

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HUM INDUSTRIAL TECHNOLOGY, INC.
Petitioner

v.

AMSTED RAIL COMPANY, INC.
Patent Owner

Case IPR2023-00538
Patent No. 9,365,223

PATENT OWNER'S PRELIMINARY RESPONSE

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Ex #	Exhibit Description
2001	Expert Declaration of Dr. Michael Shamos (“Shamos Declaration”)
2002	<i>Curriculum Vitae</i> for Dr. Michael Shamos
2003	Joint Claim Construction Chart - Amsted Rail Company, Inc., v. Hum Industrial Technology, Inc., et al., Civil Action No. 4:22-cv-00445-AGF (E.D. Mo. March 31, 2023)
2004	U.S. Patent No. 8,244,411 to Baker (“Baker”)
2005	U.S. Patent No. 9,026,281 to Murphy et. al. (the “’281 patent”)
2006	U.S. Pat. Pub. 2005/0268813 to Van Auken (“Van Auken”)
2007	U.S. Patent No. 7,698,962 to LeFebvre et al. (“LeFebvre ’962”)
2008	Declaration of LeFebvre
2009	U.S. Patent Application Publication No. 2008/0195265 to Searle et al. (“Searle”)

Patent Owner Amsted Rail Company, Inc. (“PO”) submits this Preliminary Patent Owner Response to the Petition for *Inter Partes* Review (“IPR”) filed against U.S. Patent No. 9,365,223 (“the ’223 patent”) challenging claims 1-10, 13-18, and 20-32 (the “Challenged Claims”).

Pursuant to 35 U.S.C. §314, the Director may not authorize an *inter partes* review to be instituted unless the Director determines that the information presented in the petition¹ and any response shows there is a reasonable likelihood that the petitioner would prevail with respect to at least one of the claims challenged in the petition. Here, Petitioner has failed to establish any reasonable likelihood of prevailing on any claim of the ’223 patent.

I. INTRODUCTION

The Petition should not be instituted because of the following deficiencies:

Institution should be denied because the Petition is procedurally deficient for at least three reasons. First, institution should be denied under 35 U.S.C. § 325(d) because—for all proposed grounds—the same or substantially the same prior art and arguments were previously presented to the Office.

Second, institution should be denied because the Petition is procedurally deficient for at least three reasons. Petitioners failed to comply with 37 C.F.R. §

¹ “Petition” refers to Paper No. 10, the corrected petition.

42.104(b)(3) and proffer, much less analyze the claim under, what it contends is the correct claim construction. Petitioner has offered claim constructions in District Court which conflict with its apparent positions on those claim terms in its Petition. Absent an explanation for why Petitioners are justified in taking inconsistent positions in district court and this proceeding, denial of institution is warranted.

Third, Petitioner also fails to identify with particularity the grounds and supporting evidence for its challenge on a claim-by-claim basis, instead relying on bare cross-reference citations to claims which do not share the same scope or claim language. Petitioner's failure to explain how these claims should be similarly treaded to those with different language and scope renders the Petition deficient and denial of institution is warranted.

Institution should also be denied because the Petition is deficient on the merits. Grounds 1, 2 and 3 applicable to claims 1-4, and 23-30 are deficient because LeFebvre does not disclose at least limitations 1(a), 2(c), and 23(a). Grounds 1 and 2 applicable to claims 5-10, 13-18, and 20-22 are deficient because LeFebvre does not disclose at least limitations 5(i)-5(k). Grounds 4 and 5 applicable to claims 2, 3, 4, 23, and 27-30 fail because Armitage, the primary reference in each ground, is not prior art to those claims. For the remainder of the Challenged Claims, Grounds 4, 5, and 6 are deficient because Armitage does not disclose, teach, or suggest at least

limitations 5(i)-5(k) and/or because there is no motivation to combine Armitage with LeFebvre.

II. THE PETITION IS PROCEDURALLY DEFICIENT AND SHOULD BE DENIED.

A. Petition Should Be Denied Pursuant To the Board's Discretion Under §325(d).

Institution should be denied because the art and issues raised by the Petition are cumulative and substantially similar to the art and issues already addressed by the Office during prosecution. In determining whether discretionary denial is warranted, the Board evaluates (1) whether the same or substantially similar art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of the first part of the framework is satisfied, whether the Petition has demonstrated that the Office erred in a manner material to the patentability of the challenged claims. *Advanced Bionics, LLC v. Med-El Elektromedizinische Gerate GmbH*, IPR2019-01469, Paper 6 at 8-9 (PTAB Feb. 13, 2020) (precedential). If the first part of the framework is satisfied and the Petition fails to make a showing of material error, the Director generally will exercise discretion not to institute review. *Id.*

When evaluating whether to exercise its discretion when the same or substantially the same prior art or arguments were previously presented to the Office under §325(d), the Board weighs several non-exclusive factors, including, for

example: (a) the similarities and material differences between the asserted art and the prior art involved during examination; (b) the cumulative nature of the asserted art and the prior art evaluated during examination; (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection; (d) the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art; (e) whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art; and (f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments. *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17-18 (PTAB Dec. 15, 2017) (Precedential). “If, after review of factors (a), (b), and (d), it is determined that the same or substantially the same art or arguments previously were presented to the Office, then factors (c), (e), and (f) relate to whether the petitioner has demonstrated a material error by the Office.” *Advanced Bionics*, IPR2019-01469, Paper 6 at 10.

1. Petitioner Relies on the Same or Substantially Same Prior Art Previously Presented to the USPTO (Becton, Dickinson Factors a, b, and d).

Contrary to Petitioner’s arguments, (Pet. at 7, 16-17), the cited references for each of Petitioner’s six grounds are the same or substantially similar to references previously considered by the Examiner. “Previously presented art includes...art

provided to the Office by an applicant, such as in an IDS.” *Palo Alto Networks, Inc. v. Centripetal Networks, Inc.*, IPR2021-01156, Paper. 10 at 13-14 (PTAB Jan. 24, 2022). The Board “accept[s] that the Examiner considered [the prior art references] listed on the IDS,” especially where “the Examiner signed the IDS with the statement ‘all references considered except where lined through.’” *Biocon Pharma Ltd. v. Novartis Pharms. Corp.*, IPR2020-01263, Paper 12 at 9 (PTAB Feb. 16, 2021).

Petitioner relies on LeFebvre and/or Armitage as the sole references for Grounds 1, 4, and 5 and as the primary references for Grounds 2, 3, and 6. *See* Pet. at 6. But Petitioner fails to note that Patent Owner cited and the Examiner considered both LeFebvre and Armitage during prosecution. On May 1, 2015, Patent Owner filed an Information Disclosure Statement (IDS) that explicitly informed the Examiner that a co-pending application directed to related subject matter was a continuation of LeFebvre.² Ex. 1002 at 172. The IDS further cited LeFebvre and Armitage in the PTO/SB08 form. Ex. 1002 at 174, 364-65. On June 12, 2015, Patent Owner also directly informed the Examiner that LeFebvre was also a “document of particular relevance” through its submission of the International Search Report dated

² The IDS notice identified U.S. Patent No. 7,688,218 to LeFebvre, which is the patent that issued from the cited LeFebvre publication (U.S. Pat. Pub. No. 2007/0152107) relied upon by Petitioner.

April 2015 (Ex. 1002 at 441-45. Both references are listed on the face of the '223 Patent. Ex. 1001 at p. 2.

The Examiner confirmed their consideration of LeFebvre and Armitage on August 12, 2015. (Ex. 1002 at 468-71 (confirming consideration of LeFebvre, which was listed twice on IDS, through Examiner signature and date); *see also id.* at 497-98 (confirming consideration of LeFebvre on second IDS through signature and date); Ex. 1002 at 479-80 (confirming consideration of Armitage).) In addition, at the top of each form, the Examiner included text stating, “ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /Y.S./” Ex. 1002 at 468-71 (confirming consideration of LeBevre), 497-98 (same), 479-80 (confirming consideration of Armitage). Denial is warranted because neither the LeFebvre nor Armitage reference cites are lined through, (*see id.*), and thus they were expressly considered by the Examiner. *See Microsoft Corp. v. Koninklijke Philips N.V.*, IPR2018-00279, Paper 11 at 12, 14-15 (PTAB June 8, 2018) (finding, under similar facts, the refence “was previously presented to, and considered by, the Office”); *Fellowes, Inc. v. Treefrog Devs., Inc.*, IPR2020-01509, Paper 11 at 7-8, 17 (PTAB Feb. 22, 2021) (denying institution under §325(d) where reference was cited in IDS and listed on the face of the patent); *Ocado Grp. PLC v. Autostore Tech. AS*, IPR2021-00412, Paper 9 at 34-35 (PTAB July 21, 2021) (denying institution because reference listed in IDS “was previously before the Office”); *Eyenovia, Inc.*

v. Sydnexis, IPR2022- 00963, Paper 7 at 10-11 (PTAB Nov. 8, 2022) (denying institution because references listed in IDS were “previously presented” under §325(d); *BMW of N. Am., LLC v. Stragent, LLC*, IPR2021-00419, Paper No. 14 at 12-13 (PTAB July 19, 2021) (denying institution under §325(d) in part because relied-upon prior art was cited on an IDS), *reh’g denied*, Paper No. 21 at 5 (PTAB Mar. 21, 2022).

Petitioner’s conclusory argument—that both references are not substantially similar to other art because both are “directed to railcar monitoring systems with the same [claimed] topology [] including a CMU attached to each railcar” and therefore disclose limitation missing in the art, (Pet. at 16)—fails for multiple reasons. First, at least independent claims 1 and 23 do not even claim a CMU. *See* Ex. 1001 at 15:32-55, 18:9-30. Second, the Examiner found that Baker (Ex. 2004) purportedly taught the claimed CMU. *See, e.g.*, Ex. 1002 at 113 (finding Baker disclosed a CMU). For instance, Baker discloses that receiver 10 is positioned on the railcar and configured to (i) receive signals from multiple sensors 12, (ii) add additional data, and (iii) send data over network to a server computer. Ex. 2004 at 5:5-40, 50-57; FIG. 1. Petitioner’s failure to explain why these references are not cumulative further warrants denial. *Nespresso USA, Inc. v. K-Fee System GmbH*, IPR2021-01222, Paper 9 at 13-14 (PTAB Jan. 18, 2022) (denying institution and finding asserted art

was cumulative of reference considered during prosecution because petitioner relied on references for similar purposes).

