

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

FREIGHTCAR AMERICA, INC.,

Petitioner,

v.

NATIONAL STEEL CAR LIMITED,

Patent Owner

Case IPR2025-01047

Patent No. 8,132,515

PATENT OWNER'S RESPONSE

On behalf of National Steel Car Limited

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EXHIBIT LIST	
2001	Declaration of Dr. Mark J. Viz, Ph.D., P.E. signed August 18, 2025 in support of Patent Owner's Request for Discretionary Denial of Institution
2002	Scheduling Order, D.I. 38, No. 24-cv-00594-JLH-CJB (D. Del.)
2003	Docket Sheet, No. 24-cv-00594-JLH-CJB (D. Del.)
2004	Plaintiff's Second Amended Complaint, D.I. 56, No. 24-cv-00594-JLH-CJB (D. Del.)
2005	Report and Recommendations Denying FreightCar's Motion to Dismiss, D.I. 45, No. 24-cv-00594-JLH-CJB (D. Del.)
2006	Order Adopting Report and Recommendation Denying Motion to Dismiss, D.I. 49, No. 24-cv-00594-JLH-CJB (D. Del.)
2007	FILED UNDER SEAL - Answer to Second Amended Complaint, D.I. 68, No. 24-cv-00594-JLH-CJB (D. Del.)
2008	Petitioner's Invalidity Contentions from No. 24-cv-00594-JLH-CJB (D. Del.)
2009	Petitioner's <i>Sotera</i> Stipulation
2010	Portions of United States District Courts—National Judicial Caseload Profile for 12-month period ending March 31, 2025; available at https://www.uscourts.gov/data-news/reports/statistical-reports/federal-court-management-statistics
2011	Time to Milestones for the District of Delaware, DocketNavigator
2012	U.S. Provisional Application No. 61/977,753
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2014	U.S. Patent No. 10,017,191
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2021	WIPO Publication No. WO2019/191762
2022	U.S. Patent Publication No. 2021/0009,169 (U.S. App. No. 17/038,205)

2023	Inventor's Declaration from file history of U.S. App. No. 17/038,205
2024	Complaint for Patent Infringement in <i>National Steel Car Ltd. v. FreightCar America, Inc.</i> , No. 11-cv-08743 (N.D. Ill.).
2025	Complaint for Patent Infringement in <i>National Steel Car Ltd. v. FreightCar America, Inc.</i> , No. 15-cv-03418 (N.D. Ill.).
2026	Complaint for Patent Infringement in <i>National Steel Car Ltd. v. FreightCar America, Inc.</i> , No. 15-cv-08643 (N.D. Ill.).
2027	FILED UNDER SEAL - 2017 Settlement Agreement between National Steel Car Limited and FreightCar America, Inc.
2028	FILED UNDER SEAL - Email Between National Steel Car Limited Employees
2029	Statistics for Judge Hall in Patent Cases Since January 1, 2021, DocketNavigator
2030	Tarmac PGA Stone Wagons
2031	Agreed Protective Order Regarding the Disclosure and Use of Discovery Material, D.I. 42, No. 24-cv-00594-JLH-CJB (D. Del.)
2032	Company, FreightCar America Webpage, available at https://freightcaramerica.com/company/
2033	FILED UNDER SEAL - FreightCar America's Response to Interrogatory No. 7
2034	Reserved
2035	Declaration of Mark J. Viz Ph.D., P.E. Under 37 C.F.R. §1.68
2036	Article, "This Company Got a \$10 Million PPP Loan, Then Closed Its Plant and Moved Manufacturing Jobs to Mexico", available at https://www.propublica.org/article/this-company-got-a-10-million-ppp-loan-then-closed-its-plant-and-moved-manufacturing-jobs-to-mexico
2037	Contact Information, FreightCar America Webpage, available at https://freightcaramerica.com/contact/
2038	FILED UNDER SEAL - NSC024815
2039	FILED UNDER SEAL - NSC021773
2040	FILED UNDER SEAL - NSC037310
2041	FILED UNDER SEAL - NSC028291
2042	FCA0000280 Original
2043	FCA0000280 Reproduced
2044	Email from Counsel Robert Keeler to Justin Gillett
2045	Declaration of Laura Jewell
2046	Statutory disclaimers per Manual of Patent Examining Procedure (MPEP) 1490 filed in US Pat. No. 8,132,515 on December 30, 2025

2047	RESERVED
2048	FILED UNDER SEAL - NSC011814
2049	RESERVED
2050	RESERVED
2051	RESERVED
2052	Claim Construction Order, filed December 17, 2025, Document 177, 1:24-cv-00594-JLH-CJB
2053	Claim Construction Reports and Recommendations
2054	Amended Joint Claim Construction Chart, filed November 10, 2025, Document 163, 1:24-cv-00594-JLH-CJB
2055	<i>Manual of Standards and recommended practices. section C, part II. Design, Fabrication, and Construction of Freight Cars.</i> (2023). Association of American Railroads.
2056	Deposition transcript of Sylvia Hall-Ellis, Ph.D., taken February 27, 2026, and exhibits
2057	Deposition transcript of Medhi Ahmadian, Ph.D., taken March 5, 2026, and exhibits
2058	Declaration of Mark J. Viz, Ph.D., P.E. signed March 13, 2026 in support of Patent Owner Response

I. INTRODUCTION

Following FreightCar America, Inc.'s ("Petitioner") copying of National Steel Car Limited's ("PO") proprietary railroad hopper car design, PO sued Petitioner for infringement of, inter alia, U.S. Patent No. 8,132,515 ("the '515 Patent", EX1001). Petitioner now seeks a duplicative, unnecessary, and inefficient *inter partes* review of claims 1-23 and 32-44 ("challenged claims").

Petitioner's challenge suffers from foundational and unrepaired defects. Most critically, Petitioner fails to address or substantively analyze multiple limitations the Board identified as pivotal. Petitioner does not present the required claim-by-claim, limitation-by-limitation analysis, nor a coherent analysis of any claim as a whole, rendering the Petition legally insufficient. 35 U.S.C. §312(a)(3); 37 C.F.R. §42.104(b)(4); *Harmonic Inc. v. Avid Technology, Inc.*, 815 F.3d 1356 (Fed. Cir. 2016). As explained below, Petitioner never cures the same structural mapping failures the Board already identified, such as corner-post reach, hollow-beam placement, machinery-space boundaries, and end-post/beam meet-up. Moreover, Petitioner still does not articulate any *KSR*-compliant motivation to combine.

The Petition offers no credible motivation—rooted in the teachings of the prior art, supported by evidentiary reasoning, or grounded in the perspective of a person of ordinary skill in the art at the relevant time ("POSITA")—to combine the cited references in any manner that would yield the claimed inventions. Instead,

Petitioner relies on retrospective reasoning, conclusory assertions, and generic “design choice” theories that fail to show why a POSITA would have undertaken the proposed combinations or expected them to succeed.

Although the Board instituted review, the deficiencies in Petitioner’s proofs remain unchanged. The cited references do not teach, suggest, or render obvious the claim-specific structural relationships the ’515 Patent requires, and Petitioner has not met its burden to show unpatentability by a preponderance of the evidence. Objective indicia of non-obviousness further reinforce the patentability of the claimed inventions. Indeed, the Board’s own preliminary findings confirm that Petitioner has still not shown: (1) corner posts extending to the slope sheet (claims 1, 20); (2) any hollow section beam extending between the side walls (claims 7, 18); or (3) any end-post meeting both the first beam and top chord (claim 32). These failures defeat the instituted grounds for every surviving independent claim and their dependents. Objective indicia of non-obviousness further reinforce the patentability of the ’515 Patent’s claimed inventions.

For these reasons and those detailed below, claims 1-23 and 32-44 of the ’515 Patent remain patentable.

II. FACTUAL BACKGROUND

PO designed, built, and sold hundreds of open-top, bottom-discharge railcars (colloquially referred to as “jennies”) to Canadian National Railway Company

("CN") for use on its Duluth, Missabe and Iron Range Railway ("DMIR") in 2009.

These jennies are a real-world implementation of an embodiment of the '515 Patent claims. Images of these jennies are shown below:



The '515 Patent identifies several design constraints stemming from the requirements of the railways and docks on the DMIR, rendering prior art designs unsuitable and leading to the distinctive design of the PO's patented railcars. The constraints include: (1) a large door opening; (2) a steep loading/unloading chute; (3) increased lading volume within a constrained car length; (4) a low overall height relative to Top of Rail; (5) a low center of gravity; (6) minimization of car length over the trucks; and (7) operational requirements specific to unit-train service. '515 Patent, 1:41-2:13.

In 2024, Petitioner announced that it sold 600 new 1,150 cubic-foot iron-ore hopper cars, built in Mexico, for the DMIR. EX2004 ¶39. Images of these cars are below:





EX2004 ¶50. These cars adopt the design features claimed in the '515 Patent that distinguish PO's DMIR jennies,, confirming the technological significance of the patented configurations. In response, PO sued Petitioner in the District of Delaware for infringing the '515 Patent. EX2003.

I. PROCEDURAL POSTURE AND ISSUES PRESERVED

After institution, PO disclaimed claims 24-31 of the '515 Patent, and has requested Director Review (Paper 31) to address institution in light of that disclaimer.

A. EX1054 should be excluded

Over PO's objection, Petitioner was granted leave to "correct" EX1004 by filing a higher-resolution copy as EX1054. The Board stated that all citations to EX1004 will be treated as also citing EX1054 and that PO's evidentiary concerns

may be raised “during trial.” Inst. Decision, 14-15. Consistent with that guidance, PO will separately move to exclude EX1054.

Even if not excluded, EX1054 should carry little weight. Substituting a clearer copy at institution cannot retroactively supply new micro-features, annotations, or rationales never articulated in the Petition. Accordingly, little weight should be given to any attempt to use EX1054 to expand any arguments not in the Petition.

II. OVERVIEW OF THE '515 PATENT

Claim 1, in part, is reproduced below with Petitioner's annotations [1a], [1e]-[1i]:

[1a] A railroad hopper car for carrying particulate material, said hopper car comprising...

[1e] said hopper car being free of primary structure directly above said shear plate of said first end section under said overhang of said first end slope sheet of said hopper;

[1f] one of:

(a) said first end slope sheet has an upper margin and said hopper car includes an end post extending upwardly from said draft sill to said upper margin of said first end slope sheet; and

(b) said first end slope sheet has an upper margin terminating at an end wall, and said hopper car

includes an end post extending upwardly from
draft stub sill to said end wall;

[1g] said shear plate has a longitudinally outboard
margin and said draft sill has a striker located
outboard of said longitudinally outboard margin of
said shear plate, and said end post is one of:

- (a) rooted to said draft sill adjacent to said striker;
- (b) rooted to said shear plate adjacent to said
longitudinally outboard margin of said shear
plate;

[1h] said bolster has first and second laterally outboard
distal ends, and said hopper car has corner posts
extending upwardly from said distal ends of said
bolster to said first end slope sheet; and

[1i] said hopper car has a machinery space bounded by

- (a) said first end slope sheet;
- (b) said shear plate of said first end section;
- (c) said end post; and
- (d) said corner posts, and said machinery space is
free of any other primary structure.

Petition, 1-2; '515 Patent, 23:8-56.

Independent claims 7, 18, 20, 24, and 32 contain similar limitations. Petition,
3-15. The remaining claims are dependent, through one or more intervening claims,
on an independent claim.

III. OVERVIEW OF RELEVANT ENGINEERING PRINCIPLES

A POSITA would understand no individual railcar component can be added or modified in isolation. EX2058 (“Viz”), ¶¶62-64. A hopper railcar is a complex, interdependent structural system, engineered to satisfy safety, load-path, and regulatory constraints. *Id.* As Dr. Viz explains, visual depictions alone, particularly aged, low-resolution schematics such as those in many of the cited references, including the 1946 Cyclopedia, are insufficient to reveal the required structural interrelationships of a railcar’s end-frame, slope-sheet supports, and load-transferring members. *Viz* ¶¶ 62-76. Railcar structure must safely support dynamic and static loads. *Id.* Design decisions necessarily depend on the placement, orientation, cross-section, connections, and integration of each structural element so that forces are properly transferred through the railcar, down to the trucks, and ultimately the rails. *Id.* These components must be evaluated in combination, not in isolation. *Id.*

The Petition and Dr. Ahmadian, however, rely on impermissible hindsight, proposing modifications to century-old designs shown in photographs and schematic fragments without any engineering-based rationale, and without accounting for AAA clearance limits, load-path continuity, slope-sheet performance, or the structural consequences that would necessarily follow from the proposed changes. *Id.* Their analysis substitutes conjecture for the POSITA-level, evidenced-based reasoning

required to justify altering major structural members of a railcar. *Id.* As Dr. Viz concludes, this approach fails to reflect how a POSITA would analyze or modify a railcar design. *Id.*

IV. LEVEL OF ORDINARY SKILL IN THE ART

The Board preliminarily adopted Petitioner's definition of a POSITA as someone with a bachelor's degree in a mechanically-related discipline and "at least two years of experience designing or analyzing railcars or similar vehicles." Inst. Decision, 12. Although the Board stated that the definition dispute "does not affect" its preliminary analysis, that understates the substantive gap between the parties' positions and the importance of railcar-specific expertise to the '515 Patent.

Petitioner's inclusion of designers of "similar vehicles" improperly broadens the field. The '515 Patent addresses railcar-specific structural and regulatory constraints—slope-sheet geometry, end-section load-paths, truck centers, top-chord integration, and bottom-discharge configurations—that individuals experienced primarily with trucks, trailers, or industrial equipment would not meaningfully appreciate. An overbroad definition dilutes the relevant skill level, lowers the bar for obviousness, and injects hindsight by importing engineering concepts disconnected from railcar practice. An inaccurate POSITA definition invites analytical error in both claim interpretation and the obviousness inquiry.

The Board should reject Petitioner's overbroad definition and adopt the railcar-specific standard supported by the record and consistent with the *Graham* factors.

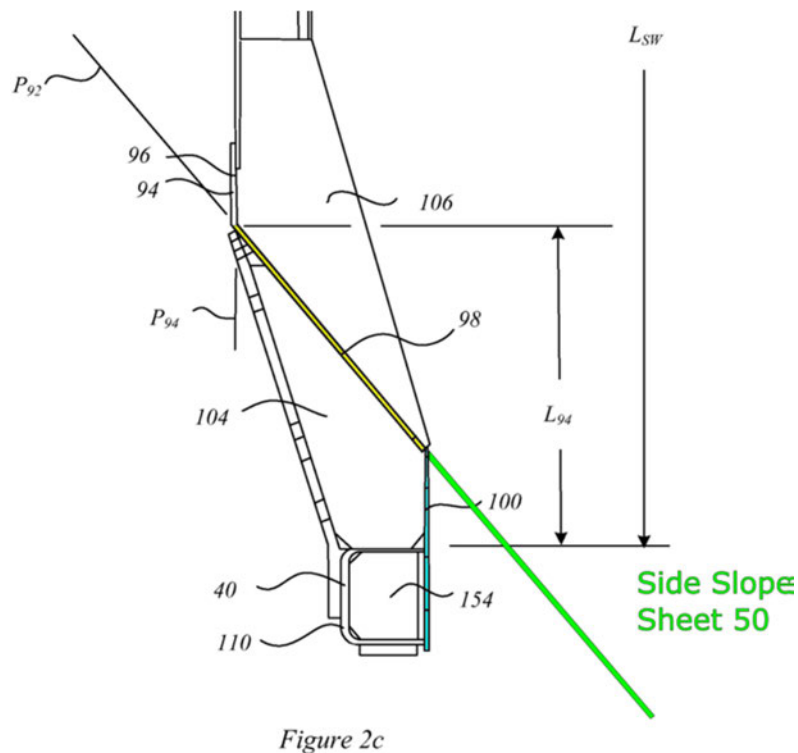
V. CLAIM CONSTRUCTION

Although the Institution Decision declined to construe the claims (Inst. Decision 10-12), the District Court has already construed two dispositive terms in the '515 Patent. That analysis provides well-reasoned guidance the Board should not ignore. EX2052; EX2053, 1-5.

First, the District Court construed "shear plate extending [lengthwise/longitudinally] along said draft sill and cross-wise from side to side of said hopper car" (claims 1, 7, 18, 20, 24, 32) to mean: "shear plate extending [lengthwise/longitudinally] along said draft sill and laterally from side sill to side sill, including a situation where there is an intermediate piece between the shear plate and the side sill." The parties had disputed whether the shear plate must "actually reach[] or touch[]" the side sills. PO argued that the claim includes embodiments, such as the preferred embodiment in Figure 1, where a side-wall piece sits between the shear plate and the side sill. Petitioner's construction would exclude that preferred embodiment, which the District Court correctly rejected. EX2053 5-6.

Second, the District Court construed "sloped side sheet" in claim 43 to mean: "a sheet extending in a longitudinal direction with respect to a side of the hopper and

which forms a sloped surface.” *Id.* 1-3 The court adopted this construction because: (1) both parties agreed that the “transition portion” refers to “intermediate portion 98,” which is part of the “sidewall”; and (2) the “sloped side sheet” and “sidewall” meet each other, they are presumed to be separate elements, not overlapping components. *Id.* The sloped side sheet 50 is annotated in green, the bottom flange 100 in blue, and transition portion 98 in yellow in the ’515 Patent Figure 2c:



The Board should adopt these constructions for the same reasons articulated by the District Court. EX2053. They follow *Phillips*, preserve the preferred embodiments, and prevent conflating distinct structural elements, errors that would distort the obviousness analysis.

All remaining terms should carry their ordinary and customary meaning to a POSITA in view of the specification and prosecution history. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005); 37 C.F.R. §42.100(b).

VI. THE PETITION FAILS TO SHOW BY PREPONDERANCE OF THE EVIDENCE UNPATENTABILITY OF ANY CLAIM

The Board instituted review on nine grounds based on its preliminary view that Petitioner showed a reasonable likelihood of prevailing on claim 24—a claim now disclaimed. With claims 24-31 removed, Petitioner still has not met its burden on any of the remaining claims.

A. Ground 1

Petitioner asserts that claims 1-2 are obvious over Hart and the 1906 Cyclopedia. The record does not show unpatentability by a preponderance of the evidence. *See* PO's Preliminary Response ("POPR," Paper 12), 14-31.

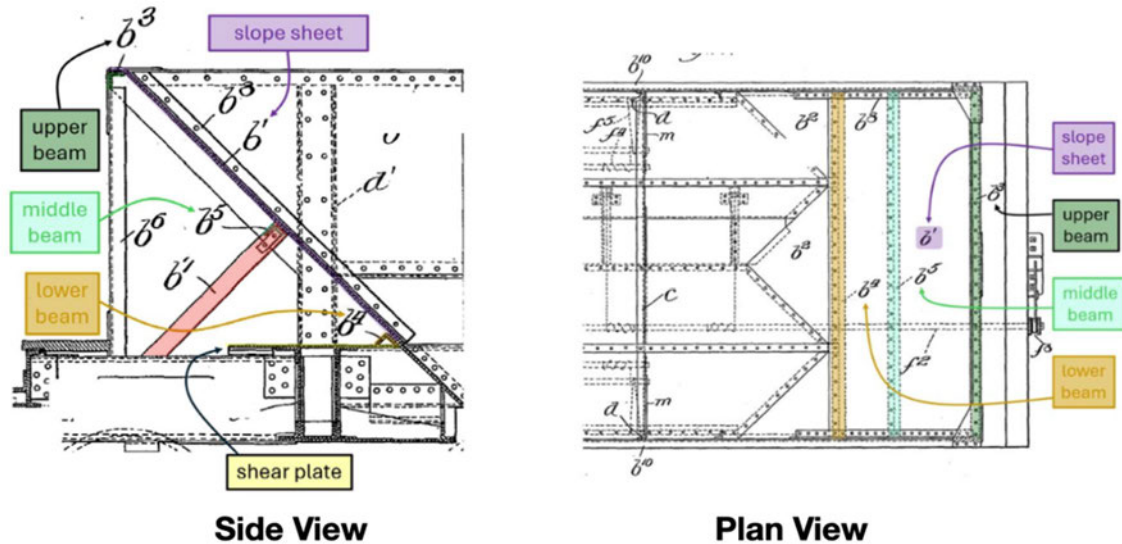
i. Limitation [1e]

Limitation [1e] requires:

said hopper car being free of primary structure directly
above said shear plate of said first end section under said
overhang of said first end slope sheet of said hopper.

