

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

REFLEX USA LLC,
Petitioner,

v.

LONGYEAR TM, INC. and GLOBALTECH CORPORATION PTY LTD.,
Patent Owner.

Case No. IPR2023-00642
Patent No. 10,830,013

REPLY TO PATENT OWNER RESPONSE

LIST OF EXHIBITS

Exhibit	Description
1001	U.S. Patent No. 10,830,013 (the “’013 Patent”)
1002	File History for U.S. Patent No. 10,830,013 (the “’013 File History”)
1003	WO 2008/113127 (“Beach-127”)
1004	U.S. Pub. No. 2008/0001775 (“Wiese”)
1005	WO 2012/012839 (“Klass-839”)
1006	U.S. 3,305,033 (“Pickard”)
1007	U.S. 2006/0210409 (“Sumner”)
1008	WO 2013/126955 (“Hejleh”)
1009	WO 2007/109848 (“Beach-848”)
1010	U.S. Patent No. 10,465,463 (the “’463 Patent”)
1011	File History for U.S. Patent No. 10,465,463 (the “’463 File History”)
1012	U.S. Patent No. 11,466,529 (the “’529 Patent”)
1013	File History for U.S. Patent No. 11,466,529 (the “’529 File History”)
1014	Chart: Patent Office’s Evaluation of Beach-127 Against the Challenged Claims
1015	U.S. Patent Pub. No. 2013/0099935 (“Ujereh”)
1016	U.S. Patent No. 4,928,088 (“Jorion”)
1017	Central Mine Equipment Company (CMECO) Product Catalog (2013)
1018	WO 2010/091471 (“Jacobs”)
1019	New Oxford Am. Dict. 3rd (2010) (hermetic)
1020	SPIE, Free-space optical transmission improves land-mobile communications, Henniger et al. (2007)
1021	OPTICAL COMMUNICATIONS, 2nd ed., Gagliardi et al. (1995), Ch. 1
1022	Declaration of Dr. Johnathan P. Rodgers
1023	Curriculum Vitae of Dr. Johnathan P. Rodgers
1024	Excerpt from File History for U.S. Application No. 17/893,409, June 7, 2023 Office Action

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I. INTRODUCTION

The Petition demonstrates why the challenged claims are obvious. In its preliminary response, Patent Owner contested the merits of that obviousness analysis. The Board considered Patent Owner's arguments, but rejected them, instituting trial.

Patent Owner's Response largely retreads its arguments that failed at the preliminary stage. In doing so, Patent Owner mischaracterizes the Petition, overlooking the extensive arguments by Petitioner and evidence provided by its expert, Dr. Rodgers, as to why it would have been obvious to implement a "window that extends from the exterior surface into optical communication with the sealed interior cavity" in Beach-127's assembly. Patent Owner also disputes Petitioner's obviousness challenge against certain dependent claims. In all cases, Patent Owner's various arguments against Dr. Rodgers' analysis are unbacked by any expert testimony, and Patent Owner's attorney argument is devoid of technical merit and, at times, illogical.

As to all challenged claims, Patent Owner cannot overcome the overwhelming evidence of obviousness. The Board therefore should determine that the challenged claims are unpatentable.

II. CLAIM CONSTRUCTION

Petitioner explained the proper constructions for the terms “window” and “selectively sealed” within the context of the ’013 Patent. Pet. 11-13. Nonetheless, the parties agree that the Board need not construe these terms. POR 6-7.

III. CLAIM 1 WOULD HAVE BEEN OBVIOUS BASED ON BEACH-127 ALONE OR IN VIEW OF WIESE

Patent Owner does not dispute that Beach-127 discloses the majority of claim 1’s limitations—specifically, limitations 1[pre], 1[a]-[d], and 1[f]-[i].¹ Even as to limitation 1[e], which recites “a window that extends from the exterior surface into optical communication with the sealed interior cavity proximate the closed proximal end of the sealed interior cavity,” Patent Owner does not appear to dispute that Beach-127 discloses:

- a window;
- that extends from the exterior surface;
- that is proximate the closed proximal end of the sealed interior cavity.

Pet. 32-35.

¹ While Patent Owner *does not* dispute that Beach-127 features a “selectively sealed interior cavity,” Patent Owner *does* dispute that this limitation is present in Petitioner’s Beach-127/Wiese combination. *See infra*, Section III.C.

That leaves limitation 1[e]’s “*optical* communication” requirement. Beach-127 discloses that its tool communicates “via wireless communication” to a remote unit. Ex. 1003, 17:33-36. The Petition and Dr. Rodgers demonstrated it would have been obvious to a POSA to use an *optical* signal as the wireless communication type in the Beach-127 assembly. Pet. 32, 36-42; Ex. 1022, ¶¶116, 125-139. As explained below, Patent Owner’s arguments that the proposed combination lacks motivation, or that it fails to meet all of claim 1’s requirements, all fail.

A. It Would Have Been Obvious to Implement “Optical Communication” in Beach-127.

Petitioner demonstrated that it would have been obvious to a POSA to implement Beach-127’s assembly using optical communication, based on Beach-127 alone or in view of Wiese.

Patent Owner first disputes that using “optical communication” in Beach-127 would have been obvious based on the knowledge of a POSA alone. POR 14-15. However, Patent Owner does not dispute Petitioner’s expert testimony and evidence demonstrating that (1) optical communication techniques, including infrared (IR) or visible light, were common and straightforward methods for transferring data from downhole equipment to surface equipment; or even that (2) it would be beneficial to perform the disclosed communication between Beach-127’s antenna 30 and the external device optically. *See* POR 14; *see also* Pet. 36-37, Ex. 1022, ¶¶126-127 (citing Exs. 1020, 1021). Further, even assuming that

Beach-127's existing window would need to be modified to facilitate optical communication (*i.e.*, assuming Beach-127's window were transmissive only to *non-optical* electromagnetic signals, even though nothing in Beach-127 suggests this), *see* POR 14-15, there is no suggestion that such a modification would present any unique difficulty that would dissuade a POSA from pursuing optical communication. *See* Ex. 1022, ¶¶137-39. Accordingly, Patent Owner's argument that limitation-1[e] would not have been obvious based on Beach-127 and the knowledge of a POSA alone lacks merit.

