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PATENT NUMBER: ***8166892***
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UNITED STATES PATENT AND TRADEMARK OFFICE · DEPARTMENT OF COMMERCE

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FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

PTO/SB/14 (07-07)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	200405.00128
	Application Number	
Title of Invention	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR	

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.
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Applicant Information:

Applicant 1 Remove

Applicant Authority	◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	James	W.	Forbes	

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

City		Country Of Residence[i]	CA
Citizenship under 37 CFR 1.41(b)[i]	CA		

Mailing Address of Applicant:

Address 1	15 Glenron Rd., RR #2		
Address 2			
City	Campbellville	State/Province	ON
Postal Code	L0P 1B0	Country[i]	CA

Applicant 2 Remove

Applicant Authority	◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Marcus		Thiesen	

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

City	Hamilton	Country Of Residence[i]	CA
Citizenship under 37 CFR 1.41(b)[i]	CA		

Mailing Address of Applicant:

Address 1	31 Stirton St		
Address 2			
City	Hamilton	State/Province	ON
Postal Code	L8L 6E7	Country[i]	CA

Applicant 3 Remove

Applicant Authority	◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Dave		Keats	

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

City	Brantford	Country Of Residence[i]	CA

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Citizenship under 37 CFR 1.41(b) [i]	CA		
Mailing Address of Applicant:			
Address 1	11 Digby Court		
Address 2			
City	Brantford	**State/Province**	ON
Postal Code	N3P 2A6	**Country**[i]	CA

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

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	21324		
Email Address	patents@hahnlaw.com	Add Email	Remove Email

Application Information:

Title of the Invention	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR		
Attorney Docket Number	200405.00128	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		**Sub Class (if any)**	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	18	**Suggested Figure for Publication (if any)**	

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.

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Customer Number	21324

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this 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(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)

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This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. 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(a).

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Application Number	Country [i]	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			◯ Yes ◉ No

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Assignee 1 Remove

If the Assignee is an Organization check here. ☒			
Organization Name	NATIONAL STEEL CAR LIMITED		
Mailing Address Information:			
Address 1	602 Kenilworth Avenue North		
Address 2			
City	Hamilton	**State/Province**	ON
Country [i] CA		Postal Code	L8N 3J4
Phone Number		Fax Number	
Email Address			

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

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.

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Signature	/Michael H. Minns/			Date (YYYY-MM-DD)	2009-09-14
First Name	Michael H.	Last Name	Minns	Registration Number	31985

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.**

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RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR

[0001] This application claims priority under 35 USC 119 on the basis of Canadian Patent Application Serial Number 2,___,_____, (such number to be entered by preliminary amendment when known) entitled "Railroad Gondola Car Structure and Mechanism Therefor" filed September 11, 2009, the specification of which is incorporated herein by reference.

Field of the Invention

[0002] This invention relates to the field of railroad freight cars, and, in particular to rail road gondola cars such as may employ bottom unloading gates or doors.

Background

[0003] There are many kinds of rail road cars for carrying particulate material, be it sand or gravel aggregate, plastic pellets, grains, ores, potash, coal or other granular materials. Many of those cars have an upper opening, or accessway of some kind, by which the particulate is loaded, and a lower opening, or accessway, or gate, or door by which the particulate material exits the car under the influence of gravity. While the inlet opening need not necessarily have a movable gate, the outlet opening requires a governor of some kind that is movable between a closed position for retaining the lading while the lading is being transported, and an open position for releasing the lading at the destination. The terminology "flow through" or "flow through rail road car" or "center flow" car, or the like, may sometimes be used for cars of this nature where lading, typically particulate lading, is introduced at the top, and flows out at the bottom.

[0004] Discharge doors for gondola cars or other bottom dumping cars may tend to have certain desirable properties. First, to the extent possible it is usually desirable for the door opening to be large so that unloading may tend to be relatively fast, and for the sides of any unloading chute to be relatively steep so that the particulate will tend not to hang up on the slope. Further, to the extent that the door can be large and the slope sheets steep, the interior of the car may tend to have a greater lading volume for a given car length. Further still, any increase in lading achieved will tend to be at a relatively low height relative to Top of Rail (TOR) and so may tend to aid in maintaining a low center of gravity. A low center of gravity tends to yield a better riding car that is less prone to derailment, and perhaps less prone to cause as much wear or damage to tracks.

[0005] For a given length of car, hopper volume, and hence overall car volume, can be maximized by reducing the proportion of the length of the car occupied by the trucks, and occupied by the door opening drive mechanism. Furthermore, where the lading to be carried by the car is of greater than usual density, it may often be helpful for the truck center length to be relatively short such that the length of the span between the trucks is smaller, and the weight of

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the structure may be correspondingly decreased relative to the maximum permissible gross weight on rail for the car. In some instances, as with iron ore or other high density lading, that truck center distance may be very short.

[0006] It may also be that in some circumstances ore cars are used in quasi-permanent sets that form a unit train. The unit train may tend to follow a single route for substantially its entire operational service life. In the case of an ore car, that operational route may be from a mine or concentrator facility, at which the cars receive the lading; to a discharge facility, whether a mill or a break of bulk terminal at a port. In these circumstances the line may be owned by the mine or mill, and the cars may not necessarily be used for interchange service. To the extent that they are not used for interchange service they may not necessarily comply with all AAR standards. The cars may have short, possibly non-standard draft sills, draft gear, and couplers, or a combination thereof.

[0007] The cars may have tightly limited space envelopes over the end shear plates, and yet these spaces may nonetheless be intended to accommodate, for example, the brake reservoir and pneumatic gear for operating the gondola discharge doors.

Summary of the Invention

[0008] In an aspect of the invention there is a railroad hopper car. It has at least one hopper having a bottom discharge, the bottom discharge including a door movable between a closed position for retaining lading and an open position for permitting egress of lading. The hopper is carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of the car. The hopper has at least a first end slope sheet inclined downwardly in the lengthwise direction toward the door. There is a linkage connected to the door. The linkage is oriented lengthwise with respect to the car. A drive is connected to the linkage. The drive is operable to move the linkage and thereby to urge the door to a closed position. The linkage is movable from a first position corresponding to the open position of the door to a second position corresponding to the closed position of the door. The linkage includes at least a drag link. When the linkage moves from the first to the second position one of (a) the overall motion from the first to the second position includes displacement of the drag link in a direction having a predominant component of motion parallel to the first end slope sheet; and (b) the motion of the drag link is at least instantaneously parallel to the first end slope sheet.

[0009] In another feature of that aspect of the invention the linkage includes a first pivot arm pivotally connected to a datum structure at a first pivot connection. The drive is also mounted to the datum structure. The linkage includes a second pivot arm pivotally connected to the datum structure at a second pivot connection. The second pivot arm has the door mounted thereto. The first pivot arm has a second connection distant from the first pivot connection. The second pivot arm has a second connection distant from the second pivot connection. A

mechanical transmission is mounted between the second connection of the second pivot arm and the second connection of the first pivot arm. The mechanical transmission includes the drag link. The drive is connected to move the first pivot arm, and, in moving from the first position to the second position, each position of the first pivot arm being associated with a unique position of the drag link. In a further feature, the linkage includes left and right hand first pivot arms pivotally connected to a datum structure at respective first pivot connections, the respective first pivot connections being co-axial. The linkage includes left and right hand second pivot arms pivotally connected to the datum structure at respective second pivot connection. The door is a left hand door of a pair of co-operable right and left hand doors, the left hand door being mounted to the left hand second pivot arm and the right hand door being mounted to the right hand second pivot arm. Each first pivot arm has a respective second connection distant from its respective first pivot connection, the respective second connections being pivot connections and being mutually co-axial. Each second pivot arm has a respective second connection distant from the respective second pivot connection. A mechanical transmission is mounted between the respective second connections of the second pivot arms and the respective second connections of the first pivot arms. The drag link is a left hand drag link, and the mechanical transmission includes a mated parallel right hand drag link. The left and right hand drag links each have a first end mounted to one of the respective second connections of the first pivot arms. The left and right hand drag links have second ends yoked together distantly from the first ends. The transmission member includes left and right hand slave links extending between and connecting the second ends of the drag links to the second connections of the second pivot arms respectively.

[0010] In still another feature, the linkage includes left and right hand first pivot arms pivotally connected to a datum structure at respective first pivot connections, the respective first pivot connections being co-axial. The linkage includes left and right hand second pivot arms pivotally connected to the datum structure at respective second pivot connection. The door is a left hand door of a pair of co-operable right and left hand doors, the left hand door being mounted to the left hand second pivot arm and the right hand door being mounted to the right hand second pivot arm. Each first pivot arm has a respective second connection distant from its respective first pivot connection, the respective second connections being pivot connections and being mutually co-axial. The left and right hand pivot arms co-operate to define a bifurcated lever straddling the drive. In yet another feature, the drive includes an actuating cylinder having an axially reciprocating member, the axially reciprocating member being inclined relative to horizontal. In still another feature the drag link lies between the actuating cylinder and the first end slope sheet of the hopper. In another feature the railroad hopper car includes a first end section, the first end section includes a draft sill and a substantially horizontal shear plate

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mounted over the draft sill, the drive includes an actuating cylinder having an axis of reciprocation lying in a central vertical-lengthwise plane of the car, the actuating cylinder is mounted above the shear plate, the first end slope sheet at least partially overhangs the actuating cylinder; and the drag link is located between the actuating cylinder and the first slope sheet.

[0011] In another aspect of the invention there is a railroad hopper car. It has at least one hopper having a bottom discharge, the bottom discharge including a gate movable between a closed position for retaining lading and an open position for permitting egress of lading. The car includes structure by which the hopper is carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of the car. A door operating linkage is connected to the gate, the door operating linkage being oriented lengthwise with respect to the car. An actuating cylinder connected to drive the door operating linkage, the actuating cylinder also being oriented to act lengthwise with respect to the car, the actuating cylinder having an axis of reciprocation. The axis of reciprocation being tilted such that displacement of the actuating cylinder includes a vertical component of motion.

[0012] In another feature of that aspect of the invention, the hopper car includes an end section mounted over one of the trucks, the end section includes a substantially horizontal shear plate, and the actuating cylinder is mounted on a pedestal mounted to the shear plate, the pedestal including an inclined mounting for the cylinder. In a further feature, the railroad hopper car has a longitudinal-vertical central plane, and the axis or reciprocation lies in the longitudinal-vertical plane. In a still further feature, the hopper includes at least a first end slope sheet extending longitudinally and being inclined longitudinally inboard and downwardly toward the gate, and at least part of the actuating cylinder is overhung by at least part of the first end slope sheet. In a yet further feature, the hopper car includes an end section having a substantially horizontal shear plate mounted over a draft sill. The hopper includes a first end slope sheet, the first end slope sheet at least partially overhanging the horizontal shear plate. The actuating cylinder is mounted above the shear plate, centrally aligned over the draft sill. The actuating cylinder is at least partially overhung by the first end slope sheet. In still yet anther further feature the first slope sheet is substantially planar and has a first angle of inclination relative to horizontal. The actuating cylinder is inclined longitudinally inboard downwardly, and is inclined at a second angle. The second angle lies between horizontal and the first angle. In yet another feature the car has an underframe and the door operating linkage includes a first linkage component, a second linkage component, a third linkage component, and a fourth linkage component. The first linkage component is a reference datum component and includes structure immovable relative to the underframe. The second linkage component is a first pivot linkage mounted to the first linkage component at a main pivot connection, the first pivot linkage being a first pivot arm constrained to pivot on an axis of rotation oriented horizontally cross-wise

relative to the underframe. The fourth linkage component is a second pivot linkage pivotally mounted to the first linkage component and includes at least the gate. The third linkage component includes a drag link element connected to the first pivot arm, the drag link element having at least a first pivotal attachment to at least a portion of the fourth linkage component, whereby input motion of the second linkage component uniquely determines position and motion of the third and fourth linkage components relative to the first linkage component. Motion of the second linkage component is driven by the actuator. In still another feature the main pivot connection of the first pivot arm to the first linkage component is located lower than the actuating cylinder. In yet still another feature, the drag link element is connected to the first pivot arm at a distal pivot connection relative to the main pivot connection, and, when the gate is in the closed position and the car is viewed in side view, the actuating cylinder is located between the main pivot connection and the distal pivot connection.

[0013] In another aspect there is a railroad hopper car. It has at least one hopper having a bottom discharge, the bottom discharge including a gate movable between a closed position for retaining lading and an open position for permitting egress of lading. It has first and second end sections to which the hopper is mounted, the first and second end sections being mounted to respective first and second railroad car trucks for rolling motion along railroad tracks in a lengthwise direction of the car. There is a door operating linkage connected to the gate, the door operating linkage being oriented lengthwise with respect to the car and connected. An actuating cylinder is connected to drive the door operating linkage. The actuating cylinder is also oriented to act in a lengthwise extending plane with respect to the car. The actuating cylinder has an axis of reciprocation. The door operating linkage includes a first pivot arm pivotally mounted to the first end section at a first pivot connection. There is a mechanical transmission connected between the first pivot arm and the gate. The mechanical transmission includes at least a drag link movably connected to the first pivot arm at a location distant from the first pivot connection. The first pivot connection is lower than the actuating cylinder as seen when viewing the first end section in side view.

[0014] In another feature of that aspect of the invention, when the gate is in the closed position and the car is viewed in side view, the actuating cylinder is located between the main pivot connection and the distal pivot connection. In still another feature, the actuating cylinder drives an intermediate lever that is connected to drive the first pivot arm.

[0015] In another aspect of the invention there is a rail road hopper car. It has a hopper carried between a pair of trucks, the hopper having first and second upstanding sidewalls running lengthwise therealong. The hopper has a lower discharge and convergent slope sheets giving onto the discharge. The rail road car has a side sill and a top chord. The first upstanding sidewall extends from the side sill to the top chord. The first upstanding sidewall has a

predominantly upwardly running sidewall stiffener mounted thereto. The sidewall stiffener is located at a longitudinal station intermediate the trucks. The first upstanding sidewall has a first region, the first region being a lower region thereof. The first upstanding sidewall has a second region. The second region is an upper region thereof. The sidewall stiffener has a first portion, the first portion being a lower portion thereof. The first portion is mounted to the first region of the first upstanding sidewall. The sidewall stiffener has a second portion, the second portion being an upper portion thereof. The second portion is mounted to the second region of the upstanding sidewall. The first portion of the first upstanding sidewall stiffener is laterally outboard of the first region of the first upstanding sidewall. The second portion of the sidewall stiffener is laterally inboard of the second region of the first upstanding sidewall. The sidewall has a continuous section between the first and second regions thereof. The sidewall stiffener has web continuity between the first and second portions thereof.

[0016] In a feature of that aspect of the invention, the first and second portions of the sidewall stiffener are substantially co-planar, and are substantially vertically aligned when seen in a sectional view looking along the car. In another feature, the first upstanding sidewall has a third region intermediate the first and second regions. The third region includes a side sheet transition portion passing across the sidewall stiffener from an inboard margin thereof to an outboard margin thereof, and the stiffener has vertical web continuity through the transition portion. In another feature, the first upstanding sidewall has a third region intermediate the first and second regions. The third region includes a side sheet transition portion passing across the sidewall stiffener from an inboard margin thereof to an outboard margin thereof. The hopper includes first and second sloped side sheets. The first sloped side sheet meets the first sidewall at the transition portion. In another feature, the first sidewall has an overall height from the side sill to the top chord, L, and the transition is located a distance above the side sill that is in the range of ¼ to 2/3 L. In a still further feature the first sidewall has an overall height from the side sill to the top chord, L, and the first sloped sheet meets the transition at an height that is in the range of ¼ to 2/3 L above the side sill.

[0017] In a further aspect of the invention there is a railroad hopper car. It has at least one hopper having a bottom discharge, the bottom discharge having a bottom discharge governor movable between a closed position for retaining lading and an open position for permitting egress of lading. The car has structure by which the hopper is carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of the car. The hopper has a door operating linkage oriented lengthwise with respect to the car. There is an actuating cylinder also oriented to act in a lengthwise extending plane with respect to the car, the actuating cylinder being connected to drive the door operating linkage. The door operating linkage includes a pair of first and second linkage members co-operably mounted to either

transverse side of the actuating cylinder, whereby the actuating cylinder is bracketed by the linkage members.

[0018] In another feature of that aspect of the invention, the car has an underframe and the linkage is a closed loop bar linkage in which there is a first linkage component, a second linkage component, a third linkage component, and a fourth linkage component. The first linkage component is a reference datum component and includes structure immovable relative to the underframe. The second linkage component is a first pivot linkage mounted to the first linkage component at a main pivot connection, and which includes the first and second linkage members, the first and second linkage members being a matched pair of left and right hand pivot arms constrained to pivot on a common axis of rotation relative to the underframe. The fourth linkage component is a second pivot linkage pivotally mounted to the first linkage component and which includes at least one pivotally mounted door assembly defining the bottom discharge governor. The third linkage component includes a drag link element having at least a first pivotal attachment to at least a portion of the fourth linkage component, whereby input motion of the second linkage component uniquely determines position and motion of the third and fourth linkage components relative to the first linkage component. Motion of the second linkage component is driven by the actuator.

[0019] In another feature the hopper includes a hopper end slope sheet. The end slope sheet extends substantially in a plane inclined downwardly and lengthwise inwardly toward the bottom discharge. Displacement of the third linkage component associated with motion of the door assembly between the open position is predominantly in a direction generally parallel to the end slope sheet. In another feature the hopper includes a hopper end slope sheet. The end slope sheet extends substantially in a plane inclined downwardly and lengthwise inwardly toward the bottom discharge. During at least an instantaneous portion of motion of the third linkage component while the door assembly is in a position between the open position and the closed position the third linkage component moves parallel to the end slope sheet. In still another feature the third linkage component includes at least a first element and a second element mounted thereto. The first element is pivotally mounted to the first linkage component, and is constrained to move in a lengthwise-vertical plane relative to the first linkage component. The second element has a first connection to the first component the first connection being a pivot connection. The second element has a second connection to the fourth linkage component, the second connection having at least one degree of freedom of motion. The second element is constrained always to be co-planar with the first connection, the second connection, and the main pivot connection. In yet still another feature, the bottom discharge governor includes a door. The actuating cylinder is connected to drive the door operating linkage through a lever assembly. The lever assembly has an over-center lock that is operable to prevent release of the bottom gate

to the open position when the actuating cylinder is inactive. In yet a further feature, motion of the first pivot linkage occurs in a longitudinal-vertical plane. The second pivot linkage moves in a plane generally cross-wise to the longitudinal-vertical plane. In still a further feature the main pivot connection is beneath the actuating cylinder when the hopper car is seen in side view. In again another feature one of (a) the main pivot is beneath the drag link element; and (b) the actuating cylinder is between the main pivot and the drag link element. In a yet still further feature, the hopper includes at least a first end slope sheet, and the bottom discharge governor includes a door. The first end slope sheet is inclined longitudinally downwardly and inboard toward the door. The drag link element is inclined on a slope predominantly parallel to, and adjacent to, the first end slope sheet. The actuating cylinder is oriented along the lengthwise direction, and is also tilted longitudinally downwardly and inwardly toward the door.

[0020] In another aspect of the invention there is a railroad hopper car. It has at least one hopper carried by railroad car trucks for motion in a lengthwise direction of the car along railroad tracks. The hopper has a bottom discharge. The bottom discharge has a door movable between a closed position for retaining lading and an open position for permitting egress of lading. A mechanical transmission is connected to the door. The mechanical transmission is oriented lengthwise with respect to the car. A door actuator is connected to the mechanical transmission and is operable to urge the door from the open position toward the closed position, the door actuator being oriented to reciprocate in a first direction. The hopper car has a first lock operable to prevent movement of the door from the closed position to the open position when the door actuator is inactive. The hopper car has a second lock operable to prevent movement of the door from the closed position to the open position when the door actuator is inactive if the first lock should fail. The second lock is movable between an engaged position in which it prevents movement of the door to the open position thereof. In moving between the engaged and disengaged positions, the second lock has a displacement that is predominantly cross-wise to the first direction of the reciprocation of the door actuator.

[0021] In another feature of that aspect of the invention, the car has a central lengthwise-vertical plane, the door actuator is positioned to reciprocate in the central lengthwise-vertical plane, and the second lock is movable between the engaged and disengaged positions in motion predominantly transverse to the central lengthwise-vertical plane. In another feature, the second lock is mounted on an hinge and pivots in a circumferential direction between the engaged and disengaged positions. In still another feature the second lock is mounted on an hinge, the hinge has an axis lying parallel to the lengthwise vertical plane, and the second lock pivots circumferentially between the engaged and disengaged positions. In another feature, the second lock is biased toward the engaged position. In still another feature, the second lock is biased toward the engaged position. In yet another feature the apparatus is one in which one of: (a) the

second lock has a cam and the actuator has a mating cam follower; and (b) the second lock has a cam follower and the actuator has a mating cam. The cam and cam follower are co-operable, and are oriented to deflect the second lock away from the engaged position as the door moves from the open position to the closed position thereof.

[0022] In another aspect of the invention, there is a lock mechanism for a door actuating transmission of a railroad gondola car, the door actuating transmission including a reciprocating actuating cylinder mounted to a datum structure, the cylinder being movable forward and backward in an axial direction. The lock mechanism has a body having a first fitting, a second fitting and a third fitting. The first fitting is a mounting by which to connect the lock mechanism to the datum structure. The second fitting is one of (a) a cam for co-operation with a member of the door actuating transmission, that member being a cam follower; and (b) a cam follower for co-operation with a member of the door actuating transmission, that member being a cam. The third fitting includes an abutment for co-operation with a mating fitting of the door actuating transmission. The third fitting is movable between a first position and a second position, in the first position the abutment being presented to obstruct motion of the mating fitting of the door actuating transmission and thereby to prevent the door from moving to an open position thereof. The second fitting is movable between a first position and a second position, in the first position thereof the second fitting being positioned to intercept the member of the door actuating transmission and to be deflected away from the first position toward the second position thereby. The first fitting has a first degree of freedom of motion permitting the first and second fittings to move between their respective first and second positions. The degree of freedom constrains the third fitting to motion predominantly cross-wise to the axial direction.

[0023] In another feature, the lock mechanism there has a bias member oriented to urge the third fitting toward the first position thereof. The bias member is a spring having a first end and a second end, the first end being mounted to bear against the body of the lock mechanism, the second end having a foot for reaction against the datum structure. In another feature, the first degree of freedom of motion is an angular degree of freedom, and the predominantly cross-wise motion is predominantly circumferential motion about an axis of rotation. In a feature the first fitting is an hinge, the axis of rotation is an axis of rotation of the hinge, and the axis of rotation of the hinge is substantially parallel to the axial direction of the door actuating transmission. In still another further feature, the first fitting of the lock mechanism includes an hinge and a footing of the hinge for mounting to the datum structure. The axis of rotation is an axis of rotation of the hinge, and the footing has a substantially planar footprint. The axis of rotation of the hinge is angularly inclined relative to the substantially planar footprint. In yet another feature, the lock mechanism has all or any combination of the forgoing additional features.

[0024] In still another aspect of the invention there is a railroad hopper car for carrying

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particulate material. The hopper car there has a hopper and first and second end sections for carriage by respective first and second rail road car trucks for rolling motion along railroad tracks in a longitudinal direction. The hopper is suspended between the first and second end sections. The hopper has a discharge section through which to release lading, and first and second end slope sheets oriented toward the first and second end sections, the slope sheets being inclined in the longitudinal direction to feed the discharge section. The first end section includes a draft sill extending in the longitudinal direction, a main bolster extending cross-wise to either side of the draft sill, and a shear plate mounted to the draft sill and to the main bolster. The shear plate extends lengthwise along the draft sill and cross-wise from side to side of the hopper car. The first end slope sheet of the hopper overhangs the shear plate of the first end section. The hopper car is free of primary structure directly above the shear plate of the first end section under the overhang of the first slope sheet of the hopper.

[0025] In another feature of that aspect of the invention, there is one of: (a) the first slope sheet has an upper margin and the hopper car includes an end post extending upwardly from the draft sill to the upper margin of the slope sheet; and (b) the first slope sheet has an upper margin terminating at an end wall, and the hopper car includes an end post extending upwardly from draft stub sill to the end wall. In another feature, the shear plate has a longitudinally outboard margin and the draft sill has a striker located outboard of the longitudinally outboard margin of the shear plate, and the end post is one of: (a) rooted to the draft sill adjacent to the striker; (b) rooted to the shear plate adjacent to the longitudinally outboard margin of the shear plate. In a further feature, the bolster has first and second laterally outboard distal ends, and the hopper car has corner posts extending upwardly from the distal ends of the hopper to the first slope sheet.

[0026] In still another feature, the bolster has first and second laterally outboard distal ends, and the hopper car has corner posts extending upwardly from the distal ends of the hopper to the first slope sheet. In another feature, one of: (a) the first slope sheet has an upper margin and the hopper car includes an end post extending upwardly from the draft sill to the upper margin of the slope sheet; and (b) the first slope sheet has an upper margin terminating at an end wall, and the hopper car includes an end post extending upwardly from draft stub sill to the end wall; the shear plate has a longitudinally outboard margin and the draft sill has a striker located outboard of the longitudinally outboard margin of the shear plate, and the end post is one of: (a) rooted to the draft sill adjacent to the striker; (b) rooted to the shear plate adjacent to the longitudinally outboard margin of the shear plate. The bolster has first and second laterally outboard distal ends, and the hopper car has corner posts extending upwardly from the distal ends of the hopper to the first slope sheet. The hopper car has a machinery space bounded by (a) the first slope sheet; (b) the shear plate of the first end section; (c) the end post; and (d) the corner posts, and the machinery space is free of any other primary structure.

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[0027] In yet another feature the hopper car has at least one longitudinally hinged discharge door, the discharge door being movable cross-wise between open and closed positions. A longitudinally acting pneumatic actuator is at least partially lodged in the machinery space directly above the draft sill. In still yet another feature a brake reservoir is also at least partially lodged in the machinery space. In a yet further feature the shear plate is mounted above and to the main bolster and defines an upper flange thereof. The main bolster has a lower flange downwardly spaced from the upper flange, the lower flange terminating at respective distal end portions at either side of the car. The car includes a side sill running along the car between the first and second end sections. The side sill has an upper flange, the upper flange of the side sill being substantially co-planar and connected to the shear plate. The side sill has a lower flange, the lower flange of the side sill being substantially co-planar with a respective one of the distal end portions of the lower flange of the main bolster. In another further feature, the shear plate defines an upper flange of the draft sill whereby the draft sill upper flange, the shear plate and the side sill upper flange are all substantially co-planar. In another feature the machinery space is free of elephant ears.

[0028] In a further aspect of the invention there is a railroad freight car having a freight car body for carrying lading, the body being mounted on railroad car trucks for rolling motion in a longitudinal direction along railroad tracks. The car body includes a draft sill having a draft gear pocket for accommodating draft gear, and a shear plate overlying the draft sill and functioning as an upper flange of the draft sill. The draft sill has an inboard end oriented toward a truck center of one of the trucks, and an outboard end terminating at a striker. The draft sill has an underside and an access opening formed in the underside to admit entry of draft gear into the draft gear pocket from below. The car has a draft gear carrier plate. The carrier plate is mounted to the underside of the draft sill beneath the draft gear pocket. The carrier plate is removable to permit installation of the draft gear into the draft gear pocket. The car body has one of (a) an aperture formed in the shear plate over an inboard end region of the draft sill, the aperture permitting a portion of the draft gear to protrude upwardly therethrough during installation in the draft gear pocket; and (b) a coupler carrier seat defined in the draft sill longitudinally inboard of the striker, and a coupler carrier co-operable therewith, the coupler carrier being removable to permit installation of draft gear in the draft pocket, and, when the coupler carrier is installed, the coupler carrier providing a support for a coupler shank when the coupler shank is connected to the draft gear within the draft sill.

[0029] In another feature of that aspect of the invention the freight car has both (a) and (b). In another feature, there is a cover plate for the aperture of the shear plate, the cover plate being removable to permit installation of the draft gear. In still another feature, the draft sill has a pair of vertically oriented, longitudinally running spaced apart side webs. The webs have a

greater depth of section adjacent to the striker. The webs have respective first and second apertures formed therein. The first and second apertures define the draft gear retainer seat, and the retainer is a sideways slidable shaft that is movable to extend across the draft sill between the first and second apertures in the draft sill side webs. In a further feature there is a cover plate for the aperture of the shear plate, the cover plate being removable to permit installation of the draft gear. In another further feature the draft sill has a centerplate centered on the truck center, rear draft stops are welded within the draft sill, and at least a portion of each of the rear draft stops extends longitudinally inboard of the truck center. In still another further feature, the car is one in which at least one of (a) the freight car has a truck center to striker plate draft sill length of less than 50 inches; and (b) the freight car has a truck center to coupler pulling face length of less than 65 inches when the draft gear is fully extended in draft. In another feature, the railroad freight car is one in which at least one of (a) the freight car has a truck center to striker plate draft sill length of about 38 inches (+/- 2"); and (b) the freight car has a truck center to coupler pulling face length of about 53 inches (+/- 2") when the draft gear is fully extended in draft.

[0030] These and other aspects and features of the invention may be understood with reference to the description which follows, and with the aid of the illustrations.

Brief Description of the Figures

[0031] The description is accompanied by a set of illustrative Figures in which:

[0032] Figure **1** is a general arrangement, isometric view of a railroad freight car according to an aspect of the invention with all ancillary systems removed to leave only primary structure visible;

[0033] Figures **2a** is an isometric view of a sidewall of the gondola car of Figure **1**;

[0034] Figure **2b** shows a side view of the sidewall of Figure **2a**;

[0035] Figure **2c** shows an end view of the sidewall of Figure **2a**;

[0036] Figure **3a** shows a perspective view of the end structure of the railroad freight car of Figure **1**;

[0037] Figure **3b** is a side view of the structure of Figure **3a**;

[0038] Figure **3c** is a detail of the end structure of Figure **3b**, with the near side web of the draft sill removed to show the draft stop, center plate, and coupler relationship.

[0039] Figure **4a** is a isometric view of a portion of the door opening mechanism for the railroad car of Figure **1** in a fully open position;

[0040] Figure **4b** is a isometric view of a portion of the door opening mechanism for the railroad car of Figure **1** in an intermediate position;

[0041] Figure **4c** is a isometric view of a portion of the door opening mechanism for the railroad car of Figure **1** in a fully closed position;

[0042] Figure **5a** is a side view of the door opening mechanism of Figure **4a**;

[0043] Figure **5b** is a side view of the door opening mechanism of Figure **4b**;

[0044] Figure **5c** is a side view of the door opening mechanism of Figure **4c**;

[0045] Figure **6a** is an end view of the door opening mechanism of Figure **4a**;

[0046] Figure **6b** is an end view of the door opening mechanism of Figure **4b**; and

[0047] Figure **6c** is an end view of the door opening mechanism of Figure **4c**;

[0048] Figure **7a** is a perspective view of a secondary lock mechanism for the door opening mechanism of Figure **4a**;

[0049] Figure **7b** is a plan view of the mechanism of Figure **7a**;

[0050] Figure **7c** is a perspective view of the mechanism of Figure **7a** when the door are open

[0051] Figure **7d** is a view similar to Figure **7c**, of the mechanism of Figure **7a** in a deflected condition; and

[0052] Figure **7e** is a perspective view of the mechanism of Figure **7a** in a locked position;

Detailed Description

[0053] The description that follows, and the embodiments described therein, are provided by way of illustration of an example, or examples, of particular embodiments of the principles, aspects or features of the present invention. These examples are provided for the purposes of explanation, and not of limitation, of those principles and of the invention. In the description, like parts are marked throughout the specification and the drawings with the same respective reference numerals. The drawings may be taken as being to scale unless noted otherwise.

[0054] The terminology used in this specification is thought to be consistent with the customary and ordinary meanings of those terms as they would be understood by a person of ordinary skill in the rail road industry in North America. Following from decision of the CAFC in *Phillips* v. *AWH Corp.*, the Applicant expressly excludes all interpretations that are inconsistent with this specification, and, in particular, expressly excludes any interpretation of the claims or the language used in this specification such as may be made in the USPTO, or in any other Patent Office, other than those interpretations for which express support can be demonstrated in this specification or in objective evidence of record in accordance with *In re Lee*, (for example, earlier publications by persons not employed by the USPTO or any other Patent Office), demonstrating how the terms are used and understood by persons of ordinary skill in the art, or by way of expert evidence of a person or persons of at least 10 years experience in the industry in North America or in other former territories of the British Empire and Commonwealth.

[0055] In terms of general orientation and directional nomenclature, for rail road cars described herein the longitudinal direction is defined as being coincident with the rolling

direction of the rail road car, or rail road car unit, when located on tangent (that is, straight) track. In the case of a rail road car having a center sill, be it a stub sill or a straight-through center sill, the longitudinal direction is parallel to the center sill, and parallel to the top chords. Unless otherwise noted, vertical, or upward and downward, are terms that use top of rail, **TOR**, as a datum. In the context of the car as a whole, the term lateral, or laterally outboard, or transverse, or transversely outboard refer to a distance or orientation relative to the longitudinal centerline of the railroad car, or car unit, or of the centerline of a centerplate at a truck center. The term "longitudinally inboard", or "longitudinally outboard" is a distance taken relative to a mid-span lateral section of the car, or car unit. Pitching motion is angular motion of a railcar unit about a horizontal axis perpendicular to the longitudinal direction. Yawing is angular motion about a vertical axis. Roll is angular motion about the longitudinal axis. Given that the rail road car described herein may tend to have both longitudinal and transverse axes of symmetry, a description of one half of the car may generally also be intended to describe the other half as well, allowing for differences between right hand and left hand parts. In this description, the abbreviation kpsi stands for thousand of pounds per square inch. To the extent that this specification or the accompanying illustrations may refer to standards of the Association of American Railroads (AAR), such as to AAR plate sizes, those references are to be understood as at the earliest date of priority to which this application is entitled.

[0056] Bottom dumping hopper cars, of which ore cars and coal cars may be examples, may tend to have either longitudinal doors or transverse doors. Longitudinal doors are oriented such that the doors operate on hinges or axes of rotation that are parallel to the direction of travel of the railroad car generally. US Patent 4,250,814 of Stark et al., issued February 17, 1981 and US Patent 3,800,711 of Tuttle, issued April 2, 1974 show cars with longitudinal doors. By contrast, transverse doors are ones in which the axes of rotation of the hinges or other pivots tend to be predominantly cross-wise to the direction of travel, most often perpendicular to it. An example of a transverse door car shown in US Patent 4,843,974 of Ritter et al, issued July 4, 1989.

[0057] Figure **1** shows an isometric view of an example of a rail road freight car **20** that is intended to be representative of a range of rail road cars in which one or more of the various aspects of the present invention may be incorporated. While car **20** may be suitable for a variety of general purpose uses, it may be taken as being symbolic of, and in some ways a generic example of, a flow through car, in which lading is introduced by gravity flow from above, and removed by gravity discharge through gated or valved outlets below. Flow through, or center flow cars may include open topped hopper cars, grain cars, plastic pellet cars, potash cars, ore cars, coal gondolas, and so on. In one embodiment car **20** may be a hopper car such as may be used for the carriage of bulk commodities in the form of a granular particulate, be it in the nature

of relatively coarse gravel or fine aggregate in the nature of fine gravel or sand or various ores, ore concentrate or coal. The principle, or primary, structure of car **20** may be symmetrical about both its longitudinal and transverse, or lateral, centerline axes. Consequently, it will be understood that the car has first and second, left and right hand side beams, bolsters and so on.

[0058] By way of a general overview, car **20** may have a car body **22** that is carried on trucks **24** for rolling operation along railroad tracks. Car **20** may be a single unit car, or it may be a multi-unit car having two or more car body units, where the multiple car body units may be substantially permanently connected at an articulated connector, or by draw bars, as opposed to by ordinarily releasable AAR couplers. Car body **22**, and the various structural members and fittings described herein may be understood to be typically of metal construction, whether welded or Huck(t.m.) bolted, or riveted together, the metal members being most typically steel, stainless steel, or aluminum, as may be appropriate. Some car builders have also used reinforced plastic composites for car elements, and those materials could also be employed where suitable. The default construction may be taken as being steel, of which the majority may be mild steel having, typically, a 50 kpsi yield. Car body **22** may have a lading containment vessel or shell **26** such as may include an upstanding wall structure **28** which may have a pair of opposed first and second end walls **30**, **32**, that extend cross-wise, and a pair of first and second side walls **34**, **36** that extend lengthwise, the end walls **30**, **32** and side walls **34**, **36** co-operating to define a generally rectangular form of peripheral wall structure **28**. Wall structure **28** may include top chords **38** running along the top of the walls, and side sills **40** running fore-and-aft along lower portions of the side sheets or side sheet assemblies **42** of side walls **34**, **36**. In some instances, such as that of the illustration of Figure **1a**, car **20** may have stub center sills **44** at either end, in which case side walls **34**, **36** may act as deep beams, and may carry vertical loads to main bolsters **90** that extend laterally from the centerplates. In the case of a single, stand alone car unit, draft gear and releasable couplers may be mounted at either end of the stub center sill. In a center flow, or flow through car, the upper portion of the car may typically include means by which to admit lading under a gravity drop system. Such an intake **46**, or entryway may be a large rectangular opening such as that bounded by top chords **38**.

[0059] Car body **22** may include end sheets **48** and side sheets **50**. Car **20** of Figures **1** et seq., is illustrated as a car having a single hopper **52**, a single hopper discharge section **54**, and an outflow or discharge governor in the nature of a discharge door assembly **56**. However, car **20** could, alternatively, be a multiple hopper car. In a multiple hopper car, the car may have laterally extending members or reinforcements, which may be cross-bearers, or cross-bearers with shrouds, or merely shrouds, particularly where the car is a multiple hopper car. These cross-members may run fully across the car from side sill to side sill, and may intersect the center sill, or the center sill shroud as may be. The car may also include upper wall bracing, in

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the nature of diagonal struts which extend diagonally upwardly and outwardly from the apices of the respective cross-members at the centerline of the car to upper regions of the side walls near or at the top chords; and lateral ties or struts that run across the car from sidewall to side wall to meet the upper ends of the diagonal struts at their wall brackets. Those brackets may be aligned with, and mated through the wall to, the vertical exterior posts that run from the side sill to the top chord and reinforce the walls.

[0060] End sheets **48** may be substantially planar slope sheets or slope sheet assemblies that are inclined downwardly in the longitudinally inboard direction to feed the discharge section. Not atypically, each pair of fore-and aft opposed slope sheets may be inclined at equal and opposite angles, and the angles of those sheets may be selected to be somewhat steeper than the free slope angle, or natural talus slope angle of the lading for which the car is designed, such that, when the gates are opened, the lading may tend to flow out, rather than sit at rest.

[0061] The primary structure of body **22** of car **20** includes lading containment vessel **26** which is in the nature of hopper **52**. Hopper **52** has an upper portion **58** with substantially vertical wall panels, and a lower stationary portion defined by a set of converging sloped walls, namely the side and end slope sheet assemblies **48** and **50**. At the lower margin of the sloped walls there is the outflow governor, namely door assembly **56**, which, in this instance, may have the form of a pair of first and second, or left and right hand doors **62**, **64**. This containment structure seats on, and is carried by, a pair of first and second end structures, **66**, **68**, at either end of the car. End structures **66**, **68** are in turn carried by trucks **24**. A door operating apparatus or mechanism, or drive train, or transmission, however it may be termed, and identified generally as **70**, is provided to move doors **62**, **64** between open and closed positions.

[0062] Considering this structure in greater detail, trucks **24** are most immediately surmounted by center plates **72** of longitudinally extending stub sills **44**. Stub sills **44** in turn carry laterally extending main bolster arms **74** of main bolster **90**. Arms **74** extended perpendicularly away from the centerplate **72**, i.e., they are centered on the truck center, **CL - Truck**. Side sills **40** run lengthwise along the car between, and tie together, the most laterally outboard extremities of main bolster arms **74**. A shear plate **76** is mounted in an x-y horizontal plane defining the top cover plate of stub sill **44**. Shear plate **76** extends laterally from side sill to side sill, and longitudinally from the fore-and-aft end slope sheet **48** to the laterally extending end sill **78** of the car, which, in this instance may be an upturned flange formed on the longitudinally outboard margin of shear plate **76**. In car **20**, the primary structure includes an end post **80** and a pair of side or corner posts **82**, **84**.

[0063] End post **80** is rooted in shear plate **76** in line with center sill **44**, and may have lateral webs or gussets aligned with the webs of stub sill **44** to provide vertical web continuity across shear plate **76**. End post **80** then extends fully between shear plate **76** and top chord **86** of

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end wall **30** or **32**, as may be. Corner posts **82** and **84** are rooted to, and stand upwardly from, the junction of the laterally outboard ends of left and right hand main bolster arms **74** and side sills **40**. Posts **82** and **84** extend upwardly from this junction to mate with various elements of the end and side walls, as may be described below.

[0064] As described in additional detail below, car **20** has an abnormally short distance from the striker **88** to the truck center, i.e., the **CL** of centerplate **72**. Striker **88** is the vertical planar surrounding face plate at the outboard end of the stub sill **44**. 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 **CL -Truck** may also be referred to as the draft sill. In car **20**, the short draft sill length, identified as $\mathbf{L_{88}}$, leaves an anomalously small space in which to install other systems, such as the brake reservoir and the door operating pneumatic cylinder. Car **20** has an end of car machinery space, indicated generally as **75**, that is bounded by shear plate **76** on the bottom, the sloped end wall assembly **30** or **32** of the car on the top, main vertical central end post **80**, and main side posts **82**, **84** at the ends of main bolster **90**. This space may be referred to as having the shape, generally, of a triangular prism and is substantially unobstructed by the primary structure of the car. For the purposes of this description, primary structure is defined as the underframe, including side sills and center sill (i.e., including the draft sill), the side walls, the slope sheets and top chords, the hopper construction including the stationary parts of the discharge section, as well as any cross-bearers, cross-ties, bolsters, shear plates and so on. Primary structure excludes secondary or ancillary structure or systems such as ladders, cat-walks and other safety appliances, brakes, brake rods and brake fittings, air hoses, reservoirs and pneumatic fittings, movable door members, door operating linkages, and so on.

[0065] In existing cars, this space, **75**, is often occupied or otherwise obstructed by other primary structure, such as so-called "elephant ears". In this context, "elephant ears" are 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. The third edge is typically a free edge. Often these plates lie in a plane that is oriented at an angle to the vertical – i.e., it leans laterally outboard. Car **20** avoids the use of these "elephant ears" and so provides the large unobstructed space shown in Figure **1b**.

[0066] Figures **1** and **2a**, **2b** and **2c**, all show the sidewall of the car, indicated generally as **34** or **36**. Sidewall **34** and **36** function as short beams of low (e.g., less than 4:1, possibly less than 3:1) length-to-depth ratio. Sidewall **34** or **36** can be seen to have a bottom flange or chord member, namely side sill **40**, a top flange or chord member, namely top chord **38**, which may have the form of a square or rectangular hollow structural steel tube; and an intermediate shear

force transfer web, namely side sheet assembly **42**. Side sheet assembly **42** may include an upper sheet portion or member **92** that is welded to the outside face of top chord **38** at a lap joint, and that extends downwardly therefrom; and a lower sheet portion or member **94**. Member **94** may have the form of a Z-section, having a first portion, namely an upper flange or leg or margin **96** that extends in a substantially vertical plane and has an uppermost margin that overlaps the lowermost edge or margin of member **92**; a second or intermediate portion **98** that runs in an inclined plane sloping inwardly and downwardly on the slope of the hopper side sheets generally, and a third or bottom portion, namely bottom flange, or leg, or margin **100** that extends in a substantially vertical plane downwardly. Sidewall **34** or **36** also includes a central post, or web stiffener, **102** that has a lowermost first portion **104** an intermediate second portion **106**, and an uppermost third portion **108**.

[0067] Side sill **40** includes a channel **110** that is welded toes-inward against the lowermost marginal portion of lower leg **100** to form a closed section. The first or lowermost portion **104** of web stiffener **102** has the form of a quadrilateral gusset having a first edge welded to the upper leg of channel **110**, a second edge welded to the vertical margin **100**, a third edge welded to the sloping portion **98**, and the fourth, laterally outboard, edge being free. As may be noted, portion **104** stands outboard of the sidewall sheet.

[0068] Portion **108** is a rectangular web stiffener that is welded to, and extends downwardly from, the underside of top chord **38** along the inside face of vertical web portion **92**. Intermediate portion **106** is a web, or plate, or gusset, that is also a quadrilateral, having a first edge that overlaps, and is welded to, the lower margin of portion **108**. A second edge is welded to the lower region of vertical web portion **92**, and to the upper flange or leg **96**. A third edge is welded along the sloped portion **98** of member **94**. The fourth edge is free, and faces inwardly into the lading containment space of the hopper. Portions **104** and **106** are co-planar, or substantially co-planar, such that stiffener **102** has web continuity through member **94**. The upper margin of the side slope sheet **50** of the hopper discharge section is welded to the lower margin of the inclined or sloped portion **98**, such that the structure presents a continuous sloped surface for containing, and then slidingly discharging, particulate lading. Expressed differently, the web of the sidewall traverses the sidewall stiffener, commencing on its inboard margin at side sill **40**, traverses the web mid-way up the post, and ends along its outboard margin at top chord **38**. In this arrangement, the vertical stiffener, **102**, acts as the web of a T-section, and the local region of the wall section to which it is joined functions as the flange of that T-section.

[0069] In this example, the locus of intersection of the side slope sheet plane $\mathbf{P_{94}}$ with the plane of the side wall sheet $\mathbf{P_{92}}$, lies above the level of side sill **40** by a substantial distance, indicated as $\mathbf{L_{94}}$. This distance may lie in the range of ¼ to $^2/_3$ of the distance $\mathbf{L_{SW}}$ from side sill **40** to top chord **38**, and, in the particular may be about $^1/_3$ of that distance. Further, although the

post has stiffening member web continuity in a vertical plane, the wall sheet traverses the stiffening web intermediate the top chord and the side sill, and does so obliquely on the slope of plane $\mathbf{P_{94}}$.

[0070] The upper leg of channel **110** forms the upper flange of side sill **40**, and the lower leg of channel **110** forms the lower flange of side sill **40**. Shear plate **76** forms the top flange of main bolster **90**. Main bolster **90** also has a lower or bottom flange **91**. In car **20** the upper leg of channel **110** is co-planar or substantially co-planar with, and is connected in flange continuity with, shear plate **76**. Similarly, the lower leg of channel **110** is co-planar or substantially co-planar with, and connected in flange continuity with, bottom flange **91** of main bolster **90**.

[0071] Continuing with the sidewall assembly, the main sheet, namely upper sheet portion **92**, ends at the corners, and there are respective first and second end upper web stiffener portions and inwardly stepped plate members **112**, which may be termed "ears". The top edge of each ear is welded to the inside face of top chord **38** in a lap joint. The longitudinally outboard end edge forms a plane to which the vertical end sheet of the end slope sheet wall abuts and is welded. The bottom edge follows the slope of, and is welded to, end slope sheet **48**. The forward, transversely outwardly bent edge is welded to the upper end portion of side sheet assembly **42**. The lower region of the main sidewall sheet also includes lightening apertures **114**, in the space between the corner posts and the slope of the end slope sheets. Finally, the lower portion of region **100** of the main sidewall sheet has longitudinal extensions **116** that are welded to the side edges of the shear panel, namely shear plate **76**, outboard of main bolster **90**, thereby forming a portion of the peripheral flange of the shear plate.

[0072] End walls **30**, **32** each include upper and lower sloped surface members **122** and **124**, which could be made as a single piece, or as two pieces butt-welded together, as here. Upper member **122** has notches **126** formed therein to accommodate corresponding corner posts **82**, **84** as may be, with local reinforcement doublers **128** at the junction. Lower portion **124** tapers in width to match the narrowing width between the sloped side sheets with which it mates. At the upper end of end wall **30** the end wall assembly includes a laterally extending first formed member **130** that has a first, vertical leg **132** that laps the inside face of the top chord **86**, and a bent flange **136** that extends initially horizontally, with a distal lip bent upward to mate perpendicularly with the upper margin **138** of the end slope sheet **48**. The distal tip of end slope sheet **48** is fillet welded to vertical leg **132**. This results in a substantially triangular closed section defining a laterally extending end slope sheet reinforcement beam **140**. The ends of this beam abut, are welded to, and are capped by elephant ears **112**. Vertical leg **132** also lies against, and is welded to, end post **80**.

[0073] A formed angle **142** is mounted toes-in at an intermediate height on sloped end wall **48**, forming thereby another hollow section laterally extending end sheet reinforcement or

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beam **148**. Vertical leg **144** of angle **142** is substantially aligned with the central web of the corner post (be it **82** or **84**) and therefore also with the central web of the main bolster. Another formed angle **150** is welded toes-in to the back of sloped end wall **30** at the level of shear plate, thereby forming yet another slope-sheet reinforcement in the form of a laterally extending beam.

[0074] The corner posts **82** and **84** each have a lower corner post flange plate **160** (that includes a lifting lug aperture) that has a bottom tab welded to the outside, or back, of the end of side sill **40** in line with the main bolster, then an angled portion following the angle of the outside edge of the vertically extending side wall reinforcements, **161**, to an upper end at the juncture of the side slope sheet with the side wall vertical leg of the lower side wall sheet. Each end post has two internal reinforcements **154**. Each corner post also includes an intermediate member, or web, or gusset, or plate **162**, which is considerably wider than intermediate gusset **106**, and a substantially triangular inside edge web stiffener **164**. Plate **162** is a quadrilateral. A first edge of plate **162** runs along the upward and outward slope of wall extension **166**. A second edge runs vertically against the upper leg of wall extension **166**. A third upper edge adjacent runs horizontally along lateral reinforcement beam **148**. The fourth edge runs vertically downward to and along edge stiffener **164**. As such, a vertical post is established.

[0075] Considering Figures **3a**, **3b** and **3c**, center sill **44** includes a bottom flange or bottom cover plate **165**, and a pair of spaced apart webs **168**. The central region of shear plate **76** forms the top flange, or top cover plate of the center sill. At its inboard end, the center sill terminates centrally under the bottom lateral reinforcement of the end slope sheet **48**. A draft pocket **175** is defined between webs **168**, shear plate **76** and bottom cover plate **165** longitudinally inboard of the striker plate.

[0076] Center plate **72** is mounted at truck center **CL-Truck**, in line with main bolster **90** and the corner posts **82**, **84**. Rear draft stops **172** are welded within the center sill above center plate **72**. As seen in Figure **3c**, the inboard end of rear draft stop **172** extends longitudinally inboard of the truck center. While this is known to have been used in at least one single piece, integrally cast draft sill, the inventor is unaware of such a construction in an all-welded fabrication draft sill assembly. The removable draft sill access cover plate, or draft gear carrier plate **174**, which is bolted to the draft sill (i.e., the stub sill) bottom flange margins, is mounted immediately longitudinally outboard of center plate **72**. Front draft stops **176** are, in turn, mounted longitudinally outboard of carrier plate **174**. In this embodiment there is also a removable member, such as a top leeway or access plate **178**, mounted to shear plate **76**. Plate **178** is removed when draft gear **180** is removed or installed. On installation, draft gear **180**, to which yoke **188** is already mounted, is fed into draft pocket **175** from below, on an angle, whereby the rear corner protrudes upwardly through the opening that is otherwise covered by plate **178**. The front end of draft gear **180** is rotated into place, and the rear end is rotated

downward. As this occurs, yoke **188** is also raised into place. Plates **178** and **174** are then reinstalled. The shank **182** of the coupler, **184** is inserted, and the coupler key **186** is fed through the slot in front draft stops **176** to link coupler **184**, and yoke **188** in the customary manner. It may be noted that coupler **184** combines an AAR Type E shank with and AAR Type F knuckle with a bottom shelf. Draft gear **180** itself has abnormally short travel, namely about 2 ½ inches deflection before going solid, as compared to a "normal" deflection of over 3" before going solid.

[0077] Draft sill webs **164** have, at their longitudinally outboard end an end portion **190** of increased depth of section with a downwardly protruding bulge or horn, such as might be termed a "chin". End portion **190** has an aperture or slot **192** formed therein to permit lateral sliding insertion of a coupler support, carrier or bar **194** immediately behind striker plate **88**. Removal of bar **194** permits yoke **188** to be swung into place during installation of draft gear **180**. When coupler **184** is installed, the shank may rest on bar **194**. Bar **194** is held in place by bolts that secure it relative to webs **164**. Overall, a coupler installation of very short length is achieved. In this example, $\mathbf{L_{88}}$ may be in the range of less than 50 inches, and in one embodiment may be about 38" +/- 2", from the truck center to the outboard face of striker plate **88**. An alternative expression of the relative compactness of the draft gear is that the length from the truck center to the pulling face of the coupler, when the draft gear is extended in tension, is in the range of less than 65 inches, and in one embodiment is in the range of 53" +/- 2".

[0078] Car **20** may also include a door opening mechanism **200**. There are left and right hand, or first and second, doors **62**, **64**. Each door has a proximal, hinged edge **206**, and a distal free edge **208**. The hinges are carried on hinge fittings welded to mounting brackets depending from the slope sheets and side sills. The hinges run parallel to the longitudinal or lengthwise axis of the car, generally such that doors **62**, **64** are longitudinal doors. Each door has the form of a hollow section beam, having a proximal beam **210** along the hinge side, a distal beam **212** along the free edge, internal cross-braces, not shown, and front and back skins or sheets or plates **214**, **216**. The hinges are indicated as **220**, the end closure plates as **222**, **224**. The doors have door seal members **226**, **228** that mutually engage when the doors are moved to a closed position. Seal members **226**, **228** are sprung, such that when they are closed they deflect somewhat and in so doing take on a spring pre-load against each other. The door mechanism includes a pair of first and second, matched left and right hand pivot arms **230**, **232**; a corresponding pair of first and second drag links **234**, **236**; a shared yoke **238**, and a pair of slave links **240**, **242** that each pick up on a knuckle fitting **244**, **246** of each of respective doors **62**, **64**. The whole assembly has left and right hand symmetry.

[0079] Inasmuch as, when tripped, doors **62**, **64** open under the influence of gravity, particularly when assisted by the weight of the lading being discharged, one may consider the

motion that occurs as the doors are closed in the sequence of views **4a**, **4b**, and **4c**; **5a**, **5b**, and **5c**; and **6a**, **6b** and **6c**. Knuckles **244** and **246** are constrained by geometry to move in circular arcs of fixed radii in planes perpendicular to the respective axes of rotation of doors **62** and **64**, those axes being the hinge axes of their respective hinges **220**, which each lie in a plane parallel to the **x**-**z** plane of the car centerline. The plane of rotation of knuckles **244**, **246** will then tend to be perpendicular to the central **x**-**z** plane. Slave links **240** and **242** are each of fixed length; each has an end pivotally connected at a two rotational degree of freedom knuckle, be it **244** or **246**, as may be; each of slave links **240** and **242** has another end pivotally connected at a second pivot connection at yoke **238**; and slave links **240** and **242** do not transmit a bending moment, and so therefore pull in pure tension. The upper, or near (i.e., proximal), ends of drag links **234**, **236** are connected to the distal ends of pivot arms **230**, **232** at pivot connections **248**, **250**, which may, if desired, share a common axis of rotation or pivot pin.

[0080] Yoke **238** is constrained by symmetry to pull in an **x**-**z** plane, which in the embodiment illustrated is the vertical plane of the centerline of the car. As such, movement of yoke **238** away from the plane of motion of knuckles **244** and **246** will necessarily draw knuckle fittings **244** and **246** closer together, and toward the vertical centerline plane of the car, eventually causing resilient door seals **226**, **228** mutually to engage, thus closing the opening. This motion can be achieved by pulling on drag links **234**, **236**. Each pivot connection of slave links **240**, **242** has a single angular degree of freedom. Similarly yoke **238** has an angular degree of freedom about the axis of rotation of the axle, or trunnions, by which it is pivotally mounted to the drag link, or drag links **234**, **236**. This gives the drag link connection two angular degrees of freedom in total. As the drag links are withdrawn, the slave links pull in tension, finding the natural hypotenuse between the plane of the arc of motion of knuckle fittings **244**, **246** and the plane of motion of drag links **234**, **236**. Since this mechanism operates in tension, pivot connections **248**, **250** and knuckle fittings **244**, **246** are co-planar, with drag links **234**, **236**, yoke **238**, slave links **240** and **242**, and their associated pivot connections also lying in that same plane as well. (See Figures **5a**, **5b**, **5c**).

[0081] Driving force for this system is provided by an actuator, identified as **260**. Actuator **260** may be a pneumatic actuator, which may be charged by the pneumatic system of the train generally, as supplied through the pressurized air connection of the train line. Actuator **260** may include its own reservoir and check valve. Actuator **260** is connected to move a first member, in the nature of a primary driven pivot arm or lever, **262**, which is in this instance actually a pair of matched lever arm members, which in turn is pivotally connected to, and drives, a second member in the nature of, a push rod, or, given the symmetrical nature of the assembly, a pair of left and right hand push rods **264** and **266**. One or both of push rods **264**, **266** may have a secondary member, such as may be an extending arm, or detent, or stop, or

abutment, identified as an over-center travel limiter or governor, **268**. The far ends of push rods **264**, **266** may be connected to either pivot arms **230** (or **232**, as may be), or to drag link **234** (or **236**, as may be). It may be convenient to connect the far end of push rods **264**, **266** at the same pivot connection, or connections **248**, **250**.

[0082] Lever **262** has a first end pivotally mounted to primary structure of car **20** at footings, identified as mounting fixtures, fittings or brackets **270**. The drive rod of actuator **260** picks up on lever **262** at an intermediate location, such that lever **262** provides magnification of displacement. Similarly, pivot arms **230**, **232** have a first or base end pivotally connected to primary structure at mounting fixtures, fittings, or brackets **272**. Actuator **260** is located on the centerline (i.e., in the central x-z plane) of car **20**, between and in substance below pivot arms **230**, **232**. "Below" in this context may be thought of as radially more proximate to the pivot axis $\mathbf{P_{270}}$ of brackets **270** than is the pivot axis of connections **248**, **250**, as well as in the context of being lower than as in closer to Top of Rail. In the past the lever fitting has more commonly been mounted to the slope sheet such that the output pin is lower than the pneumatic cylinder. Turning this arrangement upside down, in effect, and fitting the cylinder may then permit a more compact installation than otherwise. Similarly, the pivot axis, $\mathbf{P_{230}}$, of driven arms **230**, **232** is below the output knuckle, i.e., at $\mathbf{P_{250}}$, and is below the actuator cylinder as shown in Figure **5b** in which $\mathbf{P_{250}}$ lies below the center line $\mathbf{CL_{260}}$ or actuator **260**. This may be taken in the sense of being further from the plane of the end slope sheets, identified as $\mathbf{P_{48}}$. Expressed differently, actuator **260** lies between the base or datum pivot point $\mathbf{P_{250}}$ of driven arms **230**, **232** and the plane $\mathbf{P_{48}}$ of end slope sheet **48**.

[0083] As may be noted, the line of action of drag links **234**, **236** has a predominant component that is substantially parallel to plane $\mathbf{P_{48}}$. Expressed differently, at some point during mid–stroke, the line of action will be at least instantaneously parallel to plane $\mathbf{P_{48}}$. Finally, it may be noted that rather than placing actuator **260** on shear plate **76**, and orienting actuator **260** such that its longitudinal axis (i.e., the working axis or axis of reciprocation of the actuator), that actuator is itself raised upwardly from the shear plate and oriented to work along a line of action that is tilted downward and longitudinally inboard, the angle of tilt being identified as $\mathbf{\alpha_{260}}$. This angle of inclination lies in the range from horizontal to the angle of inclination of end slope sheet **48**, identified in Figure **5c** as $\mathbf{\alpha_{48}}$. Placing the mounts and pivot points under the apparatus, raising the actuator cylinder, orienting it on an incline, and making the line of action or the zone swept by the draglinks in the progressions of Figures **4a**, **4b** and **4c** (or **5a**, **5b** and **5c**) tend to correspond to a displacement substantially or predominantly parallel to plane $\mathbf{P_{48}}$, all aid in providing a more compact installation, in particular one that is longitudinally short as may suit the short distance from the truck center to the striker. It is also an installation that may tend to leave space for other car systems, such as the brake system.

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[0084] This arrangement may be thought of in terms of a four bar, or multi-bar, linkage. The first bar of the linkage may be thought of as being the underframe, and structure rigidly mounted to the underframe. This is the datum, or frame of reference member of the linkage. The second member or linkage component is the first pivot arm, **230** (or **232**) having a fixed main pivot point, and an output distal pivot point constrained to move on a fixed radius about main pivot point $\mathbf{P_{230}}$. The fourth component or element of the linkage is the second pivot arm, namely **62** or **64**, each of which is a second lever or pivot arm mounted to a pivot axis fixed with respect to the first or datum link, and having a distal connection, in this case also a pivot connection, constrained to move in an arc of constant radius about the base pivot axis. The third linkage is the drag link. Although the drag link is made of two portions that are held together at yoke **238**, the geometric symmetry of the assembly constrains both the upper portion of the drag link, (i.e., drag link **234**, **236**) and the lower portions, (i.e., slave links **240**, **242**) to be co-planar during closing of the doors. In any case, the single input of the actuator cylinder acting through the over-center links against the first pivot arm (at the distal pivot connection) produces a unique output geometry such that position of the elements is determinate as if it were a four bar linkage.

[0085] When the door opening apparatus is retracted to the position shown in Figures **4c**, **5c** and **6c**, driven primary pivot arms and the over-center links are driven to a slightly over-center relationship such that the pivot connection between the primary pivot arms and the over center arms lies below a line drawn from the primary pivot axis and the over-center link output connection as axis $\mathbf{P_{250}}$. In this condition tensile force on drag links **234** and **236** (as from weight placed on doors **62**, **64**, for example) will tend to urge the main driven pivot arms, namely lever **262**, counter-clockwise as viewed in Figure **4c**. Motion in this direction is prevented by the over center stop, **268**, thereby defining a first lock that prevents inadvertent opening of doors **62**, **64** from moving to the open position when actuator **260** is dormant, i.e., inactive. This first lock is released by reversing actuator **260** to open the doors.