Petition, 36. The asserted art does not teach or render obvious this absence of primary structure. *Viz.*, ¶¶78-91; *See* POPR, 14-21.

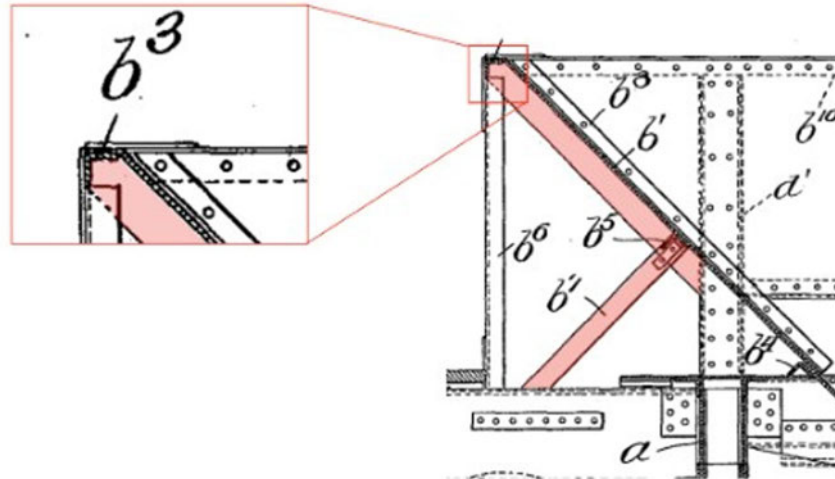
Petitioner relies on the below annotated Hart figures and asserts that inclined brace **b7** is mounted to the side sill and “extends upwards” without extending laterally inward. Petition 37-40. Petitioner argues that if **b7** extended inward, it would appear in Fig. 2 (plan view). But the plan view does not depict below-sheet details unless expressly shown with hidden lines, so Petitioner’s inference is unsupported. Nothing in Hart’s Fig. 2 requires visibility of sub-sheet members, and several expected details (*e.g.*, the side-post section) are not depicted. POPR, 17.



Petition, 38; Ahmadian, ¶¶68-69; Viz, ¶57.

Even accepting Petitioner’s premise, Hart still shows primary structure within the machinery space. POPR, 17-18. As Dr. Viz explains, **b7** is tied to a diagonal member along the end slope sheet, positioned inboard of the corner post **b6**, under the slope sheet and above the shear plate, thereby placing structure inside the claimed space bounded by the slope sheet, shear plate, end post, and corner posts. *Id.*, 18;

Viz, ¶82-85. Dr. Ahmadian agreed. Ahmadian Dep. 226:13-228:8. That configuration contravenes [1e].

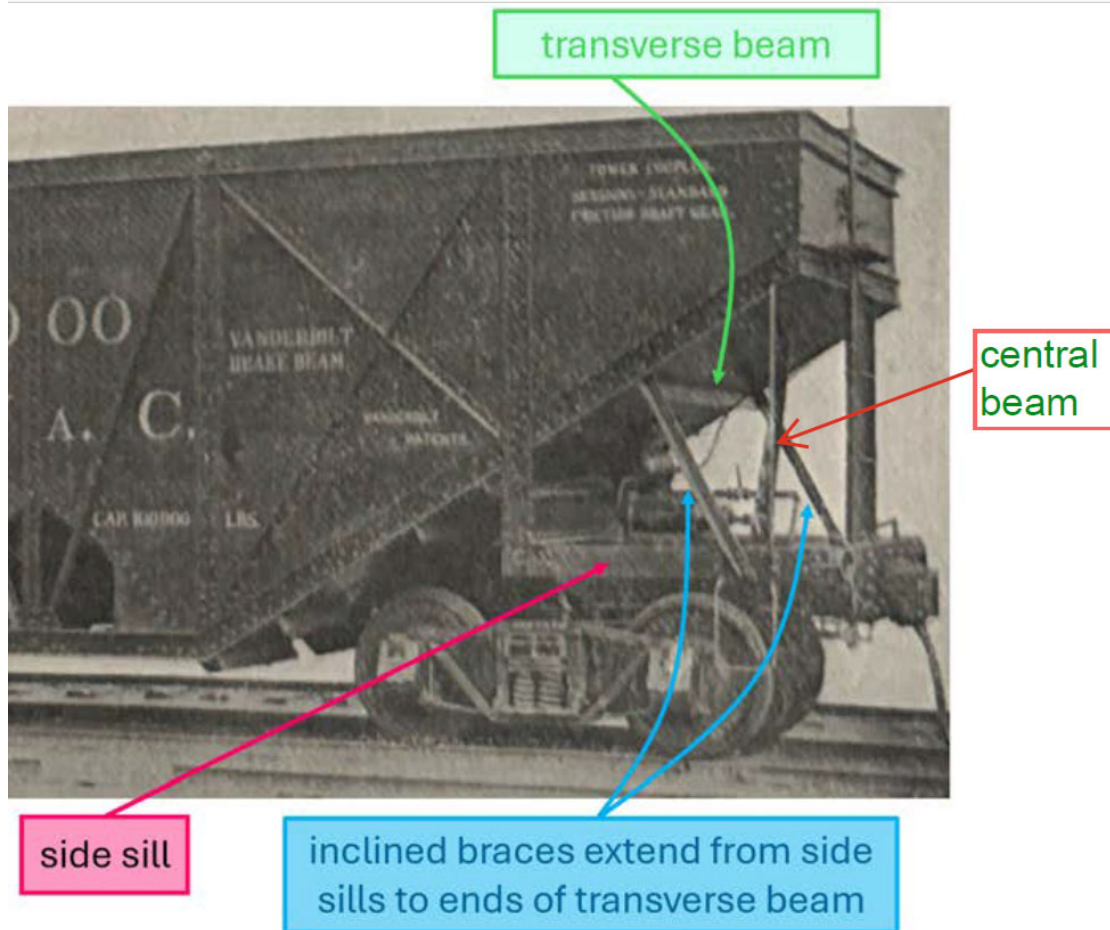


Hart Fig. 1 (cropped and annotated). Viz, ¶82-85.

Notably, Dr. Ahmadian testified that **b7** is “laterally inboard” of end posts **d’**. Ahmadian Dep. 226:13-228:8. Thus it is necessarily above Hart’s shear plate and under the slope sheet, as there is nowhere else for **b7** to sit. Hart Fig. 3.

Petitioner invokes the 1906 Cyclopedia’s “Cambria Steel car” (shown below, with Petitioner’s annotations) to justify **b7**-type braces. Petition, 40-41; POPR, 19-21. But that same car, as seen in the below annotated image, includes crisscrossing central beams in the machine space, confirming that implementing the proposed brace placement would necessitate additional in-space structure, thereby teaching against Petitioner’s reading of Hart and underscoring the failure to show an unobstructed region as required by [1e]. See POPR, 19-20; Viz, ¶89.

Petitioner further asserts that separating the braces “as far apart as possible” resists warping and torsion. Ahmadian ¶75; *see* POPR, 21. That assertion is incomplete engineering: doing so weakens resistance to bending of Hart’s beam **b5** under lading loads; and Hart itself describes its arrangement as adequate for expected loads. Petitioner’s theory therefore neither maps to the claim nor supplies a credible motivation to relocate structure out of the machinery space. *See* POPR, 21.



Hart Fig. 1 (cropped and annotated). Dr. Viz, ¶62.

As defined by the '515 Patent, 9:24-28, the “machinery space” is “bounded by (a) the first slope sheet, (b) the shear plate of the first end section; (c) the end post; and (d) the corner posts.” This means, with respect to Hart, that the beam running diagonally along the edge of the end slope sheet (as well as possibly the inclined brace **b7**) is inboard from the corner post **b6** and thus would be primary structure within the shear plate and below the end slope sheet, which is explicitly excluded in [1e]. Viz, ¶86. Ahmadian Dep. 226:13-228:8.

Dr. Ahmadian's claims in ¶73 of his Declaration are nonsensical from an engineering perspective. Viz, ¶89. Assuming that diagonal braces **b7** are at the lateral outboard locations as assumed by Dr. Ahmadian, no POSITA would tie those into the slope sheet as suggested by Petitioner, thereby leaving such a short ligament between that connection and where the vertical side posts **d'** are located. *Id.* Not only would the suggested modification not have been obvious, but from an engineering standpoint the suggested modification would have placed the diagonal struts **b7** directly in the middle of the machinery space in Hart. *Id.*

Petitioner has not met its burden regarding [1e].

ii. Limitation [1f]

Limitation [1f] requires, in part:

- (b) said first end slope sheet has an upper margin terminating at an end wall, and said hopper car includes an

end post extending upwardly from draft stub sill to said
end wall.

Petitioner concedes Hart does not teach this limitation, and instead relies on the 1906 Cyclopedia's Cambria Steel car (EX1009, Fig. 53) for the required end-wall configuration. Petition, 41-42; Viz, ¶¶92-103. As the Institution Decision noted, Petitioner raised this argument primarily in the context of claim 24 and its additional modifications using Wong, a claim now disclaimed. Institution Decision, 16-22.

Petitioner incorrectly asserts that a POSITA would combine the Cambria Steel car with Hart. Petition, 41-45; Ahmadian, ¶¶76-81; Viz, ¶92. The Cambria Steel car's "end post" **terminates *at the end wall***, not **to and including** the end wall as required by the '515 Patent. Viz ¶93. This distinction is critical: the '515 Patent's end post forms part of an integrated "box beam" structure, contributing stiffness by tying into both the end wall and top chord, a configuration not present in the Cambria Steel car. *Id.*

Petitioner proposes two modifications to Hart to accommodate an end wall: (1) increasing hopper height; or (2) reducing the slope-sheet inclination so that the end wall fits within the existing height. Petition, 42; Ahmadian, ¶77. Neither is credible. *See* POPR, 22-24. Railcars must meet AAR clearance limits, adhere to fixed dimensional profiles, and maintain allowable center-of-gravity and top-of-rail values. Viz, ¶94. Railcars are also specifically designed with their geometries, load

capacities, and intended commodity in mind. *Id.* Simply making Hart taller would add weight, reduce cargo capacity, and violate clearance constraints. Likewise, reducing the slope-sheet angle alters load-paths and may prevent proper unloading because slope sheets are engineered to match the angle of repose of the intended commodity. Viz ¶95.

A POSITA would not view the proposed modification as obvious. Viz ¶96. Adding an end wall supported by a single end post, without also adding the Cambria Steel car's multiple crisscrossing support beams in the machinery space, ignores the actual structural dependencies shown in that reference. Viz ¶¶96-97. Every Cambria Steel example Petitioner cites contains substantial in-space support structure, teaching against merely grafting an end wall and post onto Hart. Viz ¶98; *see* POPR, 23-24.

Petitioner also disregards the engineering constraints governing end-frame architecture. The number, placement, and function of corner posts and end posts directly control torsional rigidity and load transfer from the hopper into the end-frame, bolster, and trucks. Hart, which expressly states its configuration is “adequate for the loads it encounters,” does not use an end post and does not need one. Adding one would require re-engineering the entire end-structure load-path. Viz ¶¶99-101.

A POSITA would not have been motivated to make the proposed modifications, nor had any expectation of success, because Petitioner's proposed modifications would: increase structural weight, reducing payload; require extensive structural redesign to maintain strength and dynamic performance; disrupt the railcar's load distribution and stability; and provide no motivation grounded in the prior art or engineering practice.

For these reasons, the modification is not one of a finite number of well-understood options or a routine design choice. Petition 45; Viz ¶102. Instead, Petitioner engages in hindsight, selectively mixing features from unrelated designs without articulating how a POSITA would be guided to make such changes. Ahmadian ¶79; Petition 43-45; Viz ¶102.

Petitioner has not met its burden regarding [1f].

iii. Limitation [1g]

Limitation [1g] requires:

said shear plate has a longitudinally outboard margin and
said draft sill has a striker located outboard of said
longitudinally outboard margin of said shear plate, and
said end post is one of: (a) rooted to said draft sill adjacent
to said striker; (b) rooted to said shear plate adjacent to
said longitudinally outboard margin of said shear plate.

Petition, 46.

Petitioner asserts that Hart combined with the 1906 Cyclopedia's Cambria Steel car meets subpart (a). Petition, 46-48. Petitioner does not contend that subpart (b) is met, and offers no mapping to show an end post "rooted to said shear plate adjacent to said longitudinally outboard margin of said shear plate." Ahmadian, ¶¶82-90; Viz, ¶104-108.

More fundamentally, the Petition never explains how its proposed end post would be "rooted to said draft sill adjacent to said striker." Viz, ¶105. As explained above (§VI.A.ii), a POSITA would not have been motivated to add any end post to Hart, let alone one tied directly a striker location Hart does not teach. Viz, ¶¶105-106. Hart's design omits both a striker plate of the type required by the '515 patent, and a shear plate extending to the longitudinally outboard end of the railcar, as required by the claim. *Id.*

Hart's Figure 3 shows a shorter shear plate that transitions into diagonal bracing between structural members (c3 and b10). By contrast, the '515 Patent's full-length shear plate eliminates the need for such bracing. Petitioner's contention that a POSITA would "root" an added end post onto a shear plate modified from Hart ignores Hart's explicit structural choices, which Hart states are "efficient and adequate for the loads it encounters." Viz ¶106; Hart 1:104-108, 2:7-10.

Petitioner also fails to identify any credible motivation for relocating or adding structural members in this region. Viz ¶106. Moving a load-bearing post,

introducing a striker, or extending the shear plate would require extensive engineering analysis, since changes to one structural component necessarily affect load-paths, torsional stiffness, and end-frame performance. *Id.* Yet Petitioner offers only hindsight reconstruction and no engineering-based rationale to support the proposed redesign. This absence is particularly glaring given Hart's express disclosure that its existing configuration is sufficient.

Petitioner has not met its burden regarding [1g].

iv. Limitation [1h]

Limitation [1h] requires:

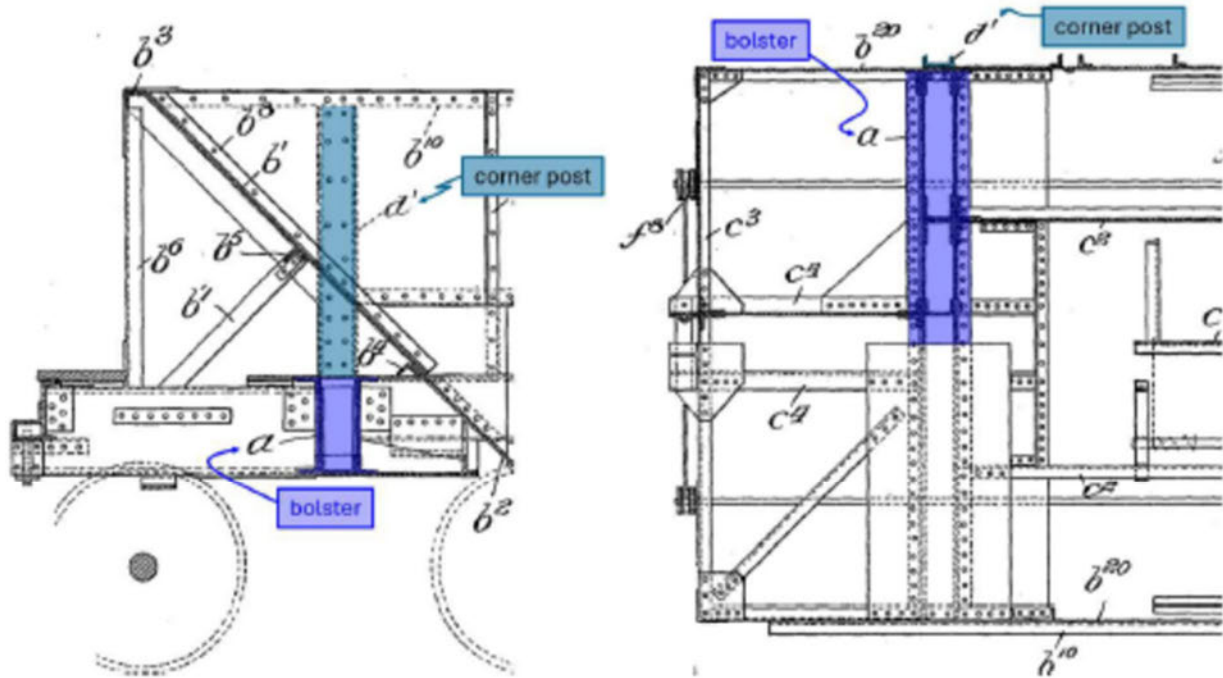
said bolster has first and second laterally outboard distal ends, and said hopper car has corner posts extending upwardly from said distal ends of said bolster to said first end slope sheet.

Petition, 48. The Petition relies on Hart to show this limitation. Viz, ¶¶109-117.

As the Institution Decision explains:

Petitioner insufficiently explains how post d' "extend[s] upwardly . . . to said first end slope sheet" asserted to be disclosed by inclined end b' and hopper bottom inclined end b2 . . . Hart does not show, and Petitioner does not sufficiently explain how, posts d' extend upwardly to inclined end b'.

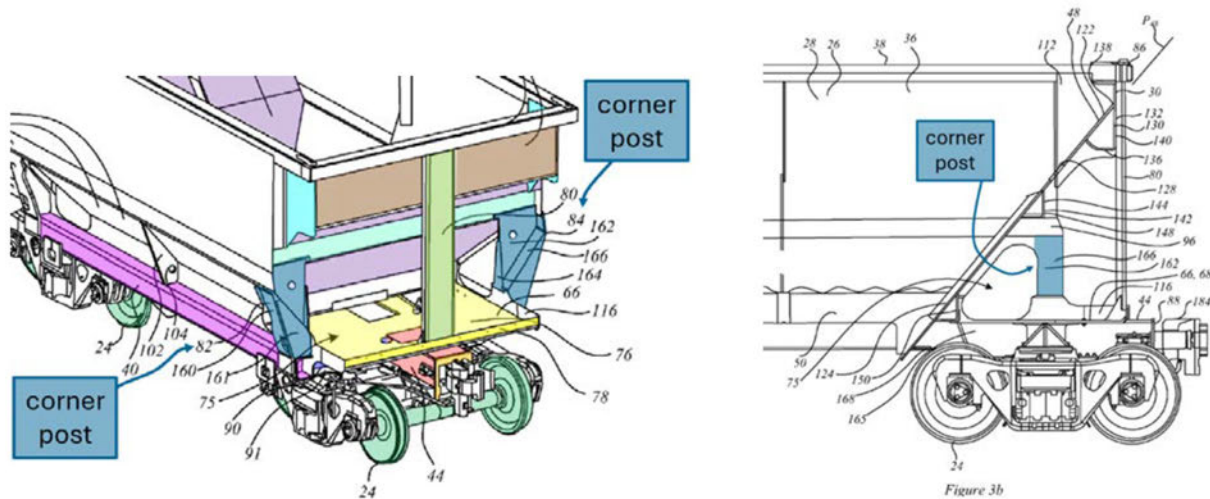
Inst. Decision, 24-25 (citation omitted). During his deposition, Dr. Ahmadian confirmed that the corner posts *d'* extend “all the way up to Hart’s top chord” and “[do not] stop at the slope sheet.” Ahmadian Dep. 226:3-12. Accordingly, the record concedes this limitation is not met.