B. It Would Have Been Obvious to Combine Beach-127 With Wiese to Implement “Optical Communication.”

Patent Owner next disputes that limitation 1[e]'s “optical communication” requirement would have been obvious based on Beach-127 in view of the teachings of Wiese. In doing so, Patent Owner largely retreads its preliminary arguments that the Board already rejected. D.I. at 29-31. Now, rather than providing additional evidence or expert testimony, Patent Owner offers only flawed legal analysis, unsupported technical assertions, and mischaracterizations of the Petition and Dr. Rodgers' testimony.

1. Patent Owner Mischaracterizes Petitioner's Obviousness Analysis.

Patent Owner argues that “the Petition's rationale for why a POSITA would have been motivated to make [the Beach-127/Wiese combination] is deficient

because it is predicated upon a **problem** not found in Beach-127's downhole tool."

POR 15-16.²

In making this argument, Patent Owner incorrectly suggests that obviousness requires demonstrating that the prior art suffered from a known "problem" that was in "need" of being solved. *See* POR 18 (urging that "a POSITA would not **need to** replace Beach-127's antenna 30 with an LED array to introduce th[e] capability" of external communication), 20 ("Petitioner's proposed combination **solves no problem**"), 21 ("[M]aking Beach-127's antenna LED array and adding an optical window **would not solve an identified problem**").

This is contrary to Federal Circuit precedent. *Unwired Planet, LLC v. Google, Inc.*, 841 F.3d 995, 1002-03 (Fed. Cir. 2016), held that a patent challenger does "not need to show that there was a known problem with the prior art system in order to articulate the required rational underpinning for the proposed combination." Instead, "[f]or the technique's use to be obvious, the skilled artisan need only be able to recognize, based on her background knowledge, its **potential to improve** the device and be able to apply the technique." *Id.* at 1003; *see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 401 (2007) ("If a person of ordinary skill in the art can implement

² All emphases added unless otherwise noted.

a predictable variation, and would see the *benefit* of doing so, § 103 likely bars its patentability.”).

Notwithstanding Patent Owner’s mischaracterization, the Petition never suggested that Beach-127 suffers from a “problem” in “need” of being solved. Instead, consistent with *Unwired Planet*, Petitioner’s obviousness analysis is based on the *advantages* that a POSA could have obtained by implementing Beach-127’s assembly using optical communication. Pet. 36-37 (explaining that “communicating wirelessly using optical signals had *advantages* over other wireless signal types, in terms of efficiency, latency, and data transmission capacity, such that its *benefits* would have translated to downhole assemblies”); *id.* at 41-42 (noting that the combination “would have constituted nothing more than the application of known techniques” (Wiese’s LED antenna) “to a known device ready *for improvement*” (Beach-127’s assembly) “to obtain predictable results”). Further, “the choice of an optical signal, as opposed to other segments of the electromagnetic spectrum, would have been obvious to try.” *Id.* at 42.

Rather than fairly dealing with Petitioner’s actual obviousness analysis, Patent Owner isolates a single paragraph from the Petition addressing Wiese’s teachings of the downsides of conventional downhole assemblies that are required to be opened at surface locations (Pet. 38-39), miscasting it as the “sole” reason for the combination. POR 16. Patent Owner then asserts that “Beach-127’s tool wirelessly

transmits data to a remote device and thus ***does not need to be opened to extract [] data.***” POR 17 (emphasis original). This strawman argument ignores the surrounding discussion in the Petition.

To reiterate Petitioner’s argument, both Wiese and Beach-127 disclose transmitting wireless signals through a window at the housing of a downhole tool, but ***only Wiese*** explicitly discusses an ***optical*** signal as a viable communication signal option.³ Ex. 1004, [0015]. Wiese also teaches that “[f]aster and more reliable methods for downloading information accumulated downhole and/or bi-directional communication to surface computers are ***always well received by the art.***” *Id.*, [0004]; Pet. 39. In light of Wiese’s teachings, a POSA would have been motivated to ***improve upon*** Beach-127 by using optical signals, which were known for efficient

³ Patent Owner repeatedly attempts to equate Beach-127 with Wiese. *See* POR 17 (“Beach-127 already implements Wiese’s solution.”); 18 (“Beach-127 already includes Wiese’s wireless configuration...”); 21 (asserting that the result of the combination is “to add the functionality that the device already possessed”).

However, the Board rejected Patent Owner’s argument that Wiese is cumulative of Beach-127. *See* D.I. at 16 (“This difference between Wiese and Beach-127—teaching an optically transmissive window—is material, because it addresses the sole limitation in dispute at this stage of the proceeding”); *see also id.* at 18, 29.

and reliable communication, to download information accumulated downhole. Pet. 36, 39-40. Patent Owner asserts that “Petitioner’s reliance on Wiese’s statement that *its configuration* provides a ‘[f]aster and more reliable method[] for downloading information accumulated downhole’ is misplaced because Wiese is referring to a wireless configuration generally, not an optical configuration.” POR 18. That misses the point of this statement, which comes from Wiese’s background section: “Faster and more reliable *methods* for downloading information accumulated downhole are always well received in the art.” Ex. 1004, [0004]. As Dr. Rodgers explained, this statement provides a clear suggestion to a POSA to use *optical* signals, which are known to be efficient and reliable, as the means of communication for Beach-127’s tool. Ex. 1022, ¶¶126-27, 132-33; *see also* Feb. 27, 2024 PTO Guidance at 2 (observing that a POSA’s “common sense...may be used to glean suggestions from the prior art that go beyond the primary purpose for which that prior art was produced”).

Further, even if there were no particular benefit to optical signals, they are one of just a few signal options along the electromagnetic spectrum. Thus, it would have been obvious to try implementing Beach-127’s wireless communication using optical signals, as the Petition explains. Pet. 42; *Id.* at ¶139. Patent Owner fails to respond to Petitioner’s obvious to try argument.

In Touch Technologies, cited by Patent Owner, POR 21, is inapposite. There, the Court found that the defendant's expert "succumbed to hindsight bias in her obviousness analysis and provided vague testimony rather than articulated reasons for combining the prior art references." 751 F.3d 1327, 1351-52 (Fed. Cir. 2014). There is no such hindsight here. *See* D.I. at 30 ("Regarding Patent Owner's hindsight argument, we disagree that Petitioner failed to articulate a reason with rational underpinning why one of ordinary skill in the art would have combined Beach-127 and Wiese...").