[0086] Car **20** has a secondary door mechanism, or secondary latching system, identified generally as **300**. This secondary latch system, and, indeed, the door closure linkage apparatus of Figures **7a** – **7e**, are slightly different from those shown in Figures **4a**, **5a**, and **6a**. In latching system **300** there is a latch assembly **302**, shown in Figures **7a** and **7b**. Assembly **302** includes a first member, or main member, or plate **304**, which performs the function of a body or armature or spider that ties the other various physical elements of the assembly together. Along one edge plate **304** has physical motion constraint fittings, identified as hinge fittings **306**, that limit plate **304** (and assembly **302** more generally) to a single degree of freedom, that single degree of freedom limiting plate **304** to motion of any point to motion in a plane perpendicular to the hinge axis, and in particular to pivotal motion in that plane about that axis. To the extent that the hinge axis is substantially or predominantly parallel to the axis of reciprocation of pneumatic actuator

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260, that motion can be said to be sideways, or predominantly transverse of cross-wise to that direction of reciprocation.

[0087] Plate **304** has a portion or finger, or arm member **308** extending away from the hinge. In this case, arm member **308** extends arcuately away, and has a bent termination, or end, or lip, or tip, indicated at **310**. Another member **312** in the form of a block is mounted, e.g., welded, at the distal end of arm member **308**. Member **312** has the same general shape, a dog-leg bend, as tip **310**. Member **312** has a first, generally inwardly (i.e., away from the tip) facing surface **314** that defines an abutment **316**. Member **312** also has an oblique surface **318** that defines a wear or cam surface, which may be termed a reset cam, or return cam.

[0088] Another member **320**, which may have the form of a plate or block, is welded to the major portion of the body of plate **304** relatively close to the hinge axis. The axially foremost face of member **322** is relieved – i.e., it does not define a face in a plane perpendicular to the hinge axis – or to the axis of reciprocation of the pneumatic actuator clevis. This face may be arcuate or chamfered, and so defines a first or deflection cam **324**. That is, as installed, it lies in the path of actuator clevis **330**. When the leading corner of clevis **330** encounters cam **324**, plate **304** will tend to be urged to rotate, i.e., pivot, about its axis in the clockwise direction as viewed looking from actuator **260** toward hopper **52**. Assembly **302** also includes a motion resisting, or return biasing member in the form of a spring, identified as leaf spring **326** that is anchored at the proximal end to stationary structure of the secondary lock footing, or base, **328** which is welded to shear plate **76**. The footprint of base **328** against shear plate **76** is planar. The hinge axis is inclined relative to the plane as shown, the angle of inclination being substantially similar to, and possibly the same as, the mid-stroke angle of inclination of actuator **260** (which, itself, varies slightly during operation). The distal end of spring **326** bears against plate **304** distant from the hinge. Finally, assembly **302** includes reaction force transmission members **332**, **334** in the form of welded flat bars that bear against, i.e., abut, the longitudinally outboard face of mounting fitting **270** when the latch is in the engaged position.

[0089] In operation, as actuator **260** works, lost motion is taken up in slot **336** of the distal or forward end **338** of the reciprocating actuator ram. Eventually the end of slot **336** engages a pivot pin **340** of bell crank arm **342** and causes driven member **344** (analogous to driven member **262**), causing it to rotate counterclockwise as viewed in Figure **7a**. This forces push rods **346**, **348** (analogous to push rods **264**, **266**) to act against connections **248**, **250**, and hence to force drag links **234**, **236** along their retracting path. Since **262**, **264**, **230** and the car body form a four bar linkage, the output path of connections **248**, **250** is determinate and unique.

[0090] While this happens, clevis **338** keeps moving rearward to engage reset cam surface **318**, with the effect that assembly **302** is urged to rotate out of the way, against the resistance of spring **326** (Figure **7d**). Eventually the trailing portion of clevis **338** clears cam

324, and soon thereafter the most longitudinally inboard edge of driven member **344** clears abutment **316**. Assembly **302** then moves under the influence of spring **326** into the locked position shown in Figure **7e**. In this locked position, any moment tending to pivot driven member **344** clockwise is reacted not by the hinge fittings, but rather by the reinforcements, namely members **332**, **334**. In this locked position driven member **344** and push rods **346**, **348** are drawn to, and locked in, their over center position.

[0091] When the doors are to be released, actuator **260** moves in the opposite direction. The lost motion of the length of slot **336** reverses, such that the end of clevis **338** bears against the release cam, namely cam surface **324**, which causes plate **304** to pivot away, and thus disengages abutment **316**, moving it out of the path of driven member **262** against which it would otherwise abut. The outboard end of slot **336** then engages pin **340**, releasing the over-center hold of driven member **344**, and permitting the doors to open under the influence of gravity.

[0092] The cams need not necessarily be on the plate, i.e., the latch body, but could be on the clevis, as shown at **350** in Figure **4c**. That is, it is to some extent arbitrary which part is identified as the cam, and which part is identified as the cam follower. The point is that the parts mutually engage such that the one intercepts the other during motion of the actuator cylinder to trip the door opening condition, with the result that the secondary latch is urged to deflect out of the way sideways. In the other direction, of course, the abutment relationship of items **262** and **316** prevents the doors from opening. The apparatus of Figure **4c** works in substantially the same way, and combines both arms of the bell crank driven member **344** into a single driven lever, namely lever **262**.

[0093] In summary, car **20** has a first lock, the over center lock, operable to prevent movement of the door from the closed position to the open position when the door actuator is inactive. Car **20** also has a second lock, symbolized by latching system **300**, operable to prevent movement of the door from the closed position to the open position when the door actuator is inactive if the first lock should fail. The second lock is movable between an engaged position in which it prevents movement of the door to the open position thereof. In moving between the engaged and disengaged positions, the second lock has a displacement that is predominantly cross-wise to the first direction of the reciprocation of the door actuator. Actuator **260** is positioned to reciprocate in the central lengthwise-vertical plane of car **20**. Latching system **300** is movable predominantly transverse to the central lengthwise-vertical plane as it pivots in a circumferential direction between the engaged and disengaged positions. The hinge axis lies parallel to the lengthwise vertical plane, and the second lock pivots circumferentially. The second lock is biased toward the engaged position. The lock mechanism can be thought of as having a first fitting, a second fitting and a third fitting. The first fitting is the mounting, **238** by

which to connect the lock mechanism to the datum structure. The second fitting is one of a cam or a cam follower for co-operation with a member of the door actuating transmission. The third fitting is the abutment, i.e., **316**, that co-operates with a mating part of the door actuating transmission, in this case the side of lever **262**. The third fitting is movable between a first position and a second position, in the first position the abutment being presented to obstruct motion of the mating fitting of the door actuating transmission and thereby to prevent the door from moving to an open position thereof. The second fitting is movable between a first position and a second position, in the first position thereof the second fitting being positioned to intercept the member of the door actuating transmission and to be deflected away from the first position toward the second position thereby. The first fitting has a first degree of freedom of motion permitting the first and second fittings to move between their respective first and second positions. The degree of freedom constrains the third fitting to motion predominantly cross-wise to the axial direction. The bias member is a spring having a first end and a second end, the first end being mounted to bear against the body of the lock mechanism, the second end having a foot for reaction against the datum structure, namely shear plate **76**. The first degree of freedom of motion is an angular degree of freedom, and is predominantly cross-wise circumferential motion. The axis of rotation is the hinge axis, which is substantially parallel to the axial direction of the door actuating transmission.

[0094] Various embodiments have been described in detail. Since changes in and or additions to the above-described examples may be made without departing from the nature, spirit or scope of the invention, the invention is not to be limited to those details.

Claims

We claim:

1. A railroad hopper car comprising:

at least one hopper having a bottom discharge, said bottom discharge including a door movable between a closed position for retaining lading and an open position for permitting egress of lading;

said hopper being carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of said car;

said hopper having at least a first end slope sheet inclined downwardly in said lengthwise direction toward said door;

a linkage connected to said door, said linkage being oriented lengthwise with respect to said car; and

a drive connected to said linkage, said drive being operable to move said linkage and thereby to urge said door to said closed position; and

said linkage being movable from a first position corresponding to said open position of said door to a second position corresponding to said closed position of said door;

said linkage including at least a drag link; and

when said linkage moves from said first position to said second position one of

(a) said overall motion from said first position to said second position includes displacement of said drag link in a direction having a predominant component of motion parallel to said first end slope sheet; and

(b) said motion of said drag link is at least instantaneously parallel to said first end slope sheet.

2. The railroad hopper car of claim 1 wherein:

said linkage includes a first pivot arm pivotally connected to a datum structure at a first pivot connection;

said drive also being mounted to said datum structure;

said linkage includes a second pivot arm pivotally connected to said datum structure at a second pivot connection, said second pivot arm having said door mounted thereto;

said first pivot arm has a second connection distant from said first pivot connection;

said second pivot arm has a second connection distant from said second pivot connection;

a mechanical transmission is mounted between said second connection of said second pivot arm and said second connection of said first pivot arm;

said mechanical transmission includes said drag link; and

said drive is connected to move said first pivot arm, and, in moving from said first position to said second position, each position of said first pivot arm being associated with a unique position of said drag link.

3. The railroad hopper car of claim 1 wherein:

said linkage includes left and right hand first pivot arms pivotally connected to a datum structure at respective first pivot connections, said respective first pivot connections being co-axial;

said linkage includes left and right hand second pivot arms pivotally connected to said datum structure at respective second pivot connection;

said door is a left hand door of a pair of co-operable right and left hand doors, said left hand door being mounted to said left hand second pivot arm and said right hand door being mounted to said right hand second pivot arm;

each said first pivot arm has a respective second connection distant from its respective first pivot connection, said respective second connections being pivot connections and being mutually co-axial;

each said second pivot arm has a respective second connection distant from said respective second pivot connection;

a mechanical transmission is mounted between said respective second connections of said second pivot arms and said respective second connections of said first pivot arms;

said drag link is a left hand drag link, and said mechanical transmission includes a mated parallel right hand drag link;

said left and right hand drag links each have a first end mounted to one of said respective second connections of said first pivot arms;

said left and right hand drag links have second ends yoked together distantly from said first ends;

said mechanical transmission includes left and right hand slave links extending between and connecting said second ends of said drag links to said second connections of said second pivot arms respectively.

4. The railroad hopper car of claim 1 wherein:

said linkage includes left and right hand first pivot arms pivotally connected to a datum structure at respective first pivot connections, said respective first pivot connections being co-axial;

said linkage includes left and right hand second pivot arms pivotally connected to said datum structure at respective second pivot connection;

said door is a left hand door of a pair of co-operable right and left hand doors, said left

hand door being mounted to said left hand second pivot arm and said right hand door being mounted to said right hand second pivot arm;

each said first pivot arm has a respective second connection distant from its respective first pivot connection, said respective second connections being pivot connections and being mutually co-axial; and

said left and right hand pivot arms co-operate to define a bifurcated lever straddling said drive.

5. The railroad hopper car of claim 1 wherein said drive includes an actuating cylinder having an axially reciprocating member, said axially reciprocating member being inclined relative to horizontal.

6. The railroad hopper car of claim 5 wherein said drag link lies between said actuating cylinder and said first end slope sheet of said hopper.

7. The railroad hopper car of claim 1 wherein said railroad hopper car includes a first end section, said first end section includes a draft sill and a substantially horizontal shear plate mounted over said draft sill, said drive includes an actuating cylinder having an axis of reciprocation lying in a central vertical-lengthwise plane of said car, said actuating cylinder is mounted above said shear plate, said first end slope sheet at least partially overhangs said actuating cylinder; and said drag link is located between said actuating cylinder and said first end slope sheet.

8. A railroad hopper car comprising:

at least one hopper having a bottom discharge, said bottom discharge including a gate movable between a closed position for retaining lading and an open position for permitting egress of lading;

structure by which said hopper is carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of said car;

a door operating linkage connected to said gate, said door operating linkage being oriented lengthwise with respect to said car; and

an actuating cylinder connected to drive said door operating linkage, said actuating cylinder also being oriented to act lengthwise with respect to said car, said actuating cylinder having an axis of reciprocation; and

said axis of reciprocation being tilted such that displacement of said actuating cylinder includes a vertical component of motion.

9. The railroad hopper car of claim 8 wherein said hopper car includes an end section mounted over one of the trucks, the end section includes a substantially horizontal shear plate, and said actuating cylinder is mounted on a pedestal mounted to said shear plate, said pedestal including an inclined mounting for said actuating cylinder.

10. The railroad hopper car of claim 8 wherein said railroad hopper car has a longitudinal-vertical central plane, and said axis of reciprocation lies in said longitudinal-vertical central plane.

11. The railroad hopper car of claim 8 wherein said hopper includes at least a first end slope sheet extending longitudinally and being inclined longitudinally inboard and downwardly toward said gate, and at least part of said actuating cylinder is overhung by at least part of said first end slope sheet.

12. The railroad hopper car of claim 8 wherein:

said hopper car includes an end section having a substantially horizontal shear plate mounted over a draft sill;

said hopper includes a first end slope sheet, said first end slope sheet at least partially overhanging said horizontal shear plate;

said actuating cylinder is mounted above said shear plate, centrally aligned over said draft sill; and

said actuating cylinder is at least partially overhung by said first end slope sheet.

13. The railroad hopper car of claim 12 wherein:

said first slope sheet is substantially planar and has a first angle of inclination relative to horizontal;

said actuating cylinder is inclined longitudinally inboard downwardly, and is inclined at a second angle; and

said second angle lies between horizontal and said first angle.

14. The railroad hopper car of claim 8 wherein:

said car has an underframe and said door operating linkage includes a first linkage component, a second linkage component, a third linkage component, and a fourth linkage component;

said first linkage component is a reference datum component and includes structure immovable relative to said underframe;

said second linkage component is a first pivot linkage mounted to said first linkage component at a main pivot connection, said first pivot linkage being a first pivot arm constrained to pivot on an axis of rotation oriented horizontally cross-wise relative to said underframe;

said fourth linkage component is a second pivot linkage pivotally mounted to said first linkage component and includes at least said gate; and

said third linkage component includes a drag link element connected to said first pivot arm, said drag link element having at least a first pivotal attachment to at least a portion of said fourth linkage component, whereby input motion of said second

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linkage component uniquely determines position and motion of said third and fourth linkage components relative to said first linkage component; and

motion of said second linkage component is driven by said actuating cylinder.

15. The railroad hopper car of claim 14 wherein said main pivot connection of said first pivot arm to said first linkage component is located lower than said actuating cylinder.

16. The railroad hopper car of claim 15 wherein said drag link element is connected to said first pivot arm at a distal pivot connection relative to said main pivot connection, and, when said gate is in said closed position and said car is viewed in side view, said actuating cylinder is located between said main pivot connection and said distal pivot connection.

17. A railroad hopper car comprising:

at least one hopper having a bottom discharge, said bottom discharge including a gate movable between a closed position for retaining lading and an open position for permitting egress of lading;

first and second end sections to which said hopper is mounted, said first and second end sections being mounted to respective first and second railroad car trucks for rolling motion along railroad tracks in a lengthwise direction of said car;

a door operating linkage connected to said gate, said door operating linkage being oriented lengthwise with respect to said car and connected; and

an actuating cylinder connected to drive said door operating linkage, said actuating cylinder also being oriented to act in a lengthwise extending plane with respect to said car, said actuating cylinder having an axis of reciprocation;

said door operating linkage including a first pivot arm pivotally mounted to said first end section at a first pivot connection;

a mechanical transmission connected between said first pivot arm and said gate, said mechanical transmission including at least a drag link movably connected to said first pivot arm at a location distant from said first pivot connection; and

said first pivot connection being lower than said actuating cylinder as seen when viewing said first end section in side view.

18. The railroad hopper car of claim 17 wherein said first pivot connection is a main pivot connection, said drag link is connected to said first pivot arm at a distal pivot connection and when said gate is in said closed position and said car is viewed in side view, said actuating cylinder is located between said main pivot connection and said distal pivot connection.

19. The railroad hopper car of claim 17 wherein said actuating cylinder drives an intermediate lever that is connected to drive said first pivot arm.

20. A rail road hopper car comprising:

a hopper carried between a pair of trucks, said hopper having first and second upstanding

sidewalls running lengthwise therealong;

said hopper having a lower discharge and convergent slope sheets giving onto said discharge;

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;

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;

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;

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;

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;

said first sidewall having a continuous section between said first and second regions thereof; and

said sidewall stiffener having web continuity between said first and second portions thereof.

21. The rail road hopper car of claim 20 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.

22. The rail road hopper car of claim 20 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.

23. The rail road hopper car of claim 20 wherein:

said first upstanding sidewall has a third region intermediate said first and second

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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;

said hopper includes first and second sloped side sheets; and

said first sloped side sheet meets said first sidewall at said transition portion.

24. The rail road hopper car of claim 22 wherein said first sidewall has an overall height from said side sill to said top chord, L, and said transition portion is located a distance above said side sill that is in the range of ¼ to 2/3 L.

25. The rail road hopper car of claim 23 wherein said first sidewall has an overall height from said side sill to said top chord, L, and said first sloped sheet meets said transition portion at an height that is in the range of ¼ to 2/3 L above said side sill.

RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR

Abstract

A railroad gondola car has a hopper carried between two trucks. The hopper has convergent end and side slope sheets that feed a bottom discharge. The bottom discharge has a pair of longitudinal doors. The door closing mechanism is a mechanical transmission that includes a set of linkages running from the door to a reciprocating pneumatic cylinder. The linkages run generally parallel to the slope sheet. The car has a very short draft installation that includes a removable coupler carrier bar, and the main shear plate has a removable draft gear installation panel. There is a machinery space above the end section shear plate. It is overhung by the slope sheet that is substantially unobstructed by any other primary structure. The pneumatic cylinder is mounted on an angle in this unobstructed machinery space, oriented longitudinally over the draft sill beneath the main drag link of the mechanical transmission, and above the main pivot of the driving input lever of the transmission. The main lever is bifurcated, and straddles the pneumatic cylinder. The mechanism includes a primary lock in the form of an over center lever arrangement, and a compact secondary lock that acts sideways rather than lengthwise. The sidewalls of the car include vertical stiffeners and side sheets. The lower portion of the side sheets lies laterally inboard of the stiffener web, while the upper portion lies laterally outboard of the stiffener web. The side slope sheet of the hopper meets the sidewall at the transition of the sidewall sheet from the inside-the-post to the outside-the-post condition.

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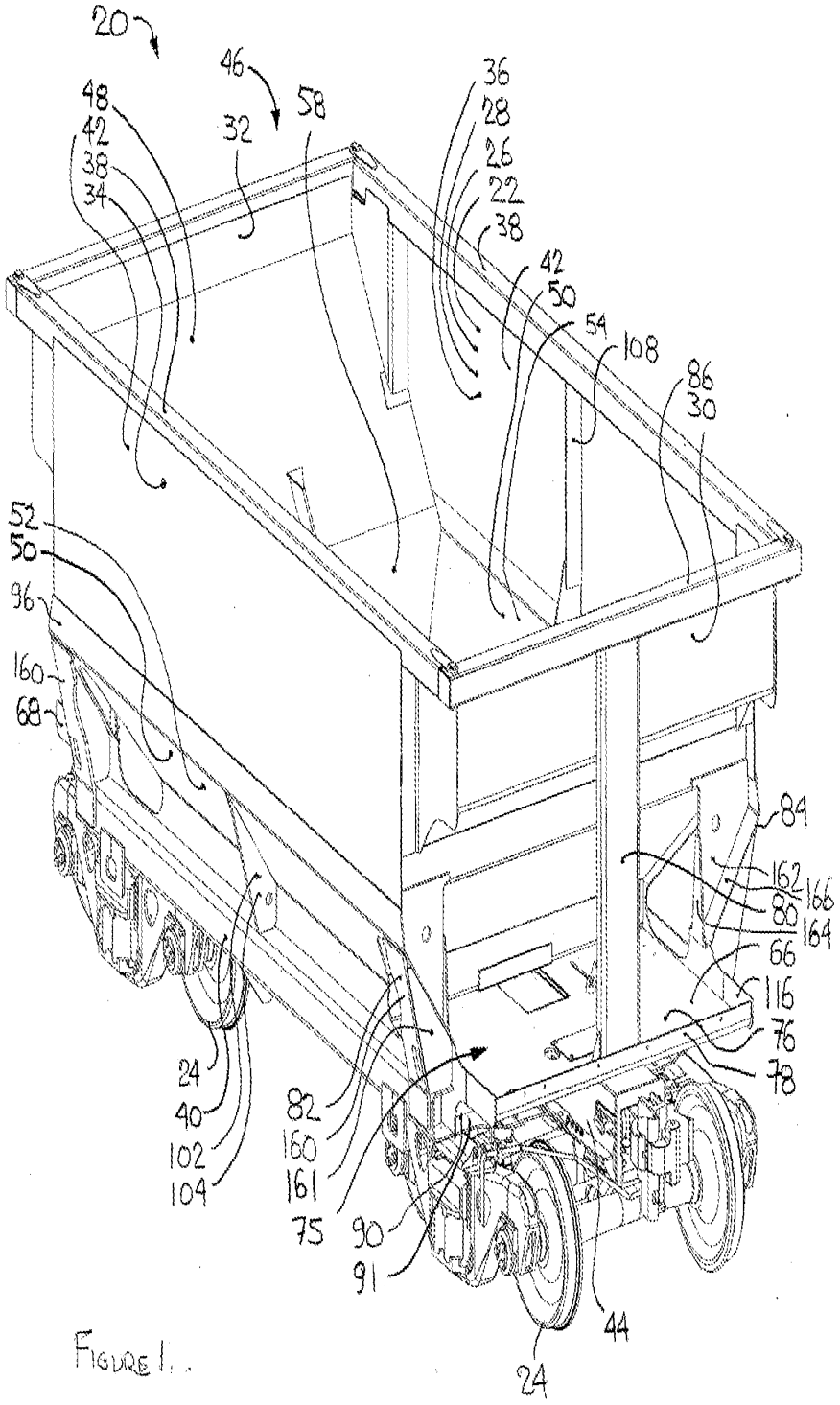

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FIGURE 1.

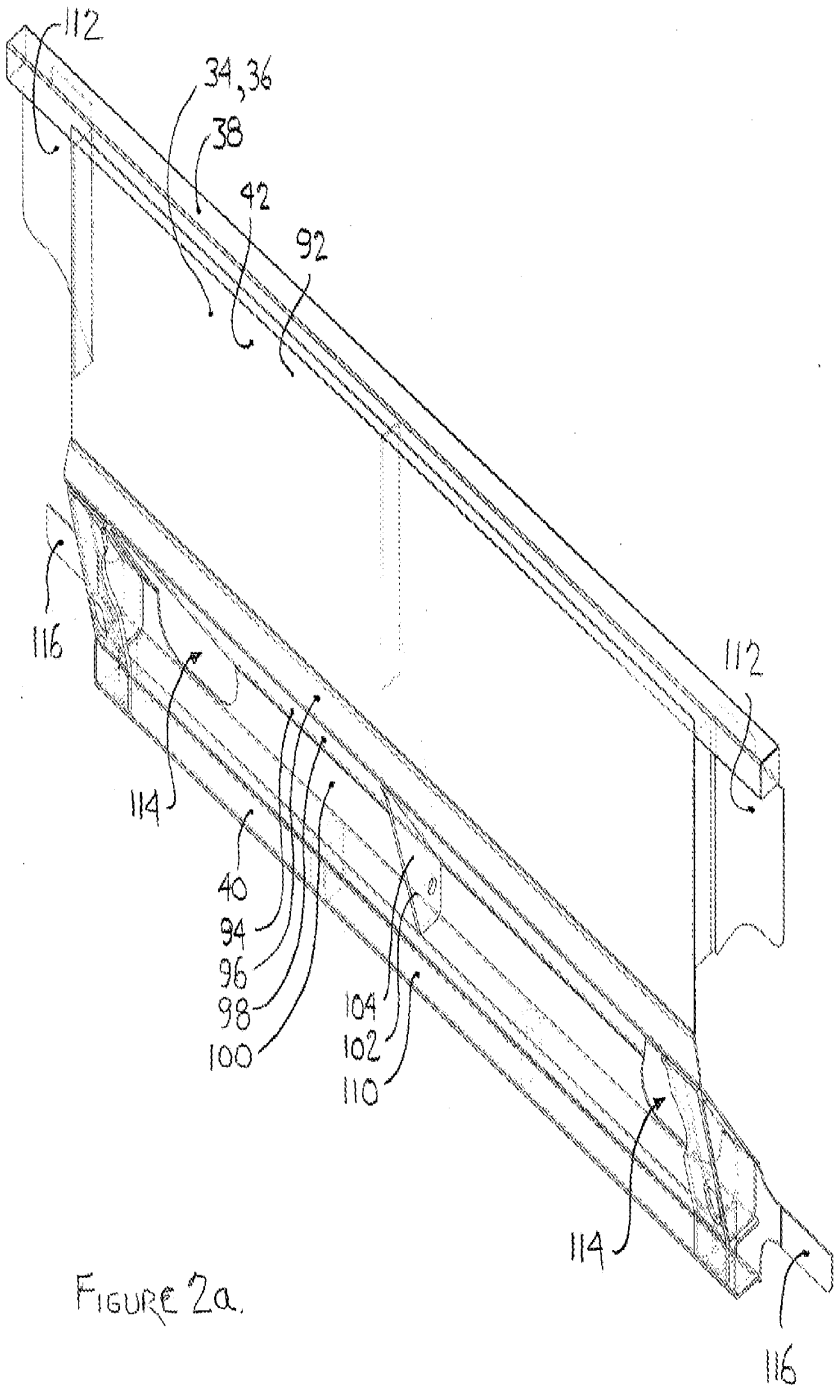


FIGURE 2a.

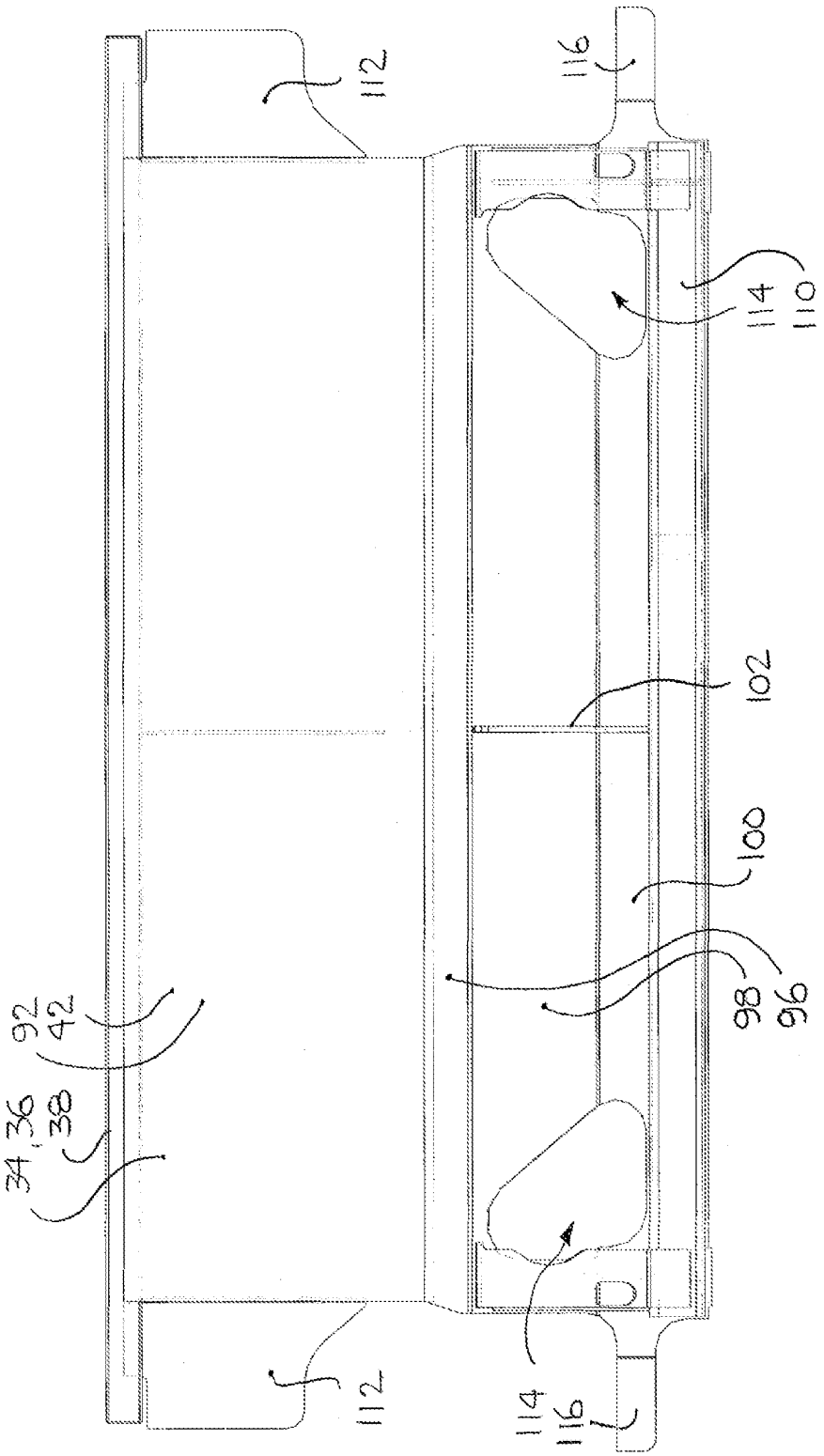


FIGURE 2b.

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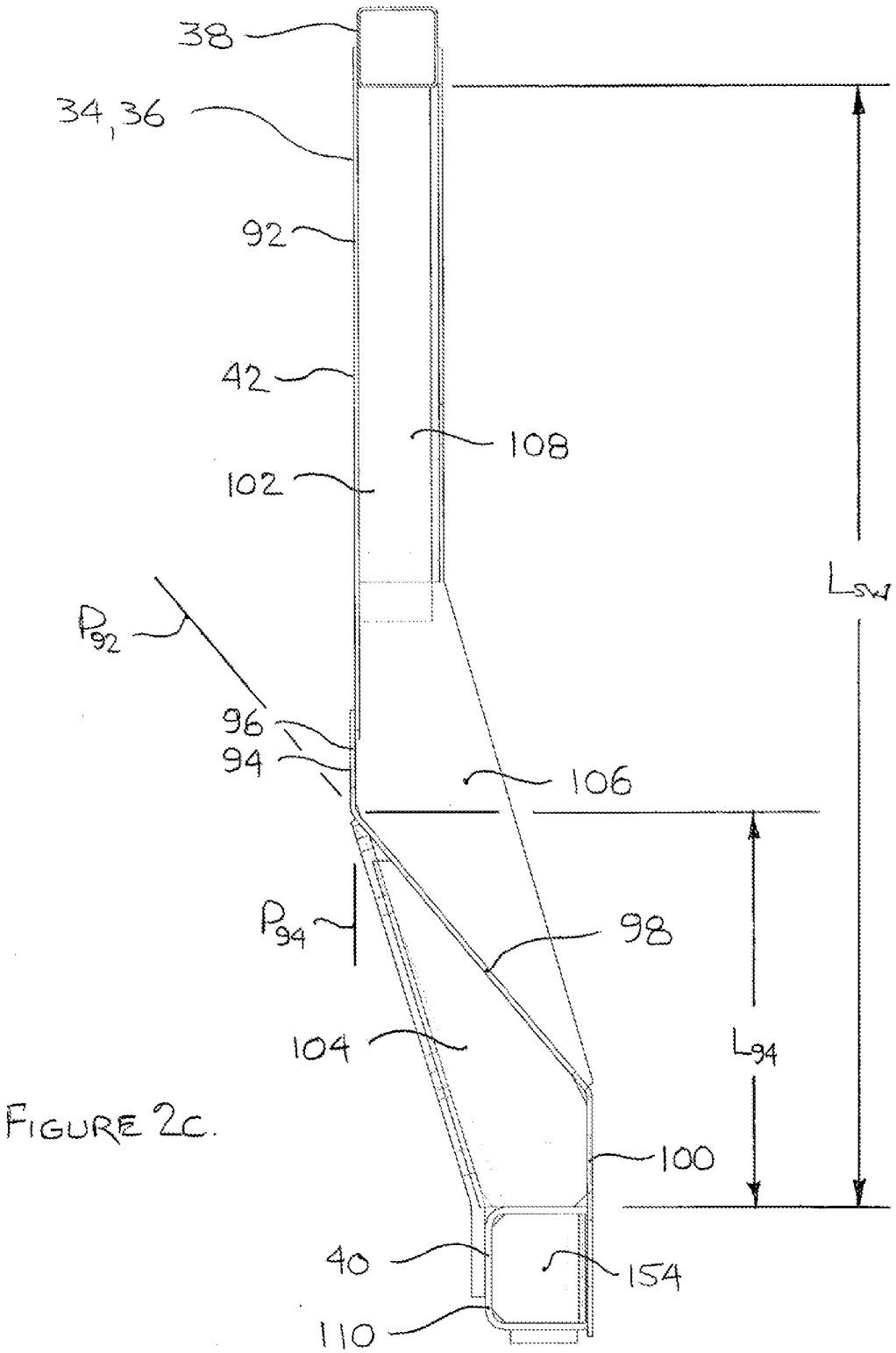


FIGURE 2C.

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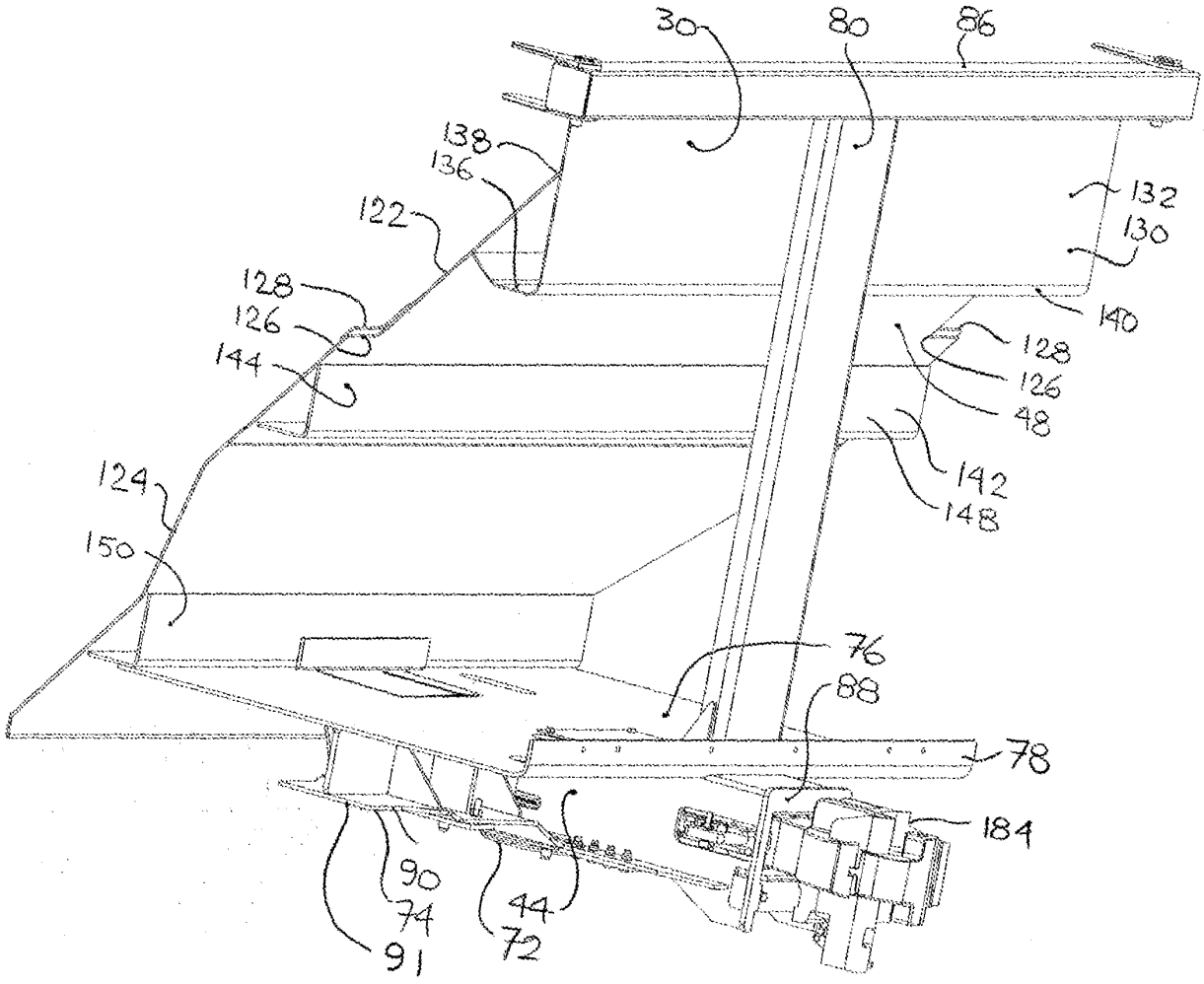

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FIGURE 3a.

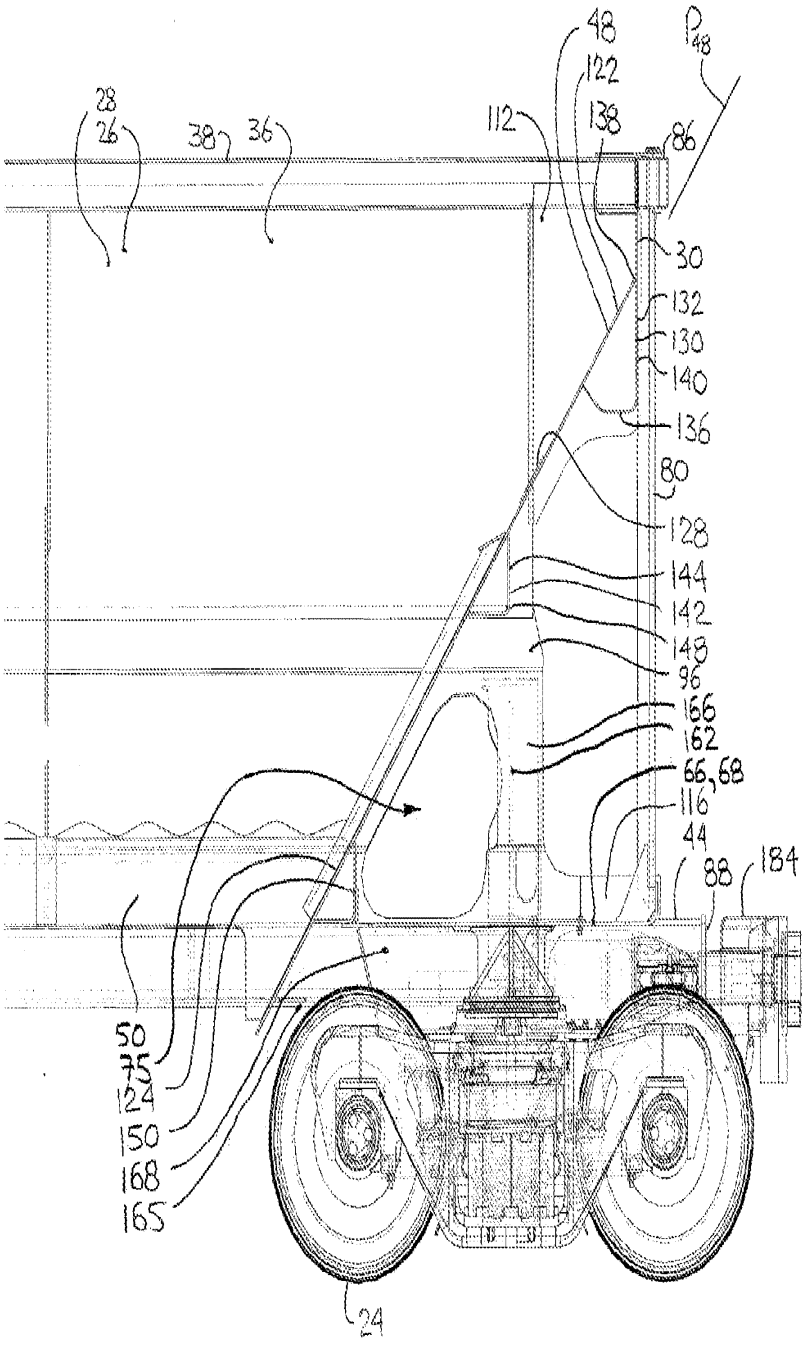


FIGURE 3b.

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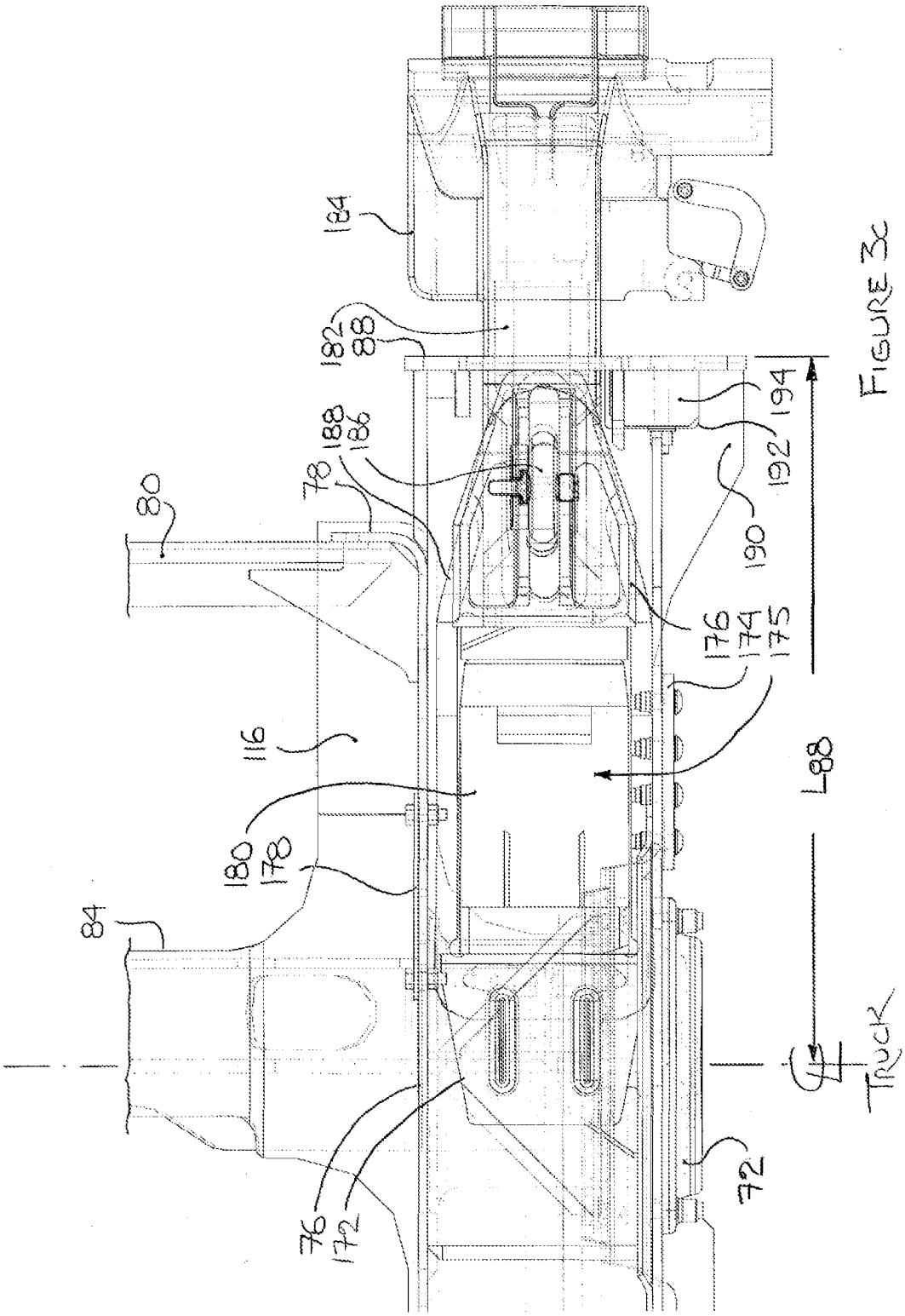


FIGURE 3C

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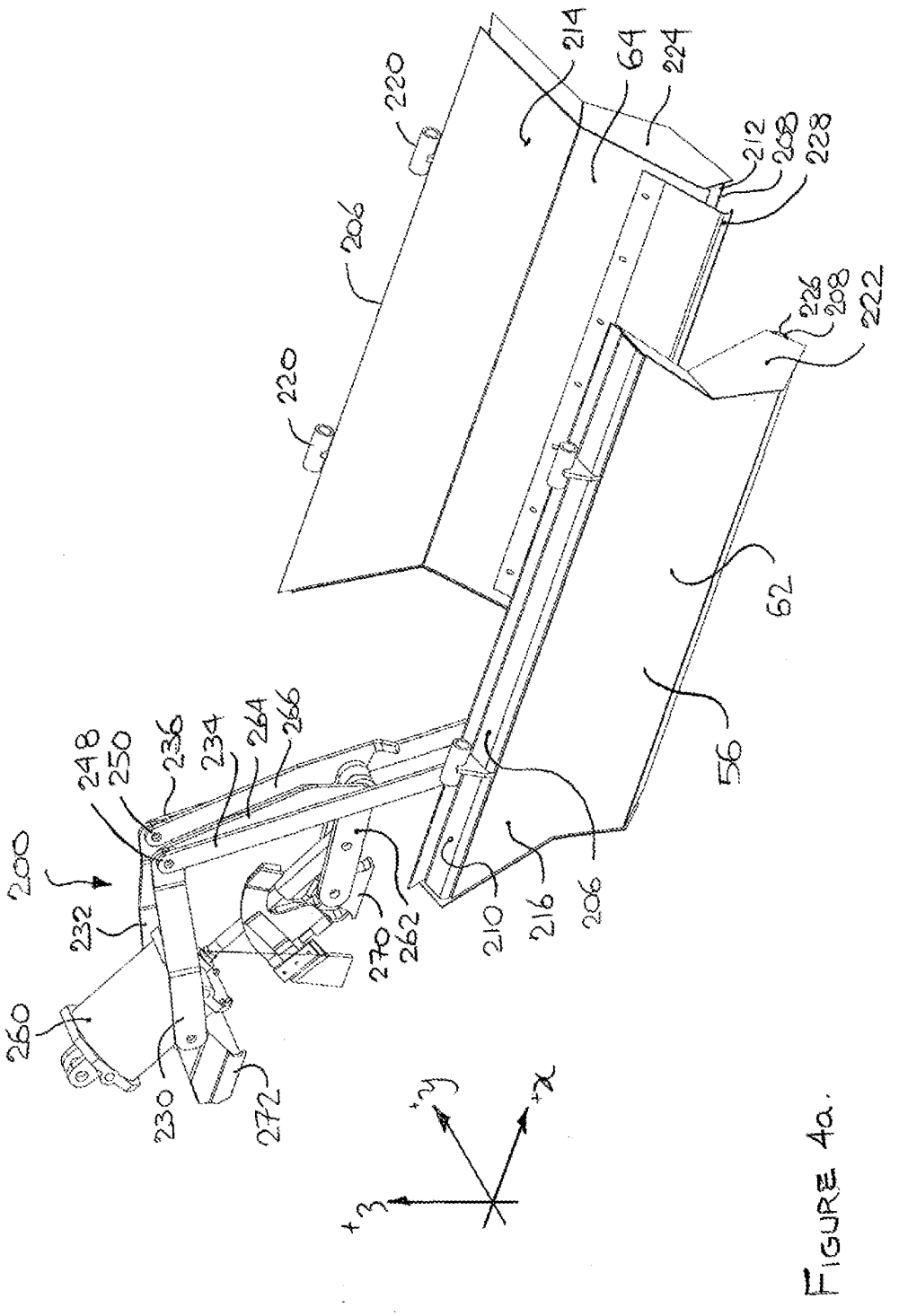


FIGURE 4a.

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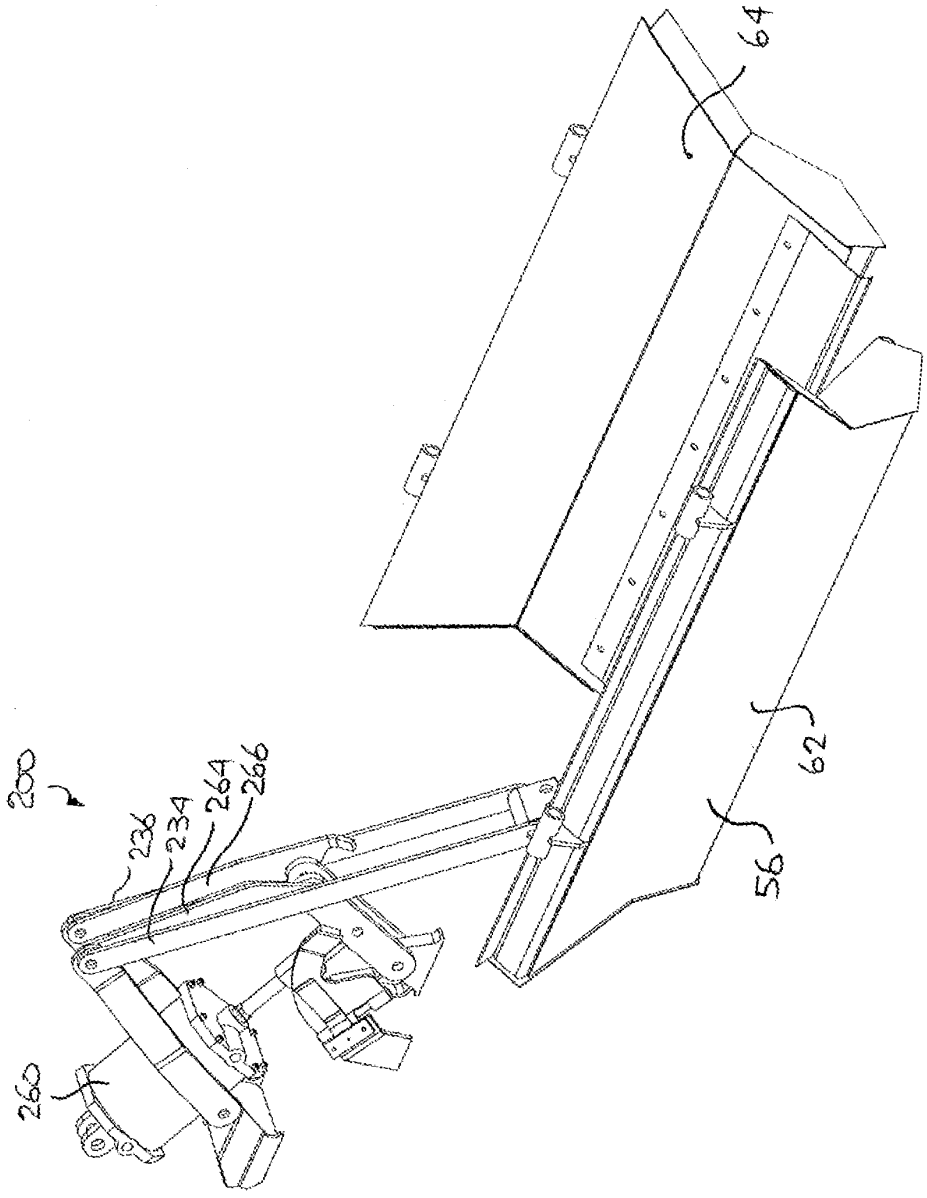


FIGURE 4b

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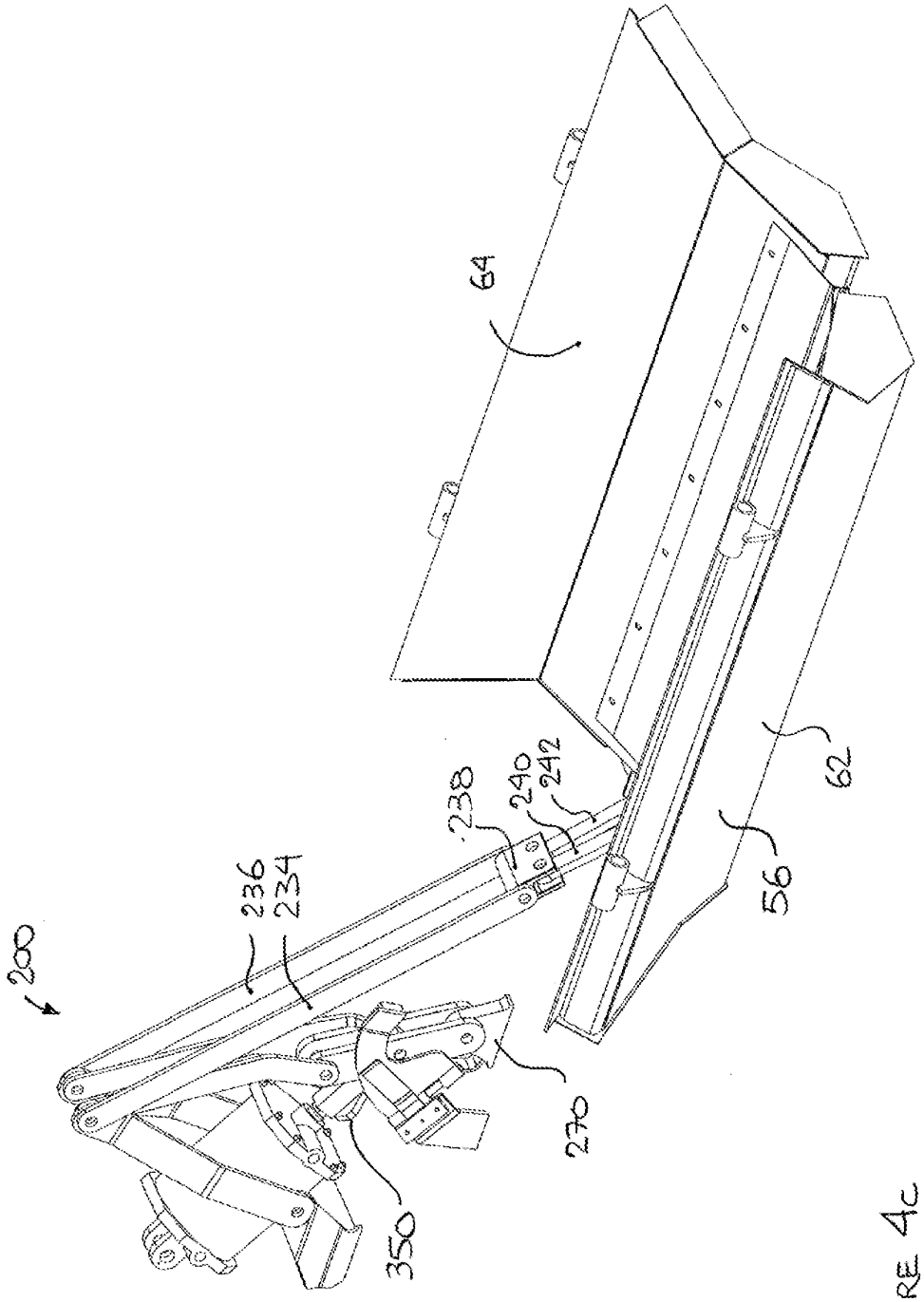


FIGURE 4C

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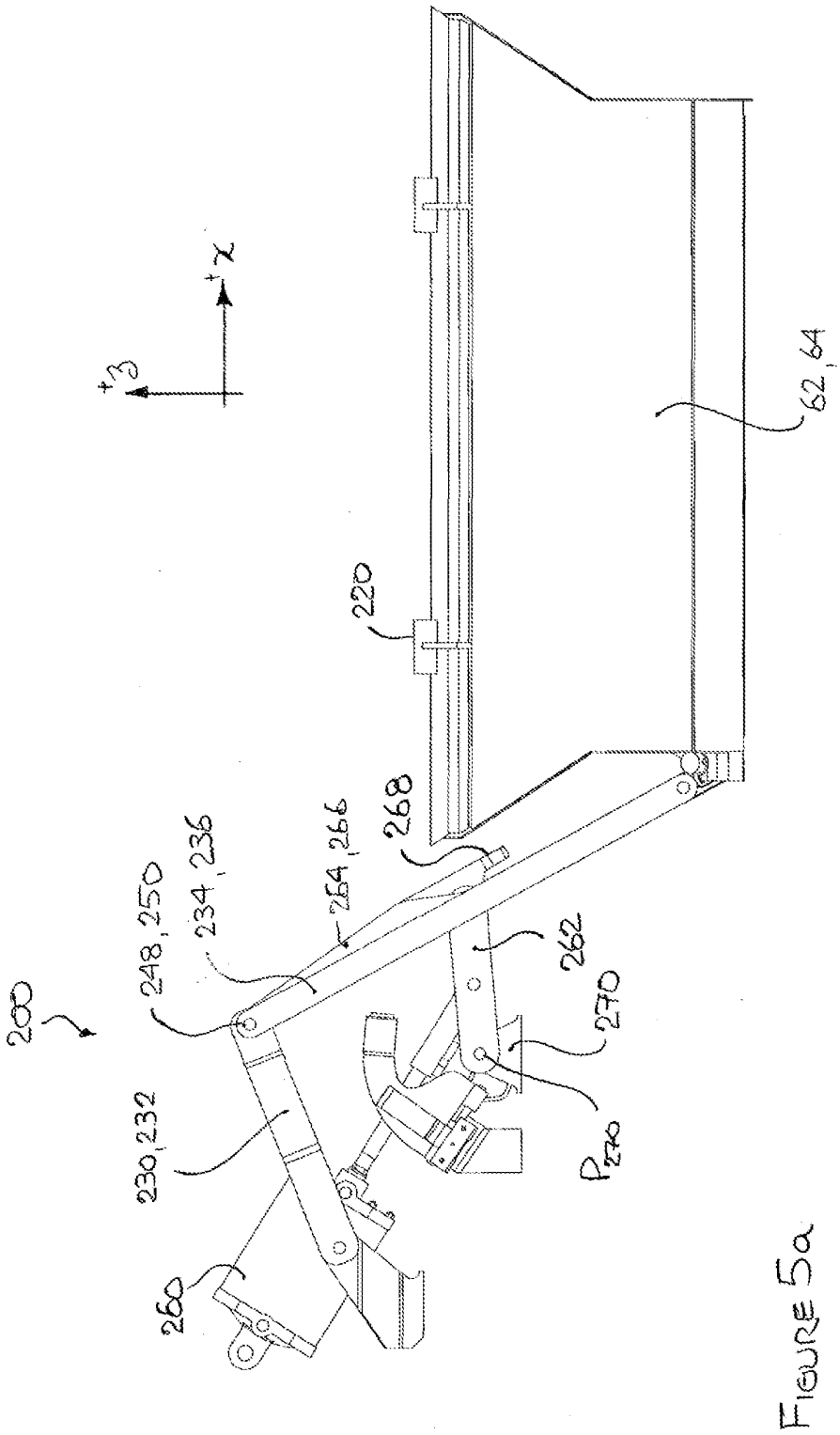


FIGURE 5a

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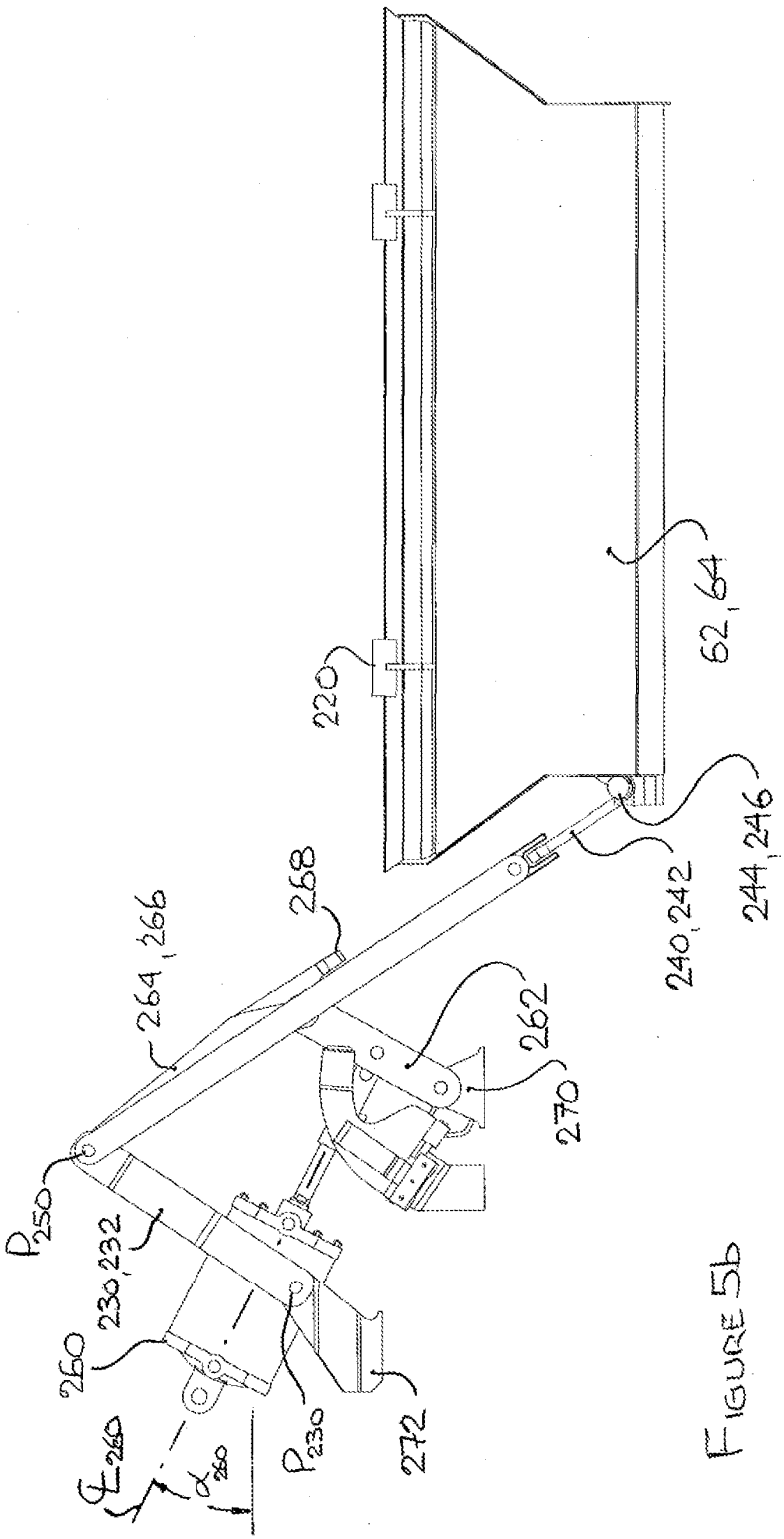


FIGURE 5b

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IPR Petition - USP 8,166,892

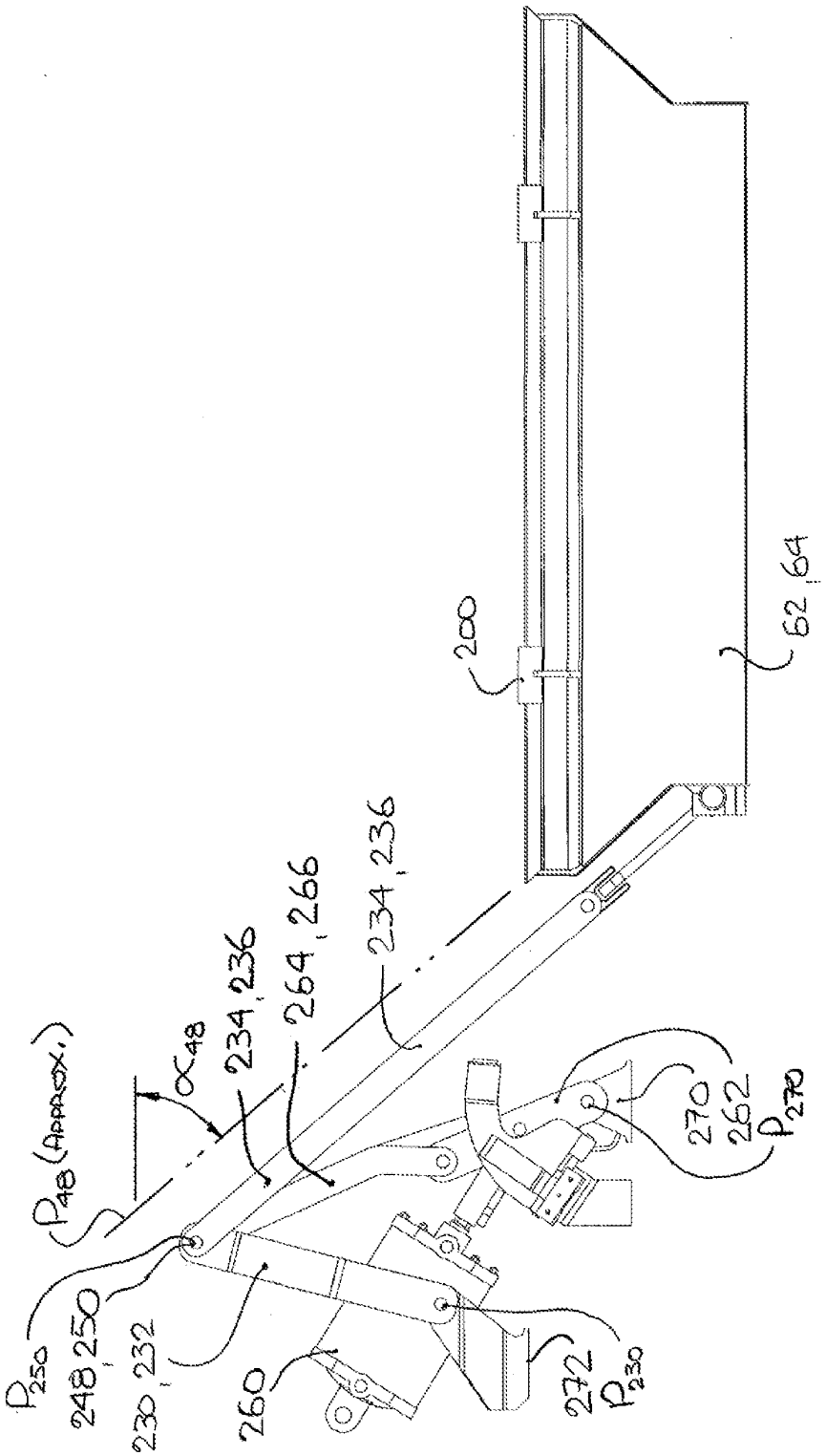


FIGURE 5C.