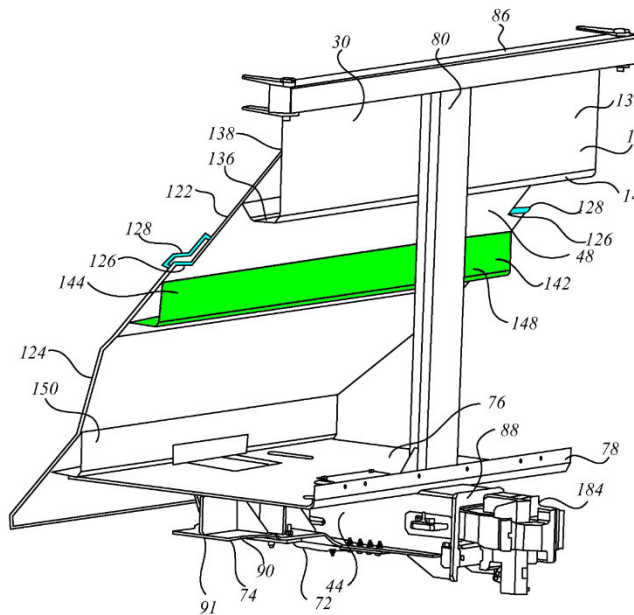
Inst. Decision, 24; Hart 1:34-41.

Moreover, Hart never calls *d'* a “corner post” but simply refers to the structure as a “post” or “stake.” Viz, ¶112. A POSITA would understand that there a “corner post” is a distinct, heavier-duty member typically located at the hopper’s corner, which is not what Hart shows. *Id.*

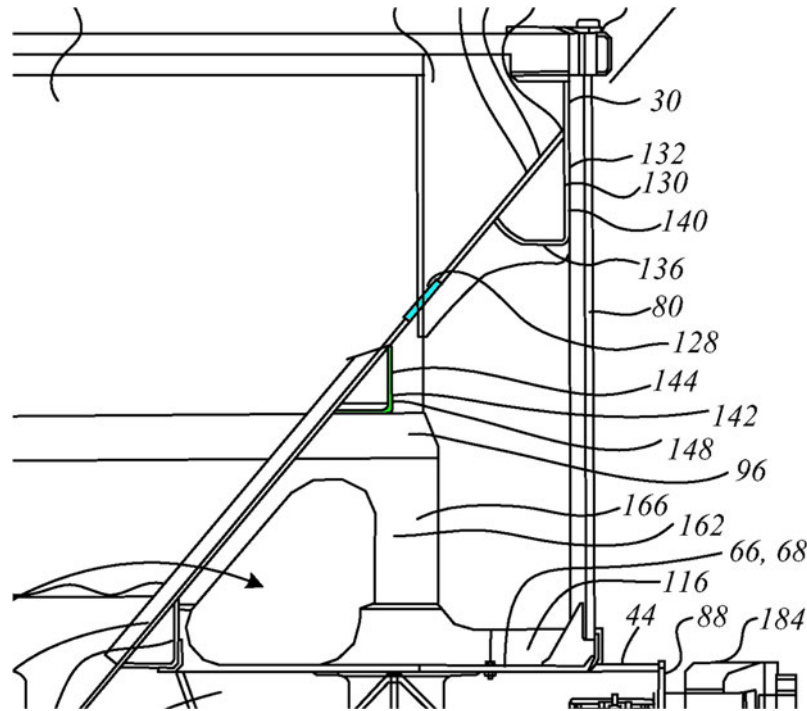
Petitioner and Dr. Ahmadian also misidentify the claimed “corner posts” in the ’515 Patent figures:



Viz, ¶113. Figure 3b (above, on the right) shows a cut-away view of a portion of the railcar, looking towards the inside of the shown corner post. *Id.* As the '515 Patent states, “[u]pper member 122 has notches 126...to accommodate corresponding corner posts 82, 84...with local reinforcement doublers 128 at the junction,” and those notches/doublers sit above angle 142, seen in Figures 3b (shown above) and 3a (shown below). '515 Patent, 16:37-39, Figs. 3a-b; Viz, ¶114.



'515 Patent, Fig. 3a (showing notches 126 and local reinforcement doublers 128 in blue and angle 142 in green).



'515 Patent, Fig. 3b (showing local reinforcement doublers 128 in blue and angle 142 in green). Viz, ¶114. Thus, the claimed corner posts extend above angle 142, to notches 126, and not below it, as Petitioner contends. Viz, ¶114.

This distinction is dispositive: the Hart members that Petitioner labels as “corner posts” extend to the structure **b10** and not to the structure Petitioner identifies as the “end slope sheet” and, therefore do not satisfy “extending...to said first end slope sheet.” Viz, ¶¶115-117.

Petitioner has not met its burden regarding [1h].

v. Limitation [1i]

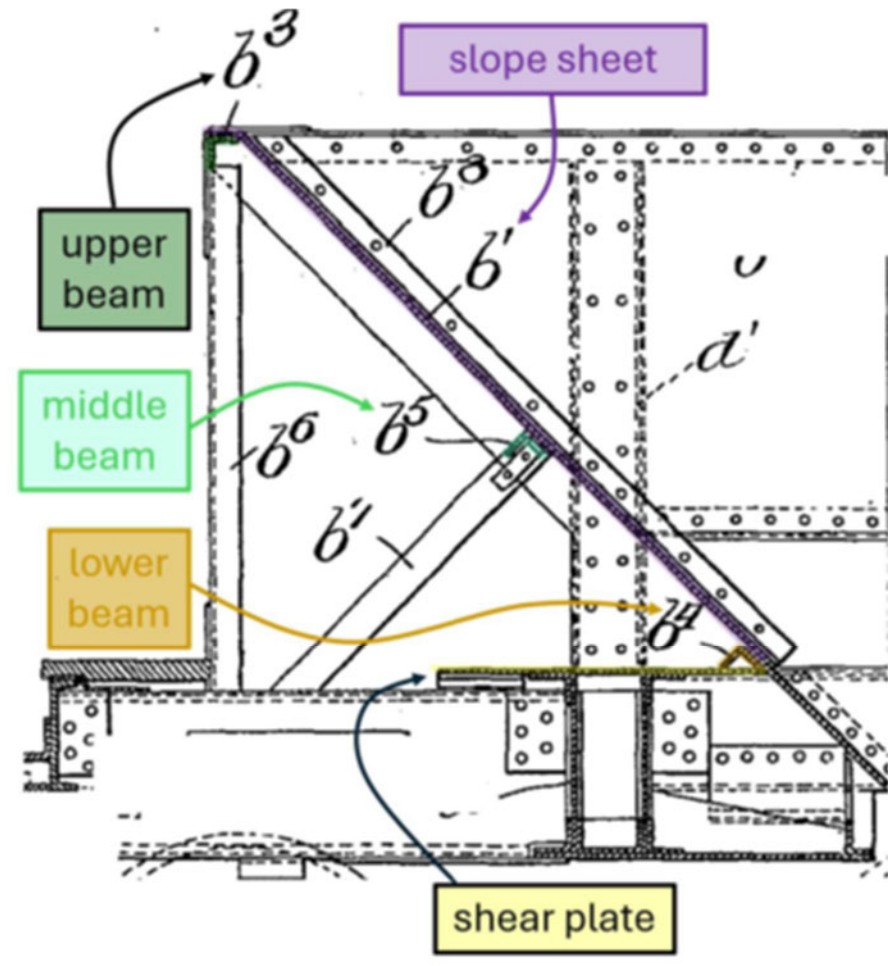
Limitation [1i] requires:

said hopper car has a machinery space bounded by (a) said first end slope sheet; (b) said shear plate of said first end section; (c) said end post; and (d) said corner posts, and said machinery space is free of any other primary structure.

Petition, 52.

Hart does not teach or suggest the claimed “machinery space.” Viz, ¶¶118-120. As discussed above (§VI.A.ii.), Petitioner identifies no prior-art teaching that would motivate a POSITA to add an “end post” to Hart, nor does Petitioner show that Hart’s alleged “corner posts” meet the claim requirements. Without the structures that define the boundaries of the “machinery space,” the claimed machinery space cannot exist. Viz, ¶118.

Even accepting Petitioner’s reinterpretation of Hart, the Petition still does not show a machinery space “free of any other primary structure.” Viz, ¶119. Hart’s brace **b7**, and the un-numbered diagonal beam to which **b7** attaches, is laterally inward of the post **d'**, placing it under the slope sheet and above the shear plate, directly inside the claimed space. *Id.*; Ahmadian Dep. 226:13-228:8. Petitioner’s own depiction of the “slope sheet” similarly places these components within the supposed machinery-space envelope:



Petition, 38; Viz, ¶119.

Petitioner has not met its burden on [1i].

B. Ground 2

Petitioner asserts that claim 3 is obvious over Hart, the 1906 Cyclopedia, and Schuller. Petition, 50. The Petition fails to meet its burden, as the proposed combination does not teach or render obvious the required claim elements. Viz, 121.

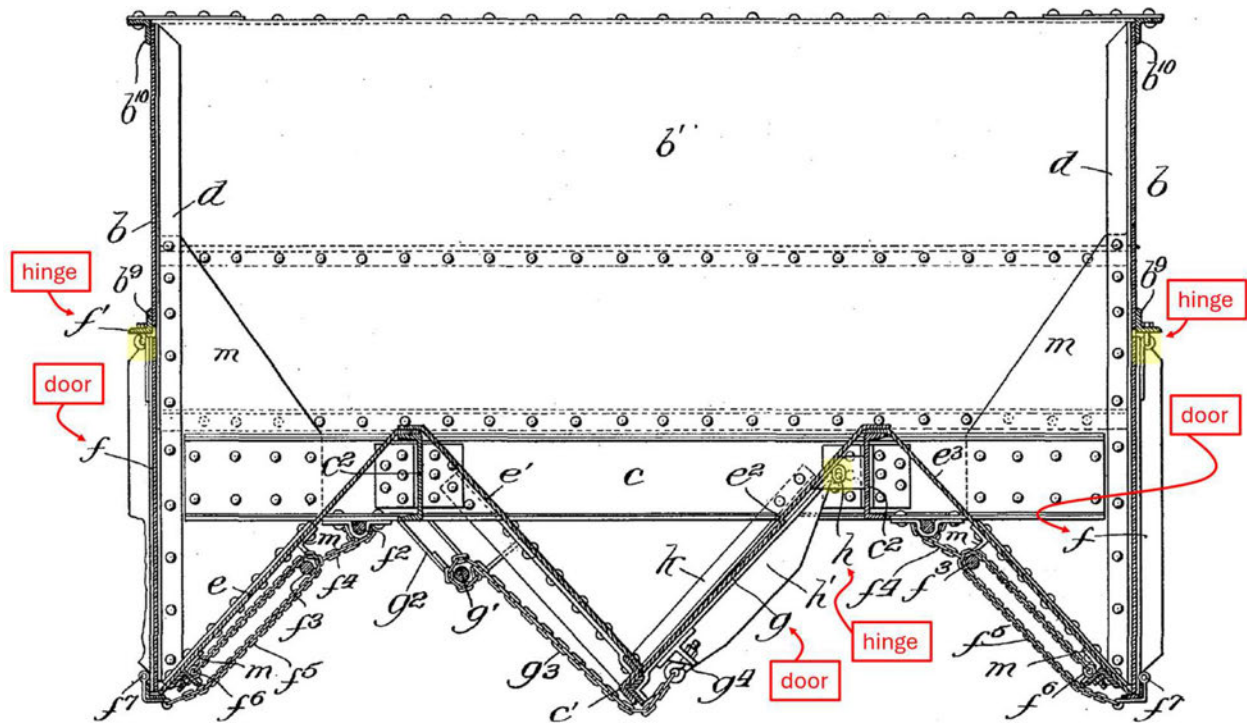
Claim 3 requires, in relevant part:

a longitudinally acting pneumatic actuator is at least partially lodged in said machinery space directly above said draft sill.

Petition, 53.

As explained above regarding [1i] (§VI.A.v.), Petitioner never establishes the existence of any machinery space in Hart, much less one “directly above said draft sill.” Without a machine space, there is no structure into which a pneumatic actuator can be “lodged.” Viz, ¶122.

A POSITA would not have been motivated to combine Schuller with Hart. Hart’s design is expressly built around dual-mode discharge, with both side and bottom doors, and its actuation system is engineered to allow those doors to function in concert. Viz, ¶123. Petitioner railcar itself reproduces Hart’s description of this functionality:

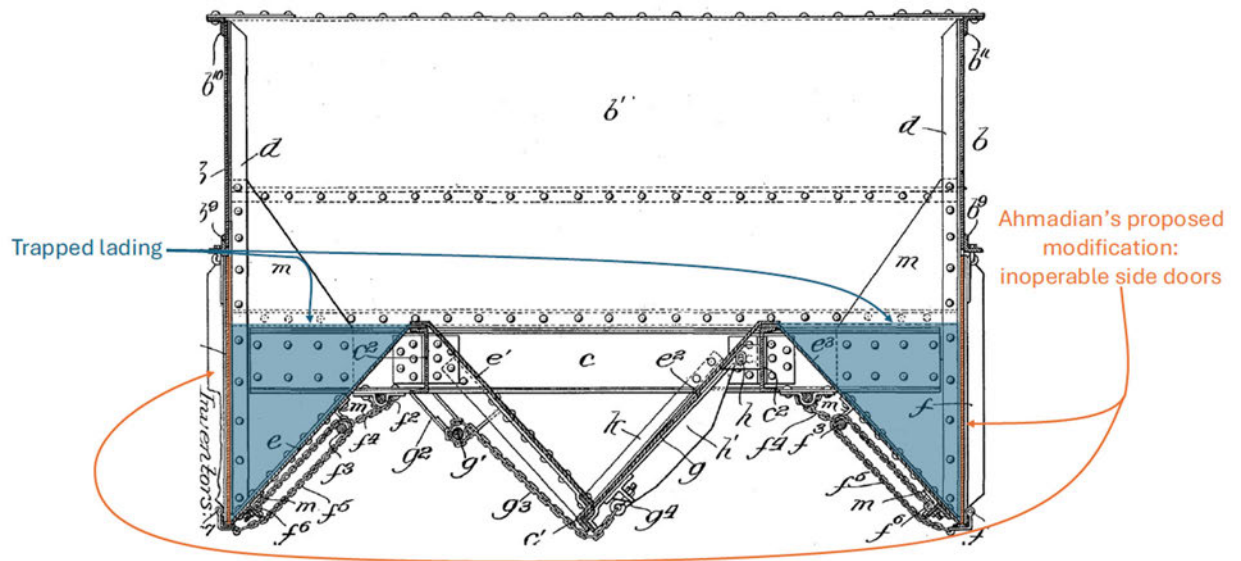


Ahmadian, ¶95; Petition, 51; Viz, ¶123.

Yet Petitioner's proposed modification would disable Hart's side doors entirely. Dr. Ahmadian concedes this. Ahmadian, ¶124. A POSITA would not begin with Hart if the goal were to achieve pneumatically actuated bottom-only discharge, because Hart's geometry, load-path, and door-system architecture are inseparable from its two-door design. Eliminating one-half of Hart's intended discharge function would require extensive redesign, not a routine substitution. Viz, ¶124.

Hart teaches away from Petitioner's proposed modification. Hart's preferred configuration includes side discharge as a critical mode, and retrofitting a linear pneumatic actuator (as in Schuller) would make side discharge ineffective. Viz, ¶125. In Hart, material proximate to the side doors relies on the geometry for

complete unloading. *Id.* A design that traps lading, as Petitioner's proposal would, is one no POSITA would adopt. *Id.*; see annotated Hart Fig. 4, showing material that would not evacuate under Petitioner's modification:



Hart Fig. 4 (annotated).

The actuation mechanics further reinforce the incompatibility. Hart uses a chain-driven rotational mechanism to actuate the doors; Schuller relies on linear pneumatic actuation, a fundamentally different motion and load-transfer pathway. Viz, ¶126. Integrating Schuller's assembly into Hart's system would require wholesale redesign of door linkages, supports, and clearances, not a straightforward substitution—one a POSITA would not make. Viz, ¶126.

Petitioner has not met its burden as to claim 3. Viz, ¶¶121-126.,

C. Ground 3

Petitioner asserts that claim 4 is obvious over Hart, the 1906 Cyclopedia, Schuller, and Karig. Petition, 53. The Petition fails to meet its burden, as the proposed combination would not have taught or rendered obvious claim 4. Viz, ¶¶129-131.

Claim 4 requires, in part:

wherein a brake reservoir is also at least partially lodged
in said machinery space.

Petition, 53.

As explained above regarding [1i] (§VI.A.v.), Petitioner has not shown that any of asserted references disclose, or could be combined to disclose, the claimed “machinery space.” Viz, ¶130-131. Without the existence of that machinery space, claim 4’s “brake reservoir” requirement cannot be met, which must be “at least partially lodged in said machinery space directly above said draft sill.” *Id.*

Petitioner has not met its burden regarding this claim.

D. Ground 4

Petitioner asserts claims 5-6 are obvious over Hart, the 1906 Cyclopedia, and Campbell '652. Petition, 54. The Petition fails to meet its burden to show that the proposed combination renders either claim obvious. Viz, ¶132.

i. Limitation [5d]

Claim 5 requires, in part:

[5d] said side sill has an upper flange, said upper flange of said side sill being substantially co-planar with, and connected to, said shear plate; and

[5e] said side sill has a lower flange, said lower flange of said side sill being substantially co-planar with a respective one of said distal end portions of said lower flange of said main bolster.

Petition, 57. Petitioner admits “Hart’s figures do not show the vertical position of the flanges of the side sills,” and therefore relies on Campbell ’652 for these features. Ahmadian, ¶104; Petition, 57; Viz, ¶133.

Petitioner offers no credible justification for combining Campbell ’652 with Hart other than a generic desire “to facilitate their interconnection to form a single strong undercarriage structure.” Viz, ¶134. It does not contend Hart’s undercarriage is weak, nor explain why differing flange elevations would be inadequate. *Id.* Indeed, Hart states its structure is efficient and adequate for expected loads. Hart, 1:104-108; 2:7-10; Viz ¶134. This is hindsight selection of features to meet claim text, not an evidence-based engineering rationale. Viz ¶134. Absent a reason that justifies the added cost/weight and the necessary redesign, a POSITA would not have made these changes. *Id.*

The motivation defect is compounded by fit-and-function mismatches between the references. In Hart Fig. 3, the “short side sill” (**b20**) is fastened into the shear plate, placing its horizontal flange above the shear plate lane, not co-planar as claimed. Campbell’652 does not disclose a shear plate at all. Viz, ¶135. Thus, a POSITA could not combine Campbell’652 with Hart to make the side sill upper flange co-planar with a shear plate that Campbell’652 does not teach, nor with Hart’s shown geometry. Hart Fig. 3; Viz, ¶¶135-136.

Petitioner has not met its burden regarding claim 5.

ii. Claim 6

Petitioner relies only on its discussion of [5d] for claim 6. Petition, 58. Accordingly, for the reasons discussed above, regarding [5d] (§VI.D.i), Petitioner has not met its burden regarding this claim. Viz, ¶¶137-138.