Finally, Patent Owner's assertion that Dr. Rodgers "admittedly failed to even consider the disadvantages of using optical communication in his proposed combination," POR 21, is yet another mischaracterization. While his analysis centered on the advantages of optical communication, Dr. Rodgers confirmed he considered the advantages and disadvantages of "every type of communication." Rodgers Tr. 58:7–59:14.

2. Patent Owner's "Structurally Weakening" Argument Fails.

Patent Owner argues that a POSA would be "strongly motivated *not* to make" the combination because, allegedly, it would structurally "weaken Beach-127's assembly." POR 18-21 (emphasis original). Again, this argument lacks technical support and mischaracterizes Dr. Rodgers' testimony.

For this argument, Patent Owner seizes on a statement in Dr. Rodgers' declaration that "the designer of a downhole tool is strongly motivated to make the instrument as robust to physical damage and fluid ingress as possible." POR 18 (citing Ex. 1022, ¶47). Patent Owner suggests that Dr. Rodgers urged maximizing tool strength as an absolute mandate, irrespective of other design considerations. This is untrue. Once again, Patent Owner ignores the relevant context.⁴

The statement comes from Dr. Rodgers' "Technology Background" section on downhole tools, which spans ten pages and discusses *several* design considerations. Dr. Rodgers explains that another key consideration (which Patent Owner ignores) is "to facilitate the *timely operation* of the drill rig as much as possible." Ex. 1022, ¶47. To that end, he discusses several examples of prior art downhole tools whose "housing featur[es] an optically transmissive window...such that the light is visible to an observer or received by an optical detector outside of

⁴ Conceptually, Patent Owner's argument is illogical and leads to absurd results.

Focusing solely tool strength would mean that a POSA would *never find it desirable* to implement a window at the housing of a downhole tool, because—in Patent Owner's view—the "tool will be, by definition, weaker." POR 19. This logic suggests, for example that Patent Owner's own '013 patent claims (requiring an optically transmissive window) contemplate a downhole tool unsuitable for use.

the drill string.” *Id.*, ¶38. For example, Jorion’s “downhole system 14” features “quartz or otherwise optically transparent windows (64) and (65) which may be fused to the material of the bulkhead,” permitting “rapid” two-way communication “in an intrinsically safe manner.” Ex. 1016, 5:50-53, 6:31-33; Ex. 1022, ¶¶39-40.

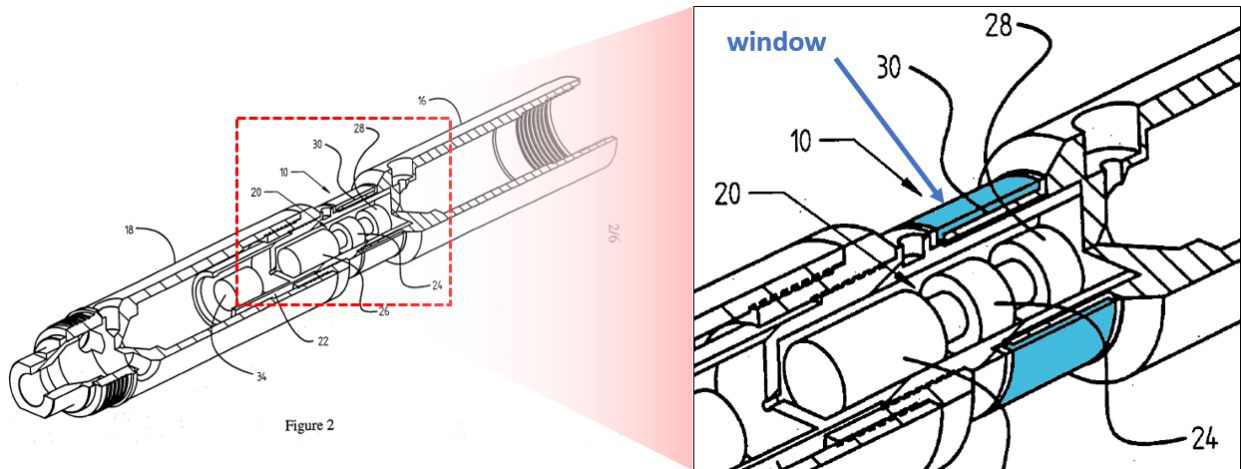
Similarly, Ujereh features an “optically transparent window 12D made of material such as boron glass, boron silicate glass or certain types of plastic” such that “[t]he window is configured to resist entry of wellbore fluid into an interior of the housing.” Ex. 1015, [0012], [0028]; Ex. 1022, ¶¶41-42. Wiese likewise demonstrates suitability of optically-transmissive windows in downhole tools. Dr. Rodgers concluded that “a window in this context, apart from permitting optical communication, would need to *serve a structural function as well*—it must be strong enough to act as a pressure barrier between the wellbore and interior of the tool, and must be sealed to the pressure housing of the tool.” Ex. 1022, ¶42.

Thus, Dr. Rodgers, and the prior art, demonstrate that POSAs knew how to design downhole tools featuring “optically transmissive windows” that were structurally reliable. Patent Owner criticizes such windows as “weaker,” POR 19, but it does not comment on the relative strength of the material used for such windows (*e.g.*, quartz, boron, etc.), or the relative size of the window (*e.g.*, compared to the rest primary housing structure) needed to facilitate optical communication externally. Nothing in the record suggests that the presence of an optically

transmissive window, while maintaining the rest of the primary structure as non-transmissive material, would doom the downhole tool as too weak or unreliable for practical use. *See Winner Int'l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349, n.8 (Fed. Cir. 2000) (“The fact that the motivating benefit comes at the expense of another benefit...should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another. ... Instead, the benefits, both lost and gained, should be weighed against one another.”). Patent Owner’s myopic focus on tool strength thus fails to rebut Petitioner’s showing of obviousness.

