On behalf of FreightCar America, Inc.

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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 IPR2025-01046 Patent 8,166,892

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,166,892

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1001	U.S. Patent No. 8,166,892 ("the '892 patent")
1002	File History of the '892 patent
1003	Declaration of Mehdi Ahmadian, Ph.D.
1004	Excerpts from 1946 Car Builders' Cyclopedia, 17th ed. ("1946 Cyclopedia")
1005	U.S. Patent No. 1,321,928 ("Lindström")
1006	U.S. Patent No. 4,941,411 ("Wong")
1007	Excerpts from <i>Lancashire & Yorkshire, Vol. 2</i> , Noel Coates, copyright 2006 ("Coates")
1022	Declaration of Sylvia Hall-Ellis
1023	U.S. Patent No. 2,030,748 ("Gilpin")

CLAIM LISTING

Limitation	Claim Language
1a	1. A rail road hopper car comprising: a hopper carried between a pair of trucks,
1b	said hopper having first and second upstanding sidewalls running lengthwise therealong;
1c	said hopper having a lower discharge and convergent slope sheets giving onto said discharge;
1d	said rail road car having a side sill and a top chord; said first upstanding sidewall extending from said side sill to said top chord;
1e	said first upstanding sidewall having a predominantly upwardly running sidewall stiffener mounted thereto, said sidewall stiffener being located at a longitudinal station intermediate the trucks;
1f	said first upstanding sidewall having a first region, said first region being a lower region thereof; said first upstanding sidewall having a second region, said second region being an upper region thereof;
1g	said sidewall stiffener having a first portion, said first portion being a lower portion thereof, said first portion being mounted to said first region of said first upstanding sidewall; said sidewall stiffener having a second portion, said second portion being an upper portion thereof, said second portion being mounted to said second region of said first upstanding sidewall;

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Limitation	Claim Language
1h	said first portion of said first upstanding sidewall stiffener being laterally outboard of said first region of said first upstanding sidewall; said second portion of said sidewall stiffener being laterally inboard of said second region of said first upstanding sidewall;
1i	said first sidewall having a continuous section between said first and second regions thereof; and
1j	said sidewall stiffener having web continuity between said first and second portions thereof.
2a	A rail road hopper car comprising: a hopper carried between a first end section and a second end section; said first and second end sections being carried by respective first and second trucks for rolling motion in a longitudinal direction along railroad tracks;
2b	said hopper having first and second upstanding sidewalls running lengthwise therealong;
2c	said hopper having a lower discharge and convergent slope sheets that slope downward toward said discharge;
2d	said discharge having a door movable between a closed position and an open position to govern egress of lading from said hopper;
2e	one of said convergent slope sheets being a first end slope sheet; said first end slope sheet extending laterally between said first and second upstanding sidewalls; said first end slope sheet having a first, lower, longitudinally inboard end proximate said discharge, and a second, upper, longitudinally outboard end distant from said discharge;

Limitation	Claim Language
2f	said first end section having a first draft sill and a main bolster extending cross-wise to said first draft sill, said first draft sill and said main bolster intersecting at a first truck center, said first truck being located centrally under said first truck center;
2g	said draft sill having a striker longitudinally outboard of said first truck center;
2h	said first end section having a shear plate mounted overtop of said first draft sill and said main bolster; said shear plate having a longitudinally inboard margin adjacent to said longitudinally inboard end of said first end slope sheet; said shear plate having a longitudinally outboard cross-wise running margin traversing said draft sill longitudinally outboard of said truck center;
2i	said upper, longitudinally outboard end of said first end slope sheet being reinforced by a first cross-wise extending beam;
2ј	said lower, longitudinally inboard end of said first end slope sheet being reinforced by a second cross-wise extending beam;
2k	said first end slope sheet overhanging said shear plate;
21	a door actuator mounted above said shear plate, said door actuator being at least partially overhung by said first end slope sheet; said door actuator being connected to said door by a mechanical transmission;
2m	said first end section being free of longitudinally oriented elephant ears extending between said draft sill and said first end slope sheet;

Limitation	Claim Language
2n	said hopper having respective first and second top chords running longitudinally therealong; said car having respective first and second side sills running longitudinally between said first and second end sections;
20	said first upstanding sidewall having a predominantly upwardly running sidewall stiffener mounted thereto, said sidewall stiffener being located at a longitudinal station intermediate the trucks;
2p	said first upstanding sidewall having a first region, said first region being a lower region thereof; said first upstanding sidewall having a second region, said second region being an upper region thereof;
2q	said first and second regions of said sidewall adjoining each other at a height intermediate said first side sill and said first top chord; said second region of said sidewall extending downwardly or said first top chord; said first region of said sidewall extending downwardly and laterally inboard from said second region of said sidewall;
2r	said sidewall stiffener having a first portion, said first portion being a lower portion thereof, said first portion being mounted to said first region of said first upstanding sidewall; said sidewall stiffener having a second portion, said second portion being an upper portion thereof, said second portion being mounted to said second region of said first upstanding sidewall;
2s	said first portion of said first upstanding sidewall stiffener being laterally outboard of said first region of said first upstanding sidewall; said second portion of said sidewall stiffener being laterally inboard of said second region of said first upstanding sidewall;

Limitation	Claim Language
2t	said first sidewall having a continuous section between said first and second regions thereof; and
2u	said sidewall stiffener having web continuity between said first and second portions thereof.
3	The rail road hopper car of claim 2 wherein said first and second portions of said sidewall stiffener are substantially co-planar, and are substantially vertically aligned when seen in a sectional view looking along the car.
4	The rail road hopper car of claim 2 wherein said first upstanding sidewall has a third region intermediate said first and second regions, said third region including a side sheet transition portion passing across said sidewall stiffener from an inboard margin thereof to an outboard margin thereof, and said stiffener having vertical web continuity through said transition portion.
5	The rail road hopper car of claim 4 wherein said first sidewall has an overall height from said first side sill to said first top chord, L, and said transition portion is located a distance above said first side sill that is in the range of $\frac{1}{4}$ to $\frac{2}{3}$ L
6a	The rail road hopper car of claim 2 wherein: said first upstanding sidewall has a third region intermediate said first and second regions, said third region including a side sheet transition portion passing across said sidewall stiffener from an inboard margin thereof to an outboard margin thereof;
6b	said hopper includes first and second sloped side sheets; and said first sloped side sheet meets said first sidewall at said transition portion.

Limitation	Claim Language	
7	The rail road hopper car of claim 6 wherein said first sidewall has an overall height from said first side sill to said first top chord, L, and said first sloped side sheet meets said transition portion at an height that is in the range of $\frac{1}{4}$ to $\frac{2}{3}$ L above said first side sill.	
8a	The rail road hopper car of claim 2 wherein said hopper has a cross-wise extending outboard end top chord;	
8b	and an end post extends from said draft sill to said end top chord, said end post being mounted above said draft sill between said truck center and said striker.	
9a	The rail road hopper car of claim 8: wherein said hopper has an end wall extending downward of said end top chord;	
9b	said upper, longitudinally outboard end of said first end slope sheet meets said downwardly extending end wall; and said first cross- wise extending beam is located where said downwardly extending end wall meets said first end slope sheet; and said first cross-wise extending beam is of hollow cross-section.	
10	The rail road hopper car of claim 8 wherein said shear plate has lateral margins; said lateral margins of said shear plate mate with said first and second side sills; and said sidewall stiffener is supported by a respective one of said side sills.	
11	The rail road hopper car of claim 10 wherein said main bolster has first and second ends; and first and second corner posts extend upwardly from said first and second ends respectively to mate with said sidewalls.	
12	The rail road hopper car of claim 2 wherein said main bolster has first and second ends; and first and second corner posts extend upwardly from said first and second ends respectively to mate with said sidewalls.	

Limitation	Claim Language
13	The rail road hopper car of claim 12 wherein said shear plate has lateral margins; said lateral margins of said shear plate mate with said first and second side sills; and said sidewall stiffener is supported by a respective one of said side sills.
14	The rail road hopper car of claim 2 wherein said shear plate has lateral margins; said lateral margins of said shear plate mate with said first and second side sills; and said sidewall stiffener is supported by a respective one of said side sills.
15	The rail road hopper car of claim 2 wherein said first and second portions of said sidewall stiffener are made of flat bar, are positioned in vertical-transverse planes, are substantially co-planar, and are substantially vertically aligned when seen in a sectional view looking along the car.

Grounds	Listing
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GROUND 1a	Claim 1: 1946 Cyclopedia		
GROUND 1b	Claims 2-8, 10-14: 1946 Cyclopedia, Lindström and		
	optionally Wong		
GROUND 1c	Claim 9: 1946 Cyclopedia, Lindström and Wong		
GROUND 1d	Claim 15: The art in Ground 1b and Coates		
GROUND 2a	Claim 1: Lindström and optionally the 1946 Cyclopedia		
GROUND 2b	Claims 2–14: Lindström, 1946 Cyclopedia and Wong		
GROUND 2c	Claim 15: The art in Ground 2b and Coates		

Petitioner FreightCar America, Inc. ("FCA") requests *inter partes* review of claims 1–15 ("the challenged claims") of U.S. Patent No. 8,166,892 ("the '892 patent," EX1001), a patent owned by National Steel Car Ltd. ("NSC").

I. INTRODUCTION

The '892 patent is directed to a bottom-discharge hopper car, a railway freight car whose payload is loaded through the hopper's open top and discharged through doors at the bottom. The '892 patent describes reinforcing the hopper's side walls with vertically oriented web stiffeners that have two portions: a lower portion on the exterior of the side sheet and an upper portion on the interior of the side sheet. Figure 1 of the patent is a perspective view of the hopper car that shows the lower, exterior portion of the stiffener of one side wall; and the upper, interior portion of the stiffener of the other side wall.