E. Ground 5

Petitioner asserts that claims 7-16, 20, and 23 are obvious over Hart in view of the 1906 Cyclopedia and Wong. Petition, 58. The Petition fails to meet its burden to show that the proposed combination renders obvious any of these claims. Viz, ¶139.

i. Limitation [7f]

Limitation [7f] requires, in part:

said first laterally extending reinforcement defining part of
a first hollow section beam extending across said hopper
car *between said first and second side walls*.

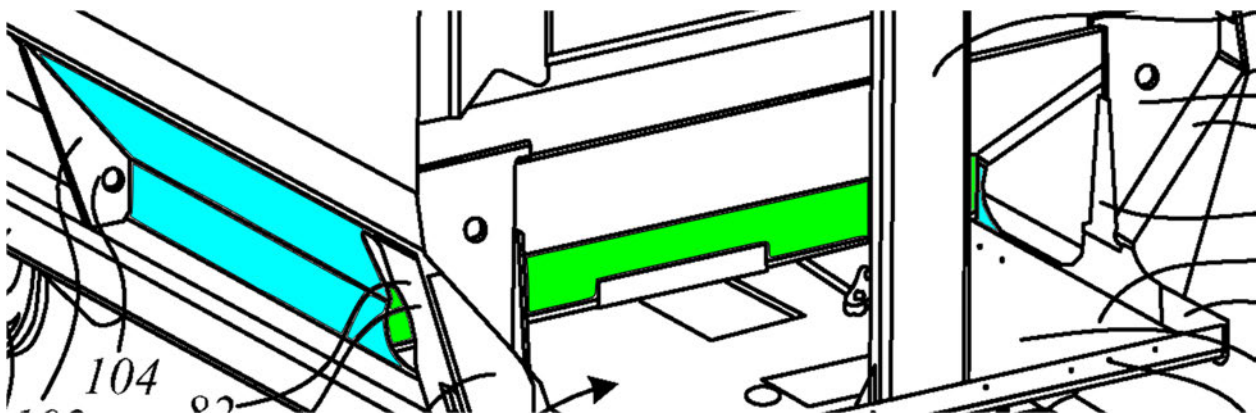
Petition, 60 (emphasis added).

The Board has already agreed with PO on the core defect:

Hart's crosswise beam b4 does not extend between the
side walls, but, instead, sits between the outside edges of
the hopper, with no side sheet abutting them.

Inst. Decision, 26.

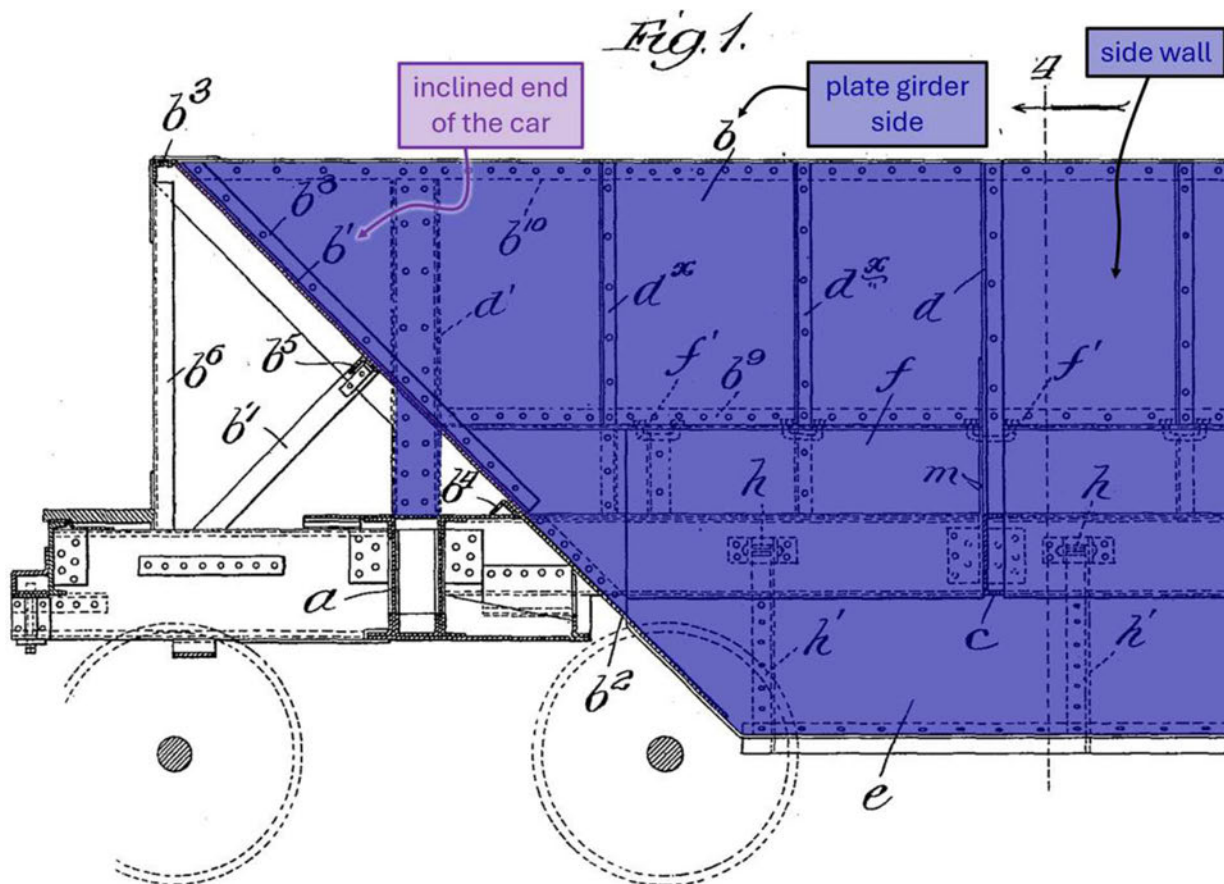
The '515 Patent's corresponding structure, angle 150, clearly spans from side
wall to side wall, as shown below:



'515 Patent, Fig. 1 (showing portions of side walls in blue and angle 150 in green);

Viz, ¶140.

By contrast, Petitioner's mapping to Hart (shown below) fails for multiple reasons. Hart's crosswise beam **b4** does not extend between the side walls. It is positioned outside them, not between them:



Petition, 59. Viz, ¶141.

Petitioner does not explain why the structure **b4** meets [7f]. *Id.* Dr. Ahmadian testified only that **b4** sits “laterally between” the side sheets, but conceded it is not longitudinally between the sidewalls. Ahmadian Dep. 233:2-236:8.

Limitation [7f] also requires that the crosswise beam be connected to the shear plate. Viz, ¶142. Petitioner fails here as well. In Hart Fig. 2, the single row of

fasteners shows **b4** attached only to the slope sheet, not to the shear plate. *Id.* Hart depicts riveted construction, not welded structure, consistent with its 1911 vintage. *Id.* The '515 Patent's beam 150, by contrast, is welded along its length to the shear plate. *Id.* Thus, Hart's geometry and connection scheme are fundamentally different from the claimed beam. *Id.*

Petitioner has not met its burden regarding [7f].

ii. Limitation [7h]

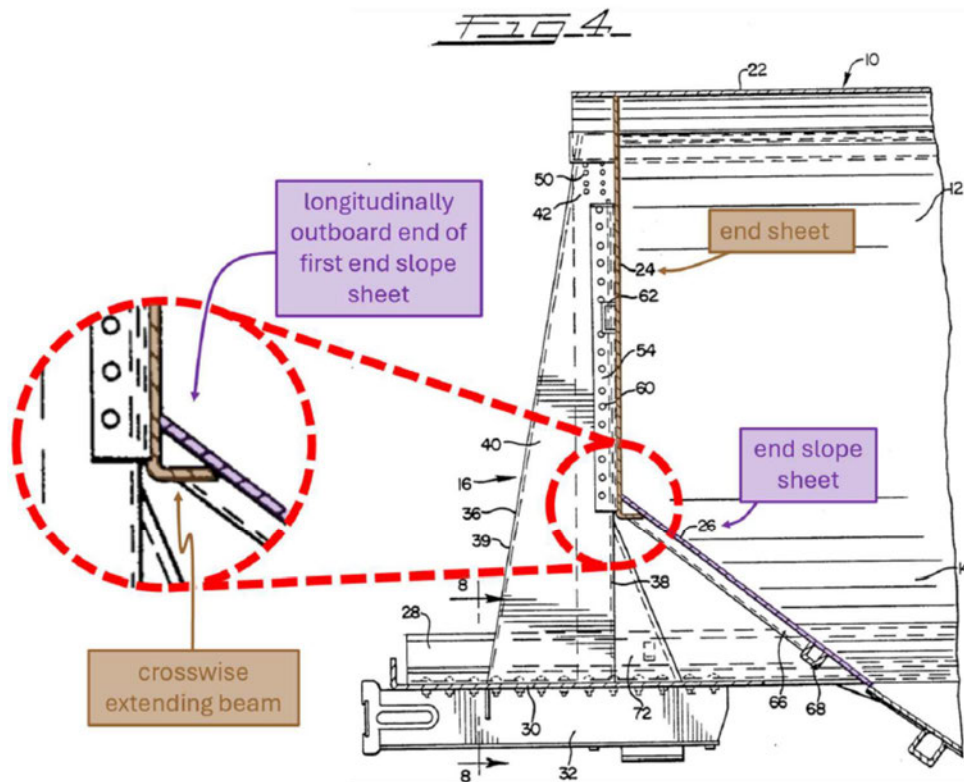
Limitation [7h] requires:

“said hopper car has a first end wall member running cross-wise between said first and second side walls; said first end slope sheet has an upper margin that meets said first end wall member at a first junction; said first end wall member extends upwardly from said first junction; said first end wall member has a lower portion extending downward of said first junction; said lower portion of said first end wall member and said upper margin of said first end slope sheet co-operate to define portions of the cross-section of a second hollow section beam extending cross-wise across said hopper car between said first and second side walls.”

The Petition asserts a POSITA would combine Hart with Wong to add an end wall or a first cross-wise extending beam. Petition, 62-64. But Wong's L-shaped detail is a joint geometry at the interface of an aluminum end sheet and slope sheet

of a tanker car, not a transplantable reinforcement for a 1911 all-steel hopper railcar. Petitioner offers no fastening path, clearance analysis, or load-transfer mechanics showing how Wong's L-shaped detail could be installed into Hart's end-frame envelope. Inst. Decision 23-26; Petition 60-61. The record confirms the mismatch: Wong addresses mixed-materials joints (steel end structure with aluminum carbody) and corrosion concerns, not steel-only hopper reinforcement under granular impact loads.

Wong's L-shaped detail is not a "hollow section beam." As shown in Wong, the L-shaped detail is simply the formed edge of the aluminum end sheet 24 meeting the aluminum slope sheet 26. Viz. ¶¶144-145. Reinforcement is actually provided by multiple aluminum channel stiffeners 66 welded to the slope sheet, not by the L-shaped detail itself. *Id.* A POSITA would not equate that joint with the claimed cross-car hollow section beam. *Id.*; EX1006, 4:50-56.



Wong's core teaching is materials-specific, a "steel end structure for [an] aluminum railcar" that manages steel vs. aluminum load paths and weight. Dr Ahmadian agreed that Wong is about using steel to bear significant loads and aluminum to reduce weight. EX2057, 174:4-175:9. He also admitted steel and aluminum have materially different stiffness/strength characteristics and that welding steel to aluminum "is not a good practice." *Id.*, 175:17-19; 73:18-22. Moreover, design loads and operating environments differ: tanker cars (*e.g.*, fluids) vs. open-top ore-cars (abrasive, granular impact). Using an aluminum-driven joint

geometry to prove obviousness for a steel-only ore car invites impermissible hindsight. Viz ¶¶144-145.

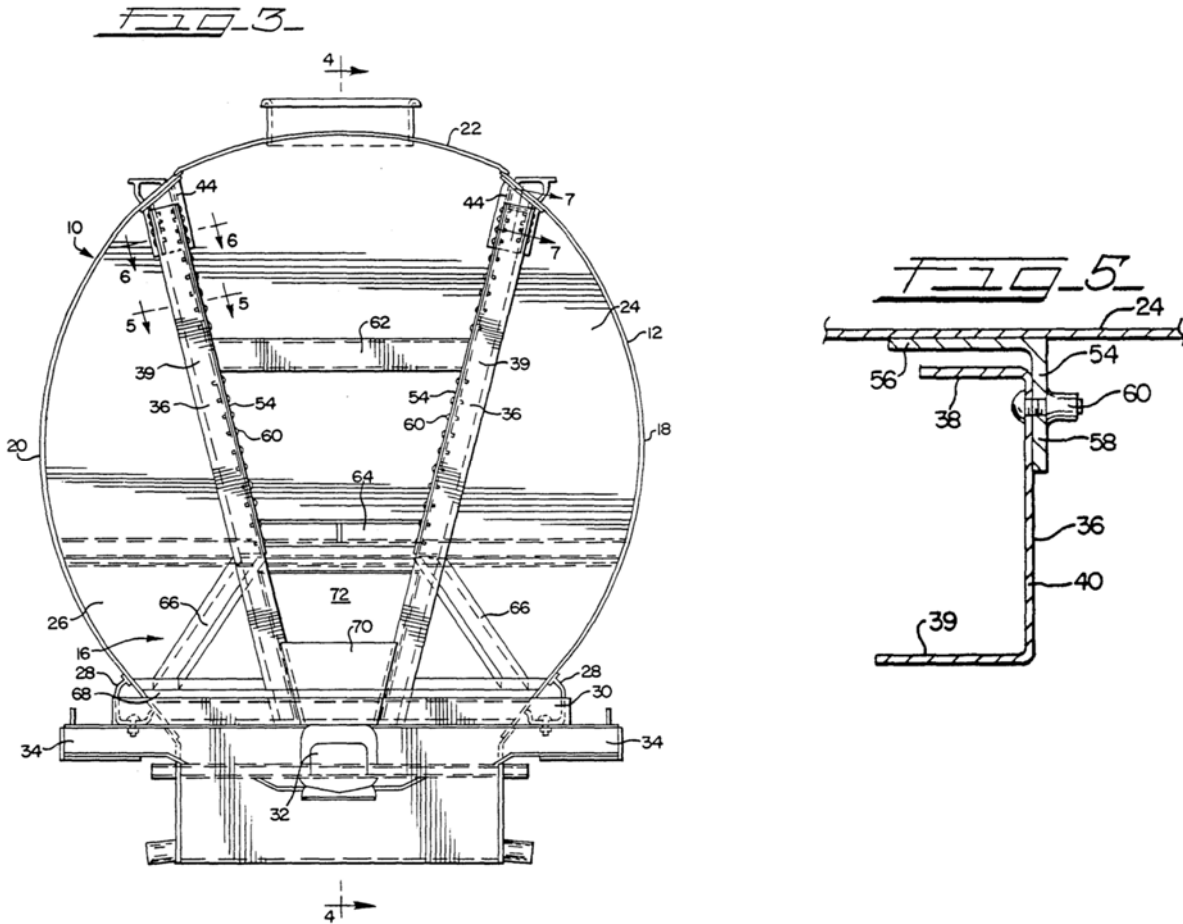
Nor does Petitioner show a workable installation in Hart. Viz ¶¶147-150. It does not reconcile interference with Hart's existing members, door clearances, or re-routing of load paths already addressed by Hart's struts/brackets. It likewise fails to explain how an "end wall member" (or lateral portion) could exist in Hart absent an end wall, a feature Hart does not have and, as discussed above, a POSITA would not add given geometric, clearance, and loading constraints.

Functionally, the proposed L-shaped "beam" would not transfer load down to the undercarriage the way the '515 Patent beam does. Hart already includes structure supporting the end slope sheet; adding Wong's edge shape would be redundant, require significant redesign and analysis, and still fail to provide the closed-section, cross-car reinforcement the claim recites. Viz ¶¶147-150. Sheet-metal L-edges are poor substitutes for true structural members (*e.g.*, formed channels/tubes). Viz ¶¶147-150.

Wong's aluminum end sheet 24 with L-shaped detail addresses material coupling/attachment in an aluminum/steel configuration and shows a particular joint geometry, not a generic, transplantable "reinforcement beam" for a 1911 ore-car end frame. Petitioner never reconciled materials, fastener/attachment paths, interference with existing Hart members, or load-transfer consequences (*e.g.*, whether the added

shape would collide with end-frame components, alter door clearances, or re-route load paths already handled by struts/brackets Hart discloses); nor did Petitioner address the material differences between hopper ore-car design like those in Hart and tanker cars like that of Wong. The Institution Decision credited the “same field” of Hart and Wong but did not identify a workable installation in the Hart envelope; nor did it identify the material differences between forces and moments experienced by hopper ore-cars compared to tanker cars. Inst. Decision at 16-21.

Referring to FIGS. 3 and 7 in Wong (reproduced below), the end sheet 24 is a semicircular, aluminum sheet that is supported by a height-wise angle member 54 welded thereto, which in turn is bolted to a web portion 40. EX1006 4:24-37. While the L-shaped detail at the bottom of the end sheet 24 appears to be in contact with the end slope sheet 26, a POSITA would have understood it does not provide reinforcement to the end slope sheet 26; that is done by the aluminum channel stiffener members 66 that are welded to the end slope sheet 26. EX1006 4:50-57.



Wong's core teaching is materials-specific - that is, a "steel end structure for [an] aluminum railcar" that manages steel vs. aluminum load paths and weight. Dr. Ahmadian agreed that Wong is about using steel to bear significant loads and aluminum to reduce weight. Ahmadian Dep., 174:4-175:9. He also admitted steel and aluminum have materially different stiffness/strength characteristics and that welding steel to aluminum "is not a good practice." *Id.*, 175:17-19; 73:18-22. That is not the design space of a monolithic steel ore car. Using an aluminum-driven joint geometry to prove obviousness for a steel-only ore car invites impermissible hindsight.

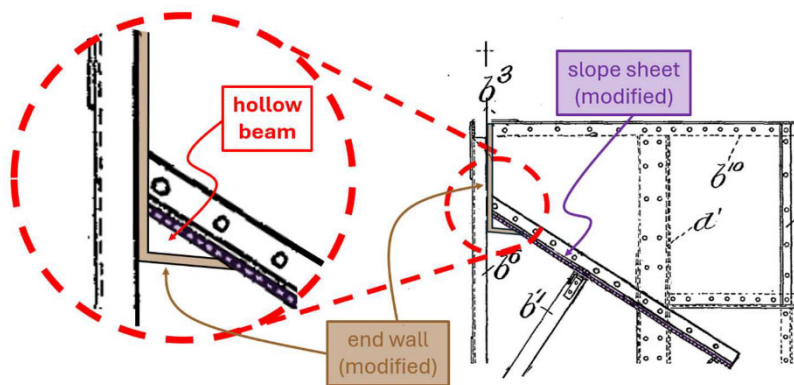
These concessions underscore how Wong's mixed-material interface problems (and solutions) are irrelevant to a steel ore-car. Further, Dr. Ahmadian explained that different commodities drive different design considerations; a car for crude oil is "designed one way," while a car for bulk aggregate (coal/ore) is "designed another way." Ahmadian Dep. 20:8-20:21. A POSITA focused on steel hopper cars, which are expected to endure heavy, abrasive loads, would not look to an aluminum/steel tanker interface for reinforcement concepts.

Dr. Ahmadian also acknowledged dynamic impact loads: when ore is dumped from height into an open-top hopper, dynamic forces increase and must be accounted for in design, which is a different load case than filling a sealed tanker with, for example, fluid. Ahmadian Dep. 37:15-39:2; 20:8-26:13. That difference goes straight to local reinforcement strategy at the slope sheet and end structure: an aluminum/steel tanker end sheet detail is not engineered for granular impact/abrasion of ore and the associated bending/shear paths in a hopper.