Patent Owner next asserts that the proposed modification would “*create unnecessary seams* in the exterior surface of Beach-127’s device between the optically transmissive material of the window and the material that makes up the rest of the device’s exterior surface,” whereas “Beach-127’s unmodified design...would, on its face, be more robust.” POR 19. This argument not only lacks technical support, it is also illogical. The unmodified Beach-127’s assembly already includes a window at the exterior of the housing. Patent Owner does not

dispute this.⁵ Accordingly, *seams* (where the window and the primary housing structure interface) *are already included* in the Beach-127's assembly. Such seams are depicted on Figure 2, as the boundary on either side of Dr. Rodgers' blue window annotation (Ex. 1022, ¶117):



⁵ As the Board observed, “Beach-127 teaches wireless communication from one side of [its] structure to the other, *i.e.*, between an interior transceiver and an exterior remote unit (Ex. 100[3], 17:33-34, Fig. 2) so *this structure would have to be transparent* to whatever electromagnetic radiation these components use to communicate.” D.I. at 25. This is consistent with Dr. Rodgers’ testimony that “a POSITA reading [Beach-127] knows...that the outer structure around the antenna has to be a window for communicating – for allowing that transmission to occur.” Rodgers Tr. 72:15-19.

Patent Owner's premise is therefore wrong; the proposed combination need not "*create...seams.*" POR 19. Rather, "seams" will be present whether or not Beach-127 is modified according to Wiese's teachings.

Patent Owner further argues—again without any evidentiary support—that the proposed combination requires that Beach-127's existing window *must be replaced* with an "optically transmissive window," and that the resulting window must be "of *weaker* material." POR 18-19. Patent Owner is wrong on both points. *First*, contrary to Patent Owner's suggestion (*see* POR 18-19), Dr. Rodgers did not say either that the existing window of Beach-127 is unsuitable for optical signals, or that optically transmissive windows are necessarily weaker than windows for non-optical signals. Rather, in the testimony cited by Patent Owner, Dr. Rodgers merely compared a downhole tool's window *to the rest of the tool's primary structure, e.g., steel*, without identifying what material forms the window of Beach-127. *See* Rodgers Tr. 68:11-22, 77:12–79:16. *Second*, even assuming that the proposed modification *did require* replacing Beach-127's existing window (*e.g., if the Figure 2 window were transmissive only to non-optical signals*), Patent Owner provides no reason to suggest that replacing it with an optically transmissive window would have been beyond the capabilities of a POSA.

Third, even further assuming that a replacement optically transmissive window were *weaker* than the existing Beach-127 window material, Patent Owner

does not explain why this factor alone would materially impact the overall integrity of the downhole device for its intended use. Patent Owner, for example, fails to address the compressive strength difference between optically transmissive window material versus windows transmissive to other electromagnetic signals. Patent Owner also does not explain why other design parameters—for example, the thickness of the window, or the size of the window relative to the surrounding primary structure—could not offset the impact of even a lower-strength optically transmissive window material. The Wiese reference itself highlights the importance of window thickness as a key design parameter for structural integrity of the downhole tool (*see* Ex. 1004, [0015]), and for that reason recites dependent claims covering a variety of “window” materials suitable for use in a downhole tool—including “glass” or other “optically transmissive” material. *See* Ex. 1004, cls. 4-9. As discussed above, Wiese is one of several prior art references demonstrating that downhole tools featuring optically transmissive windows were known and recognized in the art as a design choice that was not only suitable, but beneficial. As Dr. Rodgers explained, “the POSITA would design th[e] structure and the connection to meet whatever the pressure and temperature requirements are, just as you do with any downhole tool.” Rodgers Tr. 79:11-16.

Finally, *Fisher*, cited by Patent Owner, POR 17, is misplaced. There, the Board found the petitioner’s obviousness combination conclusory and hindsight

driven, in that it involved “discard[ing]” the base reference’s original solution and “drastically modif[y]ing” its design, “seek[ing] a wholly new way of solving a problem already resolved.” IPR2017-00272, Paper 41 at 23-29. Here, Petitioner’s combination, which merely implements a window that permits “optical” as the signal type, does not discard Beach-127’s “wireless communication,” and is far from “drastic[.]”

3. The Board Should Reject Patent Owner’s Unsupported Technical Assertions.

As reflected above, Patent Owner’s analysis of the proposed combination, with its multitude of technical assertions, suffers a significant underlying problem: it is not supported by an expert testimony or other evidence, but instead relies solely on attorney argument. Since Dr. Rodgers’ testimony is not rebutted by any qualified declarant, this circumstance alone should prompt the Board to discard any of Patent Owner’s arguments relating to the technical ramifications of combining Beach-127 with Wiese. *See Acoustic Technology Inc. v. Itron Networked*, 949 F.3d 1366, 1373 (Fed. Cir. 2020) (“Expert testimony may shed light on what a skilled artisan would reasonably understand or infer from a prior art reference.”); *see also Rembrandt Diagnostics, LP v. Alere, Inc.*, 76 F.4th 1376, 1383 (Fed. Cir. 2023) (finding substantial evidence supported the Board’s fact findings on motivation to combine, where patent owner “cite[d] no counter

testimony from a qualified declarant to refute [expert’s] conclusions regarding how a skilled artisan would have interpreted the identified disclosures”).

C. The Combination Discloses Limitation 1[e] of Claim 1

As to limitation 1[e], Patent Owner argues that “[e]ven if it would have been obvious to make the proposed combination of Beach-127 and Wiese,” it would still “fail[] to disclose or render obvious a window that ‘extends *from the exterior surface into optical communication with the sealed interior cavity*,’” because “the LED array (replacing antenna 30) would be positioned between the exterior surface and the interior cavity, *blocking optical communication between them...*” POR 22 (emphases original). Even as to Beach-127’s unmodified assembly, Patent Owner argues that the “window” does not “extend into...communication” (*of any kind*) with the ‘sealed interior cavity.’” *Id.* at 10-14.

Patent Owner’s arguments hinge on the flawed notion that any antenna in Beach-127 (with or without applying Wiese’s teachings) would be *outside* of the “sealed interior cavity” identified for limitation 1[b]. *See* POR 23. That premise is wrong. Dr. Rodgers—the *only expert* who has provided evidence in this proceeding—explained that Beach-127’s antenna is *within* the sealed interior cavity. *See* Ex. 1022, ¶¶122 (“[T]he ‘sealed interior cavity actually extends to and incorporates both [transceiver 28 and antenna 30].”). The same would be true for the “LED array” antenna in the Beach-127/Wiese combination. *See id.*, ¶150, n.7.

This is because the **window**, not the antenna, is what forms the pressure seal for the portion of the cavity that contains the antenna. Rodgers Tr. at 53:2-10; Ex. 1022, ¶119.