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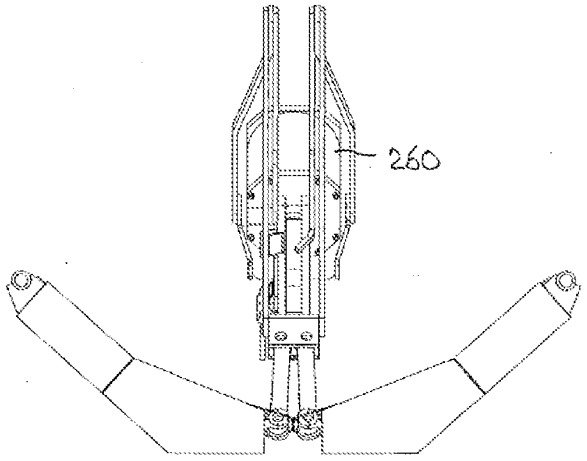


FIGURE 6C

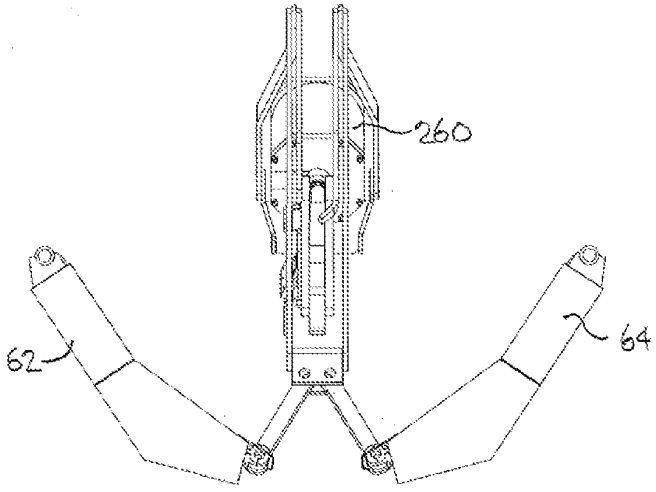


FIGURE 6b

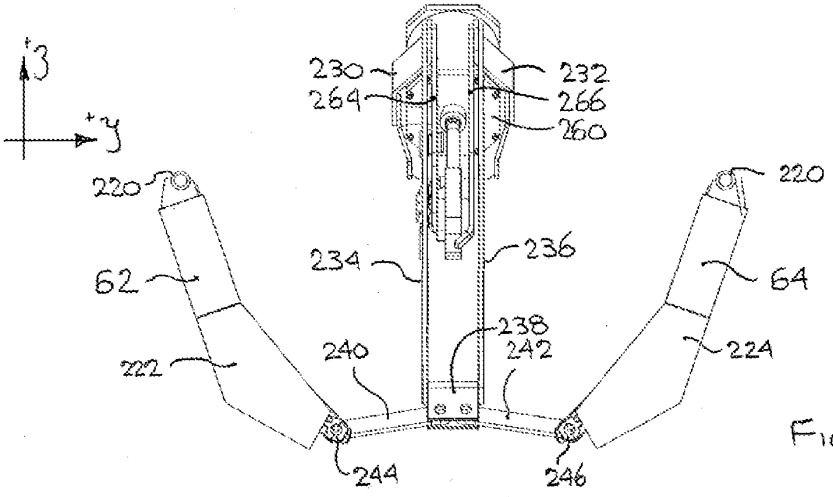


FIGURE 6a

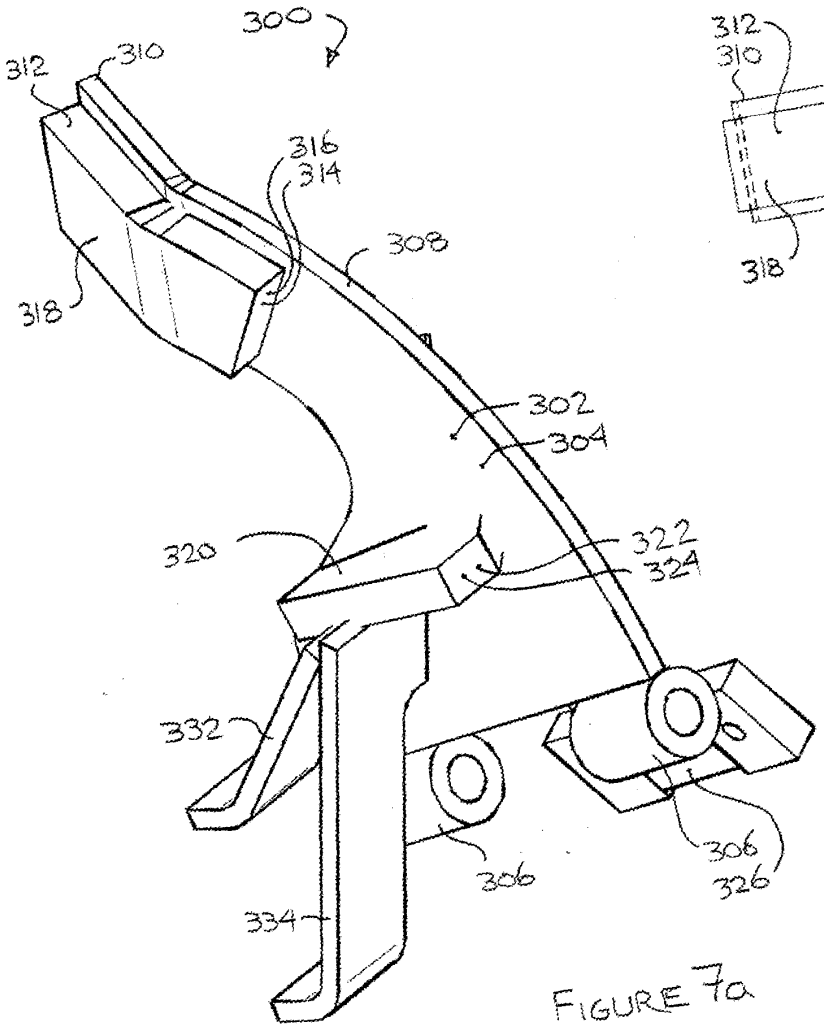


FIGURE 7a

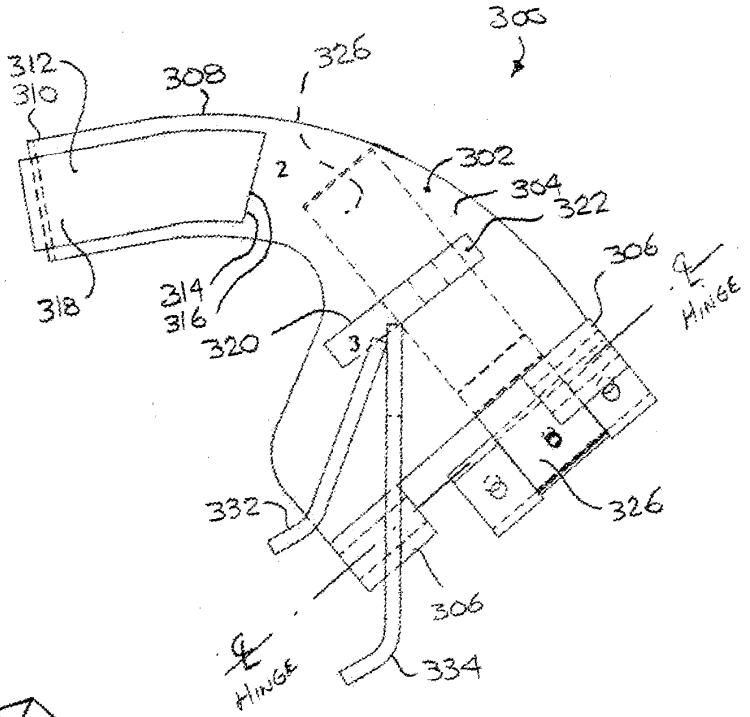
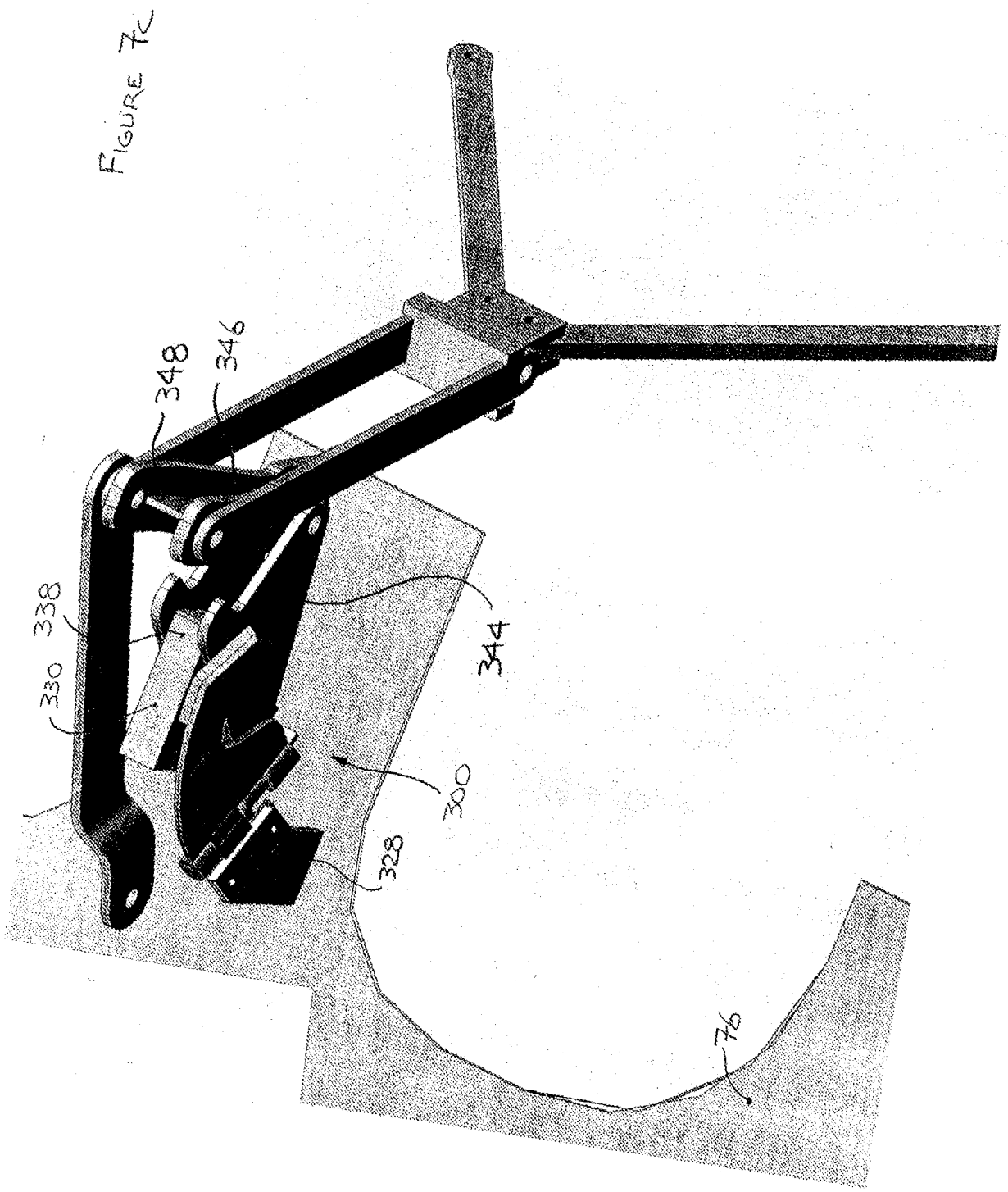


FIGURE 7b.


FIGURE 7C
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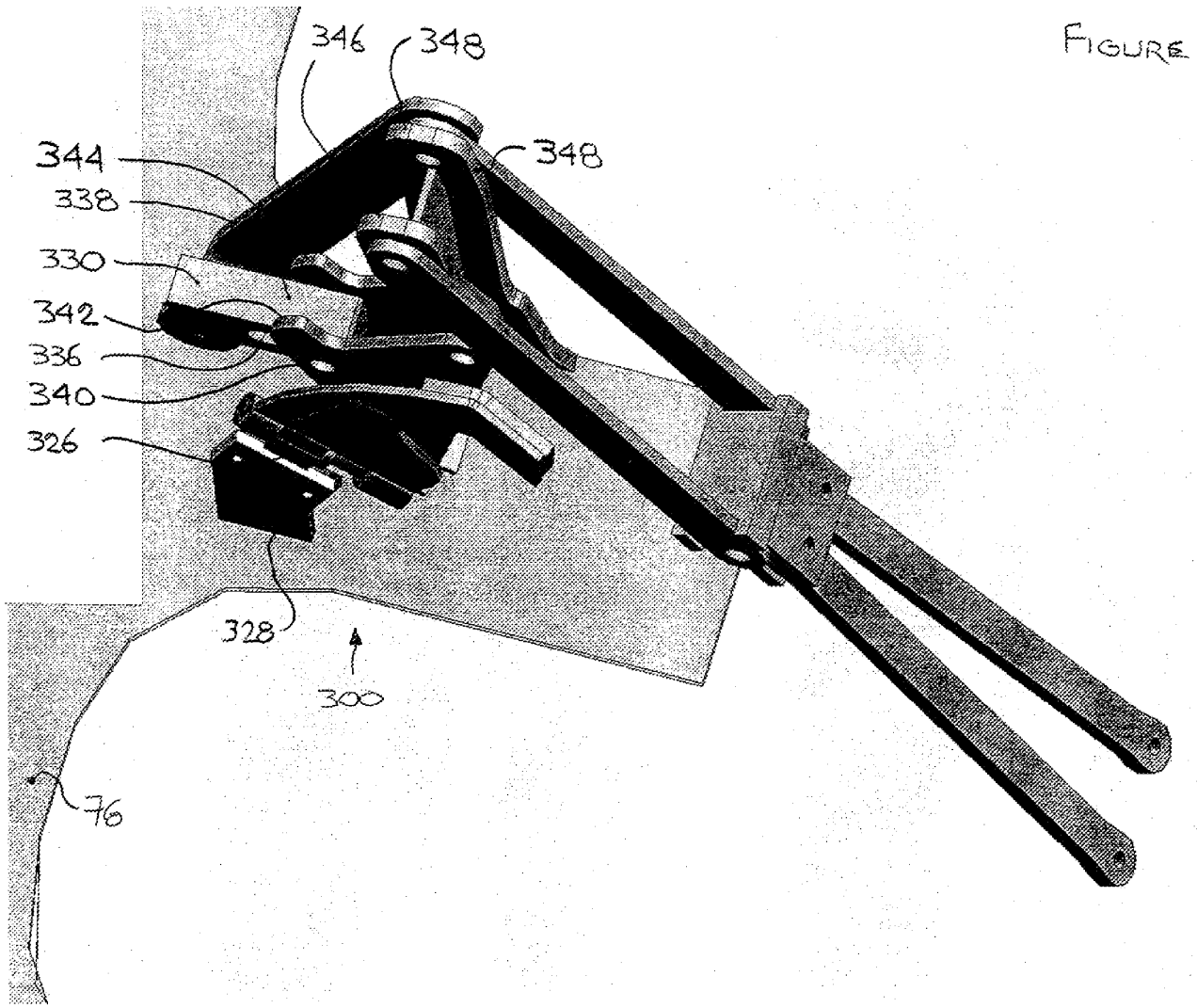


FIGURE 7d.

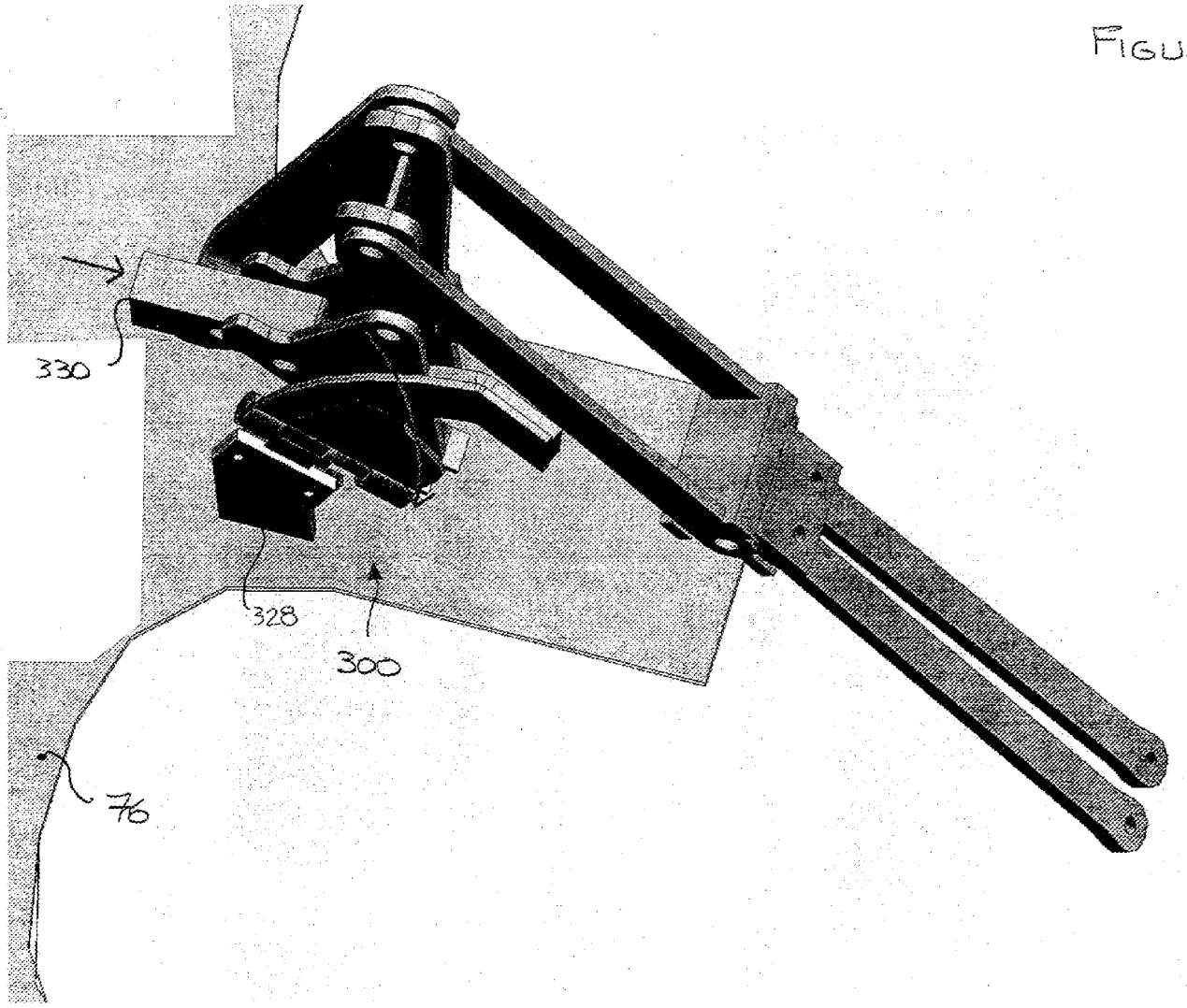


FIGURE 7E.

Electronic Acknowledgement Receipt	
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Application Number:	12559065
International Application Number:	
Confirmation Number:	7747
Title of Invention:	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR
First Named Inventor/Applicant Name:	James W. Forbes
Customer Number:	21324
Filer:	Michael Howard Minns
Filer Authorized By:	
Attorney Docket Number:	200405.00128
Receipt Date:	14-SEP-2009
Filing Date:	
Time Stamp:	16:37:11
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	ApplicationDataSheet.pdf	842333 06b7d8770aba7f2c358b5ac4bf906f009be56d43	no	5

Warnings:
Information:

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2		Specification.pdf	229914 66d2fc81e7033489a9b33481ee4f0faf9e2e1db2	yes	35

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Specification	1	27
	Claims	28	34
	Abstract	35	35

Warnings:

Information:

3	Drawings-only black and white line drawings	Drawings.pdf	3754439 6f8798ec369350fe0a6a0ed7d9f7a37acceccc2ab	no	18

Warnings:

Information:

Total Files Size (in bytes):	4826686

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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Application Number: 12559065 Document Date: 9/14/2009

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12/559,065	09/14/2009	3617	0.00	200405.00128	25	4

CONFIRMATION NO. 7747

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AKRON, OH 44311-1076

FILING RECEIPT

OC000000038007949

Date Mailed: 10/01/2009

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

James W. Forbes, Campbellville, CANADA;
Marcus Thiesen, Hamilton, CANADA;
Dave Keats, Brantford, CANADA;

Assignment For Published Patent Application

NATIONAL STEEL CAR LIMITED, Hamilton, CANADA

Power of Attorney: None

Domestic Priority data as claimed by applicant

Foreign Applications

If Required, Foreign Filing License Granted: 09/28/2009

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/559,065**

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Title

RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR

Preliminary Class

105

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/559,065	09/14/2009	James W. Forbes	200405.00128

CONFIRMATION NO. 7747

21324
HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076

FORMALITIES LETTER

OC000000038007950

Date Mailed: 10/01/2009

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
  *Applicant must submit $**330** to complete the basic filing fee for a non-small entity. If appropriate, applicant may make a written assertion of entitlement to small entity status and pay the small entity filing fee (37 CFR 1.27).*
- The oath or declaration is missing.
  A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.
  Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.

The application is informal since it does not comply with the regulations for the reason(s) indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- Replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d) are required. The drawings submitted are not acceptable because:
  - The drawings must be reasonably free from erasures and must be free from alterations, overwriting, interlineations, folds, and copy marks. See Figure(s) 7c-7e.
  - The drawings have a line quality that is too light to be reproduced (weight of all lines and letters must be heavy enough to permit adequate reproduction) or text that is illegible (reference characters, sheet numbers, and view numbers must be plain and legible) see 37 CFR 1.84(l) and (p)(1)); See Figure(s) 2b, 3b, 3c.
  - The drawings submitted to the Office are not electronically reproducible because portions of figures 2b, 3b, 3c are missing and/or blurry.

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Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- Additional claim fees of $**480** as a non-small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.
- To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of $**130** for a non-small entity, must be submitted with the missing items identified in this notice.

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is $**1700** for a non-small entity

- $**330** Statutory basic filing fee.
- $**130** Surcharge.
- The application search fee has not been paid. Applicant must submit $**540** to complete the search fee.
- The application examination fee has not been paid. Applicant must submit $**220** to complete the examination fee for a non-small entity.
- Total additional claim fee(s) for this application is $**480**
  - $**220** for **1** independent claims over 3.
  - $**260** for **5** total claims over 20.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.
https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/bnguyen/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

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To: patents@hahnlaw.com,akron-docket@hotmail.com,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 21324

Oct 01, 2009 06:08:01 AM

Dear PAIR Customer:

HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 21324 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
12559065	APP.FILE.REC	10/01/2009	200405.00128
	NTC.MISS.PRT	10/01/2009	200405.00128

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

PTO/SB/06 (12-04)

Filing Date: 09/14/09

Approved for use through 7/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/559,065

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	**330**
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	**540**
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	**220**
TOTAL CLAIMS (37 CFR 1.16(i))	**25** minus 20 =	**5**	x$26		OR	x$52	**260**
INDEPENDENT CLAIMS (37 CFR 1.16(h))	**4** minus 3 =	* **1**	x$110			x$220	**220**
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $270 ($135 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			195			390	
			TOTAL			TOTAL	**1570**

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED – PART II

AMENDMENT A	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDI-TIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDI-TIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					N/A		OR	N/A	
					TOTAL ADD'T FEE		OR	TOTAL ADD'T FEE	

AMENDMENT B	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDI-TIONAL FEE ($)	OR	RATE ($)	ADDI-TIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					N/A		OR	N/A	
					TOTAL ADD'T FEE		OR	TOTAL ADD'T FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

This collection of information is required by 37 CFR 1.16. 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 12 minutes to complete, including gathering, preparing, and submitting the completed application 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. Paten 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.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

PTO/SB/01A (01-09)
Approved for use through 06/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR

As the below named inventor(s), I/we declare that:

This declaration is directed to:

☐ The attached application, or

☒ Application No. 12/559,065 filed on September 14, 2009

☐ As amended on _____ (if applicable);

I/we believe that I/we am/are the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought;

I/we have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above;

I/we acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me/us to be material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT International filing date of the continuation-in-part application.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

All statements made herein of my/our own knowledge are true, all statements made herein on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME OF INVENTOR(S)

Inventor one: James W. Forbes Date: Nov 26, 2009

Signature: James W. Forbes Citizen of: Canada

Inventor two: Marcus Thiesen Date: Nov 26/09

Signature: _____ Citizen of: Canada

☒ Additional inventors or a legal representative are being named on one additional form(s) attached hereto.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application 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.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

FULL NAME OF INVENTOR(S)

Inventor three: Dave Keats Date: Nov. 26, 2009

Signature: Dave Keats Citizen of: Canada

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Serial No. 12/559,065
Missing Parts Notice of 10/01/2009
Replacement Sheet

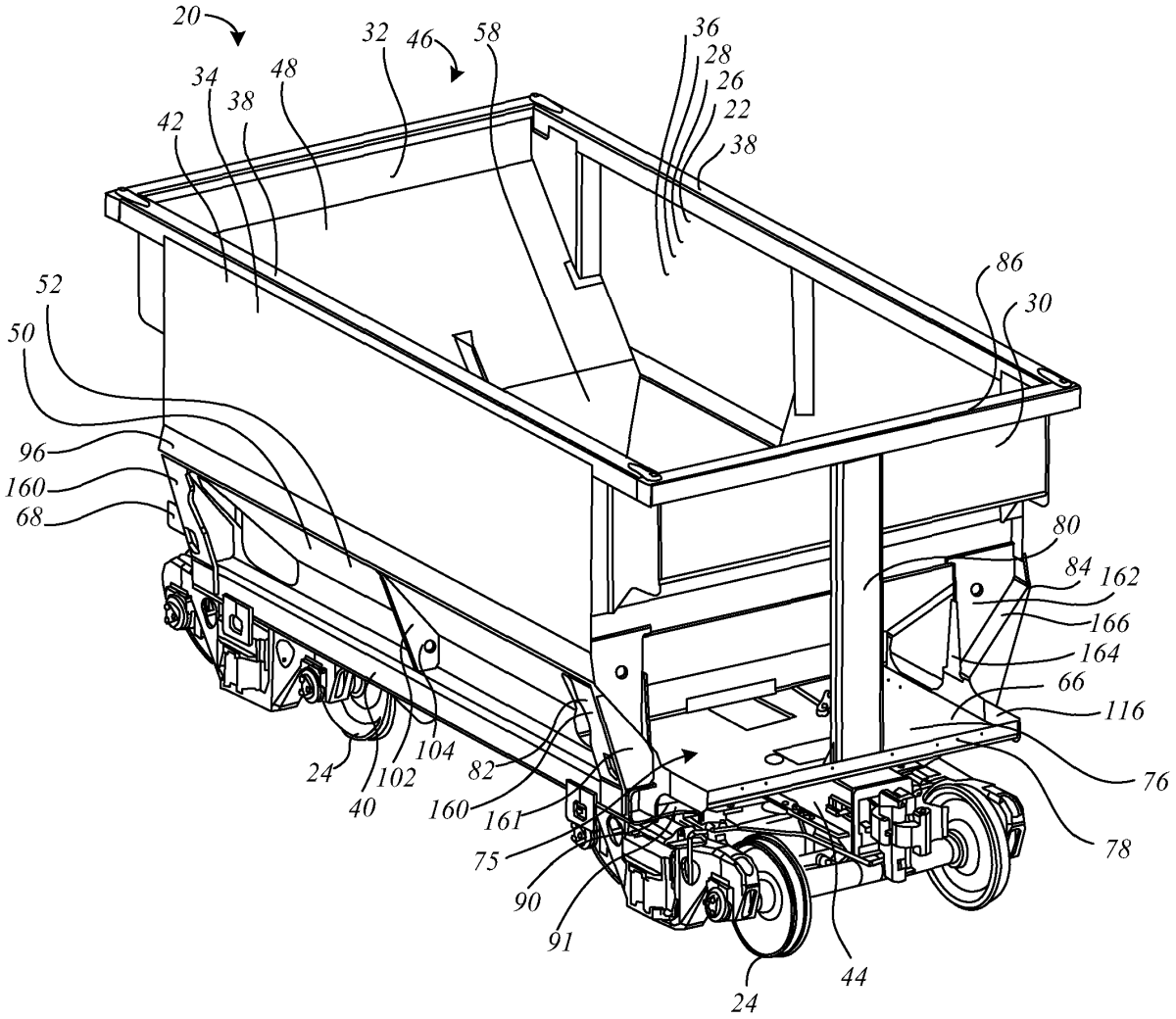


Figure 1

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

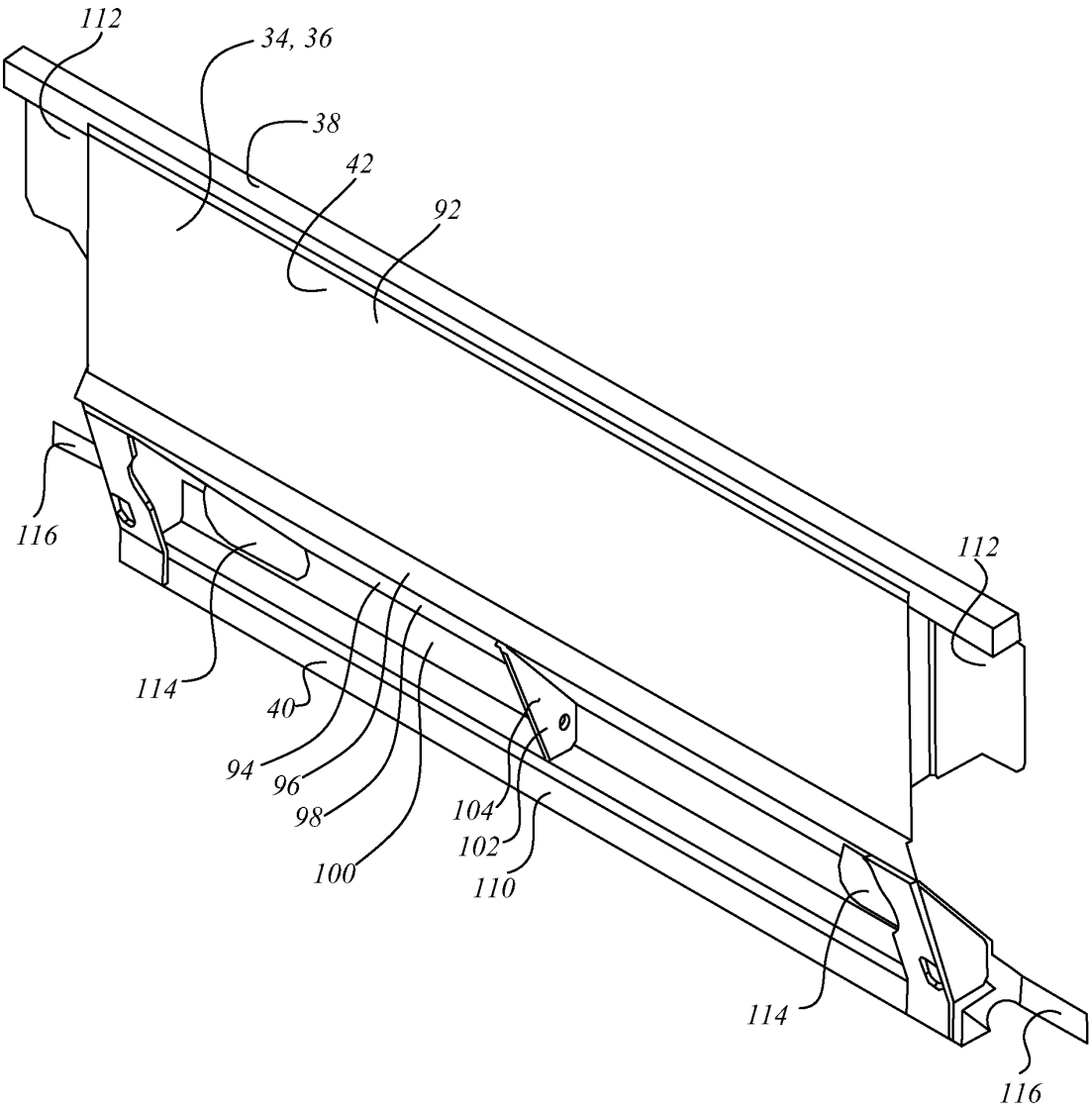


Figure 2a

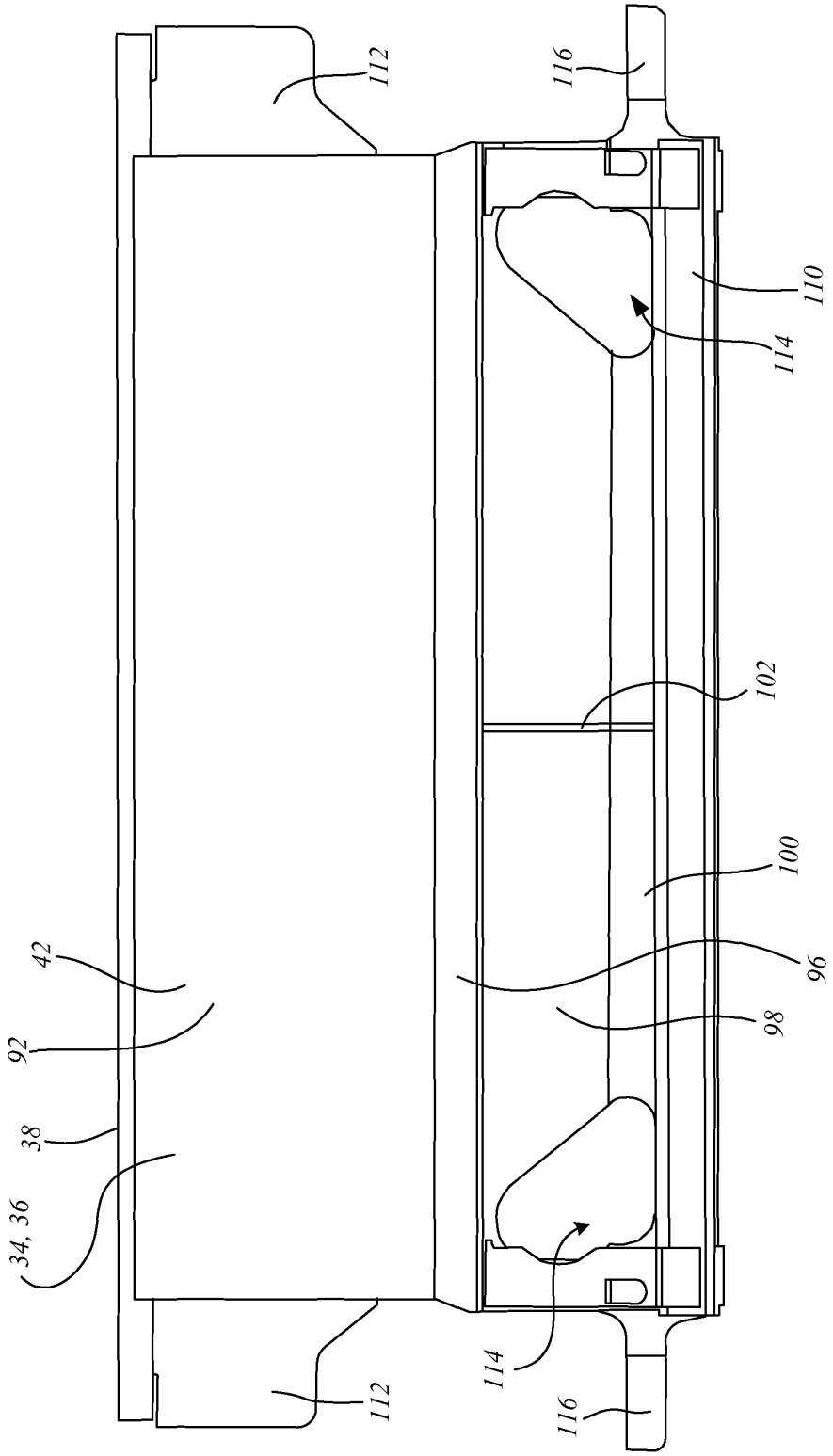


Figure 2b

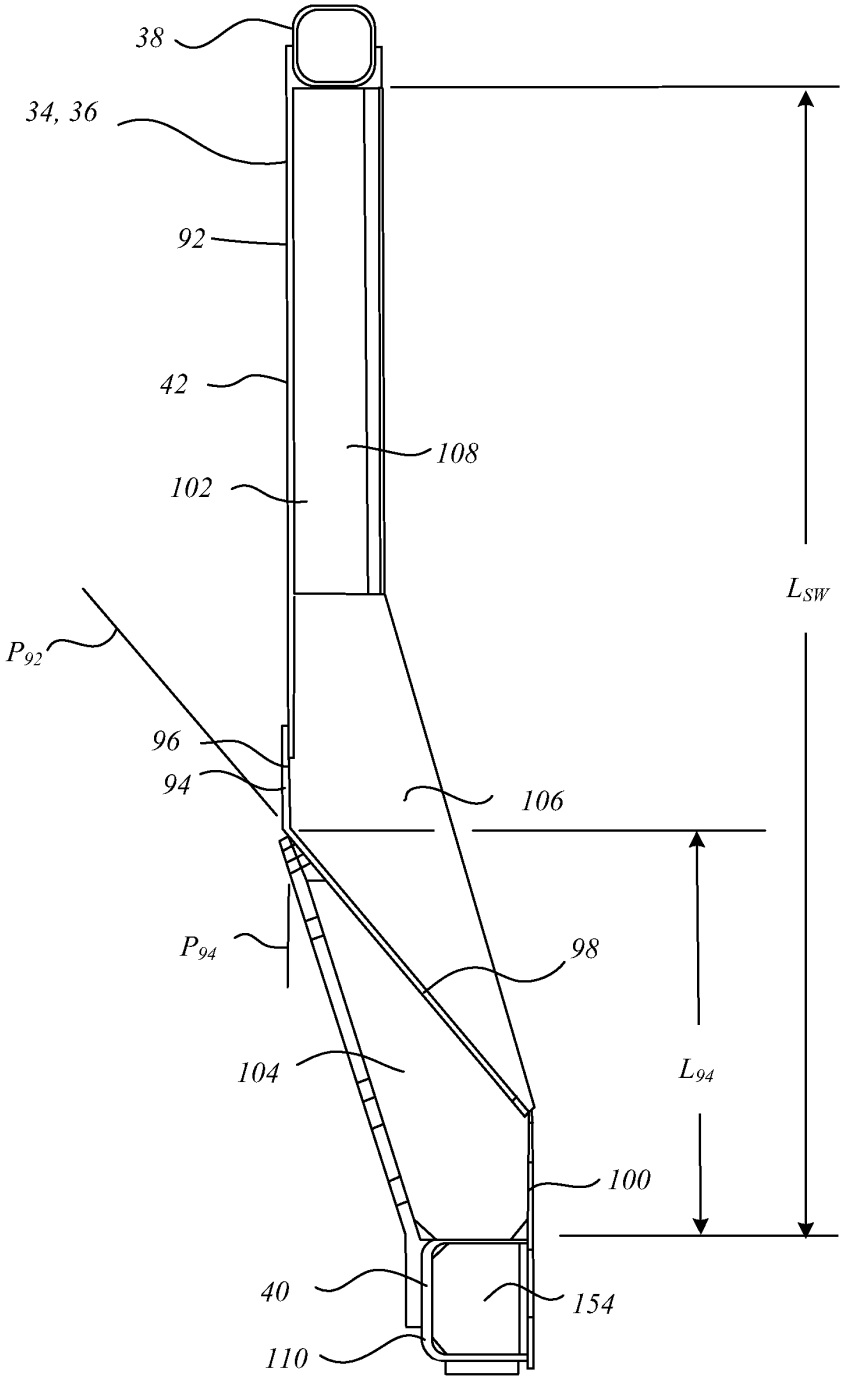

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Figure 2c

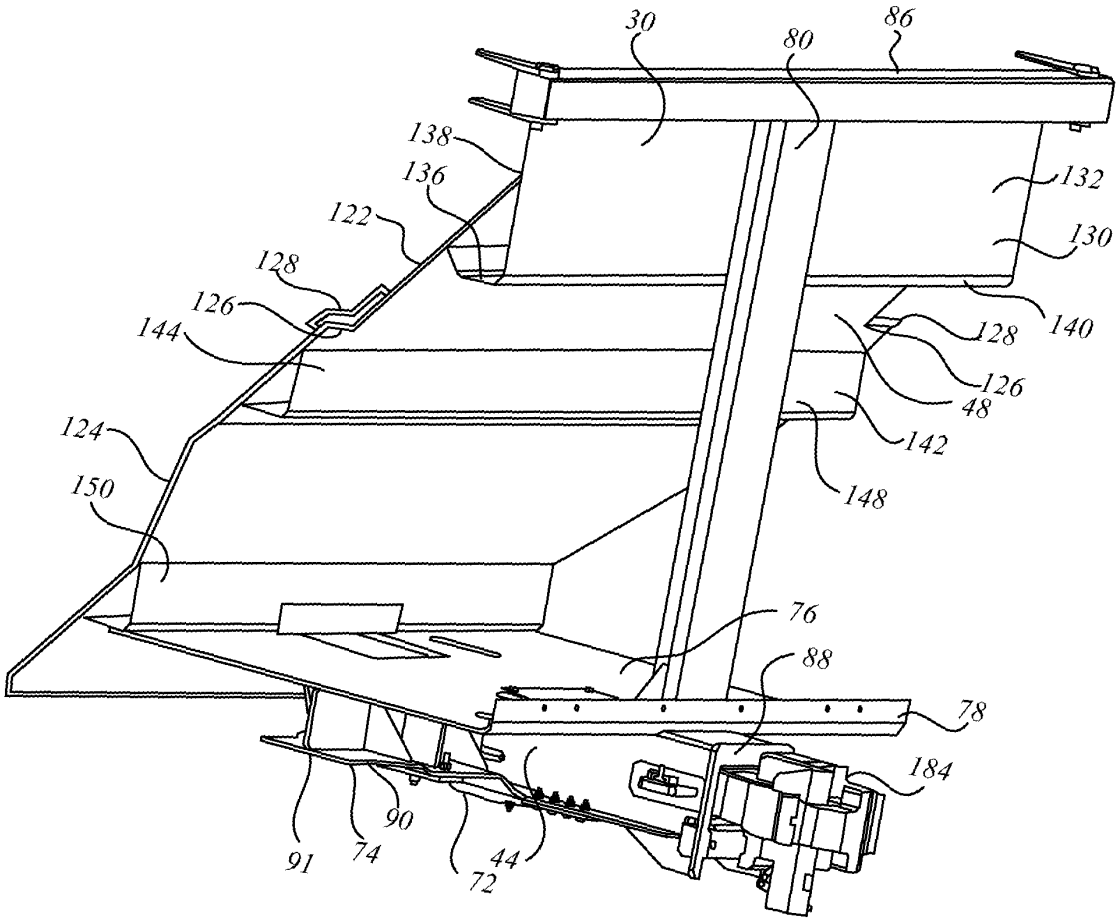

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Figure 3a

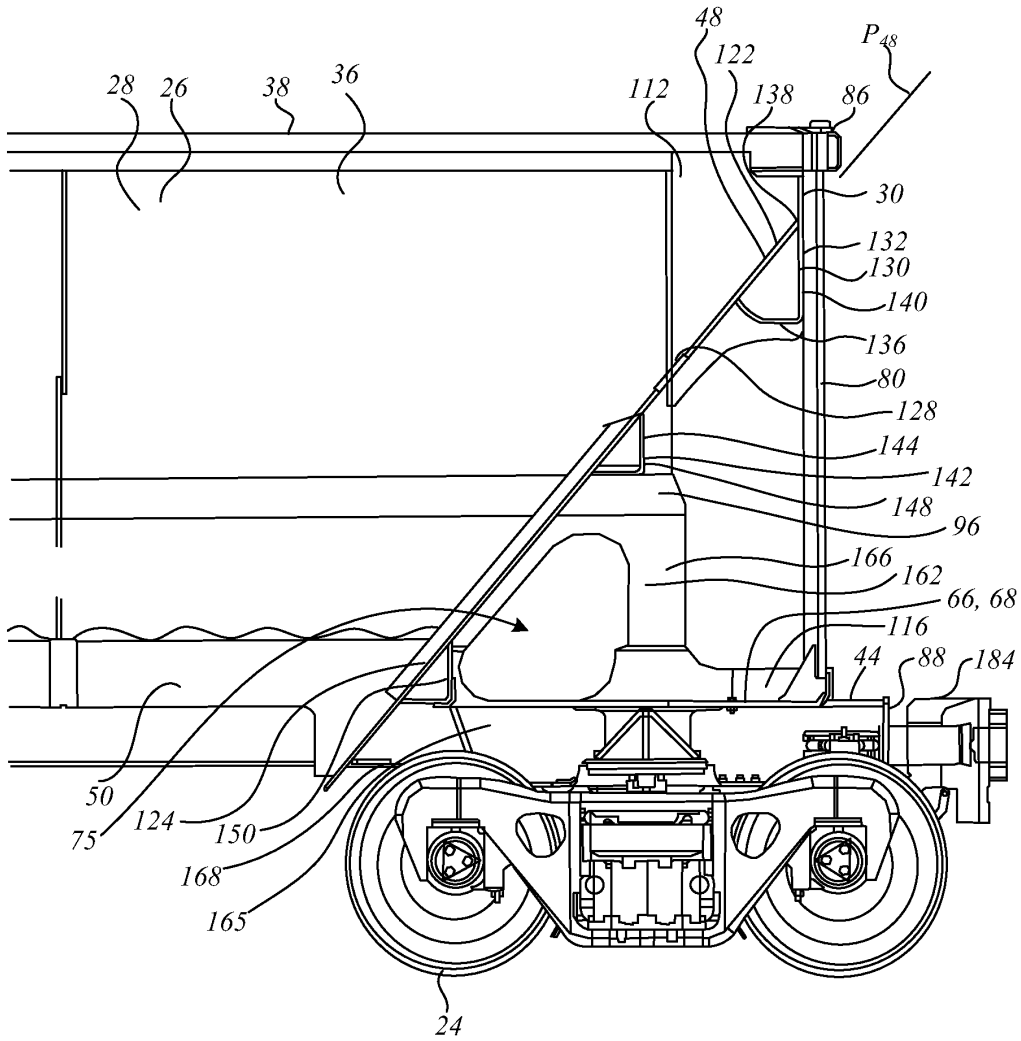

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Figure 3b

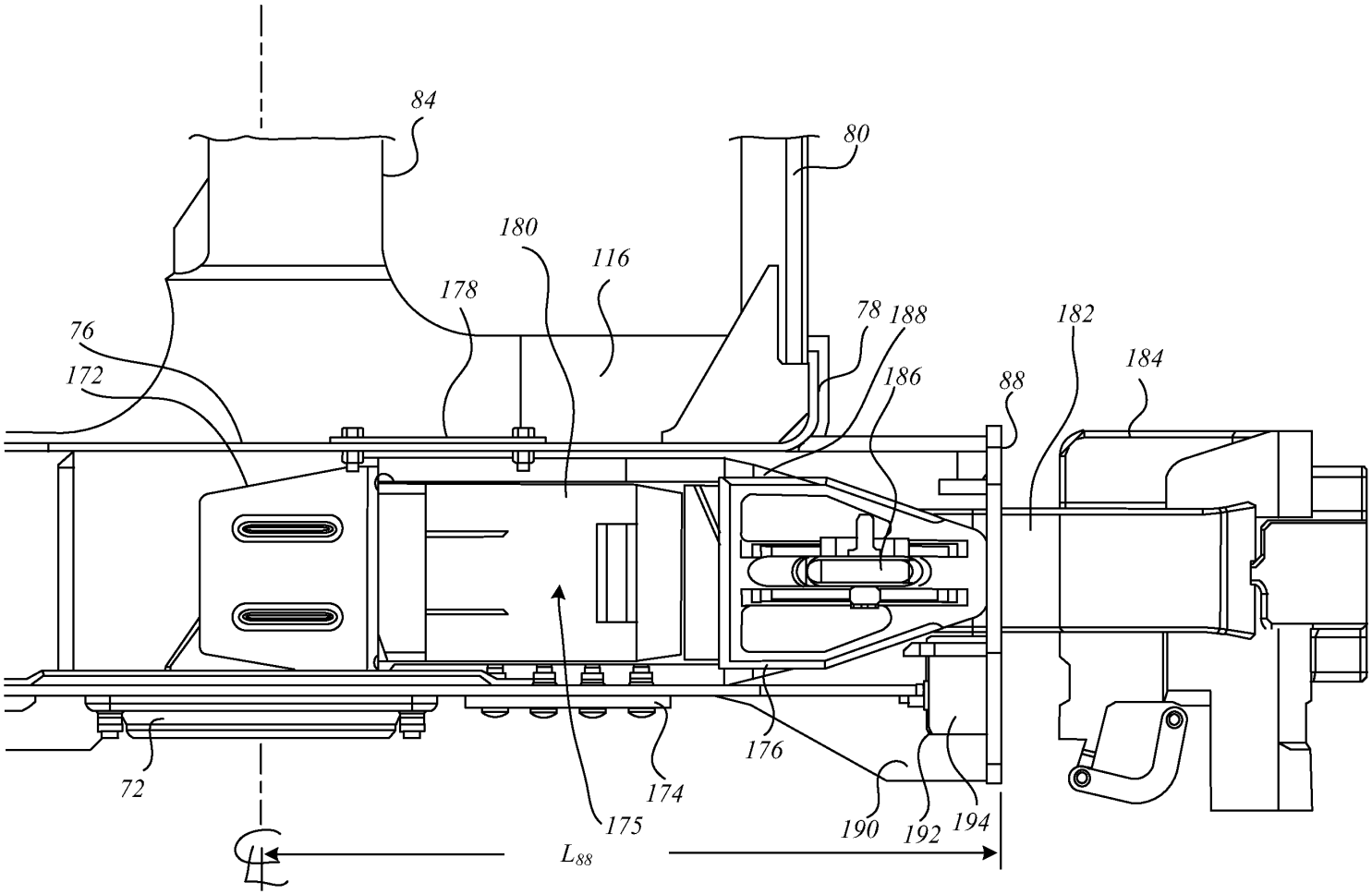


Figure 3c

Serial No. 12/559,065
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FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

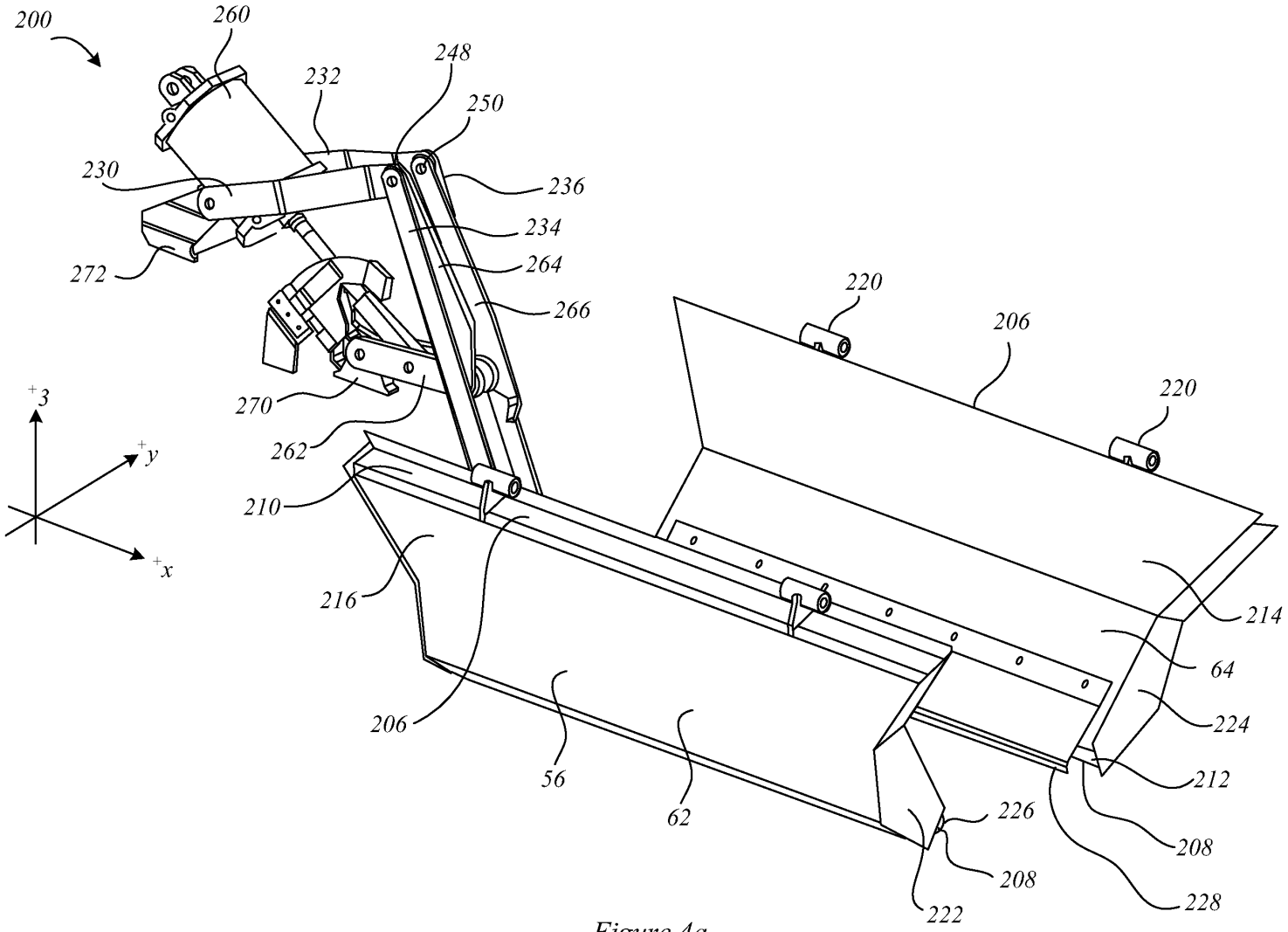


Figure 4a

Serial No. 12/559,065
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Replacement Sheet

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

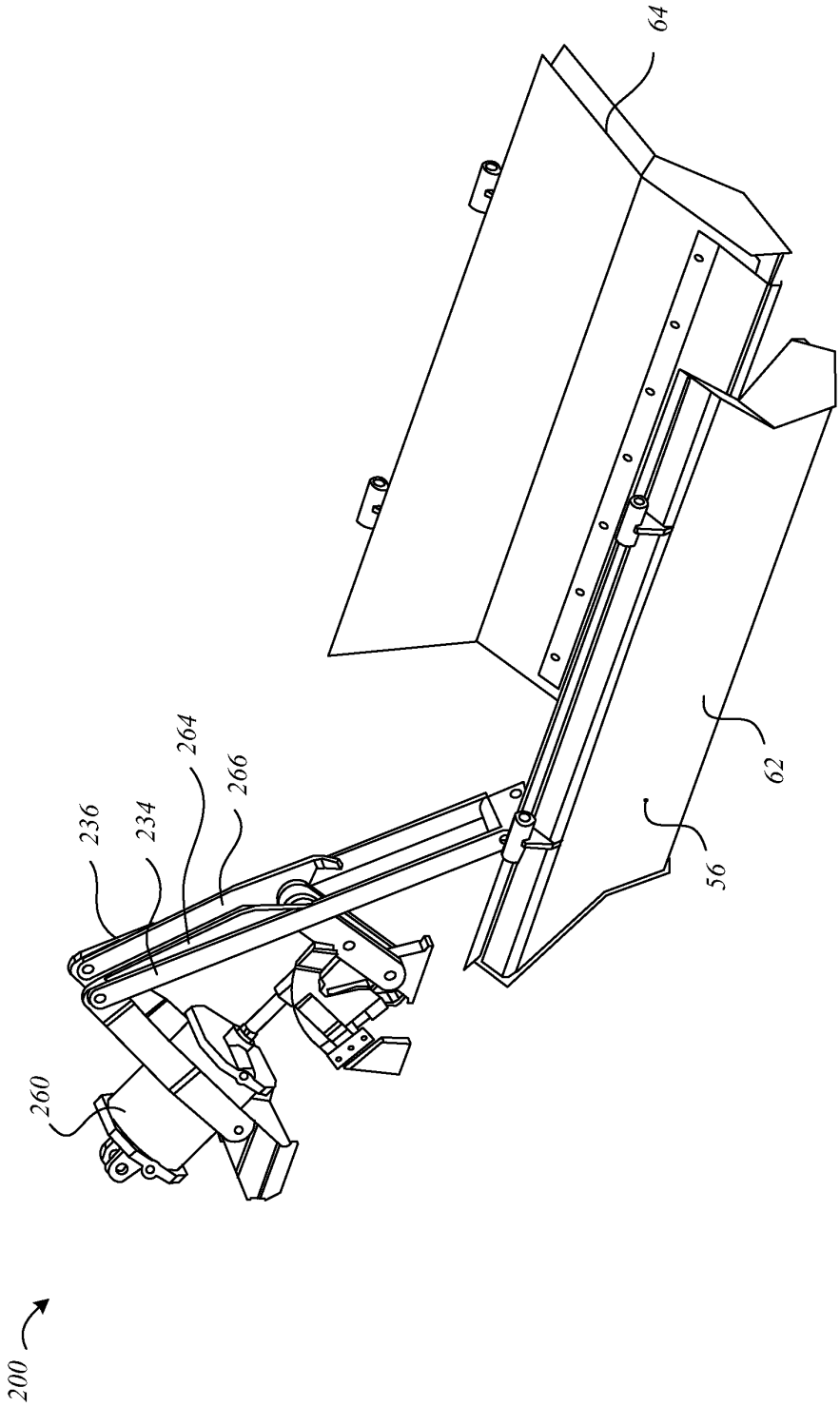


Figure 4b

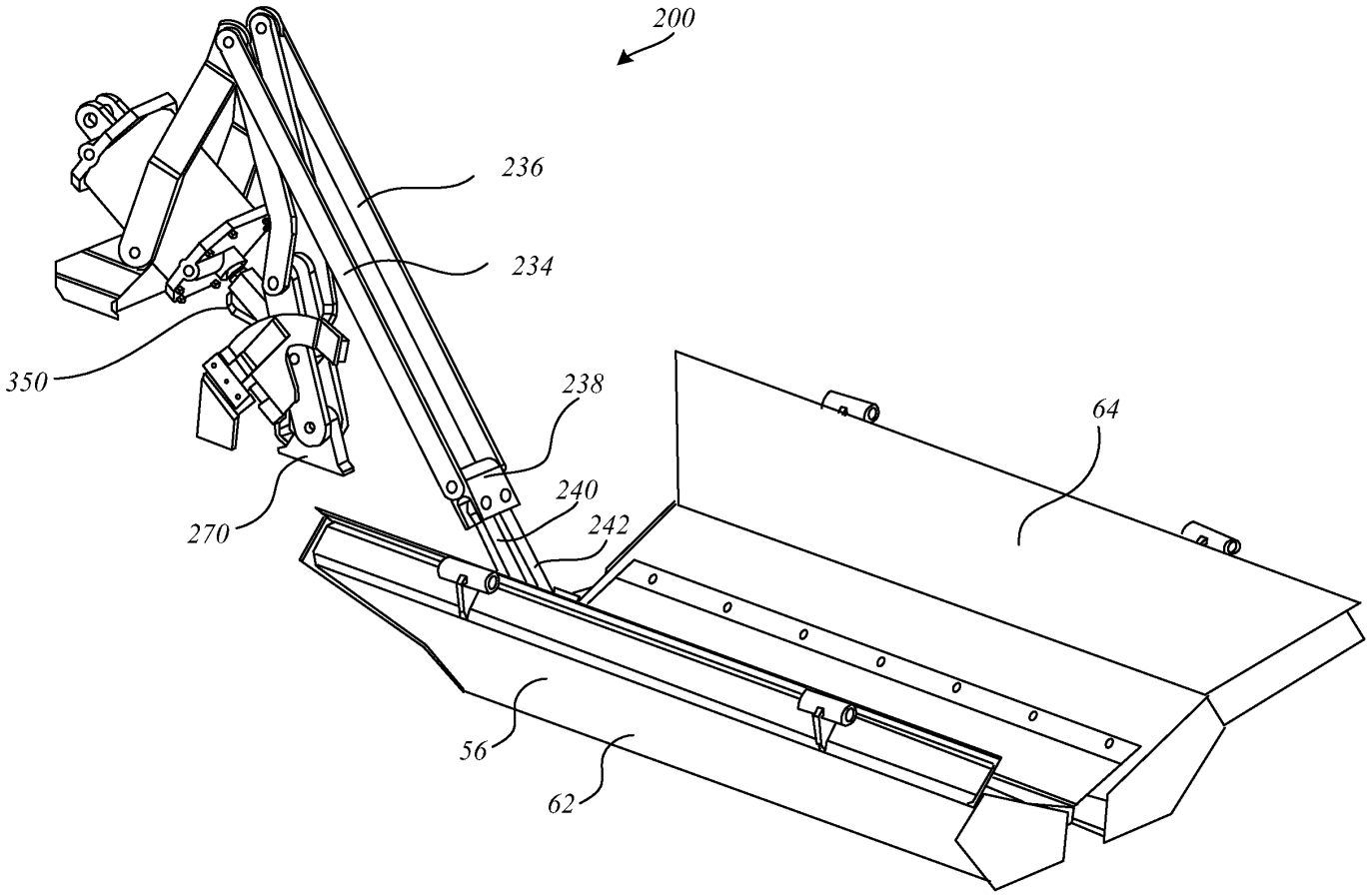


Figure 4c

Serial No. 12/559,065
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Replacement Sheet