In addition, “the issue of §325(d) is *not* limited to whether the Examiner ‘considered’ a reference or grounds during the original prosecution leading to issuance of the [] patent, but whether the same or *substantially the same* prior art or arguments ‘*previously were presented to the Office.*’” *EcoFasten Solar, LLC v. Unirac, Inc.*, IPR2021-01379, Paper 11 at 38-39 (PTAB Feb. 8, 2022) (emphasis in original). In Grounds 3 and 6, Petition also relies on Denny and Provasnik to disclose that external temperature sensors and magnetic sensor attachments would have been known to and understood by a PHOSITA. Pet. at 13-14, 52, 85. However, Petitioner does not explain how this is materially different than art already cited to or considered by the Examiner. *See id.* In fact, the Examiner found that Searle (Ex. 2009) disclosed a “rotating magnet assembly.” *See* Ex. 1002 at 456-57; Ex. 2009 at ¶105. In addition, the Examiner expressly considered other references—again stating that these other “references [were] considered” and initializing “/Y.S./”—that have similar disclosures. *See, e.g.*, Ex. 1002 at 468 (citing LeFebvre ’962 (Ex. 2007), which discloses “a sensor interface [with] embedded sensors for measuring physical parameters such as temperature” on a railcar where the sensor signals are in communication with electronic data processing and storage devices); *id.* at 475 (citing EP2650191, Ex. 1002 at 384-88 and including same, which discloses, e.g., at

claim 7, detecting temperature data from a magnetic device attached to a rail vehicle). Petitioner has not explained why the disclosures in these references are not cumulative or substantially similar to the art now relied upon.

Further, Petitioner's reliance in Ground 2 on Barone for dependent claims 13-17, 22, and 24 is immaterial to this analysis. Petitioner's citation of references not considered by the Examiner only for "additional subject matter of certain dependent claims[]" is insufficient to persuade us that exercising our discretion under 35 U.S.C. §325(d) is inappropriate." *Kayak Software Corp. v. Int'l Bus. Machs. Corp.*, Case CBM2016-00075, Paper No. 16 at 10 (PTAB Dec. 15, 2016) (Informative) (declining to institute review); *see also Miltenyi Biomed, GmbH v. Trs. of Univ. of Pa.*, IPR2022-00853, Paper No. 11 at 45 (PTAB Oct. 11, 2022) (denying institution because purportedly invalidating art was cited or similar to art cited in IDS and/or used dependent claim limitations insufficient).

Because the Petition relies on the references that are the same, substantially similar to, or cumulative of references that were previously presented to the Office during prosecution of the '223 Application, the first part of the § 325(d) discretionary denial framework is satisfied. *Advanced Bionics*, IPR2019-01469, Paper 6 at 20.

2. Petitioner Has Made No Showing of Material Error (Becton, Dickinson Factors c, e, and f).

Upon satisfaction of the first prong of the *Advanced Bionics* framework, “the Board’s decisions generally have required a showing that the Office erred in evaluating the art.” *Advanced Bionics*, IPR2019-01469 at 8. Petitioner does not argue that the Examiner made any error, much less a material one. (*See generally* Pet.) In addition, and as discussed *supra*, the Examiner was fully aware of both LeFebvre and Armitage and of art substantially similar to or cumulative of the references asserted by Petitioner. *See* §II.A.1, *supra*; Ex. 1002 at 172, 441-45 (Patent Owner specifically called out—twice—the relevance of LeFebvre to the Examiner), at 468-71, 479-80, 497-98 (Examiner confirming references were considered). Despite this, Petitioner has not provided any additional facts or evidence for why the Examiner erred or was unreasonable. *See Hospira, Inc. v. Genentech, Inc.*, IPR2017-00739, Paper 16 at 18 (PTAB July 27, 2017) (Informative) (denying institution because the petition failed to “present[] new evidence or arguments that would convince us that the examiner’s determination was unreasonable”). In fact, Petitioner entirely failed to address the second prong. *Id.* at 16-17. This should be dispositive.

Accordingly, exercise of discretion under §325(d) is warranted and the Board should deny institution.

B. Petitioner Fails to Propose a Construction It Believes Is Correct.

In addition to the reasons set forth above (*see* §II.A, *supra*), the Petition should be denied because Petitioner fails to proffer, much less analyze the claim under, what

it contends is the correct claim construction. Rule 104 requires that “the petition must set forth... [h]ow the challenged claim is to be construed.” 37 C.F.R. § 42.104(b)(3). As the Board has previously explained, “[t]he ‘construction’ referred to by 37 C.F.R. § 42.104(b)(3) is the construction proposed by the Petitioner, ***one that Petitioner believes is the correct construction*** under applicable law and should apply in the involved proceeding.” *Toyota Motor Corp. v. Blitzsafe Texas, LLC*, IPR2016-00422, Paper 12 at 26 (PTAB July 6, 2016) (emphasis added). Further, the 2018 change to claim construction standards in PTAB proceedings was meant to “prevent[] parties from taking inconsistent positions, such as a patent challenger arguing for a broad scope in a PTAB proceeding [] and a narrow scope [] in district court to avoid a finding of infringement.” 83 FED. REG. 51,342-51,343; 51,345 (Oct. 11, 2018) (further stating “the possibility of differing constructions for the same claim term is troubling, especially when claim construction takes place at the same time in parallel district court proceedings and USPTO proceedings”).

When a petitioner presents one construction in district court and another to the PTAB, “the subsequent decisions issued in reliance on these inconsistent claim constructions may lack ‘uniformity’” and “may undermine the ‘predictability’ of the... patent’s claim scope and the ‘integrity of the patent system’ overall. *KioSoft Tech. LLC v. PayRange Inc.*, CBM2020-00026, Paper 11 at 17 (PTAB Mar. 22, 2021). The “potential problems inherent in [Petitioner’s] inconsistent claim

constructions” favors a denial of institution under 35 U.S.C. § 324(a), “regardless of the Petition’s merits.” *Id.* at 17-18.

Here, Petitioner states there are “no formal claim construction necessary in this proceeding,” (Pet. at 15), but this is inconsistent with positions Petitioner has taken in the on-going district court litigation. Specifically, Petitioner proposed the following constructions of terms in the ‘223 Patent along with citations to both intrinsic and extrinsic evidence in support thereof:

Claim Term	Petitioner’s Proposed Construction in District Court
“housing”	“one or more parts that covers, encloses, supports, or protects other components”
“heuristics,” “a heuristic,” or “heuristically analyzing”	Indefinite OR “one or more rules to be applied to data to assist in drawing inferences from said data”
“actual failure”	“a state where the component is no longer capable of performing its intended function”
“potential or imminent failures”	“an increased likelihood of experiencing an actual failure in the future”
“alarm”	“an audible or visual warning or alert intended to draw immediate attention”
“a pre-determined percentage of current data readings	“a previously determined percentage calculated from two or more data points”

(*See* Ex. 2003 at 3-18, 22-23.) Petitioner’s avoidance of an actual position on the construction of these terms was almost certainly an intentional effort to use a broad construction for validity purposes and a narrow one for infringement purposes. Such gamesmanship is improper. Further, Petitioner tacitly admits these constructions are

not the plain and ordinary meanings because it took that position with other terms. (*See, e.g., id.* at 21, 26 (giving terms their “plain and ordinary meaning” and insisting “no construction [was] needed”).)

Because Petitioner did not provide “any arguments as to why [inconsistency] problems are not presented here, much less provided any reason behind its inconsistent claim constructions in general” denial is warranted. *KioSoft*, CBM2020-00026, Paper 11 at 17-18 (denying institution); *see also Orthopediatrics Corp. v. K2M Inc.*, IPR2018-01546, Paper 10, 10-12 (P.T.A.B. Feb. 14, 2019) (denying institution where petitioner failed to provide claim construction, which was inconsistent with position in district court); *Samsung Elecs. Co., Ltd. v. Ancora Techs., Inc.*, IPR2020-01184, Paper 11, 27 (P.T.A.B. Jan. 5, 2021) (denying institution where petitioner had inconsistent claim construction positions).

C. The Petition’s Claim-By-Claim Analysis Includes Impermissible Cross-Referencing.

Petitioner fails to identify with particularity the grounds and supporting evidence for its challenge on a claim-by-claim basis. Indeed, Petitioner provides analysis, or at least a partial analysis, of claims 1, 5, 7, 9-10, 14, 17-18, 23, 25, 26, 29-32 that consists entirely of internal cross-references to its prior analysis of other, different claims with different claim language or limitations. (*See* Pet. at 30-31, 35, 38-39, 41, 49, 53, 66-67, 71, 73, 76, 78, 82-86.) Petitioner’s failure to provide

analysis, e.g., explaining how the asserted art and prior analysis renders obvious different claims, is improper. *See, e.g., DIRECTV, LLC v. Qurio Holdings, Inc.*, IPR2015-02007, Paper 6 at 9 (PTAB Apr. 4, 2016) (denying institution where “[p]etition’s analysis of [cited] elements features internal cross-references to its discussion of other elements, with minimal—and often no—additional discussion specifically directed to the language of these claim elements”); *Apple Inc. v. ContentGuard Holdings, Inc.*, IPR2015-00449, Paper 10 at 6 (July 15, 2015) (rejecting obviousness analysis as “two or three levels removed from the actual disclosures of [the prior art]” where argument relied upon cross-references to other sections of petition).

For example, for limitation 5(i)—requiring the CMU to “appl[y] heuristics to analyze data collected from said one or more sensors”—Petitioner cross references to claim 3—requiring the CMU to “make a determination of an alarm condition based on data collected by two or more of said sensor devices”—but makes no effort to explain how the same analysis is relevant to this disparate claim language. *Compare* Petition at 31 (limitation 5(i) analysis citing to Section X.A.2, without more) *with id.* at 27 (Section X.A.2, claim 3 analysis). In another example, the Petition’s analyses of Claim 23—a device claim—simply redirects to the analysis performed for Claim 2—a system claim having different language—without any additional argument or analysis. (*Compare* Petition at 38 *with id.* at 19-25, 33-34;

see also Pet. at pp. xi-xvi (claim listing).) These cites to prior analysis fail to explain the differences in claim language. (*See* Pet. at 30-31, 35, 38-39, 41, 49, 53, 66-67, 71, 73, 76, 78, 82-86 (challenging claims without analysis).) Petitioner's failure to address the actual claim language, and thus, failure to meet its burden warrants denial of institution.

III. THE ASSERTED ART IS NOT PRIOR ART TO THE '223 PATENT

A. Priority Dates of the '223 Patent

The '223 patent was filed on March 15, 2013³ as U.S. Patent Application No. 13/842,427 ("the '427 Application", Ex. 1002 at 8-44). The '427 Application claims priority to U.S. Provisional Application No. 61/661,661, filed on June 19, 2012 (the '661 Provisional, Ex. 1013). The '427 Application also claims priority to and incorporates by reference U.S. Application No. 12/861,713 ("the '713 Application," Ex. 1014), filed August 23, 2010, now issued as U.S. Patent No. 9,026,281 to Murphy (Ex. 2005). *See* Ex. 1001 at 1:6-10; Ex. 1014 at 11. The '427 Application is a continuation-in-part of the '713 Application. Ex. 1001 at p. 1. The '713 Application incorporates by reference the entire disclosure of U.S. Patent No.

³ Accordingly, the '223 patent is subject to pre-AIA first to invent law. Patent Owner reserves the right to introduce, upon institution, evidence of the claimed invention's conception and reduction to practice prior to any effective filing date.

