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<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	JAC-FCA-1802
		Application Number	
Title of Invention	METHOD AND CAST COMPONENTS FOR COLD FORMED CENTER SILL RAIL CAR MODIFICATION PROGRAMS AND RAILCARS FORMED THEREBY		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

**Secrecy Order 37 CFR 5.2:**

Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

**Inventor Information:**

Inventor	1				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Cloyd		Wirick			
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service						
City	MINERAL POINT	State/Province	PA	Country of Residence	US	
Mailing Address of Inventor:						
Address 1	976 Swigle Mountain Road					
Address 2						
City	MINERAL POINT	State/Province	PA			
Postal Code	15942	Country	US			
Inventor	2				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Greg	P.	Josephson			
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service						
City	Salix	State/Province	PA	Country of Residence	US	
Mailing Address of Inventor:						
Address 1	431 Beautyline Drive					
Address 2						
City	Salix	State/Province	PA			
Postal Code	15952	Country	US			
Inventor	3				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Dave		Single			
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service						

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City	Portage	State/Province	PA	Country of Residence	US
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**Mailing Address of Inventor:**

Address 1	127 Hemlock Drive				
Address 2					
City	Portage	State/Province	PA		
Postal Code	15946	Country i	US		

Inventor	4	<input type="button" value="Remove"/>
----------	---	---------------------------------------

**Legal Name**

Prefix	Given Name	Middle Name	Family Name	Suffix
	Kerry		Sauter	

**Residence Information (Select One)**  US Residency  Non US Residency  Active US Military Service

City	SIDMAN	State/Province	PA	Country of Residence	US
------	--------	----------------	----	----------------------	----

**Mailing Address of Inventor:**

Address 1	Plummer Rd				
Address 2					
City	SIDMAN	State/Province	PA		
Postal Code	15955-3615	Country i	US		

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button.

**Correspondence Information:**

Enter either Customer Number or complete the Correspondence Information section below.  
For further information see 37 CFR 1.33(a).

An Address is being provided for the correspondence information of this application.

Customer Number	36787		
Email Address	blynn@BLKLawGroup.com	<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>
Email Address	cbelleci@BLKLawGroup.com	<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>

**Application Information:**

Title of the Invention	METHOD AND CAST COMPONENTS FOR COLD FORMED CENTER SILL RAIL CAR MODIFICATION PROGRAMS AND RAILCARS FORMED THEREBY		
Attorney Docket Number	JAC-FCA-1802	Small Entity Status Claimed	<input type="checkbox"/>
Application Type	Provisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	28	Suggested Figure for Publication (if any)	

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**Filing By Reference:**

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

**Publication Information:**

Request Early Publication (Fee required at time of Request 37 CFR 1.219)

**Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not be** the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

**Representative Information:**

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer number will be used for the Representative Information during processing.

Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	36787		

**Domestic Benefit/National Stage Information:**

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	<input type="text"/>	<input type="button" value="Remove"/>
Application Number	Continuity Type	Prior Application Number
<input type="text"/>	<input type="text"/>	<input type="text"/>
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the <b>Add</b> button.		<input type="button" value="Add"/>

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### Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)<sup>i</sup> the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country <sup>i</sup>	Filing Date (YYYY-MM-DD)	Access Code <sup>i</sup> (if applicable)	Remove

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

### Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

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## Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

**NOTE:** This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

### 1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

**A. Priority Document Exchange (PDX)** - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

**B. Search Results from U.S. Application to EPO** - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

### 2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

**NOTE:** Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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## Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

<b>Applicant</b>	1	<input type="button" value="Remove"/>
<p>If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.</p>		
<input type="button" value="Clear"/>		
Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
<input type="radio"/> Person to whom the inventor is obligated to assign.		<input type="radio"/> Person who shows sufficient proprietary interest
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:		
<div style="border: 1px solid black; height: 20px; width: 100%;"></div>		
Name of the Deceased or Legally Incapacitated Inventor: <div style="border: 1px solid black; width: 400px; height: 20px; display: inline-block;"></div>		
If the Applicant is an Organization check here. <input checked="" type="checkbox"/>		
Organization Name	JAC Operations, Inc.	
<b>Mailing Address Information For Applicant:</b>		
Address 1	Two North Riverside Plaza	
Address 2	Suite 1300	
City	Chicago	State/Province IL
Country	US	Postal Code 60606
Phone Number		Fax Number
Email Address		
Additional Applicant Data may be generated within this form by selecting the Add button. <input type="button" value="Add"/>		

## Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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<b>Assignee</b>	1
-----------------	---

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here.

Prefix	Given Name	Middle Name	Family Name	Suffix

**Mailing Address Information For Assignee including Non-Applicant Assignee:**

Address 1				
Address 2				
City		State/Province		
Country i		Postal Code		
Phone Number		Fax Number		
Email Address				

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

**Signature:**

**NOTE:** This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

<b>Signature</b>	/Blynn L. Shideler/		Date (YYYY-MM-DD)	2018-03-30	
First Name	Blynn L.	Last Name	Shideler	Registration Number	35034

Additional Signature may be generated within this form by selecting the Add button.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	JAC-FCA-1802
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This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



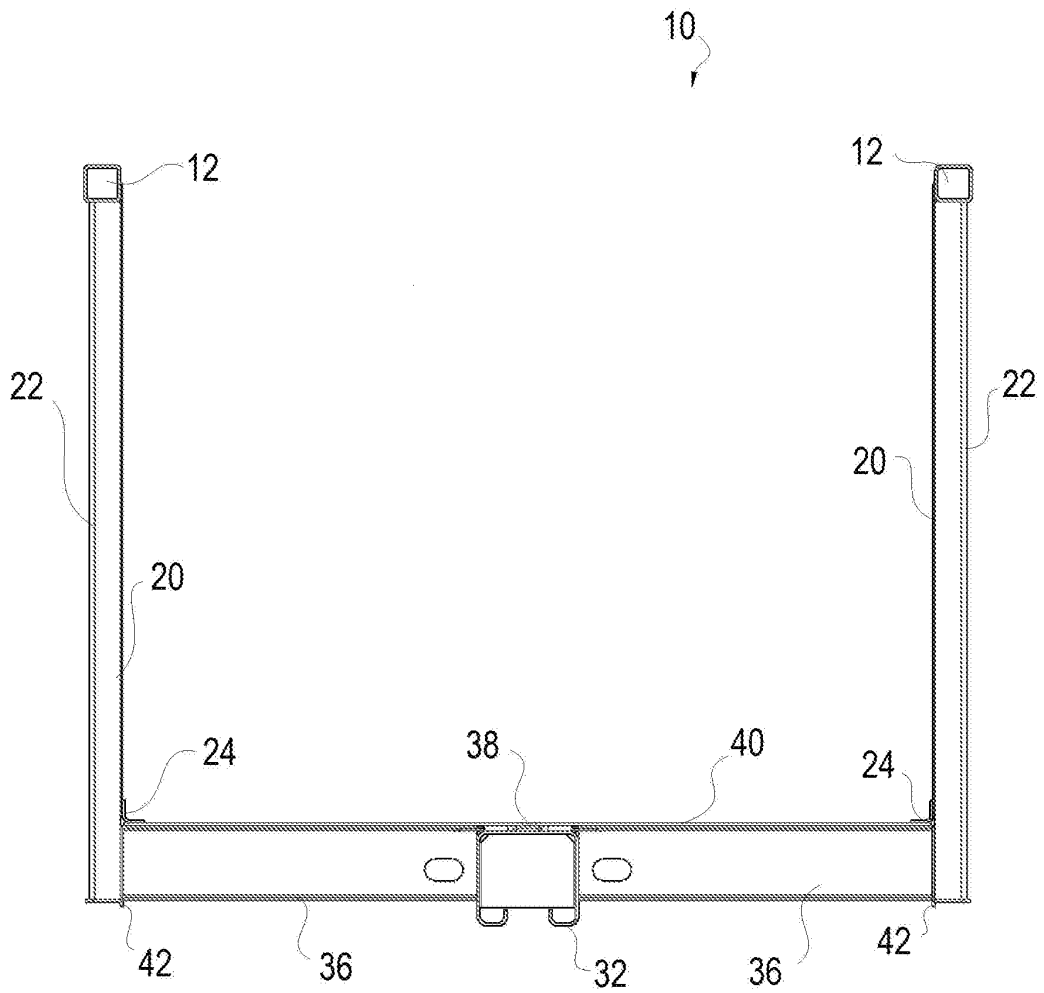


FIG. 3

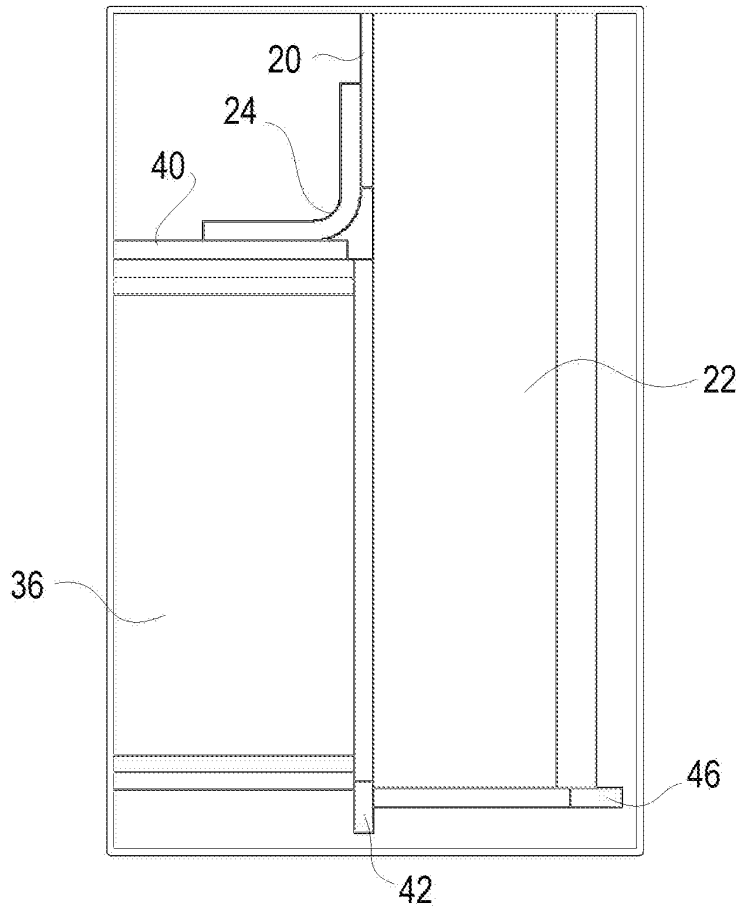


FIG. 4

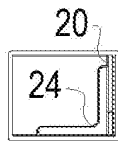
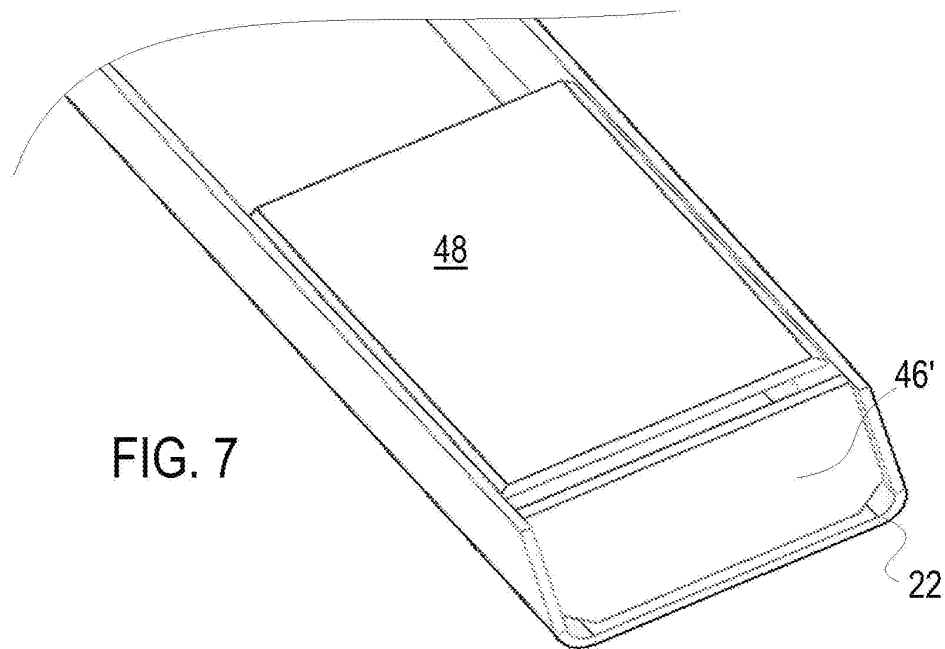
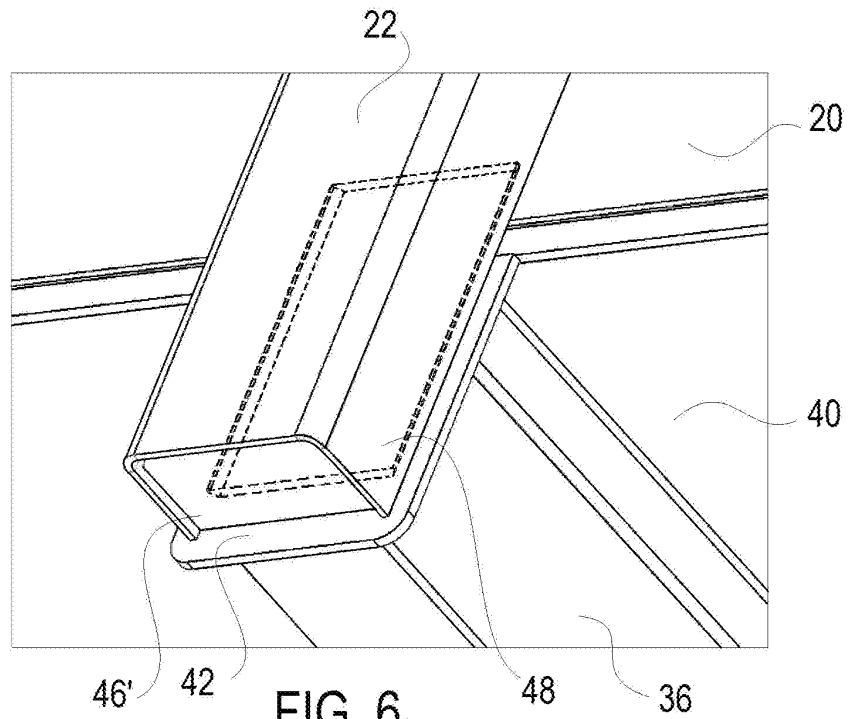