Patent Owner's flawed assumption of Beach-127's antenna being outside of the sealed interior cavity hinges on another flawed assumption—that Beach-127 lacks a through-hole connecting the antenna to the other components of the electronic system. As Dr. Rodgers explained, Beach-127's disclosure "implies that a through-hole **must be present** in the body 22 in the region under the antenna 30, in order to permit access for some reliable communication between the transceiver and antenna," even if not shown explicitly in Figure 2. Ex. 1022, ¶¶120-21; *see also* Pet. at 34-35. While Patent Owner seeks to mischaracterize Dr. Rodgers' deposition testimony (*see* POR 12-13), he actually reiterated that a through-hole is **necessarily present** in the body 22, to facilitate not only communication from the transceiver to

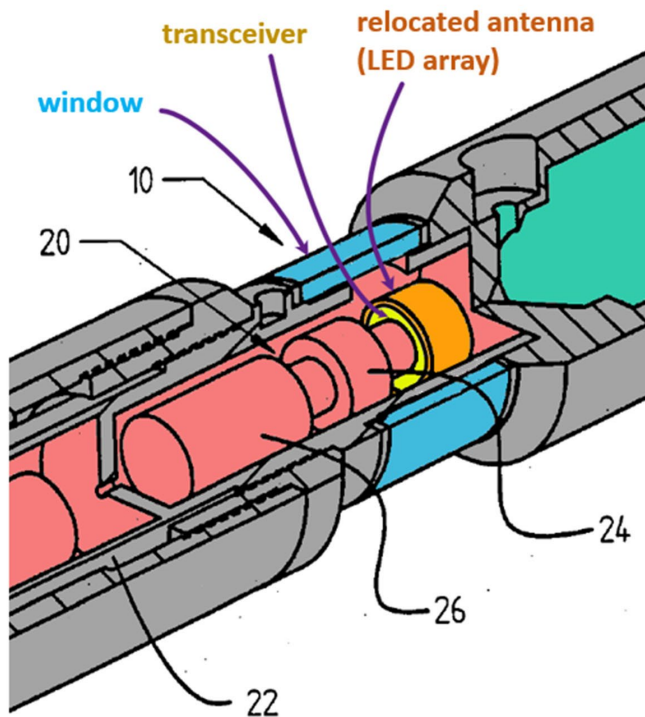
the antenna, but also to *power* the antenna.⁶ See Rodgers Tr. 70:2-13 (explaining it “would be probably *impossible to get that power and data across* to the antenna without having a hole”); *id.*, 71:5-8 (“Q. Can you think of any instances where a through-hole would not be needed in body 22? A. No...I can’t think of any.”).

Patent Owner’s theory that the replacement LED array antenna would “*block* optical communication” “between exterior surface and the interior cavity,” POR 22, likewise hinges on its flawed assumption that the LED antenna would be outside of the cavity. This argument therefore fails for the reasons discussed above. The argument lacks technical merit for additional reasons. Again, Patent Owner appears to rely solely on Figure 2’s drawing, as depicting the antenna as a solid component that would act as a signal barrier. Patent Owner’s premise is wrong; an antenna transmits a signal; it does not act as a signal barrier, and Patent Owner provides no

⁶ Patent Owner posits that a through-hole is not needed, in that communication from transceiver 28 to antenna 30 could be achieved wirelessly, such as via RF signal. POR 12-13. But as Dr. Rodgers explained, a POSA would not have understood the body 22 (the primary structure of the downhole tool string) to be of a material that facilitates communication, unlike the window at the housing. See Rodgers Tr. 68:7-22. Regardless, Patent Owner’s theory still fails to account for the need to *power* the antenna, which Dr. Rodgers underscored.

evidence to suggest otherwise. Even putting aside the shape and location of antenna 30 in Figure 2, Patent Owner’s argument fails to account for Wiese’s teaching that the antenna 28 (like transceiver 26) are *within* tool 1 (*i.e.*, a sealed interior cavity). *See id.*, ¶¶128-29; Ex. 1004, [0015], Fig. 1.

Regardless, Patent Owner’s “through-hole” and “blocking communication” arguments—and in turn, its argument that the antenna is outside of the “sealed interior cavity”—***do not even apply*** to Dr. Rodgers’ second exemplary Beach-127/Wiese Modification. In that modification, the LED array antenna is co-located with the Beach-127 transceiver 28, deeper in the cavity, according to Wiese’s teachings (Ex. 1004, [0015]), and for design simplicity.



Ex. 1022, ¶¶131, 135-36; Pet. at 38-41.

Patent Owner does not (and cannot) credibly argue that the antenna in this Modification 2 would “block” communication into the sealed interior cavity. Notably, Patent Owner made this same “blocking” argument—*verbatim*—in its preliminary response. *See* POPR at 36-37. The Board rejected the argument, specifically because it failed to account for Wiese’s teaching of a window extending into optical communication with a sealed interior cavity, and it failed to account for Dr. Rodgers’ Modification 2 above. D.I. at 29.

Lastly, Patent Owner argues that both of Dr. Rodgers’ proposed Beach-127/Wiese exemplary modifications “would require *unsealing*” Beach-127’s sealed interior cavity. *See* POR 24-25 (emphasis original). This is also a retread of Patent Owner’s preliminary response. *See* POPR 38-39. The Board rejected this argument as well, explaining that “Wiese teaches that its window is ‘pressure-sealed to the housing,’ thus ensuring that the cavity into which the window extends would be sealed.” D.I. at 30. The pressure-sealed window at the housing is present in both of Dr. Rodgers’ exemplary Beach-127/Wiese modifications. *See* Ex. 1022, ¶¶134-35.