7,688,218 (“the ’218 Patent”, Ex. 1015), filed December 22, 2006. *See* Ex. 1014 at 15; *see also* Ex. 1001 at 15:20-24 (incorporating by reference the ’218 Patent). The ’661 Provisional incorporates by reference U.S. Patent Publication No. 2012/0046811, the publication of the ’713 Application. *See* Ex. 1013 at ¶109.

Petitioner has challenged the priority dates of independent claims 1, 2, 5, and 23 of the ’223 patent but provides only conclusory allegations regarding priority of the ’223 patent with no analysis or evidence to support them. *See* Petition at 7.

At least independent claims 2 and 23 are entitled to the earliest priority date of August 23, 2010 as shown in the table below. Petitioner was made aware of these priority dates for claim 2 in the underlying district court action; claim 23 is not asserted in the district court. Dependent claims 3, 4, and 27-30⁴ are also entitled to the August 23, 2010 priority date as demonstrated below. *See also* Ex. 2001 at Appendix A.

⁴ Dependent claim 27 is also asserted in the underlying litigation and was assigned, in error, a later priority date. Claim 27 depends on claim 2 and is also supported by the ’713 Application. Thus, it is also entitled to the August 23, 2010 priority date.

Limitation	Language	August 23, 2010 35 U.S.C. § 112(a) Support
Claim 2 Preamble	A system for monitoring a railcar, comprising:	Ex. 1014 at ¶1 (“The present invention relates to a device, system and method for monitoring the status of a railcar handbrake, and for providing an alert when the car is in motion while the handbrake is applied.”)
Limitation 2(a)	a plurality of sensor devices located on the railcar for monitoring parameters or conditions of the railcar, each of said sensor devices being separate from one another and including a sensor for monitoring one of said parameters or conditions of the railcar;	Ex. 1014 at ¶¶1, 8, 21, 22, 24-25, 27.
Limitation 2(b)	said plurality of sensor devices including at least one temperature sensor device having:	Ex. 1014 at ¶27. Ex. 1015 at FIG. 2 (showing plural pads 4); 3:27-31; 5:41-50 (“The exemplary instrumented pads 16 also carry temperature sensors to give an indication of the temperature of the associated bearing.”).
Limitation 2(c)	a housing;	Ex. 1014 at FIGS. 3-4 (showing housing 66 and various components disposed within it); ¶¶25 (“The preferred embodiment of the device 40 further includes a housing 66 supported on the load bearing member 42 for housing the various components within it,

		e.g., the electrical circuitry 62 and power source 64.”), 35.
Limitation 2(d)	a temperature sensor in thermal communication with an item of the railcar for which the temperature is being monitored, which item is external to said housing;	Ex. 1014 at ¶27. Ex. 1015 at 5:41-50 (“The exemplary instrumented pads 16 also carry temperature sensors to give an indication of the temperature of the associated bearing.”)
Limitation 2(e)	electrical circuitry in communication with said temperature sensor for obtaining information regarding the temperature being sensed, said electrical circuitry positioned within said housing;	Ex. 1014 at FIGS. 3-4 (showing housing 66 and electrical circuitry 62 positioned within it); ¶¶25 (“The preferred embodiment of the device 40 further includes a housing 66 supported on the load bearing member 42 for housing the various components within it, e.g., the electrical circuitry 62 and power source 64.”), 35.
Limitation 2(f)	a power source electrically connected to said electrical circuitry for providing power thereto, said power source positioned within said housing;	Ex. 1014 at FIGS. 3-4 (showing housing 66 and power source 64 positioned within it); ¶25 (“The preferred embodiment of the device 40 further includes a housing 66 supported on the load bearing member 42 for housing the various components within it, e.g., the electrical circuitry 62 and power source 64.”)
Limitation 2(g)	a communication device capable of broadcasting information regarding the temperature sensed via wireless communication, said communication device	Ex. 1014 at FIGS. 3-4 (showing housing 66 and wireless communication device 68 positioned within it); ¶¶27 (“In one form, the means for communicating information

	positioned within said housing; and	related to the status of the handbrake from the monitoring device 40 to a remote receiver 78 includes a wireless communication device 68 mounted within the monitoring device 40 as part of the circuitry 62.”), 28-30.
Limitation 2(h)	a communication management unit, mounted on the railcar, capable of two way wireless communication with each of said plurality of sensor devices for receiving information therefrom, said communication management unit having a wireless communication device for broadcasting information about the parameter or condition being monitored.	Ex. 1014 ¶¶ 27-28, 29 (“The monitoring device 40 and CMU 70 as part of a system can carry out this method, the device 40 communicating the information about the handbrake 22 to the CMU 70 via wireless communication device 68, the CMU then forwarding this and/or other further processed information about the handbrake to the remote receiver 78 via the wireless communication device 68 a.”), 30-32.
Claim 3	The system of claim 2 wherein said communication management unit can make a determination of an alarm condition based on data collected by two or more of said sensor devices.	Ex. 1014 at ¶¶ 1, 8, 21, 22, 24-25, 27.
Claim 4	The system of claim 2 wherein each of said plurality of sensor devices is capable of exchanging data with other of said plurality of sensor devices and with	The ’713 Application, Ex. 1014 at ¶¶27 (“In one preferred embodiment, it can also communicate with, control and/or monitor other devices on the railcar 10.”), 28-32.

	said communication management unit.	
Claim 23	A monitoring device for monitoring temperature on a railcar, comprising:	<i>See Claim 2 (Preamble), supra; see also limitations 2(b) and 2(d), supra (all incorporated here).</i>
Limitation 23(a)	a housing mountable on a railcar;	<i>See limitation 2(c), supra (incorporated here).</i>
Limitation 23(b)	a temperature sensor configured to be in thermal communication with a portion of the railcar to be monitored for temperature, which portion is external to said housing;	<i>See limitation 2(d), supra (incorporated here).</i>
Limitation 23(c)	electrical circuitry in communication with said temperature sensor for obtaining information regarding the temperature being sensed, said electrical circuitry positioned within said housing;	<i>See limitation 2(e), supra (incorporated here).</i>
Limitation 23(d)	a power source electrically connected to said electrical circuitry for providing power thereto, said power source positioned within said housing; and	<i>See limitation 2(f), supra (incorporated here).</i>
Limitation 23(e)	a communication device capable broadcasting information regarding the temperature sensed, said communication device	<i>See limitation 2(g), supra (incorporated here).</i>

	positioned within said housing;	
Limitation 23(f)	wherein the power consumption of said monitoring device is managed by placing said monitoring device in a standby state and periodically awakening said monitoring device to collect readings from said temperature sensor and to transmit the information regarding the temperature sensed via said communication circuitry.	Ex. 1014 at ¶¶36, 37 (“In operation, the monitoring device 40 can sample the strain gauge 60 intermittently to preserve power and increase battery life. For example, in one embodiment the monitoring device 40 powers up every 30 seconds to read the strain gauge 60.”)
Claim 27	The system of claim 2 further comprising a second temperature sensor located on said railcar for measuring ambient air temperature, wherein said system uses information obtained from said second temperature sensor about the ambient temperature to calibrate the temperature data received from said first sensor regarding the item of the railcar being monitored.	Ex. 1014 at ¶27. Ex. 1015 at 6:25-34 (““Likewise, if desired, detectors of factors such as ambient temperature and humidity (rain, snow and icing) can be built into the communication device 24 or the data control unit 23 in the distributed inference engine functions for use described below.”); 13:9-14; claim 33.
Claim 28	The system of claim 2 wherein said communicating management unit is capable of communicating data and alarms to a remote location located off of the train of which the railcar is a part.	The ’713 Application, Ex. 1014 at ¶8 (“Information regarding the status of the handbrake, including whether it is on or off, can be communicated, such as by wireless transmission, to a remote receiver away from the railcar such as the

		locomotive or a remote monitoring station.”), 9, 26-32
Claim 29	The system of claim 2 wherein the power consumption of each of said sensor devices is managed by placing each said sensor device in a standby state and periodically awakening said sensor device to collect readings from said sensor device and to transmit the information regarding the parameter or condition being sensed via said communication circuitry.	<i>See</i> limitation 23(f), <i>supra</i> (incorporated here).
Claim 30	The system of claim 2 wherein said communication management unit and said plurality of sensor devices form a wireless mesh network for said railcar.	The '713 Application, Ex. 1014 at ¶ 28 (“Wireless devices using a frequency-hopping spread spectrum (FHSS) method of transmitting radio signals and a Time Synchronized Mesh Protocol are preferred for security and ultra low power usage.”).

All of the remaining claims are entitled to the filing date of the '661 Provisional. *See* Ex. 1013 ¶¶17, 18, 31, 33, 41, 43-44, 46, 50-51, 63, 68-76, 109-31. Indeed, Petitioner does not challenge whether the '223 patent is entitled to the benefit of the provisional filing date. *See* Petition at 7 (concluding that “the challenged claims are entitled to a priority date of June 19 2012....”).

Petitioner's only argument for why claims 2 and 23 are not entitled to an August 23, 2010 priority date is because the '713 Application does not provide support for the claimed "temperature sensor." *See* Petition at 7. Contrary to Petitioner's unsupported claim, *see id.*, the '223 Patent does include support via incorporation by reference. The '218 Patent, which discloses such a sensor, is incorporated by reference into the '713 Application, which is incorporated by reference into the '223 Patent. *See* Ex. 1014 at 15, Ex. 1015 at 5:47-50; Ex. 1001 at 1:5-10; Ex. 2001 at ¶¶34-40. Each element of independent claims 2 and 23 (as well as dependent claims 3, 4, and 27-30) are fully supported by the '713 Application as demonstrated above. *See id.*; §III, table, *supra* (incorporated here); Ex. 2001 at Appendix A. The combination of the '713 Application and the incorporated disclosure of the '218 Patent provides adequate written description support for claims 2-4, 23, and 27-30 as of the filing date of the '713 Application on August 23, 2010. Ex. 2001 at ¶¶37-40.

Accordingly, Claims 2-4, 23, and 27-30 of the '223 patent are entitled the full benefit of its earliest priority date of August 23, 2010. Ex. 2001 at ¶¶38, 40. The remainder of the claims are entitled to the provisional filing date of June 19, 2012 as acknowledged by the Petition. *See* Petition at 7.

B. Armitage Is Not Prior Art To Claims 2, 3, 4, 23, and 27-30

The petition fails to establish that Armitage is entitled to the earlier filing date of its provisional application. Petitioner concludes that Armitage is prior art to the '223 patent under § 102(e) by a conclusory footnote. Petition at 5. But to support a valid priority claim to a provisional filing date the requirements of *Dynamic Drinkware* must be met. See *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1380 (Fed. Cir. 2015); *Amgen Inc. v. Sanofi*, 872 F.3d 1367, 1380 (Fed. Cir. 2017).