Figure 2c, an end view of one side wall, shows both parts of the side-wall stiffener 102. The specification of the '892 patent states that the two parts are aligned in a vertical plane passing through the rail car perpendicular to the side wall 94. EX1001 at 15:44-46 and 15:64-65. The patent refers to this alignment in a vertical plane as "web continuity." *Id.* at 15:44-46 ("Portions 104 and 106 are co-planar, or substantially co-planar, such that stiffener 102 has web continuity through member 94.").



During prosecution, the claims of the '892 patent were allowed because the Examiner believed the prior art did not disclose a side-wall stiffener with interior and exterior portions aligned in the same vertical plane, *i.e.*, with web continuity. After

an initial restriction requirement led to a narrowing of the claims, the remaining claims were allowed in the next office action. EX1002 at 267-71, 400-07, 411-17. In his Reasons for Allowance, the Examiner stated:

The following is an examiner's statement of reasons for allowance: The sidewall stiffener having web continuity between the first and second portions along with the first portion of the sidewall stiffener being laterally outboard of the first region and the second portion of the sidewall stiffener being laterally inboard of the second region is seen as an unobvious improvement over the art of record.

Id. at 416.

Unbeknownst to the Examiner, two-part side-wall stiffeners with web continuity were known over a century before the '892 patent application was filed. For example, Coates shows photos of a hopper car produced by the Lancashire & Yorkshire Company in 1904. EX1007 (Coates) at front cover ("L&Y Hopper Car").



L&Y Hopper Car

Each side wall of the L&Y Hopper Car was comprised of four panels. As shown above, the lower part of the side wall was reinforced by three exterior web stiffeners, one at each juncture of adjacent panels. In addition, as seen in the image below, the interior of the L&Y Hopper Car's sidewalls had stiffeners located at upper ends of these same panel junctures. *Id.* at 263 Thus, the L&Y Hopper Car had upper, interior and lower, exterior stiffeners arranged in the same vertical plane.



The stiffeners of the L&Y Hopper Car were riveted to the rail car's steel sidewalls with L-brackets. However, the rail industry quickly devised other methods of providing two-part side-wall stiffeners with web continuity. In 1936, Garth Gilpin received a patent on rail-car side walls with web stiffeners formed by bending the side edges of each side-wall panel. EX1023. Figures 1 and 2 of the Gilpin patent,

shown below, show the exterior and interior, respectively, of Gilpin's side wall. As the figures demonstrate, Gilpin's stiffeners had lower, exterior and upper, interior portions arranged in the same vertical plane. *Id.* at Figs. 1-2.



Gilpin Patent

By the 1940s, two-part side-wall stiffeners with web continuity were common in hopper cars used to transport minerals such as coal and iron ore. For example, three of the four schematics in the ore-car section of the 1946 Cyclopedia, a handbook for rail car manufacturers, disclose two-part side-wall stiffeners with web continuity. EX1004 at 290, 292, 294. Indeed, as shown below, the relevant portions of those schematics—the end sectional views that show both the interior and exterior portions of the stiffener at once—are almost identical to Figure 2c of the '892 patent. *Id.* Thus, far from being novel, the side-wall stiffeners of the '892 patent had become commonplace over sixty years before the '892 patent application was filed.



EX1001 at Fig. 2c; EX1004 at 294 (NSC); 292 (Enterprise); 290 (Pressed Steel).

The claims of the '892 patent recite features other than sidewall stiffeners, but these claim elements are standard hopper-car features. Virtually all of these features are shown in the 1946 Cyclopedia's NSC schematics and in a 1919 patent issued to Charles Lindström (EX1005). The '892 patent was allowed not because of these standard features, but because the Examiner mistakenly believed that two-part sidewall stiffeners with web continuity were new when NSC filed its patent application.

The claims of the '892 patent are essentially lists of rail-car features that had become common by the 1940s. Those claims would have been unpatentable had NSC filed its patent application in 1946—they were certainly unpatentable in 2009. Those claims should be declared unpatentable and cancelled.

II. PRELIMINARY MATTERS

A. Priority Date of the '892 Patent

The '892 patent was filed as U.S. Application No. 12/559,065 on September 14, 2009 and claims priority to Canadian Patent Application No. 2,678,605, also filed on September 14, 2009, as well as to Canadian Patent Application No. 2,678,447, filed on September 11, 2009. EX1002 at 120; EX1003 ¶26. For purposes of this petition, Petitioner will assume that the earliest of these dates—September 11, 2009—is the '892 patent's priority date.

B. Prosecution History of the '892 Patent

Filed claims 1–19 were directed to a hopper car with motor-operated doors, and filed claims 20–25 were directed to a hopper car with reinforced sidewalls. EX1002 at 34-40. In response to the examiner's restriction requirement, NSC elected claim 20, cancelled claims 21–25, and added new claims 26–39. EX1002 at 266-71 and 400-405. On January 3, 2012, the Examiner allowed the pending claims—without discussing any prior art—and offered the following Reasons for Allowance:

The following is an examiner's statement of reasons for allowance: The sidewall stiffener having web continuity between the first and second portions along with the first portion of the sidewall stiffener being laterally outboard of the first region and the second portion of the

> sidewall stiffener being laterally inboard of the second region is seen as an unobvious improvement over the art of record.

Id. at 416.

C. Level of Ordinary Skill in the Art

The claims of the '892 patent are directed to reinforcing and assuring the structural integrity of the side wall of a railway hopper car. Accordingly, a person of ordinary skill in the art to which the '892 patent pertains (POSITA) would have had at least a bachelor's degree in a discipline related to mechanical engineering, physics, structural design, or an equivalent discipline, and at least two years of experience designing or analyzing rail cars or similar vehicles. EX1003 ¶30.

D. Claim Construction

No claim term requires construction to resolve the validity challenges here. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017); *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999). The challenged claims are unpatentable under any reasonable construction.

E. <u>Reliance on Expert Analysis and Testimony</u>

Expert testimony may be helpful in addressing the validity issues raised by this petition. Certain claim terms commonly used in the rail-car field require a brief explanation. In addition, because certain prior art schematics discussed in the petition are very old, expert testimony may be helpful in interpreting them. Accordingly, this

petition relies on the expert analysis and testimony of Dr. Mehdi Ahmadian. EX1003 (Expert Declaration of Medhi Ahmadian, Ph.D.).

III. STATEMENT OF PRECISE RELIEF REQUESTED

A. Statutory Grounds for Cancellation

Petitioner requests that the Board cancel claim 1 of the '892 patent under pre-AIA 35 U.S.C. § 102 because the invention recited in this claim was disclosed in a single prior art reference. In addition, Petitioner requests that the Board cancel claims 1-15 of the '892 patent under pre-AIA 35 U.S.C. § 103 because, as of their effective filing date, they would have been obvious to a POSITA.

B. Status of References as Prior Art

The references relied upon herein are prior art for the following reasons:

Exhibit No.	Description	Prior Art Basis
EX1004	1946 Cyclopedia	Pre-AIA 35 U.S.C. §102(b) – published in 1946
EX1005	Lindström	Pre-AIA 35 U.S.C. §102(b) – issued on November 18, 1919
EX1006	Wong	Pre-AIA 35 U.S.C. §102(b) – issued on July 17, 1990
EX1007	Coates	Pre-AIA 35 U.S.C. §102(b) – published in 2006

Each of these references constitutes prior art under pre-AIA 35 U.S.C. §102(b) because its issue or publication date is more than a year before September 11, 2009,

the earliest possible effective filing date of the '892 patent. EX1022. These references constitute analogous art because they are from the same field of endeavor as the '892 patent: rail-car design. *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1000 (Fed. Cir. 2016). They are also reasonably pertinent to a particular problem with which the inventor was concerned—*i.e.*, strengthening and improving bottom-discharge hopper cars—and they disclose numerous railcar features that are disclosed and claimed in the '892 patent.

None of the prior art references listed above was considered by the examiner during prosecution. *See* EX1002; EX1001 at 1–2.

IV. SPECIFIC PROPOSED GROUNDS FOR UNPATENTABILITY

As explained below, claims 1–15 of the '892 patent were anticipated by or obvious in view of the prior art. The references discussed below disclose every claim limitation, though not always using the terminology in the claims. *See In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990) (disclosure need not be *ipsissimis verbis*).

A. Ground 1a: Claim 1 is anticipated by, or at least obvious over, the 1946 Cyclopedia.

The 1946 Cyclopedia is the seventeenth edition of a handbook for rail car manufacturers. EX1004 at 1-2. The reference, which was first produced in 1879 under the name Car Builders' Dictionary, contains a dictionary of railroad terminology, photographs and schematics of passenger and freight cars, and advertisements from suppliers of rail-car parts. *Id.* at 4. The ore-car section of the

1946 Cyclopedia—entitled "Freight Cars: Hopper Ore"—contains drawings and a photograph of an ore car manufactured by Patent Owner NSC. *Id.* at 294-95.

1. <u>Independent Claim 1</u>

a. [1a] "A rail road hopper car comprising: a hopper carried between a pair of trucks"

The 1946 Cyclopedia's disclosure of the NSC ore car discloses limitation [1a],

as shown below. EX1004 at 294; EX1003, ¶47.



Regarding the hopper, the drawings are in a section of the Cyclopedia called "Freight Cars: Hopper Ore." EX1004 at 294.

In addition, the drawing below expressly refers to the hopper door.



Id. Regarding the trucks, the 1946 Cyclopedia defines "truck" as "the assembly of parts comprising the structures which support a car body at each end ... and also provide for the attachment of wheels and axels." *Id.* at 66. In the NSC drawing, each end of the car is supported by a truck with four wheels. EX1003, ¶47.

b. [1b] "said hopper having first and second upstanding sidewalls running lengthwise therealong;"

The 1946 Cyclopedia's NSC ore car discloses this limitation, as shown below. EX1004 at 294.