FIG. 5



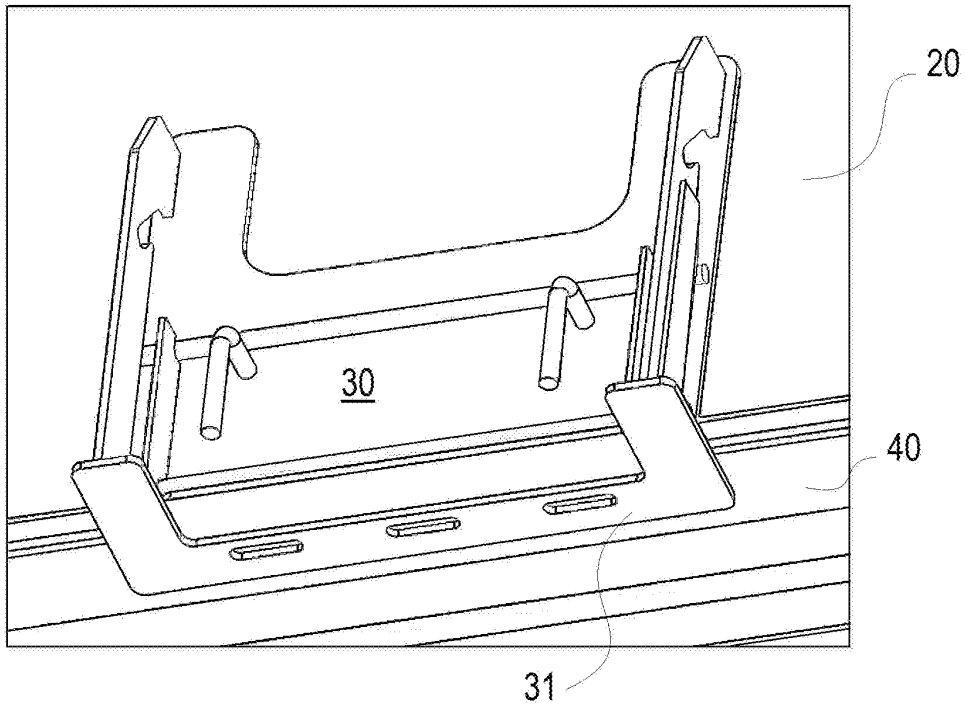


FIG. 8

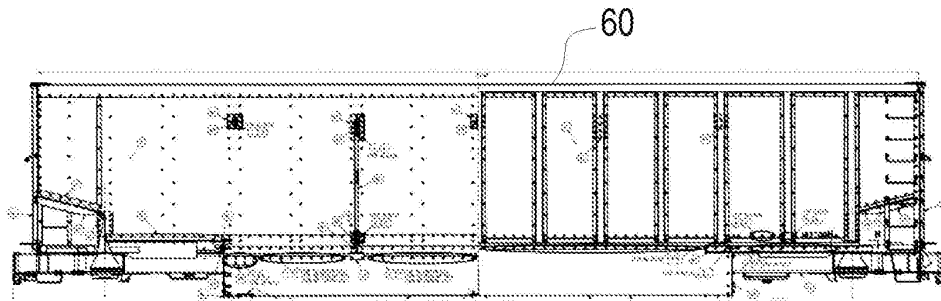


FIG. 9

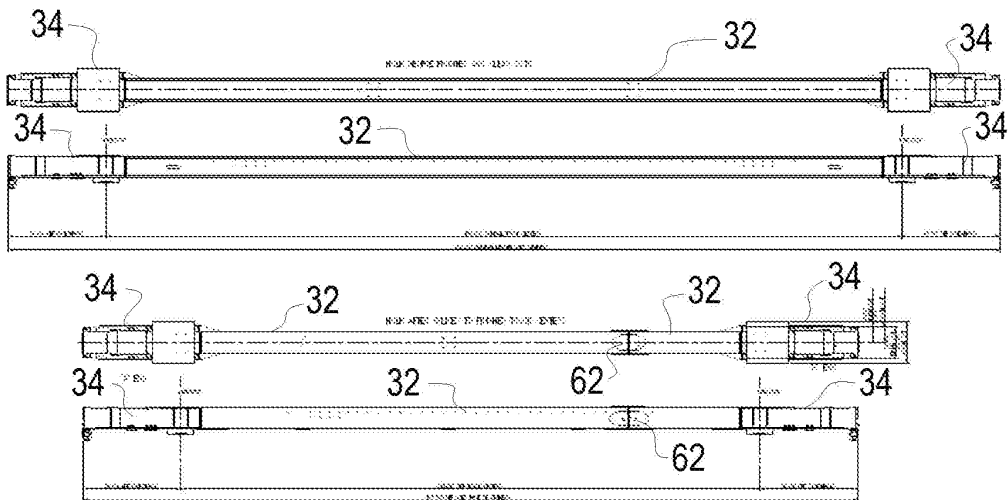


FIG. 10

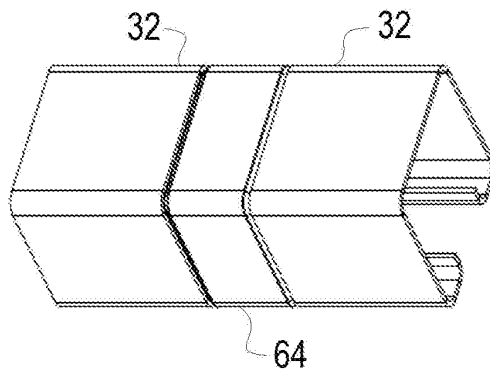


FIG. 11

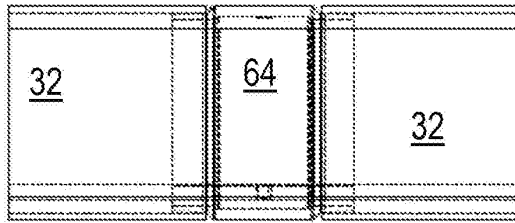


FIG. 12

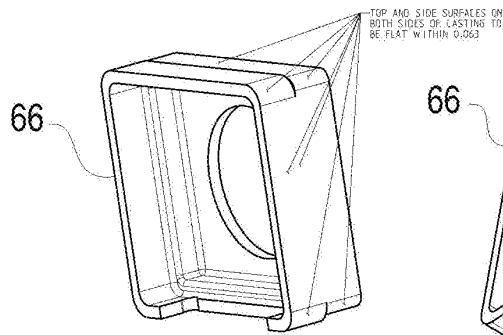


FIG. 13A

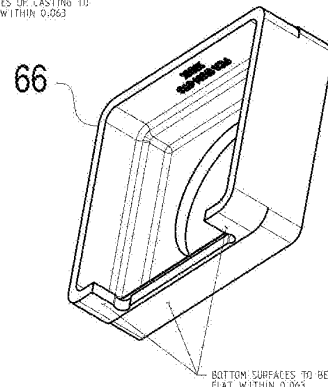


FIG. 13B

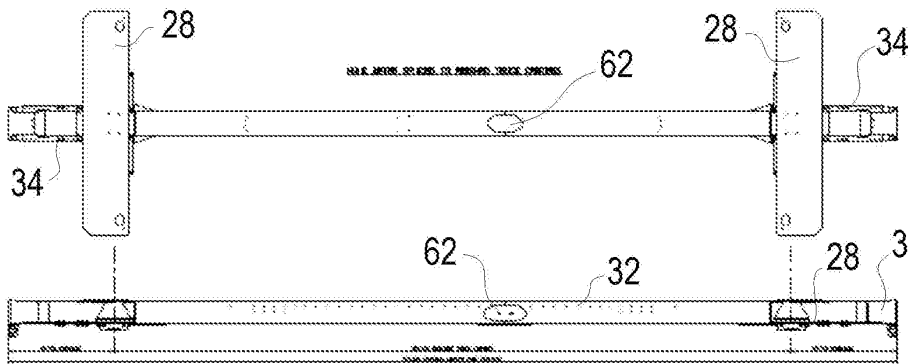


FIG. 16

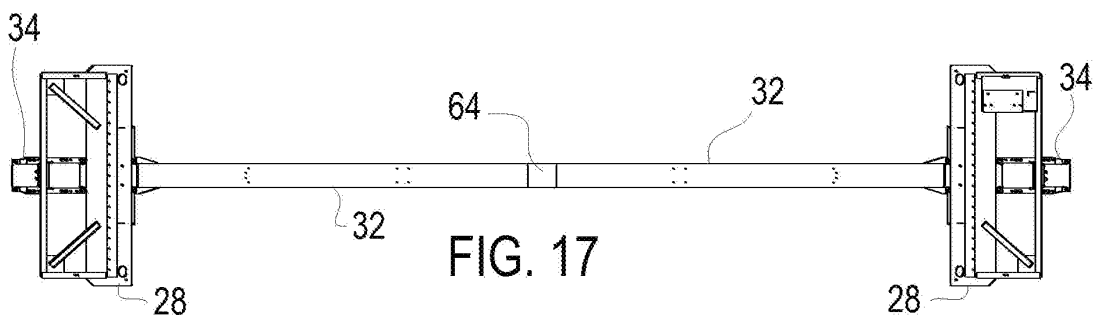
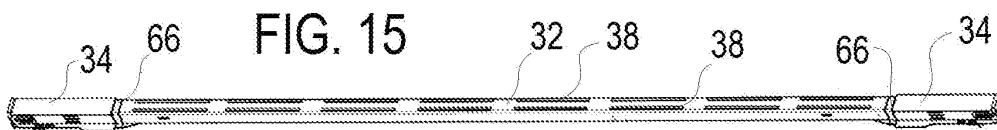
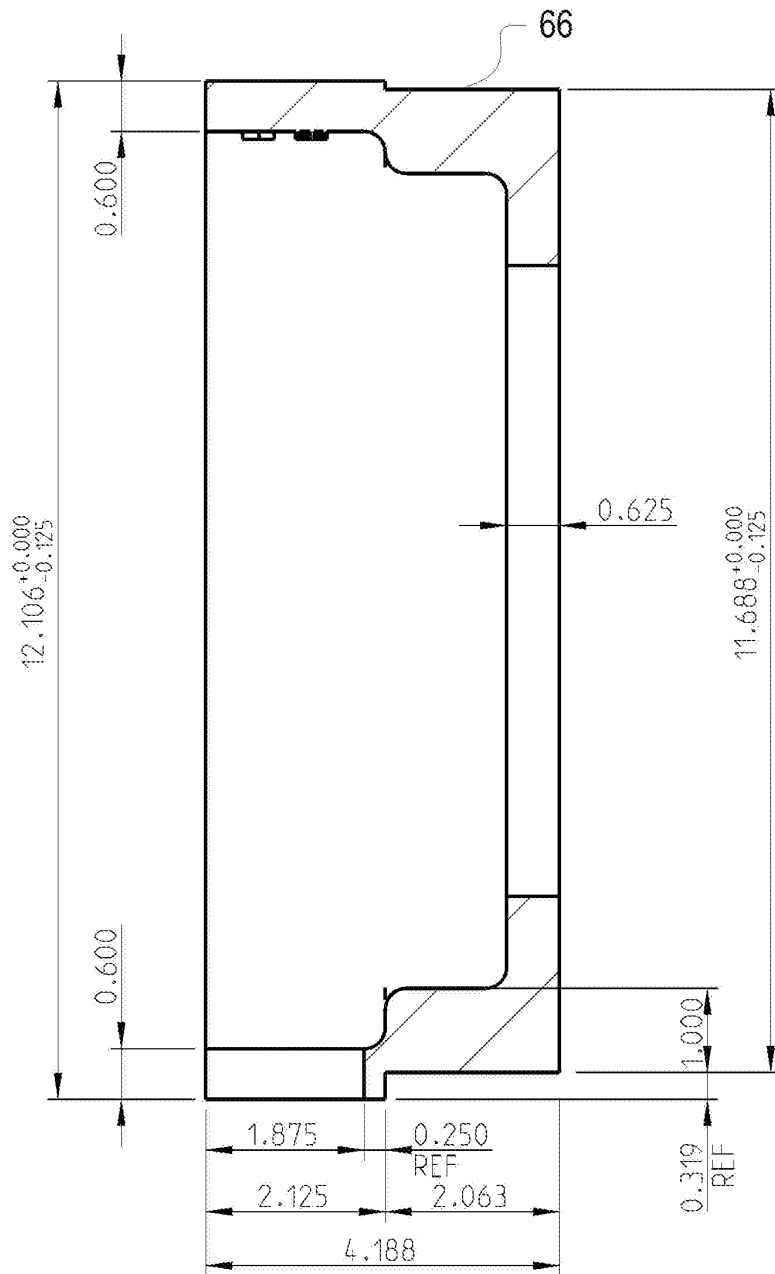