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

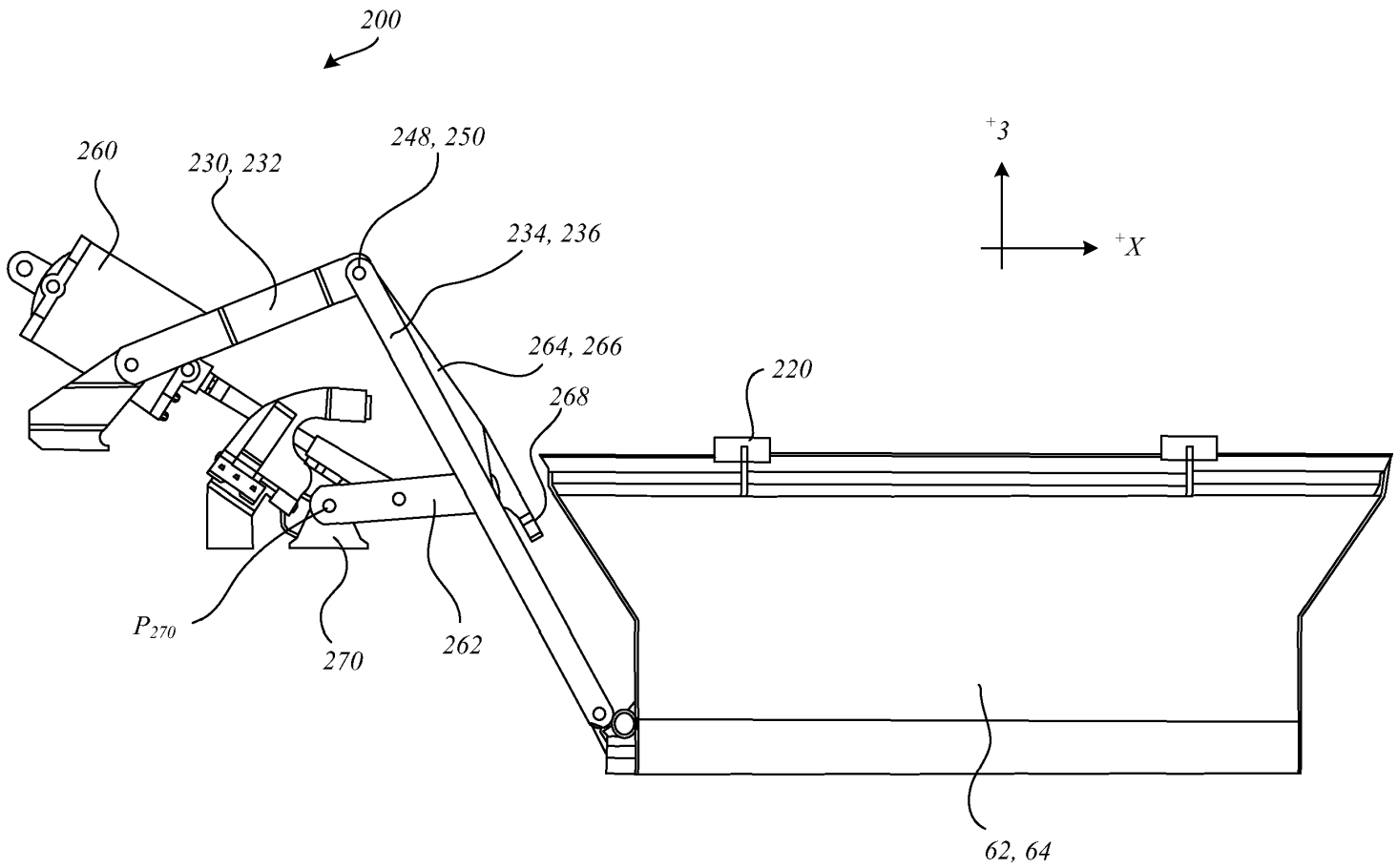


Figure 5a

Serial No. 12/559,065
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Replacement Sheet

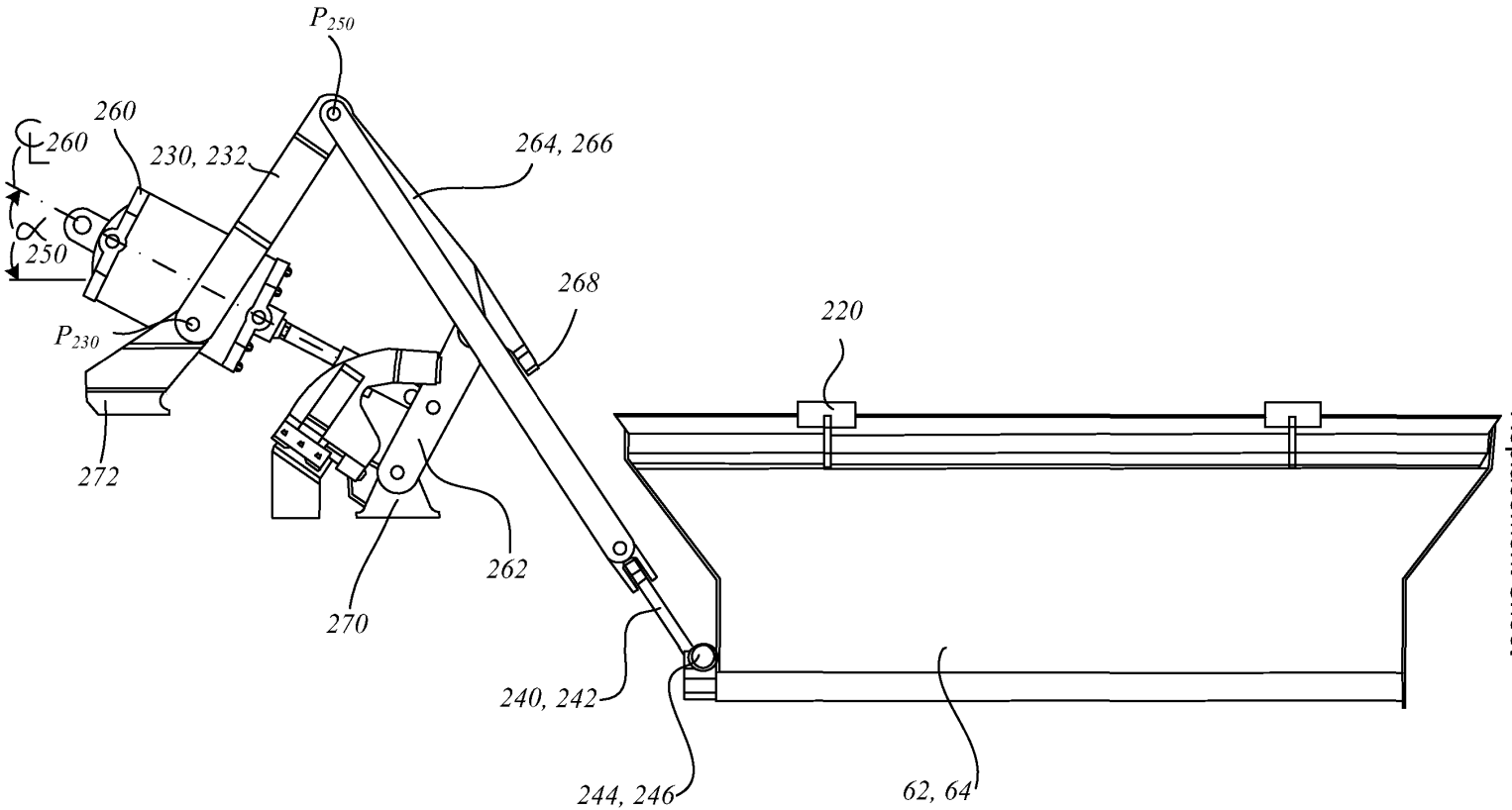


Figure 5b

Serial No. 12/559,065
Missing Parts Notice of 10/01/2009
Replacement Sheet

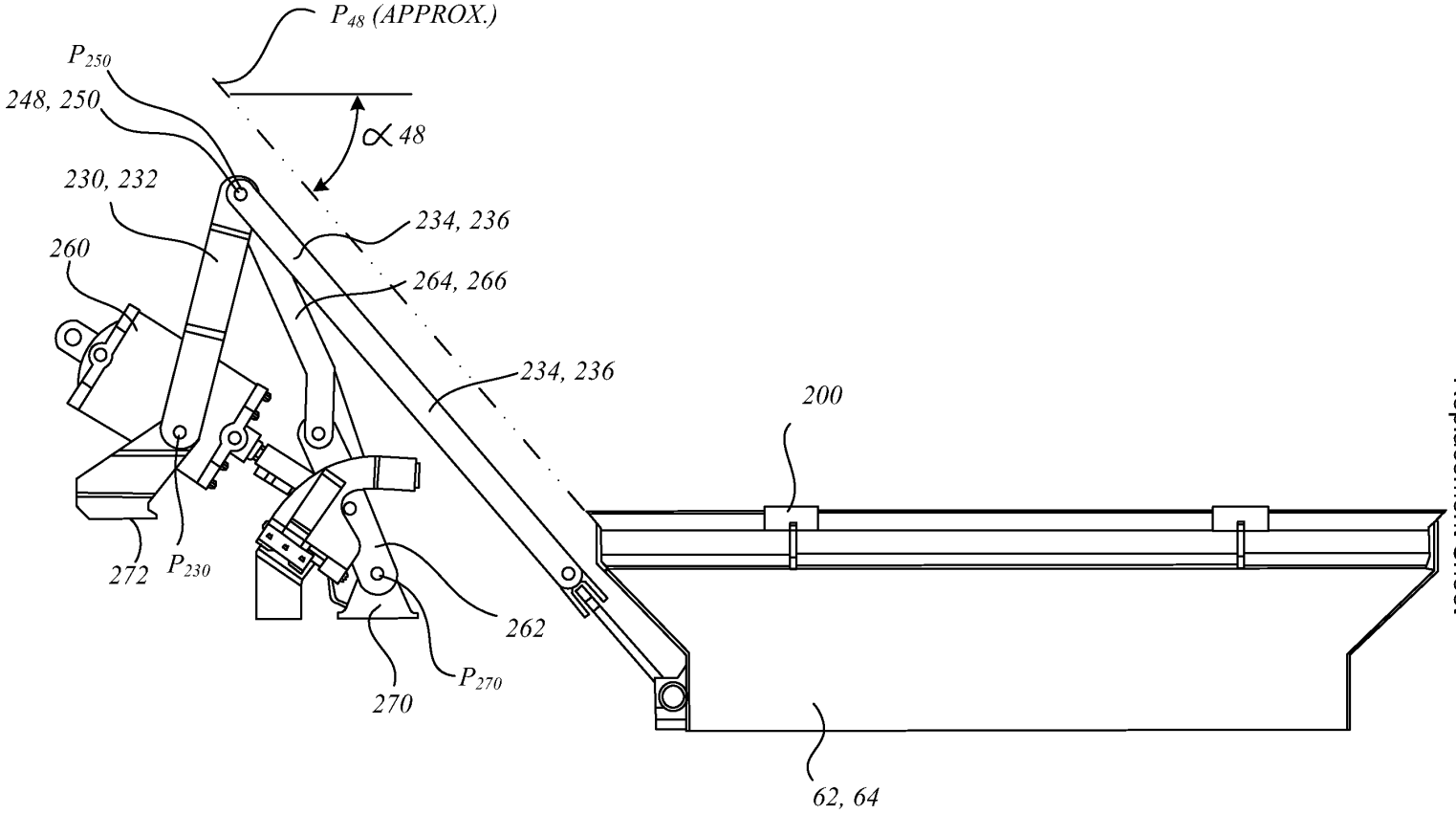


Figure 5c

Serial No. 12/559,065
Missing Parts Notice of 10/01/2009
Replacement Sheet

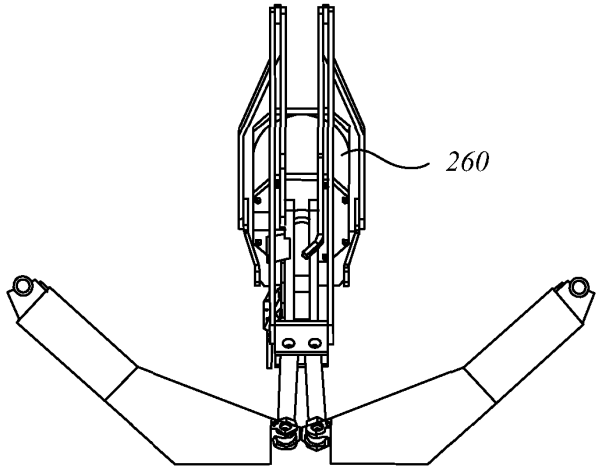


Figure 6c

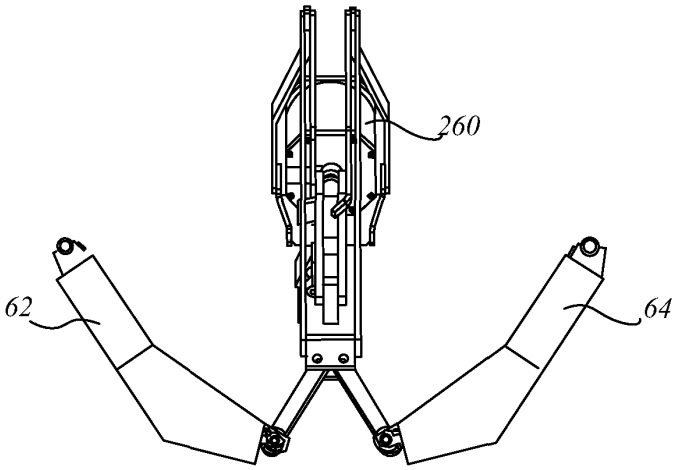


Figure 6b

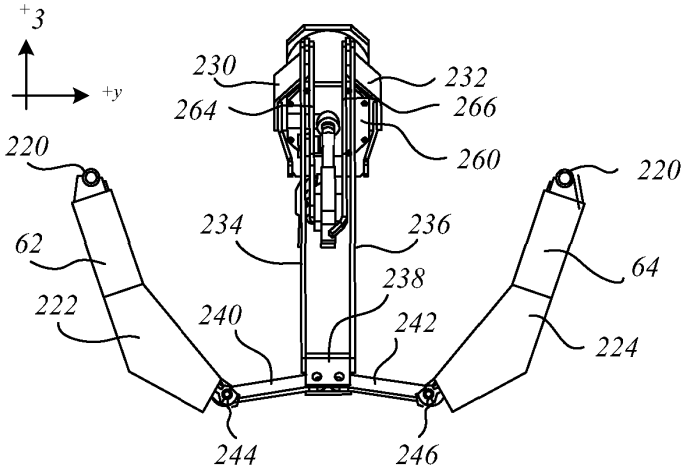


Figure 6a

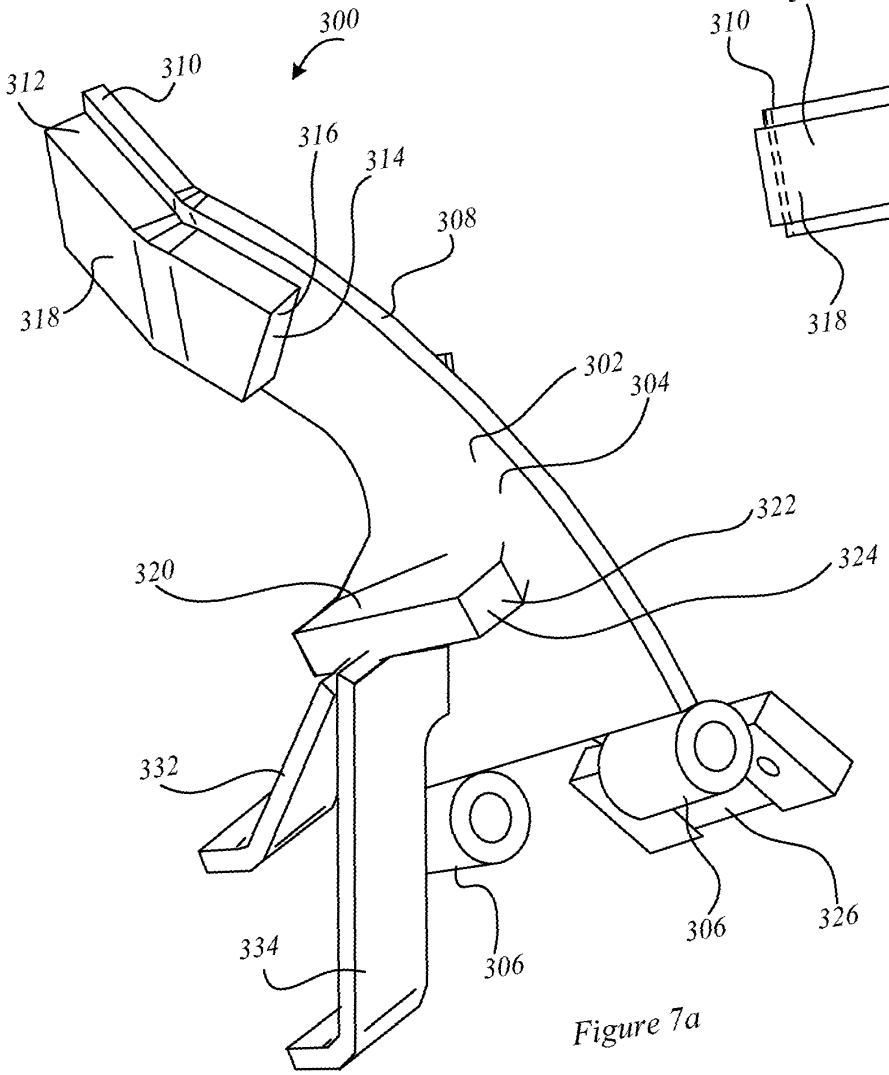


Figure 7a

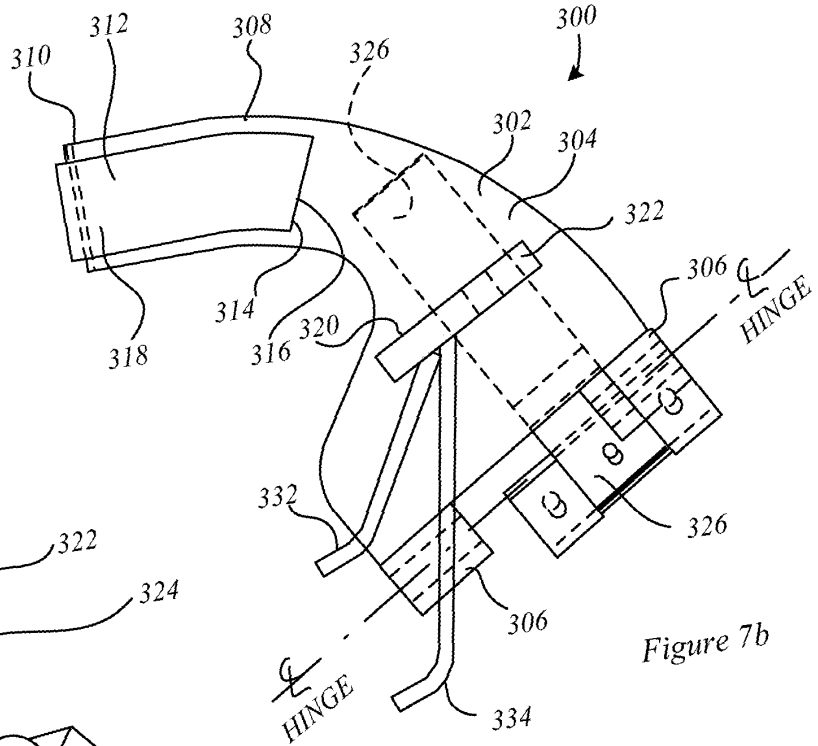


Figure 7b

Serial No. 12/559,065
Missing Parts Notice of 10/01/2009
Replacement Sheet

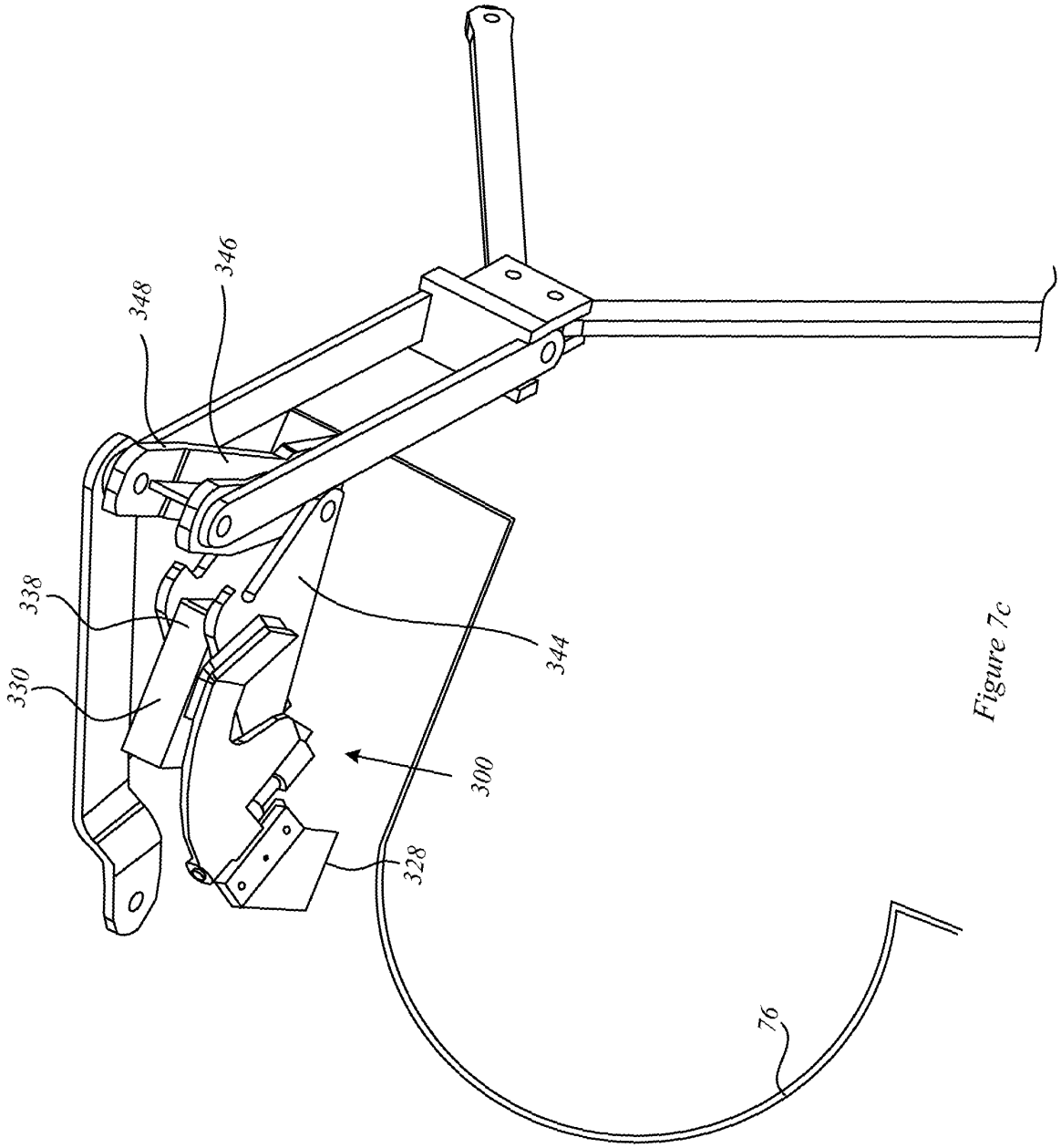


Figure 7c

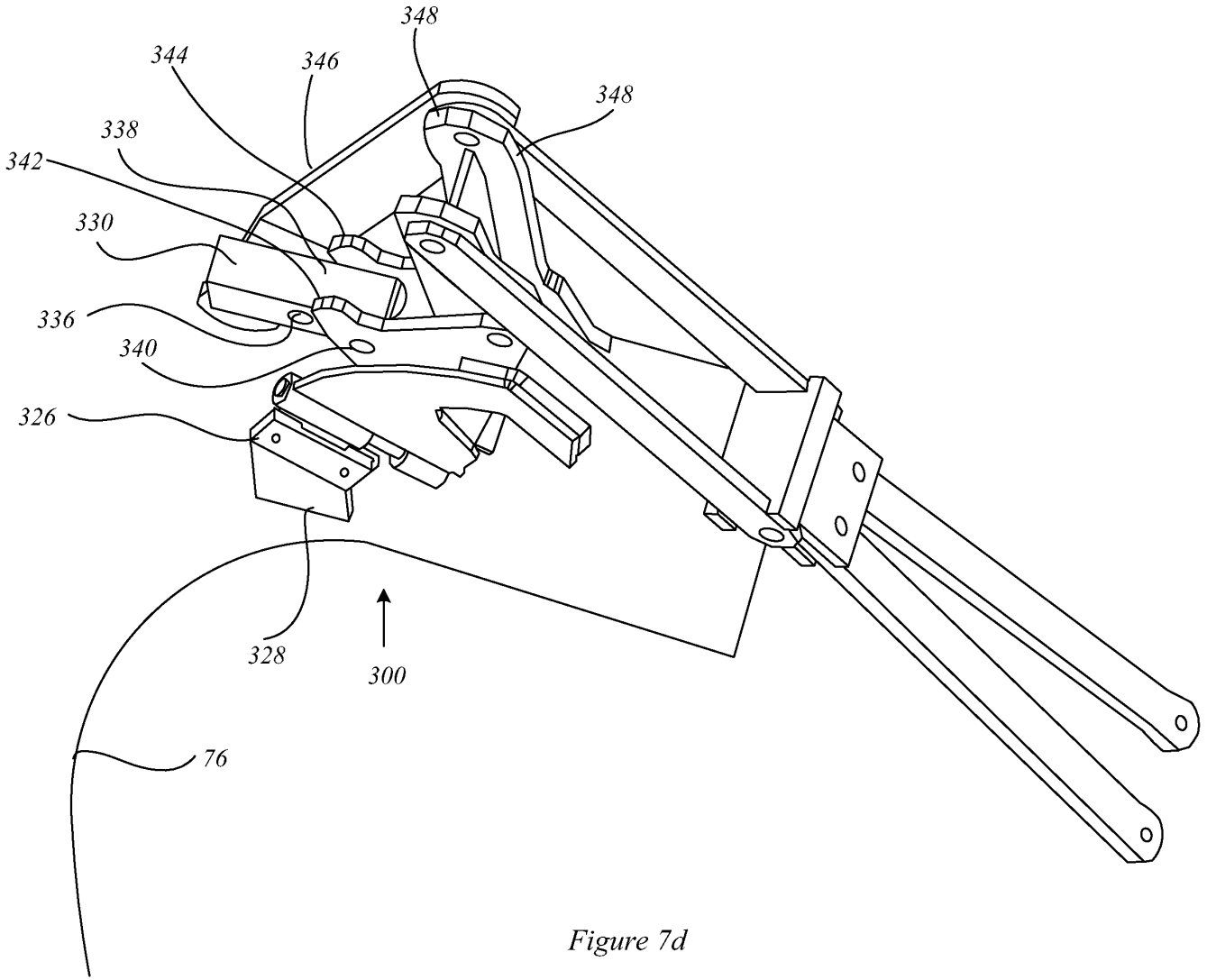


Figure 7d

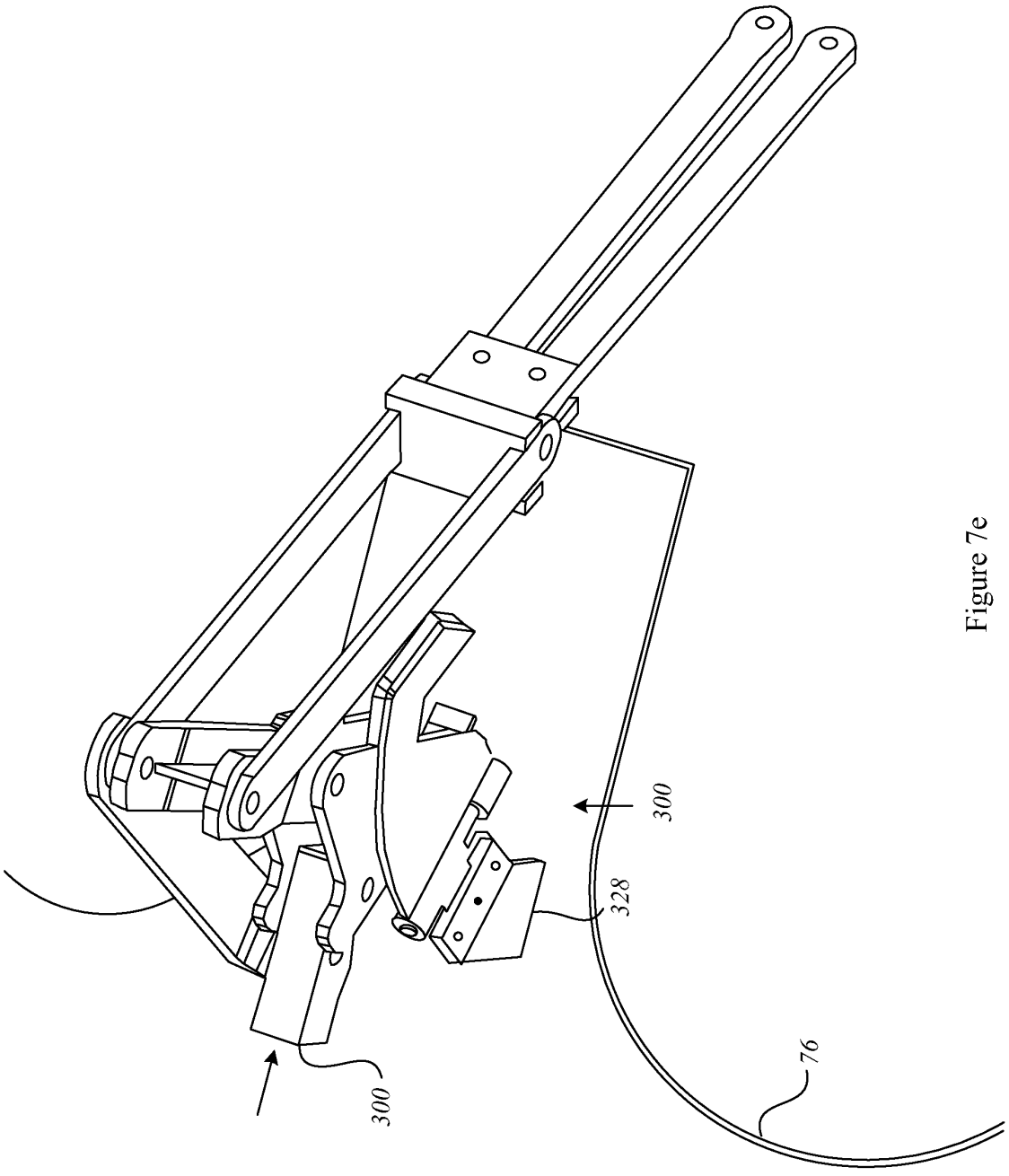


Figure 7e

Electronic Patent Application Fee Transmittal	
Application Number:	12559065
Filing Date:	14-Sep-2009
Title of Invention:	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR
First Named Inventor/Applicant Name:	James W. Forbes
Filer:	Michael Howard Minns/Teri Naehring
Attorney Docket Number:	200405.00128
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	330	330
Utility Search Fee	1111	1	540	540
Utility Examination Fee	1311	1	220	220
Pages:				
Claims:				
Claims in excess of 20	1202	5	52	260
Independent claims in excess of 3	1201	1	220	220
Miscellaneous-Filing:				

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Late filing fee for oath or declaration	1051	1	130	130
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1700**

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Electronic Acknowledgement Receipt	
EFS ID:	6740302
Application Number:	12559065
International Application Number:	
Confirmation Number:	7747
Title of Invention:	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR
First Named Inventor/Applicant Name:	James W. Forbes
Customer Number:	21324
Filer:	Michael Howard Minns/Teri Naehring
Filer Authorized By:	Michael Howard Minns
Attorney Docket Number:	200405.00128
Receipt Date:	04-JAN-2010
Filing Date:	14-SEP-2009
Time Stamp:	13:42:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1700
RAM confirmation Number	6844
Deposit Account	150450
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

1	Oath or Declaration filed	executedDeclaration.pdf	126757 25ca4f096028f84f47433a2152b90725ec982e86	no	2
Warnings:					
Information:					
2	Drawings-only black and white line drawings	ReplacementDrawings.pdf	165747 ca55bdabb8e66d4e355567cd80abc7b08a2430ee	no	18
Warnings:					
Information:					
3	Fee Worksheet (PTO-875)	fee-info.pdf	39921 7064203833181f1b128cdfc6c1d6dbb046287ad2	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	332425		

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Electronic Patent Application Fee Transmittal	
Application Number:	12559065
Filing Date:	14-Sep-2009
Title of Invention:	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR
First Named Inventor/Applicant Name:	James W. Forbes
Filer:	Michael Howard Minns/Teri Naehring
Attorney Docket Number:	200405.00128
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 1 month with $0 paid	1251	1	130	130

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IPR Petition - USP 8,166,892

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
		Total in USD ($)		**130**

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IPR Petition - USP 8,166,892

Electronic Acknowledgement Receipt	
EFS ID:	6740398
Application Number:	12559065
International Application Number:	
Confirmation Number:	7747
Title of Invention:	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR
First Named Inventor/Applicant Name:	James W. Forbes
Customer Number:	21324
Filer:	Michael Howard Minns/Teri Naehring
Filer Authorized By:	Michael Howard Minns
Attorney Docket Number:	200405.00128
Receipt Date:	04-JAN-2010
Filing Date:	14-SEP-2009
Time Stamp:	13:49:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$130
RAM confirmation Number	85
Deposit Account	150450
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

1	Fee Worksheet (PTO-875)	fee-info.pdf	30440 66ead1f3e5dba107831ccae5935fcf645b281696	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	30440	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
12/559,065	09/14/2009	3617	1700	200405.00128	25	4

CONFIRMATION NO. 7747

UPDATED FILING RECEIPT

21324
HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076



Date Mailed: 01/11/2010

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

James W. Forbes, Campbellville, CANADA;
Marcus Thiesen, Hamilton, CANADA;
Dave Keats, Brantford, CANADA;

Assignment For Published Patent Application

NATIONAL STEEL CAR LIMITED, Hamilton, CANADA

Power of Attorney: None

Domestic Priority data as claimed by applicant

Foreign Applications

If Required, Foreign Filing License Granted: 09/28/2009

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/559,065**

Projected Publication Date: 03/17/2011

Non-Publication Request: No

Early Publication Request: No

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Title

RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR

Preliminary Class

105

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Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

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Title 37, Code of Federal Regulations, 5.11 & 5.15

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To: patents@hahnlaw.com,akron-docket@hotmail.com,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 21324

Jan 11, 2010 06:04:39 AM

Dear PAIR Customer:

HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 21324 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
12559065	APP.FILE.REC	01/11/2010	200405.00128

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

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Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

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IPR Petition - USP 8,166,892

PTO/SB/80 (01-06)
Approved for use through 12/31/2008. OMB 0651-0035
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

[X] Practitioners associated with the Customer Number: 021324

OR

[ ] Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

[ ] The address associated with Customer Number:

OR

[ ] Firm or Individual Name			
Address			
City		State	Zip
Country			
Telephone		Email	

Assignee Name and Address:

National Steel Car Limited
P.O. Box 2450
600 Kenilworth Avenue North
Hamilton, Ontario, Canada L8N 3J4

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	Lorraine Johnson	Date	June 18/08
Name	LORRAINE JOHNSON	Telephone	(905) 544-3311
Title	CHIEF OPERATING OFFICE		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. 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 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application 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.**

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IPR Petition - USP 8,166,892

Electronic Acknowledgement Receipt	
EFS ID:	6807655
Application Number:	12559065
International Application Number:	
Confirmation Number:	7747
Title of Invention:	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR
First Named Inventor/Applicant Name:	James W. Forbes
Customer Number:	21324
Filer:	Michael Howard Minns/Teri Naehring
Filer Authorized By:	Michael Howard Minns
Attorney Docket Number:	200405.00128
Receipt Date:	14-JAN-2010
Filing Date:	14-SEP-2009
Time Stamp:	09:36:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73(b).	373Statement.pdf	423273 3f130f79ceb3a86076e45dd5df3dfd71262ba90a	no	2

Warnings:

Information:

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

2	Power of Attorney	CorporatePOA.pdf	129756 747327df8d70dd11b4cdd3fd23959c82e4db4e9b	no	1

Warnings:	
Information:	
Total Files Size (in bytes):	553029

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New Applications Under 35 U.S.C. 111
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National Stage of an International Application under 35 U.S.C. 371
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New International Application Filed with the USPTO as a Receiving Office
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FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

PTO/SB/96 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: National Steel Car Limited

Application No./Patent No.: 12/599,065 Filed/Issue Date: 09/14/2009

Titled: RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR

National Steel Car Limited , a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;

2. ☐ an assignee of less than the entire right, title, and interest in (The extent (by percentage) of its ownership interest is _____ %); or

3. ☐ the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

A. ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 023727, Frame 0962, or for which a copy therefore is attached.

OR

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

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The document was recorded in the United States Patent and Trademark Office at

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The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☒ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (*i.e.*, a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Michael H. Minns/ January 14, 2010

Signature Date

Michael H. Minns Attorney

Printed or Typed Name Title

This collection of information is required by 37 CFR 3.73(b). 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 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application 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.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

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 disclosure of these records is required by the Freedom of Information Act.
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 inspection 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.

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/559,065	09/14/2009	James W. Forbes	200405.00128

CONFIRMATION NO. 7747

21324
HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076

POA ACCEPTANCE LETTER

OC000000039815113

Date Mailed: 01/28/2010

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/14/2010.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/atesfai/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

To: patents@hahnlaw.com,akron-docket@hotmail.com,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 21324

Jan 28, 2010 06:10:05 AM

Dear PAIR Customer:

HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 21324 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
12559065	N570	01/28/2010	200405.00128

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No	:	12/559,065	Confirmation No. 7747
Applicant	:	Forbes et al.	
Filed	:	09/14/2009	
For	:	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR	
T.C./A.U.	:	3617	
Examiner	:	not yet assigned	
Docket No.	:	200405.00128	
Customer No.	:	021324	

Mail Stop Amendment
Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

Sir:

Please amend the above-identified application as follows:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims - none

Amendments to the Drawings - none

Remarks begin on page 3 of this paper.

Please charge any fees required by this paper to Deposit Account No. 15-0450.

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Amendments to the Specification

Please replace paragraph [0001] with the following amended paragraph:

[0001] This application claims priority under 35 USC 119 on the basis of Canadian Patent Application Serial Number 2,678,447, ___,____, ~~(such number to be entered by preliminary amendment when known)~~ entitled "Railroad Gondola Car Structure and Mechanism Therefor" filed September 11, 2009, the specification of which is incorporated herein by reference. This application also claims priority to Canadian Patent Application Serial Number 2,678,605.

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Remarks

In the specification, paragraph [0001] has been amended to include the priority claims.

This amendment merely corrects formal matters in the claims without changing the scope of the claims.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

Date: May 18, 2010
/Michael H. Minns/
Registration No. 31,985

Hahn Loeser & Parks LLP
One GOJO Plaza
Suite 300
Akron, OH 44311
330-864-5550

mhminns@hahnlaw.com

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Electronic Patent Application Fee Transmittal	
Application Number:	12559065
Filing Date:	14-Sep-2009
Title of Invention:	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR
First Named Inventor/Applicant Name:	James W. Forbes
Filer:	Michael Howard Minns
Attorney Docket Number:	200405.00128
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Publ. Fee- early, voluntary, or normal	1504	1	300	300
Extension-of-Time:				

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
		Total in USD ($)		**300**

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Electronic Acknowledgement Receipt	
EFS ID:	7630705
Application Number:	12559065
International Application Number:	
Confirmation Number:	7747
Title of Invention:	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR
First Named Inventor/Applicant Name:	James W. Forbes
Customer Number:	21324
Filer:	Michael Howard Minns
Filer Authorized By:	
Attorney Docket Number:	200405.00128
Receipt Date:	24-MAY-2010
Filing Date:	14-SEP-2009
Time Stamp:	16:20:53
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$300
RAM confirmation Number	3038
Deposit Account	150450
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

1	Request for Early Publication	RequestForEarlyPublication.pdf	17859 4426c5594a1d271701b90ea58240694de5d17b3e	no	1
Warnings:					
Information:					
2	Application Data Sheet	SUPPLEMENTALApplicationDataSheet.pdf	840981 b29683341b2b02c8873817e209f8cc8ce7962638	no	5
Warnings:					
Information:					
3		PreliminaryAmendment.pdf	32986 961787345df2eeb5c21f1b087bbbadc60aa0f5bd	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1
	Specification	2	2
	Applicant Arguments/Remarks Made in an Amendment	3	3

Warnings:					
Information:					
4	Fee Worksheet (PTO-875)	fee-info.pdf	30468 b54dbe0f8e6ff2246c1e7620107b5185ef6f8eb5	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	922294	

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Practitioner's Docket No. 200405.00128 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	FORBES, et al.
Application No.:	12/559,065
Filed:	September 14, 2009
For:	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR EARLY PUBLICATION OF APPLICATION
(37 C.F.R. § 1.219(a))

1. Applicants request that this application be published as soon as possible.

2. Applicants filed the application in compliance with the Office electronic filing system on September 14, 2009.

3. Please charge the publication fee (37 C.F.R. § 1.18(d)) of $300.00 to Deposit Account No. 15-0450.

The Commissioner is authorized to charge any fees due as a result of or in connection with the filing of this paper to Deposit Account No. 15-0450.

Respectfully submitted,

Date: May 18, 2010

/Michael H. Minns/
Michael H. Minns
Reg. No. 31,985

Hahn Loeser + Parks, LLP
One GOJO Plaza; Suite 300
Akron, OH 44311-1076
330-864-5555
mhminns@hahnlaw.com

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

PTO/SB/14 (07-07)
Approved for use through 06/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	200405.00128
	Application Number	
Title of Invention	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR	

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.)

Applicant Information:

Applicant 1 Remove

Applicant Authority	◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	James	W.	Forbes	

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

City		Country Of Residence[i]	CA
Citizenship under 37 CFR 1.41(b)[i]	CA		

Mailing Address of Applicant:

Address 1	15 Glenron Rd., RR #2		
Address 2			
City	Campbellville	State/Province	ON
Postal Code	L0P 1B0	Country[i]	CA

Applicant 2 Remove

Applicant Authority	◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Marcus		Thiesen	

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

City	Hamilton	Country Of Residence[i]	CA
Citizenship under 37 CFR 1.41(b)[i]	CA		

Mailing Address of Applicant:

Address 1	31 Stirton St		
Address 2			
City	Hamilton	State/Province	ON
Postal Code	L8L 6E7	Country[i]	CA

Applicant 3 Remove

Applicant Authority	◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Dave		Keats	

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

City	Brantford	Country Of Residence[i]	CA

PTO/SB/14 (07-07)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	200405.00128
	Application Number	
Title of Invention	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR	

Citizenship under 37 CFR 1.41(b) [i]	CA		
Mailing Address of Applicant:			
Address 1	11 Digby Court		
Address 2			
City	Brantford	**State/Province**	ON
Postal Code	N3P 2A6	**Country**[i]	CA

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

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	21324		
Email Address	patents@hahnlaw.com	Add Email	Remove Email

Application Information:

Title of the Invention	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR		
Attorney Docket Number	200405.00128	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		**Sub Class (if any)**	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	18	**Suggested Figure for Publication (if any)**	

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).
Enter either 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:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)

PTO/SB/14 (07-07)
Approved for use through 06/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	200405.00128
	Application Number	
Title of Invention	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR	

Customer Number	21324

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this 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(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. 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(a).

Remove

Application Number	Country [i]	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
2678447	CA	2009-09-11	(•) Yes ( ) No

Remove

Application Number	Country [i]	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
2678605	CA	2009-09-14	(•) Yes ( ) No

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

Assignee Information:

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

Assignee 1 Remove

If the Assignee is an Organization check here. [X]

Organization Name	NATIONAL STEEL CAR LIMITED		
Mailing Address Information:			
Address 1	602 Kenilworth Avenue North		
Address 2			
City	Hamilton	**State/Province**	ON
Country [i]	CA	Postal Code	L8N 3J4
Phone Number		Fax Number	
Email Address			

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

PTO/SB/14 (07-07)
Approved for use through 06/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	200405.00128
	Application Number	
Title of Invention	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR	

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.					
Signature	/Michael H. Minns/			Date (YYYY-MM-DD)	2010-05-18
First Name	Michael H.	Last Name	Minns	Registration Number	31985

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.

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Office de la propriété intellectuelle du Canada

Un organisme d'Industrie Canada

Canadian Intellectual Property Office

An Agency of Industry Canada

Bureau canadien des brevets

Certification

Canadian Patent Office

Certification

La présente atteste que les documents ci-joints, dont la liste figure ci-dessous, sont des copies authentiques des documents déposés au Bureau des brevets.

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Specification and Drawings, as originally filed, with Application for Patent Serial No: **CA 2678605**, on September 14, 2009, by **NATIONAL STEEL CAR LIMITED**, assignee of James W. Forbes, Marcus Thiesen and Dave Keats, for "Railroad Gondola Car Structure and Mechanism Therefor".

Agent certificateur/Certifying Officer

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RAILROAD GONGOLA CAR STRUCTURE AND MECHANISM THEREFOR

Abstract

A railroad gondola car has a hopper carried between two trucks. The hopper has convergent end and side slope sheets that feed a bottom discharge. The bottom discharge has a pair of longitudinal doors. The door closing mechanism is a mechanical transmission that includes a set of linkages running from the door to a reciprocating pneumatic cylinder. The linkages run generally parallel to the slope sheet. The car has a very short draft installation that includes a removable coupler carrier bar, and the main shear plate has a removable draft gear installation panel. There is a machinery space above the end section shear plate. It is overhung by the slope sheet that is substantially unobstructed by any other primary structure. The pneumatic cylinder is mounted on an angle in this unobstructed machinery space, oriented longitudinally over the draft sill beneath the main drag link of the mechanical transmission, and above the main pivot of the driving input lever of the transmission. The main lever is bifurcated, and straddles the pneumatic cylinder. The mechanism includes a primary lock in the form of an over center lever arrangement, and a compact secondary lock that acts sideways rather than lengthwise. The sidewalls of the car include vertical stiffeners and side sheets. The lower portion of the side sheets lies laterally inboard of the stiffener web, while the upper portion lies laterally outboard of the stiffener web. The side slope sheet of the hopper meets the sidewall at the transition of the sidewall sheet from the inside-the-post to the outside-the-post condition.

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RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR

Field of the Invention

This invention relates to the field of railroad freight cars, and, in particular to rail road gondola cars such as may employ bottom unloading gates or doors.

Background

There are many kinds of rail road cars for carrying particulate material, be it sand or gravel aggregate, plastic pellets, grains, ores, potash, coal or other granular materials. Many of those cars have an upper opening, or accessway of some kind, by which the particulate is loaded, and a lower opening, or accessway, or gate, or door by which the particulate material exits the car under the influence of gravity. While the inlet opening need not necessarily have a movable gate, the outlet opening requires a governor of some kind that is movable between a closed position for retaining the lading while the lading is being transported, and an open position for releasing the lading at the destination. The terminology "flow through" or "flow through rail road car" or "center flow" car, or the like, may sometimes be used for cars of this nature where lading, typically particulate lading, is introduced at the top, and flows out at the bottom.

Discharge doors for gondola cars or other bottom dumping cars may tend to have certain desirable properties. First, to the extent possible it is usually desirable for the door opening to be large so that unloading may tend to be relatively fast, and for the sides of any unloading chute to be relatively steep so that the particulate will tend not to hang up on the slope. Further, to the extent that the door can be large and the slope sheets steep, the interior of the car may tend to have a greater lading volume for a given car length. Further still, any increase in lading achieved will tend to be at a relatively low height relative to Top of Rail (TOR) and so may tend to aid in maintaining a low center of gravity. A low center of gravity tends to yield a better riding car that is less prone to derailment, and perhaps less prone to cause as much wear or damage to tracks.

For a given length of car, hopper volume, and hence overall car volume, can be maximized by reducing the proportion of the length of the car occupied by the trucks, and occupied by the door opening drive mechanism. Furthermore, where the lading to be carried by the car is of greater than usual density, it may often be helpful for the truck center length to be relatively short such that the length of the span between the trucks is smaller, and the weight of

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the structure may be correspondingly decreased relative to the maximum permissible gross weight on rail for the car. In some instances, as with iron ore or other high density lading, that truck center distance may be very short.

It may also be that in some circumstances ore cars are used in quasi-permanent sets that form a unit train. The unit train may tend to follow a single route for substantially its entire operational service life. In the case of an ore car, that operational route may be from a mine or concentrator facility, at which the cars receive the lading; to a discharge facility, whether a mill or a break of bulk terminal at a port. In these circumstances the line may be owned by the mine or mill, and the cars may not necessarily be used for interchange service. To the extent that they are not used for interchange service they may not necessarily comply with all AAR standards. The cars may have short, possibly non-standard draft sills, draft gear, and couplers, or a combination thereof.

The cars may have tightly limited space envelopes over the end shear plates, and yet these spaces may nonetheless be intended to accommodate, for example, the brake reservoir and pneumatic gear for operating the gondola discharge doors.

Summary of the Invention

In an aspect of the invention there is a railroad hopper car. It has at least one hopper having a bottom discharge, the bottom discharge including a door movable between a closed position for retaining lading and an open position for permitting egress of lading. The hopper is carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of the car. The hopper has at least a first end slope sheet inclined downwardly in the lengthwise direction toward the door. There is a linkage connected to the door. The linkage is oriented lengthwise with respect to the car. A drive is connected to the linkage. The drive is operable to move the linkage and thereby to urge the door to a closed position. The linkage is movable from a first position corresponding to the open position of the door to a second position corresponding to the closed position of the door. The linkage includes at least a drag link. When the linkage moves from the first to the second position one of (a) the overall motion from the first to the second position includes displacement of the drag link in a direction having a predominant component of motion parallel to the first end slope sheet; and (b) the motion of the drag link is at least instantaneously parallel to the first end slope sheet.

In another feature of that aspect of the invention the linkage includes a first pivot arm

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pivotally connected to a datum structure at a first pivot connection. The drive is also mounted to the datum structure. The linkage includes a second pivot arm pivotally connected to the datum structure at a second pivot connection. The second pivot arm has the door mounted thereto. The first pivot arm has a second connection distant from the first pivot connection. The second pivot arm has a second connection distant from the second pivot connection. A mechanical transmission is mounted between the second connection of the second pivot arm and the second connection of the first pivot arm. The mechanical transmission includes the drag link. The drive is connected to move the first pivot arm, and, in moving from the first position to the second position, each position of the first pivot arm being associated with a unique position of the drag link. In a further feature, the linkage includes left and right hand first pivot arms pivotally connected to a datum structure at respective first pivot connections, the respective first pivot connections being co-axial. The linkage includes left and right hand second pivot arms pivotally connected to the datum structure at respective second pivot connection. The door is a left hand door of a pair of co-operable right and left hand doors, the left hand door being mounted to the left hand second pivot arm and the right hand door being mounted to the right hand second pivot arm. Each first pivot arm has a respective second connection distant from its respective first pivot connection, the respective second connections being pivot connections and being mutually co-axial. Each second pivot arm has a respective second connection distant from the respective second pivot connection. A mechanical transmission is mounted between the respective second connections of the second pivot arms and the respective second connections of the first pivot arms. The drag link is a left hand drag link, and the mechanical transmission includes a mated parallel right hand drag link. The left and right hand drag links each have a first end mounted to one of the respective second connections of the first pivot arms. The left and right hand drag links have second ends yoked together distantly from the first ends. The transmission member includes left and right hand slave links extending between and connecting the second ends of the drag links to the second connections of the second pivot arms respectively.

In still another feature, the linkage includes left and right hand first pivot arms pivotally connected to a datum structure at respective first pivot connections, the respective first pivot connections being co-axial. The linkage includes left and right hand second pivot arms pivotally connected to the datum structure at respective second pivot connection. The door is a left hand door of a pair of co-operable right and left hand doors, the left hand door being mounted to the left hand second pivot arm and the right hand door being mounted to the right hand second pivot arm. Each first pivot arm has a respective second connection distant from its respective first pivot connection, the respective second connections being pivot connections and being mutually co-axial. The left and right hand pivot arms co-operate to define a bifurcated lever straddling the

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drive. In yet another feature, the drive includes an actuating cylinder having an axially reciprocating member, the axially reciprocating member being inclined relative to horizontal. In still another feature the drag link lies between the actuating cylinder and the first end slope sheet of the hopper. In another feature the railroad hopper car includes a first end section, the first end section includes a draft sill and a substantially horizontal shear plate mounted over the draft sill, the drive includes an actuating cylinder having an axis of reciprocation lying in a central vertical-lengthwise plane of the car, the actuating cylinder is mounted above the shear plate, the first end slope sheet at least partially overhangs the actuating cylinder; and the drag link is located between the actuating cylinder and the first slope sheet.

In another aspect of the invention there is a railroad hopper car. It has at least one hopper having a bottom discharge, the bottom discharge including a gate movable between a closed position for retaining lading and an open position for permitting egress of lading. The car includes structure by which the hopper is carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of the car. A door operating linkage is connected to the gate, the door operating linkage being oriented lengthwise with respect to the car. An actuating cylinder connected to drive the door operating linkage, the actuating cylinder also being oriented to act lengthwise with respect to the car, the actuating cylinder having an axis of reciprocation. The axis of reciprocation being tilted such that displacement of the actuating cylinder includes a vertical component of motion.

In another feature of that aspect of the invention, the hopper car includes an end section mounted over one of the trucks, the end section includes a substantially horizontal shear plate, and the actuating cylinder is mounted on a pedestal mounted to the shear plate, the pedestal including an inclined mounting for the cylinder. In a further feature, the railroad hopper car has a longitudinal-vertical central plane, and the axis or reciprocation lies in the longitudinal-vertical plane. In a still further feature, the hopper includes at least a first end slope sheet extending longitudinally and being inclined longitudinally inboard and downwardly toward the gate, and at least part of the actuating cylinder is overhung by at least part of the first end slope sheet. In a yet further feature, the hopper car includes an end section having a substantially horizontal shear plate mounted over a draft sill. The hopper includes a first end slope sheet, the first end slope sheet at least partially overhanging the horizontal shear plate. The actuating cylinder is mounted above the shear plate, centrally aligned over the draft sill. The actuating cylinder is at least partially overhung by the first end slope sheet. In still yet anther further feature the first slope sheet is substantially planar and has a first angle of inclination relative to horizontal. The actuating cylinder is inclined longitudinally inboard downwardly, and is inclined at a second

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angle. The second angle lies between horizontal and the first angle. In yet another feature the car has an underframe and the door operating linkage includes a first linkage component, a second linkage component, a third linkage component, and a fourth linkage component. The first linkage component is a reference datum component and includes structure immovable relative to the underframe. The second linkage component is a first pivot linkage mounted to the first linkage component at a main pivot connection, the first pivot linkage being a first pivot arm constrained to pivot on an axis of rotation oriented horizontally cross-wise relative to the underframe. The fourth linkage component is a second pivot linkage pivotally mounted to the first linkage component and includes at least the gate. The third linkage component includes a drag link element connected to the first pivot arm, the drag link element having at least a first pivotal attachment to at least a portion of the fourth linkage component, whereby input motion of the second linkage component uniquely determines position and motion of the third and fourth linkage components relative to the first linkage component. Motion of the second linkage component is driven by the actuator. In still another feature the main pivot connection of the first pivot arm to the first linkage component is located lower than the actuating cylinder. In yet still another feature, the drag link element is connected to the first pivot arm at a distal pivot connection relative to the main pivot connection, and, when the gate is in the closed position and the car is viewed in side view, the actuating cylinder is located between the main pivot connection and the distal pivot connection.

In another aspect there is a railroad hopper car. It has at least one hopper having a bottom discharge, the bottom discharge including a gate movable between a closed position for retaining lading and an open position for permitting egress of lading. It has first and second end sections to which the hopper is mounted, the first and second end sections being mounted to respective first and second railroad car trucks for rolling motion along railroad tracks in a lengthwise direction of the car. There is a door operating linkage connected to the gate, the door operating linkage being oriented lengthwise with respect to the car and connected. An actuating cylinder is connected to drive the door operating linkage. The actuating cylinder is also oriented to act in a lengthwise extending plane with respect to the car. The actuating cylinder has an axis of reciprocation. The door operating linkage includes a first pivot arm pivotally mounted to the first end section at a first pivot connection. There is a mechanical transmission connected between the first pivot arm and the gate. The mechanical transmission includes at least a drag link movably connected to the first pivot arm at a location distant from the first pivot connection. The first pivot connection is lower than the actuating cylinder as seen when viewing the first end section in side view.

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In another feature of that aspect of the invention, when the gate is in the closed position and the car is viewed in side view, the actuating cylinder is located between the main pivot connection and the distal pivot connection. In still another feature, the actuating cylinder drives an intermediate lever that is connected to drive the first pivot arm.

In another aspect of the invention there is a rail road hopper car. It has a hopper carried between a pair of trucks, the hopper having first and second upstanding sidewalls running lengthwise therealong. The hopper has a lower discharge and convergent slope sheets giving onto the discharge. The rail road car has a side sill and a top chord. The first upstanding sidewall extends from the side sill to the top chord. The first upstanding sidewall has a predominantly upwardly running sidewall stiffener mounted thereto. The sidewall stiffener is located at a longitudinal station intermediate the trucks. The first upstanding sidewall has a first region, the first region being a lower region thereof. The first upstanding sidewall has a second region. The second region is an upper region thereof. The sidewall stiffener has a first portion, the first portion being a lower portion thereof. The first portion is mounted to the first region of the first upstanding sidewall. The sidewall stiffener has a second portion, the second portion being an upper portion thereof. The second portion is mounted to the second region of the upstanding sidewall. The first portion of the first upstanding sidewall stiffener is laterally outboard of the first region of the first upstanding sidewall. The second portion of the sidewall stiffener is laterally inboard of the second region of the first upstanding sidewall. The sidewall has a continuous section between the first and second regions thereof. The sidewall stiffener has web continuity between the first and second portions thereof.

In a feature of that aspect of the invention, the first and second portions of the sidewall stiffener are substantially co-planar, and are substantially vertically aligned when seen in a sectional view looking along the car. In another feature, the first upstanding sidewall has a third region intermediate the first and second regions. The third region includes a side sheet transition portion passing across the sidewall stiffener from an inboard margin thereof to an outboard margin thereof, and the stiffener has vertical web continuity through the transition portion. In another feature, the first upstanding sidewall has a third region intermediate the first and second regions. The third region includes a side sheet transition portion passing across the sidewall stiffener from an inboard margin thereof to an outboard margin thereof. The hopper includes first and second sloped side sheets. The first sloped side sheet meets the first sidewall at the transition portion. In another feature, the first sidewall has an overall height from the side sill to the top chord, L, and the transition is located a distance above the side sill that is in the range of ¼ to 2/3 L. In a still further feature the first sidewall has an overall height from the side sill to

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the top chord, L, and the first sloped sheet meets the transition at an height that is in the range of ¼ to 2/3 L above the side sill.

