that:

Claims 1–8 are unpatentable as anticipated by Themig;

Claims 1–8 are unpatentable as anticipated by Flores;

Claims 1–8 are unpatentable as obvious over Flores;

Claims 1–8 are unpatentable as obvious over Flores and Whiteley.

Additionally, for the reasons expressed above, we determine that Petitioner has not shown by a preponderance of the evidence that:

Claims 1–8 are unpatentable as obvious in view of Echols and Thomson; and

Claims 1–8 are unpatentable as obvious in view of Echols, Thomson, and Whiteley.

V. ORDER

For the reasons given, it is:

ORDERED that claims 1–8 of the '451 patent have been shown to be *unpatentable*;

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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Patent 9,074,451 B2

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