Wong's end-structure detail, which is optimized for material coupling and puncture/weight concerns of a tanker, offers no reasoned path to address the granular impact/abrasion and door-geometry realities of a hopper ore car. Dr. Ahmadian's own testimony that commodity and loading method change the engineering confirms a POSITA would not reflexively borrow tanker solutions for a hopper reinforcement.

The Petition fails to articulate a reason why a POSITA would have been motivated to combine Hart and Wong, or that the proposed combination would have been successful. *Viz* ¶¶144-150. Indeed, Hart is, at minimum, satisfactory for its intended purposes and Petitioner's proposed modification is an unworkable solution to a problem that does not exist, one that is motivated, at best, by application of improper hindsight. *Id.* ¶ 147. Moreover, a POSITA would find no motivation to make the proposed modification since it would have increased the weight of the car and, given regulatory weight restrictions, reduced the amount of commodity the car could carry while increasing cost of the car. *Id.* ¶ 147-149.

Indeed, the proposed combination of Hart and Wong is unsatisfactory for either railcar's intended purpose. *Viz*, ¶147. Hart already has structure for holding up what the Petitioner identifies as the end slope sheet. *Id.* It is not clear how the proposed L-shaped detail in Hart would transfer load directly down from the end slope sheet to the undercarriage of the car:



Petition, 63; Ahmadian, ¶108; *Viz*, ¶147.

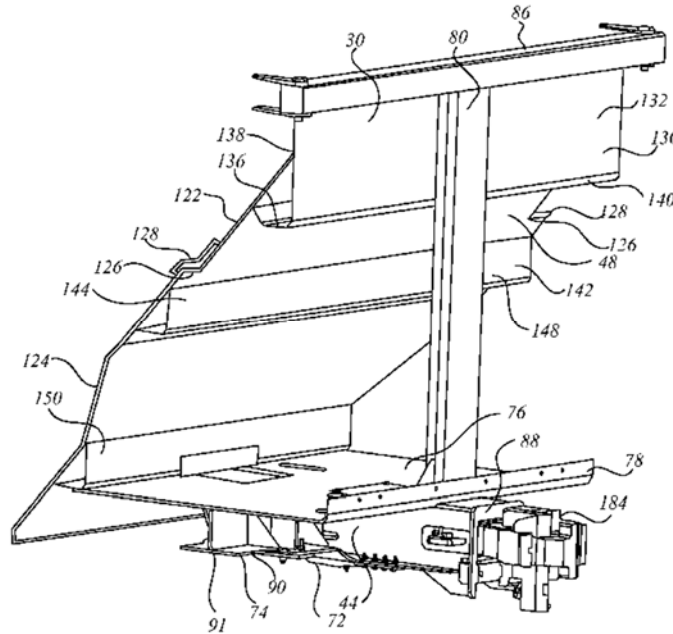
Petitioner has not met its burden regarding this claim.

iii. Claim 9

The Petition admits that Hart's brace **b4** is mounted "against the shear plate, rather than against the slope sheet" (Petition, 65), and then relies on Wong to supply what Hart does not teach. Viz, ¶151.

A POSITA would not combine Hart and Wong to reach claim 9. Viz, ¶152. Instead of cherry-picking elements, a POSITA would assess the railcars wholistically to determine whether additional strengthening is required and, if so, would adopt an integrated design, not transplant a single joint detail from a different car and material system. On that wholistic view, the POSITA would not have attempt the Hart—Wong combination proposed by the Petition. *Id.*

The proposed modification is not "very simple...re-orienting the angle iron" as Petitioner suggests. Petition, 65-66; Viz, ¶153. It would have been unclear to a POSITA how the modified angle in Hart could even be mounted within the available envelope. *Id.* The '515 Patent expressly leaves room to weld the angle iron to both the shear plate and end slope sheet, space that Hart's configuration does not provide.



'515 Patent Fig. 3a (showing space to make welds); Viz. ¶154.

Petitioner also invokes a “design choice” rationale (Ahmadian ¶110), claiming only a finite set of orientations exists for an L-shaped beam. But Hart already distributes load effectively “throughout the load sustaining members of the car,” undermining any reason to reengineer its end-frame geometry merely to reorient an angle. A POSITA would see no motivation to make that change, particularly where it adds complexity without demonstrable benefit. Hart, 1: 14-16; Viz ¶155-56.

Petitioner has not met its burden as to claim 9.

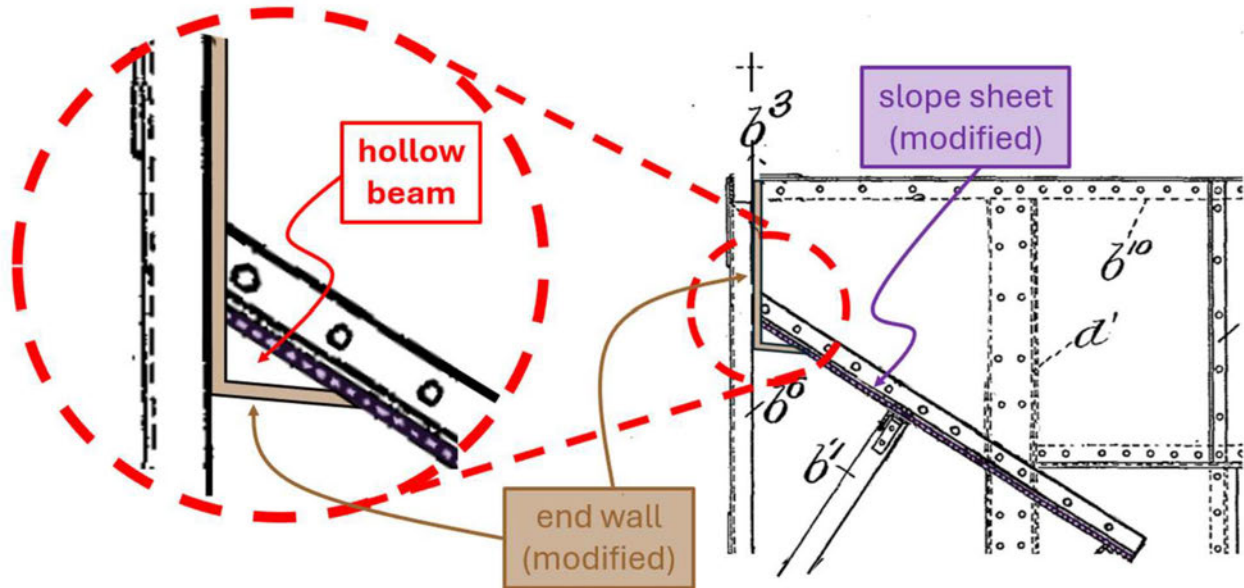
iv. Claim 12

Petitioner asserts that claim 12 is met solely through the same reasoning it offers for [7h], relying on the combination of Hart and Wong. Petition, 67; Viz, ¶¶157-58. Dr. Ahmadian provides no opinions whatsoever on claim 12 or its limitations. *Id.*

Accordingly, for the reasons discussed above for [7h] (§VI.E.ii.), Petitioner does not meet its burden on claim 12. *See* Viz. ¶¶120-121.

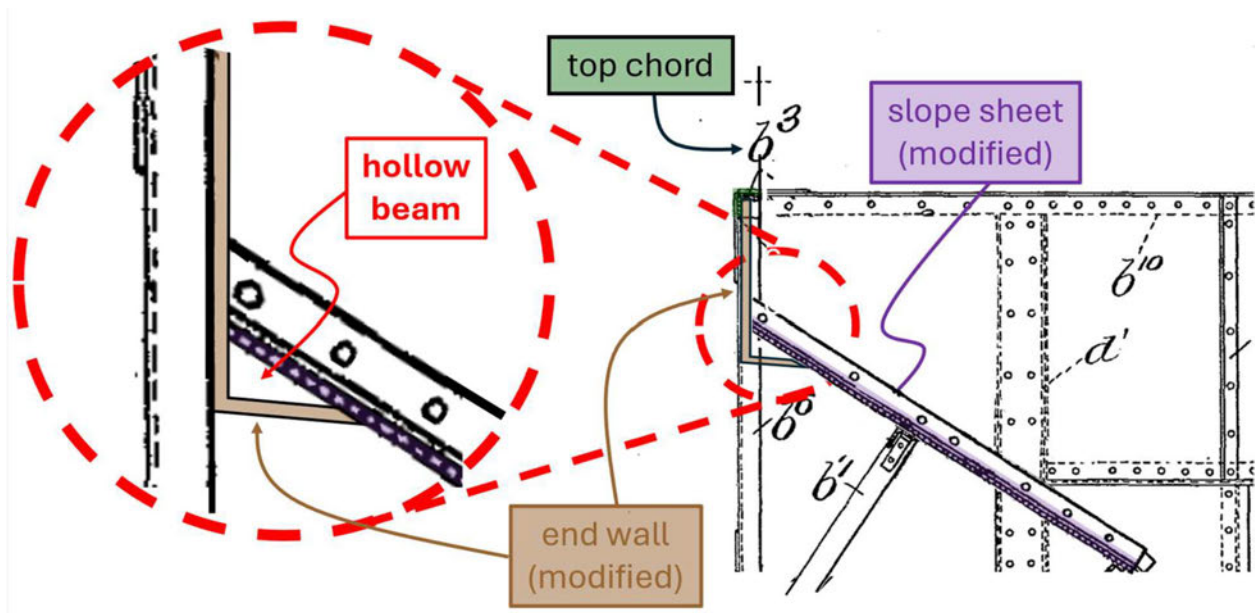
v. Claim 13

The Petition contends that “Hart, as previously modified by Wong, discloses the elements of Claim 13.” Petition, 68. Petitioner’s arguments are entirely inconsistent with its earlier arguments for [7h]. Viz, ¶159-162. There, Petitioner discusses removing top chord ***b3*** and replacing it with Wong’s transverse beam. Petition, 63 (“...in which the slope sheet is no longer supported by the upper beam ***b3***.”). Petitioner’s combination of Hart and Wong thus requires the removal of the top chord ***b3*** as shown in Petitioner’s modified drawing showing the combination:



Petition, 64 (showing b^3 removed, despite the label being present); Viz, ¶160.

Contrarily, and for reasons unknown, Petitioner changes its argument to re-add top chord b^3 back into its proposed modification, as shown below:



Petition, 68 (showing b^3 added back in); Viz, ¶161. Petitioner provides no justification for its change in position. *Id.* It is evident from Petitioner's change in position, however, that this claim is not taught by the asserted art. *Id.*

Petitioner has not met its burden on this claim.

vi. Claim 14

The Petition asserts that claim 14 is obvious over Hart in view of the 1906 Cyclopedia's Cambria Steel Car and incorporates its arguments from [1f]. Petition, 69-70. Accordingly, for the reasons discussed above for [1f] (§VI.A.ii.), the asserted art does not render obvious this claim and Petitioner has not met its burden on this claim. Viz. ¶¶163-164.

vii. Claim 15

Petitioner asserts that Hart discloses the claimed intermediate beam, but shows a modified picture of Hart that includes top chord $b3$, despite Petitioner and Dr. Ahmadian removing that same top chord $b3$ in their discussion of claim 7. Viz, ¶¶165-166.

Accordingly, it is not clear what combination Petitioner is referring to for this claim, especially since claim 15 depends on claim 7 and, therefore, includes all of the subject matter recited in claim 7. *Id.*

Petitioner has not met its burden on claim 15.

viii. Claim 16

The Petition and Dr. Ahmadian assert the combination of Hart and Wong meets this claim. Petition, 71-72. A POSITA, however, would find no motivation in either reference to modify Hart as suggested by Petitioner. Viz, ¶¶167-172.

Wong does not have an intermediate beam. Instead, it uses multiple channel stiffener members 66 as part of a broader structural system to transfer load from the end slope sheet to the end-stiffener member 36. *Id.*, ¶168. In fact, of the channel stiffener members identified by Petitioner, only one of them, labeled 68, is on what the Petitioner identifies as the end slope sheet; the others are on the end wall and the door. *Id.* Thus, a POSITA would not look towards Wong to modify Hart's intermediate beam. *Id.*

Dr. Ahmadian mischaracterizes what Wong shows at the slope-sheet/end-wall juncture. Viz, ¶169. The alleged “beam” is nothing more than a formed 90-degree bend of the end-wall sheet metal, not a structural beam. *Id.* A formed edge cannot be “re-oriented” because it is integral to the wall itself, not an independent structure. *Id.*

The proposed combination is also functionally unworkable. *Id.*, ¶170. Hart's beam **b7** supports the intermediate beam **b5**, and both support the slope sheet against the hydrostatic pressure of a fully loaded hopper. *Id.* Reorienting these members as Petitioner suggests would eliminate this support, rendering them incapable of

performing their designed structural function. *Id.* This concern is unaddressed by Petitioner. *Id.* Petitioner selects isolated features from Wong without any POSITA-level structural analysis, ignoring the redesign that would be required to alter Hart's end-frame load path, support scheme, and beam geometry. *Id.*, ¶171. A POSITA at the time would not make such structural changes without comprehensive engineering evaluation, especially where no benefit is shown. *Viz* ¶171.

Petitioner has not met its burden to show that this claim is invalid.

ix. Limitation [20f]

Petitioner relies solely on its arguments for [7f]. Petition, 73. As explained above, §VI.E.i., Hart's crosswise beam does not extend between the side walls, and asserted art fails to disclose the hollow-section beam spanning from sidewall to sidewall. *Viz*, ¶¶173-74. Because Petitioner provides no additional analysis specific to [20f], its shown fails for the same reasons as [7f].

x. Limitation [20h]

Petitioner again relies solely on its arguments for [1h]. Petition, 74. As demonstrated above, Hart's post *d'* does not extend upwardly to the first end slope sheet, and cannot satisfy the claimed geometry. As discussed above for [1h] (§VI.A.iv.), the asserted art does not render obvious [20h]. *Viz*, ¶¶175-176.

Crucially, the Board itself identified this exact deficiency:

Petitioner may not have shown that post d' 'extend[s] upwardly from said main bolster to said first end slope sheet,' as required by claim 20.... [A]t this stage, we question whether Petitioner shows that its proposed combination of Hart, the 1906 Cyclopedia, and Wong teaches or suggests all the limitations of independent claim 20.

Inst. Decision, 29. Petitioner does not met its burden on [20h].

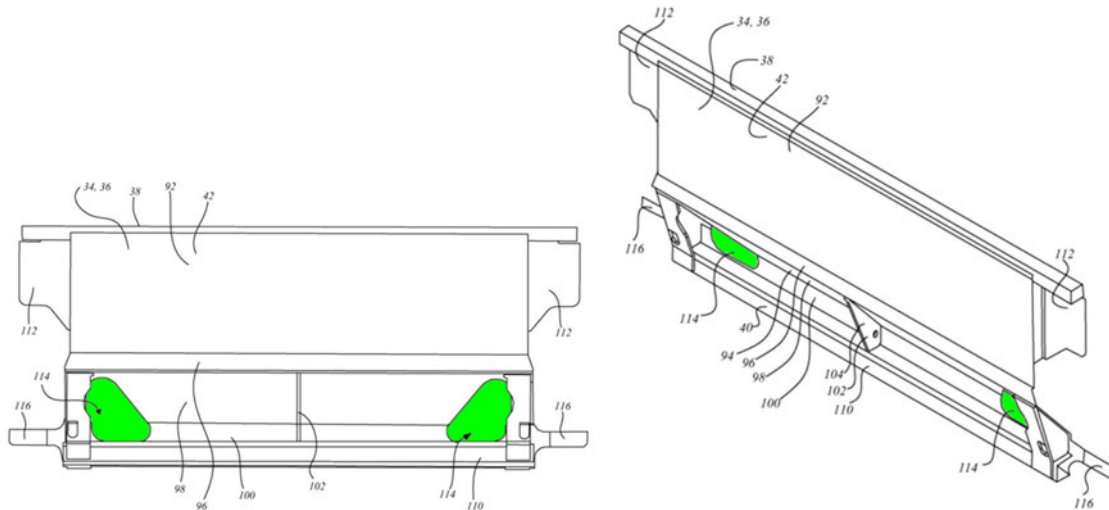
xi. Limitation [20j]

Petitioner relies solely on its arguments for [1i]. Petition, 75. For the reasons discussed above for [1i] (§VI.A.v.), the asserted art does not render obvious [20j] and Petitioner has not met its burden.

xii. Claim 23

Petitioner asserts that Hart discloses this claim. Petition, 75-76. Dr. Ahmadian provides no opinions regarding this claim. Viz, ¶¶178-82.

As the '515 Patent explains, "[t]he lower region of the main sidewall sheet also includes lightening apertures 114, in the space between the corner posts and the slope of the end slope sheets." '515 Patent 16:26-30. A POSITA would therefore understand that the claimed "openings" are the sidewall apertures (114) shown in Figs.2a-2b (apertures highlighted in green):



Viz, ¶¶179.

Petitioner misreads the claim by treating the “corner posts” as part of the “side wall.” Viz ¶180. Nowhere do the specification or claims define corner posts as sidewall components. *Id.* Petitioner’s reliance on the figure captions is misplaced: Fig. 2b (“a side view of the sidewall”) includes portions of corner posts, just as Fig. 3b (“end structure” view) still shows sidewall portions, demonstrating that figure descriptions are not definitional. A POSITA would look to the detailed description and claims, not captions, to understand scope.

Moreover, a POSITA would recognize that the “apertures” function structurally, acting like an outer flange/stiffening web for the laterally outboard surface of the corner posts (analogous to the top flange of the draft sill). Thus, the apertures both lighten the structure and provide reinforcement, a distinctive feature not shown in the asserted art. Viz, ¶181.

Petitioner has not met its burden on claim 23.

F. Ground 6

Petitioner contends that claims 17-19 are obvious over Hart in view of the 1906 Cyclopedia, Wong, and Campbell'051. Petition, 81. The Petition fails to establish by preponderance of evidence that any of these claims is unpatentable. Viz, ¶183.