FIG. 17



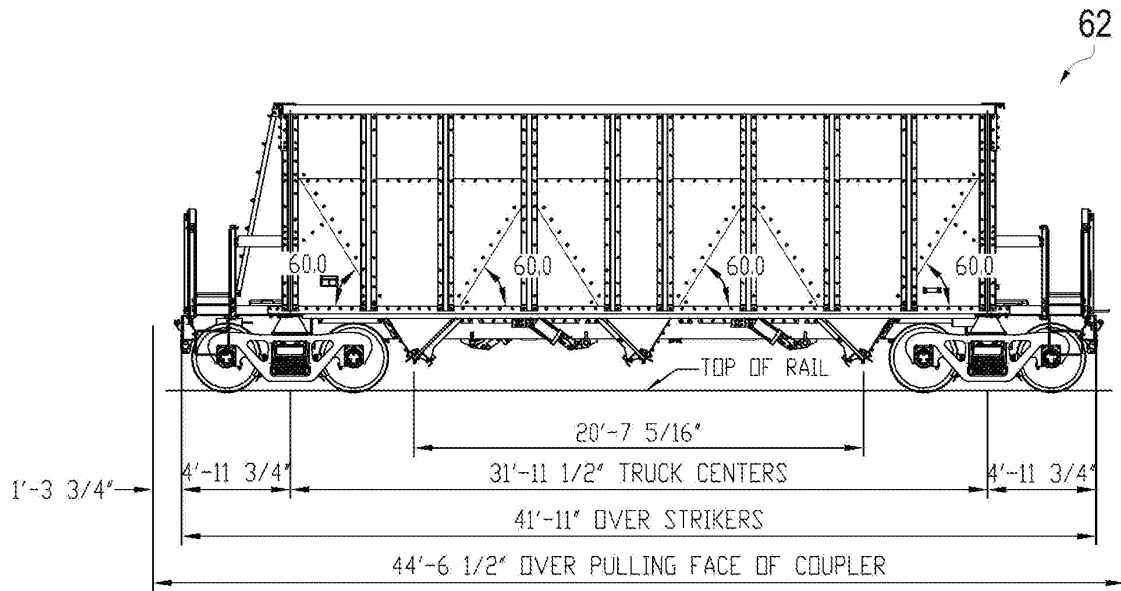


FIG. 18A

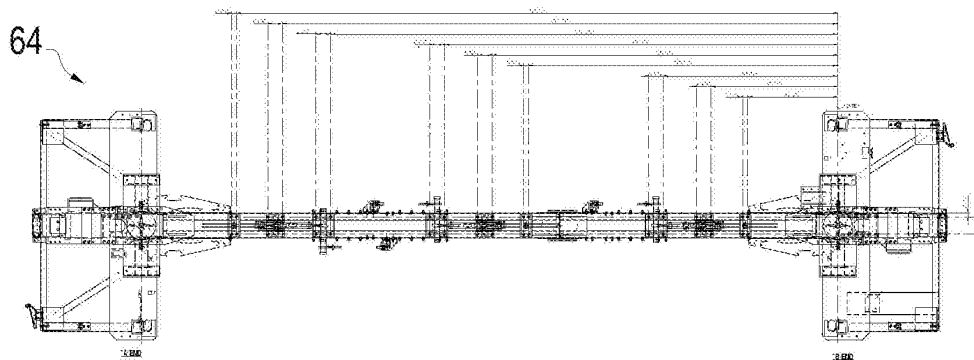


FIG. 18B

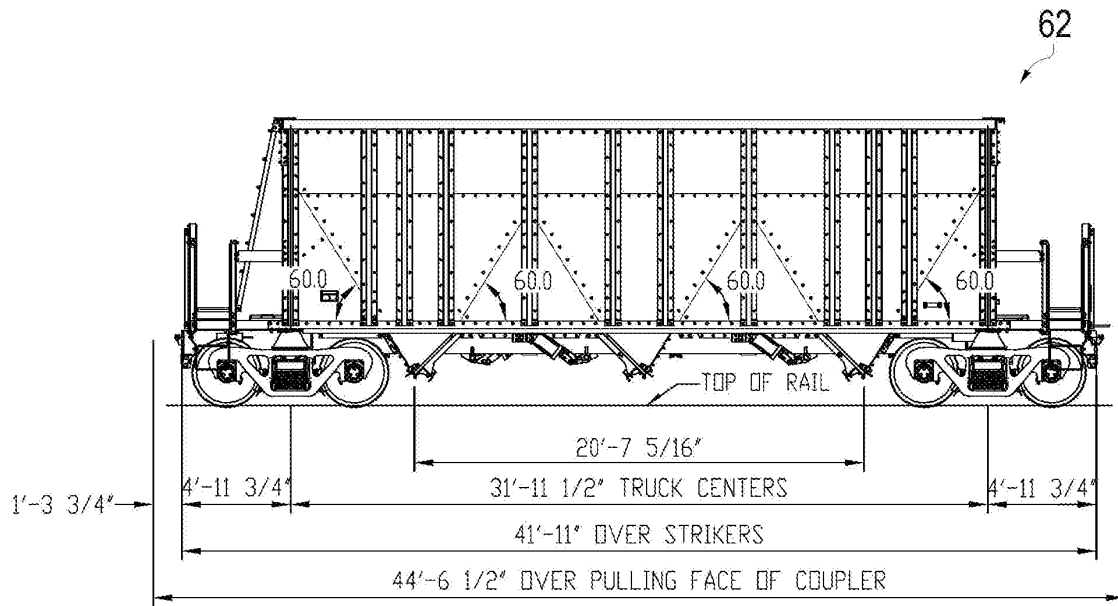


FIG. 19A

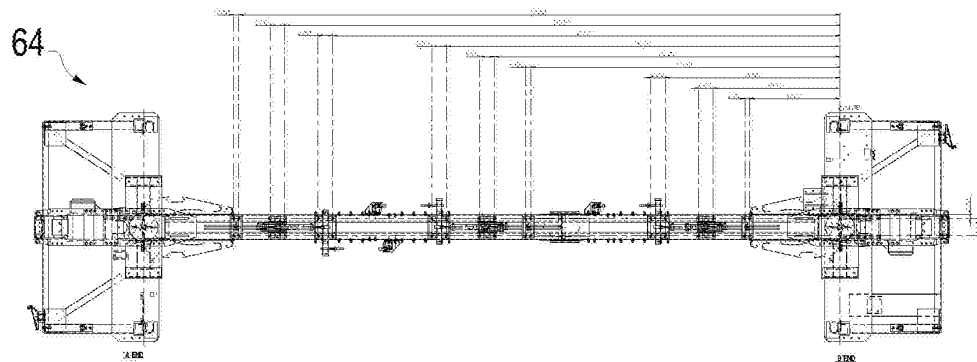


FIG. 19B

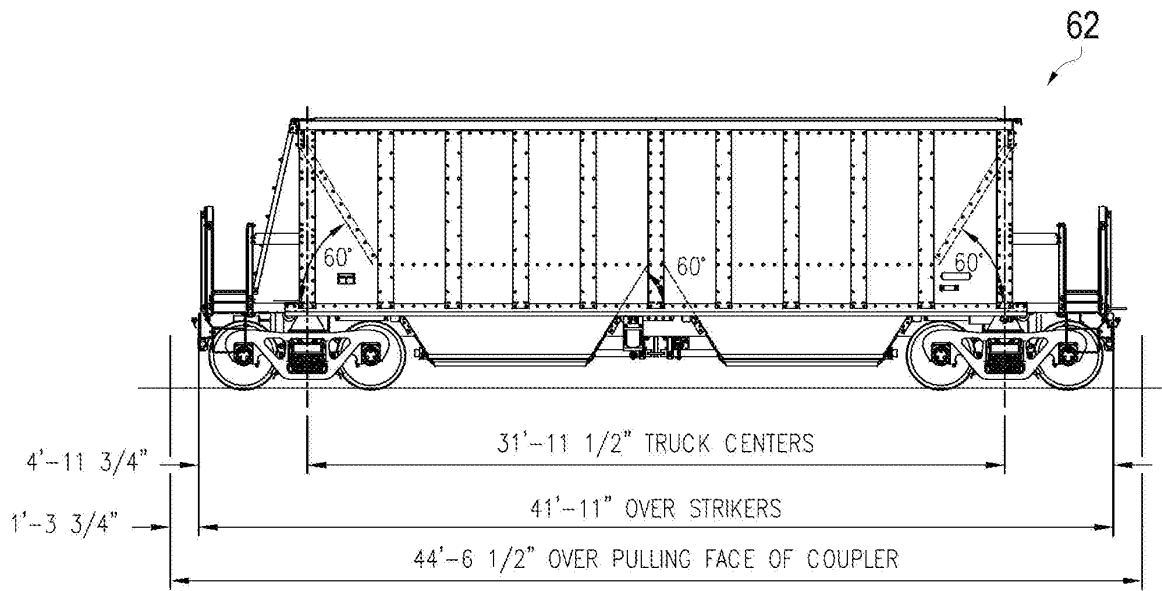


FIG. 20A

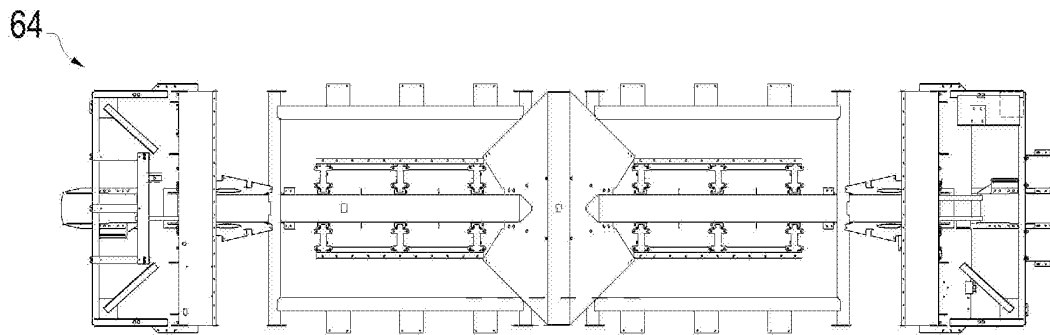


FIG. 20B

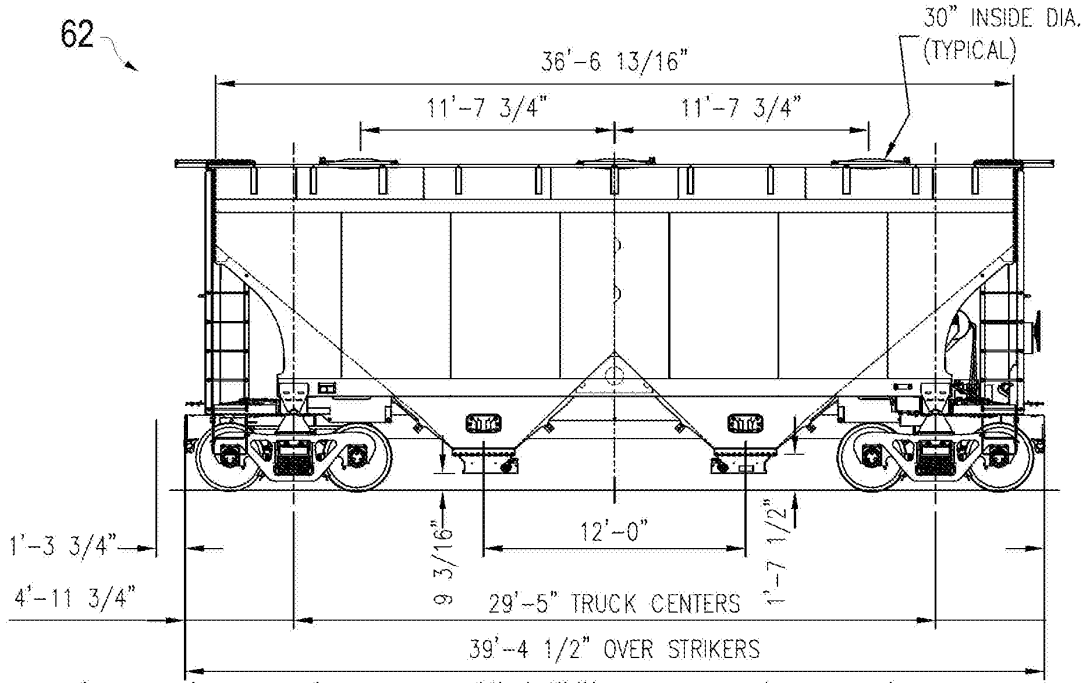


FIG. 21A

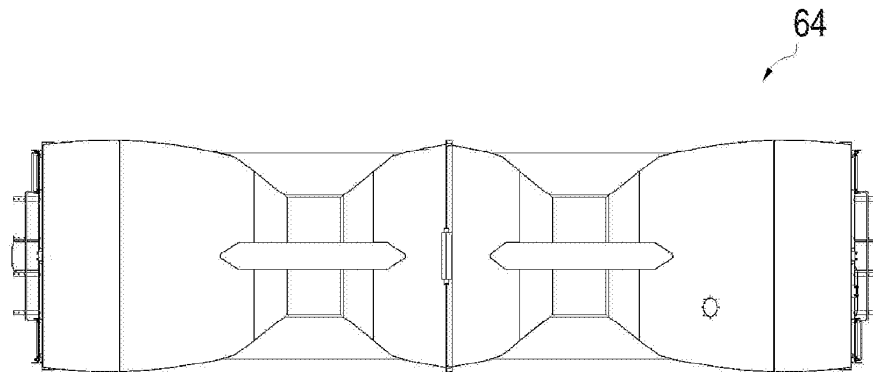


FIG. 21B

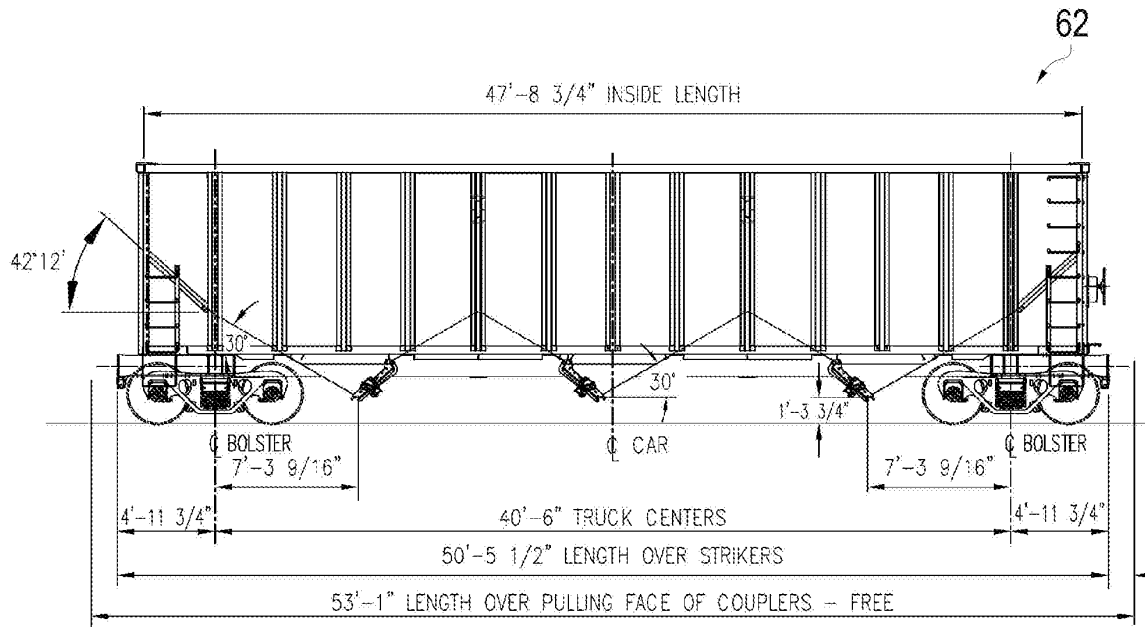