“A reference patent is only entitled to claim the benefit of the filing date of its provisional application if the disclosure of the provisional application provides support for the claims in the reference patent in compliance with § 112 ¶ 1.” *Dynamic Drinkware*, 800 F.3d at 1381; see also *Amgen*, 872 F.3d at 1380 (applying *Dynamic Drinkware* to application publications). To establish the provisional priority date, a petitioner must first demonstrate that the provisional application’s “written description [provides] support for the claims of the [later] patent.” *Dynamic Drinkware*, 800 F.3d at 1382. Second, a petitioner must show that the “subject matter relied upon for prior art was effectively filed in the provisional application[.]” *Id.* at 1380-81; see also 35 U.S.C. (pre-AIA) §119(e)(1) (requiring an invention to be “disclosed in the manner provided by the first paragraph of section 112” to be entitled to a provisional filing date. Here, Petitioner has failed to do either. In fact, Petitioner failed to even submit a copy of the Armitage provisional and therefore

cannot present any evidentiary basis for its footnote. Even if it had submitted the provisional, Petitioner and its expert rely on multiple disclosures in Armitage that are not present in the Armitage provisional *See, e.g.*, Petition at 59 (citing Armitage, Fig. 3), 65 (citing Armitage, ¶42); Ex. 1003 at ¶¶278 (citing Armitage, ¶42), 279 (citing Armitage ¶30).

Because Petitioner has presented no evidence whatsoever that Armitage is entitled to its provisional filing date, and because Armitage is not—in fact—entitled to its provisional filing date for the disclosures Petitioner has relied on, Armitage is only entitled to a filing date of May 11, 2011, and therefore is not prior art to at least claims 2, 3, 4, 23, and 27-30. *See also* Ex. 2001 ¶ 41. Petitioner has provided no basis in the record for the Board to find otherwise and the record, as far as the grounds in the Petition are concerned, is closed. *See Sirius XM Radio Inc. v. Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung eV*, IPR2018-00690, Paper 63 at 15 (PTAB Jul. 23, 2020 (holding that petitioner could not submit a reference patent’s provisional application in reply to establish entitlement to the provisional filing date for purposes of §102(e)); *see also* Office Trial Practice Guide 73 (“Petitioner may not submit new evidence or argument in reply that it could have presented earlier, e.g. to make out a prima facie case of unpatentability.”)).

IV. OVERVIEW OF THE '223 PATENT AND ITS FILE HISTORY

The '223 patent relates to a system for monitoring various operating conditions of a railcar and reporting of those operating conditions, e.g., a bearing may be monitored and the condition of the bearing may be reported. Ex. 1001 1:1-2, 2:29-44. The '223 patent teaches a POSA how to measure an operating condition of a railcar component via sensor data and apply one or more rules (i.e., heuristics) to the sensor data to determine current operating conditions and predict future operating conditions. *Id.* at 1:14-20, 8:11-11:60, 14:3-64. In one example, the '223 patent teaches a POSA how a single communication management unit may include advanced software for wirelessly collecting large amounts of data from a plurality of sensor devices and applying a statistical analysis to the data to form forward looking predictions of operating conditions of the railcar. *Id.* The communication management unit is capable of establishing a mesh network with a plurality of sensor devices, determining an alarm condition, and communicating alarm conditions off site to a remote location. *Id.* at 1:14-20, 5:11-6:7, 8:11-11:60, 14:3-64.

In one example, the '223 patent teaches a POSA how to use a temperature sensor in thermal communication with a wheel bearing and/or a wheel bearing adapter in such a way that the collected temperature data may be correlated to the overall operating health of the bearing by applying one or more rules to the temperature data to establish a conclusion regarding the overall operating health of

the bearing. *Id.* at 4:23-66, 8:10-11:60. Moreover, the '223 patent teaches a POSA how to apply statistical analysis to the collected temperature data by utilizing a statistical model to form forward looking predictions of the bearing health, i.e., time till maintenance is required, expected date of failure, or urgent / imminent failure. *Id.* at 2:65-3:7, 4:33-63, 8:14-11:58, 13:45-50. This analytical leap enabled train owners and operators to understand the severity of a measured parameter in such a way that they could continue to safely operate the train until such a time that maintenance was convenient or necessary. *Id.* at 2:55-3:14, 13:63-14:64. In one example, the '223 patent teaches a POSA that by assigning a low-level severity level, the operator may continue to operate the train but within certain safety parameters by, e.g., reducing the speed of the train and planning scheduled maintenance of the railcar at a future destination. *Id.* at 13:30-14:9.

The '223 patent revolutionized mobile train monitoring by teaching a POSA how a single universal sensor device, i.e., a “mote” could be assembled within a housing and mounted on a railcar at a location of interest without requiring the customized bearing adapters and pads of the prior art. *Id.* at 3:60-6:38, FIGS. 1-5A. This advancement required new and complex algorithms and operating software to analyze the collected sensor data because the placement of the sensor was uninhibited by the former constraints in the prior art sensors devices which were typically built directly into specific and expensive adapters. *Id.*; *see also* Ex. 1005

FIG. 4 (showing pad 16 built into the railcar frame. The '223 patent teaches a sensor device that broke free of the prior placement constraints having advanced heuristics and statistical analysis to form better assessments of operating conditions and better predictions of future operating conditions. *Id.* at 1:14-20, 6:60-6:38, 8:10-11:60, 13:63-14:63.

V. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art (“POSA”) is a person with at least a B.S. degree in electrical or computer science or a related field, with at least two years’ experience with sensing systems for railcars or similar industrial equipment, including familiarity with wireless networks and heuristics and statistical data analysis for failure prediction. Ex. 2001 at ¶¶42-46. Less work experience could be compensated for by a higher level of relevant education, and vice versa. *Id.*

VI. CLAIM CONSTRUCTION

In *Inter Partes* Review proceedings, claims are interpreted “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b). Under this standard, we construe the claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.*; see also *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005) (en banc). In determining a proper construction, the Board looks primarily

to “the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312-17).

The term “housing” means “an enclosure.” This construction that is consistent with (1) the way a POSA would understand the term based on the plain language of the claims and (2) the usage of the term “housing” in the specification. *See* Ex. 2001 at ¶¶48-53; Ex. 1001 at 3:60-63, 4:5-14, 4:23-29, 15:19-24 and FIGS. 1, 2, 3 and 3A.

First, the claim language includes multiple limitations on the claimed housing. For example, claim 1 recites that the housing is “mountable on a railcar” and that a power source and a communication device are “positioned within” the claimed housing. *See* Ex. 1001, claim 1. Similarly, claim 2 recites that electrical circuitry which obtains information from a temperature sensor, a power source, and a communication device are “positioned within” the housing. *See id.*, claim 2. Claim 23 also recites a housing “mountable on a railcar” and electrical circuitry, a power source, and a communication device “positioned within” the housing. *See id.*, claim 23. A POSA would understand these claim limitations to require the housing be an enclosure. *See* Ex. 2001 at ¶51.

Second, the specification consistently refers to a “housing” as an enclosure. For example, the specification discloses that “various components are installed *within* the housing 14.” *See* Ex. 1001 at 4:11 (emphasis added). The specification also discloses that “sensor 20 ... may be mounted *within* the housing 14.” *See id.* at 4:23-24 (emphasis added). The specification also discloses the housing as having “openings in the housing.” *See id.* at 4:12-13. As with the claim limitations, a POSA would understand these disclosures to mean that the claimed “housing” is an enclosure. *See* Ex. 2001 at ¶49-50.

In particular, the specification includes clear statements distinguishing the claimed “housing” over the earlier pad embodiments of the LeFebvre reference. The ’223 patent explains “[i]n another alternate embodiment of the invention, one or more motes may be housed in alternative housings or *built into* the railcar itself. In one such embodiment, motes can be *built into* the form of *an adapter pad* similar to the type shown in U.S. Pat. Nos. 7,698,962 and 7,688,218.”⁵ Ex. 1001 at 15:18-24 (emphasis on “built into”). A POSA would interpret these statements to distinguish from the “pad” of the Lefebvre reference because this pad is “built into the railcar itself” and understand that the LeFebvre Patents describe an embodiment in which

⁵ U.S. Pat. No. 7,688,218 is the issued patent corresponding to the LeFebvre reference.

there is no housing. See Ex. 2001 at ¶53; Ex. 2008 at ¶12. Therefore, the term “housing” would be understood by a POSA to mean an “enclosure.”

For purposes of its preliminary response only, Patent Owner gives all other terms their plain and ordinary meaning, but reserves all rights.⁶

VII. THE PETITION LACKS MERIT AND THUS INSTITUTION SHOULD BE DENIED.

Institution should be denied because Petitioner’s prior art and arguments have been rejected by the USPTO during prosecution. Further, Petitioner has failed to show a reasonable likelihood of prevailing on any ground specifically challenging any claim of the ’223 patent.

A. Petitioner’s Ground One Fails To Show Any Claim Is Unpatentable.

Petitioner has failed to show a reasonable likelihood that Claims 2–10, 18, 20, 21, 23, and 25–32 are unpatentable under 35 U.S.C. § 103(a) over LeFebvre.

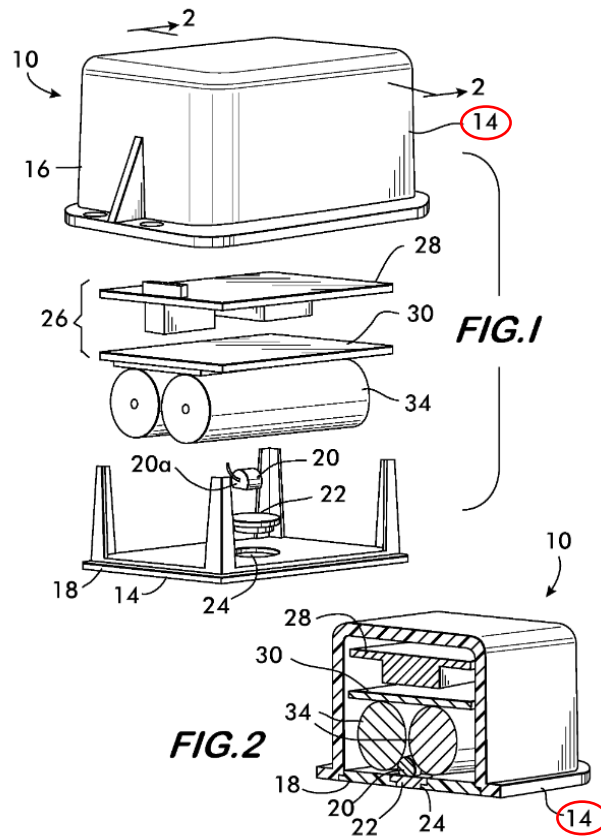
1. Claims 2-4, and 26-30

a. LeFebvre does not disclose a housing

Petitioner has failed to show that LeFebvre discloses, teaches, or suggests a “at least one temperature sensor device having: *a housing*,” as required by