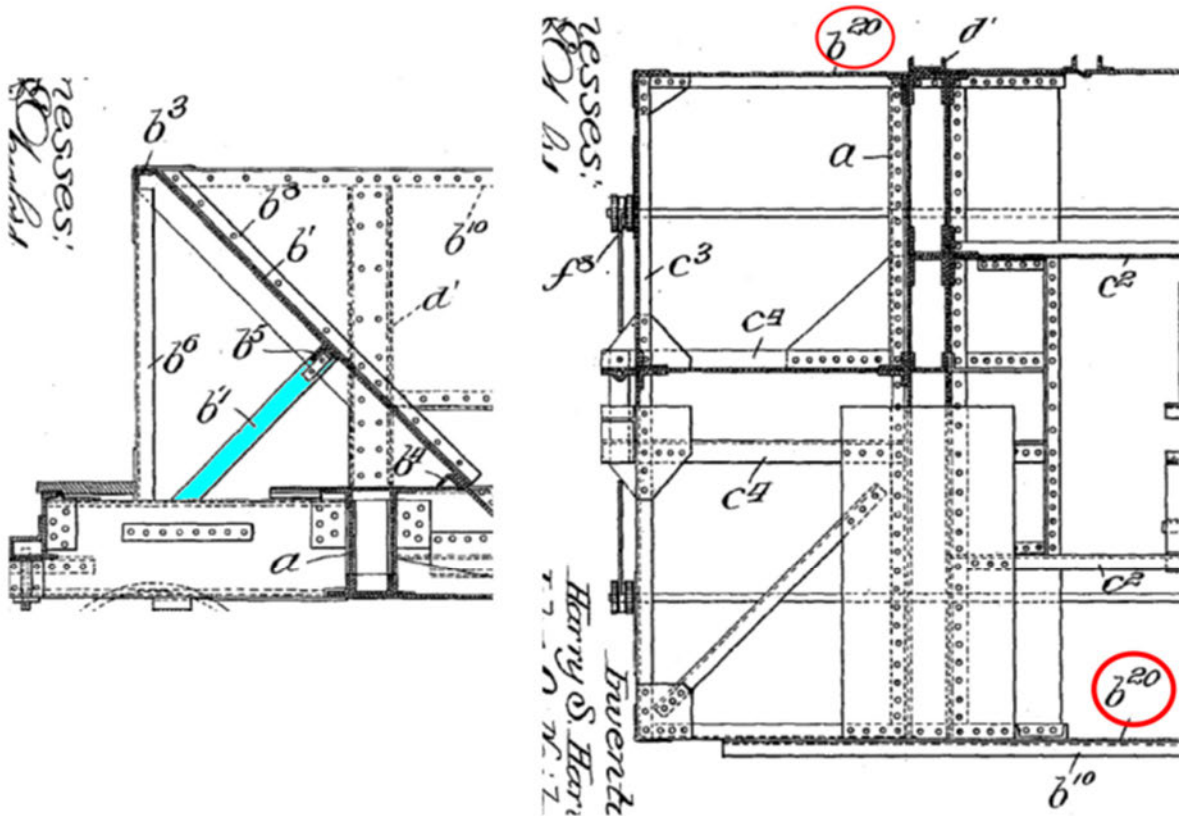
i. Claim 17

Petitioner incorrectly asserts that Hart and Campbell'051 meets this claim. Petition, 82-83.

Petitioner acknowledges that Campbell'051 includes an “offset section 18” to accommodate ladder rungs 23 within the car's permissible width. EX1012, 1:90-94; Petition, 83; Viz, ¶184. Yet Petitioner does not explain how importing Campbell'051's stepped/offset sections into Hart would affect operation, performance, or structural characteristics; particularly given that such changes would likely render Hart's railcar inoperable for its intended purpose. Viz, ¶¶184-87.

Petitioner also places Hart's inclined brace **b7** on side sill **b20** (Petition, 40: (“**b7** is mounted to the side sill and extends upwards...without extending...into the machinery space.”)). If Campbell'051's ladder/offset is grafted into Hart, **b7** would

have to be moved, creating an interference where the ladder would occupy the same location as *b*7. Viz ¶186. A POSITA would not expect to relocate and reconfigure these load-carrying supports in Hart merely to add ladders that Hart's low-profile design does not require. Personnel could access the car's top regions from the outboard draft-sill extent and related features. Viz ¶186. In other words, personnel could access the top-most portions of the car by standing on the longitudinally outboard extent of the draft sill or other related outboard features and would be able to easily access all top-most components of the railcar. *Id.*



EX1008, Figs. 1, 3 (blue highlighting to show *b7*, red circles to show *b20*): Viz, ¶185.

More fundamentally, Hart teaches distributing load throughout the load-sustaining members (Hart, 1:14–16). No POSITA would make Petitioner's proposed structural changes, which disrupt Hart's designed load-paths without any articulated benefit or engineering analysis. Viz ¶186.

Petitioner has not met its burden on claim 17.

ii. Limitation [18f]

Petitioner relies solely on its arguments for [7f]. Petition, 84. As discussed above for [7f], the asserted art does not render obvious this limitation. Viz, ¶¶188-189.

Importantly, the Board reached the same preliminary conclusion, noting that “Petitioner does not appear to show that the asserted “laterally extending reinforcement” of Hart (transverse member *b4*) extends between the asserted “side walls” of Hart (plate girder side *b*), as required by claim 18.” Inst. Decision, 28-29.

Petitioner has not met its burden on [18f].

iii. Limitation [18h]

Petitioner again incorporates its prior discussion, this time for claim 16, without additional analysis. Petition, 84-85. For the same reasons that the asserted

art fails to disclose or render obvious the required cross-car hollow-section beam/geometry in claim 16, it likewise fails here. Viz, ¶190.

Petitioner has not met its burden on [18h].

iv. Limitation [18i]

Petitioner relies solely on its arguments for [1f]. Petition, 85. For the same reasons that the asserted art fails to disclose or render obvious [1f], it likewise fails here. Viz, ¶191.

Petitioner has not met its burden on [18i].

v. Claim 19

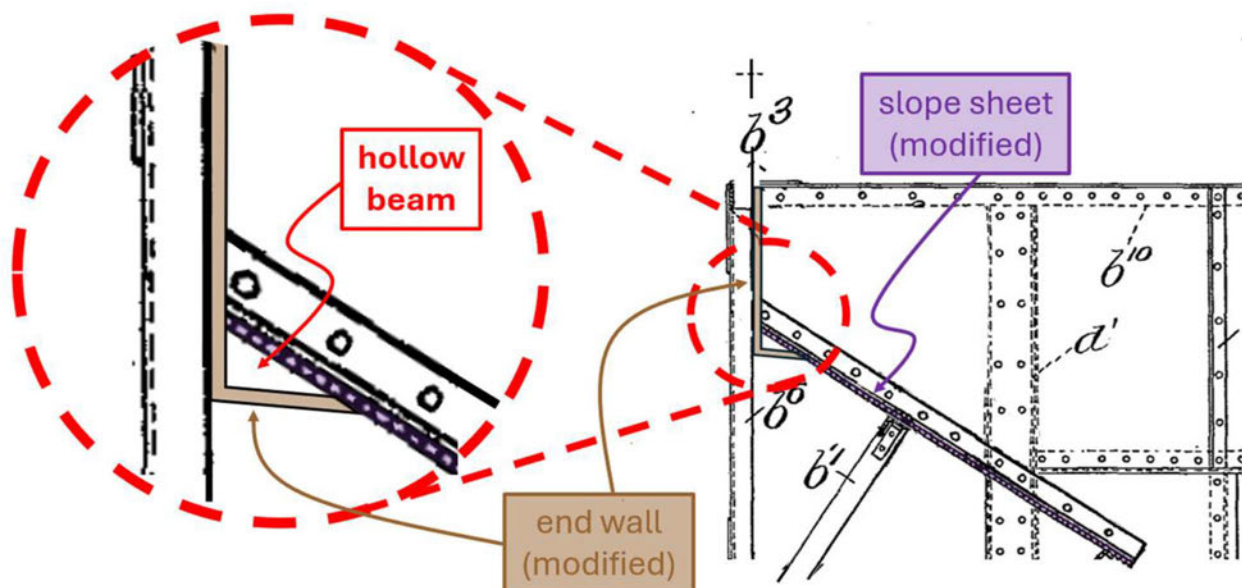
Petitioner relies solely on its discussion of claim 26, which in turn relies on the arguments for [1f]. Petition, 86. For the reasons explained above regarding claim 26 and [1f], the asserted art does not render obvious this claim. EX2035, ¶167. Moreover, Petition identifies no credible motivation to modify Hart's structural design, which Hart itself describes as distributing load efficiently through its members. Hart, 1:14-16.

Petitioner admits that the alleged "end post" in the Cambria Steel car does not extend to what it identifies as the top chord. *Id.* ¶150; EX1009, 13, Fig. 53. Petitioner then cherry-picks a different car from the 1906 Cyclopedia to argue the limitation would be met if *that* car were also combined with the Hart—Cambria Steel car

combination, without any reasoned basis for mixing features across multiple, distinct designs other than to meet the claim. EX20235, ¶150.

Moreover, the Cambria Steel car shows not an end post, but a vertical end ladder that would have been accessed to actuate the hand brake wheel that is shown at the top of the car. Petition, 79; EX1009, 14; EX2035, ¶151. Railcars built then had hand brake wheels horizontally oriented at the top of the car, not on the end of the car. EX2035, ¶151. A POSITA would have recognized that a ladder stile is not an end post because structural requirements for each are vastly different. *Id.*

As discussed with respect to claim 13 (§VI.E.v.), Petitioner's addition of an end-wall to Hart explicitly removes the structure **b3** that Petitioner identifies as the top chord. EX2035, ¶152; Petition, 63.



Petition at 64 (showing *b3* removed, despite the label being present). Now, for claim 26, the structure *b3* identified by Petitioner as the top chord is added back into Hart without any basis or explanation. EX2035, ¶152. A POSITA would not add and remove structure from a rail car with such abandon. *Id.*, ¶153.

In addition, a POSITA would not have been motivated to attempt much less make the combination proposed by Petitioner – a POSITA would have recognized the structure of Hart, as disclosed, was sound and did not need further reinforcement. *Id.*; Viz ¶192.

For at least these reasons, the Petition does not establish by a preponderance of evidence unpatentability of any claim on Ground 6.

G. Ground 7

Petitioner asserts that claims 21-22 are obvious over Hart in view of the 1906 Cyclopedia, Wong, and Schuller. Petition, 87; Viz, ¶168. As set forth below, the Petition fails to establish unpatentability of either claim by preponderance of evidence on Ground 7.

i. Claim 21

Petitioner relies on its discussion of claim 3 for this claim. Petition, 87. For the reasons discussed above, regarding claim 3, the asserted art does not render obvious this claim. Viz, ¶194.

The Petition and Dr. Ahmadian provide no rationale as to why a POSITA would understand the pneumatic actuator would “need to be mounted in the machinery space.” Petition, 88; Dr. Ahmadian, ¶117; Viz, ¶195-96. For example, Schuller mounts its pneumatic actuator at the end of its railcar, which decidedly does not have the claimed “machinery space.” *Id.*

Petitioner has not met its burden on claim 21.

ii. Claim 22

Petitioner relies solely on its discussion of claim 23 for this claim. Petition, 88. For the reasons discussed above, regarding claim 23 (§VI.E.xii.), the asserted art does not render obvious this claim. Viz, ¶197.

Petitioner has not met its burden on claim 22.

For at least these reasons, the Petition does not meet its burden on Ground 7.

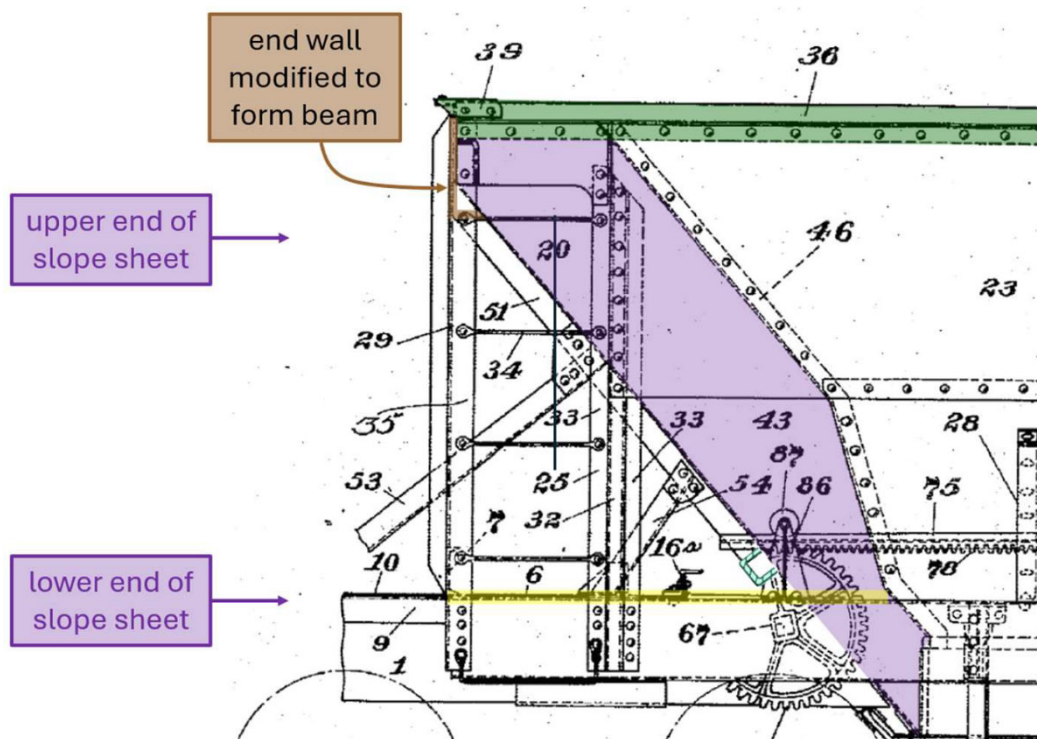
H. Ground 8

Petitioner contends that claims 32-34 are obvious over Lindström in view of Wong, Ratcliffe 1, and Hart. Petition, 89; Viz, ¶199. As set forth below, the Petition fails to establish unpatentability of any of these claims by preponderance of evidence.

i. Limitation [32g]

As explained earlier, Wong is not concerned with holding heavy lading with a steel structure that will not bend or buckle from weight or impact, as is the case in Lindström. Accordingly, a POSITA would not look to Wong to improve the end structure of Lindström. Viz, ¶¶200-07.

A POSITA would not have “slightly lengthened and bent” Lindström’s end wall based on Wong as proposed by the Petition. Petition, 95-97; Ahmadian, ¶¶125-28; Viz, ¶201. The Petition does not explain, nor would it be clear to a POSITA, how this would have been accomplished given that outwardly extending stiffening flanges 51 appear to be directly in the way of the proposed modification:



Petition, 107. Additionally, items 29, 53 and 54 would need to be changed or re-dimensioned according to Figure 2. Viz, ¶201.

A POSITA would not, and would not be motivated to, simply pick and choose pieces from the asserted art in the manner suggested by Petitioner and Dr. Ahmadian; nor would there be any reasonable expectation of success in any resultant modification. *Id.*, ¶202. Wong's end structure is a complex, interrelated structure that transfers forces through the structure, including the v-beams 36, thereby informing a POSITA not to take a single bent feature from that complex structure and incorporate it into Lindström, which uses a completely different structure based on struts 53 and 54. *Id.* Additionally, the proposed modification fails to take into consideration the other modifications Petitioner and Dr. Ahmadian propose making to Lindström in view of Ratcliffe 1 and Hart, or the impact or effect of those modifications taken together with incorporation of the bent feature in Lindström that Petitioner and Dr. Ahmadian propose. *Id.*

As discussed above, Wong teaches using aluminum to reduce the weight and cost of a railcar. Wong, 1:15-19; *Id.* ¶ 203. Meanwhile, Lindstrom seeks "to provide a dumping car having novel framings at its sides and ends, which framings are rigidly connected together and which are well adapted to take care of the stresses and strains set up in the car." Lindstrom, 1:34-39; *Id.* A POSITA cannot address the issue of

reinforcement without acknowledging that the stiffness of aluminum and steel differ by a factor of three. *Id.*

In addition, the end wall of Lindström is far shorter and differently shaped than the end wall of Hart, and a POSITA would not look towards the end wall of Wong to modify Lindström. *Id.* ¶204. The L-shaped detail at the bottom of the end sheet in Wong does not provide adequate structural reinforcement to act effectively as a structural member. *Id.* The reference detail does provide a connection point between the slope and end sheet. *Id.* A POSITA would realize that the upturned portion of the end sheet is of sheet or plate metal construction and would serve as an ineffective reinforcement member compared to readily available alternatives which would be well known to a POSITA (*e.g.*, any formed open or closed channel sections). *Id.*

Adding the L-shaped detail of Wong to Lindstrom would require other aspects of the Lindstrom to be redesigned. *Id.* ¶ 205. This modification alone cannot be made with any reasonable expectation of success. *Id.* Dr. Ahmadian does not identify that this modification could be made while satisfying the constraints described by the '515 Patent. *Id.*

Furthermore, such a modification to Lindstrom would increase the weight of the car. *Viz* ¶206. Given the aforementioned restrictions on the total weight of a loaded car, this modification would reduce the amount of a commodity the car could

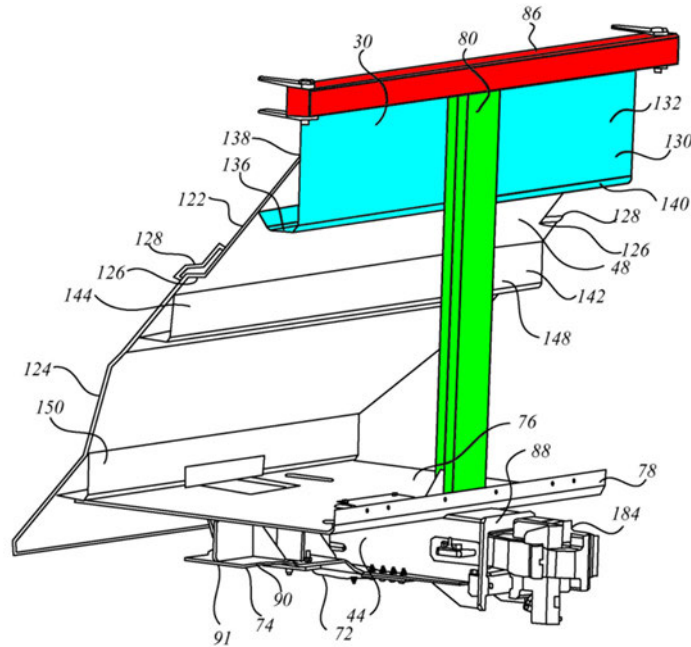
carry and increase the cost of the car itself. *Id.* Both of these effects are economically undesirable, a POSITA would find no motivation to make such a modification. *Id.*

Petitioner has not met its burden on [32g].

ii. Limitation [32i]

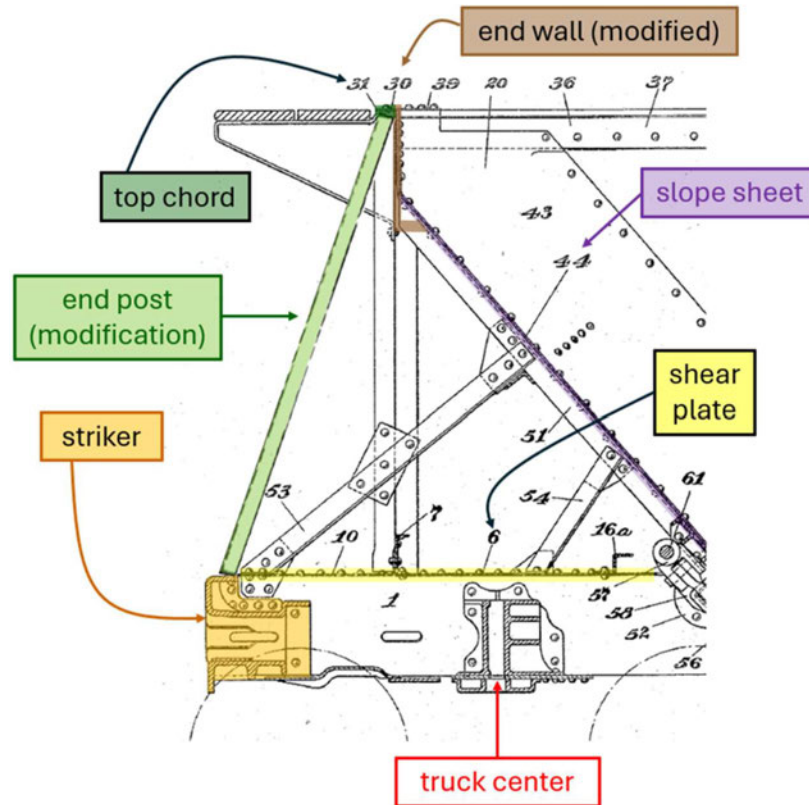
Petitioner proposes modifying “Lindström to incorporate an end post like the central end post in Ratcliffe 1.” Petition, 99. However, Ratcliffe 1 does not teach or suggest an “end post extending upwardly to meet said first beam and said top chord,” as claimed; and a POSITA would not be motivated to make Petitioner’s proposed modifications. *Viz*, ¶¶208-213. The Board agreed with this conclusion. *See* Inst. Decision, 32.