FIG. 22A

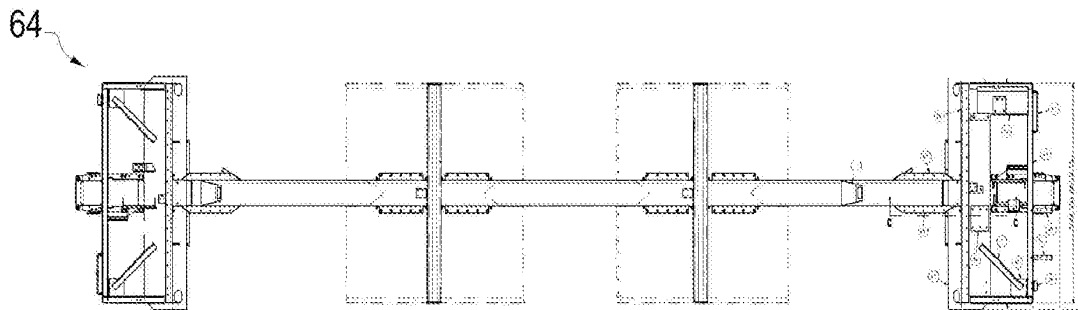


FIG. 22B



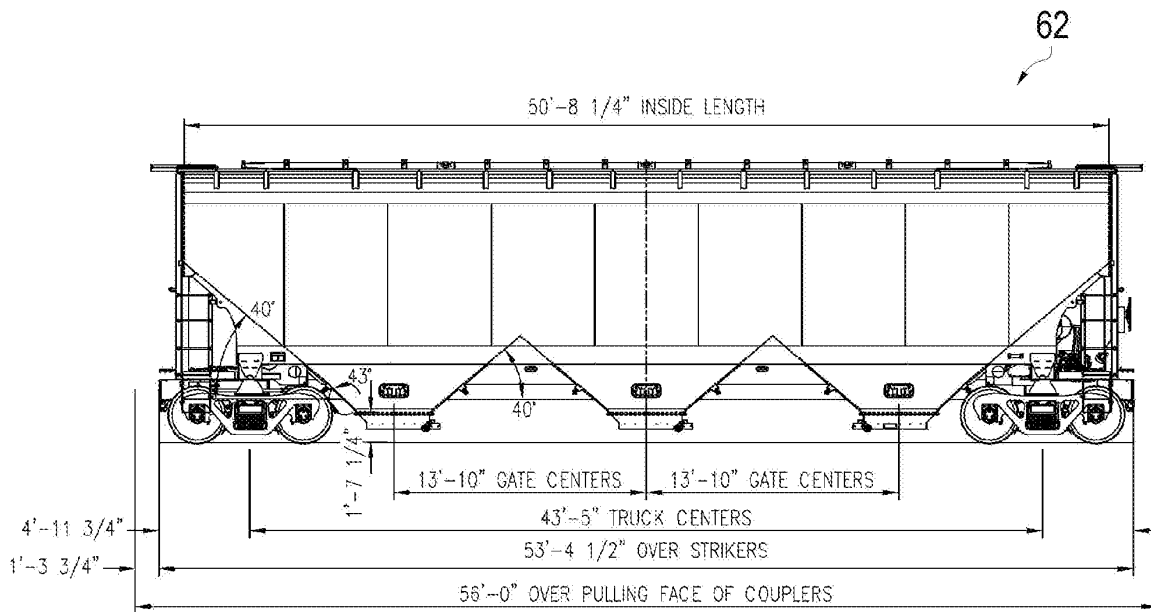


FIG. 24A

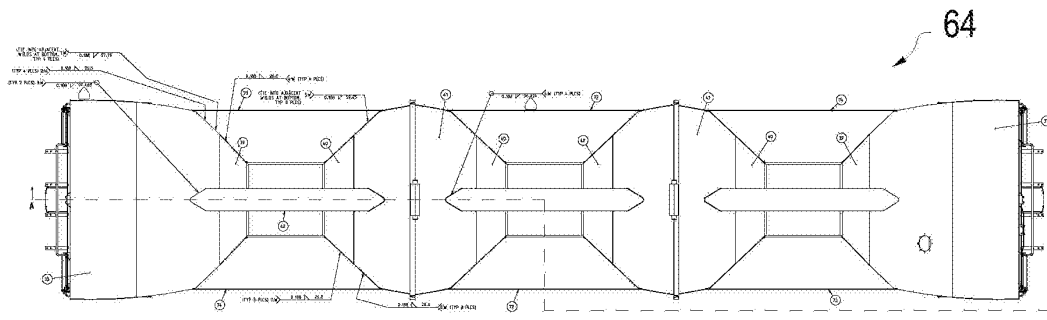


FIG. 24B



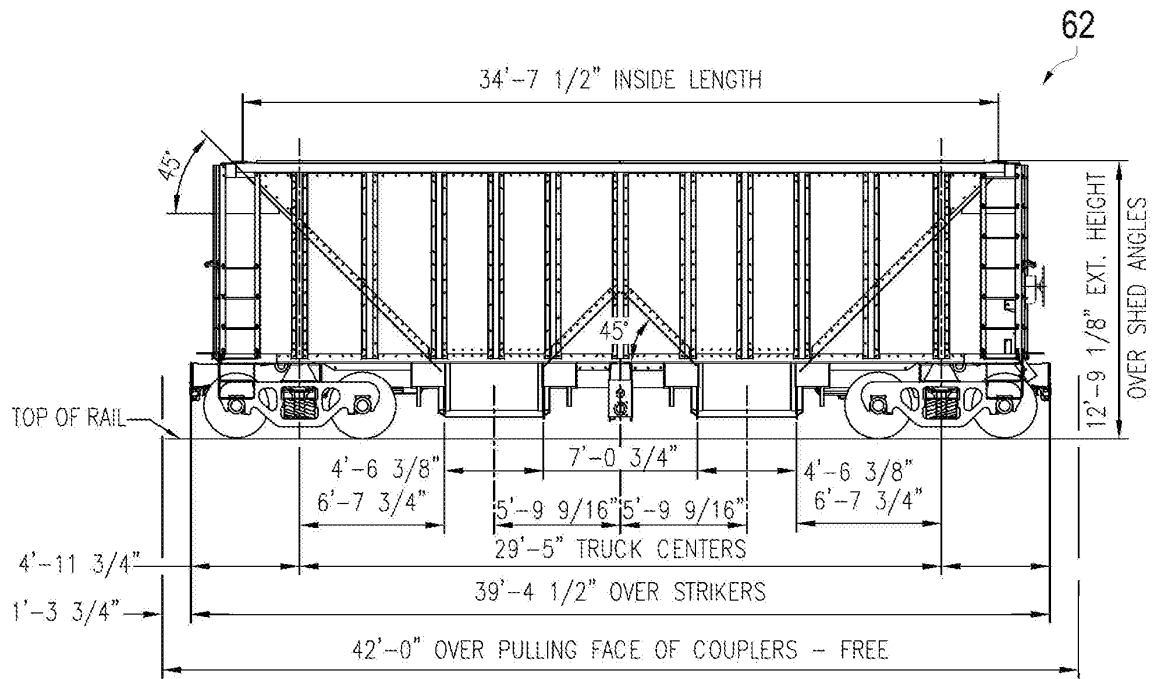


FIG. 26A

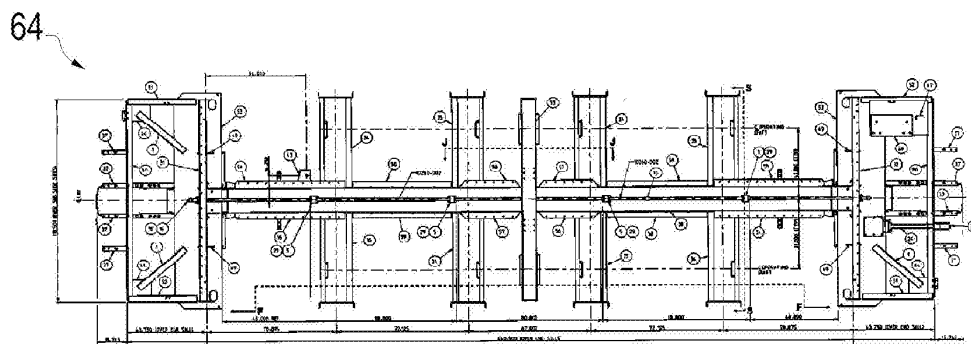


FIG. 26B

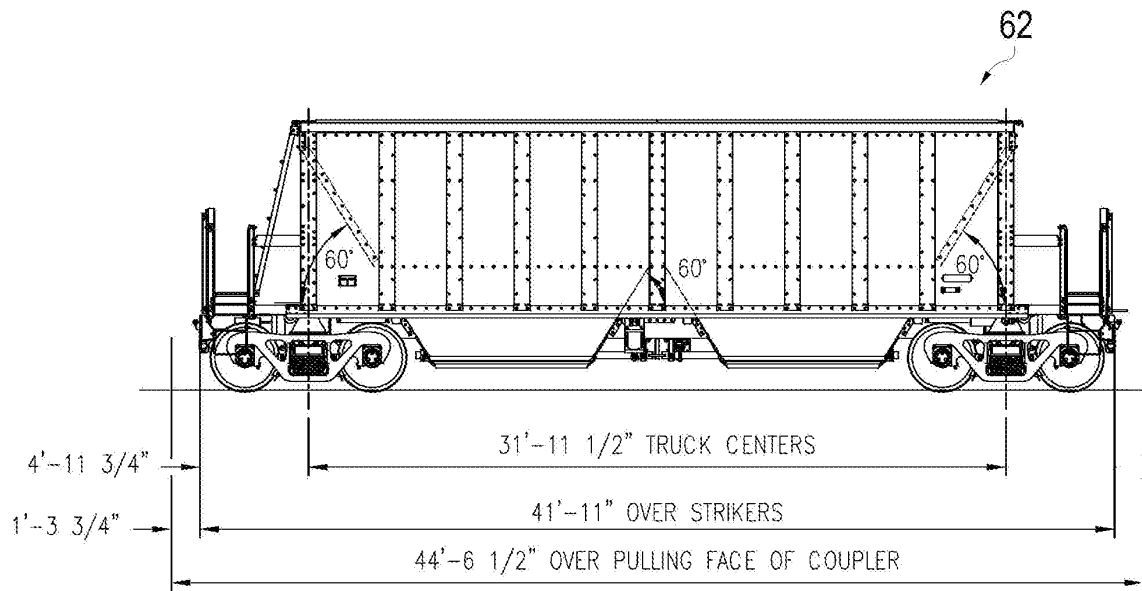


FIG. 27A

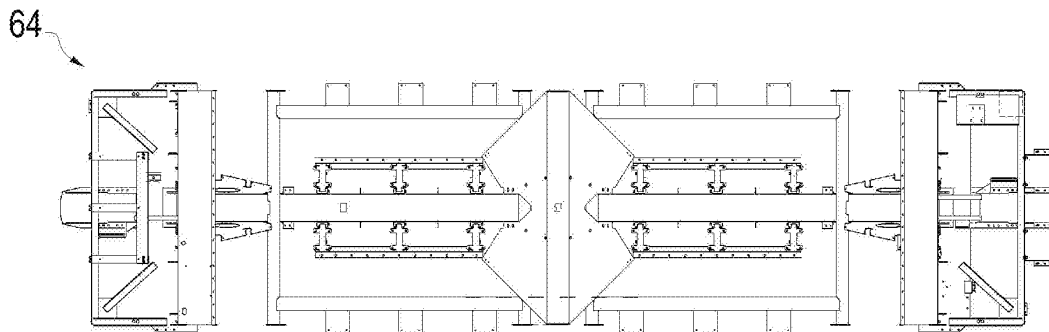


FIG. 27B

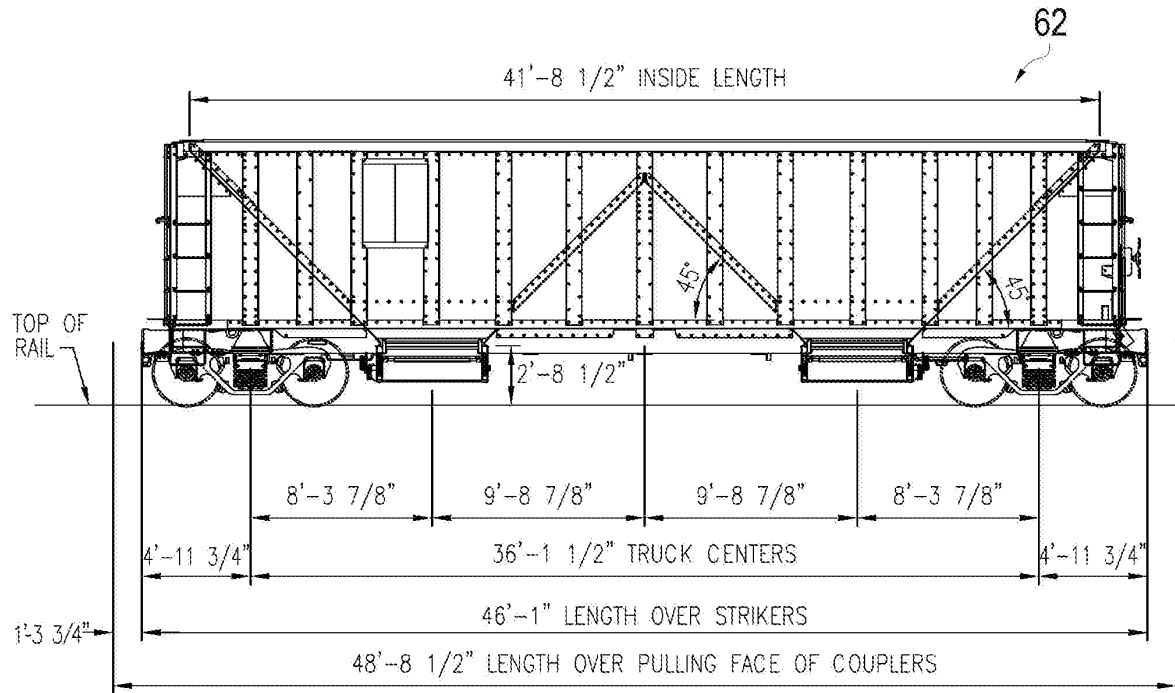
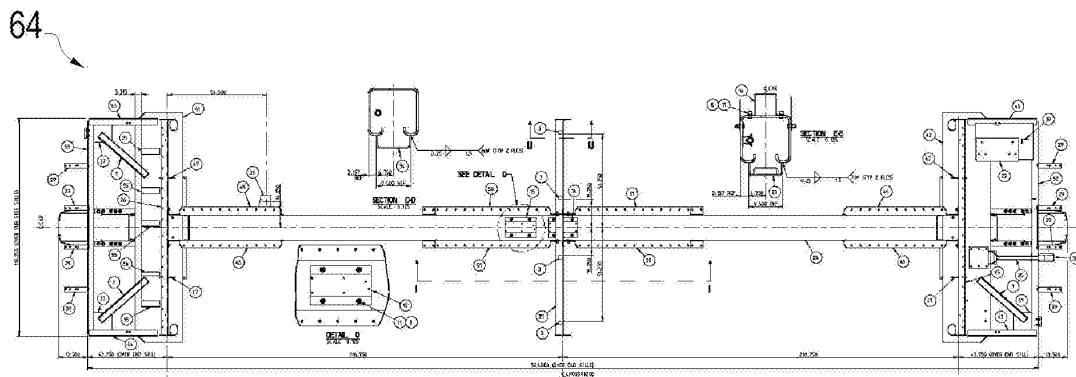