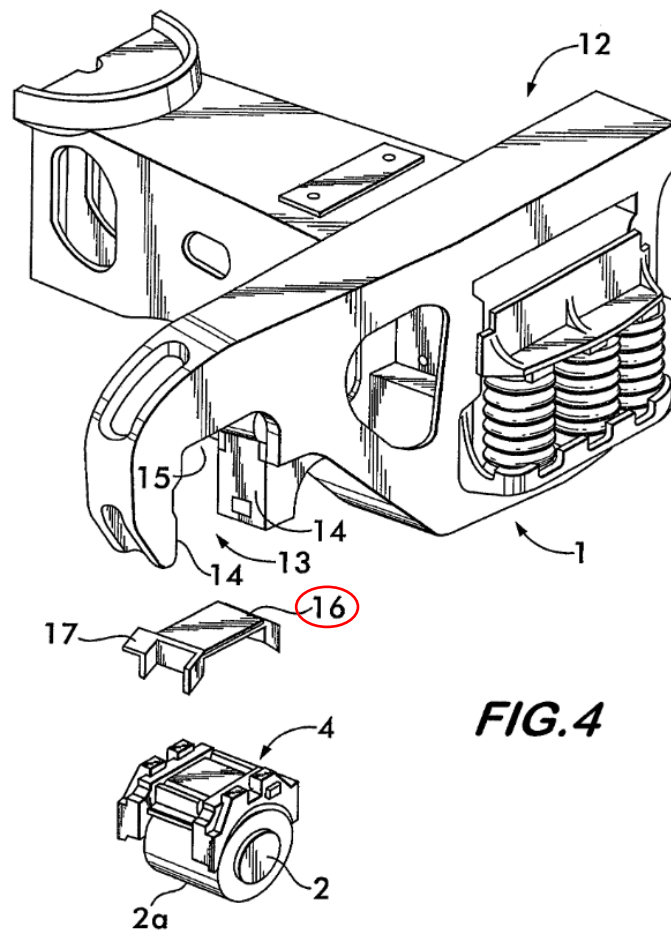
⁶ Patent Owner specifically reserves its right to assert additional arguments about the proper construction and scope of all terms if an IPR is instituted.

independent claim 2. Ex. 2001 at ¶56-68. In the same vein, Petitioner has failed to show that LeFebvre discloses, teaches, or suggests (i) “electrical circuitry,” (ii) a “power source,” and (iii) a “communication device” that are “positioned within said housing” as required by independent claim 2. Ex. 2001 at ¶60. The term “housing” refers to an enclosure that electronic components may be positioned within. *See* Ex. 1001 at Figs. 1, 2, 3, 3A; Ex. 2001 at ¶60 (confirming a POSA would understand this). Further, the circuitry 26, including main board 28 that has communications circuitry, and power source 34 are depicted as being positioned within a housing 14.



(Ex. 1001 at FIGS. 1&2; Ex. 2001 at ¶ 60.)

The Petition attempts to obfuscate the difference between the phrase “embedded into” found in the LeFebvre reference and the phrase “within said housing” as required by independent claim 2. *See* Petition at 21; Ex. 2001 ¶¶61-62. LeFebvre merely discloses an instrumented pad 16 – which a POSA would understand to be different from the claimed “housing.” Ex. 2001 at ¶¶ 63-64; Ex. 1005 at Fig. 3.). A POSA would understand from Fig. 4 (reproduced below) that an instrumented pad 16 is not a “housing” as that term is consistently used in the claims and specification of the ’223 patent. Ex. 2001 at ¶ 64.



Indeed, the '223 patent expressly differentiates the meaning of the terms “housing” and “pad” by distinguishing over the earlier pad embodiments of the LeFebvre reference. Adapter pads were already a common component of railcars at the time of the invention. *See* Ex. 2001 at ¶¶ 53, 65; *see also* Ex. 2003 (describing a bearing adapter and adapter pad). The insight of LeFebvre was to place sensors into adapter pads that were already in use on many railcars. Ex. 2001 at ¶¶ 53, 65; 2008 at ¶¶ 5-6, 10. Consistent with this history, the '223 patent explains “[i]n another alternate embodiment of the invention, one or more motes may be housed in

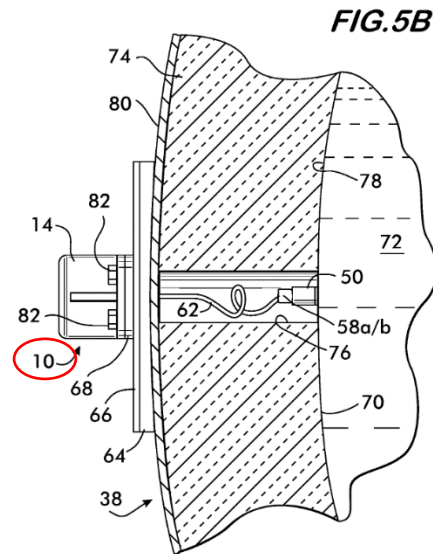
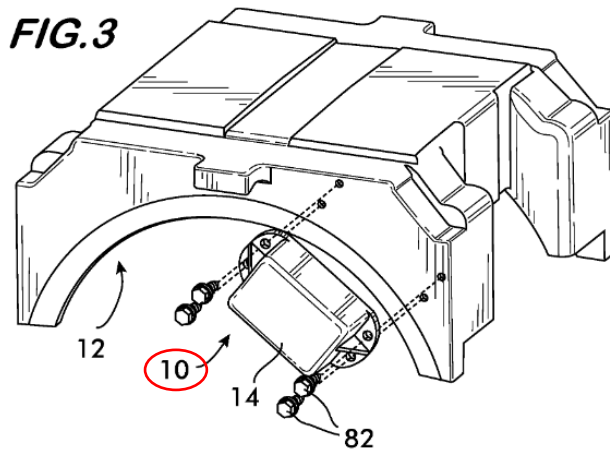
alternative housings *or built into the railcar itself*. In one such embodiment, notes can be *built into the form of an adapter pad* similar to the type shown in U.S. Pat. Nos. 7,698,962 and 7,688,218.”⁷ Ex. 1001 at 15:18-24 (emphasis added); Ex. 2008 at ¶¶5-6, 10. Thus, the smart pads disclosed in LeFebvre is an example of the sensor device being “built into the railcar itself” which is expressly distinguished from embodiments having housings. *See* Ex. 1001 at 15:18-24; Ex. 2008 at 11-12.

LeFebvre does not suggest its pad is a housing or an enclosure. Ex. 2001 ¶65 (explaining that LeFebvre never refers to the pad as either); *see, generally*, Ex. 1005. Instead, LeFebvre refers to Van Auken (Ex. 2006) for additional details on the adapter pads. *See* Ex. 1005 at ¶19. Van Auken also does not refer to the various adapter pad embodiments as including a housing or an enclosure. Ex. 2001 at ¶65. Van Auken discloses three planar shaped adapter pad embodiments 32, 232, and 332. *See id.*; Ex. 2006 at Figs. 8-12. A POSA would understand that each of the disclosed adapter pad embodiments are planar pads that are installed in a load bearing position in direct contact with a correspondingly shaped surface of a “bearing adapter” and must be placed in a specific orientation on the “bearing adapter” to function. *See* Ex. 2001 ¶65. A POSA would also understand that the

⁷ U.S. Pat. No. 7,688,218 is the issued patent corresponding to the LeFebvre reference.

term “pad” has a specific meaning as a term of art for a load bearing component of a railcar directly between a bearing adapter and the frame, i.e., in the exact position as shown by LeFebvre. *See* Ex. 2001 ¶¶65; Ex. 1005 at Fig. 4; Ex. 2003 at ¶27; Ex. 2008 at ¶¶5-6, 10.

For at least these reasons, the “pad” of LeFebvre is a demonstrably different from the universally mountable “housing” of the ’223 patent allowing the sensor device to be mounted in virtually any area of interest of a railcar. *See* Ex. 1001 at 5:30-46; figs. 3, 4, 5; Ex. 2008 at ¶¶8-9, 11; Ex. 2001 ¶66. In one embodiment, the sensor device may be mounted on a sidewall of a bearing adapter and not in a load bearing position. *See* Ex. 1001, Fig. 3 (reproduced below); Ex. 2001 ¶66. In another embodiment, the sensor device, with the claimed housing, may be mounted on a sidewall of a liquid holding tank. *See* Ex. 1001, Fig. 5B (reproduced below); Ex. 2001 at ¶66. Neither of these installations are possible with the device disclosed in LeFebvre. *See* Ex. 2001 at ¶¶66-67.



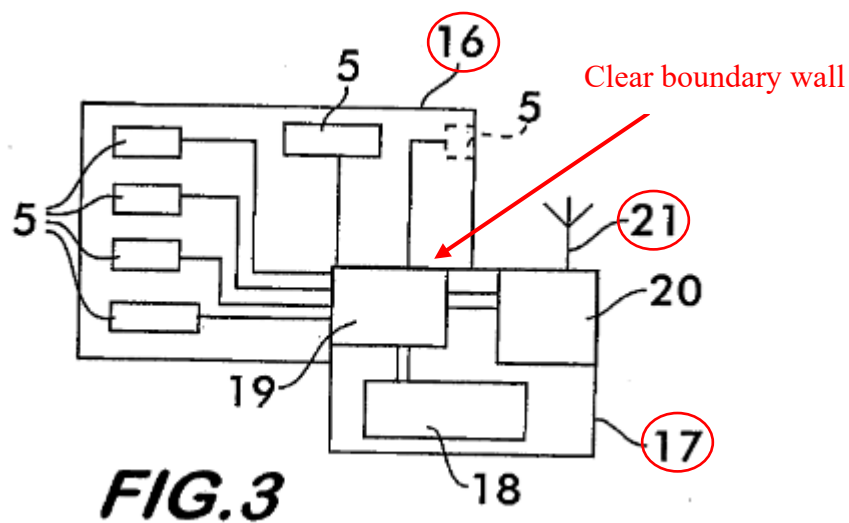
Therefore, a POSA would understand that '223 patent's distinguishment over LeFebvre would mean that the "housing" recited in the '223 patent's claim 2 is structurally distinct from—and therefore patentable—over LeFebvre. Ex. 2001 at ¶68; Ex. 2008 at ¶¶11. Thus, Petitioner has not shown a reasonable likelihood that independent claim 2 is unpatentable over the LeFebvre. Petitioner also cannot show a reasonable likelihood that claims 3, 4 and 26-30, dependent from independent claim 2, are unpatentable over the LeFebvre. Ex. 2001 at ¶68; *Mylan Pharms. Inc. v. Research Corp. Techs., Inc.*, 914 F.3d 1366, 1376 (Fed. Cir. 2019) ("Dependent claims, with added limitations, are generally not obvious when their parent claims are not.").

b. LeFebvre does not disclose electronic components within said housing

LeFebvre does not disclose, teach, or suggest “electrical circuitry positioned within said housing,” as required by independent claim 2. Ex. 2001 at ¶69. Petitioner incorrectly alleges that “[t]he instrumented pad 16 comprises electrical circuitry, specifically: ‘a power source 18, an analog/signal conditioning means ... and a communications unit 20.’” Petition at 23 (citing LeFebvre at ¶21). LeFebvre discloses that *extended portion 17* — not the pad 16 — contains these components,. *See* Ex. 1005 ¶21 (“[t]he extended portion 17 contains a power source 18, an analog/signal conditioning means and analog to digital conversion means and an associated microprocessor unit 19 and a communications unit 20 which is preferably a low power radio transmitter/receiver having an antenna 21.”); Ex. 2001 at ¶69.