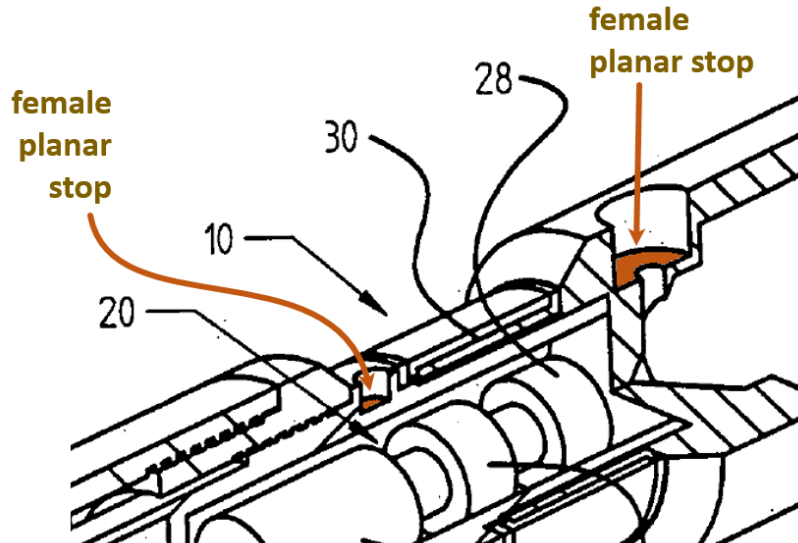
IV. The Challenged Dependent Claims Would Have Been Obvious.

Petitioner demonstrated that claims 2-4, 14-15, 19-22, 24, and 25—all of which depend directly or indirectly on claim 1—would have been obvious. Pet. 49-

77. Patent Owner only challenges Petitioner’s showing as to three of the dependent claims: claims 19, 21, and 2.⁷ Each of Patent Owner’s arguments is meritless.

A. Patent Owner’s Argument on Claim 19 Fails.

Petitioner submitted testimony from Dr. Rodgers demonstrating how the Beach-127 assembly contains claim 19’s added requirement that “the exterior surface defines a plurality of female planar stops.” He explains that the assembly has “flat segments (which are ‘planar’) along the exterior surface of the assembly, which is otherwise cylindrically-shaped or rounded.” Ex. 1022, ¶160. Dr. Rodgers further testifies that the planar segments are “stops,” or discontinuities, from the overall contour of the exterior surface. *Id.* The stops are illustrated below.

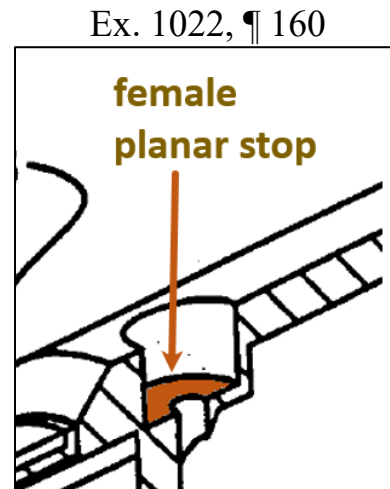
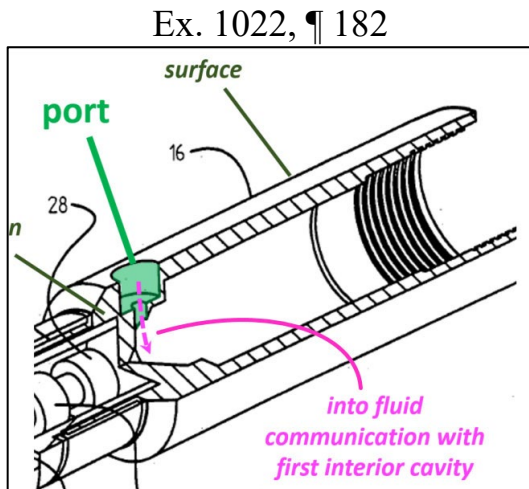


⁷ Claim 20 depends from claim 19, but Patent Owner does not raise any separate argument as to this claim.

Patent Owner argues that Petitioner has not shown that the indentations “constitute ‘stops’ with [*sic*] the meaning of the ’013 Patent, which describes ‘female planar stops’ as features for ‘aid[ing] in grasping and selectively orienting the orientation of [the core barrel head assembly].’”⁸ POR 27 (quoting Ex.1001 at 9:10–12). But Patent Owner does not seek a construction of the term “female planar stops;” to the contrary, Patent Owner concedes that “[n]o claim construction is necessary.” POR 6. Even if Patent Owner were seeking to construe the term, Patent Owner does not offer any basis for reading this language from the specification—which describes a purported use of the stops—into the claims, nor does Patent Owner provide any evidence as to how a POSA would understand the plain and ordinary meaning of the term. The *only* evidence is Dr. Rodgers’ opinion that the indentations in Beach-127’s assembly are “stops” within the meaning of claim 19.

⁸ Patent Owner’s Response misquotes the specification in what appears to be a copy-and-paste error. The Response reads “orienting the orientation of *obtain orientation data and the power source 50*,” POR 27, rather than “orienting the orientation of the core barrel head assembly.” Ex. 1001 at 9:10–12. The phrase “obtain orientation data and the power source 50” appears in column 10, line 11, of the specification, directly across from the quoted language in column 9.

Patent Owner further suggests that one of the indentations cannot be a “planar stop” because (allegedly) it is also part of the “port” identified by Petitioner with regard to claim 2. POR 27-28. Dr. Rodgers, however, clearly explained and showed the difference between the “port” (below, left) and the “planar stop” (right).



As shown above, the “port” includes the hollow cutaway passage allowing fluid into the cavity, while the “planar stop” is merely the “flat segment” near that location.

B. Patent Owner’s Argument on Claim 21 Fails.

Petitioner cited several disclosures in Beach-127, as well as testimony from Dr. Rodgers, demonstrating that electronic system 20 is programmed (through trigger system 24) “to obtain orientation data when the at least one electronic instrument senses no vibrations,” as required by limitation 21[a]. Pet. 56; Ex. 1022, ¶¶168-69. Patent Owner contends that the cited disclosures in Beach-127 do not

“relate to ‘vibrations’ at all,” POR 29, but that overlooks Beach-127’s explicit disclosure of “vibration sensors” within electronic system 20, Pet. 54 (citing Ex. 1003, 12:7-15), and its explanation that “[t]he sensing of the commencement *and* cessation of drilling may be via the use of vibration sensors,” Ex. 1003 at 14:1-3. Thus, Beach-127 provides evidence that the tool will not “vibrate after drilling has stopped.” POR 29. As shown in the Petition, Beach-127 discloses that the cessation of drilling—*i.e.*, the lack of relative movement—can trigger a signal to collect orientation data. Pet. 55-56. Indeed, Patent Owner does not dispute Petitioner’s showing that Beach-127 meets the requirement of claim 20 that the “electronic instrument is programmed to obtain orientation data when” it “*senses no relative movement.*” Pet. 54-55.