The left half of the drawing above is a sectional view. EX1003, ¶43. Consequently, the side wall shown there is the side wall farther from the reader. *Id.* The right half of the drawing above is a side view and shows the side wall closer to the reader. *Id.* A POSITA would understand that the NSC ore car is symmetrical about its longitudinal and lateral axes, allowing for it to be accurately depicted by a drawing showing a half or even a quarter of the car. *Id.*

The left and right halves of the drawing below are sectional views along lines A-A and B-B, respectively. *Id.*, ¶44 A side wall is shown in each of these views.



EX1004 at 294; EX1003, ¶¶41-46. The 1946 Cyclopedia also contains a photograph of the NSC ore car, shown below, which shows the car's side wall.



EX1004 at 295.

c. [1c] "said hopper having a lower discharge and convergent slope sheets giving onto said discharge;"

The 1946 Cyclopedia's NSC ore car discloses this limitation, as shown below. The reference describes the NSC car as a "center discharge" ore car, calls out the length of a "Door Opening" at the bottom of the hopper, and shows a hopper door in closed and open positions. EX1004 at 294. Regarding the claimed "convergent slope sheets," the 1946 Cyclopedia calls out an end slope sheet ("Slope Sheet"). *Id.*



The left half of the drawing below is a sectional view (from above) showing the structure of the ore car's lower frame or undercarriage. EX1003, ¶42. The right half of the drawing is divided into two parts. The upper right quarter of the drawing is a sectional view (from above) in which the ore car is sectioned approximately midway between the undercarriage and the top of the car, along line H-H. *Id.* The lower right quarter is a top view of the rail car. *Id.* That top view shows half of one of the two end slope sheets. *Id.*





EX1004 at 294-95.

d. [1d] "said rail road car having a side sill and a top chord; said first upstanding sidewall extending from said side sill to said top chord;"

The 1946 Cyclopedia's NSC ore car discloses limitation [1d], as shown below. EX1003 \P 49. It shows a top flange or "chord" at the top of the side wall, and a lower side sill at the bottom of the side wall. One drawing calls out a lateral distance "Over Side Sills."





EX1004 at 294-95.

e. [1e] "said first upstanding sidewall having a predominantly upwardly running sidewall stiffener mounted thereto, said sidewall stiffener being located at a longitudinal station intermediate the trucks;"

The 1946 Cyclopedia's NSC ore car discloses this limitation, as shown below.



EX1004 at 294. Both portions of the sidewall stiffener may be seen in the sectional

end view below.



Id. at 294-95; EX1003, ¶51.

f. [1f] "said first upstanding sidewall having a first region, said first region being a lower region thereof; said first upstanding sidewall having a second region, said second region being an upper region thereof;"

The 1946 Cyclopedia's NSC ore car discloses this limitation, as shown below.



EX1004 at 294.

g. [1g] "said sidewall stiffener having a first portion, said first portion being a lower portion thereof, said first portion being mounted to said first region of said first upstanding sidewall; said sidewall stiffener having a second portion, said second portion being an upper portion thereof, said second portion being mounted to said second region of said first upstanding sidewall;"

The 1946 Cyclopedia's NSC ore car discloses this limitation, as indicated below. The drawings show that the stiffener portions are mounted to the sidewall with rivets and flanges.






Id. at 294-95.

> h. [1h] "said first portion of said first upstanding sidewall stiffener being laterally outboard of said first region of said first upstanding sidewall; said second portion of said sidewall stiffener being laterally inboard of said second region of said first upstanding sidewall;"

The 1946 Cyclopedia's NSC ore car discloses this limitation, as shown below.

In the illustration below, "inboard" is to the right and "outboard" is to the left.



Id. at 294.

i. [1i] "said first sidewall having a continuous section between said first and second regions thereof; and"

The 1946 Cyclopedia's NSC ore car discloses this limitation, as shown below.

The blue side wall extends without interruption from its upper end to its lower end,

including in the section between the first and second regions.

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Id.

j. [1j] "said sidewall stiffener having web continuity between said first and second portions thereof."

The 1946 Cyclopedia's NSC ore car discloses this limitation, as shown below. The two portions of the side-wall stiffener are positioned on either side of the side wall and arranged in the same vertical plane, as in the '892 patent. Accordingly, the 1946 Cyclopedia's NSC ore car discloses each limitation of claim 1 of the '892 patent. FreightCar America, Inc. v. National Steel Car Limited



Id.

B. Ground 1b: Claims 2–8 and 10–14 are obvious over the 1946 Cyclopedia in view of Lindström, and optionally in view of Wong.

- 1. Independent Claim 2
 - a. [2a] "A rail road hopper car comprising: a hopper carried between a first end section and a second end section; said first and second end sections being carried by respective first and second trucks for rolling motion in a longitudinal direction along railroad tracks;"

The 1946 Cyclopedia's NSC ore car discloses this limitation. As discussed above in connection with limitation [1a], the disclosed NSC ore car has a hopper carried between two trucks. It is also a "rail road" car whose trucks roll "along railroad tracks," as is evident from its presence in a reference book on railroad cars, in the section on "hopper ore" cars; that book's description of the car as a "center discharge ore car"; and references in the drawings to the rails. *Id.* Finally, as shown below, the NSC ore car has two end sections carried by two trucks. *Id.*







b. [2b] "said hopper having first and second upstanding sidewalls running lengthwise therealong;"

As discussed above in connection with limitation [1b], the 1946 Cyclopedia's

NSC ore car discloses this limitation.

c. [2c] "said hopper having a lower discharge and convergent slope sheets that slope downward toward said discharge;"

As discussed above in connection with limitation [1c], the 1946 Cyclopedia's

NSC ore car discloses this limitation.

d. [2d] "said discharge having a door movable between a closed position and an open position to govern egress of lading from said hopper;

The 1946 Cyclopedia's NSC ore car discloses this limitation, as shown below.

The drawings call out the length of the "Door Opening" at the bottom of the hopper, call out a "Hopper Door Sheet," and show the door in closed and open positions at the bottom of the hopper. *Id.* Regarding the door being movable "to govern egress of lading from said hopper," the 1946 Cyclopedia describes the NSC ore car as a "center discharge" ore car for "mining operations." *Id* at 294-95.







EX1004 at 294.

e. [2e] "one of said convergent slope sheets being a first end slope sheet; said first end slope sheet extending laterally between said first and second upstanding sidewalls; said first end slope sheet having a first, lower, longitudinally inboard end proximate said discharge, and a second, upper, longitudinally outboard end distant from said discharge;"

The 1946 Cyclopedia's NSC ore car discloses this limitation, as indicated

below.



Id.

f. [2f] "said first end section having a first draft sill and a main bolster extending cross-wise to said first draft sill, said first draft sill and said main bolster intersecting at a first truck center, said first truck being located centrally under said first truck center;"

The 1946 Cyclopedia's NSC ore car discloses this limitation. A POSITA would understand what is meant by the claim terms "bolster" and "draft sills," as these are standard features on rail cars. EX1003, ¶52.

The '892 patent contains an express definition of "draft sill": "In the terminology of the industry, the portion of the center sill 44 (be it a stub center sill or a straight through center sill) that lies longitudinally outboard of the truck center ... may also be referred to as the draft sill." EX1001 at 14:31-34. "Center sill" is not defined in the '892 patent, but the 1946 Cyclopedia defines it as: "The central longitudinal member of the underframe of a car, which forms, as it were, the backbone of the underframe and transmits most of the buffing shocks, from one end of the car to the other." EX1004 at 22. The reference identifies the center sills in certain drawings, including the drawing below.

The '892 patent does not define "bolster." The 1946 Cyclopedia defines "bolster" as "[a] cross member on the underside of a car body and in the center of a truck, through which the weight is transmitted." EX1004 at 16. It also discloses examples of bolsters, including by calling out the centerline of a bolster (" \pounds of Bolster") in the diagram below.



Id. at 404 (color added).



Id. at 293 (color added).

As shown below, the 1946 Cyclopedia's NSC ore car discloses the first draft sill and the main bolster recited in limitation [2f], including the intersection of the two components at truck center.





Id. at 294.

g. [2g] "said draft sill having a striker longitudinally outboard of said first truck center;"

The '892 patent discloses a striker 88 at the end of draft sill 44, as shown below.



EX1001 at Fig. 3a.

The 1946 Cyclopedia defines "striker" and "striking plate" to mean: "A member placed on the ends of the center sills of freight cars against which the horn of the coupler strikes, preventing damage to the draft gear and center sills." EX1004 at 62. The reference shows many examples of strikers, including the following:



Id. at 972.



Id. at 973; *see also id.* at 1136.

As shown below, the 1946 Cyclopedia frequently identifies strikers when calling out the longitudinal length of cars "over strikers" or "over striking plates."



Id. at 254; *see also* 262, 276, 280. Because strikers protect the rail car from impact with the couplers that connect adjacent rail cars, they are typically placed at the end of the draft sill and therefore longitudinally outboard of truck center. EX1003, ¶55. Strikers are standard components on rail cars, and the distance between the strikers is a common measure of a rail car's length. *Id.* at ¶53.

Similarly, as shown below, the 1946 Cyclopedia's NSC ore car discloses a striker on the end of each draft sill, and therefore outboard of truck center.



EX1004 at 294. Even if the 1946 Cyclopedia's NSC ore car did not expressly disclose the claimed striker, it would have been obvious to use the claimed striker

with that rail car design, in view of the portions of the same reference cited above,

because strikers have long been standard features on rail cars and because a POSITA

would have wanted to protect the car's draft sills from damage. EX1003, ¶55.

h. [2h] "said first end section having a shear plate mounted overtop of said first draft sill and said main bolster; said shear plate having a longitudinally inboard margin adjacent to said longitudinally inboard end of said first end slope sheet; said shear plate having a longitudinally outboard cross-wise running margin traversing said draft sill longitudinally outboard of said truck center;"

The 1946 Cyclopedia's NSC ore car discloses the claimed shear plate. The shear plate on one end of the car is partially shown in top sectional view H-H. EX1004 at 294; EX1003, ¶56. The view presented in the left half of the drawing refers to the shear plate as the "Platform Plate."