Notably, there is no explanation for how or why the extended portion 17 and adapter 16 do (or even can) form the same “housing.” *See* Ex. 2001 at ¶70. Moreover, a POSA would recognize that LeFebvre teaches away from forming or making these structures into a single component. *Id.* LeFebvre discloses that “[i]n preferred form, the pad 16 has an extended attachment portion 17 *located so as to be relatively isolated* from the forces transmitted through the adapter 16.” Ex. 1005 at ¶21, Fig. 3; Ex. 2001 at ¶70 (further explaining a POSA would understand that FIG. 3 delineates the boundaries of extended portion 17 and adapter pad 16 as different components).

In view of the above, LeFebvre also does not disclose, teach, or suggest a “power source positioned within said housing” or a “communication device positioned within said housing” as recited in claim 2. *See id.* at ¶71. Here again, the Petition waves past the distinction between extended portion 17 and adapter pad 16. *See* Petition at 23-25; Ex. 2001 at ¶71. Relying on Fig. 3 of LeFebvre (reproduced below) Petitioner simply ignores that components 16 and 17 are depicted as separated by a boundary and the antenna is depicted as exterior to the boundary of extended portion 17. Ex. 2001 at ¶71. A POSA would understand from these disclosures that the power source and communications unit would not be within the same housing. *Id.* Therefore, even under Petitioners flawed interpretation of Fig. 3, LeFebvre simply does not disclose “communication device capable of broadcasting information ... via wireless communication ... positioned *within said housing.*” *See id.*



Therefore, a POSA familiar with the LeFebvre reference would understand that adapter pad 16 and extended portion 17 are separate components that do not collectively form a single housing. *See id.* at ¶72. Accordingly, a POSA would understand that the “power source” and “communication device” as they are disclosed in LeFebvre are not disposed within a housing. For this additional reason, petitioner has not shown a reasonable likelihood that claim 2 is unpatentable over LeFebvre nor that claims 3, 4 and 26-30 depend from independent claim 2 and are unpatentable. Ex. 2001 at ¶72; *Mylan*, 914 F.3d at 1376 (“Dependent claims, with added limitations, are generally not obvious when their parent claims are not.”).

2. Claims 5-10, 18, 20, 21, 31, and 32

LeFebvre fails to disclose, teach, or suggest “a communication management unit [that] applies *heuristics* to analyze data collected from said one or more sensor units (a) to determine if an actual failure exists and (b) *to predict* potential or imminent failures *based on a statistical analysis* of said collected data.” Ex. 2001 ¶¶73-82. The claim requires the communication management unit to perform each distinct analysis. *See* Ex. 1001 at 16:37-44. First, heuristics are applied “to determine if an actual failure exists,” i.e., whether current failures exist. *Id.* Second, heuristics are applied to prospectively to “predict” a failure “based on a statistical analysis” of the data collected by the sensor, i.e., a higher-level statistical analysis for predicting

failures not currently detected by the data that may develop at some point in the future. *Id.* A POSA would understand this. Ex. 2001 at ¶ 73.

In order to provide for this forward-looking, predictive analysis that is “based on a statistical analysis,” a statistical model with sufficient data, i.e., previously acquired data, on which to base such predictions would be needed. The ’223 patent explains: “The CMU is capable of wirelessly collecting data from each of the motes and performing higher-level analysis of the data to detect imminent or actual failures. During such data analysis, heuristics may be applied to determine potential failures ***based on statistical models*** and empirical data.” Ex. 1001 at 2:57-62 (emphasis added). That is, the analysis of part (b) necessarily involves a higher-level analysis than just the mere aggregation of collected sensor data to form an inference as to a condition of a train. *See* Ex. 2001 at ¶¶ 73-76, 80-81 (explaining that heuristics and statistical analysis are distinct).

Petitioner’s reliance on the same disclosures in LeFebvre for both “heuristics” and “statistical analysis” ignores that both of these concepts are claimed and are understood to have different scopes. *See, e.g.,* Petition, at 28 (citing LeFebvre at ¶¶ 58-66 for both claim requirements); Ex. 2001 at ¶¶ 75-76, 80-81. This is improper because Federal Circuit caselaw “instructs that different claim terms are presumed to have different meanings.” *MicroStrategy Inc. v. Bus. Objects Americas*, 238 F. App’x 605, 609 (Fed. Cir. 2007) (citing *CAE Screenplates, Inc. v. Heinrich Fiedler*

GmbH & Co. KG, 224 F.3d 1308, 1317 (Fed. Cir. 2000) (“In the absence of any evidence to the contrary, we must presume that the use of these different terms in the claims connotes different meanings.”); *Applied Med. Res. Corp. v. U.S. Surgical Corp.*, 448 F.3d 1324, 1333 n.3 (Fed. Cir. 2006) (“[T]he use of two terms in a claim requires that they connote different meanings”). Petitioner merely relies on disclosure in LeFebvre related to forming an “inference” of a measured condition via an inference engine. Pet. at 28; Ex. 2001 at ¶¶75-78. This is not the same as performing both “heuristics” and “statistical analysis.” Ex. 2001 at ¶¶75-76, 80-81. Indeed, LeFebvre is silent regarding utilization of “statistical analysis” to form forward looking predictions. *See generally* Ex. 1005; Ex. 2001 at ¶¶78-79. Moreover, Petitioner fails to point to anything disclosure in LeFebvre that discloses a system performing statistical analysis to establish forward looking predictions. Petition at 28, 31 (limitation 5(j) not identifying or explaining what “statistical analysis” is applied in LeFebvre ¶¶ 58-66 to form forward looking predictions); Ex. 2001 at ¶¶76-78.

Petitioner’s citation to LeFebvre fails to disclose “statistical analysis” of the collected sensor data, as required by limitation 5(j). *See* Petition at 31-32 (citing Ex. 1005 at ¶¶58-66); Ex. 2001 at ¶ 78. In fact, the scope and purpose of this cited passage states:

Examples of performance that the system is capable of monitoring include... [a] temperature sensor in instrumented pad 16 monitors relative changes in temperature against other bearings and provides ***an alarm threshold or long term trends to link to bearing condition***. The well-being of a roller bearing can be inferred using either ***trends or alarm levels***, avoiding a potential bearing burn off and possible derailment and providing ***a direct measurement*** that can be used to avoid false alarms from wayside hotbox detectors.

(Ex. 1005 at ¶ 58.) That is, LeFebvre describes identifying certain conditions or types of inferences from direct measurements, not of making any statistical analysis. Ex. 2001 at ¶ 78 (explaining LeFebvre, at most, collects data and infers that a condition exists). A POSA would readily understand that this method of using a direct measurement to draw an inference of a condition, e.g., of the roller bearing, is entirely different from performing “statistical analysis.” Ex. 2001 at ¶ 78 (further explaining that while using “long-term trends” may be considered heuristics, it is not statistical analysis).

Petitioner’s reliance on LeFebvre’s disclosure of “frequency spectrum analysis” is also distinguishable from the claimed “statistical analysis.” Ex. 2001 at ¶ 79 (citing and explaining Ex. 1005 at ¶ 59). As Dr. Shamos explains, “[f]requency domain analysis techniques merely transform time waveform data into discrete

frequency components, e.g., by taking a fast Fourier transform (FFT) analysis” and can analyze discrete data such as amplitude, frequency, and phase of sinusoidal signals” but does not perform any statistical analysis on such data. Ex. 2001 at ¶ 79.

In addition, there is no disclosure in LeFebvre relating to how a “potential or imminent failure” may be predicted based on (1) acquiring a measured condition by a sensor as “collected data” and then (2) performing a statistical analysis of the “collected data” to form the prediction. *See generally* Ex. 1005; *see also* Ex. 2001 at ¶ 80 (explaining LeFebvre only discloses measuring actual conditions to form immediate inferences based solely on the measurements taken); Ex. 1005 ¶¶ 58-66.

Petitioner relies exclusively on LeFebvre’s power-saving features to meet Limitations 5(g) and 8(b), which recite “software performing the functions of collecting data from said sensor at periodic intervals.” *See* Petition at 34 (citing Ex. 1005 at ¶¶34-35). This argument also fails. LeFebvre discloses a sensor which “is programmed to switch on briefly” but would normally be “in a low powered state most of the time.” *See* Ex. 1005 at ¶¶34-35; *see also* §VII.E.2.a, *infra* (incorporated here). This is not “**collecting data** ... at periodic intervals” as recited in limitations 5(g) and 8(b). *See* Ex. 2001 at ¶81. In fact, the claims and specification of the ’223 patent expressly distinguish between the power-saving functionality and the periodic collection of data for analysis. *Compare* Ex. 1001 at 5:24-29 with 13:51-53 (stating that limitation 1(g) is expressly directed toward management of power consumption

that “plac[es the] sensor device in a standby state and periodically awakening [the] sensor device ...” while limitation 5(g) recites “software performing the functions of collecting data ... at period intervals”). Thus, a POSA would immediately understand this same distinction and would not confuse a sampling interval with power consumption management. *See* Ex. 2001 at ¶ 81.

Petitioner has not established that independent claim 5 is unpatentable over LeFebvre. *See* Ex. 2001 at ¶ 82. Each of claims 6-10, 18, 20, 21, 31, and 32 depend from independent claim 5 and Petitioner cannot establish they are unpatentable by virtue of their dependance on a patentable independent claim. *Id.*; *Mylan*, 914 F.3d at 1376 (“Dependent claims, with added limitations, are generally not obvious when their parent claims are not.”).

3. Claims 23 and 25

In addition to LeFebvre not disclosing a housing, *see* §VII.A.1.a, *supra* (incorporated here), Petitioner has not shown that LeFebvre discloses, teaches, or suggests a housing “mountable on a railcar,” as required by limitation 23(a) of independent claim 23. *See* Petition at 38. Ex. 2001 at ¶¶ 83-84. The ‘223 patent confirms this distinction when explaining “[i]n one such embodiment, notes can be ***built into*** the form of ***an adapter pad*** similar to the type shown in U.S. Pat. Nos. 7,698,962 and 7,688,218.” Ex. 1001 at 15:18-24 (emphasis added); Ex. 2001 at ¶ 53. By contrast, in LeFebvre, the adapter pad 16 is not “mountable on a railcar” because

it is merely a planar component that functions as a load bearing and attenuation means. *See* Ex. 1005 at ¶ 19 and Fig. 4. LeFebvre explains “[t]he adapter pad 16 is formed to seat upon the upper surface of adapter 4 which, as indicated above, seats in turn on the bearing.” *Id.*

In the same vein, Petitioner has failed to show that LeFebvre discloses, teaches, or suggests (i) “electrical circuitry,” (ii) a “power source,” and (iii) a “communication device” that are “positioned within said housing,” as required by independent claim 23. Ex. 2001 at ¶83.