FIG. 28A



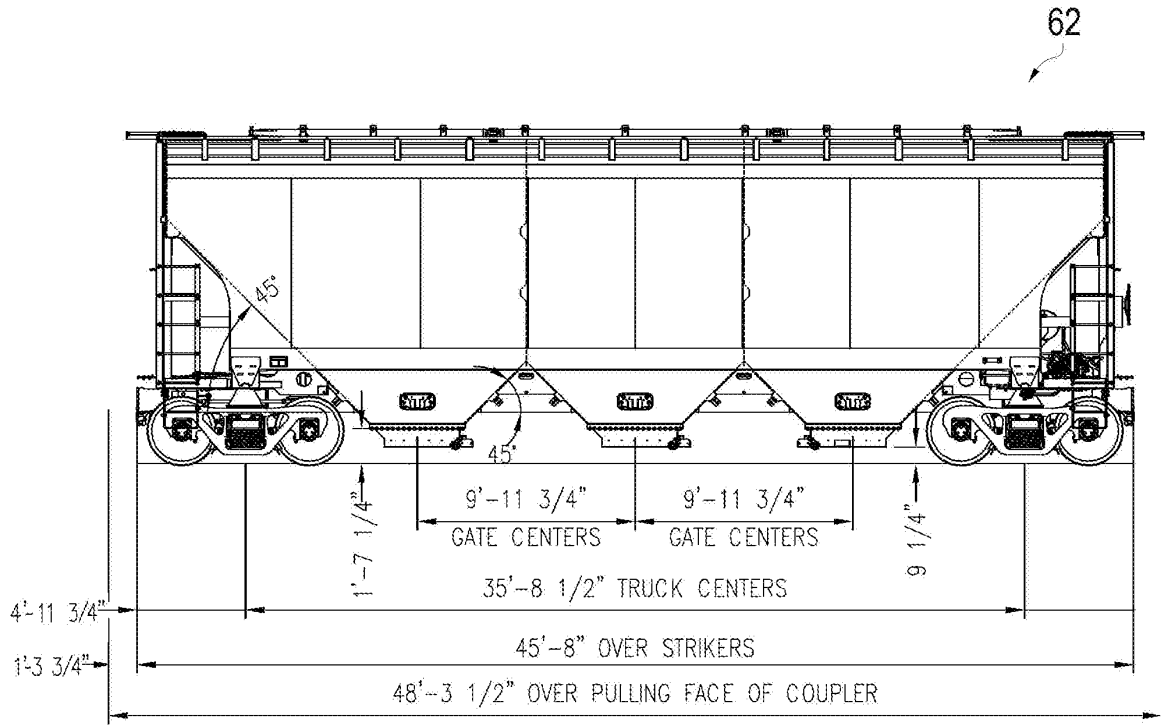


FIG. 29A

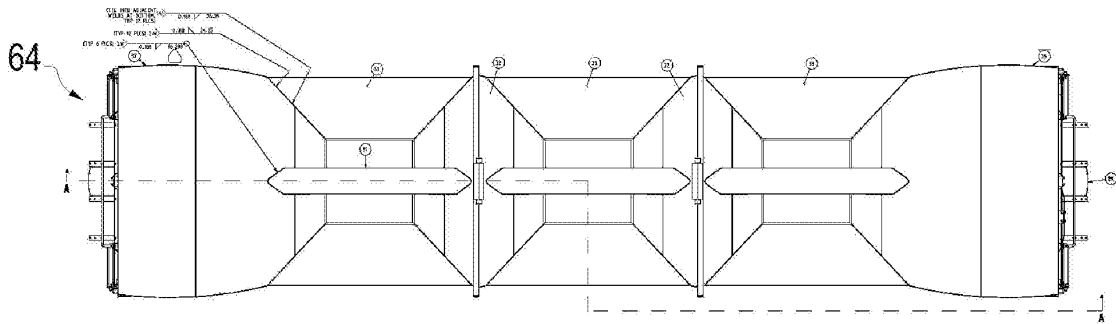


FIG. 29B

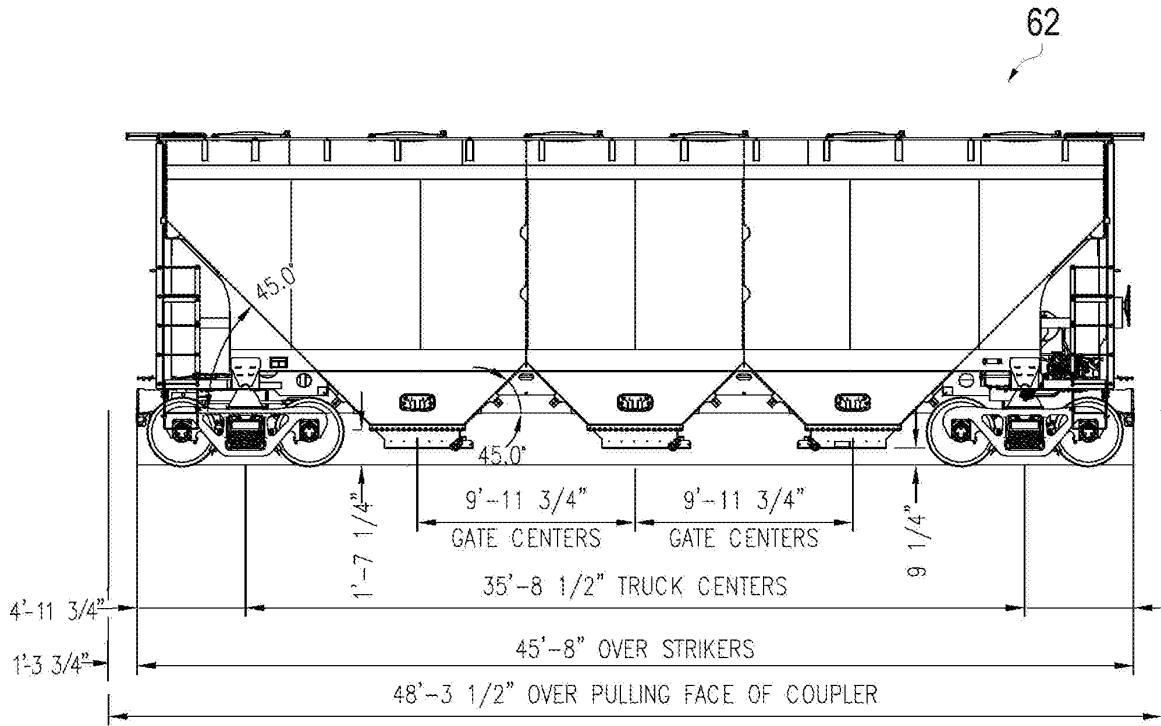


FIG. 30A

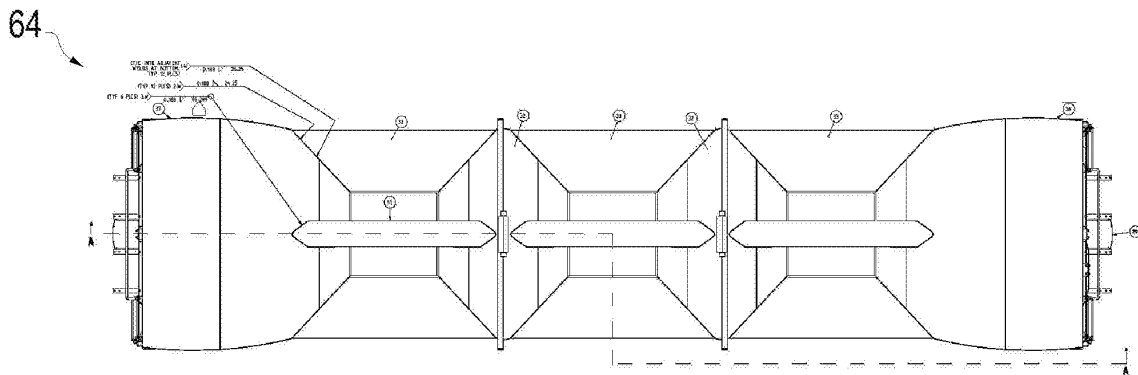


FIG. 30B

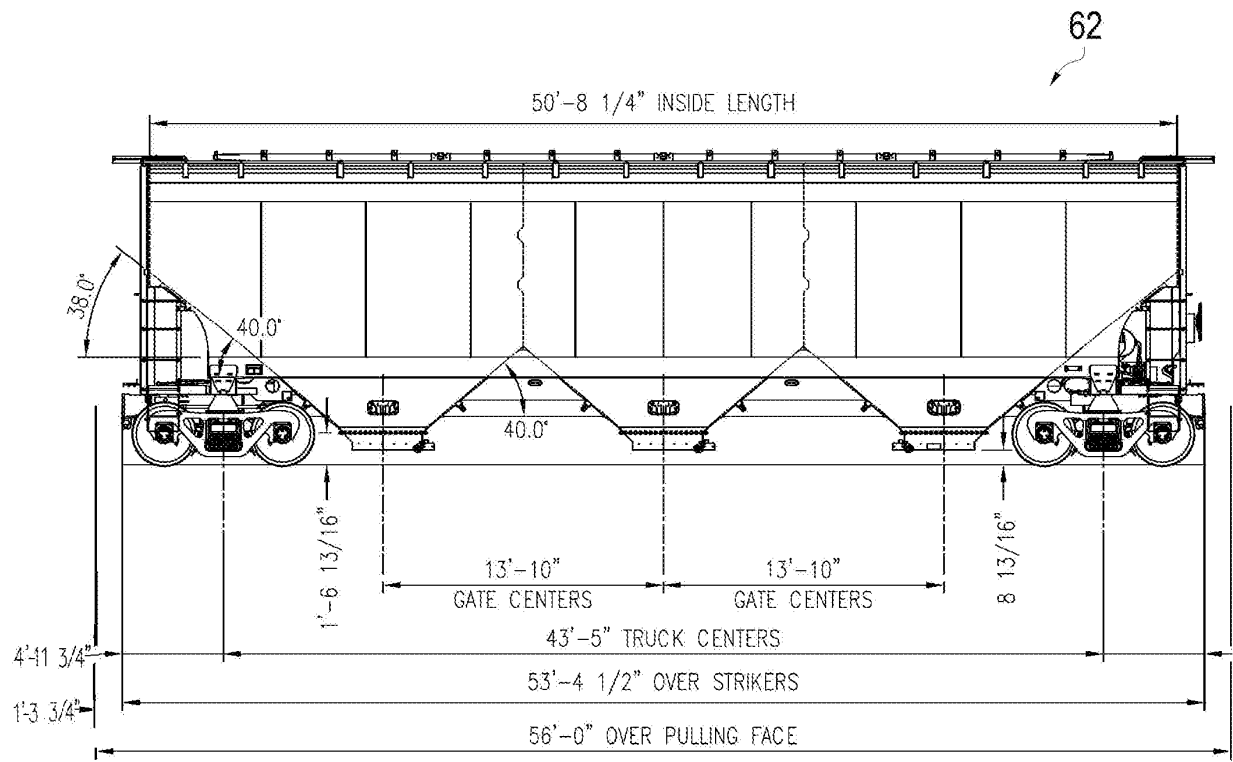


FIG. 31A

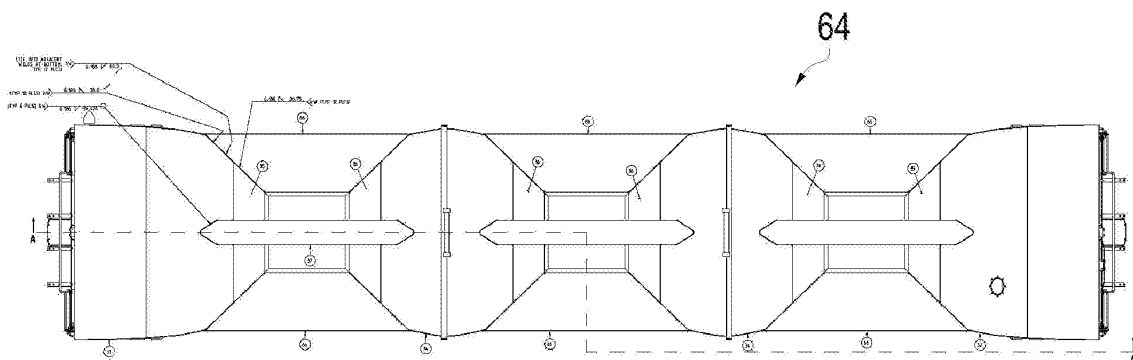


FIG. 31B



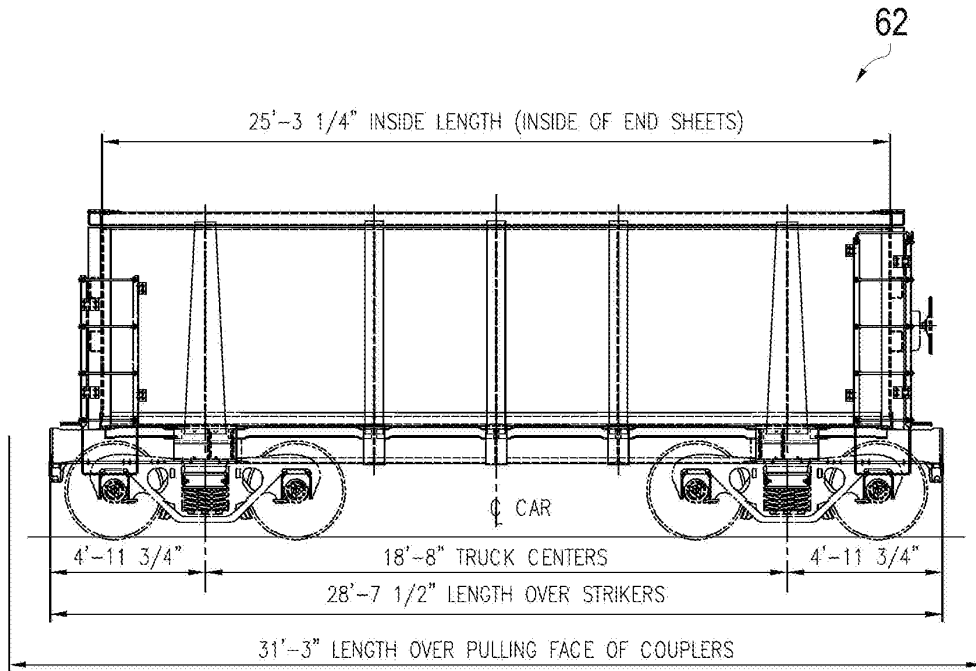


FIG. 33A

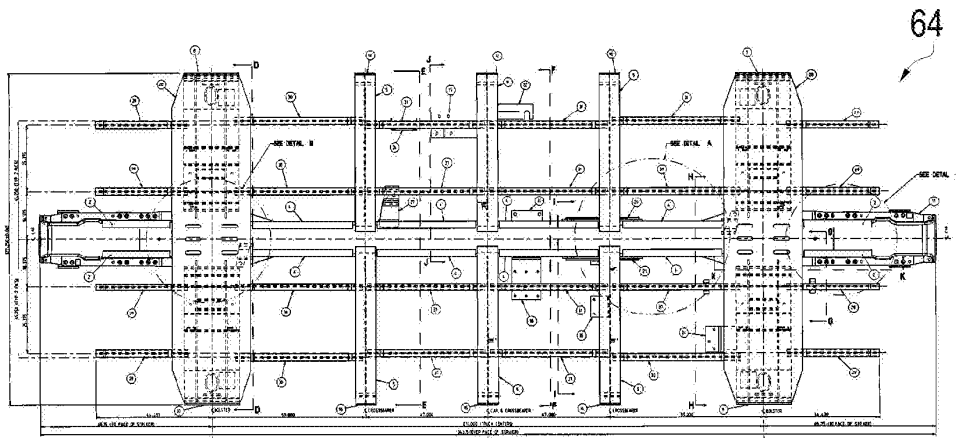


FIG. 33B

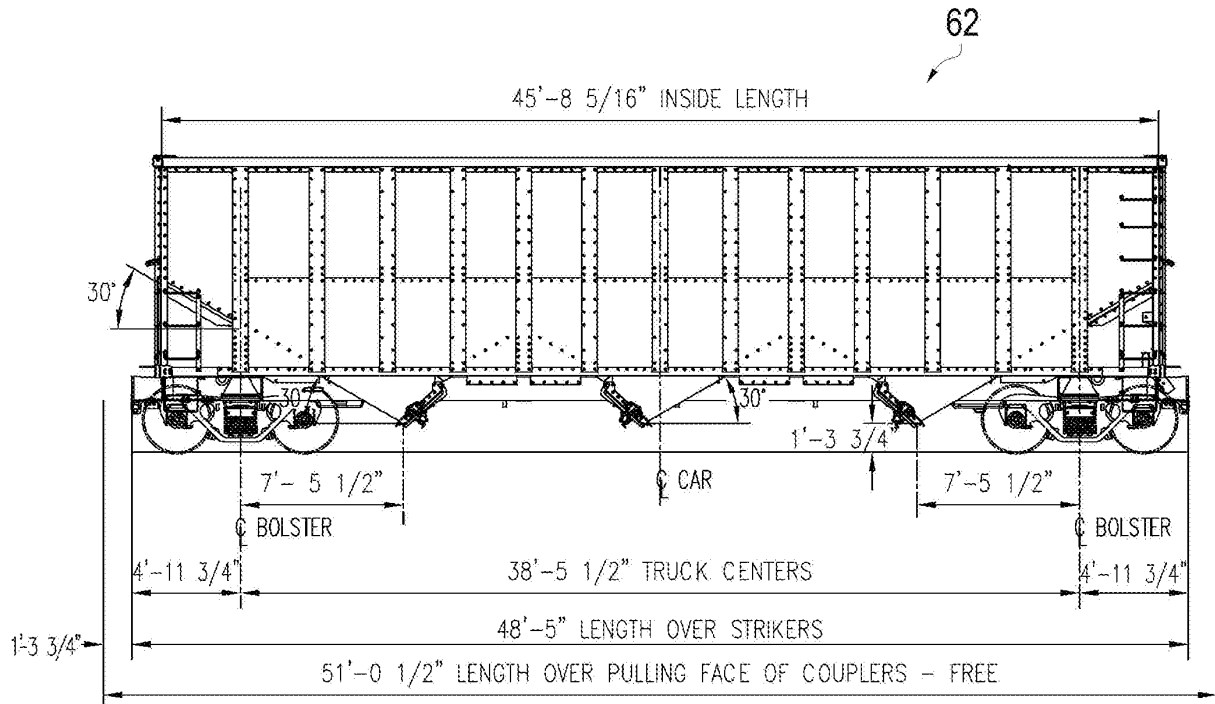


FIG. 34A

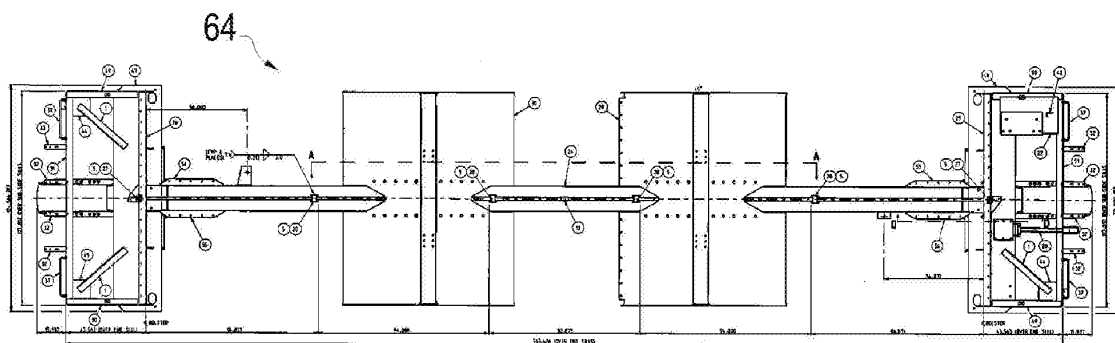


FIG. 34B

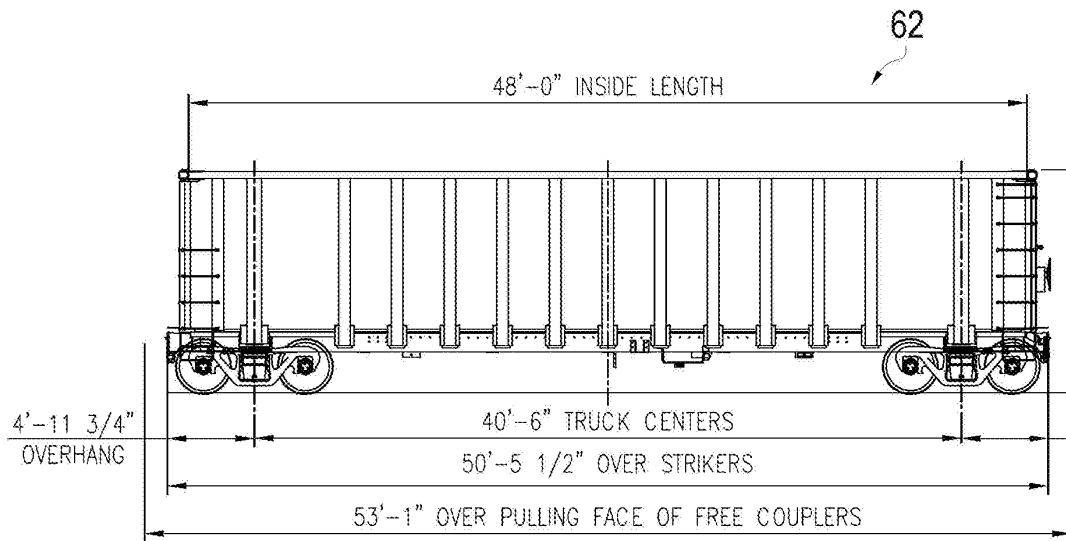


FIG. 35A

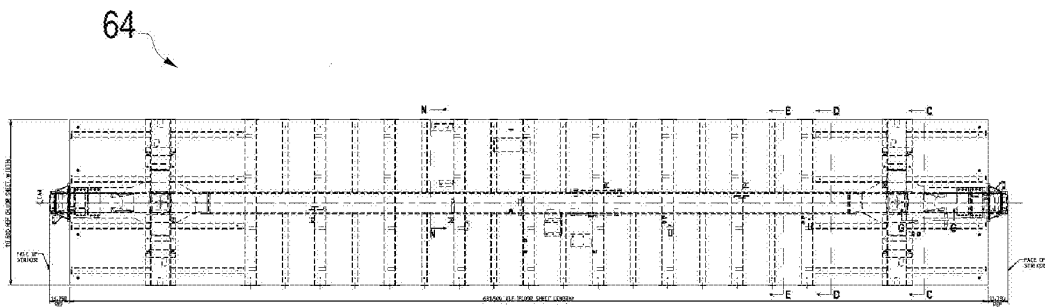


FIG. 35B

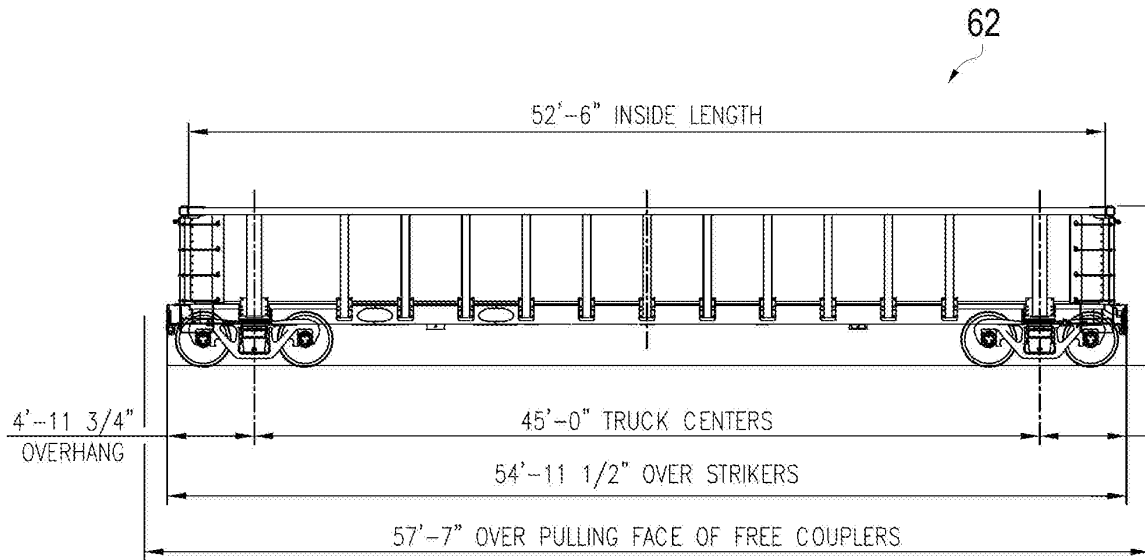


FIG. 36A

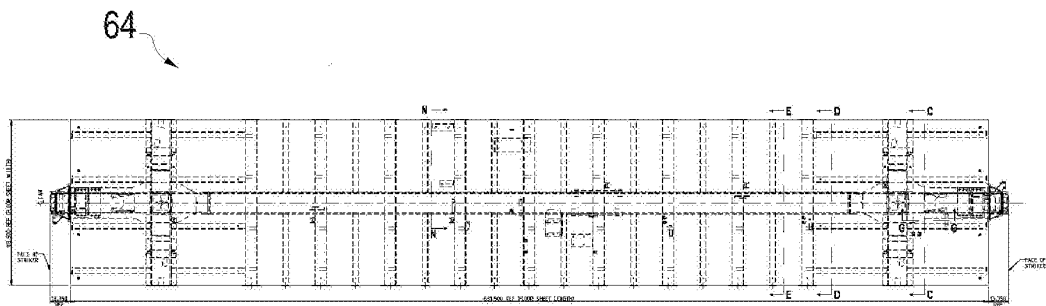


FIG. 36B

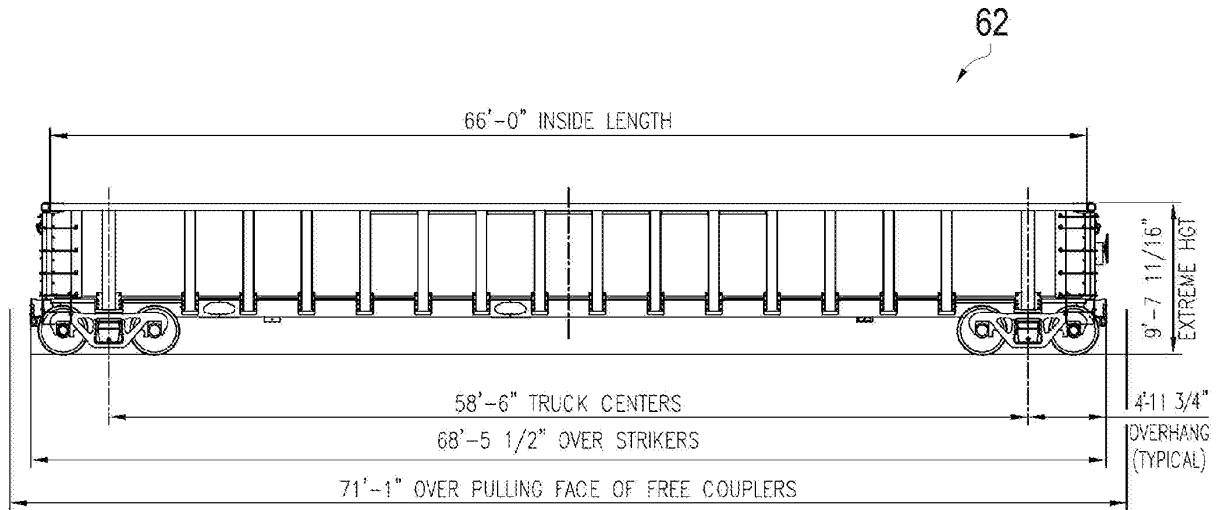


FIG. 37A

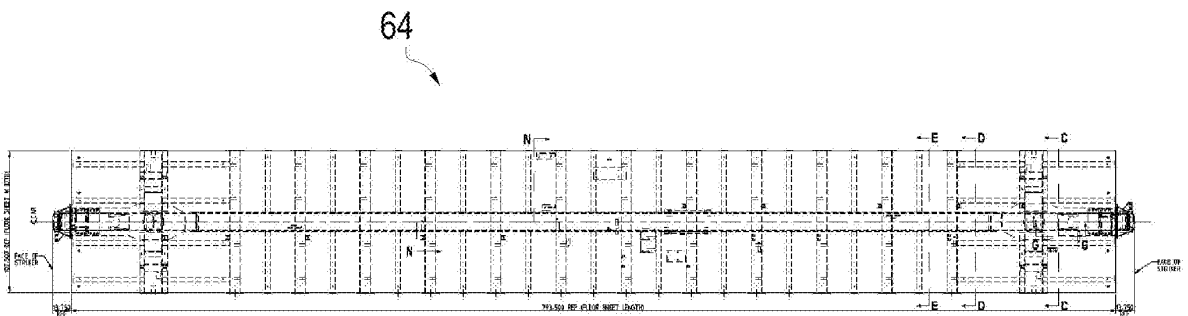


FIG. 37B

METHOD AND CAST COMPONENTS FOR COLD FORMED CENTER SILL  
RAIL CAR MODIFICATIONS AND RAILCARS FORMED THEREBY

ABSTRACT

A method of modification a railcar includes providing an existing railcar with a cold formed center sill; removing an upper portion of the railcar; Cutting and splicing the center sill; Forming an upper railcar body having top chord sections and a pair of end walls and side walls coupled to the top chord structure, wherein each sidewall includes a side sheet, a plurality of side stakes and side sill; Forming an underframe construction including the spliced center sill, bolsters configured to be above truck assemblies and coupled to the center sill and a plurality of lateral I-Beam cross bearers that extend from the center sill toward and stopping short of the inside of the side sheet, and wherein the cross bearers include vertical connection plates configured for coupling to side stakes which are positioned between the bolsters; and Coupling the upper body to the underframe.

What is claimed is:

1. A method of modification a railcar comprising providing the steps of:  
Providing an existing railcar with a cold formed center sill;  
Removing an upper portion of the existing railcar;  
Cutting and splicing the center sill to a desired length;  
Forming an upper railcar body having top chord sections and a pair of end walls and side walls coupled to the top chord structure, wherein each sidewall includes a side sheet a plurality of side stakes and side sill; and  
Forming an underframe construction including the spliced cold formed center sill running the length of the car, bolsters configured to be above truck assemblies and coupled to the center sill and a plurality of lateral I-Beam cross bearers that extend from the center sill toward and stopping short of the inside of the side sheet, and wherein the cross bearers include vertical connection plates configured for coupling to side stakes which are positioned between the bolsters; and  
Coupling the upper body to the underframe.

METHOD AND CAST COMPONENTS FOR COLD FORMED CENTER SILL  
RAIL CAR MODIFICATION PROGRAMS AND RAILCARS FORMED  
THEREBY

BACKGROUND OF THE INVENTION

**[0001]** 1. Field of the Invention

**[0002]** The present invention relates to railroad car modifications, and more particularly to a method and associated cast components for cold formed center sill railcar modification programs and the railcars formed thereby.

**[0003]** 2. BACKGROUND INFORMATION

**[0004]** In the railroad art, rolling stock has become very specialized with cars specific for transporting automobiles (vehicle carriers), shipping containers (well cars), bulk commodities open top gondola for hauling coal, ballast, coke, wood chips, ore, sand, scrap metal and construction debris, and aggregate, bulk commodities closed top hoppers for hauling grain, sand, cement, potash, soda ash, DDG, and roofing granules, bulk commodities open top hoppers for products similar to open top gondola, tanker cars and more. Railcars typically have a very long useful life of 50+years of potential service. However due to changes in the marketplace there can be a large surplus of a given car type. Additionally the efficiency of newer car types might make a prior car type obsolete before the end of the useful life of the railcar.

**[0005]** For example currently in the United States there is currently a surplus of railcars originally built primarily for hauling coal, due both to the interrelated increases in the use of natural gas in power generation and an open-secret “war on coal” in the Obama Administration (including but not limited to restrictive use of Clean Water Act’s 404(c) permit for new and existing mining operations; denial of export terminals requisite permits restricting coal exports; a torrent of stringent new regulations of greenhouse gasses (including CO<sub>2</sub>) under the Clean Air Act; EPA effective banning of the construction of new coal-fired power plants by requiring them to implement prohibitively expensive carbon capture and storage technology.)

**[0006]** It has been known to repurpose or modification of an older surplus or obsolete car type into a car type that has greater current utility. “Modification” is Association of American Railroads (AAR) defined term (see Office Manual of the AAR Interchange Rules, rule 88(d)(2)) defined as a change to a car that alters capacity of car, or size of car type, or type of lading being hauled. This application uses the terms modification and modify in connection with this rule whereby within this application rail car modification programs reference programs that will modify railcars within the meaning of this AAR rule.

**[0007]** There is a need for effective and efficient modification methodologies for coal cars in particular and the present invention is primarily related to method and associated cast components for cold formed center sill railcar modification programs and the railcars formed thereby.

#### SUMMARY OF THE INVENTION

**[0008]** It is an object of the present invention to provide an effective and efficient modification method and associated cast components for cold formed center sill railcar modifications and the railcars formed thereby.