View H-H above—which shows only one side of the "B'-End" of the car shows that the shear plate extends laterally from one side of the car to the other side. This is confirmed by end sectional view B-B below. There the shear plate is shown as a layer directly on top of the main bolster and the draft sill, riveted to the bolster, and extending from one side of the car to the other. EX1003, ¶56.



EX1004 at 294.

The longitudinal extent of the shear plate may be seen in the sectional side view presented in the left half of the drawing below. The shear plate extends inward from the end of the draft sill (at the left of the image) to the point where it meets the downwardly extending slope sheet. EX1003, ¶56.



EX1004 at 294.

Once the lateral and longitudinal margins of the shear plate are determined, it is apparent that the NSC ore car discloses limitation [2h], as shown below.



Id.

i. [2i] "said upper, longitudinally outboard end of said first end slope sheet being reinforced by a first cross-wise extending beam;"

The 1946 Cyclopedia's NSC ore car discloses this limitation. The top chord of the end wall top is a crosswise beam with a V-shaped cross-section, as shown below. The drawings show that the upper, longitudinally outboard end of the end slope sheet rests on, is riveted to, and is supported and reinforced by that top chord.



Id.

Alternatively, the 1946 Cyclopedia's NSC ore car, as modified in view of Wong, would satisfy limitation [2i]. As shown below, Wong discloses a first end slope sheet ("end slope sheet" 26). The upper, outboard end of the sheet is reinforced by a cross-wise, L-shaped beam positioned under the slope sheet.



EX1006, Fig. 4.

It would have been obvious to modify the 1946 Cyclopedia's NSC ore car to further support the upper, outboard end of the slope sheet with a cross-wise, L-shaped beam as in Wong. A POSITA would have been motivated to make the modification because Wong and the 1946 Cyclopedia are in the same field, and because a POSITA would have understood the benefits of further reinforcing the slope sheet at its upper end, where its connection with another structure creates a stress concentration.

EX1003, ¶57. A POSITA would have had a reasonable expectation of success in making this modification because it would be a straightforward addition of a simple structure, as shown below.



EX1004 at 294 (modified).

j. [2j] "said lower, longitudinally inboard end of said first end slope sheet being reinforced by a second cross-wise extending beam;"

The 1946 Cyclopedia's NSC ore car discloses this limitation. As shown below, a support plate for the slope sheet (orange) is riveted to the top of the shear plate. EX1003, ¶58. The center portion of the longitudinally outboard edge of that plate is bent upwards to contact the bottom surface of the slope sheet, forming a beam which runs crosswise underneath the slope sheet, at the inboard end of the slope sheet. *Id*.





EX1004 at 294.

k. [2k] "said first end slope sheet overhanging said shear plate;"

The 1946 Cyclopedia's NSC ore car discloses this limitation, as shown below.



Id.; EX1003, ¶59.

1. [21] "a door actuator mounted above said shear plate, said door actuator being at least partially overhung by said first end slope sheet; said door actuator being connected to said door by a mechanical transmission;"

The 1946 Cyclopedia's NSC ore car, as modified by Lindström, satisfies this claim limitation. As shown below, Lindström discloses a hopper car with a shear plate comprising plate 6 and an end slope sheet ("sloping end floor" 20). For opening hopper doors 48, Lindström discloses a door actuator comprising an operating shaft 69 with a pinion 72, a toothed member 88, a pawl 89 and a rod 90.



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EX1005 at Figs. 2, 4.

To open the hopper doors, "the operator grasps the rod 90 by one of its cranked ends and through its operation throws the pawl 89 out of engagement with the toothed member 88. A crank or wrench is then applied to the end of the shaft 69, which is then operated in the direction of the arrow, as shown in Fig. 2." *Id.* at 5:115-122. Shaft 69 is connected to the hopper doors by a mechanical transmission that includes gears and linkages, as shown in the annotated figure below. *Id.* at 4:43-5:96; EX1003, ¶60. As shown above in the figures above, Lindström's door actuator is mounted above the shear plate and is at least partially overhung by the end slope sheet.



EX1005, Fig. 4.

It would have been obvious to modify the 1946 Cyclopedia's NSC ore car to add a door-opening mechanism like Lindström's, including the door actuator. A POSITA would have been motivated to make that modification because Lindström and the 1946 Cyclopedia are in the same field, and because the NSC ore car has a configuration similar to that of Lindström's car. EX1003, ¶61. A POSITA would have known that some door opening mechanism is necessary for the hopper car to function properly. *Id.* A POSITA also would have understood that the absence of a

door-opening mechanism in the NSC car drawings indicates that the particular mechanism is not critical and that any suitable mechanism would work. *Id.* These same considerations would have given a POSITA a reasonable expectation of success in incorporating a door-opening mechanism like Lindström's in the NSC ore-car design. *Id.*

m. [2m] "said first end section being free of longitudinally oriented elephant ears extending between said draft sill and said first end slope sheet;"

The 1946 Cyclopedia's NSC ore car discloses this limitation. The '892 patent defines "elephant ears" as "large, substantially triangular planar plates, sometimes provided with central lightening holes, that have one edge fixed along the junction of the center sill webs and the center sill cover plate, and another edge welded to the end slope sheet." EX1001 at 14:58-62. The NSC ore car disclosed in the 1946 Cyclopedia does not have elephant ears, *i.e.*, large triangular plates. EX1003, ¶62. Instead, the slope sheet is supported by the two crosswise beams discussed above, a large strut positioned at a right angle to the slope sheet, and two small struts positioned near the bottom of the slope sheet. Id. The large strut and one of the two small struts may be seen in the drawing below. EX1004 at 294. Besides not being elephant ears, the small struts do not extend from the draft sill, which the '892 patent defines as the portion of the center sill outboard of truck center. Id.; see also EX1001 at 14:31-34.



EX1004 at 294.

n. [2n] "said hopper having respective first and second top chords running longitudinally therealong; said car having respective first and second side sills running longitudinally between said first and second end sections;

The 1946 Cyclopedia's NSC ore car discloses this limitation, as shown below.



EX1004 at 294-95.

o. [20] said first upstanding sidewall having a predominantly upwardly running sidewall stiffener mounted thereto, said sidewall stiffener being located at a longitudinal station intermediate the trucks;"

As discussed in connection with limitation [1e], the 1946 Cyclopedia's NSC

ore car discloses this limitation.

 p. [2p] "said first upstanding sidewall having a first region, said first region being a lower region thereof; said first upstanding sidewall having a second region, said second region being an upper region thereof;"

As discussed in connection with limitation [1f], the 1946 Cyclopedia's NSC

ore car discloses this limitation.

q. [2q] "said first and second regions of said sidewall adjoining each other at a height intermediate said first side sill and said first top chord; said second region of said sidewall extending downwardly or said first top chord; said first region of said sidewall extending downwardly and laterally inboard from said second region of said sidewall;"

The 1946 Cyclopedia's NSC ore car discloses this limitation, as shown below.



Id. at 294.

r. [2r] "said sidewall stiffener having a first portion, said first portion being a lower portion thereof, said first portion being mounted to said first region of said first upstanding sidewall;
said sidewall stiffener having a second portion, said second portion being an upper portion thereof, said second portion being mounted to said second region of said first upstanding sidewall;"

As discussed in connection with limitation [1g], the 1946 Cyclopedia's NSC

ore car discloses this limitation.

s. [2s] "said first portion of said first upstanding sidewall stiffener being laterally outboard of said first region of said first upstanding sidewall; said second portion of said

sidewall stiffener being laterally inboard of said second region of said first upstanding sidewall;"

As discussed in connection with limitation [1h], the 1946 Cyclopedia's NSC

ore car discloses this limitation.

t. [2t] "said first sidewall having a continuous section between said first and second regions thereof; and"

As discussed in connection with limitation [1i], the 1946 Cyclopedia's NSC

ore car discloses this limitation.

u. [2u] "said sidewall stiffener having web continuity between said first and second portions thereof."

As discussed in connection with limitation [1j], the 1946 Cyclopedia's NSC

ore car discloses this limitation.

2. <u>Dependent Claim 3</u>: "The rail road hopper car of claim 2 wherein said first and second portions of said sidewall stiffener are substantially co-planar, and are substantially vertically aligned when seen in a sectional view looking along the car."

The 1946 Cyclopedia's NSC ore car discloses this limitation. As the side view

below shows, the two portions of the sidewall stiffener lie in substantially the same

vertical plane, one that extends transversely, *i.e.*, perpendicularly to the rail car's

longitudinal axis.



Id. Further, as shown below, the two portions of the sidewall stiffener are substantially vertically aligned when seen in a sectional view looking along the car.



Id.
3. <u>Dependent Claim 4</u>: "The rail road hopper car of claim 2 wherein said first upstanding sidewall has a third region intermediate said first and second regions, said third region including a side sheet transition portion passing across said sidewall stiffener from an inboard margin thereof to an outboard margin thereof, and said stiffener having vertical web continuity through said transition portion."

The 1946 Cyclopedia's NSC ore car discloses this limitation, as shown below.



Id.

> 4. <u>Dependent Claim 5</u>: "The rail road hopper car of claim 4 wherein said first sidewall has an overall height from said first side sill to said first top chord, L, and said transition portion is located a distance above said first side sill that is in the range of ¹/₄ to ²/₃ L."

The 1946 Cyclopedia's NSC ore car discloses this limitation. The '892 patent's only disclosure of this limitation is in Fig. 2c, shown below, and in the text in column 15, lines 58-63. As shown below and to the left, the '892 patent compares the height of the side wall, labeled L_{SW} , and the distance from the side sill to the juncture of the upper vertical (second) region of the side walls and the sloped (third) region of the sidewall, labeled L_{94} . EX1001, Fig. 2c. The text states that distance L_{94} "may lie in the range of ¹/₄ to ²/₃ of the distance L_{SW} ." *Id.* at 15:61-62.