The ’515 Patent explains that vertical leg 132 and bent flange 136 form a substantially triangular closed section defining a laterally extending end slope sheet reinforcement beam 140:



'515 Patent, Fig. 3a (annotated to highlight end post 80 in green, beam 140 in blue, and top chord 86 in red); *id.*, 16:41-53; *Viz.*, ¶209. End post 80 is welded to vertical leg 132 of beam 140. '515 Patent, 16:52-53; *Id.*

The modified version of Lindström proposed by Petitioner would not have an “end post extending upwardly to meet said first beam.” *Id.*, ¶210. The structure that Petitioner identifies as an end post meets the structure that Petitioner identifies as a top chord and a closed portion of what Petitioner identifies as the end wall, not any structure that could be understood to correspond to the claimed first beam. *Id.* Petitioner does not address this issue. *Id.*; Petition, 98-100; Ahmadian, ¶¶130-31.



Petition, 100; Viz, ¶210.

It is unclear why Petitioner makes this modification to Lindström since strut 53 is present in Lindström and prevents a combination where an end post could meet both the first beam and the top chord. Viz, ¶211. Moreover, the proposed end post added to Lindström neither runs flush against the end wall nor is it connected to the end wall. *Id.* Indeed, Dr. Ahmadian states that the vertical post of Lindström was not “insufficient or inadequate.” Ahmadian Dep. 240:22- 242:13.

Further, there is insufficient motivation to modify the structural design of Lindstrom by incorporating design features of Ratcliffe 1, Hart, or Wong. Viz ¶ 212; *see* Lindstrom 1:34-39 (describing Lindstrom’s “well adapted” structure). Beyond a

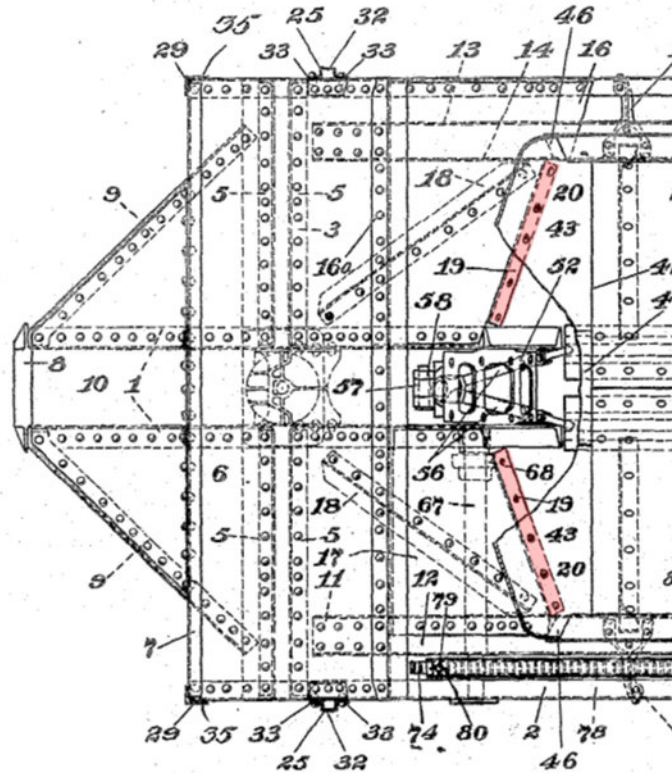
lack of motivation to combine Lindstrom, Wong, Ratcliffe 1, and Hart, adding additional structural members to the design of Lindstrom would reduce the amount of a commodity it could carry and increases the cost of the car itself. Given that both of these effects are economically undesirable, a POSITA would find no motivation to make such a modification. *Id.* ¶¶212-13.

Petitioner has not met its burden on [32i].

iii. Limitation [32k]

Petitioner picks the hollow beam **b4** from Hart to add into Lindström. Viz, ¶214. The Board agreed that “Hart’s crosswise beam b4 does not extend between the side walls, but, instead, sits between the outside edges of the hopper, with no side sheet abutting them” and “Petitioner fails to explain why beam b4 meets ‘a first hollow section beam extending across said hopper car between said first and second side walls.’” Inst. Decision, 26.

As recognized by Petitioner, the beam **b4** would need to be split to accommodate the structure of Lindström. Petition, 101-02 (“The beam could be formed of two parts and placed just longitudinally outboard of the flanges 19 that connect the slope sheet and the shear plate.”); Viz, ¶215. However, such a combination would not result in a “second beam extending cross-wise between said first and second side walls.” *Id.* Instead, as discussed by Petitioner, it would be only along flanges 19, which do not extend between the first and second side walls:



EX1005, Fig 3 (highlighting flanges 19 of the structure Petitioner identifies as the shear plate, longitudinally interior of where Petitioner would put the structure that Petitioner identifies as the second beam, in red); Viz, ¶215.

Moreover, such a relocation would require additional engineering analysis and design adjustments, because a component cannot be moved in isolation without affecting other aspects of the design (as described above). Viz ¶216. The alleged motivation is particularly lacking given that Lindstrom states the existing structure is efficient and adequate for the expected loads. Lindstrom, 1:34-39.

Additionally, adding beams to a railcar increases the weight of the railcar, as described above. Viz ¶217. The weight of the added beam reduces the weight of the

commodity the car could transport while abiding by GRL requirements and increases the cost of manufacturing the railcar. *Id.* Therefore, a POSITA would not be motivated to add an additional beam onto the existing adequate structure of Lindstrom. *Id.*

Petitioner has not met its burden on [32k], or on claim 32 as a whole.

iv. Claim 33

Petitioner proposes taking a third crosswise beam from Hart or Wong and incorporating it into Lindström. *Viz*, ¶219. For the reasons discussed above, with respect to claims 15 and 16, a POSITA would not look towards the structures of Hart or Wong, nor seek to combine them with Lindström. *Viz*, ¶219-221.

Petitioner and Dr. Ahmadian do not provide an explanation, or an illustration that would explain, how they propose to modify Lindström. *Id.* Instead, they show a modified version of Hart and cite to Wong. *Petition*, 103; *Ahmadian*, ¶134; *Viz*, ¶219. It is unclear how they propose to modify, or where the modification would be made in, Lindström (or if a third beam would even fit). *Id.* Petitioner also does not explain why a POSITA would choose to incorporate a third beam in Lindström. *Id.* Petitioner's proposed modifications to the asserted art are unclear, and it is unclear from the proposed modifications how all the modifications to the asserted art would, or could, come together to arrive at a resultant railcar, much less the invention of claim 33. *Id.*

Moreover, Petitioner fails to identify sufficient motivation to incorporate an additional beam into Lindstrom. *Viz* ¶220. Such a relocation would require additional engineering analysis and design adjustments, because a component cannot be moved in isolation without affecting other aspects of the design (as described above). *Id.* The alleged motivation is particularly lacking given that Lindstrom states the existing structure is efficient and adequate for the expected loads. Lindstrom, 1:34-39. Further, adding beams to a railcar increases the weight of the railcar, as described above, which reduces the weight of the commodity the car could transport while abiding by GRL requirements and increases the cost of manufacturing the railcar. *Id.* Therefore, a POSITA would not be motivated to add an additional beam onto the existing adequate structure of Lindstrom.

Petitioner has not met its burden on claim 33.

v. Claim 34

For the reasons discussed above, with respect to claims 15 and 16, a POSITA would not seek to combine Wong with Lindström. *See Viz*, ¶222-224.

Petitioner fails to explain how it proposes to modify that asserted art – for example, where in Lindström the proposed third beam would/could be placed, or that a third beam would even fit. *Viz*, ¶223. This conclusion cannot be made by looking at poor quality incomplete drawings and arcane descriptions. *Id.* The Petition and Dr. Ahmadian fail to provide any reasonable basis or rationale for

modifying the asserted art in the manner they propose. For example, the Petition and Dr. Ahmadian do not explain why a POSITA would choose to incorporate the proposed third beam in Lindström. Petitioner, with no opinions from Dr. Ahmadian regarding this claim, does not describe or explain why the third beam added to Lindström would be mounted to and define a hollow section. *Id.*

Petitioner has not met its burden on claim 34.

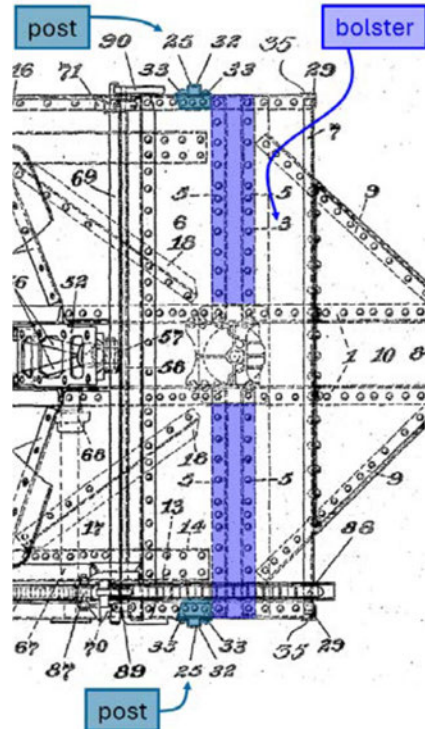
For at least these reasons, the Petition does not establish by preponderance of evidence unpatentability of any claim on Ground 8.

I. Ground 9

Petitioner contends that claims 35-44 are obvious over Lindström in view of Wong, Ratcliffe 1, Hart, and the 1946 Cyclopedia. Petition, 104; Viz, ¶191. As set forth below, the Petition fails to establish a reasonable likelihood that the asserted art renders obvious any of claims 35-44. Viz, ¶191.

i. Claim 35

Petitioner admits that Lindström's posts are "positioned immediately adjacent the bolster ends," not "mounted to said first and second ends of said main bolster and extend upwardly therefrom to meet said first end slope sheet" as the claim requires:



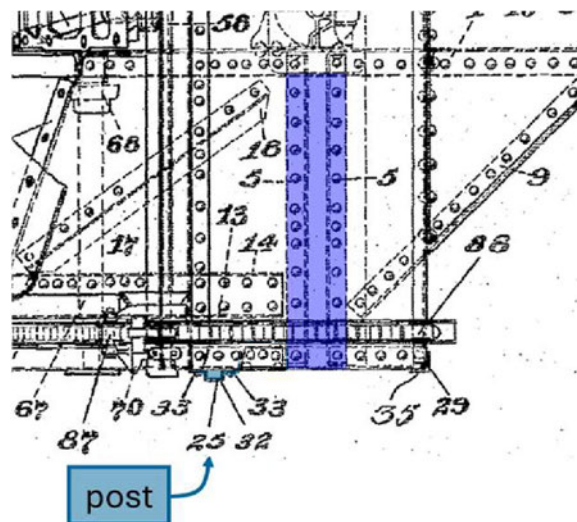
Petition, 104-05; Ahmadian, ¶135; Viz ¶226. It is unclear why Petitioner shaded the top of the sill behind the post 25 as being part of the post 25. Viz, ¶226. This appears to improperly suggest the post 25 is “adjacent” to the bolster, which it clearly is not. *Id.*

Petitioner suggests that a POSITA would understand that Lindström’s posts 25 “extend upwardly from the ends of the bolster.” Petition, 106; Viz, ¶227. However, Petitioner provides no support for this conclusory statement. Viz, ¶227. In fact, nothing in the ’515 Patent would suggest that a POSITA would consider Lindström’s posts as extending upwardly from the ends of the bolster. *Id.*

Lindström’s Figure 3 clearly shows that the structures identified by Petitioner as “corner posts” do not line up with the bolster, in contradiction to the explicit

language of claim 35 and contrary to Dr. Ahmadian's position that "it would have been obvious ... to move Lindström's posts 25 slightly inward longitudinally." Viz ¶227. Petitioner's proposed modification is neither obvious nor trivial as such a move upsets the intended load transfer between these members. *Id.* It is also unclear from the figures in Lindström if such an inward move could even be made without significantly changing the rest of the end of car structure. *Id.*

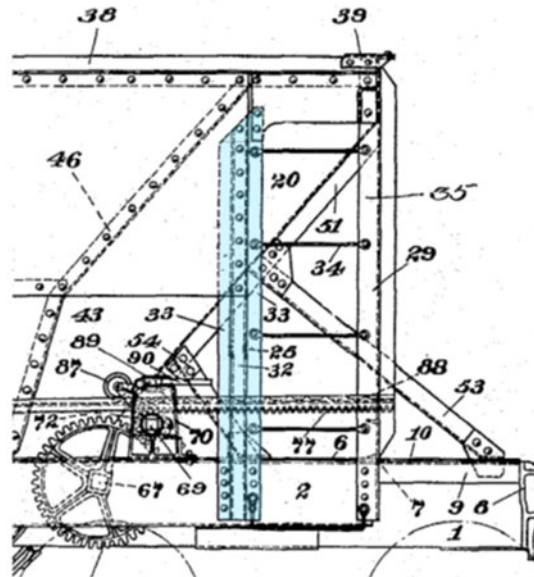
Recognizing the problem with Lindström, Petitioner suggests moving Lindström's posts "slightly inward longitudinally." Petition, 106. Such a modification would exacerbate the problem with Lindström, as shown below:



EX1005, Fig. 3 (modified); Viz, ¶228.

To the extent that Petitioner intended to suggest mounting the post over the bolster, it provides no motivation to make this change based on Hart or any of the other asserted art. Viz, ¶229. A POSITA would not seek to make this modification

because it would reduce the width of Lindström's ladder, which would make it difficult and dangerous to use, and would likely run afoul of safety regulations and conventions setting minimum ladder widths:



EX1005, Fig. 2 (annotated to highlight post 25); Viz, ¶229. Moreover, a POSITA would have lacked motivation to move the post of Lindstrom inwardly for the same reasons discussed regarding [1e] (§VI.A.i.), and for the same design and weight considerations discussed above. *Id.*

Petitioner has not met its burden on claim 36. Viz ¶230.

ii. Claim 37

Petitioner contends that Lindström discloses the claimed aperture. Viz, ¶231-32. However, as discussed above, with respect to claim 23 (§VI.E.xii.), Petitioner is

incorrect in its assumption that a POSITA would understand the corner post to be part of the sidewall. *Id.* Thus, Lindström does not disclose the claimed aperture. *Id.*

Petitioner has not met its burden on claim 37.

iii. Claim 38

Petitioner relies solely on its discussion of claim 37 for this claim. Petition, 110. For the reasons discussed above, regarding claim 37, the asserted art does not render obvious this claim. *Viz.* ¶¶233-35.

Petitioner also does not explain why or how in the asserted art “said main bolster has first and second ends; and respective first and second corner posts are mounted to said first and second ends of said main bolster and extend upwardly therefrom.” *Id.* ¶200. For the reasons discussed above, with respect to claim 35, it does not. *See* Section VI.I.i; *see also* *Viz* ¶¶233-35.

Petitioner has not met its burden on claim 38.

iv. Claim 39

Petitioner suggests modifying Lindström to have the 1946 Cyclopedia Ore Car's striker length. Petition, 111. A POSITA would not seek to modify Lindström to have the specific distance between 1946 Cyclopedia's striker and truck center. *Viz.* ¶¶236-238. Contrary to Dr. Ahmadian's position in ¶¶145-146, “making necessary adjustments” to force this dimension to either be a certain value (like from

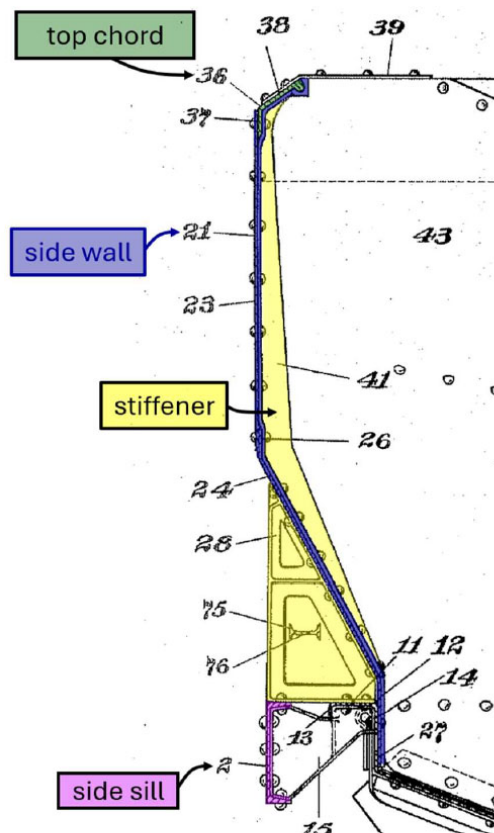
the 1946 Cyclopedia) or to be less than 50 inches as defined in claim 39 is neither a “routine design choice” nor would it be a trivial exercise. *Viz*, ¶236. The distance between the striker and centerline of the truck affects railcar curve negotiation. *Id.* The centerline of the truck also must coincide with the centerline of the body bolster, which is not easy to move unless the entire length dimension of the railcar can be altered without other issues arising. *Id.* Petitioner’s proposed modification is hand-waving at best, and no POSITA would do as Petitioner suggests. *Id.*

First, the designs of the Lindström and the 1946 Cyclopedia’s end sections are completely different, with Lindström’s tapering out to the end and the 1946 Cyclopedia having a boxed end. *Viz*, ¶237. Second, Petitioner overlooks the significant adjustments that would need to be made to modify Lindström to include the 1946 Cyclopedia’s dimensions. *Id.* Lindström uses a much longer end section than the 1946 Cyclopedia, presumably to accommodate strut 53 whose bottom end connects near the end of the car. *Id.* Moreover, the ’515 Patent calls out the “abnormally short distance[s] from the striker 88 to the truck center,” informing a POSITA that it is not the “routine design choice” asserted by Petitioner. *Id.* Finally, design and weight considerations discussed above do not support Petitioner’s proposed motivation.

Petitioner has not met its burden on claim 39.

v. Limitation [40b]

The Petition does not establish, and does not provide any reasonable basis to conclude, that the claimed “first side wall extends from said side sill to said top chord” is taught by Lindström. Viz, ¶¶239-240. Instead, as shown in the figures depicted in and relied on by the Petition, the structure that the Petition identifies as the sidewall in the asserted art never meets the structure it identifies as the side sill:



Lindström Fig. 5

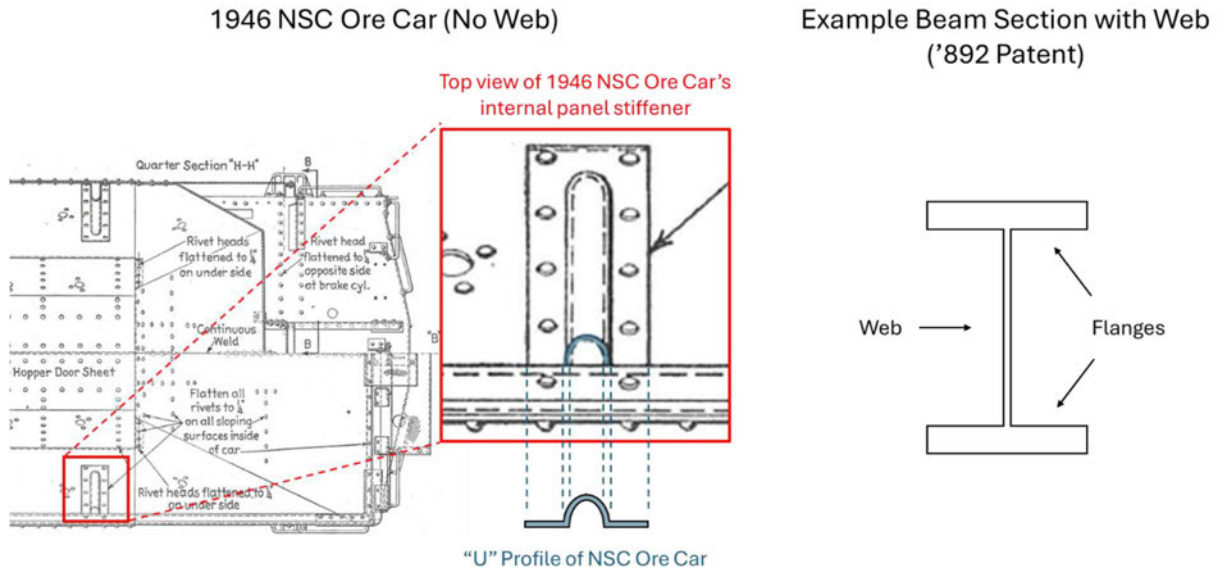
Lindström, Fig. 5 (annotated); Viz, ¶¶239-240.