**[0009]** One aspect of the invention provides a method of modification a railcar includes providing an existing railcar with a cold formed center sill; removing an upper portion of the railcar; Cutting and splicing the center sill; Forming an upper railcar body having top chord sections and a pair of end walls and side walls coupled to the top chord structure, wherein each sidewall includes a side sheet, a plurality of side stakes and side sill; Forming an underframe construction including the spliced center sill, bolsters configured to be above truck assemblies and coupled to the center sill and a plurality of lateral I-Beam cross bearers that extend from the center sill toward and stopping short of the inside of the side sheet, and wherein the cross bearers include vertical connection plates configured for coupling to side stakes which are positioned between the bolsters; and Coupling the upper body to the underframe.

**[0010]** These and other advantages of the present invention will be clarified in the brief description of the preferred embodiment taken together with the drawings in which like reference numerals represent like elements throughout.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0011]** Figure 1 is a perspective view of a modification or modified gondola railcar according to the one embodiment of the present invention.

**[0012]** Figure 2 is a perspective view of the underframe construction of the modified gondola railcar according to Figure 1.

**[0013]** Figure 3 is a sectional end view taken through a cross bearer of the modified gondola railcar according to Figure 1.

**[0014]** Figure 4 is an enlarged sectional end view of the cross bearer and side stake coupling of the modified gondola railcar according to Figure 1.

**[0015]** Figure 5 is an enlarged sectional end view of an alternative side sill of the modified gondola railcar according to Figure 1.

**[0016]** Figures 6 and 7 are enlarged perspective views of the reinforced side stake construction of the modified gondola railcar according to Figure 1.

**[0017]** Figure 8 is a perspective view of a cleanout door design of the modified gondola car 10 of according to Figure 1.

**[0018]** Figure 9 is a side view of an existing cold formed center sill railcar suitable for modification according to the present invention.

**[0019]** Figure 10 shows top and side views of a burned downed or hulked center sill and draft arm components of the railcar of figure 9 and top and side views of the shortened, spliced, center sill and draft arm component for a modification according to the present invention.

**[0020]** Figures 11 and 12 are perspective and side views of a center sill coupling with a splice casting for a modification according to the present invention.

**[0021]** Figures 13a and b are perspective views of a cast transition member for a fabricated draft arm assembly to cold formed center sill.

**[0022]** Figure 14 is a sectional view of the cast transition member of figure 13.

**[0023]** Figure 15 is a perspective view of a center sill and draft arm assembly using a cast transition castings for building a new or modified railcar according to the present invention.

**[0024]** Figure 16 are top and side views of an alternative burned downed or hulked center sill and draft arm components of the railcar of figure 9 that have

been spliced for a modification railcar according to the method of the present invention;

**[0025]** Figure 17 is a top view of an alternative burned downed or hulked center sill and draft arm components of the railcar of figure 9 that has been spliced for a modification railcar according to the method of the present invention;

**[0026]** Figure 18A is a side elevational view of an open top hopper, aggregate hopper, transverse door, steel or stainless steel modification railcar according to the method of the present invention;

**[0027]** Figure 18B is a top view of an underframe for the modification railcar of figure 18A formed on the cut down hulk of figure 16 according to the method of the present invention;

**[0028]** Figure 19A is a side elevational view of an open top hopper, aggregate hopper, transverse door, hybrid modification railcar according to the method of the present invention;

**[0029]** Figure 19B is a top view of an underframe for the modification railcar of figure 19A formed on the cut down hulk of figure 16 according to the method of the present invention;

**[0030]** Figure 20A is a side elevational view of an open top hopper, aggregate hopper, longitudinal door, hybrid modification railcar according to the method of the present invention;

**[0031]** Figure 20B is a top view of an underframe for the modification railcar of figure 20A formed on the cut down hulk of figure 17 according to the method of the present invention;

**[0032]** Figure 21A is a side elevational view of covered hopper, 3282cf sand, cement or roofing granule modification railcar according to the method of the present invention;

**[0033]** Figure 21B is a top view of an underframe for the modification railcar of figure 21A formed on the cut down hulk of figure 17 according to the method of the present invention;

**[0034]** Figure 22A is a side elevational view of an open top hopper, 4200 cf (western) modification railcar according to the method of the present invention;

**[0035]** Figure 22B is a top view of an underframe for the modification railcar of figure 22A formed on the cut down hulk of figure 17 according to the method of the present invention;

**[0036]** Figure 23A is a side elevational view of a gondola aggregate modification railcar analogous to the car of figure 1 according to the method of the present invention;

**[0037]** Figure 23B is a top view of an underframe for the modification railcar of figure 23A formed on the cut down hulk of figure 10 according to the method of the present invention;

**[0038]** Figure 24A is a side elevational view of covered hopper, 5200 cf grain modification railcar according to the method of the present invention;

**[0039]** Figure 24B is a top view of an underframe for the modification railcar of figure 24A formed on the cut down hulk of figure 17 according to the method of the present invention;

**[0040]** Figure 25A is a side elevational view of covered hopper, DDG modification car modification railcar according to the method of the present invention;

**[0041]** Figure 25B is a top view of an underframe for the modification railcar of figure 25A formed on the cut down hulk of figure 16 according to the method of the present invention;

**[0042]** Figure 26A is a side elevational view of an open top hopper, taconite ore modification railcar according to the method of the present invention;

**[0043]** Figure 26B is a top view of an underframe for the modification railcar of figure 26A formed on the cut down hulk of figure 17 according to the method of the present invention;