EX1001, Fig. 2c; EX1004 at 294.

The drawing above and to the right shows the distances L_{SW} (height of the side wall) and L_{94} (distance from the side sill to the juncture of the vertical and sloped regions of the side wall) in the NSC ore car. EX1004 at 294. The dimensions on the drawing show that $L_{94} = 2' 2 5/16''$ and that $L_{SW} = 71 1/16'' (6' 4 1/4'' - 5 3/16'')$. *Id.* Thus, the 1946 Cyclopedia's NSC ore car satisfies Claim 5 because its L_{94} is between 1/4 and 2/3 of its Lsw, specifically, 37% of its Lsw.

5. <u>Dependent Claim 6</u>:

a. [6a] "The rail road hopper car of claim 2 wherein said first upstanding sidewall has a third region intermediate said first and second regions, said third region including a side sheet transition portion passing across said sidewall stiffener from an inboard margin thereof to an outboard margin thereof;"

The 1946 Cyclopedia discloses this limitation for the same reason it discloses the limitation of Claim 4.

b. [6b] "said hopper includes first and second sloped side sheets; and said first sloped side sheet meets said first sidewall at said transition portion."

NSC has construed "sloped side sheet" to refer to the "side slope sheet" 50 in the '892 patent. EX1003 at ¶64. Accordingly, FCA adopts this construction for the purposes of this ground. So construed, limitation [6b] is satisfied by an obvious modification of the 1946 Cyclopedia's NSC ore-car design in view of Lindström.

Lindström discloses a side wall that wraps around the inward side of the lower portion of the stiffener (28) and the longitudinally extending support member (11), as shown on the left below.



EX1005, Fig. 5; EX1004 at 294. In view of Lindström, it would have been obvious to modify the side wall of the 1946 Cyclopedia's NSC ore car so that it wraps around the inward side of the lower stiffener and longitudinal support beam, as shown below. EX1003, ¶66-67. A POSITA would have been motivated to make the modification to provide additional lateral stability to the side wall. *Id.* A POSITA would understand that the lading in the hopper tends to push the side wall and stiffener laterally outward, and that wrapping the bottom of the side wall around the stiffener

and longitudinal support beam would help stabilize the side wall and stiffener against movement in the laterally outward direction. *Id.* Finally, it would have been obvious to add a sloped side sheet, as shown below in green, to ensure the side wall of the hopper has a continuous sloped surface without discontinuities that could impede the movement of the lading to the hopper doors. *Id.* at ¶68.



EX1004 at 294 (modified). So modified, the upper margin of the sloped side sheet

would meet the side wall at the transition portion, as claimed. EX1003, ¶69.

6. <u>Dependent Claim 7</u>: "The rail road hopper car of claim 6 wherein said first sidewall has an overall height from said first side sill to said first top chord, L, and said first sloped side sheet meets said transition portion at an height that is in the range of ¹/₄ to ²/₃ L above said first side sill."

The 1946 Cyclopedia discloses the limitation of this claim for the same reason

it discloses the limitation of Claim 5.

7. <u>Dependent Claim 8</u>

a. [8a] "The rail road hopper car of claim 2 wherein said hopper has a cross-wise extending outboard end top chord;
[8b] "and an end post extends from said draft sill to said end top chord, said end post being mounted above said draft sill between said truck center and said striker."

The 1946 Cyclopedia's NSC ore car discloses these limitations, as shown

below.





Id.

8. <u>Dependent Claim 10</u>: "The rail road hopper car of claim 8 wherein said shear plate has lateral margins; said lateral margins of said shear plate mate with said first and second side sills; and said sidewall stiffener is supported by a respective one of said side sills."

The 1946 Cyclopedia's NSC ore car discloses this limitation, as shown below.



Id.

9. <u>Dependent Claim 11</u>: "The rail road hopper car of claim 10 wherein said main bolster has first and second ends; and first and second corner posts extend upwardly from said first and second ends respectively to mate with said sidewalls."

The 1946 Cyclopedia's NSC ore car discloses this limitation. The '892 patent discloses "corner posts" 82 and 84. EX1001 at 14:21-23. These posts are not at the true corners of the railcar, but rather extend upward from "the junction of the laterally outboard ends of left and right hand main bolster and side sills." *Id.*

The 1946 Cyclopedia's NSC ore car discloses the recited corner posts, as shown below.







EX1004 at 294-95.

> 10. <u>Dependent Claim 12</u>: "The rail road hopper car of claim 2 wherein said main bolster has first and second ends; and first and second corner posts extend upwardly from said first and second ends respectively to mate with said sidewalls."

> The 1946 Cyclopedia discloses the limitation of this claim for the same reason

it discloses the limitation of Claim 11.

11. <u>Dependent Claim 13</u>: "The rail road hopper car of claim 12 wherein said shear plate has lateral margins; said lateral margins of said shear plate mate with said first and second side sills; and said sidewall stiffener is supported by a respective one of said side sills."

The 1946 Cyclopedia discloses the limitation of this claim for the same reason

it discloses the limitation of Claim 10.

12. Dependent Claim 14: "The rail road hopper car of claim 2 wherein said shear plate has lateral margins; said lateral margins of said shear plate mate with said first and second side sills; and said sidewall stiffener is supported by a respective one of said side sills."

The 1946 Cyclopedia discloses the limitation of this claim for the same reason

it discloses the limitation of Claim 10.

C. Ground 1c: Claim 9 is obvious over the 1946 Cyclopedia in view of Lindström and Wong.

1. <u>Dependent Claim 9</u>:

a. [9a] "The rail road hopper car of claim 8 wherein said hopper has an end wall extending downward of said end top chord;

The 1946 Cyclopedia's NSC ore car, as modified in view of Wong, discloses this limitation. As shown below, Wong discloses a rail road hopper car ("hopper railcar" 10) with a hopper ("hopper" 14) and an end wall ("end sheet" 24) extending downward from the top of the rail car.



EX1006, Fig. 4.

It would have been obvious to modify the 1946 Cyclopedia's NSC ore car to include an end wall similar to Wong's. As illustrated below, the modified car would

disclose limitation [9a]. The modification could be made either (i) by leaving the end slope sheets in place and increasing the overall height of the hopper; or (ii) by reducing the inclination of the slope sheets so that their outboard ends terminate at a lower height (*i.e.*, lower along the end wall). EX1003, ¶70. The exemplary illustration below shows such a modification using the latter method:





EX1004 at 294 (modified).

A POSITA would have had reason to modify the NSC design to incorporate an end wall, as in Wong. EX1003, ¶70. First, doing so would increase the hopper's volume without increasing the rail car's length or width (or even its height, if the end wall is added by altering the incline of the slope sheets). *Id*.

Second, by 2009, end walls were common and well-known optional features of hopper cars. *Id.* Indeed, end walls were common and well-known even by 1946, as demonstrated by the numerous examples of hopper cars with end walls shown in the 1946 Cyclopedia, such as the following:



Fig. 2.605—Norfolk & Western 55-ton hopper car, Road Class HL, A. A. R. Class HM. Road Numbers: 22,000-25,999; 38,000-39,999; 55,500-59,999; 67,000-69,999 (See also Figs. 2.604-2.607)

EX1004 at 258-59 (Norfolk & Western 55-ton hopper car).



Unitcast Corporation. (See also Pages 261, 262, 263)



Fig. 2.611-Side view of 70-ton hopper car using Unitcast design cast steel body bolsters, crossbearers and hopper frames.

Id. at 260, 263 (Unicast Corporation hopper cars).



Id. at 277 (Bessemer & Lake Erie hopper car).



Id. at 275 (Enterprise hopper car).

Third, incorporating an end wall (such as Wong's) in the NSC design would have been obvious to a POSITA because it is one of a finite number of well-

understood options for the end of a hopper car, *i.e.*, (i) incorporating an end wall or (ii) extending the slope sheet to the top cord. EX1003, ¶70. The routine design choice between these two options is governed by balancing well-understood considerations, *e.g.*, maintaining the desired maximum exterior dimensions of the railcar, maximizing the capacity of the hopper, supporting the loads carried by the slope sheet and hopper doors, and maximizing the car's efficiency in discharging its intended lading. *Id.*

Finally, as shown below, Coates describes how the height of the hopper walls on the L&Y Hopper Car was increased by nine inches in the 1904-1906 time frame to increase the hopper's capacity. EX1007 at 263. This suggests increasing the height of the hopper walls of the NSC design, thereby creating end walls. EX1003, ¶ 70.



EX1007 at 262, 265.

Because end walls had been commonplace for decades before 2009, a POSITA would have had a reasonable expectation of success in incorporating an end wall in the NSC design disclosed in the 1946 Cyclopedia.

b. [9b] "said upper, longitudinally outboard end of said first end slope sheet meets said downwardly extending end wall; and said first cross-wise extending beam is located where said downwardly extending end wall meets said first end slope sheet; and said first cross-wise extending beam is of hollow cross-section."

The 1946 Cyclopedia's NSC ore car, as further modified in view of Wong, discloses this limitation. Wong's end wall, discussed above, is bent inwards at its lower end to contact the underside of the slope sheet. EX1006, Fig. 4. As shown below, this creates a hollow support beam that runs crosswise underneath the upper end of the slope sheet.



Id.

As discussed above, it would have been obvious to modify the NSC ore car disclosed in the 1946 Cyclopedia to add an end wall, as in Wong. It also would have been obvious to use the specific end wall shown in Wong—with a bent lower end—to provide additional support for the slope sheet. EX1003, ¶71. A POSITA would have had a reasonable expectation of success because of the simplicity of the modification: bending the lower end of the end wall. *Id.* The modified design would satisfy limitation [9b], as illustrated below.



EX1004 at 294 (modified).