Petitioner has not met its burden on [40b].

vi. Limitation [40h]

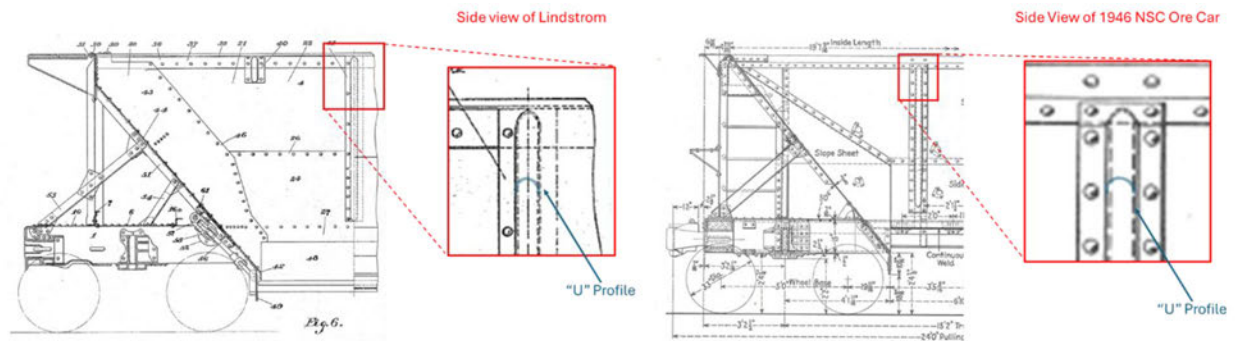
The Petition appears to assert, without any support, that “web continuity” only requires that claim elements be “in the same vertical plane.” Viz, ¶241. “Web continuity” in the ’515 Patent requires two things: *first*, structural elements involved comprise a web and, *second*, these webs are “co-planar or substantially co-planar.” ’515 Patent 15:49-50. While “web continuity” requires alignment, alignment is not defined by web continuity because the concept of alignment is more general and does not require the inclusion of a unique structural detail referred to as a “web.” *Id.* A POSITA would be well aware that the web of a beam is the specific component of the beam which resists shear loading. *Id.*

The structure shown in the 1946 Cyclopedia is not a web as can be seen in the higher resolution scan of the 1946 Cyclopedia. Viz ¶242; EX1054. The 1946 Cyclopedia has a hat or U-shaped section fastened to the sidewall. Viz, ¶242. The structure defined by Petitioner as a web does not meet the above definition of a web and a POSITA would not identify it as such. *Id.* Without a web, web continuity cannot be achieved.



Id.

Lindstrom shows a similar structure, where a hat or u-channel is depicted. As such, there is no web in Lindstrom to be considered for web continuity:



Lindstrom (modified); Viz ¶ 243.

The Petition fails to present any asserted art that teaches, suggests, or would have rendered obvious the claimed "sidewall stiffener having web continuity" together with the remaining elements and limitations in any one of the challenged claims. *See* Viz, ¶244.

Petitioner has not met its burden on [40h].

vii. Claim 41

Petitioner relies on Lindström for this claim. However, it appears that Petitioner explicitly doubted that Lindstrom's side wall stiffeners are substantially co-planar and vertically aligned in its discussion of [40h]. Viz ¶¶245-247. Because Petitioner has not established, and a POSITA would not have any reasonable basis to conclude, that Lindström teaches or suggests substantially co-planar and vertically aligned sidewall stiffeners, there is no reasonable basis to conclude that Lindström, alone or in any of the proposed combinations, teaches this claim limitation. *Id.*, ¶246.

Petitioner has not met its burden on claim 41.

viii. Claim 42

For the reasons discussed above regarding [40h], the Petition never establishes, and a POSITA would have no reasonable basis to conclude, that the structures in Lindström that Petitioner identifies as sidewall stiffeners have “webs.” Viz, ¶¶248-249.

Petitioner has not met its burden on claim 42.

ix. Claim 43

A POSITA would understand that the claimed sloped side sheet would be a separate feature from the claimed side wall. Viz, ¶250; EX2053, 1-3. The '515 Patent

explains “[t]he upper margin of the side slope sheet 50 of the hopper discharge section is welded to the lower margin of the inclined or sloped portion 98, such that the structure presents a continuous sloped surface for containing, and then slidingly discharging, particulate lading.” ’515 Patent, 15:51-55; Viz, ¶250.

This understanding is confirmed by Figs. 2b and 3b of the ’515 Patent (reproduced below with annotations). Viz, ¶251. Figure 2b is a view of the sidewall of the railcar from the outside, and shows the bottom flange 100 of the side sheet (shown in light blue) in line with the apertures 114 (red):

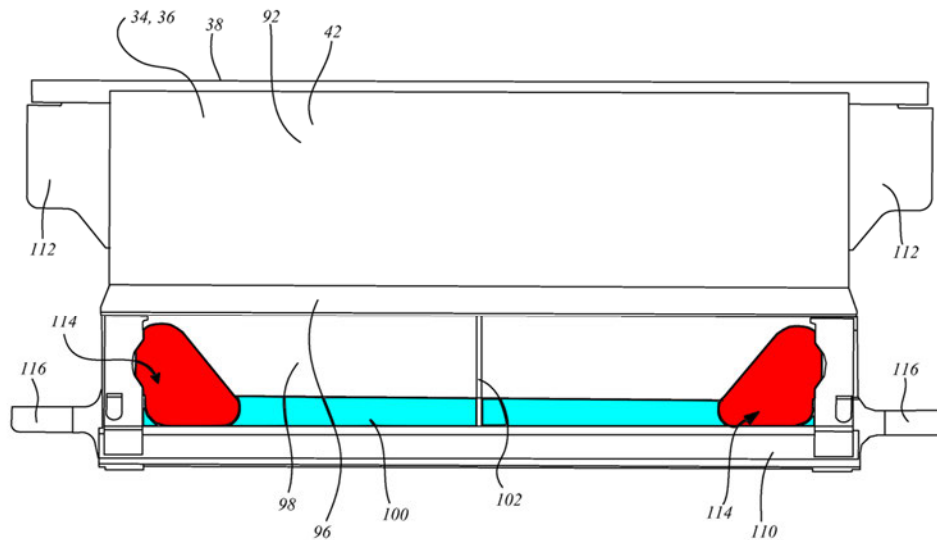


Figure 2b

’515 Patent, Fig. 2b (showing bottom flange 100 in blue and apertures 114 in red); Viz, ¶251.

Figure 3b is a cross-sectional view through the middle of the railcar and shows side slope sheet 50 (shown in green), with aperture 114 (red):

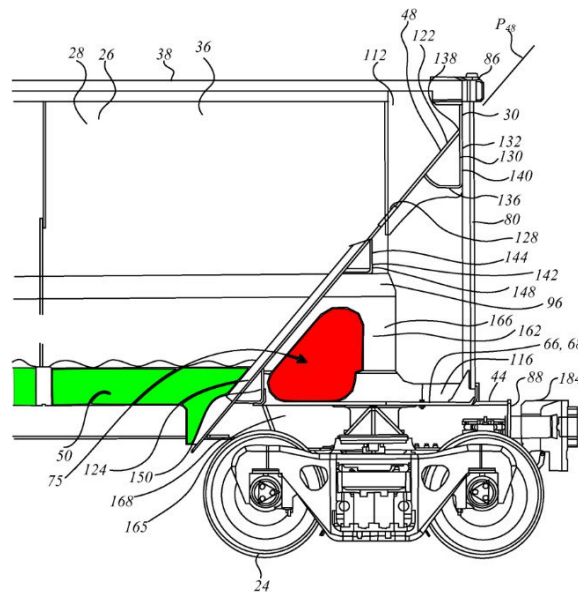


Figure 3b

'515 Patent, Fig. 3b (showing side slope sheet 50 in green, apertures 114, annotated in red); Viz, ¶251. As seen by comparing Figures 2b and 3b, the upper margin of the bottom flange 100 in Figure 2b is at the same height as the upper margin of the side slope sheet 50 in Figure 3b because both are at the same height when compared to aperture 114 (annotated in red). *Id.* This is consistent with the placement of the side slope sheet as shown in modified Figure 2c:

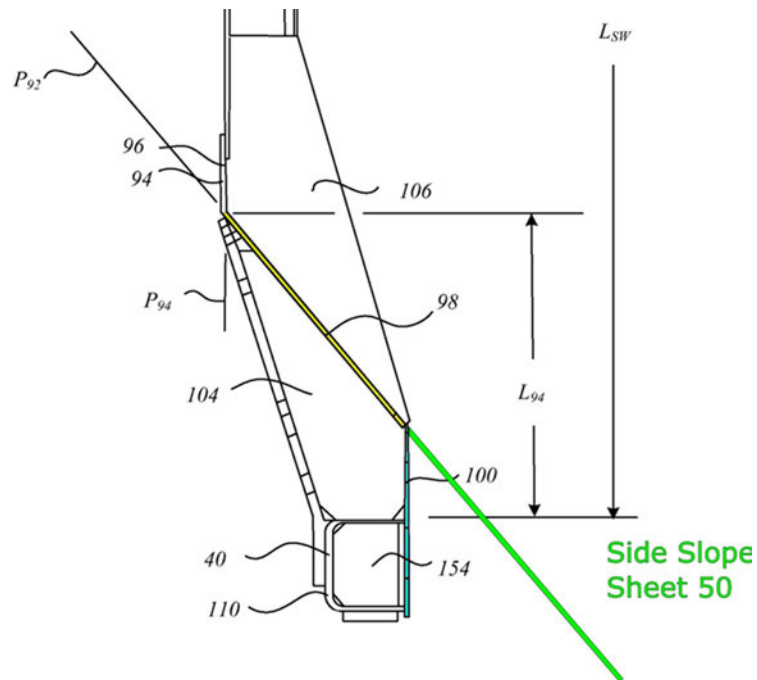


Figure 2c

'515 Patent, Fig. 2c (portion of figure showing side slope sheet annotated in green, bottom flange 100 annotated in blue, and sloped portion 98 annotated in yellow); Viz, ¶251.

However, under Petitioner's interpretation, the claimed "sloped side sheet" is the same as the claimed "transition portion." *Id.*, ¶252. The "sloped side sheet" cannot be the same physical structure as the "transition portion" because the "first sloped side sheet" cannot "meet" the "first sidewall at said transition portion" – they are one and the same. *Id.*

Petitioner has not met its burden on claim 43.

x. Claim 44

Patent drawings are not to be relied on as being to scale unless otherwise indicated in the specification. There is no such indication in Lindström. Viz, ¶254-257. Petitioner errs in adopting dimensions from Lindström as if it was to scale. *Id.* ¶254.

Dr. Ahmadian states that “it would have been obvious to select dimensions consistent with the Lindström’s drawings and with the 1946 Cyclopedia for the additional reason that the precise dimensions are a matter of design choice.” Ahmadian, ¶154; Viz, ¶255. A POSITA would not make such wholesale modifications to a railcar to obtain the claimed dimensions. Viz, ¶256. Dr. Ahmadian fails to explain how having the claimed dimensions maximizes the design constraints he discusses, or that Lindström’s sloped sheets are at different angles than the 1946 1946 Cyclopedia’s. *Id.*

Petitioner has not met its burden on claim 44.

For at least these reasons, the Petition does not establish by preponderance of evidence unpatentability of any claim on Ground 9.

J. Objective indicia of non-obviousness

Secondary considerations support a finding of non-obviousness. “Objective indicia of non-obviousness must be considered in every case where present.” *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1048 (Fed. Cir. 2016). Evidence of such

indicia “may often be the most probative and cogent evidence in the record” and can “guard against slipping into use of hindsight,” which is especially true here. *Id.* (citation omitted).

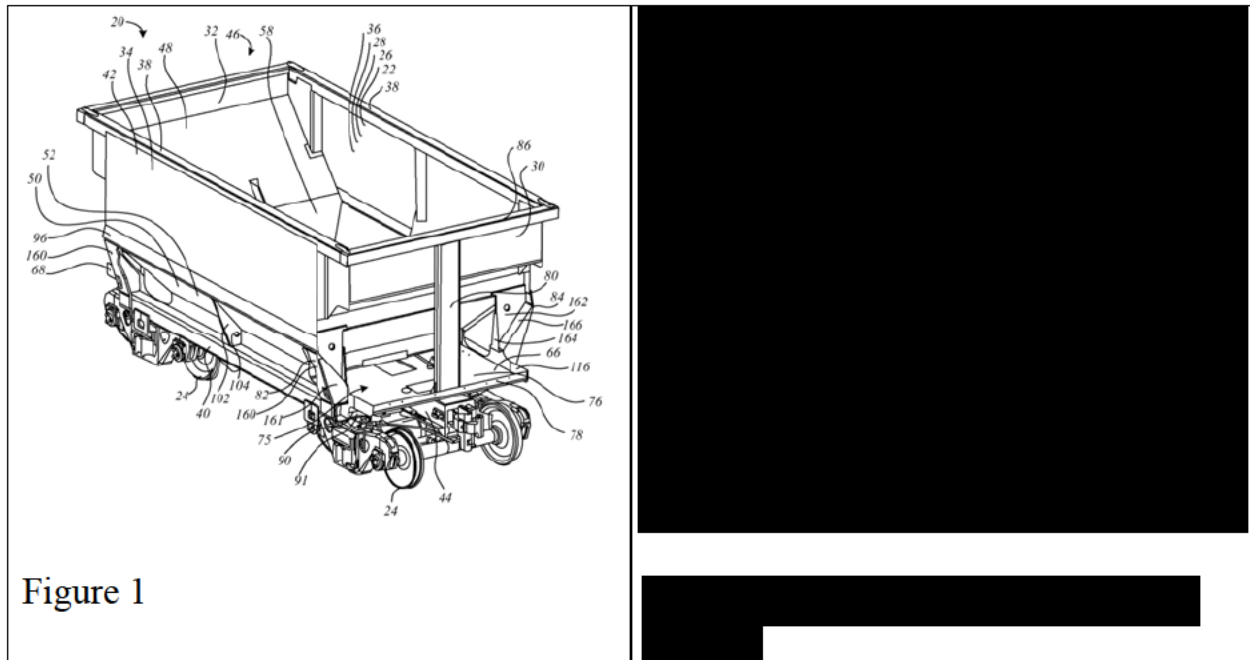
PO's claimed inventions are embodied by its commercially successful embodiment. Petitioner copied that commercial embodiment (and the claimed inventions) after another competitor failed in replicating the success of PO's inventions and product. And the common customer for these specialty railcars specifically requested patented features.

i. PO's commercial embodiment practices the claims

PO's commercial embodiment practices the claims. PO sold 232 railcars for use on the DMIR in 2009 that practice the claimed invention:



EX2004, 4.



ii. ARI failed to replicate the success of PO's product

After taking delivery of PO's railcars for use on the DMIR in 2009, CN sought additional bids for the same type of specialty railcar in or around 2012. ARI, a third-party railcar manufacturer, was awarded contract and provided railcars that lacked many of the inventive features of PO's railcars. As a nonlimiting example, ARI's railcars lacked the open end sections claimed in the independent claims of the '515 Patent, which recite the use of cross-wise beams to support the slope sheet, and also recite the lack of "elephant ears" or "primary structure" in the "machinery space". Instead, ARI's design used a large, vertical wall to provide such support.



EX2004, 21.

After receiving the ARI railcars, CN noted the lack of easy access for maintenance personnel because of ARI's large, vertical wall. EX2048.

iii. Petitioner copied PO's commercial embodiment and claimed inventions

By 2019, CN sought to add additional railcars to its roster. CN specifically requested the open-end sections of NSC's patented railcars during the bidding process for such railcars. EX2048. [REDACTED]

[REDACTED] EX2033, 4-6; EX2007, ¶¶64-67; EX2004, ¶¶64-67. [REDACTED]

[REDACTED] EX2033, 4-6; EX2007, ¶¶64-67; EX2004, ¶¶64-67. What resulted was a near-identical copy of the NSC railcar:





EX2004, 9-10.

PO sued Petitioner for its willful patent infringement. EX2004. Petitioner's railcars infringe the claimed inventions. EX2004 at ¶¶135-145, 156-167.

As explained in PO's Discretionary Denial Brief (Paper 8 at 5-13), Petitioner knew of the '515 Patent approximately two years after it issued (EX2012, ¶[0005]), cited the '515 Patent in its own patent applications (*Id.*; *see also* EX2013 ¶[0006]; 2014, 1:30-41; EX2017, 1:36-46; 2015; EX2016; 2018; 2019; EX2020 ¶[0071]; EX2021 ¶[0074]; EX2022 ¶[0073]), [REDACTED]

[REDACTED] (EX2004, ¶26, EX2007, ¶¶68-69), [REDACTED]

[REDACTED] (EX2004, ¶¶59-71), and was involved in multiple patent lawsuits with PO. EX2024, EX2025, EX2026, EX2005; IPR2016-00787; IPR2016-00788; EX2026, ¶21. And notably, in the pending District Court Litigation, the Court

has already found that Petitioner likely knew of the '515 Patent prior to the lawsuit. EX2005; EX2006.

iv. PO's commercial embodiment received industry praise

PO's commercial embodiments received industry praise because of its open end-section design. This praise and recognition has a nexus to the product's use of the patented technology because the claims specify how to create the open end-section through the use of various structural features. PO advertised its use of the open end-sections and CN—the only company to order these types of specialized railcars—has specifically asked for open end-sections in subsequent orders, including those awarded to Petitioner. EX2048.

v. Further evidence of objective indicia of non-obvious exists

Petitioner is aware of other evidence of objective indicia of non-obviousness, but refused PO's request to use such evidence in this filing. PO reserves the right to submit additional evidence. Thus, the objective indicia of non-obviousness support a finding of patentability.

VII. Conclusion

For the foregoing reasons, the claims of the '515 Patent should be found not unpatentable.

Respectfully Submitted,

Date: March 13, 2026

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CERTIFICATION UNDER 37 C.F.R. § 42.24(d)

I hereby certify that the foregoing complies with the type-volume limitation of 37 C.F.R. §42.24 and contains 13,678 words based on the word count indicated by the word-processing system used to prepare the paper, excluding the table of contents, table of authorities, exhibit list, certificate of service, and certificate of word count.

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that the foregoing **PATENT OWNER'S RESPONSE** was served electronically in its entirety on the date noted below via electronic mail to the following attorneys of record:

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