In a further aspect of the invention there is a railroad hopper car. It has at least one hopper having a bottom discharge, the bottom discharge having a bottom discharge governor movable between a closed position for retaining lading and an open position for permitting egress of lading. The car has structure by which the hopper is carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of the car. The hopper has a door operating linkage oriented lengthwise with respect to the car. There is an actuating cylinder also oriented to act in a lengthwise extending plane with respect to the car, the actuating cylinder being connected to drive the door operating linkage. The door operating linkage includes a pair of first and second linkage members co-operably mounted to either transverse side of the actuating cylinder, whereby the actuating cylinder is bracketed by the linkage members.

In another feature of that aspect of the invention, the car has an underframe and the linkage is a closed loop bar linkage in which there is a first linkage component, a second linkage component, a third linkage component, and a fourth linkage component. The first linkage component is a reference datum component and includes structure immovable relative to the underframe. The second linkage component is a first pivot linkage mounted to the first linkage component at a main pivot connection, and which includes the first and second linkage members, the first and second linkage members being a matched pair of left and right hand pivot arms constrained to pivot on a common axis of rotation relative to the underframe. The fourth linkage component is a second pivot linkage pivotally mounted to the first linkage component and which includes at least one pivotally mounted door assembly defining the bottom discharge governor. The third linkage component includes a drag link element having at least a first pivotal attachment to at least a portion of the fourth linkage component, whereby input motion of the second linkage component uniquely determines position and motion of the third and fourth linkage components relative to the first linkage component. Motion of the second linkage component is driven by the actuator.

In another feature the hopper includes a hopper end slope sheet. The end slope sheet extends substantially in a plane inclined downwardly and lengthwise inwardly toward the bottom discharge. Displacement of the third linkage component associated with motion of the door assembly between the open position is predominantly in a direction generally parallel to the end slope sheet. In another feature the hopper includes a hopper end slope sheet. The end slope

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sheet extends substantially in a plane inclined downwardly and lengthwise inwardly toward the bottom discharge. During at least an instantaneous portion of motion of the third linkage component while the door assembly is in a position between the open position and the closed position the third linkage component moves parallel to the end slope sheet. In still another feature the third linkage component includes at least a first element and a second element mounted thereto. The first element is pivotally mounted to the first linkage component, and is constrained to move in a lengthwise-vertical plane relative to the first linkage component. The second element has a first connection to the first component the first connection being a pivot connection. The second element has a second connection to the fourth linkage component, the second connection having at least one degree of freedom of motion. The second element is constrained always to be co-planar with the first connection, the second connection, and the main pivot connection. In yet still another feature, the bottom discharge governor includes a door,. The actuating cylinder is connected to drive the door operating linkage through a lever assembly. The lever assembly has an over-center lock that is operable to prevent release of the bottom gate to the open position when the actuating cylinder is inactive. In yet a further feature, motion of the first pivot linkage occurs in a longitudinal-vertical plane. The second pivot linkage moves in a plane generally cross-wise to the longitudinal-vertical plane. In still a further feature the main pivot connection is beneath the actuating cylinder when the hopper car is seen in side view. In again another feature one of (a) the main pivot is beneath the drag link element; and (b) the actuating cylinder is between the main pivot and the drag link element. In a yet still further feature, the hopper includes at least a first end slope sheet, and the bottom discharge governor includes a door. The first end slope sheet is inclined longitudinally downwardly and inboard toward the door. The drag link element is inclined on a slope predominantly parallel to, and adjacent to, the first end slope sheet. The actuating cylinder is oriented along the lengthwise direction, and is also tilted longitudinally downwardly and inwardly toward the door.

In another aspect of the invention there is a railroad hopper car. It has at least one hopper carried by railroad car trucks for motion in a lengthwise direction of the car along railroad tracks. The hopper has a bottom discharge. The bottom discharge has a door movable between a closed position for retaining lading and an open position for permitting egress of lading. A mechanical transmission is connected to the door. The mechanical transmission is oriented lengthwise with respect to the car. A door actuator is connected to the mechanical transmission and is operable to urge the door from the open position toward the closed position, the door actuator being oriented to reciprocate in a first direction. The hopper car has a first lock operable to prevent movement of the door from the closed position to the open position when the door actuator is inactive. The hopper car has a second lock operable to prevent movement of the door from the

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closed position to the open position when the door actuator is inactive if the first lock should fail. The second lock is movable between an engaged position in which it prevents movement of the door to the open position thereof. In moving between the engaged and disengaged positions, the second lock has a displacement that is predominantly cross-wise to the first direction of the reciprocation of the door actuator.

In another feature of that aspect of the invention, the car has a central lengthwise-vertical plane, the door actuator is positioned to reciprocate in the central lengthwise-vertical plane, and the second lock is movable between the engaged and disengaged positions in motion predominantly transverse to the central lengthwise-vertical plane. In another feature, the second lock is mounted on an hinge and pivots in a circumferential direction between the engaged and disengaged positions. In still another feature the second lock is mounted on an hinge, the hinge has an axis lying parallel to the lengthwise vertical plane, and the second lock pivots circumferentially between the engaged and disengaged positions. In another feature, the second lock is biased toward the engaged position. In still another feature, the second lock is biased toward the engaged position. In yet another feature the apparatus is one in which one of: (a) the second lock has a cam and the actuator has a mating cam follower; and (b) the second lock has a cam follower and the actuator has a mating cam. The cam and cam follower are co-operable, and are oriented to deflect the second lock away from the engaged position as the door moves from the open position to the closed position thereof.

In another aspect of the invention, there is a lock mechanism for a door actuating transmission of a railroad gondola car, the door actuating transmission including a reciprocating actuating cylinder mounted to a datum structure, the cylinder being movable forward and backward in an axial direction. The lock mechanism has a body having a first fitting, a second fitting and a third fitting. The first fitting is a mounting by which to connect the lock mechanism to the datum structure. The second fitting is one of (a) a cam for co-operation with a member of the door actuating transmission, that member being a cam follower; and (b) a cam follower for co-operation with a member of the door actuating transmission, that member being a cam. The third fitting includes an abutment for co-operation with a mating fitting of the door actuating transmission. The third fitting is movable between a first position and a second position, in the first position the abutment being presented to obstruct motion of the mating fitting of the door actuating transmission and thereby to prevent the door from moving to an open position thereof. The second fitting is movable between a first position and a second position, in the first position thereof the second fitting being positioned to intercept the member of the door actuating transmission and to be deflected away from the first position toward the second position thereby.

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The first fitting has a first degree of freedom of motion permitting the first and second fittings to move between their respective first and second positions. The degree of freedom constrains the third fitting to motion predominantly cross-wise to the axial direction.

In another feature, the lock mechanism there has a bias member oriented to urge the third fitting toward the first position thereof. The bias member is a spring having a first end and a second end, the first end being mounted to bear against the body of the lock mechanism, the second end having a foot for reaction against the datum structure. In another feature, the first degree of freedom of motion is an angular degree of freedom, and the predominantly cross-wise motion is predominantly circumferential motion about an axis of rotation. In a feature the first fitting is an hinge, the axis of rotation is an axis of rotation of the hinge, and the axis of rotation of the hinge is substantially parallel to the axial direction of the door actuating transmission. In still another further feature, the first fitting of the lock mechanism includes an hinge and a footing of the hinge for mounting to the datum structure. The axis of rotation is an axis of rotation of the hinge, and the footing has a substantially planar footprint. The axis of rotation of the hinge is angularly inclined relative to the substantially planar footprint. In yet another feature, the lock mechanism has all or any combination of the forgoing additional features.

In still another aspect of the invention there is a railroad hopper car for carrying particulate material. The hopper car there has a hopper and first and second end sections for carriage by respective first and second rail road car trucks for rolling motion along railroad tracks in a longitudinal direction. The hopper is suspended between the first and second end sections. The hopper has a discharge section through which to release lading, and first and second end slope sheets oriented toward the first and second end sections, the slope sheets being inclined in the longitudinal direction to feed the discharge section. The first end section includes a draft sill extending in the longitudinal direction, a main bolster extending cross-wise to either side of the draft sill, and a shear plate mounted to the draft sill and to the main bolster. The shear plate extends lengthwise along the draft sill and cross-wise from side to side of the hopper car. The first end slope sheet of the hopper overhangs the shear plate of the first end section. The hopper car is free of primary structure directly above the shear plate of the first end section under the overhang of the first slope sheet of the hopper.

In another feature of that aspect of the invention, there is one of: (a) the first slope sheet has an upper margin and the hopper car includes an end post extending upwardly from the draft sill to the upper margin of the slope sheet; and (b) the first slope sheet has an upper margin terminating at an end wall, and the hopper car includes an end post extending upwardly from draft stub sill to the end wall. In another feature, the shear plate has a longitudinally outboard

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margin and the draft sill has a striker located outboard of the longitudinally outboard margin of the shear plate, and the end post is one of: (a) rooted to the draft sill adjacent to the striker; (b) rooted to the shear plate adjacent to the longitudinally outboard margin of the shear plate. In a further feature, the bolster has first and second laterally outboard distal ends, and the hopper car has corner posts extending upwardly from the distal ends of the hopper to the first slope sheet.

In still another feature, the bolster has first and second laterally outboard distal ends, and the hopper car has corner posts extending upwardly from the distal ends of the hopper to the first slope sheet. In another feature, one of: (a) the first slope sheet has an upper margin and the hopper car includes an end post extending upwardly from the draft sill to the upper margin of the slope sheet; and (b) the first slope sheet has an upper margin terminating at an end wall, and the hopper car includes an end post extending upwardly from draft stub sill to the end wall; the shear plate has a longitudinally outboard margin and the draft sill has a striker located outboard of the longitudinally outboard margin of the shear plate, and the end post is one of: (a) rooted to the draft sill adjacent to the striker; (b) rooted to the shear plate adjacent to the longitudinally outboard margin of the shear plate. The bolster has first and second laterally outboard distal ends, and the hopper car has corner posts extending upwardly from the distal ends of the hopper to the first slope sheet. The hopper car has a machinery space bounded by (a) the first slope sheet; (b) the shear plate of the first end section; (c) the end post; and (d) the corner posts, and the machinery space is free of any other primary structure.

In yet another feature the hopper car has at least one longitudinally hinged discharge door, the discharge door being movable cross-wise between open and closed positions. A longitudinally acting pneumatic actuator is at least partially lodged in the machinery space directly above the draft sill. In still yet another feature a brake reservoir is also at least partially lodged in the machinery space. In a yet further feature the shear plate is mounted above and to the main bolster and defines an upper flange thereof. The main bolster has a lower flange downwardly spaced from the upper flange, the lower flange terminating at respective distal end portions at either side of the car. The car includes a side sill running along the car between the first and second end sections. The side sill has an upper flange, the upper flange of the side sill being substantially co-planar and connected to the shear plate. The side sill has a lower flange, the lower flange of the side sill being substantially co-planar with a respective one of the distal end portions of the lower flange of the main bolster. In another further feature, the shear plate defines an upper flange of the draft sill whereby the draft sill upper flange, the shear plate and the side sill upper flange are all substantially co-planar. In another feature the machinery space is free of elephant ears.

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In a further aspect of the invention there is a railroad freight car having a freight car body for carrying lading, the body being mounted on railroad car trucks for rolling motion in a longitudinal direction along railroad tracks. The car body includes a draft sill having a draft gear pocket for accommodating draft gear, and a shear plate overlying the draft sill and functioning as an upper flange of the draft sill. The draft sill has an inboard end oriented toward a truck center of one of the trucks, and an outboard end terminating at a striker. The draft sill has an underside and an access opening formed in the underside to admit entry of draft gear into the draft gear pocket from below. The car has a draft gear carrier plate. The carrier plate is mounted to the underside of the draft sill beneath the draft gear pocket. The carrier plate is removable to permit installation of the draft gear into the draft gear pocket. The car body has one of (a) an aperture formed in the shear plate over an inboard end region of the draft sill, the aperture permitting a portion of the draft gear to protrude upwardly therethrough during installation in the draft gear pocket; and (b) a coupler carrier seat defined in the draft sill longitudinally inboard of the striker, and a coupler carrier co-operable therewith, the coupler carrier being removable to permit installation of draft gear in the draft pocket, and, when the coupler carrier is installed, the coupler carrier providing a support for a coupler shank when the coupler shank is connected to the draft gear within the draft sill.

In another feature of that aspect of the invention the freight car has both (a) and (b). In another feature, there is a cover plate for the aperture of the shear plate, the cover plate being removable to permit installation of the draft gear. In still another feature, the draft sill has a pair of vertically oriented, longitudinally running spaced apart side webs. The webs have a greater depth of section adjacent to the striker. The webs have respective first and second apertures formed therein. The first and second apertures define the draft gear retainer seat, and the retainer is a sideways slidable shaft that is movable to extend across the draft sill between the first and second apertures in the draft sill side webs. In a furtrher feature there is a cover plate for the aperture of the shear plate, the cover plate being removable to permit installation of the draft gear. In another further feature the draft sill has a centerplate centered on the truck center, rear draft stops are welded within the draft sill, and at least a portion of each of the rear draft stops extends longitudinally inboard of the truck center. In still another further feature, the car is one in which at least one of (a) the freight car has a truck center to striker plate draft sill length of less than 50 inches; and (b) the freight car has a truck center to coupler pulling face length of less than 65 inches when the draft gear is fully extended in draft. In another feature, the railroad freight car is one in which at least one of (a) the freight car has a truck center to striker plate draft sill length of about 38 inches (+/- 2"); and (b) the freight car has a truck center to coupler pulling

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face length of about 53 inches (+/- 2") when the draft gear is fully extended in draft.

These and other aspects and features of the invention may be understood with reference to the description which follows, and with the aid of the illustrations.

Brief Description of the Figures

The description is accompanied by a set of illustrative Figures in which:

Figure **1** is a general arrangement, isometric view of a railroad freight car according to an aspect of the invention with all ancillary systems removed to leave only primary structure visible;

Figures **2a** is an isometric view of a sidewall of the gondola car of Figure **1**;

Figure **2b** shows a side view of the sidewall of Figure **2a**;

Figure **2c** shows an end view of the sidewall of Figure **2a**;

Figure **3a** shows a perspective view of the end structure of the railroad freight car of Figure **1**;

Figure **3b** is a side view of the structure of Figure **3a**;

Figure **3c** is a detail of the end structure of Figure **3b**, with the near side web of the draft sill removed to show the draft stop, center plate, and coupler relationship.

Figure **4a** is a isometric view of a portion of the door opening mechanism for the railroad car of Figure **1** in a fully open position;

Figure **4b** is a isometric view of a portion of the door opening mechanism for the railroad car of Figure **1** in an intermediate position;

Figure **4c** is a isometric view of a portion of the door opening mechanism for the railroad car of Figure **1** in a fully closed position;

Figure **5a** is a side view of the door opening mechanism of Figure **4a**;

Figure **5b** is a side view of the door opening mechanism of Figure **4b**;

Figure **5c** is a side view of the door opening mechanism of Figure **4c**;

Figure **6a** is an end view of the door opening mechanism of Figure **4a**;

Figure **6b** is an end view of the door opening mechanism of Figure **4b**; and

Figure **6c** is an end view of the door opening mechanism of Figure **4c**;

Figure **7a** is a perspective view of a secondary lock mechanism for the door opening mechanism of Figure **4a**;

Figure **7b** is a plan view of the mechanism of Figure **7a**;

Figure **7c** is a perspective view of the mechanism of Figure **7a** when the door are open

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Figure **7d** is a view similar to Figure **7c**, of the mechanism of Figure **7a** in a deflected condition; and

Figure **7e** is a perspective view of the mechanism of Figure **7a** in a locked position;

Detailed Description

The description that follows, and the embodiments described therein, are provided by way of illustration of an example, or examples, of particular embodiments of the principles, aspects or features of the present invention. These examples are provided for the purposes of explanation, and not of limitation, of those principles and of the invention. In the description, like parts are marked throughout the specification and the drawings with the same respective reference numerals. The drawings may be taken as being to scale unless noted otherwise.

The terminology used in this specification is thought to be consistent with the customary and ordinary meanings of those terms as they would be understood by a person of ordinary skill in the rail road industry in North America. Following from decision of the CAFC in *Phillips* v. *AWH Corp.*, the Applicant expressly excludes all interpretations that are inconsistent with this specification, and, in particular, expressly excludes any interpretation of the claims or the language used in this specification such as may be made in the USPTO, or in any other Patent Office, other than those interpretations for which express support can be demonstrated in this specification or in objective evidence of record in accordance with *In re Lee*, (for example, earlier publications by persons not employed by the USPTO or any other Patent Office), demonstrating how the terms are used and understood by persons of ordinary skill in the art, or by way of expert evidence of a person or persons of at least 10 years experience in the industry in North America or in other former territories of the British Empire and Commonwealth.

In terms of general orientation and directional nomenclature, for rail road cars described herein the longitudinal direction is defined as being coincident with the rolling direction of the rail road car, or rail road car unit, when located on tangent (that is, straight) track. In the case of a rail road car having a center sill, be it a stub sill or a straight-through center sill, the longitudinal direction is parallel to the center sill, and parallel to the top chords. Unless otherwise noted, vertical, or upward and downward, are terms that use top of rail, **TOR**, as a datum. In the context of the car as a whole, the term lateral, or laterally outboard, or transverse, or transversely outboard refer to a distance or orientation relative to the longitudinal centerline of the railroad car, or car unit, or of the centerline of a centerplate at a truck center. The term "longitudinally inboard", or "longitudinally outboard" is a distance taken relative to a mid-span

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lateral section of the car, or car unit. Pitching motion is angular motion of a railcar unit about a horizontal axis perpendicular to the longitudinal direction. Yawing is angular motion about a vertical axis. Roll is angular motion about the longitudinal axis. Given that the rail road car described herein may tend to have both longitudinal and transverse axes of symmetry, a description of one half of the car may generally also be intended to describe the other half as well, allowing for differences between right hand and left hand parts. In this description, the abbreviation kpsi stands for thousand of pounds per square inch. To the extent that this specification or the accompanying illustrations may refer to standards of the Association of American Railroads (AAR), such as to AAR plate sizes, those references are to be understood as at the earliest date of priority to which this application is entitled.

Bottom dumping hopper cars, of which ore cars and coal cars may be examples, may tend to have either longitudinal doors or transverse doors. Longitudinal doors are oriented such that the doors operate on hinges or axes of rotation that are parallel to the direction of travel of the railroad car generally. US Patent 4,250,814 of Stark et al., issued February 17, 1981 and US Patent 3,800,711 of Tuttle, issued April 2, 1974 show cars with longitudinal doors. By contrast, transverse doors are ones in which the axes of rotation of the hinges or other pivots tend to be predominantly cross-wise to the direction of travel, most often perpendicular to it. An example of a transverse door car shown in US Patent 4,843,974 of Ritter et al, issued July 4, 1989.

Figure **1** shows an isometric view of an example of a rail road freight car **20** that is intended to be representative of a range of rail road cars in which one or more of the various aspects of the present invention may be incorporated. While car **20** may be suitable for a variety of general purpose uses, it may be taken as being symbolic of, and in some ways a generic example of, a flow through car, in which lading is introduced by gravity flow from above, and removed by gravity discharge through gated or valved outlets below. Flow through, or center flow cars may include open topped hopper cars, grain cars, plastic pellet cars, potash cars, ore cars, coal gondolas, and so on. In one embodiment car **20** may be a hopper car such as may be used for the carriage of bulk commodities in the form of a granular particulate, be it in the nature of relatively coarse gravel or fine aggregate in the nature of fine gravel or sand or various ores, ore concentrate or coal. The principle, or primary, structure of car **20** may be symmetrical about both its longitudinal and transverse, or lateral, centreline axes. Consequently, it will be understood that the car has first and second, left and right hand side beams, bolsters and so on.

By way of a general overview, car **20** may have a car body **22** that is carried on trucks **24** for rolling operation along railroad tracks. Car **20** may be a single unit car, or it may be a multi-

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unit car having two or more car body units, where the multiple car body units may be substantially permanently connected at an articulated connector, or by draw bars, as opposed to by ordinarily releasable AAR couplers. Car body **22**, and the various structural members and fittings described herein may be understood to be typically of metal construction, whether welded or Huck(t.m.) bolted, or riveted together, the metal members being most typically steel, stainless steel, or aluminum, as may be appropriate. Some car builders have also used reinforced plastic composites for car elements, and those materials could also be employed where suitable. The default construction may be taken as being steel, of which the majority may be mild steel having, typically, a 50 kpsi yield. Car body **22** may have a lading containment vessel or shell **26** such as may include an upstanding wall structure **28** which may have a pair of opposed first and second end walls **30**, **32**, that extend cross-wise, and a pair of first and second side walls **34**, **36** that extend lengthwise, the end walls **30**, **32** and side walls **34**, **36** co-operating to define a generally rectangular form of peripheral wall structure **28**. Wall structure **28** may include top chords **38** running along the top of the walls, and side sills **40** running fore-and-aft along lower portions of the side sheets or side sheet assemblies **42** of side walls **34**, **36**. In some instances, such as that of the illustration of Figure **1a**, car **20** may have stub center sills **44** at either end, in which case side walls **34**, **36** may act as deep beams, and may carry vertical loads to main bolsters **90** that extend laterally from the centerplates. In the case of a single, stand alone car unit, draft gear and releasable couplers may be mounted at either end of the stub center sill. In a center flow, or flow through car, the upper portion of the car may typically include means by which to admit lading under a gravity drop system. Such an intake **46**, or entryway may be a large rectangular opening such as that bounded by top chords **38**.

Car body **22** may include end sheets **48** and side sheets **50**. Car **20** of Figures **1** et seq., is illustrated as a car having a single hopper **52**, a single hopper discharge section **54**, and an outflow or discharge governor in the nature of a discharge door assembly **56**. However, car **20** could, alternatively, be a multiple hopper car. In a multiple hopper car, the car may have laterally extending members or reinforcements, which may be cross-bearers, or cross-bearers with shrouds, or merely shrouds, particularly where the car is a multiple hopper car. These cross-members may run fully across the car from side sill to side sill, and may intersect the center sill, or the center sill shroud as may be. The car may also include upper wall bracing, in the nature of diagonal struts which extend diagonally upwardly and outwardly from the apices of the respective cross-members at the centerline of the car to upper regions of the side walls near or at the top chords; and lateral ties or struts that run across the car from sidewall to side wall to meet the upper ends of the diagonal struts at their wall brackets. Those brackets may be aligned

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with, and mated through the wall to, the vertical exterior posts that run from the side sill to the top chord and reinforce the walls.

End sheets **48** may be substantially planar slope sheets or slope sheet assemblies that are inclined downwardly in the longitudinally inboard direction to feed the discharge section. Not atypically, each pair of fore-and aft opposed slope sheets may be inclined at equal and opposite angles, and the angles of those sheets may be selected to be somewhat steeper than the free slope angle, or natural talus slope angle of the lading for which the car is designed, such that, when the gates are opened, the lading may tend to flow out, rather than sit at rest.

The primary structure of body **22** of car **20** includes lading containment vessel **26** which is in the nature of hopper **52**. Hopper **52** has an upper portion **58** with substantially vertical wall panels **60**, and a lower stationary portion **62** defined by a set of converging sloped walls, namely the side and end slope sheet assemblies **48** and **50**. At the lower margin of the sloped walls there is the outflow governor, namely door assembly **56**, which, in this instance, may have the form of a pair of first and second, or left and right hand doors **62, 64**. This containment structure seats on, and is carried by, a pair of first and second end structures, **66, 68**, at either end of the car. End structures **66, 68** are in turn carried by trucks **24**. A door operating apparatus or mechanism, or drive train, or transmission, however it may be termed, and identified generally as **70**, is provided to move doors **62, 64** between open and closed positions.

Considering this structure in greater detail, trucks **24** are most immediately surmounted by center plates **72** of longitudinally extending stub sills **44**. Stub sills **44** in turn carry laterally extending main bolster arms **74** of main bolster **90**. Arms **74** extended perpendicularly away from the centerplate **72**, i.e., they are centered on the truck center, **CL - Truck**. Side sills **40** run lengthwise along the car between, and tie together, the most laterally outboard extremities of main bolster arms **74**. A shear plate **76** is mounted in an x-y horizontal plane defining the top cover plate of stub sill **44**. Shear plate **76** extends laterally from side sill to side sill, and longitudinally from the fore-and-aft end slope sheet **48** to the laterally extending end sill **78** of the car, which, in this instance may be an upturned flange formed on the longitudinally outboard margin of shear plate **76**. In car **20**, the primary structure includes an end post **80** and a pair of side or corner posts **82, 84**.

End post **80** is rooted in shear plate **76** in line with center sill **44**, and may have lateral webs or gussets aligned with the webs of stub sill **44** to provide vertical web continuity across shear plate **76**. End post **80** then extends fully between shear plate **76** and top chord **86** of end wall **30** or **32**, as may be. Corner posts **82** and **84** are rooted to, and stand upwardly from, the

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junction of the laterally outboard ends of left and right hand main bolster arms **74** and side sills **40**. Posts **82** and **84** extend upwardly from this junction to mate with various elements of the end and side walls, as may be described below.

As described in additional detail below, car **20** has an abnormally short distance from the striker **88** to the truck center, i.e., the **CL** of centerplate **72**. Striker **88** is the vertical planar surrounding face plate at the outboard end of the stub sill **44**. 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 **CL -Truck** may also be referred to as the draft sill. In car **20**, the short draft sill length, identified as L_{88}, leaves an anomalously small space in which to install other systems, such as the brake reservoir and the door operating pneumatic cylinder. Car **20** has an end of car machinery space, indicated generally as **75**, that is bounded by shear plate **76** on the bottom, the sloped end wall assembly **30** or **32** of the car on the top, main vertical central end post **80**, and main side posts **82, 84** at the ends of main bolster **90**. This space may be referred to as having the shape, generally, of a triangular prism and is substantially unobstructed by the primary structure of the car. For the purposes of this description, primary structure is defined as the underframe, including side sills and center sill (i.e., including the draft sill), the side walls, the slope sheets and top chords, the hopper construction including the stationary parts of the discharge section, as well as any cross-bearers, cross-ties, bolsters, shear plates and so on. Primary structure excludes secondary or ancillary structure or systems such as ladders, cat-walks and other safety appliances, brakes, brake rods and brake fittings, air hoses, reservoirs and pneumatic fittings, movable door members, door operating linkages, and so on.

In existing cars, this space, **75**, is often occupied or otherwise obstructed by other primary structure, such as so-called "elephant ears". In this context, "elephant ears" are 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. The third edge is typically a free edge. Often these plates lie in a plane that is oriented at an angle to the vertical – i.e., it leans laterally outboard. Car **20** avoids the use of these "elephant ears" and so provides the large unobstructed space shown in Figure **1b**.

Figures **1** and **2a**, **2b** and **2c**, all show the sidewall of the car, indicated generally as **34** or **36**. Sidewall **34** and **36** function as short beams of low (e.g., less than 4:1, possibly less than 3:1) length-to-depth ratio. Sidewall **34** or **36** can be seen to have a bottom flange or chord member, namely side sill **40**, a top flange or chord member, namely top chord **38**, which may have the

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form of a square or rectangular hollow structural steel tube; and an intermediate shear force transfer web, namely side sheet assembly **42**. Side sheet assembly **42** may include an upper sheet portion or member **92** that is welded to the outside face of top chord **38** at a lap joint, and that extends downwardly therefrom; and a lower sheet portion or member **94**. Member **94** may have the form of a Z-section, having a first portion, namely an upper flange or leg or margin **96** that extends in a substantially vertical plane and has an uppermost margin that overlaps the lowermost edge or margin of member **92**; a second or intermediate portion **98** that runs in an inclined plane sloping inwardly and downwardly on the slope of the hopper side sheets generally, and a third or bottom portion, namely bottom flange, or leg, or margin **100** that extends in a substantially vertical plane downwardly. Sidewall **34** or **36** also includes a central post, or web stiffener, **102** that has a lowermost first portion **104** an intermediate second portion **106**, and an uppermost third portion **108**.

Side sill **40** includes a channel **110** that is welded toes-inward against the lowermost marginal portion of lower leg **100** to form a closed section. The first or lowermost portion **104** of web stiffener **102** has the form of a quadrilateral gusset having a first edge welded to the upper leg of channel **110**, a second edge welded to the vertical margin **100**, a third edge welded to the sloping portion **98**, and the fourth, laterally outboard, edge being free. As may be noted, portion **104** stands outboard of the sidewall sheet.

Portion **108** is a rectangular web stiffener that is welded to, and extends downwardly from, the underside of top chord **38** along the inside face of vertical web portion **92**. Intermediate portion **106** is a web, or plate, or gusset, that is also a quadrilateral, having a first edge that overlaps, and is welded to, the lower margin of portion **108**. A second edge is welded to the lower region of vertical web portion **92**, and to the upper flange or leg **96**. A third edge is welded along the sloped portion **98** of member **94**. The fourth edge is free, and faces inwardly into the lading containment space of the hopper. Portions **104** and **106** are co-planar, or substantially co-planar, such that stiffener **102** has web continuity through member **94**. The upper margin of the side slope sheet **50** of the hopper discharge section is welded to the lower margin of the inclined or sloped portion **98**, such that the structure presents a continuous sloped surface for containing, and then slidingly discharging, particulate lading. Expressed differently, the web of the sidewall traverses the sidewall stiffener, commencing on its inboard margin at side sill **40**, traverses the web mid-way up the post, and ends along its outboard margin at top chord **38**. In this arrangement, the vertical stiffener, **102**, acts as the web of a T-section, and the local region of the wall section to which it is joined functions as the flange of that T-section.

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In this example, the locus of intersection of the side slope sheet plane P_{94} with the plane of the side wall sheet P_{92}, lies above the level of side sill **40** by a substantial distance, indicated as L_{94}. This distance may lie in the range of ¼ to $^2/_3$ of the distance L_{SW} from side sill **40** to top chord **38**, and, in the particular may be about $^1/_3$ of that distance. Further, although the post has stiffening member web continuity in a vertical plane, the wall sheet traverses the stiffening web intermediate the top chord and the side sill, and does so obliquely on the slope of plane P_{94}.

The upper leg of channel **110** forms the upper flange of side sill **40**, and the lower leg of channel **110** forms the lower flange of side sill **40**. Shear plate **76** forms the top flange of main bolster **90**. Main bolster **90** also has a lower or bottom flange **91**. In car **20** the upper leg of channel **110** is co-planar or substantially co-planar with, and is connected in flange continuity with, shear plate **76**. Similarly, the lower leg of channel **110** is co-planar or substantially co-planar with, and connected in flange continuity with, bottom flange **91** of main bolster **90**.

Continuing with the sidewall assembly, the main sheet, namely upper sheet portion **92**, ends at the corners, and there are respective first and second end upper web stiffener portions and inwardly stepped plate members **112**, which may be termed "ears". The top edge of each ear is welded to the inside face of top chord **38** in a lap joint. The longitudinally outboard end edge forms a plane to which the vertical end sheet of the end slope sheet wall abuts and is welded. The bottom edge follows the slope of, and is welded to, end slope sheet **48**. The forward, transversely outwardly bent edge is welded to the upper end portion of side sheet assembly **42**. The lower region of the main sidewall sheet also includes lightening apertures **114**, in the space between the corner posts and the slope of the end slope sheets. Finally, the lower portion of region **100** of the main sidewall sheet has longitudinal extensions **116** that are welded to the side edges of the shear panel, namely shear plate **76**, outboard of main bolster **90**, thereby forming a portion of the peripheral flange of the shear plate.

End walls **30**, **32** each include upper and lower sloped surface members **122** and **124**, which could be made as a single piece, or as two pieces butt-welded together, as here. Upper member **122** has notches **126** formed therein to accommodate corresponding corner posts **82**, **84** as may be, with local reinforcement doublers **128** at the junction. Lower portion **124** tapers in width to match the narrowing width between the sloped side sheets with which it mates. At the upper end of end wall **30** the end wall assembly includes a laterally extending first formed member **130** that has a first, vertical leg **132** that laps the inside face of the top chord **86**, and a bent flange **136** that extends initially horizontally, with a distal lip bent upward to mate perpendicularly with the upper margin **138** of the end slope sheet **48**. The distal tip of end slope

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sheet **48** is fillet welded to vertical leg **132**. This results in a substantially triangular closed section defining a laterally extending end slope sheet reinforcement beam **140**. The ends of this beam abut, are welded to, and are capped by elephant ears **112**. Vertical leg **132** also lies against, and is welded to, end post **80**.

A formed angle **142** is mounted toes-in at an intermediate height on sloped end wall **48**, forming thereby another hollow section laterally extending end sheet reinforcement or beam **148**. Vertical leg **144** of angle **142** is substantially aligned with the central web of the corner post (be it **82** or **84**) and therefore also with the central web of the main bolster. Another formed angle **150** is welded toes-in to the back of sloped end wall **30** at the level of shear plate, thereby forming yet another slope-sheet reinforcement in the form of a laterally extending beam.

The corner posts **82** and **84** each have a lower corner post flange plate **160** (that includes a lifting lug aperture) that has a bottom tab welded to the outside, or back, of the end of side sill **40** in line with the main bolster, then an angled portion following the angle of the outside edge of the vertically extending side wall reinforcements, **161**, to an upper end at the juncture of the side slope sheet with the side wall vertical leg of the lower side wall sheet. Each end post has two internal reinforcements **154**. Each corner post also includes an intermediate member, or web, or gusset, or plate **162**, which is considerably wider than intermediate gusset **106**, and a substantially triangular inside edge web stiffener **164**. Plate **162** is a quadrilateral. A first edge of plate **162** runs along the upward and outward slope of wall extension **166**. A second edge runs vertically against the upper leg of wall extension **166**. A third upper edge adjacent runs horizontally along lateral reinforcement beam **148**. The fourth edge runs vertically downward to and along edge stiffener **164**. As such, a vertical post is established.

Considering Figures **3a**, **3b** and **3c**, center sill **44** includes a bottom flange or bottom cover plate **165**, and a pair of spaced apart webs **168**. The central region of shear plate **76** forms the top flange, or top cover plate of the center sill. At its inboard end, the center sill terminates centrally under the bottom lateral reinforcement of the end slope sheet **48**. A draft pocket **175** is defined between webs **168**, shear plate **76** and bottom cover plate **165** longitudinally inboard of the striker plate.

Center plate **72** is mounted at truck center **CL-Truck**, in line with main bolster **90** and the corner posts **82**, **84**. Rear draft stops **172** are welded within the center sill above center plate **72**. As seen in Figure **3c**, the inboard end of rear draft stop **172** extends longitudinally inboard of the truck center. While this is known to have been used in at least one single piece, integrally

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cast draft sill, the inventor is unaware of such a construction in an all-welded fabrication draft sill assembly. The removable draft sill access cover plate, or draft gear carrier plate **174**, which is bolted to the draft sill (i.e., the stub sill) bottom flange margins, is mounted immediately longitudinally outboard of center plate **72**. Front draft stops **176** are, in turn, mounted longitudinally outboard of carrier plate **174**. In this embodiment there is also a removable member, such as a top leeway or access plate **178**, mounted to shear plate **76**. Plate **178** is removed when draft gear **180** is removed or installed. On installation, draft gear **180**, to which yoke **188** is already mounted, is fed into draft pocket **175** from below, on an angle, whereby the rear corner protrudes upwardly through the opening that is otherwise covered by plate **178**. The front end of draft gear **180** is rotated into place, and the rear end is rotated downward. As this occurs, yoke **188** is also raised into place. Plates **178** and **174** are then reinstalled. The shank **182** of the coupler, **184** is inserted, and the coupler key **186** is fed through the slot in front draft stops **176** to link coupler **184**, and yoke **188** in the customary manner. It may be noted that coupler **184** combines an AAR Type E shank with and AAR Type F knuckle with a bottom shelf. Draft gear **180** itself has abnormally short travel, namely about 2 ½ inches deflection before going solid, as compared to a "normal" deflection of over 3" before going solid.

Draft sill webs **164** have, at their longitudinally outboard end an end portion **190** of increased depth of section with a downwardly protruding bulge or horn, such as might be termed a "chin". End portion **190** has an aperture or slot **192** formed therein to permit lateral sliding insertion of a coupler support, carrier or bar **194** immediately behind striker plate **88**. Removal of bar **194** permits yoke **188** to be swung into place during installation of draft gear **180**. When coupler **184** is installed, the shank may rest on bar **194**. Bar **194** is held in place by bolts that secure it relative to webs **164**. Overall, a coupler installation of very short length is achieved. In this example, L_{88} may be in the range of less than 50 inches, and in one embodiment may be about 38" +/- 2", from the truck center to the outboard face of striker plate **88**. An alternative expression of the relative compactness of the draft gear is that the length from the truck center to the pulling face of the coupler, when the draft gear is extended in tension, is in the range of less than 65 inches, and in one embodiment is in the range of 53" +/- 2".

Car **20** may also include a door opening mechanism **200**. There are left and right hand, or first and second, doors **62**, **64**. Each door has a proximal, hinged edge **206**, and a distal free edge **208**. The hinges are carried on hinge fittings welded to mounting brackets depending from the slope sheets and side sills. The hinges run parallel to the longitudinal or lengthwise axis of the car, generally such that doors **62**, **64** are longitudinal doors. Each door has the form of a hollow section beam, having a proximal beam **210** along the hinge side, a distal beam **212** along

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the free edge, internal cross-braces, not shown, and front and back skins or sheets or plates **214, 216**. The hinges are indicated as **220**, the end closure plates as **222, 224**. The doors have door seal members **226, 228** that mutually engage when the doors are moved to a closed position. Seal members **226, 228** are sprung, such that when they are closed they deflect somewhat and in so doing take on a spring pre-load against each other. The door mechanism includes a pair of first and second, matched left and right hand pivot arms **230, 232**; a corresponding pair of first and second drag links **234, 236**; a shared yoke **238**, and a pair of slave links **240, 242** that each pick up on a knuckle fitting **244, 246** of each of respective doors **62, 64**. The whole assembly has left and right hand symmetry.

Inasmuch as, when tripped, doors **62, 64** open under the influence of gravity, particularly when assisted by the weight of the lading being discharged, one may consider the motion that occurs as the doors are closed in the sequence of views **4a, 4b**, and **4c**; **5a, 5b**, and **5c**; and **6a, 6b** and **6c**. Knuckles **244** and **246** are constrained by geometry to move in circular arcs of fixed radii in planes perpendicular to the respective axes of rotation of doors **62** and **64**, those axes being the hinge axes of their respective hinges **220**, which each lie in a plane parallel to the **x-z** plane of the car centerline. The plane of rotation of knuckles **244, 246** will then tend to be perpendicular to the central **x-z** plane. Slave links **240** and **242** are each of fixed length; each has an end pivotally connected at a two rotational degree of freedom knuckle, be it **244** or **246**, as may be; each of slave links **240** and **242** has another end pivotally connected at a second pivot connection at yoke **238**; and slave links **240** and **242** do not transmit a bending moment, and so therefore pull in pure tension. The upper, or near (i.e., proximal), ends of drag links **234, 236** are connected to the distal ends of pivot arms **230, 232** at pivot connections **248, 250**, which may, if desired, share a common axis of rotation or pivot pin.

Yoke **238** is constrained by symmetry to pull in an **x-z** plane, which in the embodiment illustrated is the vertical plane of the centerline of the car. As such, movement of yoke **238** away from the plane of motion of knuckles **244** and **246** will necessarily draw knuckle fittings **244** and **246** closer together, and toward the vertical centerline plane of the car, eventually causing resilient door seals **226, 228** mutually to engage, thus closing the opening. This motion can be achieved by pulling on drag links **234, 236**. Each pivot connection of slave links **240, 242** has a single angular degree of freedom. Similarly yoke **238** has an angular degree of freedom about the axis of rotation of the axle, or trunnions, by which it is pivotally mounted to the drag link, or drag links **234, 236**. This gives the drag link connection two angular degrees of freedom in total. As the drag links are withdrawn, the slave links pull in tension, finding the natural hypoteneuse between the plane of the arc of motion of knuckle fittings **244, 246** and the

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plane of motion of drag links **234, 236**. Since this mechanism operates in tension, pivot connections **248, 250** and knuckle fittings **244, 246** are co-planar, with drag links **234, 236**, yoke **238**, slave links **240** and **242**, and their associated pivot connections also lying in that same plane as well. (See Figures **5a, 5b, 5c**).

Driving force for this system is provided by an actuator, identified as **260**. Actuator **260** may be a pneumatic actuator, which may be charged by the pneumatic system of the train generally, as supplied through the pressurized air connection of the train line. Actuator **260** may include its own reservoir and check valve. Actuator **260** is connected to move a first member, in the nature of a primary driven pivot arm or lever, **262**, which is in this instance actually a pair of matched lever arm members, which in turn is pivotally connected to, and drives, a second member in the nature of, a push rod, or, given the symmetrical nature of the assembly, a pair of left and right hand push rods **264** and **266**. One or both of push rods **264, 266** may have a secondary member, such as may be an extending arm, or detent, or stop, or abutment, identified as an over-center travel limiter or governor, **268**. The far ends of push rods **264, 266** may be connected to either pivot arms **230** (or **232**, as may be), or to drag link **234** (or **236**, as may be). It may be convenient to connect the far end of push rods **264, 266** at the same pivot connection, or connections **248, 250**.

Lever **262** has a first end pivotally mounted to primary structure of car **20** at footings, identified as mounting fixtures, fittings or brackets **270**. The drive rod of actuator **260** picks up on lever **262** at an intermediate location, such that lever **262** provides magnification of displacement. Similarly, pivot arms **230, 232** have a first or base end pivotally connected to primary structure at mounting fixtures, fittings, or brackets **272**. Actuator **260** is located on the centerline (i.e., in the central x-z plane) of car **20**, between and in substance below pivot arms **230, 232**. "Below" in this context may be thought of as radially more proximate to the pivot axis P_{270} of brackets **270** than is the pivot axis of connections **248, 250**, as well as in the context of being lower than as in closer to Top of Rail. In the past the lever fitting has more commonly been mounted to the slope sheet such that the output pin is lower than the pneumatic cylinder. Turning this arrangement upside down, in effect, and fitting the cylinder may then permit a more compact installation than otherwise. Similarly, the pivot axis, P_{230}, of driven arms **230, 232** is below the output knuckle, i.e., at P_{250}, and is below the actuator cylinder as shown in Figure **5b** in which P_{250} lies below the center line CL_{260} or actuator **260**. This may be taken in the sense of being further from the plane of the end slope sheets, identified as P_{48}. Expressed differently, actuator **260** lies between the base or datum pivot point P_{250} of driven arms **230, 232** and the plane P_{48} of end slope sheet **48**.

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As may be noted, the line of action of drag links **234, 236** has a predominant component that is substantially parallel to plane P_{48}. Expressed differently, at some point during mid–stroke, the line of action will be at least instantaneously parallel to plane P_{48}. Finally, it may be noted that rather than placing actuator **260** on shear plate **76**, and orienting actuator **260** such that its longitudinal axis (i.e., the working axis or axis of reciprocation of the actuator), that actuator is itself raised upwardly from the shear plate and oriented to work along a line of action that is tilted downward and longitudinally inboard, the angle of tilt being identified as $[alpha]_{260}$. This angle of inclination lies in the range from horizontal to the angle of inclination of end slope sheet **48**, identified in Figure **5c** as $[alpha]_{48}$. Placing the mounts and pivot points under the apparatus, raising the actuator cylinder, orienting it on an incline, and making the line of action or the zone swept by the draglinks in the progressions of Figures **4a, 4b** and **4c** (or **5a, 5b** and **5c**) tend to correspond to a displacement substantially or predominantly parallel to plane P_{48}, all aid in providing a more compact installation, in particular one that is longitudinally short as may suit the short distance from the truck center to the striker. It is also an installation that may tend to leave space for other car systems, such as the brake system.

This arrangement may be thought of in terms of a four bar, or multi-bar, linkage. The first bar of the linkage may be thought of as being the underframe, and structure rigidly mounted to the underfame. This is the datum, or frame of reference member of the linkage. The second member or linkage component is the first pivot arm, **230** (or **232**) having a fixed main pivot point, and an output distal pivot point constrained to move on a fixed radius about main pivot point P_{230}. The fourth component or element of the linkage is the second pivot arm, namely **62** or **64**, each of which is a second lever or pivot arm mounted to a pivot axis fixed with respect to the first or datum link, and having a distal connection, in this case also a pivot connection, constrained to move in an arc of constant radius about the base pivot axis. The third linkage is the drag link. Although the drag link is made of two portions that are held together at yoke **238**, the geometric symmetry of the assembly constrains both the upper portion of the drag link, (i.e., drag link **234, 236**) and the lower portions, (i.e., slave links **240, 242**) to be co-planar during closing of the doors. In any case, the single input of the actuator cylinder acting through the over-center links against the first pivot arm (at the distal pivot connection) produces a unique output geometry such that position of the elements is determinate as if it were a four bar linkage.

When the door opening apparatus is retracted to the position shown in Figures **4c, 5c** and **6c**, driven primary pivot arms and the over-center links are driven to a slightly over-center relationship such that the pivot connection between the primary pivot arms and the over center arms lies below a line drawn from the primary pivot axis and the over-center link output

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connection as axis P_{250}. In this condition tensile force on drag links **234** and **236** (as from weight placed on doors **62, 64**, for example) will tend to urge the main driven pivot arms, namely lever **262**, counter-clockwise as viewed in Figure **4c**. Motion in this direction is prevented by the over center stop, **268**, thereby defining a first lock that prevents inadvertent opening of doors **62, 64** from moving to the open position when actuator **260** is dormant, i.e., inactive. This first lock is released by reversing actuator **260** to open the doors.

Car **20** has a secondary door mechanism, or secondary latching system, identified generally as **300**. This secondary latch system, and, indeed, the door closure linkage apparatus of Figures **7a – 7e**, are slightly different from those shown in Figures **4a**, **5a**, and **6a**. In latching system **300** there is a latch assembly **302**, shown in Figures **7a** and **7b**. Assembly **302** includes a first member, or main member, or plate **304**, which performs the function of a body or armature or spider that ties the other various physical elements of the assembly together. Along one edge plate **304** has physical motion constraint fittings, identified as hinge fittings **306**, that limit plate **304** (and assembly **302** more generally) to a single degree of freedom, that single degree of freedom limiting plate **304** to motion of any point to motion in a plane perpendicular to the hinge axis, and in particular to pivotal motion in that plane about that axis. To the extent that the hinge axis is substantially or predominantly parallel to the axis of reciprocation of pneumatic actuator **260**, that motion can be said to be sideways, or predominantly transverse of cross-wise to that direction of reciprocation.

Plate **304** has a portion or finger, or arm member **308** extending away from the hinge. In this case, arm member **308** extends arcuately away, and has a bent termination, or end, or lip, or tip, indicated at **310**. Another member **312** in the form of a block is mounted, e.g., welded, at the distal end of arm member **308**. Member **312** has the same general shape, a dog-leg bend, as tip **310**. Member **312** has a first, generally inwardly (i.e., away from the tip) facing surface **314** that defines an abutment **316**. Member **312** also has an oblique surface **318** that defines a wear or cam surface, which may be termed a reset cam, or return cam.

Another member **320**, which may have the form of a plate or block, is welded to the major portion of the body of plate **304** relatively close to the hinge axis. The axially foremost face of member **322** is relieved – i.e., it does not define a face in a plane perpendicular to the hinge axis – or to the axis of reciprocation of the pneumatic actuator clevis. This face may be arcuate or chamfered, and so defines a first or deflection cam **324**. That is, as installed, it lies in the path of actuator clevis **330**. When the leading corner of clevis **330** encounters cam **324**, plate **304** will tend to be urged to rotate, i.e., pivot, about its axis in the clockwise direction as viewed

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looking from actuator **260** toward hopper **52**. Assembly **302** also includes a motion resisting, or return biasing member in the form of a spring, identified as leaf spring **326** that is anchored at the proximal end to stationary structure of the secondary lock footing, or base, **328** which is welded to shear plate **76**. The footprint of base **328** against shear plate **76** is planar. The hinge axis is inclined relative to the plane as shown, the angle of inclination being substantially similar to, and possibly the same as, the mid-stroke angle of inclination of actuator **260** (which, itself, varies slightly during operation). The distal end of spring **326** bears against plate **304** distant from the hinge. Finally, assembly **302** includes reaction force transmission members **332**, **334** in the form of welded flat bars that bear against, i.e., abut, the longitudinally outboard face of mounting fitting **270** when the latch is in the engaged position.

In operation, as actuator **260** works, lost motion is taken up in slot **336** of the distal or forward end **338** of the reciprocating actuator ram. Eventually the end of slot **336** engages a pivot pin **340** of bell crank arm **342** and causes driven member **344** (analogous to driven member **262**), causing it to rotate counterclockwise as viewed in Figure **7a**. This forces push rods **346**, **348** (analogous to push rods **264**, **266**) to act against connections **248**, **250**, and hence to force drag links **234**, **236** along their retracting path. Since **262**, **264**, **230** and the car body form a four bar linkage, the output path of connections **248**, **250** is determinate and unique.

While this happens, clevis **338** keeps moving rearward to engage reset cam surface **318**, with the effect that assembly **302** is urged to rotate out of the way, against the resistance of spring **326** (Figure **7d**). Eventually the trailing portion of clevis **338** clears cam **324**, and soon thereafter the most longitudinally inboard edge of driven member **344** clears abutment **316**. Assembly **302** then moves under the influence of spring **326** into the locked position shown in Figure **7e**. In this locked position, any moment tending to pivot driven member **344** clockwise is reacted not by the hinge fittings, but rather by the reinforcements, namely members **332**, **334**. In this locked position driven member **344** and push rods **346**, **348** are drawn to, and locked in, their over center position.

When the doors are to be released, actuator **260** moves in the opposite direction. The lost motion of the length of slot **336** reverses, such that the end of clevis **338** bears against the release cam, namely cam surface **324**, which causes plate **304** to pivot away, and thus disengages abutment **316**, moving it out of the path of driven member **262** against which it would otherwise abut. The outboard end of slot **336** then engages pin **340**, releasing the over-center hold of driven member **344**, and permitting the doors to open under the influence of gravity.

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The cams need not necessarily be on the plate, i.e., the latch body, but could be on the clevis, as shown at **350** in Figure **4c**. That is, it is to some extent arbitrary which part is identified as the cam, and which part is identified as the cam follower. The point is that the parts mutually engage such that the one intercepts the other during motion of the actuator cylinder to trip the door opening condition, with the result that the secondary latch is urged to deflect out of the way sideways. In the other direction, of course, the abutment relationship of items **262** and **316** prevents the doors from opening. The apparatus of Figure **4c** works in substantially the same way, and combines both arms of the bell crank driven member **344** into a single driven lever, namely lever **262**.

In summary, car **20** has a first lock, the over center lock, operable to prevent movement of the door from the closed position to the open position when the door actuator is inactive. Car **20** also has a second lock, symbolized by latching system **300**, operable to prevent movement of the door from the closed position to the open position when the door actuator is inactive if the first lock should fail. The second lock is movable between an engaged position in which it prevents movement of the door to the open position thereof. In moving between the engaged and disengaged positions, the second lock has a displacement that is predominantly cross-wise to the first direction of the reciprocation of the door actuator. Actuator **260** is positioned to reciprocate in the central lengthwise-vertical plane of car **20**. Latching system **300** is movable predominantly transverse to the central lengthwise-vertical plane as it pivots in a circumferential direction between the engaged and disengaged positions. The hinge axis lies parallel to the lengthwise vertical plane, and the second lock pivots circumferentially. The second lock is biased toward the engaged position. The lock mechanism can be thought of as having a first fitting, a second fitting and a third fitting. The first fitting is the mounting, **238** by which to connect the lock mechanism to the datum structure. The second fitting is one of a cam or a cam follower for co-operation with a member of the door actuating transmission. The third fitting is the abutment, i.e., **316**, that co-operates with a mating part of the door actuating transmission, in this case the side of lever **262**. The third fitting is movable between a first position and a second position, in the first position the abutment being presented to obstruct motion of the mating fitting of the door actuating transmission and thereby to prevent the door from moving to an open position thereof. The second fitting is movable between a first position and a second position, in the first position thereof the second fitting being positioned to intercept the member of the door actuating transmission and to be deflected away from the first position toward the second position thereby. The first fitting has a first degree of freedom of motion permitting the first and second fittings to move between their respective first and second positions. The degree of freedom constrains the third fitting to motion predominantly cross-wise to the axial direction.

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The bias member is a spring having a first end and a second end, the first end being mounted to bear against the body of the lock mechanism, the second end having a foot for reaction against the datum structure, namely shear plate **76**. The first degree of freedom of motion is an angular degree of freedom, and is predominantly cross-wise circumferential motion. The axis of rotation is the hinge axis, which is substantially parallel to the axial direction of the door actuating transmission.

Various embodiments have been described in detail. Since changes in and or additions to the above-described examples may be made without departing from the nature, spirit or scope of the invention, the invention is not to be limited to those details.

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Claims

We claim:

1. A railroad hopper car comprising:

at least one hopper having a bottom discharge, said bottom discharge including a door movable between a closed position for retaining lading and an open position for permitting egress of lading;

said hopper being carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of said car;

said hopper having at least a first end slope sheet inclined downwardly in said lengthwise direction toward said door;

a linkage connected to said door, said linkage being oriented lengthwise with respect to said car; and

a drive connected to said linkage, said drive being operable to move said linkage and thereby to urge said door to a closed position; and

said linkage being movable from a first position corresponding to said open position of said door to a second position corresponding to said closed position of said door;

said linkage including at least a drag link; and

when said linkage moves from said first position to said second position one of

(a) said overall motion from said first position to said second position includes displacement of said drag link in a direction having a predominant component of motion parallel to said first end slope sheet; and

(b) said motion of said drag link is at least instantaneously parallel to said first end slope sheet.

2. The railroad hopper car of claim 1 wherein:

said linkage includes a first pivot arm pivotally connected to a datum structure at a first pivot connection;

said drive also being mounted to said datum structure;

said linkage includes a second pivot arm pivotally connected to said datum structure at a second pivot connection, said second pivot arm having said door mounted thereto;

said first pivot arm has a second connection distant from said first pivot connection;

said second pivot arm has a second connection distant from said second pivot connection;

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a mechanical transmission is mounted between said second connection of said second pivot arm and said second connection of said first pivot arm;

said mechanical transmission includes said drag link; and

said drive is connected to move said first pivot arm, and, in moving from said first position to said second position, each position of said first pivot arm being associated with a unique position of said drag link.

3. The railroad hopper car of claim 1 wherein:

said linkage includes left and right hand first pivot arms pivotally connected to a datum structure at respective first pivot connections, said respective first pivot connections being co-axial;

said linkage includes left and right hand second pivot arms pivotally connected to said datum structure at respective second pivot connection;

said door is a left hand door of a pair of co-operable right and left hand doors, said left hand door being mounted to said left hand second pivot arm and said right hand door being mounted to said right hand second pivot arm;

each said first pivot arm has a respective second connection distant from its respective first pivot connection, said respective second connections being pivot connections and being mutually co-axial;

each said second pivot arm has a respective second connection distant from said respective second pivot connection;

a mechanical transmission is mounted between said respective second connections of said second pivot arms and said respective second connections of said first pivot arms;

said drag link is a left hand drag link, and said mechanical transmission includes a mated parallel right hand drag link;

said left and right hand drag links each have a first end mounted to one of said respective second connections of said first pivot arms;

said left and right hand drag links have second ends yoked together distantly from said first ends;

said transmission member includes left and right hand slave links extending between and connecting said second ends of said drag links to said second connections of said second pivot arms respectively.

4. The railroad hopper car of claim 1 wherein:

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said linkage includes left and right hand first pivot arms pivotally connected to a datum structure at respective first pivot connections, said respective first pivot connections being co-axial;

said linkage includes left and right hand second pivot arms pivotally connected to said datum structure at respective second pivot connection;

said door is a left hand door of a pair of co-operable right and left hand doors, said left hand door being mounted to said left hand second pivot arm and said right hand door being mounted to said right hand second pivot arm;

each said first pivot arm has a respective second connection distant from its respective first pivot connection, said respective second connections being pivot connections and being mutually co-axial; and

said left and right hand pivot arms co-operate to define a bifurcated lever straddling said drive.

5. The railroad hopper car of claim 1 wherein said drive includes an actuating cylinder having an axially reciprocating member, said axially reciprocating member being inclined relative to horizontal.

6. The railroad hopper car of claim 5 wherein said drag link lies between said actuating cylinder and said first end slope sheet of said hopper.

7. The railroad hopper car of claim 1 wherein said railroad hopper car includes a first end section, said first end section includes a draft sill and a substantially horizontal shear plate mounted over said draft sill, said drive includes an actuating cylinder having an axis of reciprocation lying in a central vertical-lengthwise plane of said car, said actuating cylinder is mounted above said shear plate, said first end slope sheet at least partially overhangs said actuating cylinder; and said drag link is located between said actuating cylinder and said first slope sheet.

8. A railroad hopper car comprising:

at least one hopper having a bottom discharge, said bottom discharge including a gate movable between a closed position for retaining lading and an open position for permitting egress of lading;

structure by which said hopper is carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of said car;

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a door operating linkage connected to said gate, said door operating linkage being oriented lengthwise with respect to said car; and

an actuating cylinder connected to drive said door operating linkage, said actuating cylinder also being oriented to act lengthwise with respect to said car, said actuating cylinder having an axis of reciprocation; and

said axis of reciprocation being tilted such that displacement of said actuating cylinder includes a vertical component of motion.

9. The railroad hopper car of claim 8 wherein said hopper car includes an end section mounted over one of the trucks, the end section includes a substantially horizontal shear plate, and said actuating cylinder is mounted on a pedestal mounted to said shear plate, said pedestal including an inclined mounting for said cylinder.

10. The railroad hopper car of claim 8 wherein said railroad hopper car has a longitudinal-vertical central plane, and said axis or reciprocation lies in said longitudinal-vertical plane.

11. The railroad hopper car of claim 8 wherein said hopper includes at least a first end slope sheet extending longitudinally and being inclined longitudinally inboard and downwardly toward said gate, and at least part of said actuating cylinder is overhung by at least part of said first end slope sheet.

12. The railroad hopper car of claim 8 wherein:

said hopper car includes an end section having a substantially horizontal shear plate mounted over a draft sill;

said hopper includes a first end slope sheet, said first end slope sheet at least partially overhanging said horizontal shear plate;

said actuating cylinder is mounted above said shear plate, centrally aligned over said draft sill; and

said actuating cylinder is at least partially overhung by said first end slope sheet.

13. The railroad hopper car of claim 12 wherein:

said first slope sheet is substantially planar and has a first angle of inclination relative to horizontal;

said actuating cylinder is inclined longitudinally inboard downwardly, and is inclined at a second angle; and

said second angle lies between horizontal and said first angle.

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14. The railroad hopper car of claim 8 wherein:

said car has an underframe and said door operating linkage includes a first linkage component, a second linkage component, a third linkage component, and a fourth linkage component;

said first linkage component is a reference datum component and includes structure immovable relative to said underframe;

said second linkage component is a first pivot linkage mounted to said first linkage component at a main pivot connection, said first pivot linkage being a first pivot arm constrained to pivot on an axis of rotation oriented horizontally cross-wise relative to said underframe;

said fourth linkage component is a second pivot linkage pivotally mounted to said first linkage component and includes at least said gate; and

said third linkage component includes a drag link element connected to said first pivot arm, said drag link element having at least a first pivotal attachment to at least a portion of said fourth linkage component, whereby input motion of said second linkage component uniquely determines position and motion of said third and fourth linkage components relative to said first linkage component; and

motion of said second linkage component is driven by said actuator.

15. The railroad hopper car of claim 14 wherein said main pivot connection of said first pivot arm to said first linkage component is located lower than said actuating cylinder.

16. The railroad hopper car of claim 15 wherein said drag link element is connected to said first pivot arm at a distal pivot connection relative to said main pivot connection, and, when said gate is in said closed position and said car is viewed in side view, said actuating cylinder is located between said main pivot connection and said distal pivot connection.

17. A railroad hopper car comprising:

at least one hopper having a bottom discharge, said bottom discharge including a gate movable between a closed position for retaining lading and an open position for permitting egress of lading;

first and second end sections to which said hopper is mounted, said first and second end sections being mounted to respective first and second railroad car trucks for rolling motion along railroad tracks in a lengthwise direction of said car;

a door operating linkage connected to said gate, said door operating linkage being

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oriented lengthwise with respect to said car and connected; and

an actuating cylinder connected to drive said door operating linkage, said actuating cylinder also being oriented to act in a lengthwise extending plane with respect to said car, said actuating cylinder having an axis of reciprocation;

said door operating linkage including a first pivot arm pivotally mounted to said first end section at a first pivot connection;

a mechanical transmission connected between said first pivot arm and said gate, said mechanical transmission including at least a drag link movably connected to said first pivot arm at a location distant from said first pivot connection; and

said first pivot connection being lower than said actuating cylinder as seen when viewing said first end section in side view.

18. The railroad hopper car of claim 17 wherein said first pivot connection is a main pivot connection, said drag link is connected to said first pivot arm at a distal pivot connection and when said gate is in said closed position and said car is viewed in side view, said actuating cylinder is located between said main pivot connection and said distal pivot connection.

19. The railroad hopper car of claim 17 wherein said actuating cylinder drives an intermediate lever that is connected to drive said first pivot arm.

20. A rail road hopper car comprising:

a hopper carried between a pair of trucks, said hopper having first and second upstanding sidewalls running lengthwise therealong;

said hopper having a lower discharge and convergent slope sheets giving onto said discharge;

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;

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;

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;

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

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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 upstanding sidewall;

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;

said sidewall having a continuous section between said first and second regions thereof; and

said sidewall stiffener having web continuity between said first and second portions thereof.

21. The rail road hopper car of claim 20 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.

22. The rail road hopper car of claim 20 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.

23. The rail road hopper car of claim 20 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;

said hopper includes first and second sloped side sheets; and

said first sloped side sheet meets said first sidewall at said transition portion.

24. The rail road hopper car of claim 22 wherein said first sidewall has an overall height from said side sill to said top chord, L, and said transition is located a distance above said side sill that is in the range of ¼ to 2/3 L.