- D. Ground 1d: Claim 15 is obvious over the art in Ground 1b in view of Coates.
 - 1. <u>Dependent Claim 15</u>: "The rail road hopper car of claim 2 wherein said first and second portions of said sidewall stiffener are made of flat bar, are positioned in vertical-transverse planes, are substantially co-planar, and are substantially vertically aligned when seen in a sectional view looking along the car."

For the reasons discussed in connection with Claim 3, the 1946 Cyclopedia's

NSC ore car, as modified by Lindström, discloses all aspects of Claim 15 except the

requirement that the side-wall stiffener be made of flat bar.

As shown below, Coates contains photographs of the L&Y Hopper Car with a sidewall stiffener having a lower, exterior (first) portion and an upper, interior (second) portion aligned in the same vertical plane. The lower, exterior portion of the stiffener is a triangular flat bar mounted to the side wall with a pair of L-brackets and rivets. EX1003, ¶72. The upper, interior portion is a generally rectangular flat bar that is attached to the side sheet with a flange and rivets. *Id*.





Plate 205. The official photograph of wagon No. 30813 as built and painted in June 1904. The undergear had been left grey for photographic purposes. The triangular fillets supporting the angled sides show up well. NATIONAL RAILWAY MUSEUM



EX1007 at 262-64, front cover.

A POSITA would have had reason to make the stiffener of flat bar, and would have had a reasonable expectation of success, because flat bar is a common, inexpensive material that was regularly used in rail cars before 2009. EX1003, ¶72.

E. Ground 2a: Claim 1 is anticipated by Lindström, or at least obvious over Lindström in view of the 1946 Cyclopedia.

1. <u>Independent Claim 1</u>

a. [1a] "A rail road hopper car comprising: a hopper carried between a pair of trucks"

U.S. Patent No. 1,321,928 was granted to Charles A. Lindstrom on Nov. 18,

1919. EX1005 ("Lindström"). Lindström discloses this limitation, as shown below.





b. [1b] "said hopper having first and second upstanding sidewalls running lengthwise therealong;"

As shown below, Lindström's hopper car has the claimed side walls, including "combined side wall and sloping floors 21," top "members" 36, stiffening "members" 28, "side sills" 2, and corner "posts" 25. *Id.* at 2:50-53.



Id. at Figs. 2,5.

c. [1c] "said hopper having a lower discharge and convergent slope sheets giving onto said discharge;"

Lindström discloses end slope sheets and side slope sheets that converge on a central discharge opening. Specifically, it discloses "sloping end floors 20, 20, and

combined side walls and sloping floors 21, 21, some times herein referred to as sloping side floors, which are formed and connected together in such a manner as to permit of the free discharge of the lading through the single central unobstructed discharge opening 22...." *Id.* at 2:52-59. The "sloping end floors 20"—the end slope sheets—each comprise a "center end floor plate 44" and two "side end floor plates 43" that slope downwards to center plate 44. *Id.* at 3:74-96. The sloped parts of "combined side walls and sloping floors 21"—the side slope sheets—are called "sloping floor plates 24." *Id.* 2:111-19. The claimed elements are shown below.





EX1005, Figs. 2, 5.

d. [1d] "said rail road car having a side sill and a top chord; said first upstanding sidewall extending from said side sill to said top chord;"

Lindström discloses this limitation, as shown in Fig. 2 below.



EX1005, Fig. 2; EX1003, ¶73.

e. [1e] "said first upstanding sidewall having a predominantly upwardly running sidewall stiffener mounted thereto, said sidewall stiffener being located at a longitudinal station intermediate the trucks;"

Lindström discloses this limitation, as shown below. As in the '892 patent, Lindström's side-wall stiffener has two portions: an upper portion attached to the interior surface of the side wall (stiffening stakes 41), and a lower portion attached to the exterior of the sidewall (stiffening members 28). EX1005, Fig. 5; EX1003, ¶74. Lindström first describes the exterior portion: "To assist in supporting and stiffening the combined side walls and sloping floor plate 21, 21, members 28 are provided which are preferably of triangular form and secured to the longitudinally extending columns, viz., to the side sills 2, 2 and the members 11, 11 thereof, and to the sloping floor plates 24, 24." EX1005 at 2:111-19. Lindström later describes the interior portion: "To further stiffen and strengthen the combined side walls and sloping floors 21, 21 stakes 41 are provided which are preferably of U-shape in cross section having lateral flanges, which are secured to the plates 23 and 24 by rivets or other suitable means." Id. at 3:39-45. Fig. 6 shows



EX1001, Fig. 2c; EX1005, Fig. 5.

Figure 2 below shows the exterior portion 28 located intermediate the trucks.



EX1005, Fig. 2. Figure 6 shows the interior portion of the stiffener located intermediate the trucks:



Id., Fig. 6.

> f. [1f] "said first upstanding sidewall having a first region, said first region being a lower region thereof; said first upstanding sidewall having a second region, said second region being an upper region thereof;"

Lindström discloses this limitation, as shown below.



EX1001, Fig. 2c; EX1005, Fig. 5.

g. [1g] "said sidewall stiffener having a first portion, said first portion being a lower portion thereof, said first portion being mounted to said first region of said first upstanding sidewall; said sidewall stiffener having a second portion, said second portion being an upper portion thereof, said second portion being mounted to said second region of said first upstanding sidewall;"

Lindström discloses this limitation, as shown below. Both portions of the sidewall stiffener may be seen in Lindström's Fig. 5, an end view. EX1003, ¶75. The lower, exterior portion may be seen in Lindström's Fig. 2, a side view; and the upper, interior portion may be seen in Fig. 6, a cross-sectional side view. *Id*.





EX1001, Fig. 2c; EX1005, Figs. 2, 5-6.

h. [1h] "said first portion of said first upstanding sidewall stiffener being laterally outboard of said first region of said first upstanding sidewall; said second portion of said sidewall stiffener being laterally inboard of said second region of said first upstanding sidewall;"

In the preceding illustration, "inboard" is to the right and "outboard" is to the

left. Accordingly, Lindström discloses this limitation, as shown above.

i. [1i] "said first sidewall having a continuous section between said first and second regions thereof; and"

Lindström discloses this limitation, as shown below. Lindström's blue side wall extends without interruption from its upper end to its lower end, including in the section between the first and second regions.



EX1005, Fig. 5.

j. [1j] "said sidewall stiffener having web continuity between said first and second portions thereof."

A POSITA would understand that the two portions of Lindström's side-wall stiffener are arranged in the same vertical plane, as in the '892 patent, because any other arrangement would subject the side walls to bending moments that could damage them. EX1003, ¶76. That is also strongly suggested by Fig. 5 (above), which depicts the two portions one above the other. However, even if Lindström did not disclose web continuity, the 1946 Cyclopedia's NSC ore car drawings disclose twopart side-wall stiffeners with web continuity, as discussed above. See supra, at §§ IV.A.1.j, IV.B.2, and IV.B.3. A POSITA would have been motivated to align the portions of Lindström's side-wall stiffener in the same vertical plane, as in the NSC ore car, to avoid the bending moments discussed above, and because such sidewall stiffeners had become commonplace at least by 1946. EX1003, ¶76. Accordingly, Claim 1 is either anticipated by Lindström or obvious over Lindström in view of the 1946 Cyclopedia.

F. Ground 2b: Claims 2-14 are obvious over Lindström in view of the 1946 Cyclopedia and Wong.

- 1. <u>Independent Claim 2</u>
 - a. [2a] "A railroad hopper car comprising: a hopper carried between a first end section and a second end section; said first and second end sections being carried by respective first

and second trucks for rolling motion in a longitudinal direction along railroad tracks;"

Lindström discloses a railroad hopper car with the claimed hopper, end sections, and trucks, as shown below.



EX1005, Fig. 2.

b. [2b] "said hopper having first and second upstanding sidewalls running lengthwise therealong;"

As discussed above in connection with limitation [1b], Lindström discloses this limitation.

c. [2c] "said hopper having a lower discharge and convergent slope sheets that slope downward toward said discharge;"

As discussed above in connection with limitation [1c], Lindström discloses this limitation.

d. [2d] "said discharge having a door movable between a closed position and an open position to govern egress of lading from said hopper;

Lindström discloses "discharge doors 48," as shown below, as well as a mechanism for opening and closing the doors. *Id.* at 1:64-65 ("discharge door operating mechanism"), 4:43-6:5.



Id., Fig. 5.

e. [2e] "one of said convergent slope sheets being a first end slope sheet; said first end slope sheet extending laterally between said first and second upstanding sidewalls; said first end slope sheet having a first, lower, longitudinally inboard end proximate said discharge, and a second, upper, longitudinally outboard end distant from said discharge;"

Lindström discloses this limitation, as shown below.



Lindström Fig. 2

Id., Figs. 2,5. Figure 5 shows an end slope sheet extending laterally between the side walls, and Figure 6 shows the sheets' inboard and outboard ends.
> f. [2f] "said first end section having a first draft sill and a main bolster extending cross-wise to said first draft sill, said first draft sill and said main bolster intersecting at a first truck center, said first truck being located centrally under said first truck center;

Lindström discloses this limitation. Draft sills and main bolsters are discussed above in connection with Ground 1b. *See supra*, at §§ IV.B.1.f, IV.B.1.m, IV.B.7. Lindström expressly discloses "draft sills 2" and "bolsters 3." EX1005 at 1:81-83. Lindström's figures show these structures in the claimed arrangement. Specifically, Figure 2 shows that truck center is located just outboard of post 25, and Figure 1 shows that first draft sill and the first main bolster intersect at truck center. *Id.*, Figs. 1-2; EX1003, ¶77.