**[0044]** Figure 27A is a side elevational view of an open top hopper, aggregate hopper, longitudinal door, steel or stainless steel modification railcar according to the method of the present invention;

**[0045]** Figure 27B is a top view of an underframe for the modification railcar of figure 20A formed on the cut down hulk of figure 17 according to the method of the present invention;

**[0046]** Figure 28A is a side elevational view of an open top hopper, ballast modification railcar according to the method of the present invention;

**[0047]** Figure 28B is a top view of an underframe for the modification railcar of figure 28A formed on the cut down hulk of figure 17 according to the method of the present invention;

**[0048]** Figure 29A is a side elevational view of covered hopper, 4300 cf Potash modification railcar according to the method of the present invention;

**[0049]** Figure 29B is a top view of an underframe for the modification railcar of figure 29A formed on the cut down hulk of figure 17 according to the method of the present invention;

**[0050]** Figure 30A is a side elevational view of covered hopper, 4300 cf soda ash modification railcar according to the method of the present invention;

**[0051]** Figure 30B is a top view of an underframe for the modification railcar of figure 30A formed on the cut down hulk of figure 17 according to the method of the present invention;

**[0052]** Figure 31A is a side elevational view of covered hopper, 5400 cf grain modification railcar according to the method of the present invention;

**[0053]** Figure 31B is a top view of an underframe for the modification railcar of figure 31A formed on the cut down hulk of figure 17 according to the method of the present invention;

**[0054]** Figure 32A is a side elevational view of a gondola, eastern coal car modification railcar according to the method of the present invention;

**[0055]** Figure 32B is a top view of an underframe for the modification railcar of figure 32A formed on the cut down hulk of figure 17 according to the method of the present invention;

**[0056]** Figure 33A is a side elevational view of a gondola, ore car modification railcar according to the method of the present invention;

**[0057]** Figure 33B is a top view of an underframe for the modification railcar of figure 33A formed on the cut down hulk of figure 16 according to the method of the present invention;

**[0058]** Figure 34A is a side elevational view of an open top hopper, 4221 cf (eastern) modification railcar according to the method of the present invention;

**[0059]** Figure 34B is a top view of an underframe for the modification railcar of figure 34A formed on the cut down hulk of figure 17 according to the method of the present invention;

**[0060]** Figure 35A is a side elevation view of a gondola, C&D car modification railcar according to the method of the present invention;

**[0061]** Figure 35B is a top view of an underframe for the modification railcar of figure 35A formed on the cut down hulk of figure 10 according to the method of the present invention;

**[0062]** Figure 36A is a side view of a gondola, 52' mill modification railcar according to the method of the present invention;

**[0063]** Figure 36B is a top view of an underframe for the modification railcar of figure 36A formed on the cut down hulk of figure 10 according to the method of the present invention;

**[0064]** Figure 37A is a side view of a gondola, 66' mill modification railcar according to the method of the present invention; and

**[0065]** Figure 37B is a top view of an underframe for the modification railcar of figure 37A formed on the cut down hulk of figure 10 according to the method of the present invention.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0066]** The present invention provides method and associated cast components for cold formed center sill railcar modification programs and the railcars formed thereby.

**[0067]** As background the trucks, center sill 32, draft arm assemblies 35, couplers, collectively represent considerable cost components of a railcar 10 and the reuse of some or all of these components makes railcar modification feasible, provided there is not too much work associated with conforming the prior existing bolsters and center sill 32 orientations to the end design (the trucks will generally be the same in a rebuilt car 10).

**[0068]** The center sill 32 is the primary structural member of the underframe of a rail car. It is subjected to the buff and draft forces created during operation of the railcar 10 and normally extends as a continuous member along the length of the car body. In the past, center sills have possessed many different cross-sectional configurations depending on the type of rail car and other considerations and it was well known to form a center sill by welding a plurality of pieces together as a unit along its substantial length.

**[0069]** The use of welds in earlier center sill designs to manufacture center sills presented several problems including that i) because welding is needed, the reliance on this process to fabricate a finished center sill is inefficient from both a cost and productivity standpoint, ii) the application of the welds along the lengths of the pieces being joined as a center sill is labor intensive and cannot attain high-speed production, iii) the application of multiple welds heats the material being joined and results in so-called weld flux which is known to create deviations in the straightness or acceptable tolerances of the center sill being formed; iv) a welded center sill is an inherently heavy structure due to its design and fabrication technique. Addressing these drawbacks is a cold formed center sill 32 which is described in detail in U.S. Patent Nos 7,478,599; 6,769,366 and 6,119,345, which are incorporated herein by reference. A cold formed center sill 32 of this type provides an improved, light weight center sill in which the necessity of welds or other securement techniques are eliminated. In a modification of a railcar to a new car type, as in the present invention, it is common and generally required to adjust the length of the center sill 32 to the new car length configuration as a critical step. It is theoretically possible to replace a center sill in a rebuild program with a completely new center sill, but such a process becomes less a rebuild and more of scrapping an old car for parts. The modification program according to the present invention require the use of the existing center sill 32, namely a cold formed center sill 32. The center sill 32 may be cut down/shortened or extended/lengthened depending on the modification. A modification of a car having a welded fabricated center sill can quickly become impractical in the lengthening and/or shortening of the center sill in part due to the wider tolerances in camber, sweep and twist of the welded center sill. The tighter tolerances inherent in the cold formed center sills 32 make these particularly well suited for modifications applications in accordance with the method of the present invention.

**[0070]** Prior to describing a method of modification, the resulting design of one rebuilt railcar type is helpful to understand. Figures 1-8 illustrate an open top gondola modified or modification railcar 10 with railcar underframe and sidewall construction that simplifies construction, minimizes car weight while

yielding the necessary structural support without sacrificing cargo carrying capacity.

**[0071]** Each modification railcar 10 includes a number of conventional features that need not be described herein in detail as they are generally well known in the art and generally only the underframe and sidewall construction are described in detail herein. Examples of gondola cars are illustrated in U.S. Pat. Nos. 4,212,252; 4,361,097; 4,911,082; 5,253,593; 5,335,603; 5,488,912; 5,813,353; 6,148,735; 6,978,720; 8,132,515; 8,240,256, which patents are incorporated herein by reference establishing the general nature of the relevant art relating to gondola type cars.

**[0072]** Each railcar 10 includes top chord sections 12 above the sidewalls and end-walls. Extruded closed sections can effectively form the top chord sections 12 although other top chord configurations are possible. The railcar 10 includes a pin coupling 14 between the end wall top chord 12 and the side wall top chord 12 as shown.

**[0073]** The end-walls are generally formed of end sheet 16 and cross supports 18. The end sheet 16 can be formed a plurality of coupled sheet materials extending from the top chord 12 to the floor structure, however one piece structure forming the end sheet 16 is preferred. The cross supports may be extruded channel sections, I-beam, t-sections or a variety of supporting beam shapes.

**[0074]** The sidewalls are generally formed of side sheet 20, side stakes 22 and side sill 24. The side sheet 20 can be formed a plurality of coupled sheet materials extending from the top chord 12 to the side sill 24, however a single sheet forming the side sheet 20 is preferred. The side stakes 22 are coupled to the top chord 12 and the side sheet 20 and are preferably mainly formed as extruded channels and will be described further below.

**[0075]** The side sill 24 may be a closed section like the top chord 12, or other conventional shape such as a solid bar, but a pressed angle or structural angle as shown best in figures 4 and 5 is preferred as it represents a cost effective design that does not take away from the cargo carrying capacity of the railcar 10.

**[0076]** Two more conventional side stakes (22' and 22'') differ from the side stake 24 construction between the bolsters that, as described below, form an important part of the design of the modified railcar 10 of the present invention. The first more conventional side stake is a ladder side stake 22' at the ends of each sidewall and in addition to a side stake it forms an attaching point for a corner ladder 26. The ladder side stake 22' is not associated with a cross bearer and mainly functions as a side wall support and as one attachment for the corner ladder 26. The second specialized side stake is the bolster side stake 22'' that extends from the top chord 12 to a laterally extending part of a bolster 28. The bolster side stake 22'' sees more structural loading and is generally thicker and/or dimensioned larger (e.g. a wider channel) to accommodate the extra loading. The bolster side stake 22'' may also be internally reinforced as with side stakes 22 discussed below, however as shown the bolster 28 includes a horizontal coupling portion and a vertical bolster to side connection plate making further reinforcement of the bolster side stake 22'' less needed.

**[0077]** The modified gondola car 10 also includes multiple clean-out doors 30, also called access doors, built into the side wall and floor structure for removing small amounts of residual material from the car and/or to wash out the railcar interior. The clean out/wash out doors 30 can be particularly important if the car 10 is changing from hauling one type of lading to another. Car maintenance is another reason for requiring a thorough removal of residual lading. Typically the cleanout doors 30 are simply hatches or doors that close against the floor of the gondola railcar, examples of which can be seen in U.S. Pat. Nos. 2,681,470; 2,722,899; 7,434,519; 7,461,600; 7,559,284; 7,757,611; 7,878,125, and 8,025,014 which patents are also incorporated herein by reference, and the door 30 may be formed in these conventional fashions, however the sidewall and floor mounting disclosed in U.S. Patent Publication No 2017/0129504 is preferred and this disclosure is incorporated herein by reference.

**[0078]** The preferred cleanout door 30 is formed as generally described in U.S. Patent Publication No 2017/0129504 except with the inclusion of a u-shaped closure plate 31 shown in figure 8. The closure plate 31 is added

because of the material savings associated with a shorter floor 40 in the railcar 30 than in the design shown in U.S. Patent Publication No 2017/0129504. This door 30 design actually forms a larger opening than in the in U.S. Patent Publication No 2017/0129504. Additionally the slot holding the door in the open position is deeper than shown in U.S. Patent Publication No 2017/0129504 making it more secure and safer preventing unwanted accidental dislodgement during use that could injure a worker. Preferably the top of the bar should be contained entirely within the slot in the stowed position.

**[0079]** Figure 2 is a perspective view of the underframe construction of the gondola railcar 10 according to the present invention. The underframe uses a cold formed center sill 32 running the length of the car with draft sills (also known as end sections or draft arms) 34 at each end. Regarding the draft arms 34, cast arms and fabricated arms are known and either may be used in the railcar 10 although fabricated arms may further require transition pieces between the draft arm and the center sill 32. Further the draft arms 34 receive the desired coupler assemblies appropriate for the car 10.

**[0080]** The bolsters 28 are above the trucks (not shown) and coupled to the center sill 28. Between the bolsters 28, the underframe of the railcar 10 includes a plurality of lateral I-Beam cross bearers 36 that extend from the cold formed center sill 32 extending toward but stopping short of the inside of the side sheet 20, as best shown in figure 4. The top of the I-Beam cross bearers 36, the flanges, align with and support the floor sheets 40 of the railcar 10. Spacers 38 may be included on the center sill 32 and the draft arm assemblies 34 to align with and couple to the floor sheets 40. The cross bearers 36 include vertical connection plates 42 that allow for coupling to the side stakes 22 as best shown in figures 3 and 4. The underframe includes longitudinal stringers 44 extending from the end cross bearers 36 to the bolster 28 and from the bolster 28 to the end wall structure. The stringers 44 may be formed as channels, S-beam, or possibly t-sections or the like.

**[0081]** Figure 3 is a sectional end view taken through a cross bearer 36 of the gondola railcar 10 and Figure 4 is an enlarged sectional end view of the cross bearer 36 and side stake 22 coupling of the gondola railcar 10 according to

invention. As described above the I-Beam cross bearers 36 extend from the center sill 32 extending toward but stopping short of the inside of the side sheet 20. The floor sheets 40 also can stop short of the inside of the side sheet 20 as it need only extend to the coupling of the side sill 24, which is preferably either a pressed or structural angle as shown, alternatively, in figures 4 and 5. The side stakes 22 extend from the top chord 12 and are coupled to a cross bearer 36 through a vertical connection plate 42. A side stake cap 46 may be added to the side stakes 22, with weep holes therein to allow the egress of moisture. The side stakes 22 are preferably reinforced as shown in figures 6 and 7.

**[0082]** Figures 6 and 7 are enlarged perspective views of the reinforced side stake 22 construction of the gondola railcar 10. It is preferred if each side stake 22 includes a stub reinforcing plate 48 within the side stake 22 extending between the legs thereof and extending across the area of the side sill 24. The plate 48 is referenced as a stub plate as it does not extend the entire length of the side stake 24 but reinforces the area of the stake 22 around the side sill 24 through the bottom of the side stake 22. Figures 6 and 7 show a modified cap 46' that is fitted into the interior of the side stake 22 and the weep holes can easily be formed as beveled or cut off corners of the plate forming openings (weep holes) in the corners. The internal cap 46' offers some material savings over the cap 46 and the use of this type is most dependent upon the assembly time, namely the internal cap 46" is preferred if it does not add significant assembly time to the overall construction.

**[0083]** The present invention may be described as forming a modified open top gondola car 10 that includes top chord sections 12; a pair of end walls and side walls coupled to the top chord structure 12, wherein each sidewall includes a side sheet 20, a plurality of side stakes 22, 22' and 22" and side sill 24; and an underframe construction including a center sill 32 running the length of the car, bolsters 28 configured to be above truck assemblies and coupled to the center sill 32 and a plurality of lateral I-Beam cross bearers 36 that extend from the center sill 32 toward and stopping short of the inside of the side sheet 20, and wherein the cross bearers 36 include vertical connection plates 40 configured for coupling to side stakes 22 which are

positioned between the bolsters 28. Every side stake 22, 22' and 22" is welded to the top chord 12 and welded to the side sheet 16 and extending the full height of the side sheet 20. Side stake 22 and 22" extend past the floor to cross supporting structures of the underframe (bolster 28 and cross bearers 36).

**[0084]** With one modification end product railcar 10 described above the details of the modification program can be discussed. Figure 9 illustrates an existing railcar 60 with a cold formed center sill 32 known as the BETHGON II™ developed by the assignees of this application. Technically this car 60 may be described or defined as an aluminum outside stake body, double tub floor railcar with cold formed center sill designed primarily for carrying coal. Leasing agencies have this type of car 60 in surplus and efficient repurposing could be particularly useful.

**[0085]** The first step of the modification of car 60 according to the present invention is known herein as burn down in which the upper portion of the car is removed. The removed car components of car 60 are those components that will be reinstalled on the modification railcar 10 in addition to the trucks and center sill and draft assemblies (draft arm and coupler assemblies –if appropriate), such as the control valve, brake cylinder, hand brake, and reservoir. Mainly the brake system component, the draft system components and the truck system components. Other non-reused components of the railcar 60 may be repurposed or scrapped for salvage.

**[0086]** Figure 10 illustrates top and side views of a burned down or hulked center sill 32 and draft arm assembly 34 components of the railcar 60 of figure 9 and top and side views of the shortened, spliced, center sill 32 and draft arm or draft sill components 34 for a modification railcar 10 according to the present invention. The spliced center sill 32 included splicing patches 62 on a top and side surface of the center sill 32 and a reinforcement plate on the bottom of the center sill 32 at the splice location in accordance with AAR requirements (see rule 57 of the AAR field manual).

**[0087]** Figures 11 and 12 are perspective and side views of a center sill 32 coupling with a splice casting 64 for a modification according to the present invention. The present method may preferably implement the splicing casting

64 in place of the patches 62 to facilitate the attaching of the shortened center sill 32. The splice casting 64 has a center portion of 6-7" and the same profile as the exterior of the rolled formed center sill, with two end sections that telescope into the interior of the spliced center sill 32 sections as shown. The center portion of the splice casting 64 can theoretically be used to add length to the center sill 32, but it would be used to add lengths of a limited amount (2 feet or less). Typically, the splice casting 64 is only used for connection as the center section is only 6-7" in length and the total weight is preferably less than 100 LBS, and preferably less than 80 LBS. The size of the casting 64 is determined by the particular cold formed center sill 32 shape in the existing car 60.

**[0088]** The existing center sill 32, once sized to the desired length is inspected and must be free of damage and inspected for heat damage, cracks, nicks and gouges, and other damage including to damage to the splice patches 62 (if used), splice casting 64 (if used). The center bowl should also be inspected before proceeding. Further all areas in which the components of the railcar 60 were removed or cut away needs to be inspected. The modified center sill 32 must be straight to within 0.500" in 6'.