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25. The rail road hopper car of claim 23 wherein said first sidewall has an overall height from said side sill to said top chord, L, and said first sloped sheet meets said transition at an height that is in the range of ¼ to 2/3 L above said side sill.

26. A railroad hopper car comprising:

at least one hopper having a bottom discharge, said bottom discharge having a bottom discharge governor movable between a closed position for retaining lading and an open position for permitting egress of lading;

structure by which said hopper is carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of said car;

a door operating linkage oriented lengthwise with respect to said car; and

an actuating cylinder also oriented to act in a lengthwise extending plane with respect to said car, said actuating cylinder being connected to drive said door operating linkage;

said door operating linkage including a pair of first and second linkage members co-operably mounted to either transverse side of said actuating cylinder, whereby said actuating cylinder is bracketed by said linkage members.

27. The railroad hopper car of claim 26 wherein:

said car has an underframe and said linkage is a closed loop bar linkage in which there is a first linkage component, a second linkage component, a third linkage component, and a fourth linkage component;

said first linkage component is a reference datum component and includes structure immovable relative to said underframe;

said second linkage component is a first pivot linkage mounted to said first linkage component at a main pivot connection, and which includes said first and second linkage members, said first and second linkage members being a matched pair of left and right hand pivot arms constrained to pivot on a common axis of rotation relative to said underframe;

said fourth linkage component is a second pivot linkage pivotally mounted to said first linkage component and includes at least one pivotally mounted door assembly defining said bottom discharge governor; and

said third linkage component includes a drag link element having at least a first pivotal attachment to at least a portion of said fourth linkage component, whereby input motion of said second linkage component uniquely determines position and

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motion of said third and fourth linkage components relative to said first linkage component; and

motion of said second linkage component is driven by said actuator.

28. The railroad hopper car of claim 26 wherein:

said hopper includes a hopper end slope sheet, said end slope sheet extending substantially in a plane inclined downwardly and lengthwise inwardly toward said bottom discharge;

displacement of said third linkage component associated with motion of said door assembly between said open position is predominantly in a direction generally parallel to said end slope sheet.

29. The railroad hopper car of claim 26 wherein:

said hopper includes a hopper end slope sheet, said end slope sheet extending substantially in a plane inclined downwardly and lengthwise inwardly toward said bottom discharge;

during at least an instantaneous portion of motion of said third linkage component while said door assembly is in a position between said open position and said closed position said third linkage component moves parallel to said end slope sheet.

30. The railroad hopper car of claim 26 wherein:

said third linkage component includes at least a first element and a second element mounted thereto;

said first element is pivotally mounted to said first linkage component, and is constrained to move in a lengthwise-vertical plane relative to said first linkage component;

said second element has a first connection to said first component said first connection being a pivot connection; and a second connection to said fourth linkage component, said second connection having at least one degree of freedom of motion; and

said second element being constrained always to be co-planar with said first connection, said second connection, and said main pivot connection.

31. The railroad hopper car of claim 26 wherein said bottom discharge governor includes a door, said actuating cylinder is connected to drive said door operating linkage through a lever assembly, and said lever assembly has an over-center lock, said over center lock being operable

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to prevent release of said bottom gate to said open position when said actuating cylinder is inactive.

32. The railroad hopper car of claim 26 wherein motion of said first pivot linkage occurs in a longitudinal-vertical plane, and said second pivot linkage moves in a plane generally cross-wise to said longitudinal-vertical plane.

33. The railroad hopper car of claim 26 wherein said main pivot connection is beneath said actuating cylinder when said hopper car is seen in side view.

34. The railroad hopper car of claim 26 wherein one of (a) said main pivot is beneath said drag link element; and (b) said actuating cylinder is between said main pivot and said drag link element.

35. The railroad hopper car of claim 26 wherein said hopper includes at least a first end slope sheet, said bottom discharge governor includes a door, said first end slope sheet being inclined longitudinally downwardly and inboard toward said door, said drag link element is inclined on a slope predominantly parallel to, and adjacent to, said first end slope sheet, and said actuating cylinder is oriented along said lengthwise direction, and is also tilted longitudinally downwardly and inwardly toward said door.

36. A railroad hopper car comprising:

at least one hopper carried by railroad car trucks for motion in a lengthwise direction of said car along railroad tracks, said hopper having a bottom discharge, said bottom discharge having a door movable between a closed position for retaining lading and an open position for permitting egress of lading;

a mechanical transmission connected to said door, said mechanical transmission being oriented lengthwise with respect to said car; and

a door actuator, said door actuator being connected to said mechanical transmission and being operable to urge said door from said open position toward said closed position, said door actuator being oriented to reciprocate in a first direction;

said hopper car having a first lock operable to prevent movement of said door from said closed position to said open position when said door actuator is inactive;

said hopper car having a second lock operable to prevent movement of said door from said closed position to said open position when said door actuator is inactive if said first lock should fail; and

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said second lock is movable between an engaged position in which it prevents movement of said door to said open position thereof, and

in moving between said engaged and disengaged positions, said second lock is mounted to have a displacement that is predominantly cross-wise to said first direction of said reciprocation of said door actuator.

37. The railroad hopper car of claim 36 wherein said car has a central lengthwise-vertical plane, said door actuator is positioned to reciprocate in said central lengthwise-vertical plane, and said second lock is movable between said engaged and disengaged positions in motion predominantly transverse to said central lengthwise-vertical plane.

38. The railroad hopper car of claim 36 wherein said second lock is mounted on an hinge and pivots in a circumferential direction between said engaged and disengaged positions.

39. The railroad hopper car of claim 37 wherein said second lock is mounted on an hinge, said hinge has an axis lying parallel to said lengthwise vertical plane, and said second lock pivots circumferentially between said engaged and disengaged positions.

40. The railroad hopper car of claim 38 wherein said second lock is biased toward said engaged position.

41. The railroad hopper car of claim 39 wherein said second lock is biased toward said engaged position.

42. The railroad hopper car of claim 40 wherein one of:

(a) said second lock has a cam and said actuator has a mating cam follower; and

(b) said second lock has a cam follower and said actuator has a mating cam,

said cam and cam follower being co-operable, and being oriented to deflect said second lock away from said engaged position as said door moves from said open position to said closed position thereof.

43. A lock mechanism for a door actuating transmission of a railroad gondola car, the door actuating transmission including a reciprocating actuating cylinder mounted to a datum structure, the cylinder being movable forward and backward in an axial direction, said lock mechanism comprising:

a body having a first fitting, a second fitting and a third fitting;

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said first fitting being a mounting by which to connect said lock mechanism to the datum structure;

said second fitting being one of (a) a cam for co-operation with a member of the door actuating transmission, that member being a cam follower; and (b) a cam follower for co-operation with a member of the door actuating transmission, that member being a cam;

said third fitting including an abutment for co-operation with a mating fitting of the door actuating transmission;

said third fitting being movable between a first position and a second position, in said first position said abutment being presented to obstruct motion of the mating fitting of the door actuating transmission and thereby to prevent the door from moving to an open position thereof;

said second fitting being movable between a first position and a second position, in said first position thereof said second fitting being positioned to intercept the member of the door actuating transmission and to be deflected away from said first position toward said second position thereby;

said first fitting having a first degree of freedom of motion permitting said first and second fittings to move between their respective first and second positions; and

said degree of freedom constraining said third fitting to motion predominantly cross-wise to the axial direction.

44. The lock mechanism of claim 43 further comprising a bias member, said bias member being oriented to urge said third fitting toward said first position thereof.

45. The lock mechanism of claim 44 wherein said bias member is a spring having a first end and a second end, said first end being mounted to bear against said body of said lock mechanism, said second end having a foot for reaction against the datum structure.

46. The lock mechanism of claim 43 wherein said first degree of freedom of motion is an angular degree of freedom, and said predominantly cross-wise motion is predominantly circumferential motion about an axis of rotation.

47. The lock mechanism of claim 46 wherein said first fitting is an hinge, said axis of rotation is an axis of rotation of said hinge; and said axis of rotation of said hinge is substantially parallel to the axial direction of the door actuating transmission.

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48. The lock mechanism of claim 46 wherein said first fitting includes an hinge and a footing of said hinge for mounting to the datum structure, wherein said axis of rotation is an axis of rotation of said hinge, and said footing has a substantially planar footprint, said axis of rotation of said hinge being angularly inclined relative to said substantially planar footprint.

49. The lock mechanism of claim 43 wherein:

said lock mechanism has a bias member, said bias member being oriented to urge said third fitting toward said first position thereof;

said bias member is a spring having a first end and a second end, said first end being mounted to bear against said body of said lock mechanism, said second end having a foot for reaction against the datum structure;

said first degree of freedom of motion is an angular degree of freedom, and said predominantly cross-wise motion is predominantly circumferential motion about an axis of rotation;

said first fitting includes an hinge, said axis of rotation is an axis of rotation of said hinge; said axis of rotation of said hinge is substantially parallel to the axial direction of the door actuating transmission; and

said footing has a substantially planar footprint, said axis of rotation of said hinge being angularly inclined relative to said substantially planar footprint.

50. A railroad hopper car for carrying particulate material, said hopper car comprising:

a hopper;

first and second end sections for carriage by respective first and second rail road car trucks for rolling motion along railroad tracks in a longitudinal direction;

said hopper being suspended between said first and second end sections, said hopper having a discharge section through which to release lading, and first and second end slope sheets oriented toward said first and second end sections, said slope sheets being inclined in the longitudinal direction to feed said discharge section;

said first end section including a draft sill extending in the longitudinal direction, a main bolster extending cross-wise to either side of said draft sill, and a shear plate mounted to said draft sill and to said main bolster, said shear plate extending lengthwise along said draft sill and cross-wise from side to side of said hopper car;

said first end slope sheet of said hopper over hanging said shear plate of said first end section; and

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

51. The railroad hopper car of claim 50 wherein one of:

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

(b) said first slope sheet has an upper margin terminating at an end wall, and said hopper car includes an end post extending upwardly from draft stub sill to said end wall.

52. The railroad hopper car of claim 51 wherein said shear plate has a longitudinally outboard margin and said draft sill has a striker located outboard of said longitudinally outboard margin of said shear plate, and said end post is one of:

(a) rooted to said draft sill adjacent to said striker;

(b) rooted to said shear plate adjacent to said longitudinally outboard margin of said shear plate.

53. The railroad hopper car of claim 50 wherein said bolster has first and second laterally outboard distal ends, and said hopper car has corner posts extending upwardly from said distal ends of said hopper to said first slope sheet.

54. The railroad hopper car of claim 51 wherein said bolster has first and second laterally outboard distal ends, and said hopper car has corner posts extending upwardly from said distal ends of said hopper to said first slope sheet.

55. The railroad hopper car of claim 50 wherein:

one of:

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

(b) said first slope sheet has an upper margin terminating at an end wall, and said hopper car includes an end post extending upwardly from draft stub sill to said end wall;

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

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(a) rooted to said draft sill adjacent to said striker;

(b) rooted to said shear plate adjacent to said longitudinally outboard margin of said shear plate;

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

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

56. The railroad hopper car of claim 55 wherein:

said hopper car has at least one longitudinally hinged discharge door, said discharge door being movable cross-wise between open and closed positions; and

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

57. The railroad hopper car of claim 56 wherein a brake reservoir is also at least partially lodged in said machinery space.

58. The railroad hopper car of claim 50 wherein:

said shear plate is mounted above and to said main bolster and defines an upper flange thereof;

said main bolster has a lower flange downwardly spaced from said upper flange, said lower flange terminating at respective distal end portions at either side of said car;

said car includes a side sill running along said car between said first and second end sections;

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

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

59. The railroad hopper car of claim 58 wherein said shear plate defines an upper flange of said draft sill whereby said draft sill upper flange, said shear plate and said side sill upper flange are all substantially co-planar.

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60. The railroad hopper car of claim 56 wherein said machinery space is free of elephant ears.

61. A railroad freight car said railroad freight car comprising:
a freight car body for carrying lading, said body being mounted on railroad car trucks for rolling motion in a longitudinal direction along railroad tracks;
said car body including a draft sill having a draft gear pocket for accommodating draft gear, and a shear plate overlying said draft sill and functioning as an upper flange of said draft sill;
said draft sill having an inboard end oriented toward a truck center of one of said trucks, and an outboard end terminating at a striker;
said draft sill having an underside and an access opening formed in said underside to admit entry of draft gear into said draft gear pocket from below;
said car having a draft gear carrier plate, said carrier plate being mounted to said underside of said draft sill beneath said draft gear pocket, and said carrier plate being removable to permit installation of the draft gear into said draft gear pocket;
said car body having one of
(a) an aperture formed in said shear plate over an inboard end region of the draft sill, said aperture permitting a portion of said draft gear to protrude upwardly therethrough during installation in said draft gear pocket; and
(b) a coupler carrier seat defined in said draft sill longitudinally inboard of said striker, and a coupler carrier co-operable therewith, said coupler carrier being removable to permit installation of draft gear in said draft pocket, and, when said coupler carrier is installed, said coupler carrier providing a support for a coupler shank when the coupler shank is connected to the draft gear within said draft sill.

62. The railroad freight car of claim 61 wherein said freight car has both (a) and (b) thereof.

63. The railroad freight car of claim 61 further comprising a cover plate for said aperture of said shear plate, said cover plate being removable to permit installation of said draft gear.

64. The railroad freight car of claim 61 wherein said draft sill has a pair of vertically oriented, longitudinally running spaced apart side webs; said webs have a greater depth of section adjacent to said striker, said webs have respective first and second apertures formed

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therein, said first and second apertures defining said draft gear retainer seat, and said retainer is a sideways slidable shaft that is movable to extend across said draft sill between said first and second apertures in said draft sill side webs.

65. The railroad freight car of claim 64 further comprising a cover plate for said aperture of said shear plate, said cover plate being removable to permit installation of said draft gear.

66. The railroad freight car of claim 61 wherein said draft sill has a centerplate centered on said truck center, rear draft stops are welded within said draft sill, and at least a portion of each of said rear draft stops extends longitudinally inboard of the truck center.

67. The railroad freight car of claim 61 wherein one of:

(a) said freight car has a truck center to striker plate draft sill length of less than 50 inches; and

(b) said freight car has a truck center to coupler pulling face length of less than 65 inches when the draft gear is fully extended in draft.

68. The railroad freight car of claim 67 wherein one of:

(a) said freight car has a truck center to striker plate draft sill length of about 38 inches (+/- 2"); and

(b) said freight car has a truck center to coupler pulling face length of about 53 inches (+/- 2") when the draft gear is fully extended in draft.

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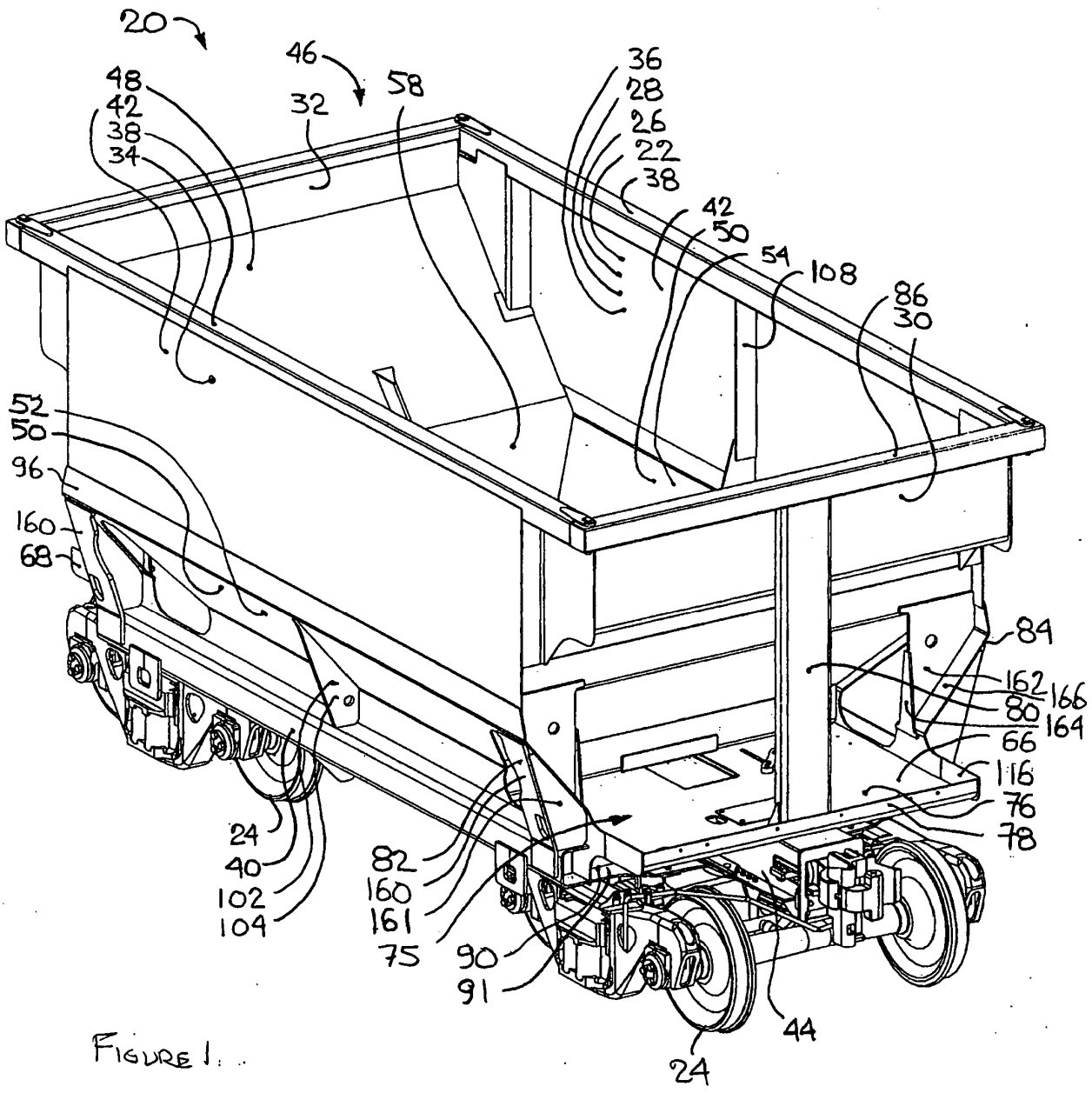


FIGURE 1

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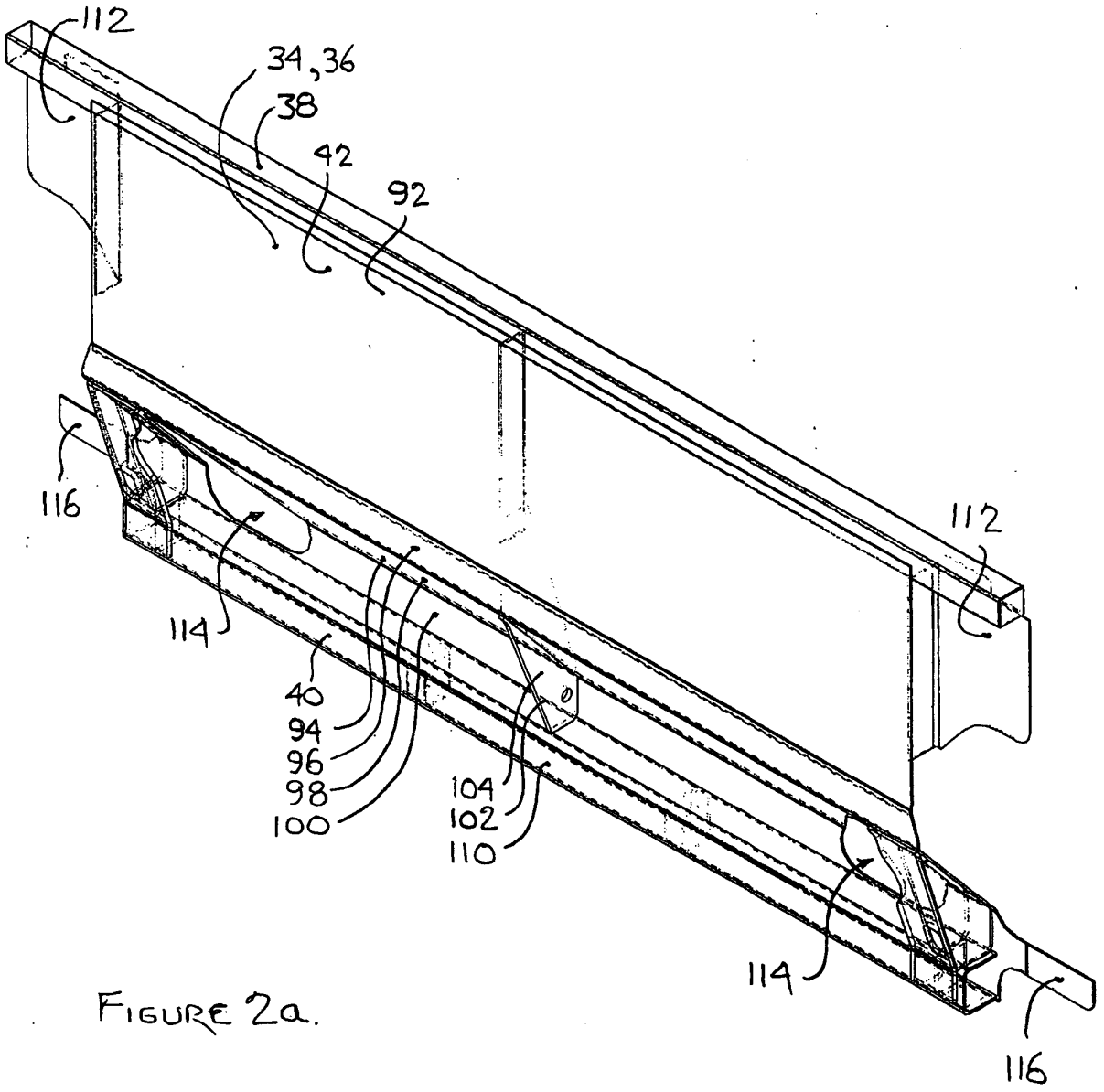


FIGURE 2a.

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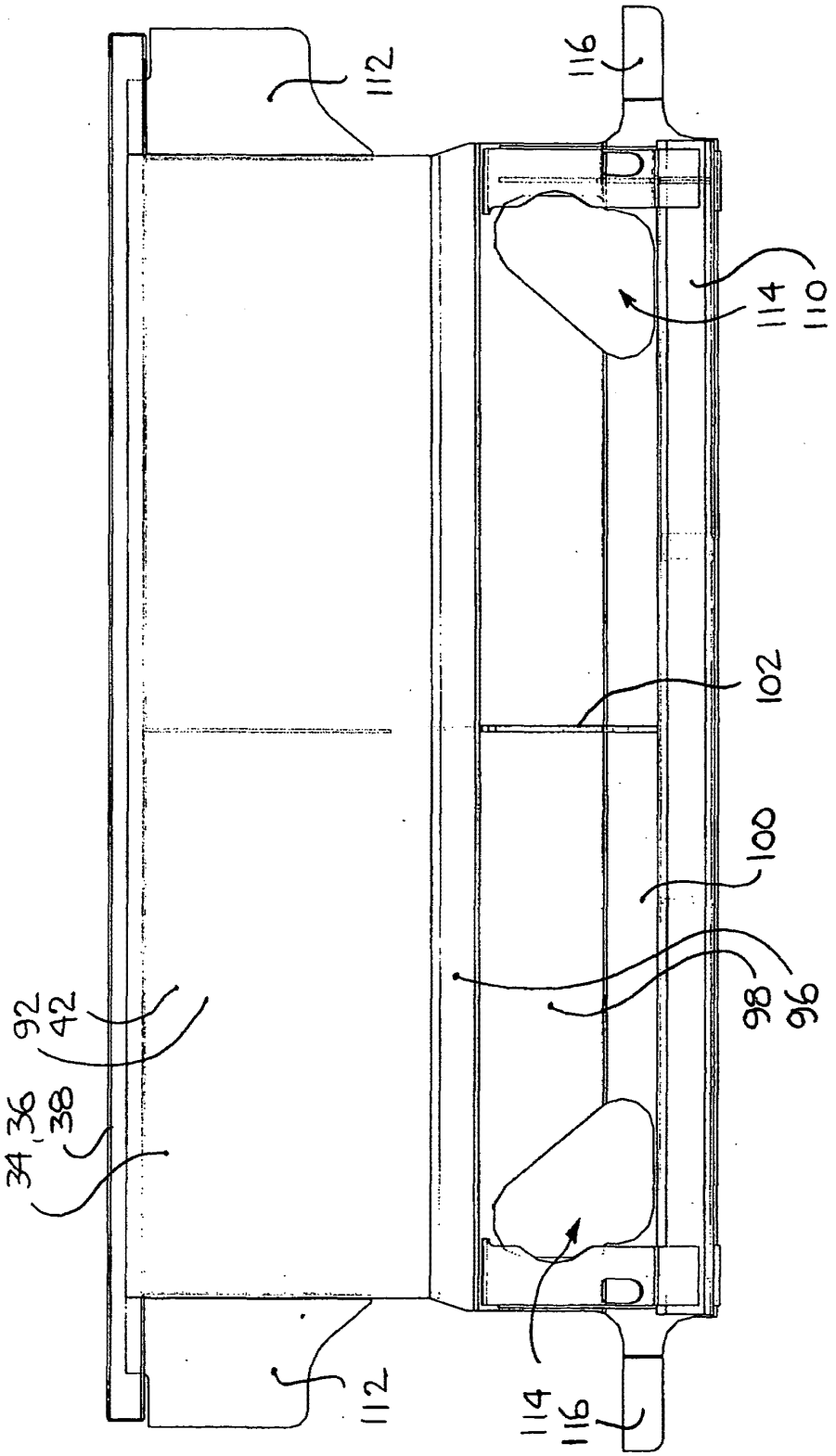


FIGURE 2b.

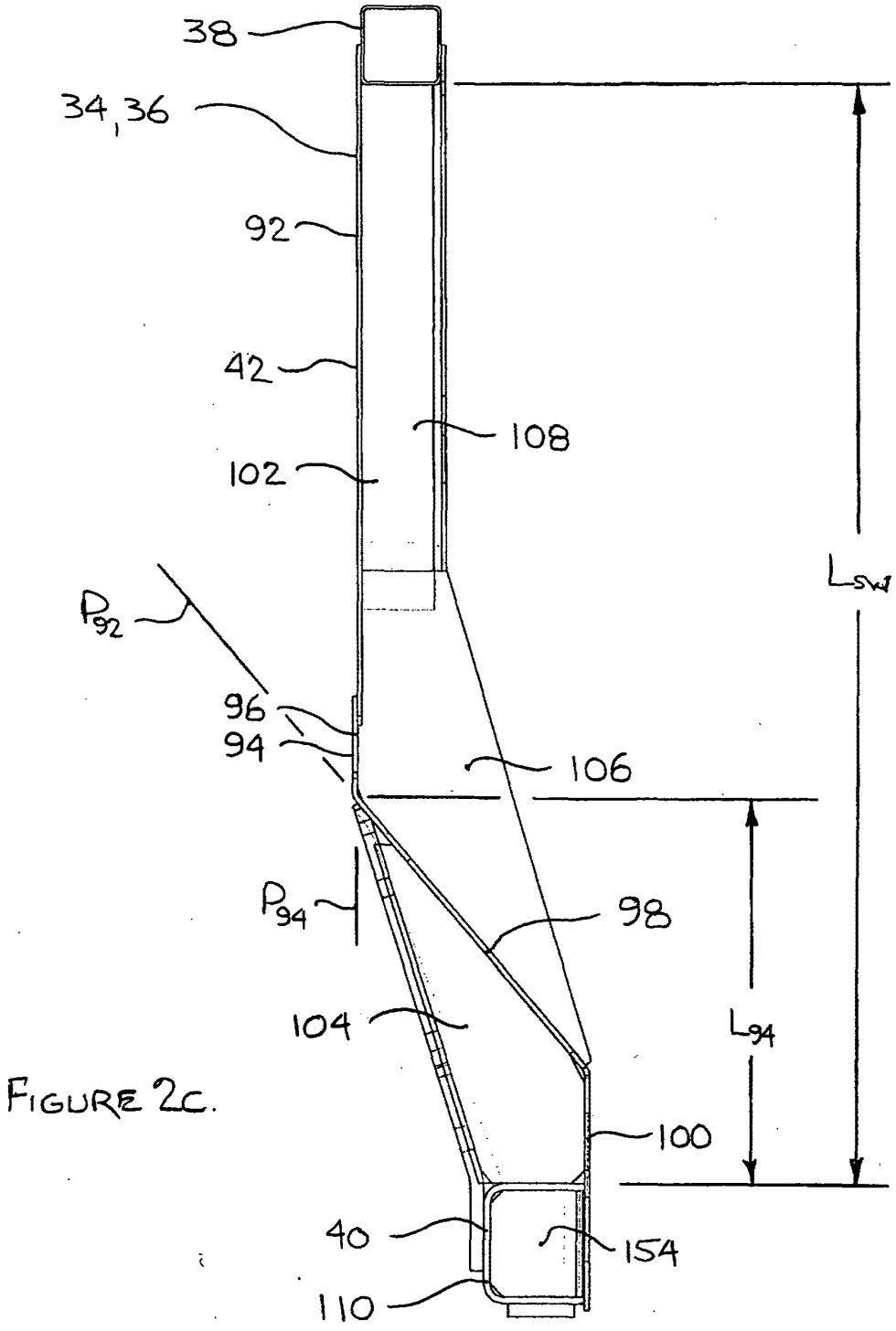


FIGURE 2C.

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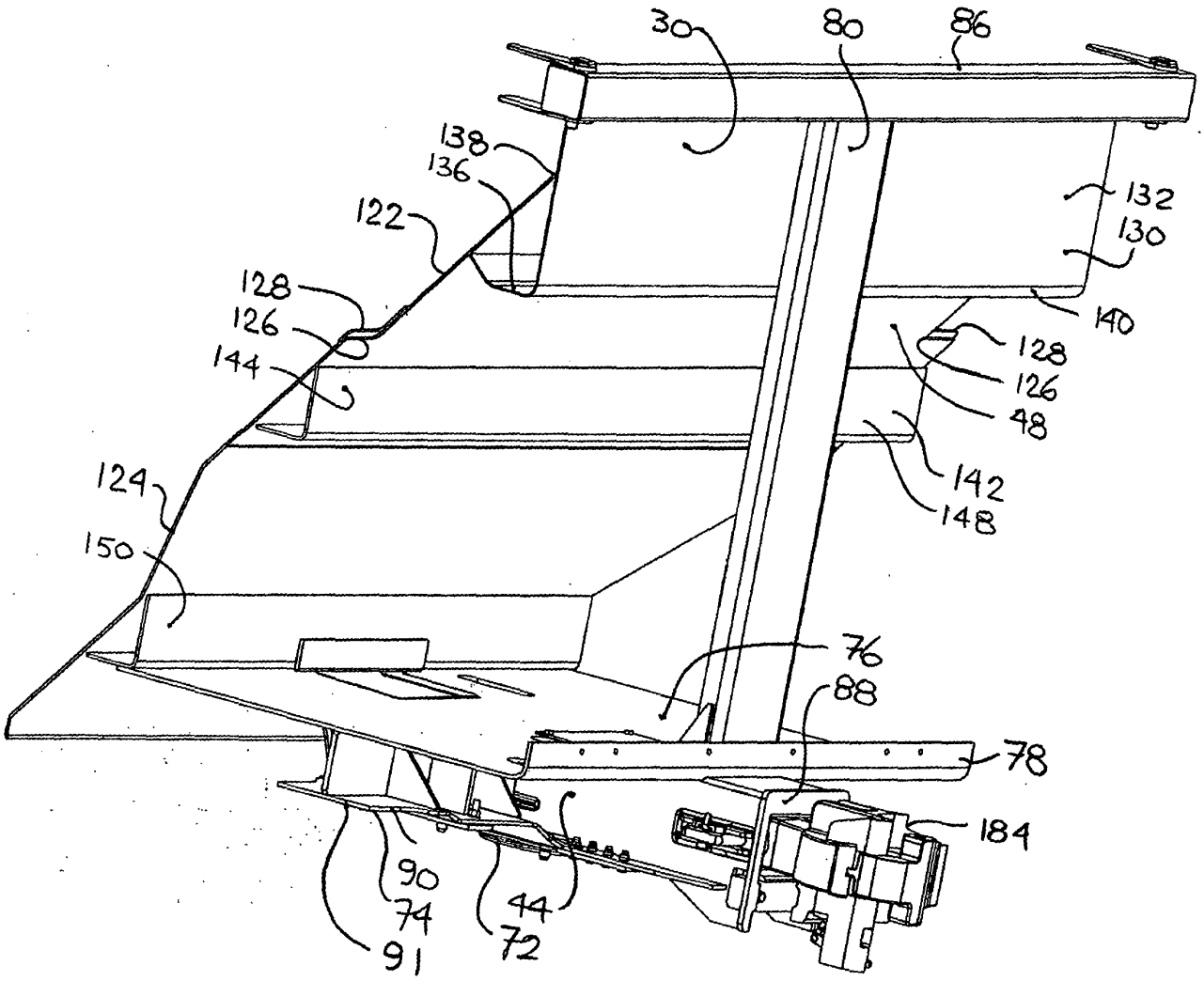

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FIGURE 3a.

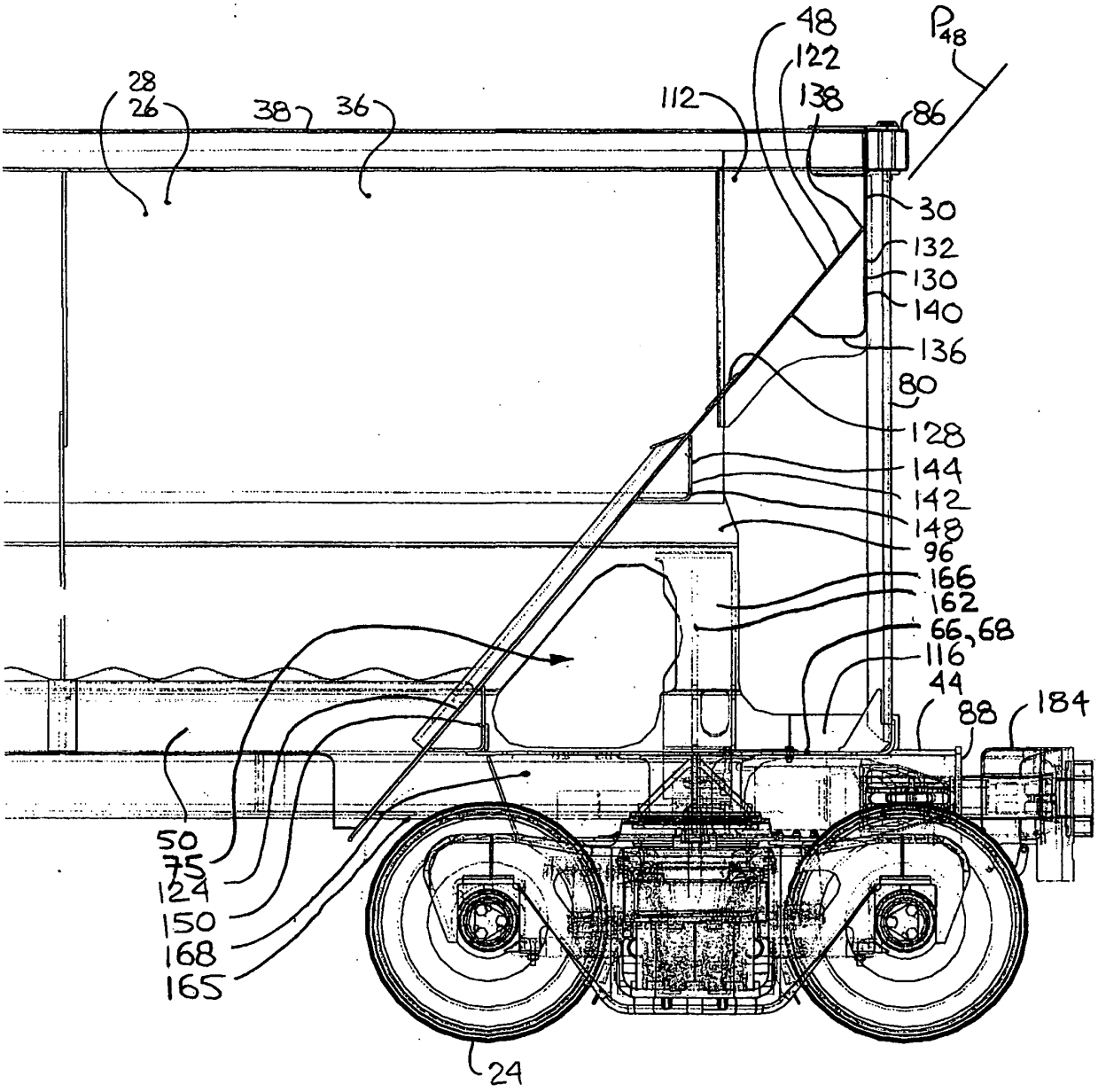


FIGURE 3b.

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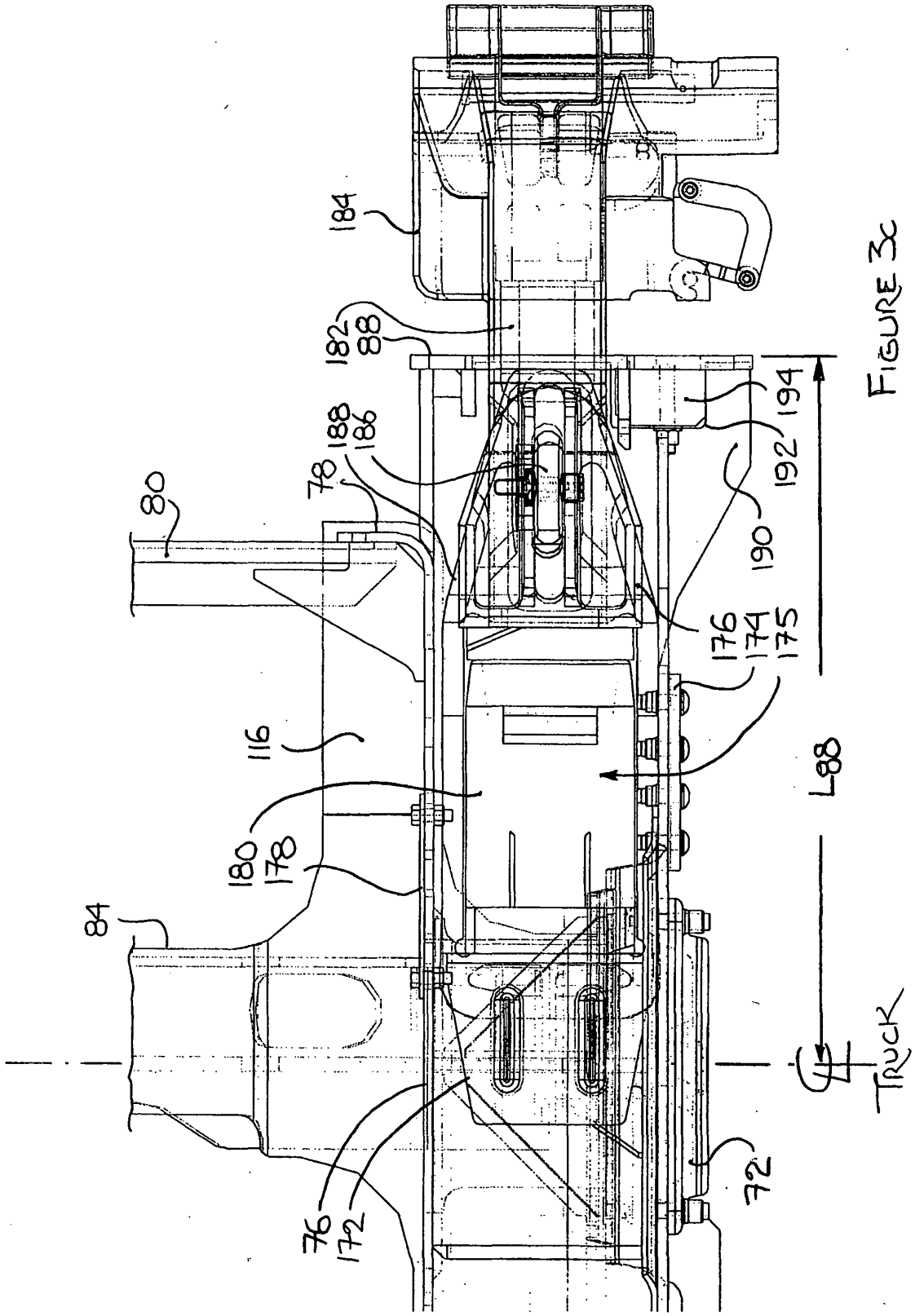


FIGURE 3c

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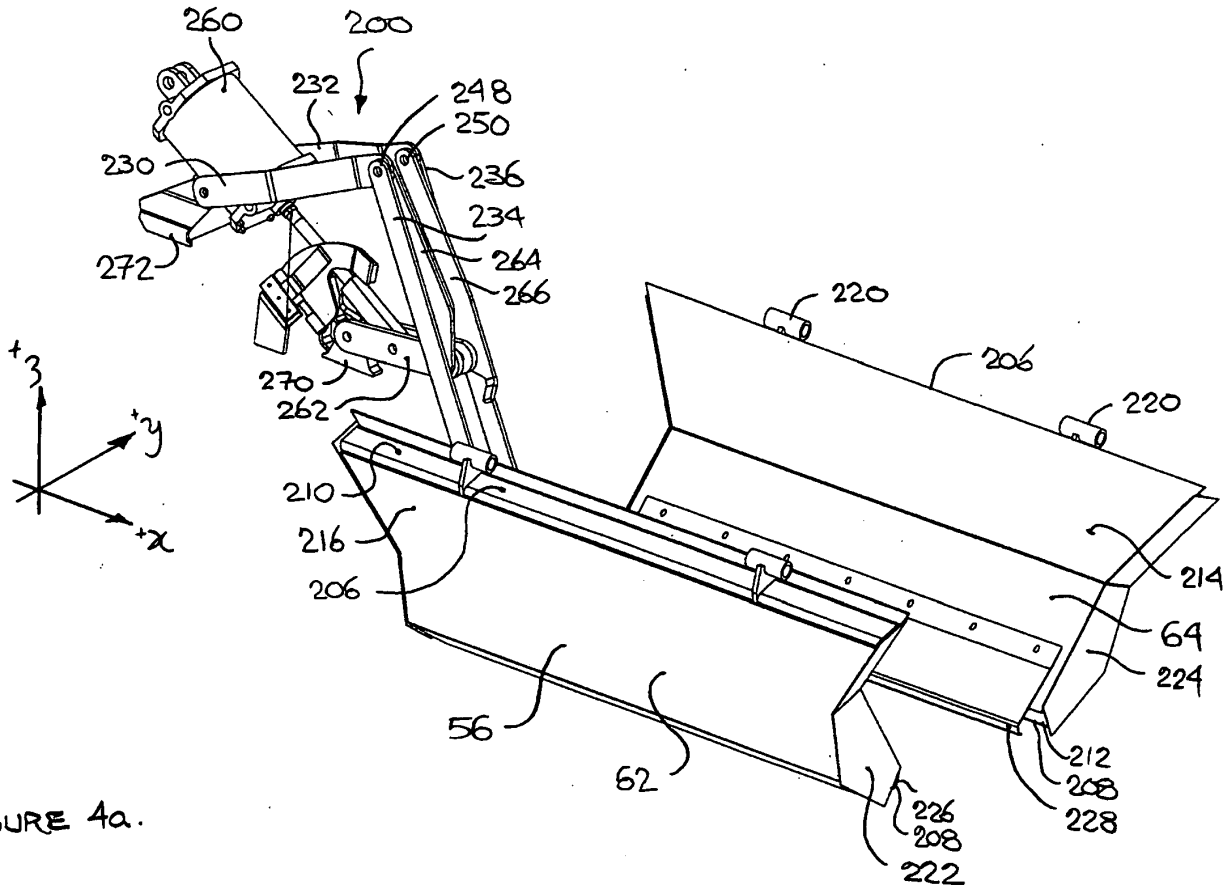


FIGURE 4a.

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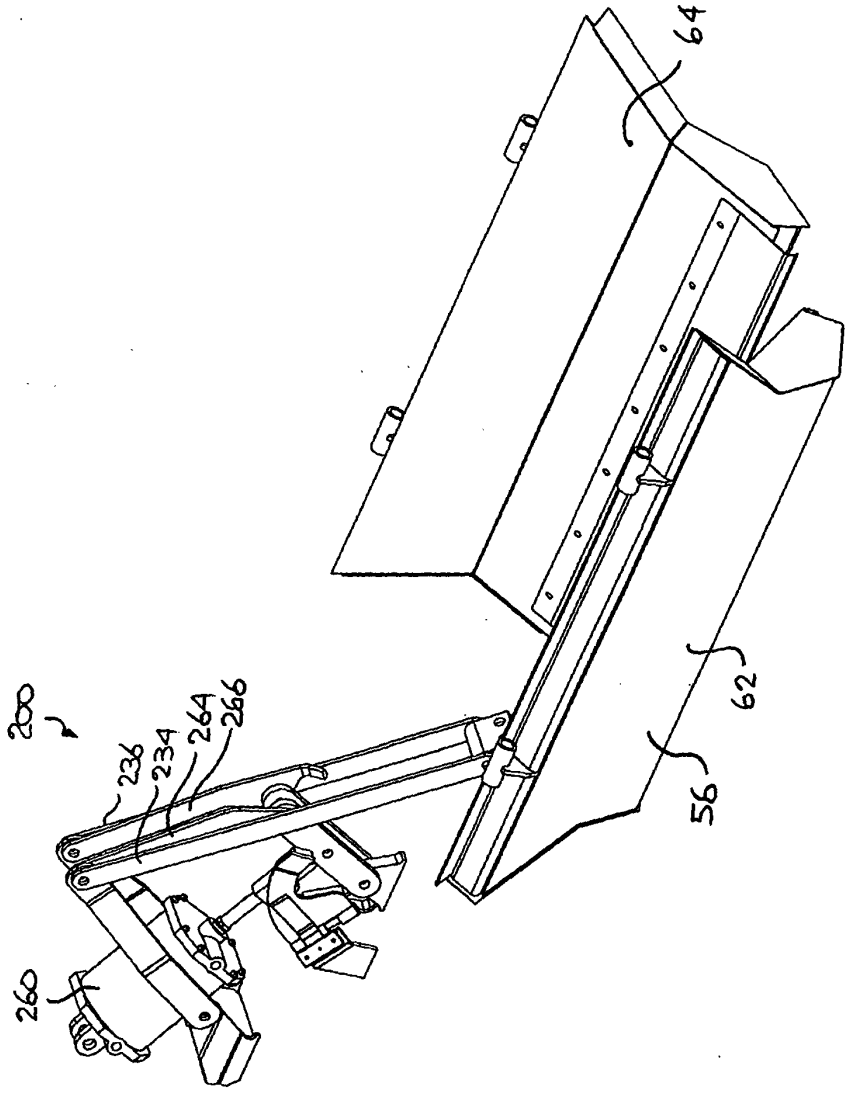


FIGURE 4b

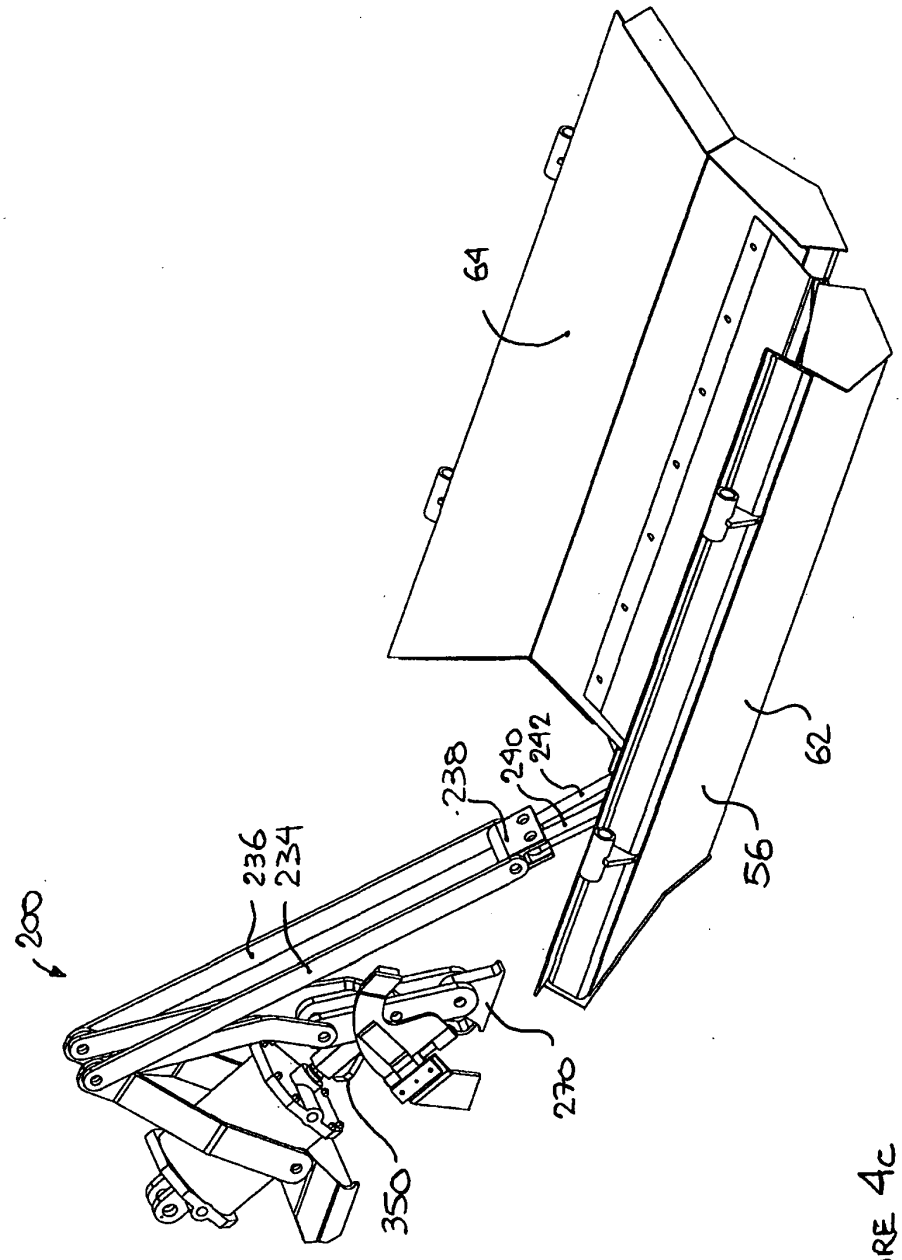


FIGURE 4C

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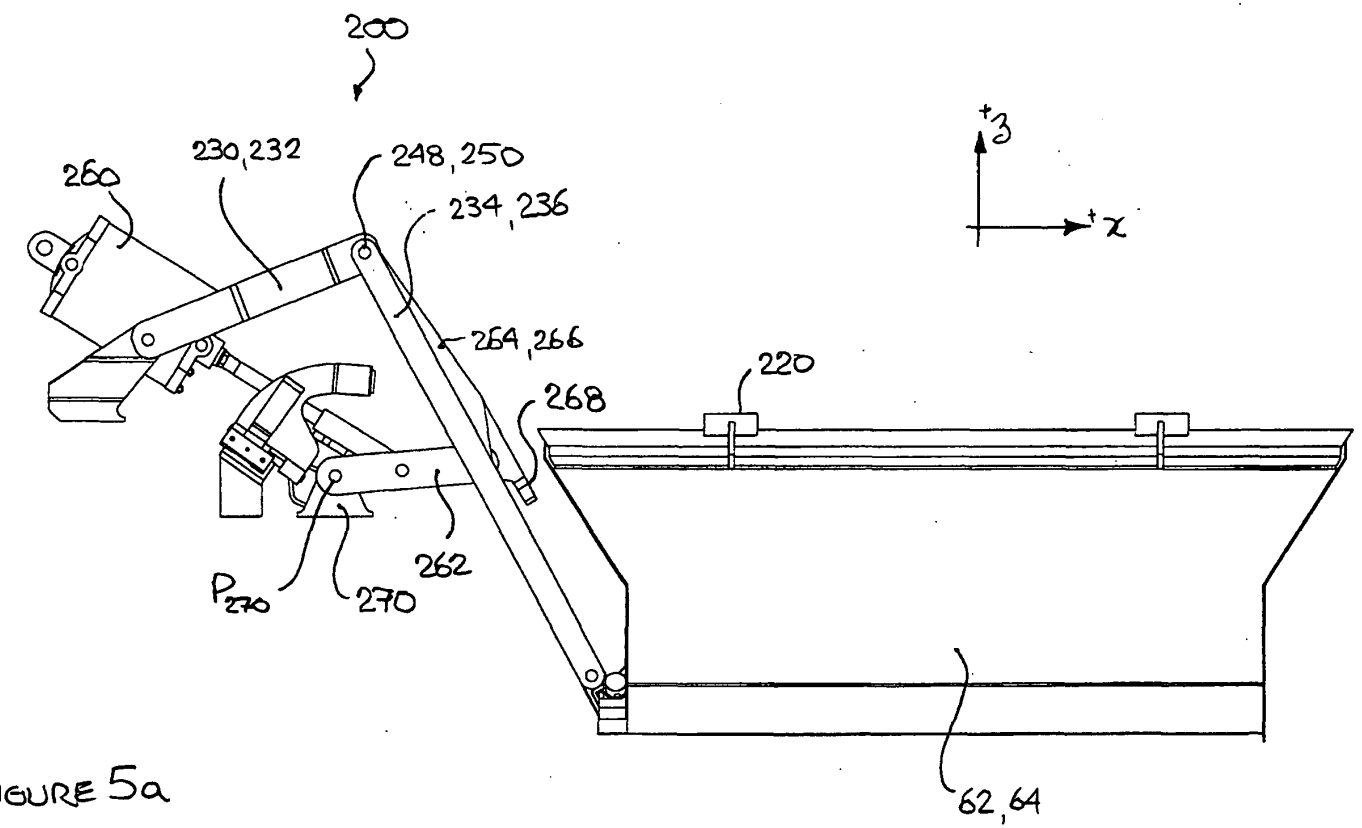


FIGURE 5a

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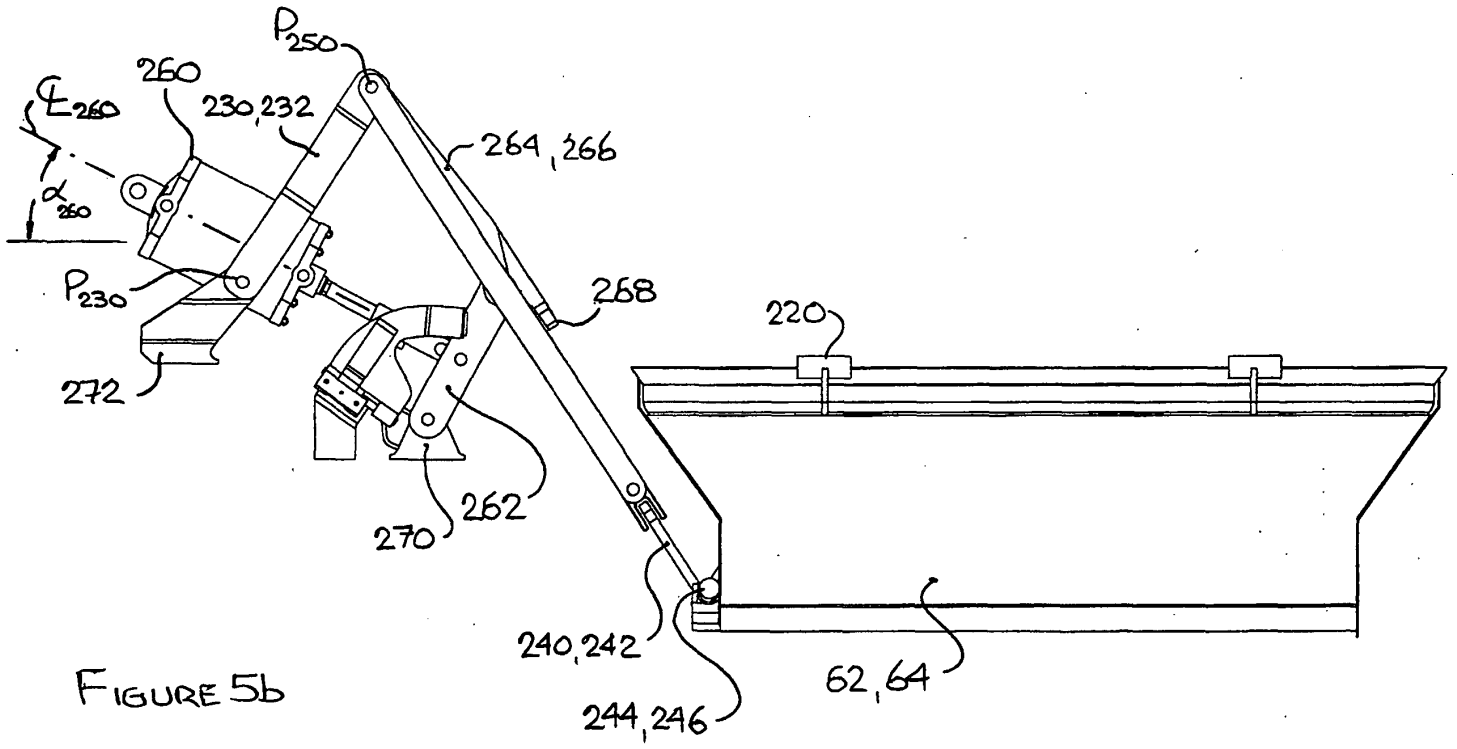


FIGURE 5b

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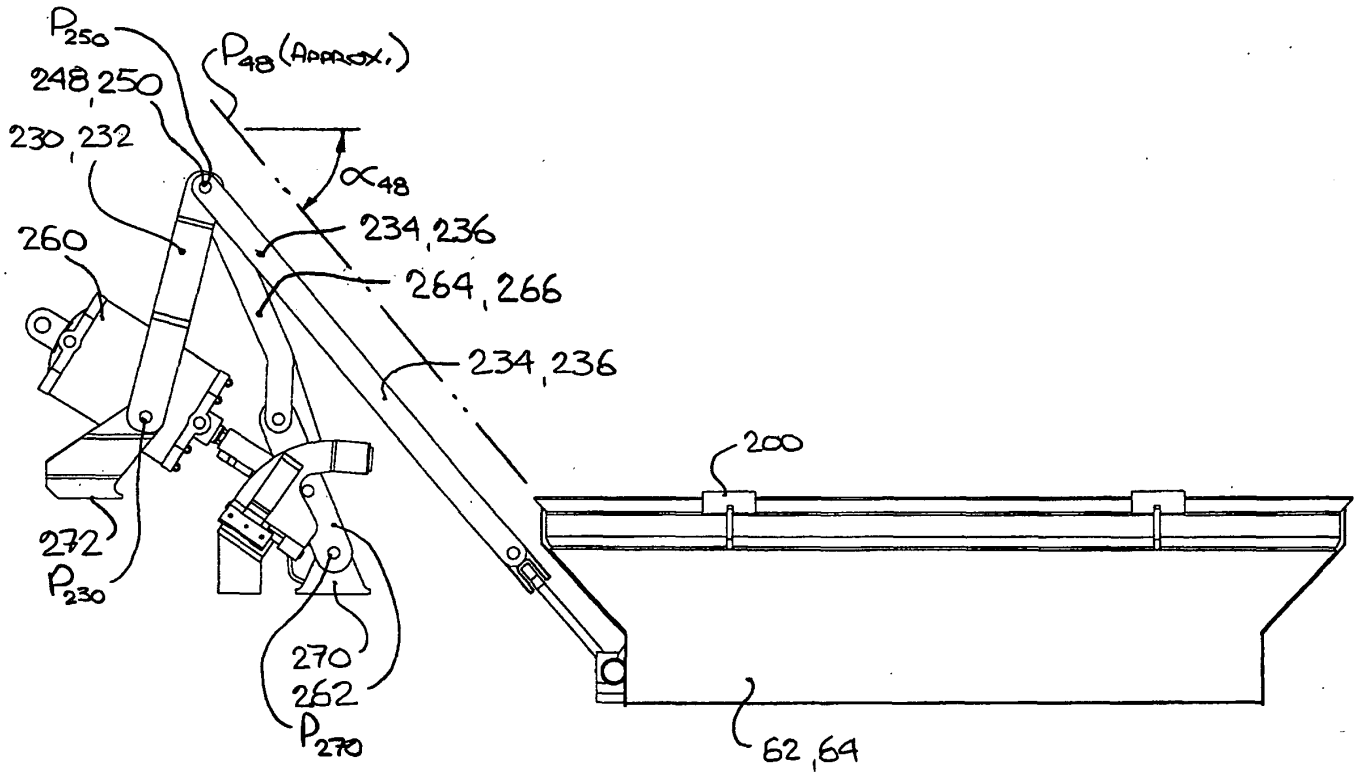


FIGURE 5C.