Lindström Fig. 2



Id., Figs. 1-2.

g. [2g] "said draft sill having a striker longitudinally outboard of said first truck center;"

Lindström discloses that its "draft sills 1, 1 extend beyond the member 7 and at their ends are provided with the ordinary striking plate 8...," *id.* at 1:101-04, and Figure 1 shows that the striker is longitudinally outboard of truck center. *Id.*, Fig. 1.



h. [2h] "said first end section having a shear plate mounted overtop of said first draft sill and said main bolster; said shear plate having a longitudinally inboard margin adjacent to said longitudinally inboard end of said first end slope sheet; said shear plate having a longitudinally outboard cross-wise running margin traversing said draft sill longitudinally outboard of said truck center;"

Lindström discloses this limitation. Lindström discloses three plates that together comprise the shear plate at one end of the hopper car: plate 6, plate 16 and plate 17. EX1003, ¶78. At the inboard ends of plates 16 and 17 are downwardly angled flanges 19 that are riveted to the underside of the slope sheet, specifically, to the sloping end plates of the slope sheet. *Id.*; EX1005 at 2:36-39, 4:29-33.



Id., Fig. 3. Each of the two shear plates in Lindström satisfies limitation [2h], as shown below. The inboard margin of the shear plate is adjacent to the inboard end of slope sheet because the two structures are riveted together (via flanges 19) at the inboard end of the slope sheet. EX1003, ¶78.

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Id., Fig. 3.

i. [2i] "said upper, longitudinally outboard end of said first end slope sheet being reinforced by a first cross-wise extending beam;"

As discussed above in connection with Ground 1b, and as shown below, Wong discloses a cross-wise extending beam for reinforcing the upper end of the slope sheet. *See supra*, at § IV.B.1.i. For the reasons set forth in Ground 1b, it would have been obvious to modify Lindström's design to support the upper, outboard end of the slope sheet with a crosswise, L-shaped beam as in Wong. *Id*.



EX1006, Fig. 4.

A POSITA would have had a reasonable expectation of success in making this modification because it is a straightforward modification of Lindström's existing end wall 30. EX1003, ¶79; EX1005 at 2:123-27 (plate 30 "forms an end wall of the car body"). Specifically, Lindström's end wall would be slightly lengthened and bent inward at its lower end, as shown below. EX1003, ¶79.



j. [2j] said lower, longitudinally inboard end of said first end slope sheet being reinforced by a second cross-wise extending beam;

As shown below, Wong discloses a hollow reinforcement beam at the inboard end of the slope sheet that the patent refers to as "channel stiffener member 68." EX1006 at 4:50-56. For the reasons set forth in Ground 1b, it would have been obvious to modify Lindström's design to support the lower, inboard end of the slope sheet with a U-shaped hollow beam, as in Wong. *See supra*, at § IV.B.1.i.



EX1006, Fig. 4.

A POSITA would have had a reasonable expectation of success in making this modification because it is a straightforward addition of a U-shaped beam to the underside of Lindström's slope sheet, as shown below. EX1003, ¶80.



EX1005, Fig. 2 (modified).

k. [2k] said first end slope sheet overhanging said shear plate;"

Lindström discloses this limitation, as shown in the preceding illustration. Id.

1. [21] "a door actuator mounted above said shear plate, said door actuator being at least partially overhung by said first

end slope sheet; said door actuator being connected to said door by a mechanical transmission;"

As discussed above in connection with Ground 1b, Lindström discloses this

limitation. See supra, at § IV.B.1.l.

m. [2m] "said first end section being free of longitudinally oriented elephant ears extending between said draft sill and said first end slope sheet;"

As discussed above in connection with Ground 1b, the '892 patent defines elephant ears as "large, substantially triangular planar plates." *See supra* § IV.B.1.m. As shown below, each of Lindström's slope sheets is supported not by elephant ears, but by larger strut 53 and a smaller strut 54. EX1003, ¶81; EX1005 at 4:34-42.



EX1005, Fig. 6. In addition, the smaller strut does not extend between the draft sill

and the slope sheet. Id. Thus, Lindström discloses limitation [2m].

n. [2n] "said hopper having respective first and second top chords running longitudinally therealong; said car having respective first and second side sills running longitudinally between said first and second end sections;

Lindström discloses this limitation, as shown below.



Lindström Fig. 5



Lindström Fig. 2

Id. at Figs. 2, 5, 1:88-90 (side sills), 3:21-39 (top chords).

o. [20] said first upstanding sidewall having a predominantly upwardly running sidewall stiffener mounted thereto, said sidewall stiffener being located at a longitudinal station intermediate the trucks;"

As discussed in connection with limitation [1e], Lindström discloses this limitation.

p. [2p] "said first upstanding sidewall having a first region, said first region being a lower region thereof; said first upstanding sidewall having a second region, said second region being an upper region thereof;"

As discussed in connection with limitation [1f], Lindström discloses this limitation.

> q. [2q] "said first and second regions of said sidewall adjoining each other at a height intermediate said first side sill and said first top chord; said second region of said sidewall extending downwardly or [sic] said first top chord; said first region of said sidewall extending downwardly and laterally inboard from said second region of said sidewall;"

Lindström discloses this limitation, as shown below.





r. [2r] "said sidewall stiffener having a first portion, said first portion being a lower portion thereof, said first portion being mounted to said first region of said first upstanding sidewall;
said sidewall stiffener having a second portion, said second portion being an upper portion thereof, said second portion being mounted to said second region of said first upstanding sidewall;"

As discussed in connection with limitation [1g], Lindström discloses this

limitation.

s. [2s] "said first portion of said first upstanding sidewall stiffener being laterally outboard of said first region of said first upstanding sidewall; said second portion of said sidewall stiffener being laterally inboard of said second region of said first upstanding sidewall;"

As discussed in connection with limitation [1h], Lindström discloses this

limitation.

t. [2t] "said first sidewall having a continuous section between said first and second regions thereof; and"

As discussed in connection with limitation [1i], Lindström discloses this limitation.

u. [2u] "said sidewall stiffener having web continuity between said first and second portions thereof."

As discussed in connection with limitation [1j], Lindström discloses this limitation.

2. <u>Dependent Claim 3</u>: "The rail road hopper car of claim 2 wherein said first and second portions of said sidewall stiffener are

substantially co-planar, and are substantially vertically aligned when seen in a sectional view looking along the car."

The two portions of Lindström's stiffener are substantially vertically aligned

when seen in a sectional view looking along the car, as shown below.



EX1001, Fig. 2c; EX1005, Fig. 5. A POSITA would understand that the two portions of Lindström's side-wall stiffener are arranged in the same vertical plane, as in the '892 patent, because any other arrangement would subject the side walls to bending moments that could damage them. EX1003, ¶82. However, even if Lindström did not disclose this, the 1946 Cyclopedia's NSC ore car drawings disclose two-part side-wall stiffeners arranged in the same vertical plane, as discussed above. *See supra*, at §§ IV.A.1.j, IV.B.2. A POSITA would have been motivated to align the portions

of Lindström's stiffener in the same vertical plane, as in the NSC ore car, to avoid the bending moments discussed above, and because such side-wall stiffeners had become commonplace at least by 1946. EX1003, ¶82.

3. <u>Dependent Claim 4</u>: "The rail road hopper car of claim 2 wherein said first upstanding sidewall has a third region intermediate said first and second regions, said third region including a side sheet transition portion passing across said sidewall stiffener from an inboard margin thereof to an outboard margin thereof, and said stiffener having vertical web continuity through said transition portion."

Lindström discloses this limitation, as shown below.



EX1001, Fig. 2c; EX1005, Fig. 5.

> 4. <u>Dependent Claim 5</u>: "The rail road hopper car of claim 4 wherein said first sidewall has an overall height from said first side sill to said first top chord, L, and said transition portion is located a distance above said first side sill that is in the range of ¹/₄ to ²/₃ L."

As discussed above in connection with Ground 1b, the '892 patent compares the height of the side wall, labeled L_{sw} , and the distance from the side sill to the juncture of the upper vertical (second) region of the side walls and the sloped (third) region of the sidewall, labeled L_{94} . As shown below, Lindström discloses that its distance L_{94} is between 1/4 and 2/3 of L_{sw} , as required by Claim 5. EX1003, ¶83.



Even if Lindström did not expressly disclose this limitation, it would have been obvious to select dimensions consistent with the Lindström's drawings and with the NSC ore car, as the precise dimensions are a matter of design choice. *Id.*

5. <u>Dependent Claim 6</u>:

a. [6a] "The rail road hopper car of claim 2 wherein: said first upstanding sidewall has a third region intermediate said first and second regions, said third region including a side sheet transition portion passing across said sidewall stiffener from an inboard margin thereof to an outboard margin thereof;"

Lindström satisfies this limitation for the same reason it satisfies Claim 4.

b. [6b] "said hopper includes first and second sloped side sheets; and said first sloped side sheet meets said first sidewall at said transition portion."

The written description of the '892 patent uses the term "sloped side sheet" only once, where it states: "Lower portion 124 tapers in width to match the narrowing width between the *sloped side sheets* with which it mates." EX1001 at 16:34-36 (emphasis added). The lower portion 124 is a sloped portion of end wall 30. *Id.* at 16:29-30 ("End walls 30, 32 each include upper and lower sloped surface members 122 and 124"). End wall 30 with its lower portion 124 is shown in Fig. 3a below.



Id., Fig. 3a. As the figure shows, lower portion 124 is spaced above the (yellow) shear plate 76. Thus, the "sloped side sheets" that mate with the sides of lower portion 124 are the sloped portions 98 of the side walls, as these are sloped portions of the side walls that are spaced above the shear plate:



Id., Fig. 2c. Accordingly, the "sloped side sheets" recited in limitation [6b] are the sloped portions 98 of side walls 34, 36. EX1003, ¶85.

Limitation [6b] recites that the first sloped side sheet, which is part of the first side wall, "meets" the first side wall. Claim 6's requirement that the sloped side sheet "meets" the side wall must therefore be satisfied by a sloped side sheet that forms part of the side wall. *Id*.