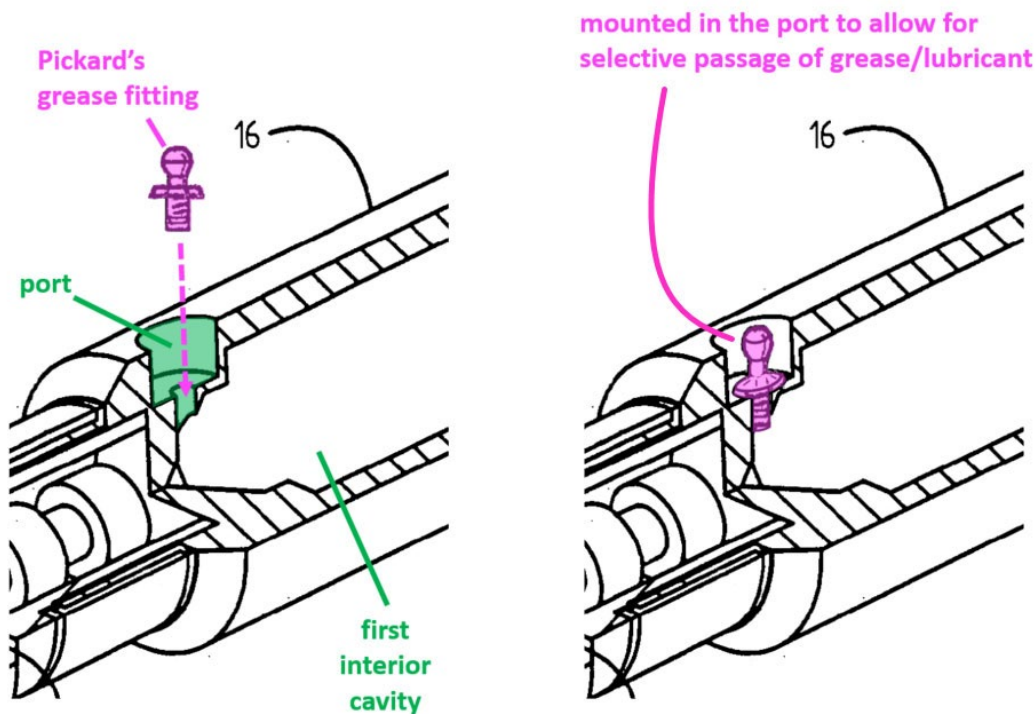
C. Patent Owner’s Argument on Claim 2 Fails.

Petitioner demonstrated that claim 2 would have been obvious based on Beach-127 in view of Wiese and Pickard. Pet. 62-68. In particular, Dr. Rodgers explained that (1) Beach-127 features “a port positioned proximate the base portion and extending into fluid communication with the first interior cavity,” as required by limitation 2[a]; and (2) it would have been obvious to a POSA, particularly in view of Pickard’s teachings, to mount a “grease fitting” into that port to selectively allow fluid into the cavity, as required by limitation 2[b]. *See* Ex. 1022, ¶¶181-200.

Neither of Patent Owner's arguments in response to this showing on claim 2 has any merit.

1. The Beach-127/Wiese/Pickard Combination Discloses a "grease fitting" Mounted Into a "port."

Patent Owner argues that Dr. Rodgers offers only "conclusory" expert testimony that the aperture in Beach-127's assembly is a "port." POR 31. Not so. Dr. Rodgers articulated a rational underpinning for his obviousness analysis, relying on the fact that Beach-127's port extends from the exterior surface to the interior of adapter 16 (which forms the first interior cavity), as shown:



Ex. 1022, ¶ 197 (Dr. Rodgers' modification of Beach-127 in view of Pickard)

In addition, adapter 16 is shown and described as connecting to bearing 32:

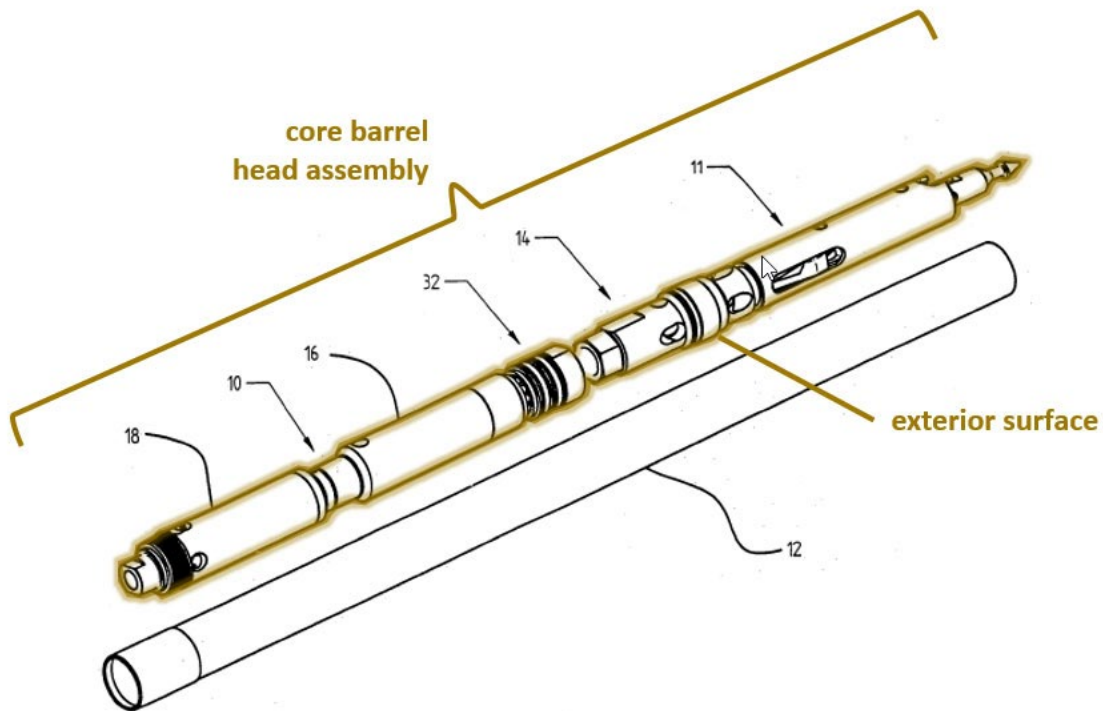


Figure 1

Ex. 1022, ¶ 93 (Beach-127 Fig. 1, showing adapter 16 connected to bearing 32)

As Dr. Rodgers explains, a POSA would understand that such a bearing would require lubrication to avoid undesirable mechanical friction during operation. Ex. ¶¶1022, ¶¶193-95. Likewise, a POSA would understand that removal of Pickard’s grease fitting would allow the addition of grease, which would serve as a lubricant for the bearing. *See id.* at ¶¶188-89; *see also* Ex. 1007, cl.12 (reciting a “grease fitting sealingly secured to the housing and in fluid communication with the inlet passage” of a grease pump.”).