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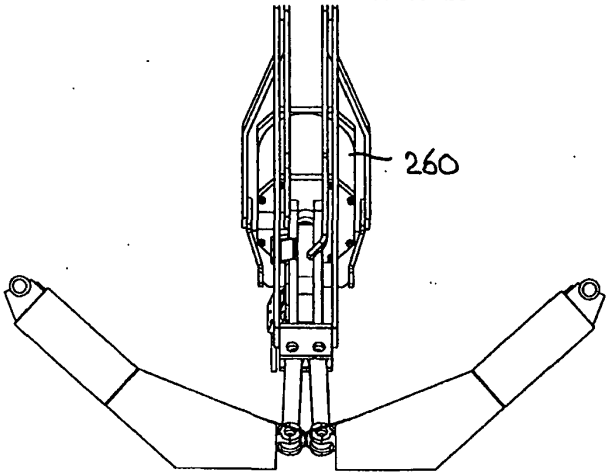


FIGURE 6c

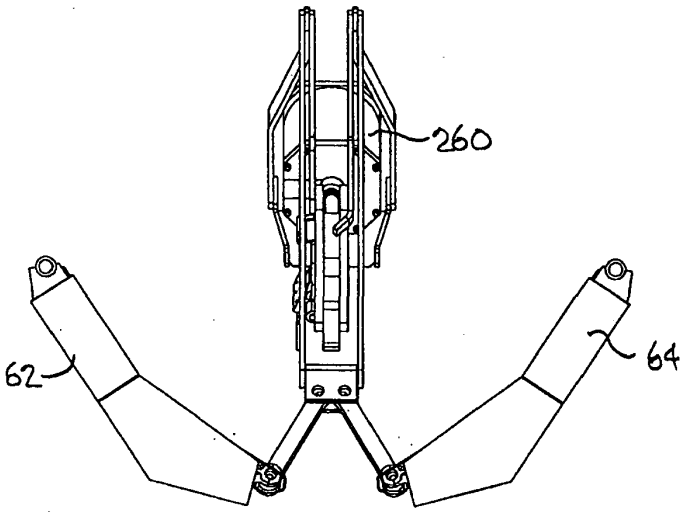


FIGURE 6b

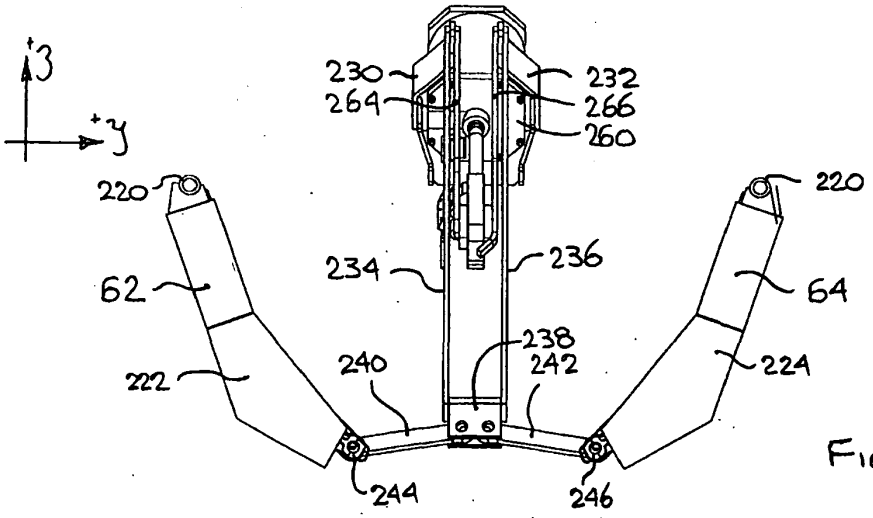


FIGURE 6a

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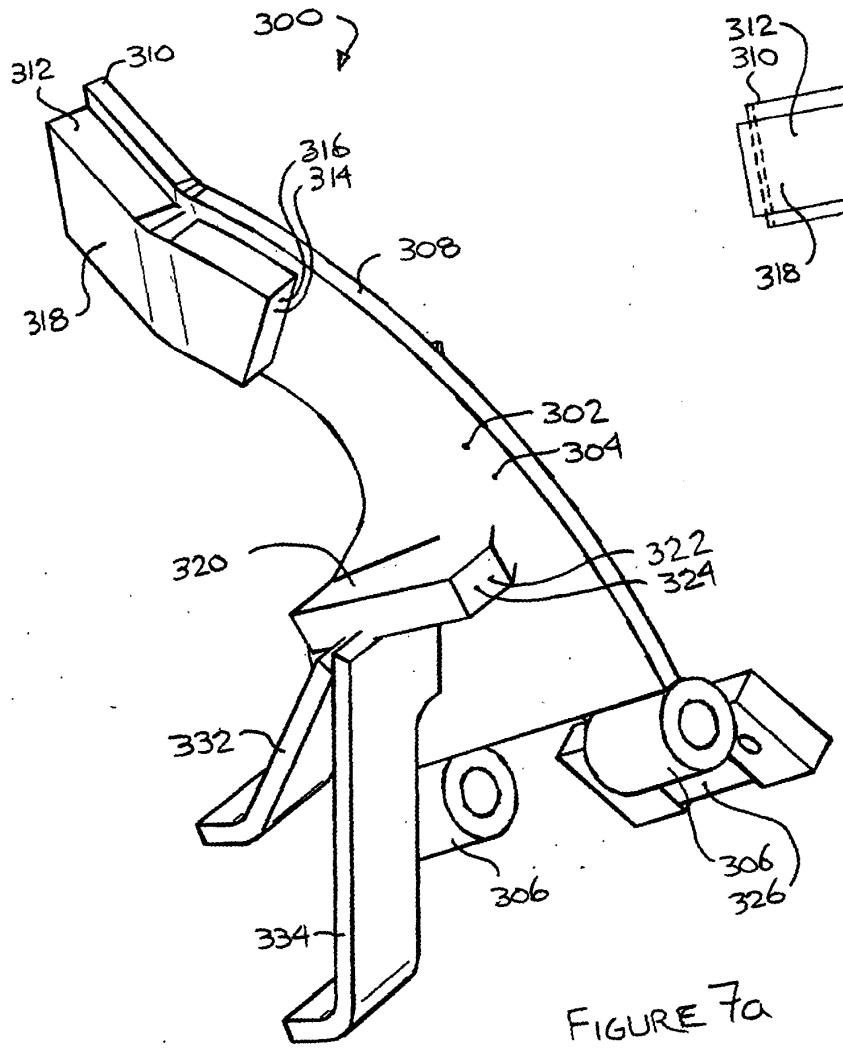


FIGURE 7a

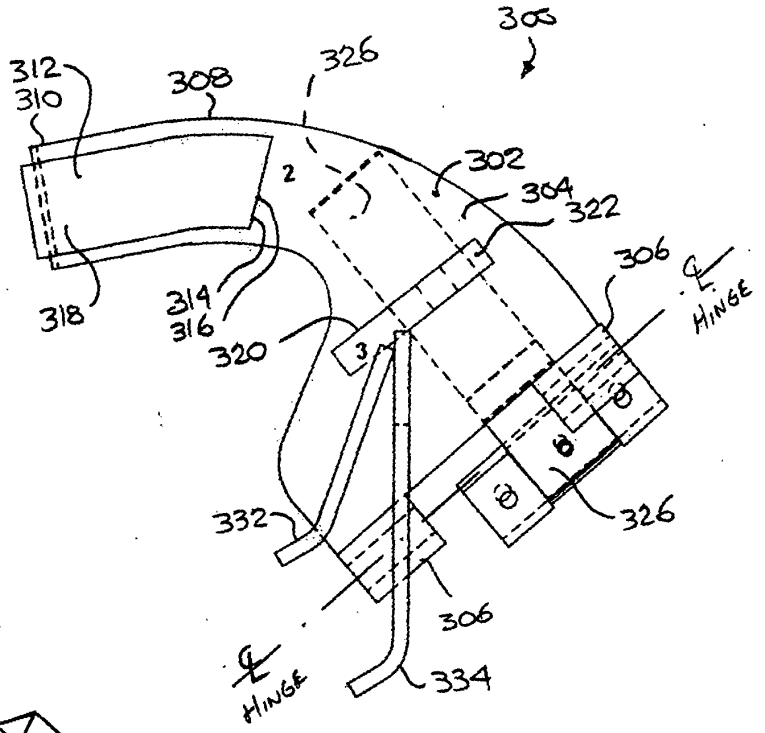


FIGURE 7b.

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FIGURE 7C

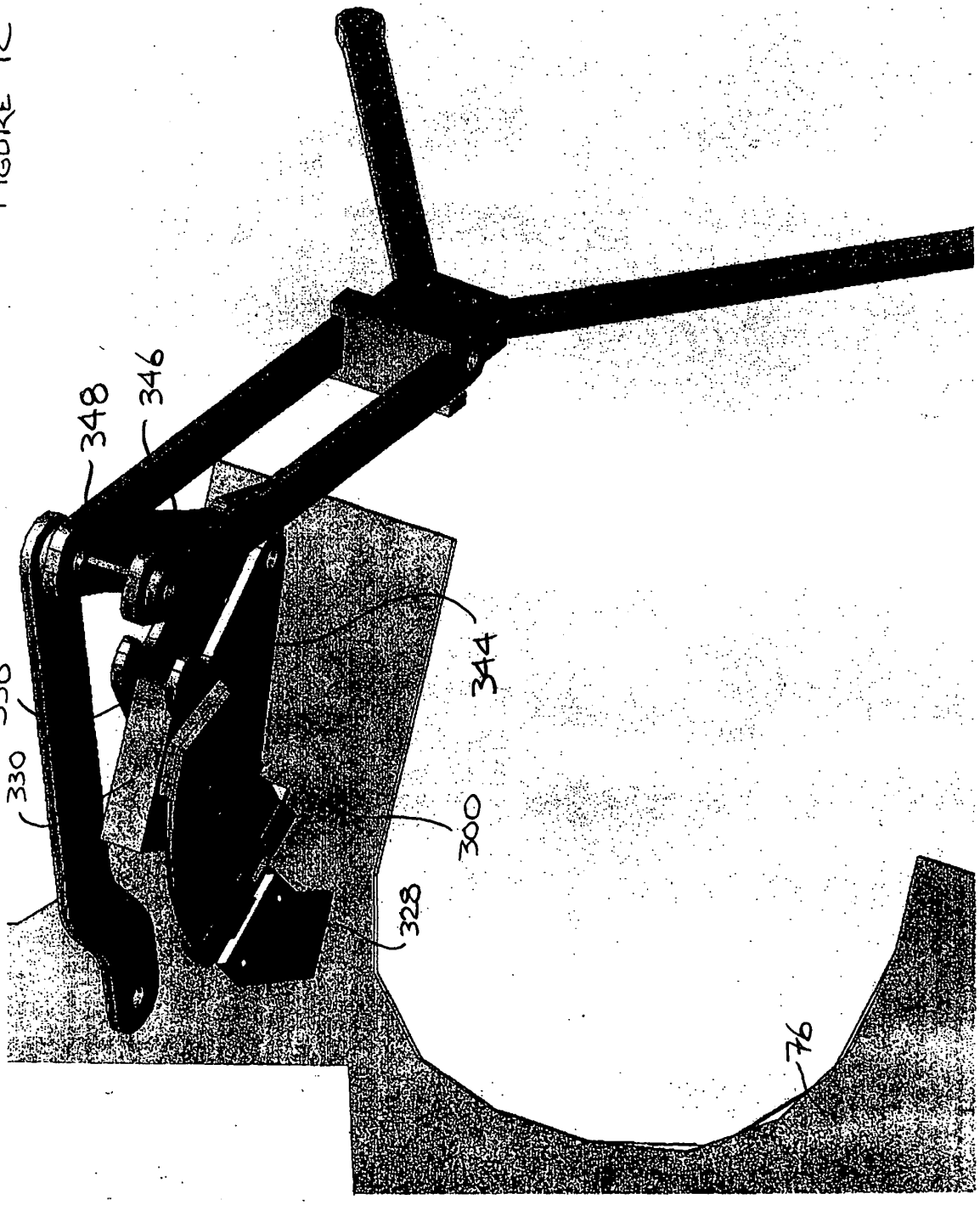
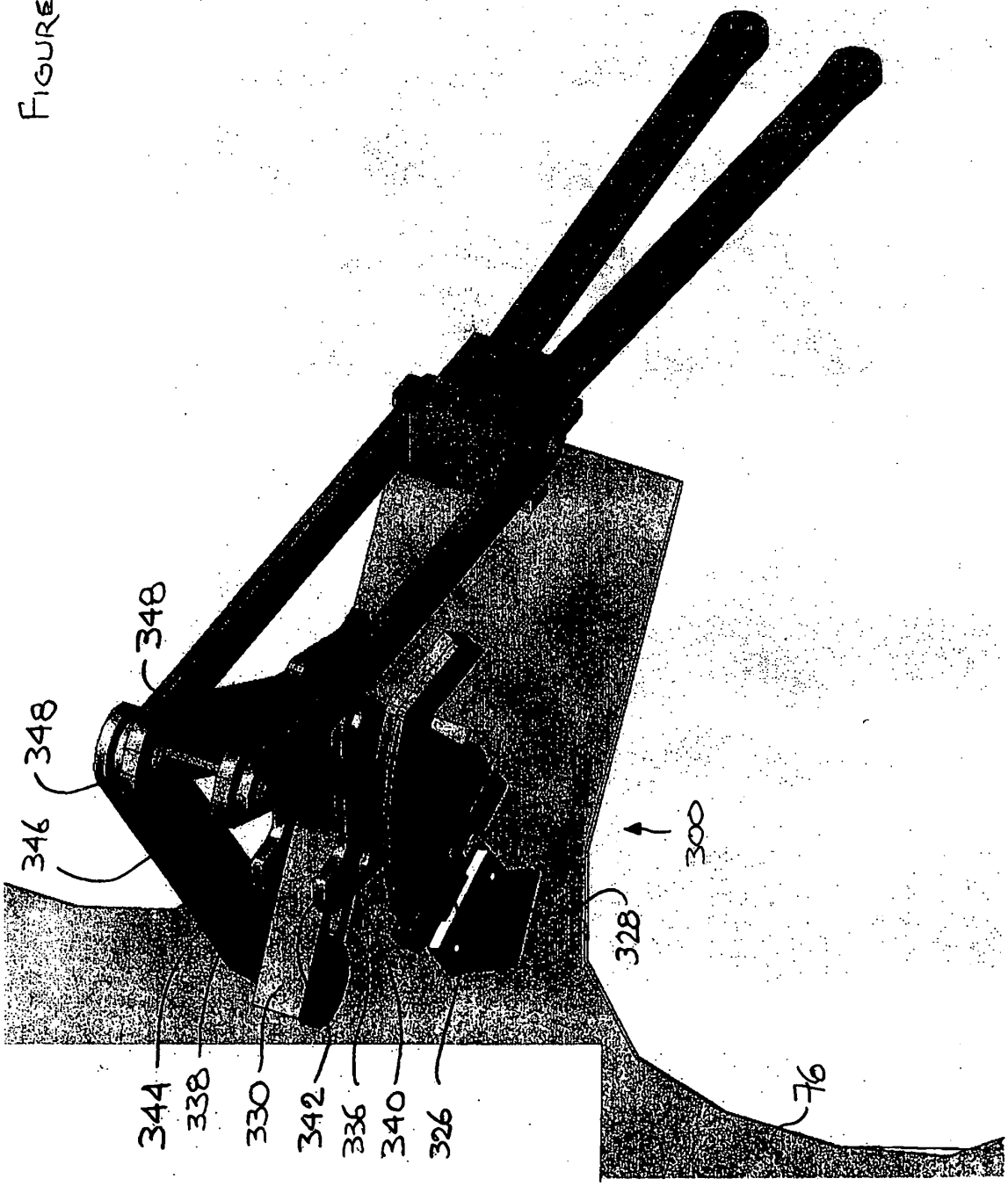
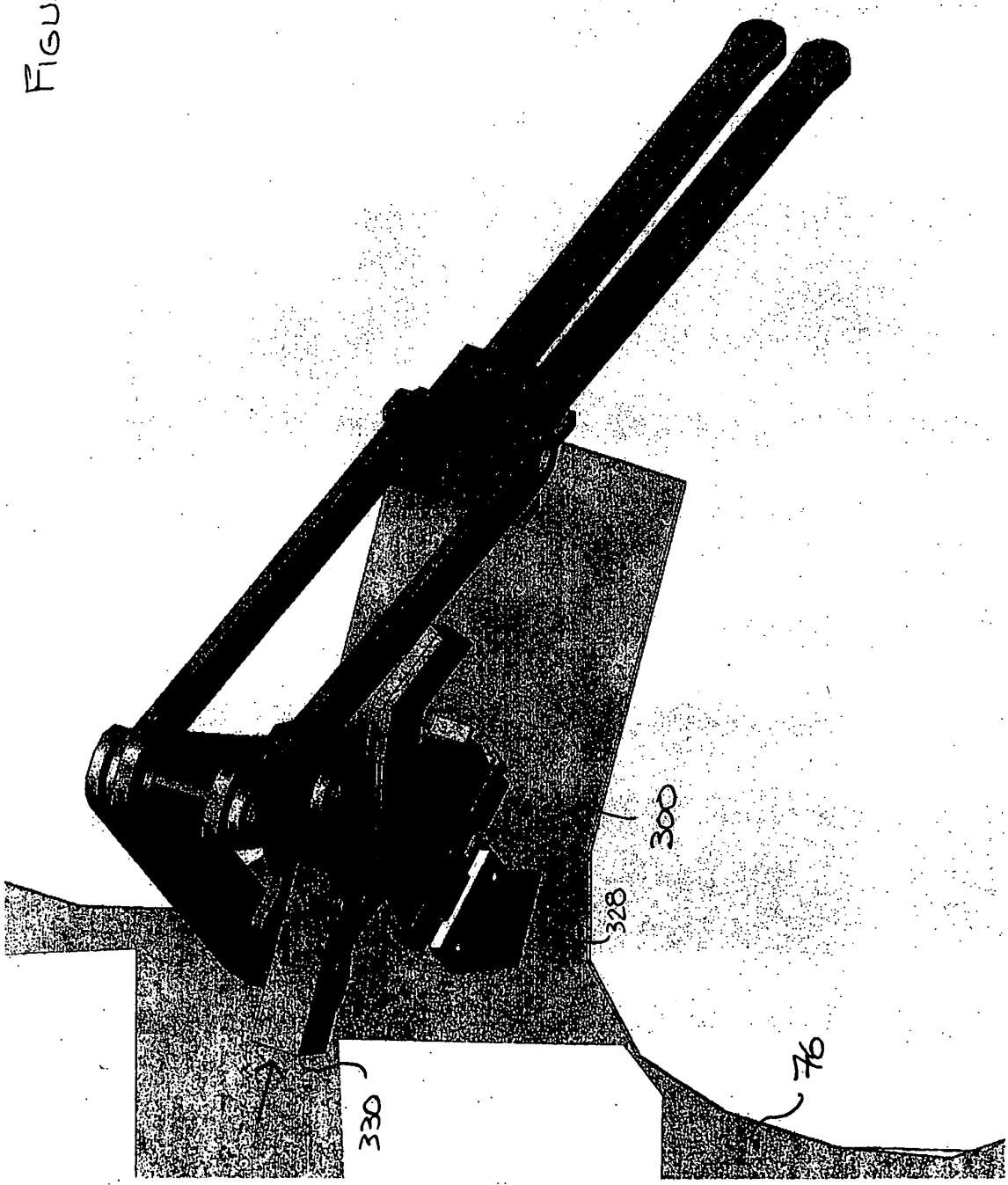


FIGURE 7d.



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FIGURE 7e.



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This is to certify that the documents attached hereto and identified below are true copies of the documents on file in the Patent Office.

Specification and Drawings, as originally filed, with Application for Patent Serial No: **CA 2678447**, on September 11, 2009, by **NATIONAL STEEL CAR LIMITED**, assignee of James W. Forbes, Marcus Thiesen and Dave Keats, for "Railroad Gondola Car Structure and Mechanism Therefor".

Chris Colyer

Agent certificateur/Certifying Officer

May 18, 2010

Date

Canada

(CIPO 68)
07-10-08

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RAILROAD GONGOLA CAR STRUCTURE AND MECHANISM THEREFOR

Abstract

A railroad gondola car has a hopper carried between two trucks. The hopper has convergent end and side slope sheets that feed a bottom discharge. The bottom discharge has a pair of longitudinal doors. The door closing mechanism is a mechanical transmission that includes a set of linkages running from the door to a reciprocating pneumatic cylinder. The linkages run generally parallel to the slope sheet. The car has a very short draft installation that includes a removable coupler carrier bar, and the main shear plate has a removable draft gear installation panel. There is a machinery space above the end section shear plate. It is overhung by the slope sheet that is substantially unobstructed by any other primary structure. The pneumatic cylinder is mounted on an angle in this unobstructed machinery space, oriented longitudinally over the draft sill beneath the main drag link of the mechanical transmission, and above the main pivot of the driving input lever of the transmission. The main lever is bifurcated, and straddles the pneumatic cylinder. The mechanism includes a primary lock in the form of an over center lever arrangement, and a compact secondary lock that acts sideways rather than lengthwise. The sidewalls of the car include vertical stiffeners and side sheets. The lower portion of the side sheets lies laterally inboard of the stiffener web, while the upper portion lies laterally outboard of the stiffener web. The side slope sheet of the hopper meets the sidewall at the transition of the sidewall sheet from the inside-the-post to the outside-the-post condition.

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RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR

Field of the Invention

This invention relates to the field of railroad freight cars, and, in particular to rail road gondola cars such as may employ bottom unloading gates or doors.

Background

There are many kinds of rail road cars for carrying particulate material, be it sand or gravel aggregate, plastic pellets, grains, ores, potash, coal or other granular materials. Many of those cars have an upper opening, or accessway of some kind, by which the particulate is loaded, and a lower opening, or accessway, or gate, or door by which the particulate material exits the car under the influence of gravity. While the inlet opening need not necessarily have a movable gate, the outlet opening requires a governor of some kind that is movable between a closed position for retaining the lading while the lading is being transported, and an open position for releasing the lading at the destination. The terminology "flow through" or "flow through rail road car" or "center flow" car, or the like, may sometimes be used for cars of this nature where lading, typically particulate lading, is introduced at the top, and flows out at the bottom.

Discharge doors for gondola cars or other bottom dumping cars may tend to have certain desirable properties. First, to the extent possible it is usually desirable for the door opening to be large so that unloading may tend to be relatively fast, and for the sides of any unloading chute to be relatively steep so that the particulate will tend not to hang up on the slope. Further, to the extent that the door can be large and the slope sheets steep, the interior of the car may tend to have a greater lading volume for a given car length. Further still, any increase in lading achieved will tend to be at a relatively low height relative to Top of Rail (TOR) and so may tend to aid in maintaining a low center of gravity. A low center of gravity tends to yield a better riding car that is less prone to derailment, and perhaps less prone to cause as much wear or damage to tracks.

For a given length of car, hopper volume, and hence overall car volume, can be maximized by reducing the proportion of the length of the car occupied by the trucks, and occupied by the door opening drive mechanism. Furthermore, where the lading to be carried by the car is of greater than usual density, it may often be helpful for the truck center length to be relatively short such that the length of the span between the trucks is smaller, and the weight of

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the structure may be correspondingly decreased relative to the maximum permissible gross weight on rail for the car. In some instances, as with iron ore or other high density lading, that truck center distance may be very short.

It may also be that in some circumstances ore cars are used in quasi-permanent sets that form a unit train. The unit train may tend to follow a single route for substantially its entire operational service life. In the case of an ore car, that operational route may be from a mine or concentrator facility, at which the cars receive the lading; to a discharge facility, whether a mill or a break of bulk terminal at a port. In these circumstances the line may be owned by the mine or mill, and the cars may not necessarily be used for interchange service. To the extent that they are not used for interchange service they may not necessarily comply with all AAR standards. The cars may have short, possibly non-standard draft sills, draft gear, and couplers, or a combination thereof.

The cars may have tightly limited space envelopes over the end shear plates, and yet these spaces may nonetheless be intended to accommodate, for example, the brake reservoir and pneumatic gear for operating the gondola discharge doors.

Summary of the Invention

In an aspect of the invention there is a railroad hopper car. It has at least one hopper having a bottom discharge, the bottom discharge including a door movable between a closed position for retaining lading and an open position for permitting egress of lading. The hopper is carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of the car. The hopper has at least a first end slope sheet inclined downwardly in the lengthwise direction toward the door. There is a linkage connected to the door. The linkage is oriented lengthwise with respect to the car. A drive is connected to the linkage. The drive is operable to move the linkage and thereby to urge the door to a closed position. The linkage is movable from a first position corresponding to the open position of the door to a second position corresponding to the closed position of the door. The linkage includes at least a drag link. When the linkage moves from the first position to the second position one of (a) the overall motion from the first position to the second position includes displacement of the drag link in a direction having a predominant component of motion parallel to the first end slope sheet; and (b) the motion of the drag link is at least instantaneously parallel to the first end slope sheet.

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In another feature of that aspect of the invention the linkage includes a first pivot arm pivotally connected to a datum structure at a first pivot connection. The drive is also mounted to the datum structure. The linkage includes a second pivot arm pivotally connected to the datum structure at a second pivot connection. The second pivot arm has the door mounted thereto. The first pivot arm has a second connection distant from the first pivot connection. The second pivot arm has a second connection distant from the second pivot connection. A mechanical transmission is mounted between the second connection of the second pivot arm and the second connection of the first pivot arm. The mechanical transmission includes the drag link. The drive is connected to move the first pivot arm, and, in moving from the first position to the second position, each position of the first pivot arm being associated with a unique position of the drag link. In a further feature, the linkage includes left and right hand first pivot arms pivotally connected to a datum structure at respective first pivot connections, the respective first pivot connections being co-axial. The linkage includes left and right hand second pivot arms pivotally connected to the datum structure at respective second pivot connection. The door is a left hand door of a pair of co-operable right and left hand doors, the left hand door being mounted to the left hand second pivot arm and the right hand door being mounted to the right hand second pivot arm. Each first pivot arm has a respective second connection distant from its respective first pivot connection, the respective second connections being pivot connections and being mutually co-axial. Each second pivot arm has a respective second connection distant from the respective second pivot connection. A mechanical transmission is mounted between the respective second connections of the second pivot arms and the respective second connections of the first pivot arms. The drag link is a left hand drag link, and the mechanical transmission includes a mated parallel right hand drag link. The left and right hand drag links each have a first end mounted to one of the respective second connections of the first pivot arms. The left and right hand drag links have second ends yoked together distantly from the first ends. The transmission member includes left and right hand slave links extending between and connecting the second ends of the drag links to the second connections of the second pivot arms respectively.

In still another feature, the linkage includes left and right hand first pivot arms pivotally connected to a datum structure at respective first pivot connections, the respective first pivot connections being co-axial. The linkage includes left and right hand second pivot arms pivotally connected to the datum structure at respective second pivot connection. The door is a left hand door of a pair of co-operable right and left hand doors, the left hand door being mounted to the left hand second pivot arm and the right hand door being mounted to the right hand second pivot arm. Each first pivot arm has a respective second connection distant from its respective first pivot connection, the respective second connections being pivot connections and being mutually

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co-axial. The left and right hand pivot arms co-operate to define a bifurcated lever straddling the drive. In yet another feature, the drive includes an actuating cylinder having an axially reciprocating member, the axially reciprocating member being inclined relative to horizontal. In still another feature the drag link lies between the actuating cylinder and the first end slope sheet of the hopper. In another feature the railroad hopper car includes a first end section, the first end section includes a draft sill and a substantially horizontal shear plate mounted over the draft sill, the drive includes an actuating cylinder having an axis of reciprocation lying in a central vertical-lengthwise plane of the car, the actuating cylinder is mounted above the shear plate, the first end slope sheet at least partially overhangs the actuating cylinder; and the drag link is located between the actuating cylinder and the first slope sheet.

In another aspect of the invention there is a railroad hopper car. It has at least one hopper having a bottom discharge, the bottom discharge including a gate movable between a closed position for retaining lading and an open position for permitting egress of lading. The car includes structure by which the hopper is carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of the car. A door operating linkage is connected to the gate, the door operating linkage being oriented lengthwise with respect to the car. An actuating cylinder connected to drive the door operating linkage, the actuating cylinder also being oriented to act lengthwise with respect to the car, the actuating cylinder having an axis of reciprocation. The axis of reciprocation being tilted such that displacement of the actuating cylinder includes a vertical component of motion.

In another feature of that aspect of the invention, the hopper car includes an end section mounted over one of the trucks, the end section includes a substantially horizontal shear plate, and the actuating cylinder is mounted on a pedestal mounted to the shear plate, the pedestal including an inclined mounting for the cylinder. In a further feature, the railroad hopper car has a longitudinal-vertical central plane, and the axis or reciprocation lies in the longitudinal-vertical plane. In a still further feature, the hopper includes at least a first end slope sheet extending longitudinally and being inclined longitudinally inboard and downwardly toward the gate, and at least part of the actuating cylinder is overhung by at least part of the first end slope sheet. In a yet further feature, the hopper car includes an end section having a substantially horizontal shear plate mounted over a draft sill. The hopper includes a first end slope sheet, the first end slope sheet at least partially overhanging the horizontal shear plate. The actuating cylinder is mounted above the shear plate, centrally aligned over the draft sill. The actuating cylinder is at least partially overhung by the first end slope sheet. In still yet anther further feature the first slope sheet is substantially planar and has a first angle of inclination relative to horizontal. The

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actuating cylinder is inclined longitudinally inboard downwardly, and is inclined at a second angle. The second angle lies between horizontal and the first angle. In yet another feature the car has an underframe and the door operating linkage includes a first linkage component, a second linkage component, a third linkage component, and a fourth linkage component. The first linkage component is a reference datum component and includes structure immovable relative to the underframe. The second linkage component is a first pivot linkage mounted to the first linkage component at a main pivot connection, the first pivot linkage being a first pivot arm constrained to pivot on an axis of rotation oriented horizontally cross-wise relative to the underframe. The fourth linkage component is a second pivot linkage pivotally mounted to the first linkage component and includes at least the gate. The third linkage component includes a drag link element connected to the first pivot arm, the drag link element having at least a first pivotal attachment to at least a portion of the fourth linkage component, whereby input motion of the second linkage component uniquely determines position and motion of the third and fourth linkage components relative to the first linkage component. Motion of the second linkage component is driven by the actuator. In still another feature the main pivot connection of the first pivot arm to the first linkage component is located lower than the actuating cylinder. In yet still another feature, the drag link element is connected to the first pivot arm at a distal pivot connection relative to the main pivot connection, and, when the gate is in the closed position and the car is viewed in side view, the actuating cylinder is located between the main pivot connection and the distal pivot connection.

In another aspect there is a railroad hopper car. It has at least one hopper having a bottom discharge, the bottom discharge including a gate movable between a closed position for retaining lading and an open position for permitting egress of lading. It has first and second end sections to which the hopper is mounted, the first and second end sections being mounted to respective first and second railroad car trucks for rolling motion along railroad tracks in a lengthwise direction of the car. There is a door operating linkage connected to the gate, the door operating linkage being oriented lengthwise with respect to the car and connected. An actuating cylinder is connected to drive the door operating linkage. The actuating cylinder is also oriented to act in a lengthwise extending plane with respect to the car. The actuating cylinder has an axis of reciprocation. The door operating linkage includes a first pivot arm pivotally mounted to the first end section at a first pivot connection. There is a mechanical transmission connected between the first pivot arm and the gate. The mechanical transmission includes at least a drag link movably connected to the first pivot arm at a location distant from the first pivot connection. The first pivot connection is lower than the actuating cylinder as seen when viewing the first end section in side view.

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In another feature of that aspect of the invention, when the gate is in the closed position and the car is viewed in side view, the actuating cylinder is located between the main pivot connection and the distal pivot connection. In still another feature, the actuating cylinder drives an intermediate lever that is connected to drive the first pivot arm.

In another aspect of the invention there is a rail road hopper car. It has a hopper carried between a pair of trucks, the hopper having first and second upstanding sidewalls running lengthwise therealong. The hopper has a lower discharge and convergent slope sheets giving onto the discharge. The rail road car has a side sill and a top chord. The first upstanding sidewall extends from the side sill to the top chord. The first upstanding sidewall has a predominantly upwardly running sidewall stiffener mounted thereto. The sidewall stiffener is located at a longitudinal station intermediate the trucks. The first upstanding sidewall has a first region, the first region being a lower region thereof. The first upstanding sidewall has a second region. The second region is an upper region thereof. The sidewall stiffener has a first portion, the first portion being a lower portion thereof. The first portion is mounted to the first region of the first upstanding sidewall. The sidewall stiffener has a second portion, the second portion being an upper portion thereof. The second portion is mounted to the second region of the upstanding sidewall. The first portion of the first upstanding sidewall stiffener is laterally outboard of the first region of the first upstanding sidewall. The second portion of the sidewall stiffener is laterally inboard of the second region of the first upstanding sidewall. The sidewall has a continuous section between the first and second regions thereof. The sidewall stiffener has web continuity between the first and second portions thereof.

In a feature of that aspect of the invention, the first and second portions of the sidewall stiffener are substantially co-planar, and are substantially vertically aligned when seen in a sectional view looking along the car. In another feature, the first upstanding sidewall has a third region intermediate the first and second regions. The third region includes a side sheet transition portion passing across the sidewall stiffener from an inboard margin thereof to an outboard margin thereof, and the stiffener has vertical web continuity through the transition portion. In another feature, the first upstanding sidewall has a third region intermediate the first and second regions. The third region includes a side sheet transition portion passing across the sidewall stiffener from an inboard margin thereof to an outboard margin thereof. The hopper includes first and second sloped side sheets. The first sloped side sheet meets the first sidewall at the transition portion. In another feature, the first sidewall has an overall height from the side sill to the top chord, L, and the transition is located a distance above the side sill that is in the range of

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¼ to 2/3 L. In a still further feature the first sidewall has an overall height from the side sill to the top chord, L, and the first sloped sheet meets the transition at an height that is in the range of ¼ to 2/3 L above the side sill.

In a further aspect of the invention there is a railroad hopper car. It has at least one hopper having a bottom discharge, the bottom discharge having a bottom discharge governor movable between a closed position for retaining lading and an open position for permitting egress of lading. The car has structure by which the hopper is carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of the car. The hopper has a door operating linkage oriented lengthwise with respect to the car. There is an actuating cylinder also oriented to act in a lengthwise extending plane with respect to the car, the actuating cylinder being connected to drive the door operating linkage. The door operating linkage includes a pair of first and second linkage members co-operably mounted to either transverse side of the actuating cylinder, whereby the actuating cylinder is bracketed by the linkage members.

In another feature of that aspect of the invention, the car has an underframe and the linkage is a closed loop bar linkage in which there is a first linkage component, a second linkage component, a third linkage component, and a fourth linkage component. The first linkage component is a reference datum component and includes structure immovable relative to the underframe. The second linkage component is a first pivot linkage mounted to the first linkage component at a main pivot connection, and which includes the first and second linkage members, the first and second linkage members being a matched pair of left and right hand pivot arms constrained to pivot on a common axis of rotation relative to the underframe. The fourth linkage component is a second pivot linkage pivotally mounted to the first linkage component and which includes at least one pivotally mounted door assembly defining the bottom discharge governor. The third linkage component includes a drag link element having at least a first pivotal attachment to at least a portion of the fourth linkage component, whereby input motion of the second linkage component uniquely determines position and motion of the third and fourth linkage components relative to the first linkage component. Motion of the second linkage component is driven by the actuator.

In another feature the hopper includes a hopper end slope sheet. The end slope sheet extends substantially in a plane inclined downwardly and lengthwise inwardly toward the bottom discharge. Displacement of the third linkage component associated with motion of the door assembly between the open position is predominantly in a direction generally parallel to the end

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slope sheet. In another feature the hopper includes a hopper end slope sheet. The end slope sheet extends substantially in a plane inclined downwardly and lengthwise inwardly toward the bottom discharge. During at least an instantaneous portion of motion of the third linkage component while the door assembly is in a position between the open position and the closed position the third linkage component moves parallel to the end slope sheet. In still another feature the third linkage component includes at least a first element and a second element mounted thereto. The first element is pivotally mounted to the first linkage component, and is constrained to move in a lengthwise-vertical plane relative to the first linkage component. The second element has a first connection to the first component the first connection being a pivot connection. The second element has a second connection to the fourth linkage component, the second connection having at least one degree of freedom of motion. The second element is constrained always to be co-planar with the first connection, the second connection, and the main pivot connection. In yet still another feature, the bottom discharge governor includes a door,. The actuating cylinder is connected to drive the door operating linkage through a lever assembly. The lever assembly has an over-center lock that is operable to prevent release of the bottom gate to the open position when the actuating cylinder is inactive. In yet a further feature, motion of the first pivot linkage occurs in a longitudinal-vertical plane. The second pivot linkage moves in a plane generally cross-wise to the longitudinal-vertical plane. In still a further feature the main pivot connection is beneath the actuating cylinder when the hopper car is seen in side view. In again another feature one of (a) the main pivot is beneath the drag link element; and (b) the actuating cylinder is between the main pivot and the drag link element. In a yet still further feature, the hopper includes at least a first end slope sheet, and the bottom discharge governor includes a door. The first end slope sheet is inclined longitudinally downwardly and inboard toward the door. The drag link element is inclined on a slope predominantly parallel to, and adjacent to, the first end slope sheet. The actuating cylinder is oriented along the lengthwise direction, and is also tilted longitudinally downwardly and inwardly toward the door.

In another aspect of the invention there is a railroad hopper car. It has at least one hopper carried by railroad car trucks for motion in a lengthwise direction of the car along railroad tracks. The hopper has a bottom discharge. The bottom discharge has a door movable between a closed position for retaining lading and an open position for permitting egress of lading. A mechanical transmission is connected to the door. The mechanical transmission is oriented lengthwise with respect to the car. A door actuator is connected to the mechanical transmission and is operable to urge the door from the open position toward the closed position, the door actuator being oriented to reciprocate in a first direction. The hopper car has a first lock operable to prevent movement of the door from the closed position to the open position when the door actuator is

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inactive. The hopper car has a second lock operable to prevent movement of the door from the closed position to the open position when the door actuator is inactive if the first lock should fail. The second lock is movable between an engaged position in which it prevents movement of the door to the open position thereof. In moving between the engaged and disengaged positions, the second lock has a displacement that is predominantly cross-wise to the first direction of the reciprocation of the door actuator.

In another feature of that aspect of the invention, the car has a central lengthwise-vertical plane, the door actuator is positioned to reciprocate in the central lengthwise-vertical plane, and the second lock is movable between the engaged and disengaged positions in motion predominantly transverse to the central lengthwise-vertical plane. In another feature, the second lock is mounted on an hinge and pivots in a circumferential direction between the engaged and disengaged positions. In still another feature the second lock is mounted on an hinge, the hinge has an axis lying parallel to the lengthwise vertical plane, and the second lock pivots circumferentially between the engaged and disengaged positions. In another feature, the second lock is biased toward the engaged position. In still another feature, the second lock is biased toward the engaged position. In yet another feature the apparatus is one in which one of: (a) the second lock has a cam and the actuator has a mating cam follower; and (b) the second lock has a cam follower and the actuator has a mating cam. The cam and cam follower are co-operable, and are oriented to deflect the second lock away from the engaged position as the door moves from the open position to the closed position thereof.

In another aspect of the invention, there is a lock mechanism for a door actuating transmission of a railroad gondola car, the door actuating transmission including a reciprocating actuating cylinder mounted to a datum structure, the cylinder being movable forward and backward in an axial direction. The lock mechanism has a body having a first fitting, a second fitting and a third fitting. The first fitting is a mounting by which to connect the lock mechanism to the datum structure. The second fitting is one of (a) a cam for co-operation with a member of the door actuating transmission, that member being a cam follower; and (b) a cam follower for co-operation with a member of the door actuating transmission, that member being a cam. The third fitting includes an abutment for co-operation with a mating fitting of the door actuating transmission. The third fitting is movable between a first position and a second position, in the first position the abutment being presented to obstruct motion of the mating fitting of the door actuating transmission and thereby to prevent the door from moving to an open position thereof. The second fitting is movable between a first position and a second position, in the first position thereof the second fitting being positioned to intercept the member of the door actuating

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transmission and to be deflected away from the first position toward the second position thereby. The first fitting has a first degree of freedom of motion permitting the first and second fittings to move between their respective first and second positions. The degree of freedom constrains the third fitting to motion predominantly cross-wise to the axial direction.

In another feature of that aspect of the invention, the lock mechanism there has a bias member, the bias member being oriented to urge the third fitting toward the first position thereof. In another feature the bias member is a spring having a first end and a second end, the first end being mounted to bear against the body of the lock mechanism, the second end having a foot for reaction against the datum structure. In still another feature, the first degree of freedom of motion is an angular degree of freedom, and the predominantly cross-wise motion is predominantly circumferential motion about an axis of rotation. In yet another feature the first fitting is an hinge, the axis of rotation is an axis of rotation of the hinge, and the axis of rotation of the hinge is substantially parallel to the axial direction of the door actuating transmission. In still another further feature, the first fitting of the lock mechanism includes an hinge and a footing of the hinge for mounting to the datum structure. The axis of rotation is an axis of rotation of the hinge, and the footing has a substantially planar footprint. The axis of rotation of the hinge is angularly inclined relative to the substantially planar footprint. In yet another feature, the lock mechanism has all or any combination of the forgoing additional features.

In still another aspect of the invention there is a railroad hopper car for carrying particulate material. The hopper car there has a hopper and first and second end sections for carriage by respective first and second rail road car trucks for rolling motion along railroad tracks in a longitudinal direction. The hopper is suspended between the first and second end sections. The hopper has a discharge section through which to release lading, and first and second end slope sheets oriented toward the first and second end sections, the slope sheets being inclined in the longitudinal direction to feed the discharge section. The first end section includes a draft sill extending in the longitudinal direction, a main bolster extending cross-wise to either side of the draft sill, and a shear plate mounted to the draft sill and to the main bolster. The shear plate extends lengthwise along the draft sill and cross-wise from side to side of the hopper car. The first end slope sheet of the hopper overhangs the shear plate of the first end section. The hopper car is free of primary structure directly above the shear plate of the first end section under the overhang of the first slope sheet of the hopper.

In another feature of that aspect of the invention, there is one of: (a) the first slope sheet has an upper margin and the hopper car includes an end post extending upwardly from the draft

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sill to the upper margin of the slope sheet; and (b) the first slope sheet has an upper margin terminating at an end wall, and the hopper car includes an end post extending upwardly from draft stub sill to the end wall. In another feature, the shear plate has a longitudinally outboard margin and the draft sill has a striker located outboard of the longitudinally outboard margin of the shear plate, and the end post is one of: (a) rooted to the draft sill adjacent to the striker; (b) rooted to the shear plate adjacent to the longitudinally outboard margin of the shear plate. In a further feature, the bolster has first and second laterally outboard distal ends, and the hopper car has corner posts extending upwardly from the distal ends of the hopper to the first slope sheet.

In still another feature, the bolster has first and second laterally outboard distal ends, and the hopper car has corner posts extending upwardly from the distal ends of the hopper to the first slope sheet. In another feature, one of: (a) the first slope sheet has an upper margin and the hopper car includes an end post extending upwardly from the draft sill to the upper margin of the slope sheet; and (b) the first slope sheet has an upper margin terminating at an end wall, and the hopper car includes an end post extending upwardly from draft stub sill to the end wall; the shear plate has a longitudinally outboard margin and the draft sill has a striker located outboard of the longitudinally outboard margin of the shear plate, and the end post is one of: (a) rooted to the draft sill adjacent to the striker; (b) rooted to the shear plate adjacent to the longitudinally outboard margin of the shear plate. The bolster has first and second laterally outboard distal ends, and the hopper car has corner posts extending upwardly from the distal ends of the hopper to the first slope sheet. The hopper car has a machinery space bounded by (a) the first slope sheet; (b) the shear plate of the first end section; (c) the end post; and (d) the corner posts, and the machinery space is free of any other primary structure.

In yet another feature the hopper car has at least one longitudinally hinged discharge door, the discharge door being movable cross-wise between open and closed positions. A longitudinally acting pneumatic actuator is at least partially lodged in the machinery space directly above the draft sill. In still yet another feature a brake reservoir is also at least partially lodged in the machinery space. In a yet further feature the shear plate is mounted above and to the main bolster and defines an upper flange thereof. The main bolster has a lower flange downwardly spaced from the upper flange, the lower flange terminating at respective distal end portions at either side of the car. The car includes a side sill running along the car between the first and second end sections. The side sill has an upper flange, the upper flange of the side sill being substantially co-planar and connected to the shear plate. The side sill has a lower flange, the lower flange of the side sill being substantially co-planar with a respective one of the distal end portions of the lower flange of the main bolster. In another further feature, the shear plate

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defines an upper flange of the draft sill whereby the draft sill upper flange, the shear plate and the side sill upper flange are all substantially co-planar. In another feature the machinery space is free of elephant ears.

In a further aspect of the invention there is a railroad freight car having a freight car body for carrying lading, the body being mounted on railroad car trucks for rolling motion in a longitudinal direction along railroad tracks. The car body includes a draft sill having a draft gear pocket for accommodating draft gear, and a shear plate overlying the draft sill and functioning as an upper flange of the draft sill. The draft sill has an inboard end oriented toward a truck center of one of the trucks, and an outboard end terminating at a striker. The draft sill has an underside and an access opening formed in the underside to admit entry of draft gear into the draft gear pocket from below. The car has a draft gear carrier plate. The carrier plate is mounted to the underside of the draft sill beneath the draft gear pocket. The carrier plate is removable to permit installation of the draft gear into the draft gear pocket. The car body has one of (a) an aperture formed in the shear plate over an inboard end region of the draft sill, the aperture permitting a portion of the draft gear to protrude upwardly therethrough during installation in the draft gear pocket; and (b) a coupler carrier seat defined in the draft sill longitudinally inboard of the striker, and a coupler carrier co-operable therewith, the coupler carrier being removable to permit installation of draft gear in the draft pocket, and, when the coupler carrier is installed, the coupler carrier providing a support for a coupler shank when the coupler shank is connected to the draft gear within the draft sill.

In another feature of that aspect of the invention the freight car has both (a) and (b). In another feature, there is a cover plate for the aperture of the shear plate, the cover plate being removable to permit installation of the draft gear. In still another feature, the draft sill has a pair of vertically oriented, longitudinally running spaced apart side webs. The webs have a greater depth of section adjacent to the striker. The webs have respective first and second apertures formed therein. The first and second apertures define the draft gear retainer seat, and the retainer is a sideways slidable shaft that is movable to extend across the draft sill between the first and second apertures in the draft sill side webs. In a furtrher feature there is a cover plate for the aperture of the shear plate, the cover plate being removable to permit installation of the draft gear. In another further feature the draft sill has a centerplate centered on the truck center, rear draft stops are welded within the draft sill, and at least a portion of each of the rear draft stops extends longitudinally inboard of the truck center. In still another further feature, the car is one in which at least one of (a) the freight car has a truck center to striker plate draft sill length of less than 50 inches; and (b) the freight car has a truck center to coupler pulling face length of

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less than 65 inches when the draft gear is fully extended in draft. In another feature, the railroad freight car is one in which at least one of (a) the freight car has a truck center to striker plate draft sill length of about 38 inches (+/- 2"); and (b) the freight car has a truck center to coupler pulling face length of about 53 inches (+/- 2") when the draft gear is fully extended in draft.

These and other aspects and features of the invention may be understood with reference to the description which follows, and with the aid of the illustrations.

Brief Description of the Figures

The description is accompanied by a set of illustrative Figures in which:

Figure **1** is a general arrangement, isometric view of a railroad freight car according to an aspect of the invention with all ancillary systems removed to leave only primary structure visible;

Figures **2a** is an isometric view of a sidewall of the gondola car of Figure **1**;

Figure **2b** shows a side view of the sidewall of Figure **2a**;

Figure **2c** shows an end view of the sidewall of Figure **2a**;

Figure **3a** shows a perspective view of the end structure of the railroad freight car of Figure **1**;

Figure **3b** is a side view of the structure of Figure **3a**;

Figure **3c** is a detail of the end structure of Figure **3b**, with the near side web of the draft sill removed to show the draft stop, center plate, and coupler relationship.

Figure **4a** is a isometric view of a portion of the door opening mechanism for the railroad car of Figure **1** in a fully open position;

Figure **4b** is a isometric view of a portion of the door opening mechanism for the railroad car of Figure **1** in an intermediate position;

Figure **4c** is a isometric view of a portion of the door opening mechanism for the railroad car of Figure **1** in a fully closed position;

Figure **5a** is a side view of the door opening mechanism of Figure **4a**;

Figure **5b** is a side view of the door opening mechanism of Figure **4b**;

Figure **5c** is a side view of the door opening mechanism of Figure **4c**;

Figure **6a** is an end view of the door opening mechanism of Figure **4a**;

Figure **6b** is an end view of the door opening mechanism of Figure **4b**; and

Figure **6c** is an end view of the door opening mechanism of Figure **4c**;

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Figure **7a** is a perspective view of a secondary lock mechanism for the door opening mechanism of Figure **4a**;

Figure **7b** is a plan view of the mechanism of Figure **7a**;

Figure **7c** is a perspective view of the mechanism of Figure **7a** when the door are open

Figure **7d** is a view similar to Figure **7c**, of the mechanism of Figure **7a** in a deflected condition; and

Figure **7e** is a perspective view of the mechanism of Figure **7a** in a locked position;

Detailed Description

The description that follows, and the embodiments described therein, are provided by way of illustration of an example, or examples, of particular embodiments of the principles, aspects or features of the present invention. These examples are provided for the purposes of explanation, and not of limitation, of those principles and of the invention. In the description, like parts are marked throughout the specification and the drawings with the same respective reference numerals. The drawings may be taken as being to scale unless noted otherwise.

The terminology used in this specification is thought to be consistent with the customary and ordinary meanings of those terms as they would be understood by a person of ordinary skill in the rail road industry in North America. Following from decision of the CAFC in *Phillips* v. *AWH Corp.*, the Applicant expressly excludes all interpretations that are inconsistent with this specification, and, in particular, expressly excludes any interpretation of the claims or the language used in this specification such as may be made in the USPTO, or in any other Patent Office, other than those interpretations for which express support can be demonstrated in this specification or in objective evidence of record in accordance with *In re Lee*, (for example, earlier publications by persons not employed by the USPTO or any other Patent Office), demonstrating how the terms are used and understood by persons of ordinary skill in the art, or by way of expert evidence of a person or persons of at least 10 years experience in the rail road industry in North America or in other former territories of the British Empire and Commonwealth.

In terms of general orientation and directional nomenclature, for rail road cars described herein the longitudinal direction is defined as being coincident with the rolling direction of the rail road car, or rail road car unit, when located on tangent (that is, straight) track. In the case of a rail road car having a center sill, be it a stub sill or a straight-through center sill, the longitudinal direction is parallel to the center sill, and parallel to the top chords. Unless

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otherwise noted, vertical, or upward and downward, are terms that use top of rail, **TOR**, as a datum. In the context of the car as a whole, the term lateral, or laterally outboard, or transverse, or transversely outboard refer to a distance or orientation relative to the longitudinal centerline of the railroad car, or car unit, or of the centerline of a centerplate at a truck center. The term "longitudinally inboard", or "longitudinally outboard" is a distance taken relative to a mid-span lateral section of the car, or car unit. Pitching motion is angular motion of a railcar unit about a horizontal axis perpendicular to the longitudinal direction. Yawing is angular motion about a vertical axis. Roll is angular motion about the longitudinal axis. Given that the rail road car described herein may tend to have both longitudinal and transverse axes of symmetry, a description of one half of the car may generally also be intended to describe the other half as well, allowing for differences between right hand and left hand parts. In this description, the abbreviation kpsi stands for thousand of pounds per square inch. To the extent that this specification or the accompanying illustrations may refer to standards of the Association of American Railroads (AAR), such as to AAR plate sizes, those references are to be understood as at the earliest date of priority to which this application is entitled.

Bottom dumping hopper cars, of which ore cars and coal cars may be examples, may tend to have either longitudinal doors or transverse doors. Longitudinal doors are oriented such that the doors operate on hinges or axes of rotation that are parallel to the direction of travel of the railroad car generally. US Patent 4,250,814 of Stark et al., issued February 17, 1981 and US Patent 3,800,711 of Tuttle, issued April 2, 1974 show cars with longitudinal doors. By contrast, transverse doors are ones in which the axes of rotation of the hinges or other pivots tend to be predominantly cross-wise to the direction of travel, most often perpendicular to it. An example of a transverse door car shown in US Patent 4,843,974 of Ritter et al, issued July 4, 1989.

Figure **1** shows an isometric view of an example of a rail road freight car **20** that is intended to be representative of a range of rail road cars in which one or more of the various aspects of the present invention may be incorporated. While car **20** may be suitable for a variety of general purpose uses, it may be taken as being symbolic of, and in some ways a generic example of, a flow through car, in which lading is introduced by gravity flow from above, and removed by gravity discharge through gated or valved outlets below. Flow through, or center flow cars may include open topped hopper cars, grain cars, plastic pellet cars, potash cars, ore cars, coal gondolas, and so on. In one embodiment car **20** may be a hopper car such as may be used for the carriage of bulk commodities in the form of a granular particulate, be it in the nature of relatively coarse gravel or fine aggregate in the nature of fine gravel or sand or various ores, ore concentrate or coal. The principle, or primary, structure of car **20** may be symmetrical about

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both its longitudinal and transverse, or lateral, centreline axes. Consequently, it will be understood that the car has first and second, left and right hand side beams, bolsters and so on.

By way of a general overview, car **20** may have a car body **22** that is carried on trucks **24** for rolling operation along railroad tracks. Car **20** may be a single unit car, or it may be a multi-unit car having two or more car body units, where the multiple car body units may be substantially permanently connected at an articulated connector, or by draw bars, as opposed to by ordinarily releasable AAR couplers. Car body **22**, and the various structural members and fittings described herein may be understood to be typically of metal construction, whether welded or Huck(t.m.) bolted, or riveted together, the metal members being most typically steel, stainless steel, or aluminum, as may be appropriate. Some car builders have also used reinforced plastic composites for car elements, and those materials could also be employed where suitable. The default construction may be taken as being steel, of which the majority may be mild steel having, typically, a 50 kpsi yield. Car body **22** may have a lading containment vessel or shell **26** such as may include an upstanding wall structure **28** which may have a pair of opposed first and second end walls **30, 32**, that extend cross-wise, and a pair of first and second side walls **34, 36** that extend lengthwise, the end walls **30, 32** and side walls **34, 36** co-operating to define a generally rectangular form of peripheral wall structure **28**. Wall structure **28** may include top chords **38** running along the top of the walls, and side sills **40** running fore-and-aft along lower portions of the side sheets or side sheet assemblies **42** of side walls **34, 36**. In some instances, such as that of the illustration of Figure **1a**, car **20** may have stub center sills **44** at either end, in which case side walls **34, 36** may act as deep beams, and may carry vertical loads to main bolsters **90** that extend laterally from the centerplates. In the case of a single, stand alone car unit, draft gear and releaseable couplers may be mounted at either end of the stub center sill. In a center flow, or flow through car, the upper portion of the car may typically include means by which to admit lading under a gravity drop system. Such an intake **46**, or entryway may be a large rectangular opening such as that bounded by top chords **38**.

Car body **22** may include end sheets **48** and side sheets **50**. Car **20** of Figures **1** et seq., is illustrated as a car having a single hopper **52**, a single hopper discharge section **54**, and an outflow or discharge governor in the nature of a discharge door assembly **56**. However, car **20** could, alternatively, be a multiple hopper car. In a multiple hopper car, the car may have laterally extending members or reinforcements, which may be cross-bearers, or cross-bearers with shrouds, or merely shrouds, particularly where the car is a multiple hopper car. These cross-members may run fully across the car from side sill to side sill, and may intersect the center sill, or the center sill shroud as may be. The car may also include upper wall bracing, in

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the nature of diagonal struts which extend diagonally upwardly and outwardly from the apices of the respective cross-members at the centerline of the car to upper regions of the side walls near or at the top chords; and lateral ties or struts that run across the car from sidewall to side wall to meet the upper ends of the diagonal struts at their wall brackets. Those brackets may be aligned with, and mated through the wall to, the vertical exterior posts that run from the side sill to the top chord and reinforce the walls.

End sheets **48** may be substantially planar slope sheets or slope sheet assemblies that are inclined downwardly in the longitudinally inboard direction to feed the discharge section. Not atypically, each pair of fore-and aft opposed slope sheets may be inclined at equal and opposite angles, and the angles of those sheets may be selected to be somewhat steeper than the free slope angle, or natural talus slope angle of the lading for which the car is designed, such that, when the gates are opened, the lading may tend to flow out, rather than sit at rest.

The primary structure of body **22** of car **20** includes lading containment vessel **26** which is in the nature of hopper **52**. Hopper **52** has an upper portion **58** with substantially vertical wall panels **60**, and a lower stationary portion **62** defined by a set of converging sloped walls, namely the side and end slope sheet assemblies **48** and **50**. At the lower margin of the sloped walls there is the outflow governor, namely door assembly **56**, which, in this instance, may have the form of a pair of first and second, or left and right hand doors **62**, **64**. This containment structure seats on, and is carried by, a pair of first and second end structures, **66**, **68**, at either end of the car. End structures **66**, **68** are in turn carried by trucks **60**. A door operating apparatus or mechanism, or drive train, or transmission, however it may be termed, and identified generally as **70**, is provided to move doors **62**, **64** between open and closed positions.

Considering this structure in greater detail, trucks **24** are most immediately surmounted by center plates **72** of longitudinally extending stub sills **44**. Stub sills **44** in turn carry laterally extending main bolster arms **74** of main bolster **90**. Arms **74** extended perpendicularly away from the centerplate **72**, i.e., they are centered on the truck center, **CL - Truck**.

Side sills **40** run lengthwise along the car between, and tie together, the most laterally outboard extremities of main bolster arms **72**. A shear plate **76** is mounted in an x-y horizontal plane defining the top cover plate of stub sill **44**. Shear plate **76** extends laterally from side sill to side sill, and longitudinally from the fore-and-aft end slope sheet **48** to the laterally extending end sill **78** of the car, which, in this instance may be an upturned flange formed on the

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longitudinally outboard margin of shear plate **76**. In car **20**, the primary structure includes an end post **80** and a pair of side or corner posts **82, 84**.

End post **80** is rooted in shear plate **76** in line with center sill **44**, and may have lateral webs or gussets aligned with the webs of stub sill **44** to provide vertical web continuity across shear plate **76**. End post **80** then extends fully between shear plate **76** and top chord **86** of end wall **30** or **32**, as may be. Corner posts **82** and **84** are rooted to, and stand upwardly from, the junction of the laterally outboard ends of left and right hand main bolster arms **74** and side sills **40**. Posts **82** and **84** extend upwardly from this junction to mate with various elements of the end and side walls, as may be described below.

As described in additional detail below, car **20** has an abnormally short distance from the striker **88** to the truck center, i.e., the **CL** of centerplate **72**. Striker **88** is the vertical planar surrounding face plate at the outboard end of the stub sill **44**. 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 **CL -Truck** may also be referred to as the draft sill. In car **20**, the short draft sill length, identified as L_{88}, leaves an anomalously small space in which to install other systems, such as the brake reservoir and the door operating pneumatic cylinder. Car **20** has an end of car machinery space, indicated generally as **75**, that is bounded by shear plate **76** on the bottom, the sloped end wall assembly **30** or **32** of the car on the top, main vertical central end post **80**, and main side posts **82, 84** at the ends of main bolster **90**. This space may be referred to as having the shape, generally, of a triangular prism and is substantially unobstructed by the primary structure of the car. For the purposes of this description, primary structure is defined as the underframe, including side sills and center sill (i.e., including the draft sill), the side walls, the slope sheets and top chords, the hopper construction including the stationary parts of the discharge section, as well as any cross-bearers, cross-ties, bolsters, shear plates and so on. Primary structure excludes secondary or ancillary structure or systems such as ladders, cat-walks and other safety appliances, brakes, brake rods and brake fittings, air hoses, reservoirs and pneumatic fittings, movable door members, door operating linkages, and so on.

In existing cars, this space, **75**, is often occupied or otherwise obstructed by other primary structure, such as so-called "elephant ears". In this context, "elephant ears" are 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. The third edge is typically a free edge. Often these plates lie in a plane that is oriented at an angle to the vertical – i.e., it leans laterally outboard.

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Car **20** avoids the use of these "elephant ears" and so provides the large unobstructed space shown in Figure **1b**.

Figures **1** and **2a**, **2b** and **2c**, all show the sidewall of the car, indicated generally as **34** or **36**. Sidewall **34** and **36** function as short beams of low (e.g., less than 4:1, possibly less than 3:1) length-to-depth ratio. Sidewall **34** or **36** can be seen to have a bottom flange or chord member, namely side sill **40**, a top flange or chord member, namely top chord **38**, which may have the form of a square or rectangular hollow structural steel tube; and an intermediate shear force transfer web, namely side sheet assembly **42**. Side sheet assembly **42** may include an upper sheet portion or member **92** that is welded to the outside face of top chord **38** at a lap joint, and that extends downwardly therefrom; and a lower sheet portion or member **94**. Member **94** may have the form of a Z-section, having a first portion, namely an upper flange or leg or margin **96** that extends in a substantially vertical plane and has an uppermost margin that overlaps the lowermost edge or margin of member **92**; a second or intermediate portion **98** that runs in an inclined plane sloping inwardly and downwardly on the slope of the hopper side sheets generally, and a third or bottom portion, namely bottom flange, or leg, or margin **100** that extends in a substantially vertical plane downwardly. Sidewall **34** or **36** also includes a central post, or web stiffener, **102** that has a lowermost first portion **104** an intermediate second portion **106**, and an uppermost third portion **108**.

Side sill **40** includes a channel **110** that is welded toes-inward against the lowermost marginal portion of lower leg **100** to form a closed section. The first or lowermost portion **104** of web stiffener **102** has the form of a quadrilateral gusset having a first edge welded to the upper leg of channel **110**, a second edge welded to the vertical margin **100**, a third edge welded to the sloping portion **98**, and the fourth, laterally outboard, edge being free. As may be noted, portion **104** stands outboard of the sidewall sheet.

Portion **108** is a rectangular web stiffener that is welded to, and extends downwardly from, the underside of top chord **38** along the inside face of vertical web portion **92**. Intermediate portion **106** is a web, or plate, or gusset, that is also a quadrilateral, having a first edge that overlaps, and is welded to, the lower margin of portion **108**. A second edge is welded to the lower region of vertical web portion **92**, and to the upper flange or leg **96**. A third edge is welded along the sloped portion **98** of member **94**. The fourth edge is free, and faces inwardly into the lading containment space of the hopper. Portions **104** and **106** are co-planar, or substantially co-planar, such that stiffener **102** has web continuity through member **94**. The upper margin of the side slope sheet **50** of the hopper discharge section is welded to the lower

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margin of the inclined or sloped portion **98**, such that the structure presents a continuous sloped surface for containing, and then slidingly discharging, particulate lading. Expressed differently, the web of the sidewall traverses the sidewall stiffener, commencing on its inboard margin at side sill **40**, traverses the web mid-way up the post, and ends along its outboard margin at top chord **38**. In this arrangement, the vertical stiffener, **102**, acts as the web of a T-section, and the local region of the wall section to which it is joined functions as the flange of that T-section.