Lindström discloses the same structure. As shown below, Lindström has a sloped side sheet that forms part of the car's side wall. And as in the '892 patent, the sloped side sheet is located in the same part of the side wall as the transition portion. Lindström therefore discloses limitation [6b] under any reasonable interpretation of the claim language.



EX1001, Fig. 2c; EX1005, Fig. 5.

> 6. <u>Dependent Claim 7</u>: "The rail road hopper car of claim 6 wherein said first sidewall has an overall height from said first side sill to said first top chord, L, and said first sloped side sheet meets said transition portion at an height that is in the range of ¹/₄ to ²/₃ L above said first side sill."

Lindström discloses the limitation of this claim for the same reason it discloses the limitation of Claim 5.

7. <u>Dependent Claim 8</u>

a. [8a] "The rail road hopper car of claim 2 wherein said hopper has a cross-wise extending outboard end top chord;

As discussed above, the '892 patent implicitly defines "end top chord" as a flange at the top of the end wall. *See supra*, at § IV.A.1.d. Lindström discloses an end top chord that it refers to as "stiffening flange 31." EX1005 at 2:123-28. Specifically, Lindström discloses corner posts 29 and states that the "upper end portions of these corner posts are connected together transversely of the car by a plate 30, which forms an end wall of the car body, and is provided with a stiffening flange 31." *Id.* at 2:120-28. As shown below, stiffening flanges 31 are top chords that extend crosswise at each end of the car.



Lindström Fig. 1



Id., Figs. 1, 6.

b. [8b] "and an end post extends from said draft sill to said end top chord, said end post being mounted above said draft sill between said truck center and said striker."

As discussed in connection with Ground 1b, and as shown below, the 1946

Cyclopedia's NSC ore car drawings disclose an end post extending from the draft sill

(between truck center and the striker) to the end top chord. See supra, at § IV.B.7.



EX1004 at 294.

A POSITA would have been motivated to modify Lindström's design to incorporate an end post extending from the draft sill to the top chord, similar to the end post in the NSC car, to further strengthen the top chord and end wall, which are subject to significant stresses because the slope sheet is connected to the end wall. EX1003, ¶86. A POSITA would have a reasonable expectation of success in making the modification because it would be a straightforward addition of a simple structure that is very similar to Lindström's corner posts, but with the end post extending from the draft sill rather than a side sill. *Id.* Finally, in the modified car, the end post would extend from a part of the draft sill between truck center and the striker, because (i) the entire draft sill lies between truck center and the striker, and (ii) a vertical end post would extend down from the top chord to a point between truck center and the striker, as shown below. *Id.*

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EX1005, Fig. 6.

8. <u>Dependent Claim 9</u>:

a. [9a] "The rail road hopper car of claim 8 wherein: said hopper has an end wall extending downward of said end top chord;

Lindström discloses this limitation, as shown below.



Id., Figs. 1, 6.

b. [9b] "said upper, longitudinally outboard end of said first end slope sheet meets said downwardly extending end wall; and said first cross-wise extending beam is located where said downwardly extending end wall meets said first end slope sheet; and said first cross-wise extending beam is of hollow crosssection."

As discussed above in connection with limitation [2i], it would have been obvious to modify Lindström's car design to support the upper, outboard end of each slope sheet with a crosswise, L shaped beam as in Wong. *See supra*, at §§ IV.B.1.i, IV.F.1.i. The resulting modified car design would satisfy limitation [9b], as shown below. EX1003, ¶88.



EX1005, Fig. 2 (modified).

9. <u>Dependent Claim 10</u>: "The rail road hopper car of claim 8 wherein said shear plate has lateral margins; said lateral margins of said shear plate mate with said first and second side sills; and said sidewall stiffener is supported by a respective one of said side sills."

Lindström discloses this limitation. The lateral margins of Lindström's shear

plate mate with the side sills, as shown below.



EX1005, Fig. 3. In addition, Linndström's stiffener is supported by the side sill.



Id., Fig. 5.

10. <u>Dependent Claim 11</u>: "The rail road hopper car of claim 10 wherein said main bolster has first and second ends; and first and second corner posts extend upwardly from said first and second ends respectively to mate with said sidewalls."

The '892 patent discloses "corner posts" 82 and 84 that do not extend upward

from the true corners of the railcar, but rather from "the junction of the laterally

outboard ends of left and right hand main bolster and side sills." EX1001 at 14:21-

23. Lindström discloses corner posts 25 whose corrugated portions mate with the

side walls:

Each of the posts 25 is preferably provided with a channel shaped corrugation 32 and with flanges 33, 33 which flanges may be secured to the side sill 2. When these posts 25 are secured to the side sill 2, the corrugations 32 extend outwardly beyond the vertical plane of the side sill and at their upper portion are connected with the side wall sheets 23 by rivets or other suitable means.

EX1005 at 2:129-3:8. Posts 25 are positioned just laterally inboard of the bolster

ends, as shown below.





Id., Figs. 2-3. A POSITA would consider Lindström's posts 25 to extend upwardly from the ends of the bolster, as required by Claim 11. However, even if Lindström did not expressly disclose this, it would have been obvious to move Lindström's posts 25 slightly longitudinally outboard, so that they could be more directly supported by the bolster, as shown in the 1946 Cyclopedia's drawings and photograph of the NSC ore car. EX1003, ¶89; *see also supra*, at §IV.B.9 (NSC car).

11. <u>Dependent Claim 12</u>: "The rail road hopper car of claim 2 wherein said main bolster has first and second ends; and first and second corner posts extend upwardly from said first and second ends respectively to mate with said sidewalls."

Lindström discloses the limitation of this claim for the same reason it discloses

the limitation of Claim 11.

12. <u>Dependent Claim 13</u>: "The rail road hopper car of claim 12 wherein said shear plate has lateral margins; said lateral margins of said shear plate mate with said first and second side sills; and said sidewall stiffener is supported by a respective one of said side sills."

Lindström discloses the limitation of this claim for the same reason it discloses

the limitation of Claim 10.

13. Dependent Claim 14: "The rail road hopper car of claim 2 wherein said shear plate has lateral margins; said lateral margins of said shear plate mate with said first and second side sills; and said sidewall stiffener is supported by a respective one of said side sills."

Lindström discloses the limitation of this claim for the same reason it discloses

the limitation of Claim 10.

- G. Ground 2c: Claim 15 is obvious over the art in Ground 2b in view of Coates.
 - 1. <u>Dependent Claim 15</u>: "The rail road hopper car of claim 2 wherein said first and second portions of said sidewall stiffener are made of flat bar, are positioned in vertical-transverse planes, are

substantially co-planar, and are substantially vertically aligned when seen in a sectional view looking along the car."

For the reasons discussed in connection with Claim 3, Lindström (or at least Lindström as modified by the 1946 Cyclopedia) discloses all aspects of Claim 15 except the requirement that the side-wall stiffener be made of flat bar.

For the reasons discussed in connection with Ground 1d, it would have been obvious to make Lindström's sidewall stiffeners from flat bar, such as the flat bar shown in Coates's photographs of the L&Y hopper car.

V. CONCLUSION

Petitioner respectfully requests that the Board institute an IPR and cancel claims 1–15 of the '892 patent.

VI. <u>MANDATORY NOTICES, GROUNDS FOR STANDING,</u> <u>AND FEE PAYMENT</u>

Pursuant to 37 C.F.R. 42.8(a)(1), the mandatory notices identified in 37 C.F.R. 42.8(b) are provided below as part of this Petition.

A. <u>Real Party-In-Interest (37 C.F.R. §42.8(b)(1))</u>

FreightCar America, Inc., FreightCar North America, LLC, JAC Operations

Inc., and FCA-FASEMEX, LLC, are real parties-in-interest.

B. <u>Related Matters (37 C.F.R. §42.8(b)(2))</u>

The parties are currently engaged in district-court litigation in a case captioned *National Steel Car Limited v. FreightCar America, Inc., et al.*, C.A. No. 1:24-cv-

00594-JLH (D. Del.) ("district court case"). National Steel Car Limited ("NSC" or

"Patent Owner") has asserted the '892 patent against Petitioner in the district-court

litigation.

C. Lead and Backup Counsel (37 C.F.R. §42.8(b)(3))

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Pursuant to 37 C.F.R. § 42.10(b), a power of attorney accompanies this petition. The above-identified lead and backup counsel are registered practitioners associated with Customer No. 20,995 listed in that power of attorney.

D. <u>Service Information (37 C.F.R. §42.8(b)(4))</u>

Service information above. Petitioner consents to electronic service by email

to FCAIPR-892@knobbe.com.

E. Grounds for Standing (37 C.F.R. §42.104)

Petitioner hereby certifies that the '892 patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR.

F. <u>Payment of Fees (37 C.F.R. §42.15(a))</u>

The fee set forth in 37 C.F.R. § 42.15(a) has been paid. The undersigned further authorizes payment for any additional fees that may be due in connection with this petition to be charged to Deposit Account 11-1410.

Dated: May 27, 2025 By:

By: / Philip M. Nelson / Philip M. Nelson (Reg. No. 62,676) KNOBBE MARTENS OLSON & BEAR, LLP

Attorney for Petitioner FreightCar America, Inc.

<u>CERTIFICATE OF COMPLIANCE</u>

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that this PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,166,892 contains 13, 978 words according to the word-processing program used to prepare this paper. The foregoing word count complies with the 14,000-word type-volume limit specified by 37 C.F.R. § 42.24(a)(1).

Dated: May 27, 2025

By: / Philip M. Nelson / Philip M. Nelson (Reg. No. 62,676) KNOBBE MARTENS OLSON & BEAR, LLP

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on the date below a copy of this

PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 8,166,892

PETITIONER'S POWER OF ATTORNEY, AND EXHIBITS 1001-1007 and

1022-1023, are being served by FedEx on the Patent Owner at the correspondence

address of record for the subject patent as follows:

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A courtesy copy has been sent by email on this day to Patent Owner's counsel

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Dated: May27, 2025

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