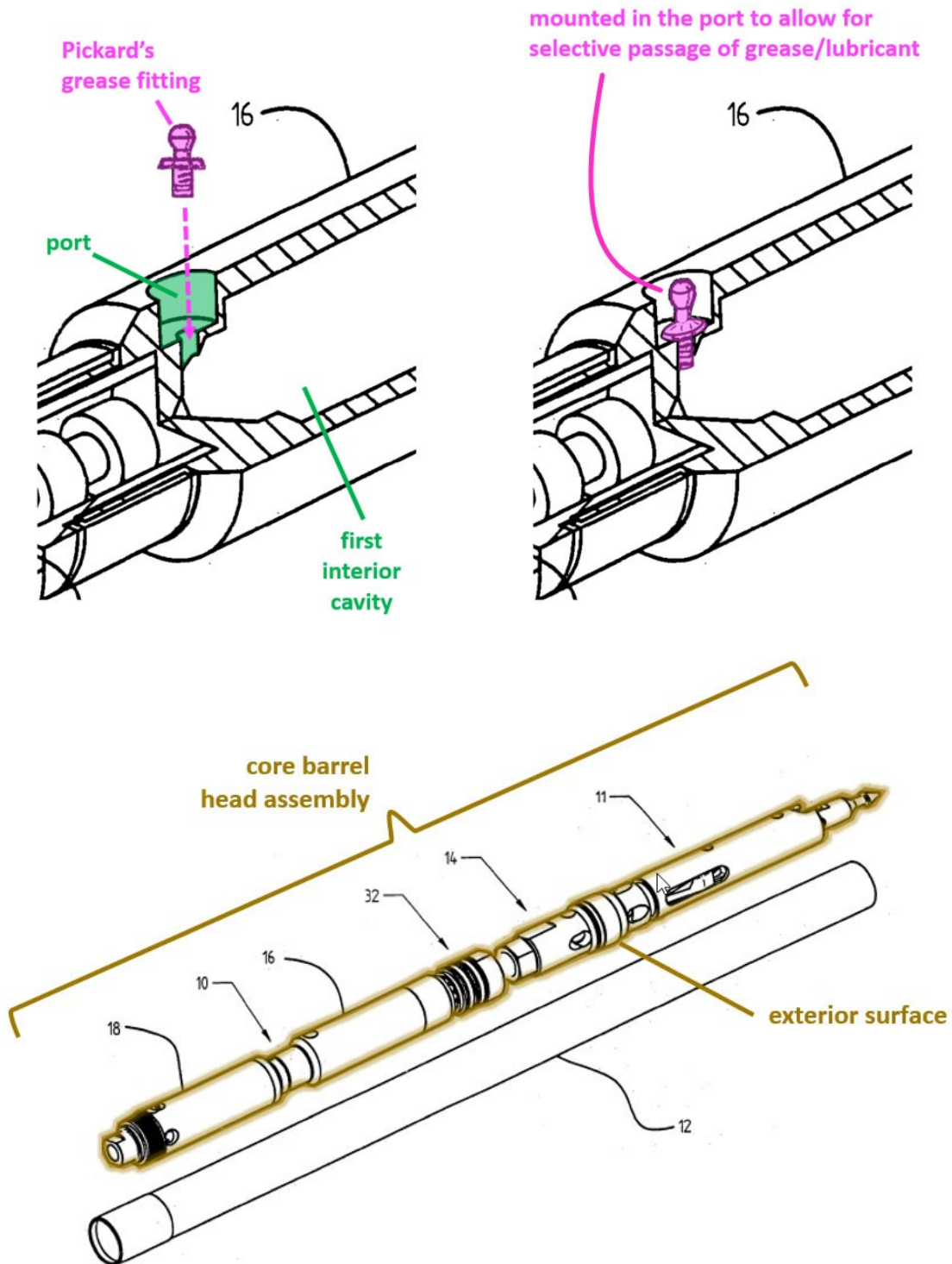


Figure 1

That Beach-127 does not explicitly use the terms “port” or “grease fitting,”
see POR 31, is not dispositive.

Nor is there any merit to Patent Owner’s argument that Pickard does not disclose mounting its grease fitting into a port. POR 31. Further, as to the Pickard reference, Petitioner is *not* characterizing the *entirety of* “bore 40” as a “port,” as Patent Owner asserts. POR 31. Pickard teaches “grease fitting 41 is threaded into the *opposite end of* bore 40.” Pet. 65. As Dr. Rodgers explains, this “opposite end of bore 40” (rather than the entirety of the bore) is the port in which Pickard’s grease fitting 41 is mounted.

2. Patent Owner’s Argument Regarding Lack of Threading is a Red Herring.

Patent Owner further asserts that “[t]he Petition fails to explain how or why a POSITA would mount Pickard’s threaded grease fitting into Beach-127’s non-threaded aperture.” POR 32-33. But Patent Owner offers no evidence to dispute Dr. Rodgers’ explanation that (a) a POSA would have understood that the aperture in Beach-127 includes female threads (even if they are not shown in Figure 2); and (b) even if the aperture lacked threads, implementing them would have been an obvious, “routine task that was well within the skillset of a POSITA,” Ex. 1022, ¶198, n.9.

Moreover, claim 2 does not require threads, nor does Patent Owner cite evidence that threads are necessary to mount a grease fitting into a port. Thus, Patent Owner fails to rebut Petitioner’s showing that it would have been obvious to mount a grease fitting into the Beach-127 port.

Date: March 12, 2024

Respectfully submitted,

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6, I hereby certify that on the date listed below, a copy of Petitioner's Reply to Patent Owner Preliminary Response was served on the Patent Owner by electronic mail to the following counsel of record for Patent Owner:

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