Petitioner has therefore not established that independent claim 23 is unpatentable over LeFebvre. Dependent claim 25 depends from independent claim 23 and Petitioner cannot establish that it is unpatentable by virtue of depending from a patentable independent claim. *Mylan*, 914 F.3d at 1376 (“Dependent claims, with added limitations, are generally not obvious when their parent claims are not.”).

4. Petitioner provides no evidence that a POSA would have been motivated to modify LeFebvre

Petitioner has failed to explain, much less argue, that a POSA would have been motivated modified LeFebvre to arrive at the claimed invention. As explained, *supra*, LeFebvre never references a housing and the instrumented pad 16 is not a housing. Ex. 2001 at ¶85 (further explaining the instrumented pad 16 does not store components inside of it and therefore serves a different purpose and function from

that of a housing). Instead, LeFebvre suggests that pad 16 is a thin planar component, Ex. 1005 at FIG. 4, which a POSA would understand to have significant vertical load would bear down it. Ex. 1005 at ¶ 17 (stating “[t]he axle bearings 2a and bearing adapters 4, best shown in fig. 4, are configured so that each bearing transmits the load which it carries and heat that it may generate through pads 16 and to the truck.”); Ex. 2001 ¶ 85. Thus, a POSA would not modify it to be a housing. Ex. 2001 at ¶ 85 (explaining that an enclosure would not function well as a load bearing component, especially on an axle designed to support heavy freight).

Petitioner points to no evidence, in the LeFebvre reference or otherwise, which suggests that it would be advantageous to put the pad 16 somewhere else on the railcar. *See generally* Petition. As such, there is no motivation for a POSA to modify the pad 16 to be a housing for enclosing electronic components. Ex. 2001 at ¶ 86.

B. Ground Two: Petitioner has failed to show a reasonable likelihood that Claims 13–17, 22, and 24 are unpatentable under 35 U.S.C. § 103(a) over LeFebvre in view of Barone

1. Claims 13-17, and 22

Petitioner’s reliance on Barone does not cure the above-mentioned deficiencies of LeFebvre. *See* Petition at 41-51; §VII.A.2, *supra* (incorporated here). As an initial matter, Claims 13-17 and 22 all depend from Claim 5, which is independently patentable as described above. Because Barone does not cure the

aforementioned deficiencies in LeFebvre. Indeed, Barone fails to disclose, teach, or suggest “a communication management unit [that] applies *heuristics* to analyze data collected from said one or more sensor units (a) to determine if an actual failure exists and (b) *to predict* potential or imminent failures *based on a statistical analysis* of said collected data,” as required by independent claim 5.

Petitioner has not established that independent claim 5 is unpatentable over LeFebvre and Barone. Each of Claims 13-17, and 22 depend from independent claim 5 and Petitioner cannot establish that they are unpatentable either. *Mylan*, 914 F.3d at 1376 (“Dependent claims, with added limitations, are generally not obvious when their parent claims are not.”).

2. Claim 24

Petitioner’s arguments regarding Claim 24, which depends from Claim 23, fail for the same reasons discussed above. *See* §VII.A.1.a, *supra* (incorporated here). Petitioner has failed to show that LeFebvre discloses, teaches, or suggests “a housing mountable on a railcar” as required by independent claim 23. *See* §VII.A.3, *supra* (incorporated here). In the same vein, Petitioner has failed to show that LeFebvre discloses, teaches, or suggests (i) “electrical circuitry,” (ii) a “power source,” and (iii) a “communication device” that are “positioned within said housing,” as required by independent claim 23. *Id.* The Petition does not rely on Barone for disclosing the above quoted limitations. *See* Petition at 50-51. Petitioner has not shown that

independent claim 23 is unpatentable over LeFebvre and Barone. Claim 24 depends from independent claim 23 and Petitioner cannot show that it is unpatentable either. *Mylan*, 914 F.3d at 1376 (“Dependent claims, with added limitations, are generally not obvious when their parent claims are not.”).

C. Ground Three: Petitioner has failed to show a reasonable likelihood that Claims 1 and 24 are unpatentable under 35 U.S.C. § 103(a) over LeFebvre in view of Denny and Provasnik

LeFebvre does not disclose a housing. *See* §VII.A.1.a, *supra* (incorporated here). Petitioner has failed to show that LeFebvre discloses, teaches, or suggests “a housing mountable on a railcar” as required by independent claims 1 and 23 (from which claim 24 depends). In the same vein, Petitioner has failed to show that LeFebvre discloses, teaches, or suggests (i) “electrical circuitry,” (ii) a “power source,” and (iii) a “communication device” that are “positioned within said housing” as required by each of independent claims 1 and 23. The Petition does not rely on Denny or Provasnik for disclosing the above quoted limitations. *See* Petition at 38, 53; Ex. 2001 at ¶ 90. Moreover, Denny and Provasnik fail to cure the above explained deficiencies in LeFebvre. *Id.* Petitioner has not established that independent claims 1 and 23 are unpatentable over LeFebvre, Denny, and Provasnik. Claim 24 depends from independent claim 23 and consequently Petitioner cannot show that claim 24 is unpatentable either. *Mylan*, 914 F.3d at 1376 (“Dependent

claims, with added limitations, are generally not obvious when their parent claims are not.”).

D. Ground Four: Petitioner has failed to show a reasonable likelihood that Claims 2, 3, and 26–28 are unpatentable under 35 U.S.C. § 103(a) over Armitage

As explained above, Armitage is not prior art to claims 2, 3, 27, and 28. *See* §III, IV, *supra* (incorporated here). Limitations 26(b) and 26(c) are identical to limitations 5(i) and 5(j). Armitage does not disclose, teach, or suggest limitations 26(b) and 26(c) for at least the same reasons. §VII.E.2, *infra* (incorporated here). Petitioner has not shown that independent claim 2 or dependent claim 26 are unpatentable over Armitage.

E. Ground Five: Petitioner has failed to show a reasonable likelihood that Claims 4-10, 13-18, 20-23, 25, and 29-32 are unpatentable under 35 U.S.C. § 103(a) over Armitage in view of LeFebvre

1. Claims 4, 29, and 30

Not only is Armitage not prior art to claims 4, 29, and 30, *see* §III, IV, *supra* (incorporated here), Petitioner has not shown that independent claim 2, from which each claim depends, is unpatentable over Lefebvre and Armitage. *See* §VII.A.1, *supra* (incorporated here); §VII.D, *supra* (incorporated here). Accordingly, Petitioner has not shown that claims 4, 29, and 30 are unpatentable. *Mylan*, 914 F.3d at 1376 (“Dependent claims, with added limitations, are generally not obvious when their parent claims are not.”).

2. **Claims 5-10, 13-18, and 20-22**

a. **Claim 5 – There is no motivation to modify Armitage in view of LeFebvre**

Petitioner has not and cannot show any motivation to modify Armitage in view of LeFebvre to arrive at claim 5 because doing so would change the basic operating principles of the Armitage invention. Petitioner argues against limitation 5(g) by referring back (through multiple cross references) to limitation 8(b) *See* Petition at 34. Petitioner’s analysis is not only confusing, but fatally flawed.

Initially, Petitioner has not shown that LeFebvre discloses limitation 5(g) because a POSA would not confuse the collection of data at periodic intervals with a power management method. *See* VII.A.2, *supra* (incorporated here). With regard to the combination of LeFebvre and Armitage, Petitioner relies on Armitage at ¶55 (disclosing various components of Armitage’s sensor node), Ex. 1005 ¶¶34-35 (discussing a low power mode), and the Ricca Declaration at ¶¶146, 349. *Id.* It appears that Petitioner’s analysis alleges that Armitage at ¶55 discloses “software” that could be modified in view of LeFebvre’s “power saving scheme.” Petition at 71. Petitioner then argues that a POSA would be motivated to modify Armitage in view of the “power-saving scheme described by LeFebvre because “it saves power” and because it was a “well-known feature.” *Id.* However, Armitage relies on a data analysis technique that requires “continuous monitoring” and there is no indication in Armitage that power saving is a concern. *See* Ex. 1006 ¶44 (“Realtime, continuous

monitoring of all critical railway car components can be monitored....”); Ex. 2001 at ¶¶93-94. Armitage discloses that the sensors operate in the conventional manner by continuously performing sensing while the railcar is in motion. *See* Ex. 2001 at ¶94. Specifically, Armitage analysis sensor data through a comparison of the data from one sensor to a running average of data from a population of sensors and identifies outliers. *See id.* (citing Armitage at ¶¶30, 42)

LeFebvre, in contrast, discloses a sensor which “is programmed to switch on briefly” but would normally be “in a low powered state most of the time.” Ex. 1005 ¶¶34-35. As pointed out by Mr. Ricca, the explicit result of LeFebvre’s low power mode is that “it allows the microprocessor in the sensor node to be in a low powered state most of the time.” Ex. 1003 at ¶349 (citing Lefebvre at ¶¶34-35). Such a modification to Armitage would frustrate the ability of Armitage’s sensor to “continuous[ly] monitor[] all critical railway components.” Ex. 1006 ¶44; Ex. 2001 at ¶94.

A POSA would not be able to combine the dynamic continuous monitoring of Armitage and the power management features of LeFebvre to perform periodic collections of sensor data with any probability of success because turning sensors off and on as disclosed in LeFebvre would prevent Armitage’s system from establishing an accurate running average of the sensor data. Ex. 2001 at ¶¶94-95; *see also* Ex. 1006¶ 41-44. Thus, LeFebvre’s alleged “power-saving scheme” would not

motivate a POSA to modify Armitage in the manner described in the Petition. Ex. 2001 at ¶94.

Petitioner has failed to show that independent claim 5 is unpatentable over Armitage and LeFebvre at least because there is no motivation to modify Armitage in view of LeFebvre. *Id.* Claims 6-10, 13-18, and 20-22 depend from independent claim 5 and consequently Petitioner cannot show that they are unpatentable either. *Mylan*, 914 F.3d at 1376 (“Dependent claims, with added limitations, are generally not obvious when their parent claims are not.”).

b. Armitage does not utilize statistical analysis techniques for predictive purposes

Armitage and LeFebvre fail to disclose, teach, or suggest “wherein said communication management unit applies heuristics to analyze data collected from said one or more sensor units (a) to determine if an actual failure exists and (b) to predict potential or imminent failures based on a statistical analysis of said collected data,” as required by independent claim 5. Ex. 2001 at ¶97. Petitioner does not apply LeFebvre against any of limitation 5(i), 5(j), 5(k). Petition at 75; Ex. 2001 at ¶97. Rather Petitioner relies exclusively on Armitage. *Id.*

The Petition alleges that Armitage’s control node 130 corresponds to the claimed “communication management unit” and performs the above quoted application of heuristics by relying on the preceding analysis presented with respect

to dependent claim 3. *See* Petition at 64-66, 75. Notably missing from the Petition at these pages is any discussion regarding a “prediction.” Ex. 2001 at ¶98. Here, all that the Petition has done is allege that the “control node collects this data and analyzes it to determine whether a fault condition is present.” Petition at 64.