**[0089]** Once the unit is cut down the spliced center sill 32 is formed into the underframe of figure 2 and coupled to an upper railcar body portion to form the railcar 10 of figure 1. The spacers 38 would simply skip the area of the splice patches 62 if used. The existing trucks from the car 60 will be used as well in the modification gondola car 10. Portions of the original bolster 28 can be used to the extent they can conform to the final bolster 28 of figure 2. Any removed components that are reusable are attached to the railcar 10 generally around when the trucks are reinstalled on the railcar 10.

**[0090]** Figures 13 A and B are perspective views of a cast transition casting 66 for a fabricated draft arm 34 to cold formed center sill 32. Figure 14 is a sectional view of the cast transition casting 66 of figure 13. The cast transition casting 66 is a lightweight design and is generally under 75 LBS and preferably under 55LBS and allows for easy transition from fabricated end assemblies 34 (draft arm or draft sill) to the center sill 32. The casting 66 allows for replacement of either draft arm 34 in the modification and can be

used effectively in place of a splice casting 64 in cutting down a center sill 32 from the railcar 60.

**[0091]** Figure 15 is a perspective view of a center sill 32 and draft arm assembly using two of slightly different cast transition castings 66 for building a new railcar 10 or building a modification according to the present invention. In building a railcar as an entirely new car with castings 66, rather than a modification of a prior car 60, the castings 66 can facilitate the assembly of the car 10 and gives the designers an option for the draft arm assemblies 34.

**[0092]** In a modification configuration where both (or at least one) of the original draft arms 34 are maintained, a single casting 66 can still be used to couple (or splice) one draft arm 34 to the shortened center sill 32. In this mode the original center sill 32 is cut at the connection with one draft arm 34, the portion to be removed cut from the center sill 32 and the shortened center sill 32 is coupled to the coupler 64 through the use of the casting 66.

**[0093]** The modification methodology of the present invention is not limited to forming the one railcar 10 shown in figures 1-8, although that design has particular advantages in the marketplace. Figure 16 is a top and side view burned downed or hulked center sill 32 and draft arm 34 components from the railcar 60 of figure 9 which have been shortened, spliced (with patches 62) for a modification railcar known as a VERSAFLOOD™ Hybrid railcar discussed below in connection with figure 19A. The castings 64 or 66 may be used in this modification as well. The VERSAFLOOD™ Hybrid railcar may be described as an outside stake, three hopper railcar with steel hoppers and outside stake aluminum upper sheets having a cold formed center sill.

**[0094]** Additionally with the castings 64 and 66 it is possible to lengthen the center sill 32 with intervening added sections and using the castings 66 and possibly 64.

**[0095]** The existing BETHGON II™ style car 60 may be described as an open top, all steel underframe with through center sill (preferably a cold formed center sill 32), aluminum outside stake, one piece aluminum side, flat intermediate floor, two interior K braces with three additional top ties (separate from the K braces), twin aluminum rounded bottom tubs railcar 60 designed primarily for carrying coal can be effectively modified. This definition defines a

type of car suitable for modification under the present invention, even if some of the defined structural elements of this definition are ultimately scrapped in the process.

**[0096]** The existing railcar 60 is modified to form a modified railcar 10 or 62 which is one of the following gondola, open top hopper and covered hopper railcar types:

**[0097]** i) A gondola, aggregate car 10 of figures 1-8 described above (and also figure 23A in slightly modified form and bearing reference numeral 62) may be formed, which car 10 (or 62 for figure 23A) can also be defined as an open top, flat bottom gondola preferably with a cold formed center sill 32, with no interior bracing, pinned top chord connections, and end lower slope plates and four corner cleanout doors for ease of cleaning, primarily designed for hauling aggregate. Generally the process is as described above, namely the components that are to be reused are removed from the car 60 of figure 9 and the cut down hulk of figure 10 is formed as discussed above, then the underframe of figure 2 (or figure 23B) is formed then the upper body and reused components added as generally shown in figure 1 (or figure 23A).

**[0098]** ii) A gondola, 52' or 66' mill car 62 shown in figures 36A and 37A respectively, each of which car 62 can also be defined as an open top, flat bottom gondola preferably with a cold formed center sill 32, with no interior bracing, pinned top chord connections, and end lower slope plates, welded and mechanically fastened sides, and designed for general gondola service. Generally the process is analogous to that described above, namely the components that are to be reused for car 62 are removed from the car 60 of figure 9 and the cut down hulk of figure 10 is formed as discussed above. There may be minor variations in the hulk from that shown in figure 10 but the figure shows the main structural components of this modification. Then the underframe 64 of figure 36B or 37B, respectively, is formed then the upper body and reused components added as generally shown in the car design of figures 36A and 37A respectively.

**[0099]** iii) A gondola, C&D car 62 shown in figure 35A may be formed from car 60 and the gondola, C&D car 62 can also be defined as an open top, flat bottom gondola preferably with a cold formed center sill 32, with no interior

bracing, pinned top chord connections, and end lower slope plates, welded and mechanically fastened sides, tapered sides stakes, and designed for construction and debris material service. Again the process is analogous to that described above, namely the components that are to be reused for car 62 of figure 35A are removed from the car 60 of figure 9 and the cut down hulk having the main structural components of figure 10 is formed as discussed above. Then the underframe 64 of figure 35B is formed then the upper body and reused components added as generally shown in the car design of figure 35A.

**[00100]** iv) A gondola, eastern coal car 62 design shown in figure 32A may be formed and the gondola, eastern coal car 62 design can be defined herein as an open top, all steel underframe with through preferably cold formed center sill 32, steel outside stake, two piece composite side with lower margin stainless steel and upper margin aluminum, slopped intermediate floor, two interior K braces with three additional top ties (separate from the K braces), twin stainless steel rounded bottom tubs designed primarily for carrying coal. The process is analogous to, but slightly different from that described above, namely the components that are to be reused for car 62 of figure 32A are removed from the car 60 of figure 9 and the cut down hulk having the main structural components of figure 17 is formed analogous to the process described above in connection with figure 10. Then the underframe 64 of figure 32B is formed followed by the upper body and reused components being added as generally shown in the car design of figure 32A.

**[00101]** v) A gondola, ore car 62 design shown in figure 33A may be formed and the gondola ore car 62 design can also be defined as an open top, flat bottom gondola preferably with a cold formed center sill 32, with no interior bracing, pinned top chord connections, and end lower slope plates, tapered sides stakes, and designed for hauling ore. The process again is analogous to, but slightly different from that described above, namely the components that are to be reused for car 62 of figure 33A are removed from the car 60 of figure 9 and the cut down hulk having the main structural components of figure 16 is formed analogous to the process described above in connection with figures 10 and 17. Then the underframe 64 of figure 33B is formed

followed by the upper body and reused components being added as generally shown in the car design of figure 33A.

**[00102]** vi) An open top hopper, 4200 cf (western) as shown in figure 22A or 4221 cf (eastern) as shown in figure 34A , modification car 62 may be formed. This modification car 62 type may be defined as an open top three pocket hopper car, all steel underframe, stainless steel body, fastened side construction, through center sill (preferably cold formed center sill 32) and designed for hauling coke and similar lading. The process again is analogous to that described above, namely the components that are to be reused for car 62 of one of figures 22A or 34A are removed from the car 60 of figure 9 and the cut down hulk having the main structural components of figure 17 is formed analogous to the process described above in connection with figure 10. Then the underframe 64 of one of figures 22B or 34B is formed followed by the upper body and reused components being added as generally shown in the car design of one of figures 22A or 34A.

**[00103]** vii) An open top hopper, taconite ore modification car 62 as shown in figure 26A may be formed and open top hopper, taconite ore modification car 62 may be defined as an open top, four longitudinal doors, hopper car, all steel construction, fastened side construction, through center sill (preferably cold formed center sill 32) and designed for hauling ore, specifically taconite ore. The process is analogous to that described above, namely the components that are to be reused for car 62 of figure 26A are removed from the car 60 of figure 9 and the cut down hulk having the main structural components of figure 17 is formed analogous to the process described above in connection with figure 10. Then the underframe 64 of figure 26B is formed followed by the upper body and reused components being added as generally shown in the car design of figure 26A.

**[00104]** viii) An open top hopper, ballast modification car 62 as shown in figure 28A may be formed and open top hopper, ballast modification car 62 may be defined as an open top, four longitudinal ballast outlet gates (8 doors), hopper car, all steel construction, fastened side construction, through center sill (preferably cold formed center sill 32) and designed for hauling ballast. The process is analogous to that described above, namely the components

that are to be reused for car 62 of figure 28A are removed from the car 60 of figure 9 and the cut down hulk having the main structural components of figure 17 is formed analogous to the process described above in connection with figure 10. Then the underframe 64 of figure 28B is formed followed by the upper body and reused components being added as generally shown in the car design of figure 28A.

**[00105]** ix) An open top hopper, aggregate hopper, transverse door (a steel or stainless steel version shown in figure 18A or a hybrid version shown in figure 19A) modification car may be formed which can also be defined as an open top, hopper, all steel underframe, three hopper pockets, fastened side construction, through center sill (preferably cold formed center sill 32), with pneumatic door operating system for independent or simultaneous door operation with integrated touch panel control, and designed for hauling aggregate. The process again is analogous to that described above, namely the components that are to be reused for car 62 of one of figures 18A or 19A are removed from the car 60 of figure 9 and the cut down hulk having the main structural components of figure 16 is formed analogous to the process described above in connection with figures 10 or 17. Then the underframe 64 of one of figures 18B or 19B is formed followed by the upper body and reused components being added as generally shown in the car design of one of figures 18A or 19A.

**[00106]** x) An open top hopper, aggregate hopper, longitudinal door (hybrid version shown in figure 20A, steel or stainless steel version shown in figure 27A) modification car 62 may be formed which can also be defined as an open top, hopper, all steel underframe, four hopper pockets, fastened side construction, through center sill (preferably cold formed center sill 32), with pneumatic door operating system for independent or simultaneous door operation with integrated touch panel control, and designed for hauling aggregate. The process again is analogous to that described above, namely the components that are to be reused for car 62 of one of figures 20A or 27A are removed from the car 60 of figure 9 and the cut down hulk having the main structural components of figure 17 is formed analogous to the process described above in connection with figure 10. Then the underframe 64 of one

of figures 20B or 27B is formed followed by the upper body and reused components being added as generally shown in the car design of one of figures 20A or 27A.

**[00107]** xi) A covered hopper, 3282cf sand, cement or roofing granule modification car 62 as shown in figure 21A may be formed and which can be defined as all steel underframe, through center sill (preferably a cold formed center sill 32), two bolt on hopper gates, welded curved roof, welded curved side construction, and round loading hatches designed primarily for hauling sand, cement or roofing granules. The process is analogous to that described above, namely the components that are to be reused for car 62 of figure 21A are removed from the car 60 of figure 9 and the cut down hulk having the main structural components of figure 17 is formed analogous to the process described above in connection with figure 10. Then the underframe 64 of figure 21B is formed followed by the upper body and reused components being added as generally shown in the car design of figure 21A.

**[00108]** xii) A covered hopper, 4300 cf potash modification car 62 as shown in figure 29A may be formed which can be defined as all steel underframe, through center sill (preferably a cold formed center sill 32), three bolt on hopper gates, welded curved roof, welded curved side construction, and longitudinal trough loading hatches designed primarily for potash. The process is analogous to that described above, namely the components that are to be reused for car 62 of figure 29A are removed from the car 60 of figure 9 and the cut down hulk having the main structural components of figure 17 is formed analogous to the process described above in connection with figure 10. Then the underframe 64 of figure 29B is formed followed by the upper body and reused components being added as generally shown in the car design of figure 29A.

**[00109]** xiii) A covered hopper, 4300 cf soda ash modification car 62 as shown in figure 30A which can be defined as all steel underframe, through center sill (preferably a cold formed center sill 32), three bolt on hopper gates, welded curved roof, welded curved side construction, and round loading hatches designed primarily for hauling soda ash. The process is analogous to that described above, namely the components that are to be reused for car 62

of figure 30A are removed from the car 60 of figure 9 and the cut down hulk having the main structural components of figure 17 is formed analogous to the process described above in connection with figure 10. Then the underframe 64 of figure 30B is formed followed by the upper body and reused components being added as generally shown in the car design of figure 30A.

**[00110]** xiv) A covered hopper, 5200 cf version shown in figure 24A or 5400cf version shown in figure 31A, grain modification car 62 may be formed and may be defined as all steel underframe, through center sill (preferably a cold formed center sill 32), three bolt on hopper gates, welded curved roof, welded curved side construction, and longitudinal trough loading hatches designed primarily for grain. The process again is analogous to that described above, namely the components that are to be reused for car 62 of one of figures 24A or 31A are removed from the car 60 of figure 9 and the cut down hulk having the main structural components of figure 17 is formed analogous to the process described above in connection with figure 10. Then the underframe 64 of one of figures 24B or 31B is formed followed by the upper body and reused components being added as generally shown in the car design of one of figures 24A or 31A.

**[00111]** xv) A covered hopper, DDG modification car 62 may be formed as shown in figure 25A and which can be defined as all steel underframe, through center sill (preferably a cold formed center sill 32), four bolt on hopper gates, welded curved roof, welded curved side construction, and longitudinal trough loading hatches designed primarily for dried distillers grain (DDG). The process again is analogous to that described above, namely the components that are to be reused for car 62 of figure 25A are removed from the car 60 of figure 9 and the cut down hulk having the main structural components of figure 16 is formed analogous to the process described above in connection with figures 10 or 17. Then the underframe 64 of figure 25B is formed followed by the upper body and reused components being added as generally shown in the car 62 design of figure 25A.

**[00112]** xvi) A covered hopper, pellet modification car defined as all steel underframe, stub center sill (preferably a cold formed center sill 32), four bolt on hopper gates, welded curved roof, welded curved side construction, and

round loading hatches designed primarily for plastic pellets. The process again is analogous to that described above, namely the components that are to be reused for known pellet car configuration are removed from the car 60 of figure 9 and the cut down hulk having the main structural components of figure 10. Then the underframe for the conventional pellet car is formed followed by the upper body and reused components being added to form the pellet car.

**[00113]** Although the present invention has been described with particularity herein, the scope of the present invention is not limited to the specific embodiment disclosed. It will be apparent to those of ordinary skill in the art that various modifications may be made to the present invention without departing from the spirit and scope thereof. The scope of the present invention should be defined by the appended claims and equivalents thereto.

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>					
<b>Filing Date:</b>					
<b>Title of Invention:</b>	METHOD AND CAST COMPONENTS FOR COLD FORMED CENTER SILL RAIL CAR MODIFICATION PROGRAMS AND RAILCARS FORMED THEREBY				
<b>First Named Inventor/Applicant Name:</b>	Cloyd Wirick				
<b>Filer:</b>	Blynn L. Shideler/Catherine Belleci				
<b>Attorney Docket Number:</b>	JAC-FCA-1802				
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<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>	
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Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
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<b>Title of Invention:</b>	METHOD AND CAST COMPONENTS FOR COLD FORMED CENTER SILL RAIL CAR MODIFICATION PROGRAMS AND RAILCARS FORMED THEREBY
<b>First Named Inventor/Applicant Name:</b>	Cloyd Wirick
<b>Customer Number:</b>	36787
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	aia0014_FCA-1802.pdf	1792953	no	9
			5ab5fb3212774ca7fcd1b764c68508197fe94076		
<b>Warnings:</b>					
<b>Information:</b>					
2	Drawings-only black and white line drawings	ProvFigs1-37_JAC-FCA-1802.pdf	9518269	no	28
			cf755335c10bc9995075ddec368a3c8b051720eb		
<b>Warnings:</b>					
<b>Information:</b>					
3		REBUILD2018FinalMarch30.pdf	126055	yes	24
			a4f0f423082af0cb0dda7f33b8f8d195bddd689dc		
<b>Multipart Description/PDF files in .zip description</b>					
<b>Document Description</b>			<b>Start</b>	<b>End</b>	
Abstract			24	24	
Claims			23	23	
Specification			1	22	
<b>Warnings:</b>					
<b>Information:</b>					
4	Fee Worksheet (SB06)	fee-info.pdf	29813	no	2
			743a886ee5dceb9f2e7b2d6d8ba69bb1d5caf031		
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