Petitioner’s arguments fall short because determining whether a fault condition is present is not the same thing as forming a forward-looking prediction that is “based on a statistical analysis of *said collected data*.” Ex. 2001 at ¶99. The limitations in 5(i), 5(j) and 5(k) require that heuristics be used in two different ways. *Id.*

First, to determine if a currently detected failure exists, i.e., “determine if an actual failure exists.” Ex. 2001 at ¶100; Limitation 5(j). Second, to form forward looking predictions based on a statistical analysis of the collected data, i.e., “to predict potential or imminent failures based on a statistical analysis of said collected data.” Ex. 2001 at ¶100; Limitation 5(k). All that Petitioner has done is show that the combination discloses a system capable of detecting whether a fault condition event currently exists and whether maintenance is immediately required or may be put off until later. *See* Petition, 58; Ex. 2001 at ¶100.

Armitage merely discloses establishing an event ranking for a deviation from normal conditions based on a comparative analysis of sensor data to the population of sensor data. Ex. 2001 at ¶101. This type of analysis is not predicated on

performing a statistical analysis of the data collected from a specific sensor or even a pool of individual sensor data. *Id.* Rather it is merely a comparative analysis using basic arithmetic. *Id.*

Armitage may only determine a fault condition by scanning for outliers, e.g., by comparing single sensor data against a corresponding pool of sensor data from a plurality of sensors to find outliers. Armitage ¶42; Ex. 2001 at ¶102. That is to say that Armitage may only determine “failure alerts” of a presently detected fault condition by performing a comparative analysis of sensor information from one sensor node against the corresponding sensor information from a plurality of sensor nodes. Ex. 2001 at ¶102. For example, “When one or more of the sensor nodes begin to deviate from the others in the population, then a failure condition could be determined.” Armitage ¶30.

Armitage’s ¶41 refers to FIG. 4, which merely contemplates performing a comparative analysis of sensor 325 against the other sensors 320, 322, 327, 326, etc. Armitage explains that “the population of all of sensor nodes 320-327 is taken into account to determine a dynamic threshold of failure.” *Id.* ¶41. Next, Armitage explains that a failure condition may be determined by a standard deviation metric, e.g., “when data from a sensor node deviates by more than three standard deviations, among other examples.” *Id.* Both of these analysis techniques require a pool of sensor data and would not work with a single sensor data. Armitage may determine

“failure alerts” of a presently detected fault condition by performing a comparative analysis of sensor information from one sensor node against the corresponding sensor information from a plurality of sensor nodes. Ex. 2001 at ¶103.

A POSA would understand that the methodologies contemplated by Armitage are merely comparative in nature and can only establish a fault condition based on how much a single sensor deviates from the other sensors on the railcar. *Id.* at ¶104. Furthermore, the system of Armitage requires a plurality of sensors to determine outliers. *Id.* This is not the same thing as applying a heuristic, i.e., one or more rules, to “predict potential or imminent failures based on a statistical analysis of said collected data,” as required by independent claim 5. Armitage merely performs a comparative analysis that determines a current failure has occurred when a single sensor data is outside of a threshold level (in this case three standard deviations from the average). *Id.* Furthermore, this type of analysis does not “predict potential or imminent failures,” as explained in more detail below. *Id.*

c. Armitage does not “predict” future failures

When addressing limitation 5(k) Petitioner fails to provide any discussion regarding a “prediction.” Ex. 2001 at ¶105; Petition at 75 (citing 64-66; Ex. 1003 at ¶292). The cross-reference points to a discussion of claim 3 which does not include any discussion of limitation 5(k). Mr. Ricca at ¶292 does not provide any additional insight into why Armitage discloses limitations 5(k) beyond conclusory statements

unsupported by any citation to the record. Specifically, nothing in Petitioner’s analysis addresses the full claim requirements of “*predict[ing]* potential or imminent failures based on a statistical analysis of said collected data.” Ex. 2001 at ¶105; *see also* Petition at 64-66, 75. Indeed, the words “predict” are never used by Petitioner. Petitioner has failed to even argue limitation 5(k) is present in the prior art. Therefore, for this reason alone, Petitioner cannot show claim 5 is unpatentable over the Armitage and LeFebvre combination.

Petitioner alleges “Armitage’s system ... distinguishes between potential failures (which warrant maintenance) and actual failures (which require immediate service). Petition at 66. Petitioner cites only to Armitage ¶44 for this assertion. *Id.* However, this passage in Armitage assigns a “yellow” status to the “event” indicating “which indicates that a railway car requires service” and a “red” status which indicates “a serious deviation ... that requires immediate service.” Ex. 1006 ¶44; *see also* Ex. 2001 at ¶106. Each of these status indicators refers to a *currently detected failure*, i.e., an “event” in the Armitage nomenclature, and does not in any way disclose *predicting* potential or imminent failures. *Id.*

Petitioner has failed to show that independent claim 5 is unpatentable over Armitage and LeFebvre. Claims 6-10, 13-18, and 20-22 depend from independent claim 5 and consequently Petitioner cannot show that they are unpatentable either.

Mylan, 914 F.3d at 1376 (“Dependent claims, with added limitations, are generally not obvious when their parent claims are not.”).

3. Claims 23 and 25

Armitage is not prior art to independent claim 23 because Claim 23 is entitled the full benefit of its earliest priority date. *See* § III, *supra* (incorporated here). Armitage does not disclose, teach, or suggest (i) “electrical circuitry,” (ii) a “power source,” and (iii) a “communication device” that are “positioned within said housing” as required by independent claim 2. *See* §VII.D, *supra* (incorporated here). As explained above, LeFebvre does not disclose, teach, or suggest “a housing” nor does LeFebvre disclose teach or suggest “a housing **mountable on a railcar.**” *See* §VII.A, *supra* (incorporated here). Accordingly, LeFebvre fails to cure the deficiencies of Armitage. Furthermore, this ground of the Petition only relies on LeFebvre for limitation 23(f). *See* Petition at 72.

Petitioner has failed to show that Claim 23 is unpatentable in view of Armitage and LeFebvre. Claim 25 depends from independent claim 23 and consequently Petitioner cannot show that claim 23 is unpatentable either. Ex. 2001 at ¶¶108-10. *Mylan*, 914 F.3d at 1376 (“Dependent claims, with added limitations, are generally not obvious when their parent claims are not.”).

F. **Ground Six: Petitioner has failed to show a reasonable likelihood that Claims 1 and 24 are unpatentable under 35 U.S.C. § 103(a) over Armitage in view of LeFebvre, Denny, and Provasnik.**

As explained above in reference to limitation 5(g) and 8(b), a POSA would lack a motivation to combine the continuous monitoring and running-average calculations of Armitage with the power-saving features of LeFebvre. *See* §VII.E.2.a, *supra* (incorporated here); Ex. 2001 at ¶¶94-96. The same is true regarding limitation 1(g). *Id.* at ¶ 111-115. Petitioner relies entirely on its analysis performed with respect to limitation 8(b) — which relies exclusively on LeFebvre and is fundamentally flawed on its own terms, as explained above — to support its arguments for limitation 1(g). *See* Petition at 86; §VII.B.2, *supra* (incorporated here).

There is no motivation for a POSA to modify Armitage with LeFebvre to reach the subject matter of limitation 1(g) because adding LeFebvre’s power management features would prohibit Armitage’s dynamic continuous monitoring, a critical feature of Armitage’s disclosed system. *See* §VII.E.2.a, *supra*; Ex. 2001 at ¶¶111-113.

However, limitation 8(b) requires that “said software performing the functions of collecting data from said sensor at periodic intervals” whereas limitation 1(g) requires “the power consumption of said sensor device is managed by placing said sensor device in a standby state and periodically awakening said sensor device to collect readings from said temperature sensor and to transmit the information regarding the temperature sensed via said communication circuitry.” Ex. 1001 at

15:50-55, 16:58-60. That is, the claims have different scope: using software to collect data at periodic intervals is not the same as placing “said sensor device in a standby state” required by limitation 1(g). Ex. 2001 at ¶ 112. Given the differences between the two features in the specification and claims, a POSA would not confuse them. *See id*; *see also* §VII.B.2, *supra*.

In addition, and contrary to Petitioner’s suggestions, Armitage discloses that the “sensor nodes 121-124 will sense and monitor the equipment while railway car 110 is in motion, such as when rolling.” Ex. 1006 at ¶21. That is, the sensors operate by continuously sensing operational parameters while the railcar is in motion. See Ex. 2001 at ¶ 11 (explaining this is confirmed by Armitage’s disclosure in paragraph 44, which discusses realtime, continuous monitoring of all critical components being performed); Ex. 1006 ¶44. Therefore, a POSA would not understand Armitage’s sensors to be placed in a standby state at all, much less periodically awakened to collect and transmit readings as recited by independent claim 1. Ex. 2001 at ¶113. Further, any attempt to so modify Armitage using LeFebvre’s power management disclosure would necessarily frustrate the critical function of the realtime, continuous monitoring evidence in Armitage’s disclosed system. *Id*. Therefore, a POSA would have no motivation to seek out a combination of Armitage and LeFebvre. *Id*.

Denny or Provasnik do not remedy these deficiencies. Denny discloses that the electronic circuit 50 is always active. Ex. 1008 at 7:14-19; Ex. 2001 at ¶ 114. Thus, its thermal warning device 10 is never placed in a standby state, much less periodically awakened to collect and transmit readings. Ex. 2001 at ¶ 114. In addition, Provasnik has no disclosure relating to a “standby state.” *See generally* Ex. 1009; Ex. 2001 at ¶ 114 (sensor device is always in active state). Furthermore, the Petition does not rely on Denny or Provasnik for disclosing limitation 1(g).

Therefore, Petitioner has not shown that claims 1 and 24 are obvious over Armitage in view of LeFebvre, Denny, and Provasnik. *Id.* at ¶115.

VIII. CONCLUSION

For the reasons described above, the Board should decline to institute *inter partes* review.

Respectfully submitted,

Dated: May 15, 2023

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Amsted Rail Company, Inc.

CERTIFICATION

Patent Owner's Preliminary Response, excluding the caption, Table of Contents, Table of Authorities, Table of Exhibits, and this Certification contains 13,579 words as measured by the word processing software used to prepare the document, in compliance with 37 C.F.R. § 42.24(d).

Respectfully submitted,

Dated: May 15, 2023

By: / Ryan N. Miller /

Ryan N. Miller
Reg. No. 68,262
Counsel for Patent Owner
Amsted Rail Company, Inc.

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §42.6(e), I certify that on this 15th day of May, 2023, a copy of PATENT OWNER'S PRELIMINARY RESPONSE under 37 C.F.R. §42.107 was served by electronic mail on Petitioner's counsel, lead and back-up, as follows:

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Counsel for Petitioner has consented to service of all documents via electronic email. *See* Petition, Paper 1 at 2.

Dated: May 15, 2023

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