In this example, the locus of intersection of the side slope sheet plane P_{94} with the plane of the side wall sheet P_{92}, lies above the level of side sill **40** by a substantial distance, indicated as L_{94}. This distance may lie in the range of ¼ to $^2/_3$ of the distance L_{SW} from side sill **40** to top chord **38**, and, in the particular may be about $^1/_3$ of that distance. Further, although the post has stiffening member web continuity in a vertical plane, the wall sheet traverses the stiffening web intermediate the top chord and the side sill, and does so obliquely on the slope of plane P_{94}.

The upper leg of channel **110** forms the upper flange of side sill **40**, and the lower leg of channel **110** forms the lower flange of side sill **40**. Shear plate **76** forms the top flange of main bolster **90**. Main bolster **90** also has a lower or bottom flange **91**. In car **20** the upper leg of channel **110** is co-planar or substantially co-planar with, and is connected in flange continuity with, shear plate **76**. Similarly, the lower leg of channel **110** is co-planar or substantially co-planar with, and connected in flange continuity with, bottom flange **91** of main bolster **90**.

Continuing with the sidewall assembly, the main sheet, namely upper sheet portion **92**, ends at the corners, and there are respective first and second end upper web stiffener portions and inwardly stepped plate members **112**, which may be termed "ears". The top edge of each ear is welded to the inside face of top chord **38** in a lap joint. The longitudinally outboard end edge forms a plane to which the vertical end sheet of the end slope sheet wall abuts and is welded. The bottom edge follows the slope of, and is welded to, end slope sheet **48**. The forward, transversely outwardly bent edge is welded to the upper end portion of side sheet assembly **42**. The lower region of the main sidewall sheet also includes lightening apertures **114**, in the space between the corner posts and the slope of the end slope sheets. Finally, the lower portion of region **100** of the main sidewall sheet has longitudinal extensions **116** that are welded to the side edges of the shear panel, namely shear plate **76**, outboard of main bolster **90**, thereby forming a portion of the peripheral flange of the shear plate.

End walls **30**, **32** each include upper and lower sloped surface members **122** and **124**, which could be made as a single piece, or as two pieces butt-welded together, as here. Upper

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member **122** has notches **126** formed therein to accommodate corresponding corner posts **82, 84** as may be, with local reinforcement doublers **128** at the junction. Lower portion **124** tapers in width to match the narrowing width between the sloped side sheets with which it mates. At the upper end of end wall **30** the end wall assembly includes a laterally extending first formed member **130** that has a first, vertical leg **132** that laps the inside face of the top chord **86**, and a bent flange **136** that extends initially horizontally, with a distal lip bent upward to mate perpendicularly with the upper margin **138** of the end slope sheet **48**. The distal tip of end slope sheet **48** is fillet welded to vertical leg **132**. This results in a substantially triangular closed section defining a laterally extending end slope sheet reinforcement beam **140**. The ends of this beam abut, are welded to, and are capped by elephant ears **112**. Vertical leg **132** also lies against, and is welded to, end post **80**.

A formed angle **142** is mounted toes-in at an intermediate height on sloped end wall **48**, forming thereby another hollow section laterally extending end sheet reinforcement or beam **148**. Vertical leg **144** of angle **142** is substantially aligned with the central web of the corner post (be it **82** or **84**) and therefore also with the central web of the main bolster. Another formed angle **150** is welded toes-in to the back of sloped end wall **30** at the level of shear plate, thereby forming yet another slope-sheet reinforcement in the form of a laterally extending beam.

The corner posts **82** and **84** each have a lower corner post flange plate **160** (that includes a lifting lug aperture) that has a bottom tab welded to the outside, or back, of the end of side sill **40** in line with the main bolster, then an angled portion following the angle of the outside edge of the vertically extending side wall reinforcements, **161**, to an upper end at the juncture of the side slope sheet with the side wall vertical leg of the lower side wall sheet. Each end post has two internal reinforcements **154**. Each corner post also includes an intermediate member, or web, or gusset, or plate **162**, which is considerably wider than intermediate gusset **106**, and a substantially triangular inside edge web stiffener **164**. Plate **162** is a quadrilateral. A first edge of plate **162** runs along the upward and outward slope of wall extension **166**. A second edge runs vertically against the upper leg **104** and lower margin of **106**. A third edge runs horizontally and laps the lower edge of lateral reinforcement beam **148**. The fourth edge runs vertically downward. As such, a vertical post is established.

Considering Figures **3a**, **3b** and **3c**, center sill **44** includes a bottom flange or bottom cover plate **165**, and a pair of spaced apart webs **168**. The central region of shear plate **76** forms the top flange, or top cover plate of the center sill. At its inboard end, the center sill terminates centrally under the bottom lateral reinforcement of the end slope sheet **48**. A draft pocket **175** is

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defined between webs **168**, shear plate **76** and bottom cover plate **165** longitudinally inboard of the striker plate.

Center plate **72** is mounted at the truck center **CL-Truck**, in line with main bolster **90** and the corner posts **82, 84**. Rear draft stops **172** are welded within the center sill above the centerplate. As can be seen in Figure **3c**, the inboard end of rear draft stop **172** extends longitudinally inboard of the truck center. While this is known to have been used in at least one single piece, integrally cast draft sills, the inventor is unaware of such a construction in an all-welded fabrication draft sill assembly. The removable draft sill access cover plate, or draft gear carrier plate **174**, which is bolted to the draft sill (i.e., the stub sill) bottom flange margins, is mounted immediately longitudinally outboard of center plate **72**. The front draft stops **176** are, in turn, mounted longitudinally outboard of carrier plate **174**. In this embodiment there is also a removable member, such as a top leeway or access plate **178**, mounted to shear plate **76**. Plate **178** is removed when draft gear **180** is removed or installed. On installation, draft gear **180**, to which yoke **188** is already mounted, is fed into draft pocket **175** from below, on an angle, whereby the rear corner protrudes upwardly through the opening that is otherwise covered by plate **178**. The front end of draft gear **180** is rotated into place, and the rear end is rotated downward. As this occurs, yoke **188** is also raised into place. Plates **178** and **174** are then reinstalled. The shank **182** of the coupler, **184** is inserted, and the coupler key **186** is fed through the slot in front draft stops **176** to link coupler **184**, and yoke **188** in the customary manner. It may be noted that coupler **184** combines an AAR Type E shank with and AAR Type F knuckle with a bottom shelf. Draft gear **180** itself has abnormally short travel, namely about 2 ½ inches deflection before going solid, as compared to a "normal" deflection of 3 - 9/16" before going solid.

Draft sill webs **164** have, at their longitudinally outboard end an end portion **190** of increased depth of section with a downwardly protruding bulge or horn, such as might be termed a "chin". End portion **190** has an aperture or slot **192** formed therein to permit lateral sliding insertion of a coupler support, carrier or bar **194** immediately behind striker plate **88**. Removal of bar **194** permits yoke **188** to be swung into place during installation of draft gear **180**. When coupler **184** is installed, the shank may rest on bar **194**. Bar **194** is held in place by bolts that secure it relative to webs **164**. Overall, a coupler installation of very short length is achieved. In this example, L_{88} may be in the range of less than 50 inches, and in one embodiment may be about 38" +/- 2", from the truck center to the outboard face of striker plate **88**. An alternative expression of the relative compactness of the draft gear is that the length from the truck center to the pulling face of the coupler, when the draft gear is extended in tension, is in the range of less

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than 65 inches, and in one embodiment is in the range of 53" +/- 2".

Car **20** may also include a door opening mechanism **200**. There are left and right hand, or first and second, doors **62, 64**. Each door has a proximal, hinged edge **206**, and a distal free edge **208**. The hinges are carried on hinge fittings welded to mounting brackets depending from the slope sheets and side sills. The hinges run parallel to the longitudinal or lengthwise axis of the car, generally such that doors **62, 64** are longitudinal doors. Each door has the form of a hollow section beam, having a proximal beam **210** along the hinge side, a distal beam **212** along the free edge, internal cross-braces, not shown, and front and back skins or sheets or plates **214, 216**. The hinges are indicated as **220**, the end closure plates as **222, 224**. The doors have door seal members **226, 228** that mutually engage when the doors are moved to a closed position. Seal members **226, 228** are sprung, such that when they are closed they deflect somewhat and in so doing take on a spring pre-load against each other.

The door mechanism includes a pair of first and second, matched left and right hand pivot arms **230, 232**; a corresponding pair of first and second drag links **234, 236**; a shared yoke **238**, and a pair of slave links **240, 242** that each pick up on a knuckle fitting **244, 246** of each of respective doors **62, 64**. The whole assembly has left and right hand symmetry.

Inasmuch as, when tripped, doors **62, 64** open under the influence of gravity, particularly when assisted by the weight of the lading being discharged, one may consider the motion that occurs as the doors are closed in the sequence of views **4a, 4b,** and **4c**; **5a, 5b,** and **5c**; and **6a, 6b** and **6c**. Knuckles **244** and **246** are constrained by geometry to move in circular arcs of fixed radii in planes perpendicular to the respective axes of rotation of doors **62** and **64**, those axes being the hinge axes of their respective hinges **220**, which each lie in a plane parallel to the **x-z** plane of the car centerline. The plane of rotation of knuckles **244, 246** will then tend to be perpendicular to the central **x-z** plane. Slave links **240** and **242** are each of fixed length; each has an end pivotally connected at a two rotational degree of freedom knuckle, be it **244** or **246**, as may be; each of slave links **240** and **242** has another end pivotally connected at a second pivot connection at yoke **238**; and slave links **240** and **242** do not transmit a bending moment, and so therefore pull in pure tension. The upper, or near (i.e., proximal), ends of drag links **234, 236** are connected to the distal ends of pivot arms **230, 232** at pivot connections **248, 250**, which may, if desired, share a common axis of rotation or pivot pin.

Yoke **238** is constrained by symmetry to pull in an **x-z** plane, which in the embodiment illustrated is the vertical plane of the centerline of the car. As such, movement of yoke **238**

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away from the plane of motion of knuckles **244** and **246** will necessarily draw knuckle fittings **244** and **246** closer together, and toward the vertical centerline plane of the car, eventually causing resilient door seals **226, 228** mutually to engage, thus closing the opening.

This motion can be achieved by pulling on drag links **234, 236**. Each pivot connection of slave links **240, 242** has a single angular degree of freedom. Similarly yoke **238** has an angular degree of freedom about the axis of rotation of the axle, or trunnions, by which it is pivotally mounted to the drag link, or drag links **234, 236**. This gives the drag link connection two angular degrees of freedom in total. As the drag links are withdrawn, the slave links pull in tension, finding the natural hypoteneuse between the plane of the arc of motion of knuckle fittings **244, 246** and the plane of motion of drag links **234, 236**. Since this mechanism operates in tension, pivot connections **248, 250** and knuckle fittings **244, 246** are co-planar, with drag links **234, 236**, yoke **238**, slave links **240** and **242**, and their associated pivot connections also lying in that same plane as well. (See Figures **5a, 5b, 5c**).

Driving force for this system is provided by an actuator, identified as **260**. Actuator **260** may be a pneumatic actuator, which may be charged by the pneumatic system of the train generally, as supplied through the pressurized air connection of the train line. Actuator **260** may include its own reservoir and check valve.

Actuator **260** is connected to move a first member, in the nature of a primary driven pivot arm or lever, **262**, which is in this instance actually a pair of matched lever arm members, which in turn is pivotally connected to, and drives, a second member in the nature of, a push rod, or, given the symmetrical nature of the assembly, a pair of left and right hand push rods **264** and **266**. One or both of push rods **264, 266** may have a secondary member, such as may be an extending arm, or detent, or stop, or abutment, identified as an over-center travel limiter or governor, **268**. The far ends of push rods **264, 266** may be connected to either pivot arms **230** (or **232**, as may be), or to drag link **234** (or **236**, as may be). It may be convenient to connect the far end of push rods **264, 266** at the same pivot connection, or connections **248, 250**.

Lever **262** has a first end pivotally mounted to primary structure of car **20** at footings, identified as mounting fixtures, fittings or brackets **270**. The drive rod of actuator **260** picks up on lever **262** at an intermediate location, such that lever **262** provides magnification of displacement. Similarly, pivot arms **230, 232** have a first or base end pivotally connected to primary structure at mounting fixtures, fittings, or brackets **272**. Actuator **260** is located on the centerline (i.e., in the central x-z plane) of car **20**, between and in substance below pivot arms

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230, 232. "Below" in this context may be thought of as radially more proximate to the pivot axis **274** of brackets **270** than is the pivot axis of connections **248, 250**, as well as in the context of being lower than as in closer to Top of Rail. In the past the lever fitting has more commonly been mounted to the slope sheet such that the output pin is lower than the pneumatic cylinder. Turning this arrangement upside down, in effect, and fitting the cylinder may then permit a more compact installation than otherwise. Similarly, the pivot axis of the driven arms is below the output knuckle. This may be taken in the sense of being further from the plane of the end slope sheets, identified as $\mathbf{P_{48}}$.

As may be noted, the line of action of drag links **234, 236** has a predominant component that is substantially parallel to plane $\mathbf{P_{48}}$. Expressed differently, at some point during mid–stroke, the line of action will be parallel to plane $\mathbf{P_{48}}$. Finally, it may be noted that rather than placing actuator **260** on shear plate **76**, and orienting actuator **260** such that its longitudinal axis (i.e., the working axis or axis of reciprocation of the actuator), that actuator is itself raised upwardly from the shear plate and oriented to work along a line of action that is tilted downward and inboard. Placing the mounts and pivot points under the apparatus, raising the actuator cylinder, and orienting it on an inclines, and making the line of action or the zone swept by the draglinks in the progressions of Figures **4a**, **4b** and **4c** (or **5a**, **5b** and **5c**) all aid in providing a more compact installation, in particular one that is longitudinally short as may suit the short distance from the truck center to the striker. It is also an installation that may tend to leave space for other car systems, such as the brake system.

This arrangement may be thought of in terms of a four bar, or multi-bar, linkage. The first bar of the linkage may be thought of as being the underframe, and everything that is rigidly mounted to the underfame. This is the datum, or frame of reference member of the linkage. The second member or component if the first pivot arm, **230** (or **232**) having a fixed main pivot point, and an output distal pivot point constrained to move on a fixed radius about the main pivot point. The fourth component or element of the linkage is the second pivot arm, namely the door, be it **62** or **64**, each of which is a second lever or pivot arm mounted to a pivot axis fixed with respect to the first or datum link, and having a distal connection, in this case also a pivot connection, constrained to move in an arc of constant radius about the base pivot axis. The third linkage is the drag link. Although the drag link is made of two portions that are held together at yoke **238**, the geometric symmetry of the assembly is such that both the upper portion of the drag link, (i.e., drag link **234, 236**) and the lower portions, namely slave links **240, 242**, are constrained to be co-planar during closing of the doors. In any case, the single input of the actuator cylinder acting through the over-center links against the first pivot arm (at the distal

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pivot connection) produces a unique output geometry such that position of the elements is determinate as if it were a four bar linkage.

When the door opening apparatus is retracted to the position shown in Figures **4c**, **5c** and **6c**, driven primary pivot arms and the over-center links are driven to a slightly over-center relationship such that the pivot connection between the primary pivot arms and the over center arms lies below a line drawn from the primary pivot axis and the over-center link output connection as axis P_{250}. In this condition tensile force on drag links **234** and **236** (as from weight placed on doors **62**, **64**, for example) will tend to urge main driven pivot arms **252**, **254** counter-clockwise as viewed in Figure **4c**. Motion in this direction is prevented by the over center stop, and is reversed by operating actuator **260** to open the doors.

Car **20** has a secondary door mechanism latching system identified generally as **300**. This secondary latch system, and, indeed, the door closure linkage apparatus of Figures **7a – 7e**, are slightly different from those shown in Figures **4a**, **5a**, and **6a**.

In latching system **300** there is a latch assembly **302**, shown in Figures **7a** and **7b**. Assembly **302** includes a first member, or main member, or plate **304**, which performs the function of a body or armature or spider that ties the other various physical elements of the assembly together. Along one edge plate **304** has physical motion constraint fittings, identified as hinge fittings **306**, that limit plate **304** (and assembly **302** more generally) to a single degree of freedom, that single degree of freedom limiting plate **304** to motion of any point to motion in a plane perpendicular to the hinge axis, and in particular to pivotal motion in that plane about that axis. To the extent that the hinge axis is substantially or predominantly parallel to the axis of reciprocation of pneumatic actuator **260**, that motion can be said to be sideways, or predominantly transverse of cross-wise to that direction of reciprocation.

Plate **304** has a portion or finger, or arm member **308** extending away from the hinge. In this case, arm member **308** extends arcuately away, and has a bent termination, or end, or lip, or tip, indicated at **310**. Another member **312** in the form of a block is mounted, e.g., welded, at the distal end of arm member **308**. Member **312** has the same general shape, a dog-leg bend, as tip **310**. Member **312** has a first, generally inwardly (i.e., away from the tip) facing surface **314** that defines an abutment **316**. Member **312** also has an oblique surface **318** that defines a wear or cam surface, which may be termed a reset cam, or return cam.

Another member **320**, which may have the form of a plate or block, is welded to the

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major portion of the body of plate **304** relatively close to the hinge axis. The axially foremost face of member **322** is relieved – i.e., it does not define a face in a plane perpendicular to the hinge axis – or to the axis of reciprocation of the pneumatic actuator clevis. This face may be arcuate or chamfered, and so defines a first or deflection cam **324**. That is, as installed, it lies in the path of actuator clevis **330**. When the leading corner of clevis **330** encounters cam **324**, plate **304** will tend to be urged to rotate, i.e., pivot, about its axis in the clockwise direction as viewed looking from actuator **260** toward hopper **52**. Assembly **302** also includes a motion resisting, or return biasing member in the form of a spring, identified as leaf spring **326** that is anchored at the proximal end to stationary structure of the secondary lock footing, or base, **328** which is welded to shear plate **76**. The distal end of spring **326** bears against plate **304** distant from the hinge. Finally, assembly **302** includes reaction force transmission members **332, 334** in the form of welded flat bars that bear against, i.e., abut, the longitudinally outboard face of mounting fitting **270** when the latch is in the engaged position.

In operation, as actuator **260** works, lost motion is taken up in slot **336** of the distal or forward end **338** of the reciprocating actuator ram. Eventually the end of slot **336** engages a pivot pin **340** of bell crank arm **342** and causes driven member **344** (analogous to driven member **262**), causing it to rotate counterclockwise as viewed in Figure **7a**. This forces push rods **346, 348** (analogous to push rods **264, 266**) to act against connections **248, 250**, and hence to force drag links **234, 236** along their retracting path. Since **262, 264, 230** and the car body form a four bar linkage, the output path of connections **248, 250** is determinate and unique.

While this happens, clevis **338** keeps moving rearward to engage reset cam surface **318**, with the effect that assembly **302** is urged to rotate out of the way, against the resistance of spring **326** (Figure **7d**). Eventually the trailing portion of clevis **338** clears cam **324**, and soon thereafter the most longitudinally inboard edge of driven member **344** clears abutment **316**. Assembly **302** then moves under the influence of spring **326** into the locked position shown in Figure **7e**. In this locked position, any moment tending to pivot driven member **344** clockwise is reacted not by the hinge fittings, but rather by the reinforcements, namely members **332, 334**. In this locked position driven member **344** and push rods **346, 348** are drawn to, and locked in, their over center position.

When the doors are to be released, actuator **260** moves in the opposite direction. The lost motion of the length of slot **336** reverses, such that the end of clevis **338** bears against the release cam, namely cam surface **324**, which causes plate **304** to pivot away, and thus disengages abutment **316**. The outboard end of slot **336** then engages pin **340**, releasing the over-center hold

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of driven member **344**, and permitting the doors to open under the influence of gravity.

The cams need not necessarily be on the plate, but could be on the clevis, as shown at **350** in Figure **4c**. The apparatus of Figure **4c** works in substantially the same way, and combines both arms of the bell crank driven member **344** into the driven lever **262**.

Various embodiments have been described in detail. Since changes in and or additions to the above-described examples may be made without departing from the nature, spirit or scope of the invention, the invention is not to be limited to those details.

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Claims

We claim:

1. A railroad hopper car comprising:

at least one hopper having a bottom discharge, said bottom discharge including a door movable between a closed position for retaining lading and an open position for permitting egress of lading;

said hopper being carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of said car;

said hopper having at least a first end slope sheet inclined downwardly in said lengthwise direction toward said door;

a linkage connected to said door, said linkage being oriented lengthwise with respect to said car; and

a drive connected to said linkage, said drive being operable to move said linkage and thereby to urge said door to a closed position; and

said linkage being movable from a first position corresponding to said open position of said door to a second position corresponding to said closed position of said door;

said linkage including at least a drag link; and

when said linkage moves from said first position to said second position one of

(a) said overall motion from said first position to said second position includes displacement of said drag link in a direction having a predominant component of motion parallel to said first end slope sheet; and

(b) said motion of said drag link is at least instantaneously parallel to said first end slope sheet.

2. The railroad hopper car of claim 1 wherein:

said linkage includes a first pivot arm pivotally connected to a datum structure at a first pivot connection;

said drive also being mounted to said datum structure;

said linkage includes a second pivot arm pivotally connected to said datum structure at a second pivot connection, said second pivot arm having said door mounted thereto;

said first pivot arm has a second connection distant from said first pivot connection;

said second pivot arm has a second connection distant from said second pivot connection;

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a mechanical transmission is mounted between said second connection of said second pivot arm and said second connection of said first pivot arm;

said mechanical transmission includes said drag link; and

said drive is connected to move said first pivot arm, and, in moving from said first position to said second position, each position of said first pivot arm being associated with a unique position of said drag link.

3. The railroad hopper car of claim 1 wherein:

said linkage includes left and right hand first pivot arms pivotally connected to a datum structure at respective first pivot connections, said respective first pivot connections being co-axial;

said linkage includes left and right hand second pivot arms pivotally connected to said datum structure at respective second pivot connection;

said door is a left hand door of a pair of co-operable right and left hand doors, said left hand door being mounted to said left hand second pivot arm and said right hand door being mounted to said right hand second pivot arm;

each said first pivot arm has a respective second connection distant from its respective first pivot connection, said respective second connections being pivot connections and being mutually co-axial;

each said second pivot arm has a respective second connection distant from said respective second pivot connection;

a mechanical transmission is mounted between said respective second connections of said second pivot arms and said respective second connections of said first pivot arms;

said drag link is a left hand drag link, and said mechanical transmission includes a mated parallel right hand drag link;

said left and right hand drag links each have a first end mounted to one of said respective second connections of said first pivot arms;

said left and right hand drag links have second ends yoked together distantly from said first ends;

said transmission member includes left and right hand slave links extending between and connecting said second ends of said drag links to said second connections of said second pivot arms respectively.

4. The railroad hopper car of claim 1 wherein:

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said linkage includes left and right hand first pivot arms pivotally connected to a datum structure at respective first pivot connections, said respective first pivot connections being co-axial;

said linkage includes left and right hand second pivot arms pivotally connected to said datum structure at respective second pivot connection;

said door is a left hand door of a pair of co-operable right and left hand doors, said left hand door being mounted to said left hand second pivot arm and said right hand door being mounted to said right hand second pivot arm;

each said first pivot arm has a respective second connection distant from its respective first pivot connection, said respective second connections being pivot connections and being mutually co-axial; and

said left and right hand pivot arms co-operate to define a bifurcated lever straddling said drive.

5. The railroad hopper car of claim 1 wherein said drive includes an actuating cylinder having an axially reciprocating member, said axially reciprocating member being inclined relative to horizontal.

6. The railroad hopper car of claim 5 wherein said drag link lies between said actuating cylinder and said first end slope sheet of said hopper.

7. The railroad hopper car of claim 1 wherein said railroad hopper car includes a first end section, said first end section includes a draft sill and a substantially horizontal shear plate mounted over said draft sill, said drive includes an actuating cylinder having an axis of reciprocation lying in a central vertical-lengthwise plane of said car, said actuating cylinder is mounted above said shear plate, said first end slope sheet at least partially overhangs said actuating cylinder; and said drag link is located between said actuating cylinder and said first slope sheet.

8. A railroad hopper car comprising:

at least one hopper having a bottom discharge, said bottom discharge including a gate movable between a closed position for retaining lading and an open position for permitting egress of lading;

structure by which said hopper is carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of said car;

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a door operating linkage connected to said gate, said door operating linkage being oriented lengthwise with respect to said car; and

an actuating cylinder connected to drive said door operating linkage, said actuating cylinder also being oriented to act lengthwise with respect to said car, said actuating cylinder having an axis of reciprocation; and

said axis of reciprocation being tilted such that displacement of said actuating cylinder includes a vertical component of motion.

9. The railroad hopper car of claim 8 wherein said hopper car includes an end section mounted over one of the trucks, the end section includes a substantially horizontal shear plate, and said actuating cylinder is mounted on a pedestal mounted to said shear plate, said pedestal including an inclined mounting for said cylinder.

10. The railroad hopper car of claim 8 wherein said railroad hopper car has a longitudinal-vertical central plane, and said axis or reciprocation lies in said longitudinal-vertical plane.

11. The railroad hopper car of claim 8 wherein said hopper includes at least a first end slope sheet extending longitudinally and being inclined longitudinally inboard and downwardly toward said gate, and at least part of said actuating cylinder is overhung by at least part of said first end slope sheet.

12. The railroad hopper car of claim 8 wherein:

said hopper car includes an end section having a substantially horizontal shear plate mounted over a draft sill;

said hopper includes a first end slope sheet, said first end slope sheet at least partially overhanging said horizontal shear plate;

said actuating cylinder is mounted above said shear plate, centrally aligned over said draft sill; and

said actuating cylinder is at least partially overhung by said first end slope sheet.

13. The railroad hopper car of claim 12 wherein:

said first slope sheet is substantially planar and has a first angle of inclination relative to horizontal;

said actuating cylinder is inclined longitudinally inboard downwardly, and is inclined at a second angle; and

said second angle lies between horizontal and said first angle.

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14. The railroad hopper car of claim 8 wherein:

said car has an underframe and said door operating linkage includes a first linkage component, a second linkage component, a third linkage component, and a fourth linkage component;

said first linkage component is a reference datum component and includes structure immovable relative to said underframe;

said second linkage component is a first pivot linkage mounted to said first linkage component at a main pivot connection, said first pivot linkage being a first pivot arm constrained to pivot on an axis of rotation oriented horizontally cross-wise relative to said underframe;

said fourth linkage component is a second pivot linkage pivotally mounted to said first linkage component and includes at least said gate; and

said third linkage component includes a drag link element connected to said first pivot arm, said drag link element having at least a first pivotal attachment to at least a portion of said fourth linkage component, whereby input motion of said second linkage component uniquely determines position and motion of said third and fourth linkage components relative to said first linkage component; and

motion of said second linkage component is driven by said actuator.

15. The railroad hopper car of claim 8 wherein said main pivot connection of said first pivot arm to said first linkage component is located lower than said actuating cylinder.

16. The railroad hopper car of claim 15 wherein said drag link element is connected to said first pivot arm at a distal pivot connection relative to said main pivot connection, and, when said gate is in said closed position and said car is viewed in side view, said actuating cylinder is located between said main pivot connection and said distal pivot connection.

17. A railroad hopper car comprising:

at least one hopper having a bottom discharge, said bottom discharge including a gate movable between a closed position for retaining lading and an open position for permitting egress of lading;

first and second end sections to which said hopper is mounted, said first and second end sections being mounted to respective first and second railroad car trucks for rolling motion along railroad tracks in a lengthwise direction of said car;

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a door operating linkage connected to said gate, said door operating linkage being oriented lengthwise with respect to said car and connected; and

an actuating cylinder connected to drive said door operating linkage, said actuating cylinder also being oriented to act in a lengthwise extending plane with respect to said car, said actuating cylinder having an axis of reciprocation;

said door operating linkage including a first pivot arm pivotally mounted to said first end section at a first pivot connection;

a mechanical transmission connected between said first pivot arm and said gate, said mechanical transmission including at least a drag link movably connected to said first pivot arm at a location distant from said first pivot connection; and

said first pivot connection being lower than said actuating cylinder as seen when viewing said first end section in side view.

18. The railroad hopper car of claim 17 wherein when said gate is in said closed position and said car is viewed in side view, said actuating cylinder is located between said main pivot connection and said distal pivot connection.

19. The railroad hopper car of claim 17 wherein said actuating cylinder drives an intermediate lever that is connected to drive said first pivot arm.

20. A rail road hopper car comprising:

a hopper carried between a pair of trucks, said hopper having first and second upstanding sidewalls running lengthwise therealong;

said hopper having a lower discharge and convergent slope sheets giving onto said discharge;

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;

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;

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;

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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 upstanding sidewall;

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;

said sidewall having a continuous section between said first and second regions thereof; and

said sidewall stiffener having web continuity between said first and second portions thereof.

21. The rail road hopper car of claim 20 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.

22. The rail road hopper car of claim 20 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.

23. The rail road hopper car of claim 20 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;

said hopper includes first and second sloped side sheets; and

said first sloped side sheet meets said first sidewall at said transition portion.

24. The rail road hopper car of claim 22 wherein said first sidewall has an overall height from said side sill to said top chord, L, and said transition is located a distance above said side sill that is in the range of ¼ to 2/3 L.

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25. The rail road hopper car of claim 23 wherein said first sidewall has an overall height from said side sill to said top chord, L, and said first sloped sheet meets said transition at an height that is in the range of ¼ to 2/3 L above said side sill.

26. A railroad hopper car comprising:

at least one hopper having a bottom discharge, said bottom discharge having a bottom discharge governor movable between a closed position for retaining lading and an open position for permitting egress of lading;

structure by which said hopper is carried on spaced apart railroad cars trucks for rolling motion along railroad tracks in a lengthwise direction of said car;

a door operating linkage oriented lengthwise with respect to said car; and

an actuating cylinder also oriented to act in a lengthwise extending plane with respect to said car, said actuating cylinder being connected to drive said door operating linkage;

said door operating linkage including a pair of first and second linkage members co-operably mounted to either transverse side of said actuating cylinder, whereby said actuating cylinder is bracketed by said linkage members.

27. The railroad hopper car of claim 26 wherein:

said car has an underframe and said linkage is a closed loop bar linkage in which there is a first linkage component, a second linkage component, a third linkage component, and a fourth linkage component;

said first linkage component is a reference datum component and includes structure immovable relative to said underframe;

said second linkage component is a first pivot linkage mounted to said first linkage component at a main pivot connection, and which includes said first and second linkage members, said first and second linkage members being a matched pair of left and right hand pivot arms constrained to pivot on a common axis of rotation relative to said underframe;

said fourth linkage component is a second pivot linkage pivotally mounted to said first linkage component and includes at least one pivotally mounted door assembly defining said bottom discharge governor; and

said third linkage component includes a drag link element having at least a first pivotal attachment to at least a portion of said fourth linkage component, whereby input motion of said second linkage component uniquely determines position and

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motion of said third and fourth linkage components relative to said first linkage component; and

motion of said second linkage component is driven by said actuator.

28. The railroad hopper car of claim 26 wherein:

said hopper includes a hopper end slope sheet, said end slope sheet extending substantially in a plane inclined downwardly and lengthwise inwardly toward said bottom discharge;

displacement of said third linkage component associated with motion of said door assembly between said open position is predominantly in a direction generally parallel to said end slope sheet.

29. The railroad hopper car of claim 26 wherein:

said hopper includes a hopper end slope sheet, said end slope sheet extending substantially in a plane inclined downwardly and lengthwise inwardly toward said bottom discharge;

during at least an instantaneous portion of motion of said third linkage component while said door assembly is in a position between said open position and said closed position said third linkage component moves parallel to said end slope sheet.

30. The railroad hopper car of claim 26 wherein:

said third linkage component includes at least a first element and a second element mounted thereto;

said first element is pivotally mounted to said first linkage component, and is constrained to move in a lengthwise-vertical plane relative to said first linkage component;

said second element has a first connection to said first component said first connection being a pivot connection; and a second connection to said fourth linkage component, said second connection having at least one degree of freedom of motion; and

said second element being constrained always to be co-planar with said first connection, said second connection, and said main pivot connection.

31. The railroad hopper car of claim 26 wherein said bottom discharge governor includes a door, said actuating cylinder is connected to drive said door operating linkage through a lever assembly, and said lever assembly has an over-center lock, said over center lock being operable

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to prevent release of said bottom gate to said open position when said actuating cylinder is inactive.

32. The railroad hopper car of claim 26 wherein motion of said first pivot linkage occurs in a longitudinal-vertical plane, and said second pivot linkage moves in a plane generally cross-wise to said longitudinal-vertical plane.

33. The railroad hopper car of claim 26 wherein said main pivot connection is beneath said actuating cylinder when said hopper car is seen in side view.

34. The railroad hopper car of claim 26 wherein one of (a) said main pivot is beneath said drag link element; and (b) said actuating cylinder is between said main pivot and said drag link element.

35. The railroad hopper car of claim 26 wherein said hopper includes at least a first end slope sheet, said bottom discharge governor includes a door, said first end slope sheet being inclined longitudinally downwardly and inboard toward said door, said drag link element is inclined on a slope predominantly parallel to, and adjacent to, said first end slope sheet, and said actuating cylinder is oriented along said lengthwise direction, and is also tilted longitudinally downwardly and inwardly toward said door.

36. A railroad hopper car comprising:

at least one hopper carried by railroad car trucks for motion in a lengthwise direction of said car along railroad tracks, said hopper having a bottom discharge, said bottom discharge having a door movable between a closed position for retaining lading and an open position for permitting egress of lading;

a mechanical transmission connected to said door, said mechanical transmission being oriented lengthwise with respect to said car; and

a door actuator, said door actuator being connected to said mechanical transmission and being operable to urge said door from said open position toward said closed position, said door actuator being oriented to reciprocate in a first direction;

said hopper car having a first lock operable to prevent movement of said door from said closed position to said open position when said door actuator is inactive;

said hopper car having a second lock operable to prevent movement of said door from said closed position to said open position when said door actuator is inactive if said first lock should fail; and

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said second lock is movable between an engaged position in which it prevents movement of said door to said open position thereof, and

in moving between said engaged and disengaged positions, said second lock is mounted to have a displacement that is predominantly cross-wise to said first direction of said reciprocation of said door actuator.

37. The railroad hopper car of claim 36 wherein said car has a central lengthwise-vertical plane, said door actuator is positioned to reciprocate in said central lengthwise-vertical plane, and said second lock is movable between said engaged and disengaged positions in motion predominantly transverse to said central lengthwise-vertical plane.

38. The railroad hopper car of claim 36 wherein said second lock is mounted on an hinge and pivots in a circumferential direction between said engaged and disengaged positions.

39. The railroad hopper car of claim 37 wherein said second lock is mounted on an hinge, said hinge has an axis lying parallel to said lengthwise vertical plane, and said second lock pivots circumferentially between said engaged and disengaged positions.

40. The railroad hopper car of claim 38 wherein said second lock is biased toward said engaged position.

41. The railroad hopper car of claim 39 wherein said second lock is biased toward said engaged position.

42. The railroad hopper car of claim 40 wherein one of:

(a) said second lock has a cam and said actuator has a mating cam follower; and

(b) said second lock has a cam follower and said actuator has a mating cam,

said cam and cam follower being co-operable, and being oriented to deflect said second lock away from said engaged position as said door moves from said open position to said closed position thereof.

43. A lock mechanism for a door actuating transmission of a railroad gondola car, the door actuating transmission including a reciprocating actuating cylinder mounted to a datum structure, the cylinder being movable forward and backward in an axial direction, said lock mechanism comprising:

a body having a first fitting, a second fitting and a third fitting;

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said first fitting being a mounting by which to connect said lock mechanism to the datum structure;

said second fitting being one of (a) a cam for co-operation with a member of the door actuating transmission, that member being a cam follower; and (b) a cam follower for co-operation with a member of the door actuating transmission, that member being a cam;

said third fitting including an abutment for co-operation with a mating fitting of the door actuating transmission;

said third fitting being movable between a first position and a second position, in said first position said abutment being presented to obstruct motion of the mating fitting of the door actuating transmission and thereby to prevent the door from moving to an open position thereof;

said second fitting being movable between a first position and a second position, in said first position thereof said second fitting being positioned to intercept the member of the door actuating transmission and to be deflected away from said first position toward said second position thereby;

said first fitting having a first degree of freedom of motion permitting said first and second fittings to move between their respective first and second positions; and

said degree of freedom constraining said third fitting to motion predominantly cross-wise to the axial direction.

44. The lock mechanism of claim 43 further comprising a bias member, said bias member being oriented to urge said third fitting toward said first position thereof.

45. The lock mechanism of claim 44 wherein said bias member is a spring having a first end and a second end, said first end being mounted to bear against said body of said lock mechanism, said second end having a foot for reaction against the datum structure.

46. The lock mechanism of claim 43 wherein said first degree of freedom of motion is an angular degree of freedom, and said predominantly cross-wise motion is predominantly circumferential motion about an axis of rotation.

47. The lock mechanism of claim 46 wherein said first fitting is an hinge, said axis of rotation is an axis of rotation of said hinge; and said axis of rotation of said hinge is substantially parallel to the axial direction of the door actuating transmission.

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48. The lock mechanism of claim 46 wherein said first fitting includes an hinge and a footing of said hinge for mounting to the datum structure, wherein said axis of rotation is an axis of rotation of said hinge, and said footing has a substantially planar footprint, said axis of rotation of said hinge being angularly inclined relative to said substantially planar footprint.

49. The lock mechanism of claim 43 wherein:

said lock mechanism has a bias member, said bias member being oriented to urge said third fitting toward said first position thereof;

said bias member is a spring having a first end and a second end, said first end being mounted to bear against said body of said lock mechanism, said second end having a foot for reaction against the datum structure;

said first degree of freedom of motion is an angular degree of freedom, and said predominantly cross-wise motion is predominantly circumferential motion about an axis of rotation;

said first fitting includes an hinge, said axis of rotation is an axis of rotation of said hinge; said axis of rotation of said hinge is substantially parallel to the axial direction of the door actuating transmission; and

said footing has a substantially planar footprint, said axis of rotation of said hinge being angularly inclined relative to said substantially planar footprint.

50. A railroad hopper car for carrying particulate material, said hopper car comprising:

a hopper;

first and second end sections for carriage by respective first and second rail road car trucks for rolling motion along railroad tracks in a longitudinal direction;

said hopper being suspended between said first and second end sections, said hopper having a discharge section through which to release lading, and first and second end slope sheets oriented toward said first and second end sections, said slope sheets being inclined in the longitudinal direction to feed said discharge section;

said first end section including a draft sill extending in the longitudinal direction, a main bolster extending cross-wise to either side of said draft sill, and a shear plate mounted to said draft sill and to said main bolster, said shear plate extending lengthwise along said draft sill and cross-wise from side to side of said hopper car;

said first end slope sheet of said hopper over hanging said shear plate of said first end section; and

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

51. The railroad hopper car of claim 50 wherein one of:

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

(b) said first slope sheet has an upper margin terminating at an end wall, and said hopper car includes an end post extending upwardly from draft stub sill to said end wall.

52. The railroad hopper car of claim 51 wherein said shear plate has a longitudinally outboard margin and said draft sill has a striker located outboard of said longitudinally outboard margin of said shear plate, and said end post is one of:

(a) rooted to said draft sill adjacent to said striker;

(b) rooted to said shear plate adjacent to said longitudinally outboard margin of said shear plate.

53. The railroad hopper car of claim 50 wherein said bolster has first and second laterally outboard distal ends, and said hopper car has corner posts extending upwardly from said distal ends of said hopper to said first slope sheet.

54. The railroad hopper car of claim 51 wherein said bolster has first and second laterally outboard distal ends, and said hopper car has corner posts extending upwardly from said distal ends of said hopper to said first slope sheet.

55. The railroad hopper car of claim 50 wherein:

one of:

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

(b) said first slope sheet has an upper margin terminating at an end wall, and said hopper car includes an end post extending upwardly from draft stub sill to said end wall;

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

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(a) rooted to said draft sill adjacent to said striker;

(b) rooted to said shear plate adjacent to said longitudinally outboard margin of said shear plate;

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

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

56. The railroad hopper car of claim 55 wherein:

said hopper car has at least one longitudinally hinged discharge door, said discharge door being movable cross-wise between open and closed positions; and

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

57. The railroad hopper car of claim 56 wherein a brake reservoir is also at least partially lodged in said machinery space.

58. The railroad hopper car of claim 50 wherein:

said shear plate is mounted above and to said main bolster and defines an upper flange thereof;

said main bolster has a lower flange downwardly spaced from said upper flange, said lower flange terminating at respective distal end portions at either side of said car;

said car includes a side sill running along said car between said first and second end sections;

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

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

59. The railroad hopper car of claim 58 wherein said shear plate defines an upper flange of said draft sill whereby said draft sill upper flange, said shear plate and said side sill upper flange are all substantially co-planar.

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60. The railroad hopper car of claim 56 wherein said machinery space is free of elephant ears.

61. A railroad freight car said railroad freight car comprising:

a freight car body for carrying lading, said body being mounted on railroad car trucks for rolling motion in a longitudinal direction along railroad tracks;

said car body including a draft sill having a draft gear pocket for accommodating draft gear, and a shear plate overlying said draft sill and functioning as an upper flange of said draft sill;

said draft sill having an inboard end oriented toward a truck center of one of said trucks, and an outboard end terminating at a striker;

said draft sill having an underside and an access opening formed in said underside to admit entry of draft gear into said draft gear pocket from below;

said car having a draft gear carrier plate, said carrier plate being mounted to said underside of said draft sill beneath said draft gear pocket, and said carrier plate being removable to permit installation of the draft gear into said draft gear pocket;

said car body having one of

(a) an aperture formed in said shear plate over an inboard end region of the draft sill, said aperture permitting a portion of said draft gear to protrude upwardly therethrough during installation in said draft gear pocket; and

(b) a coupler carrier seat defined in said draft sill longitudinally inboard of said striker, and a coupler carrier co-operable therewith, said coupler carrier being removable to permit installation of draft gear in said draft pocket, and, when said coupler carrier is installed, said coupler carrier providing a support for a coupler shank when the coupler shank is connected to the draft gear within said draft sill.

62. The railroad freight car of claim 61 wherein said freight car has both (a) and (b) thereof.

63. The railroad freight car of claim 61 further comprising a cover plate for said aperture of said shear plate, said cover plate being removable to permit installation of said draft gear.

64. The railroad freight car of claim 61 wherein said draft sill has a pair of vertically oriented, longitudinally running spaced apart side webs; said webs have a greater depth of section adjacent to said striker, said webs have respective first and second apertures formed

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therein, said first and second apertures defining said draft gear retainer seat, and said retainer is a sideways slidable shaft that is movable to extend across said draft sill between said first and second apertures in said draft sill side webs.

65. The railroad freight car of claim 64 further comprising a cover plate for said aperture of said shear plate, said cover plate being removable to permit installation of said draft gear.

66. The railroad freight car of claim 61 wherein said draft sill has a centerplate centered on said truck center, rear draft stops are welded within said draft sill, and at least a portion of each of said rear draft stops extends longitudinally inboard of the truck center.

67. The railroad freight car of claim 61 wherein one of:

(a) said freight car has a truck center to striker plate draft sill length of less than 50 inches; and

(b) said freight car has a truck center to coupler pulling face length of less than 65 inches when the draft gear is fully extended in draft.

68. The railroad freight car of claim 67 wherein one of:

(a) said freight car has a truck center to striker plate draft sill length of about 38 inches (+/- 2"); and

(b) said freight car has a truck center to coupler pulling face length of about 53 inches (+/- 2") when the draft gear is fully extended in draft.

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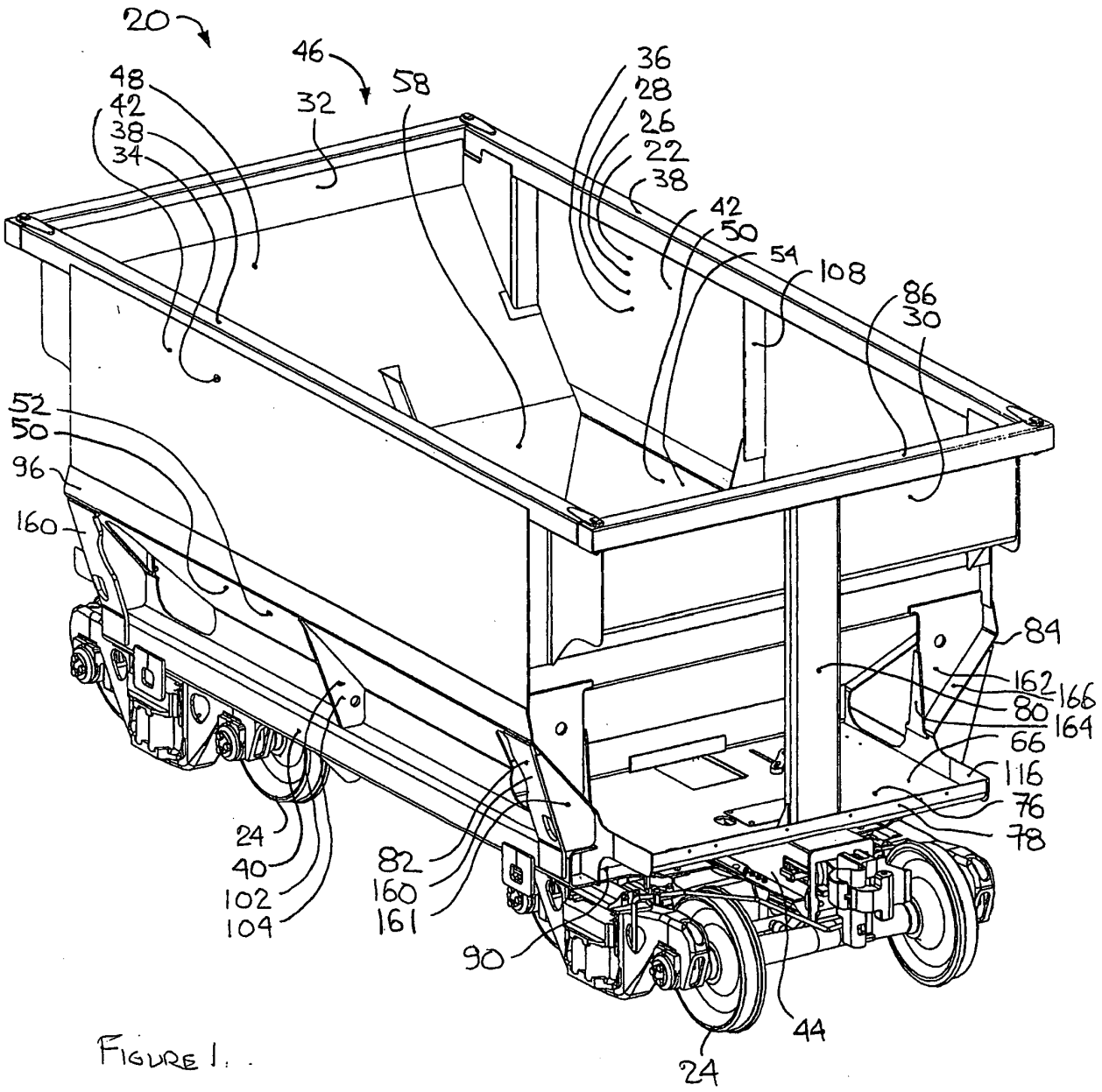


FIGURE 1.

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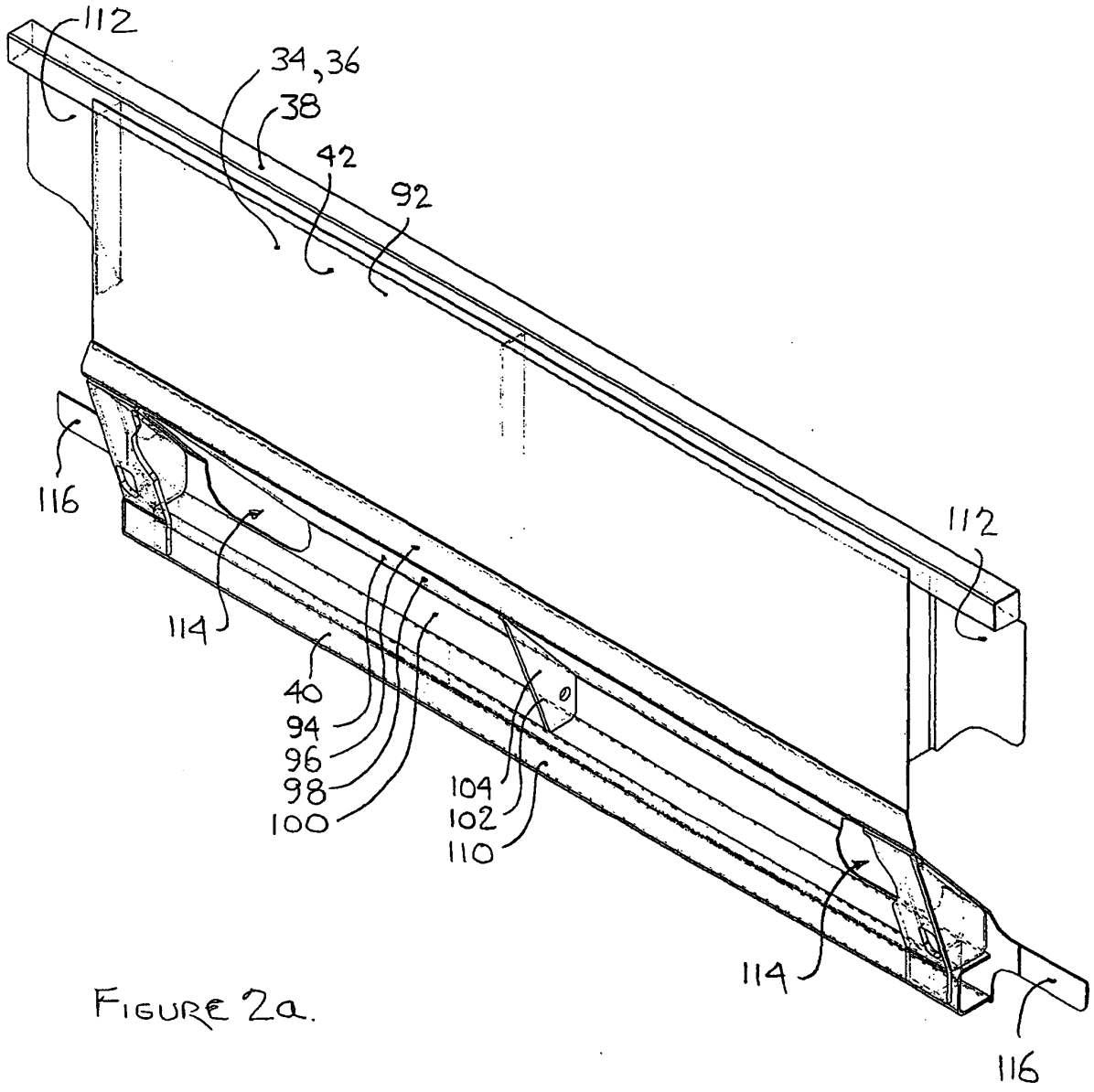


FIGURE 2a.

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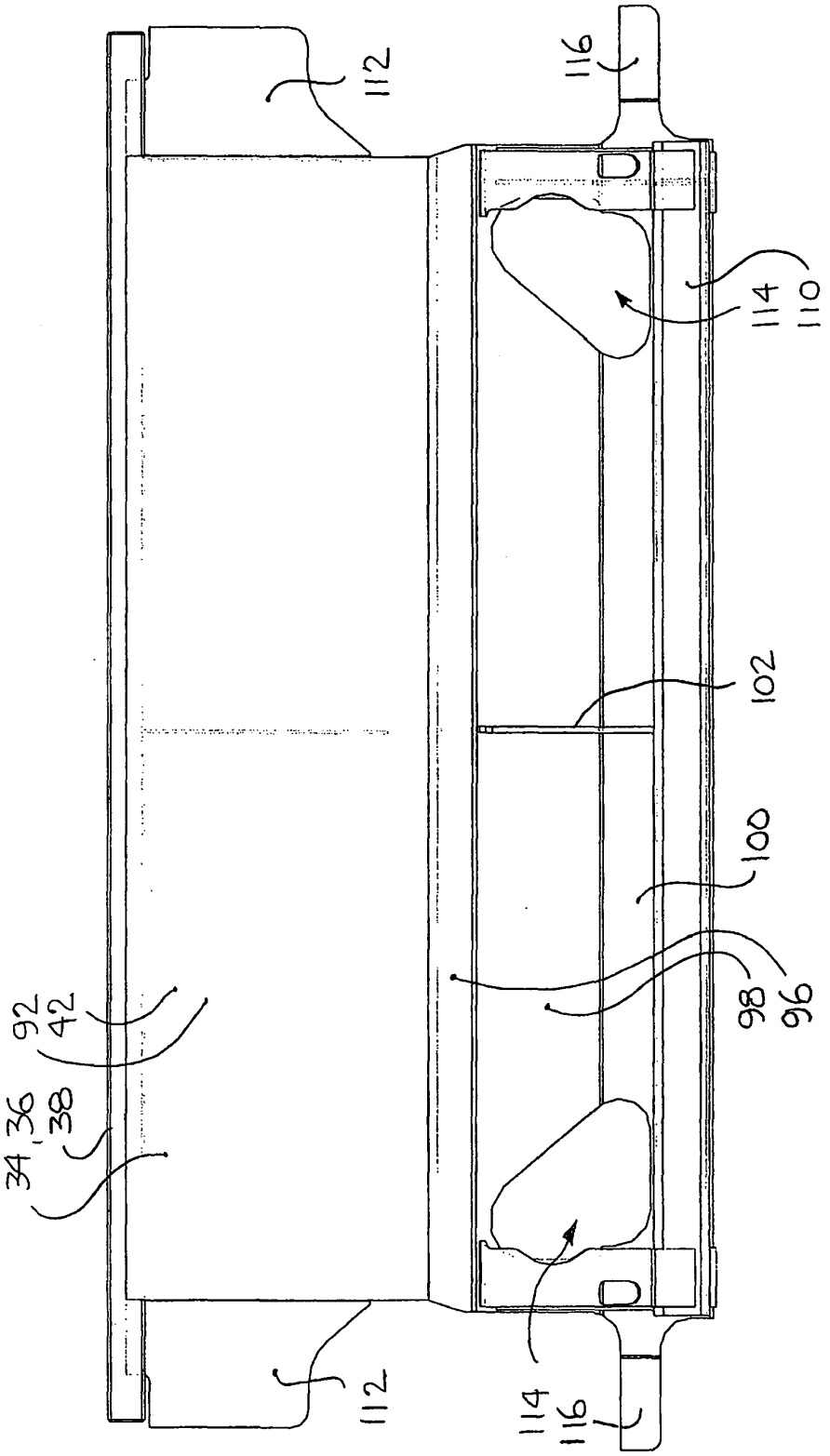


FIGURE 2b.

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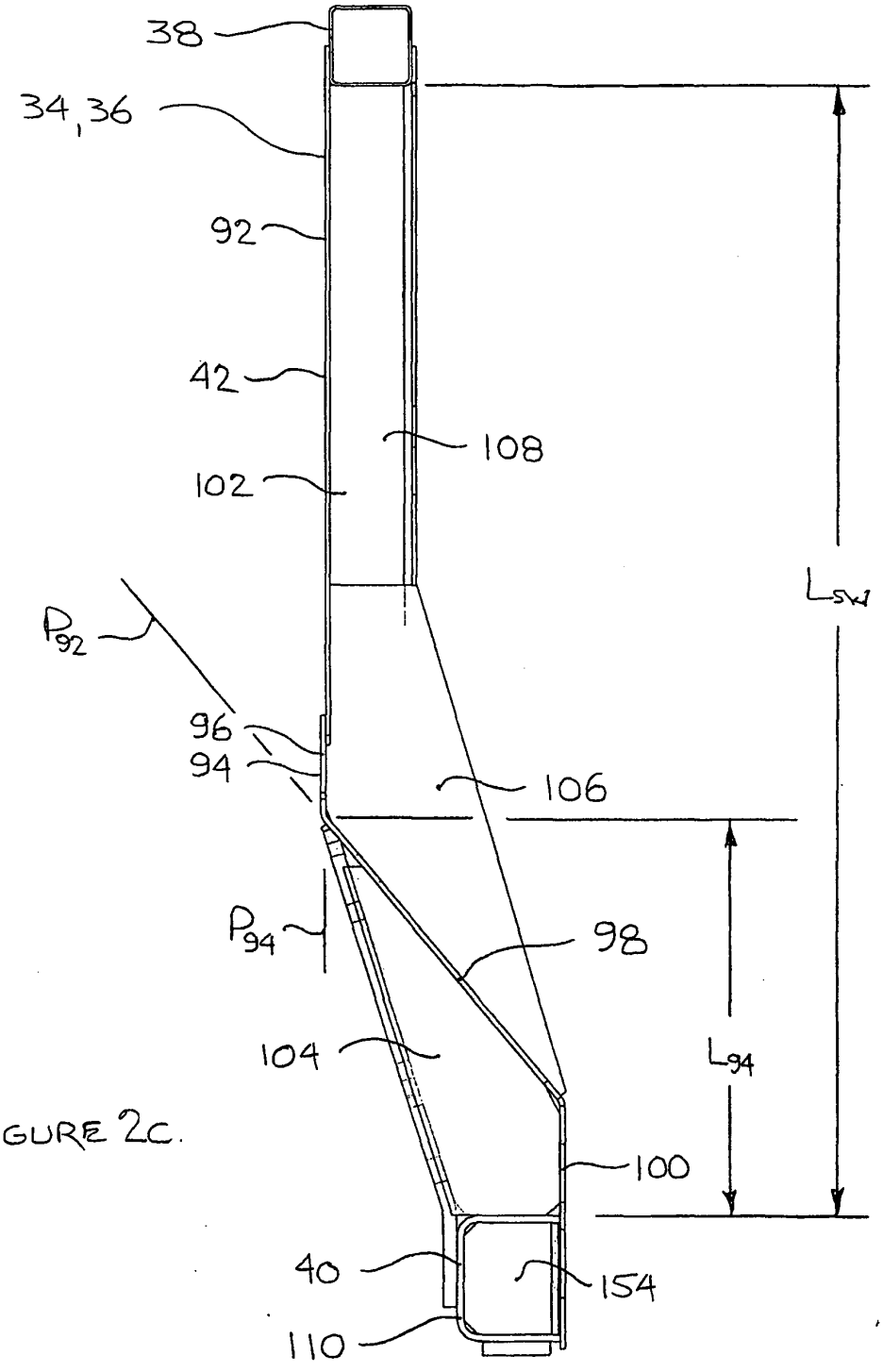


FIGURE 2C.

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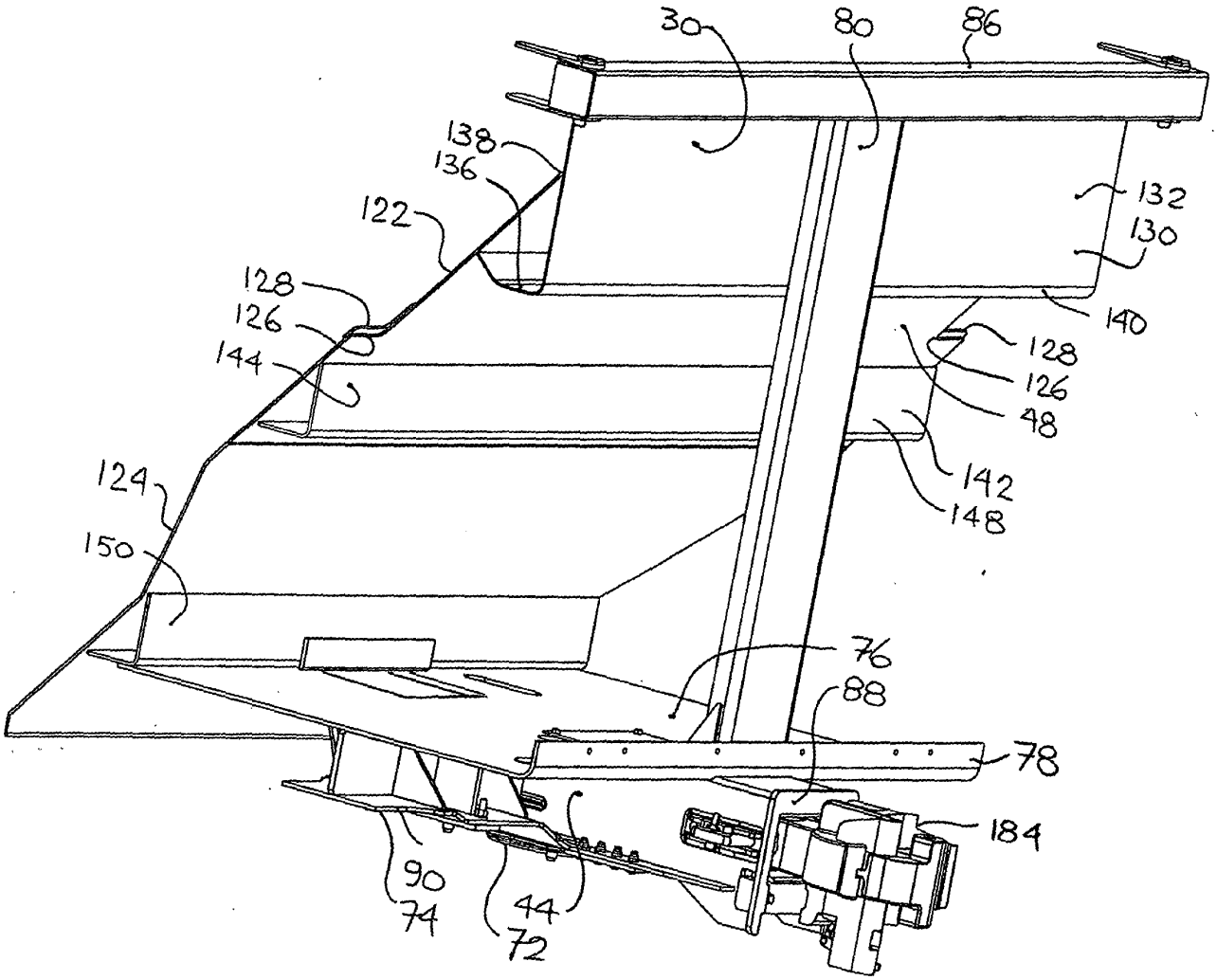

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FIGURE 3a.

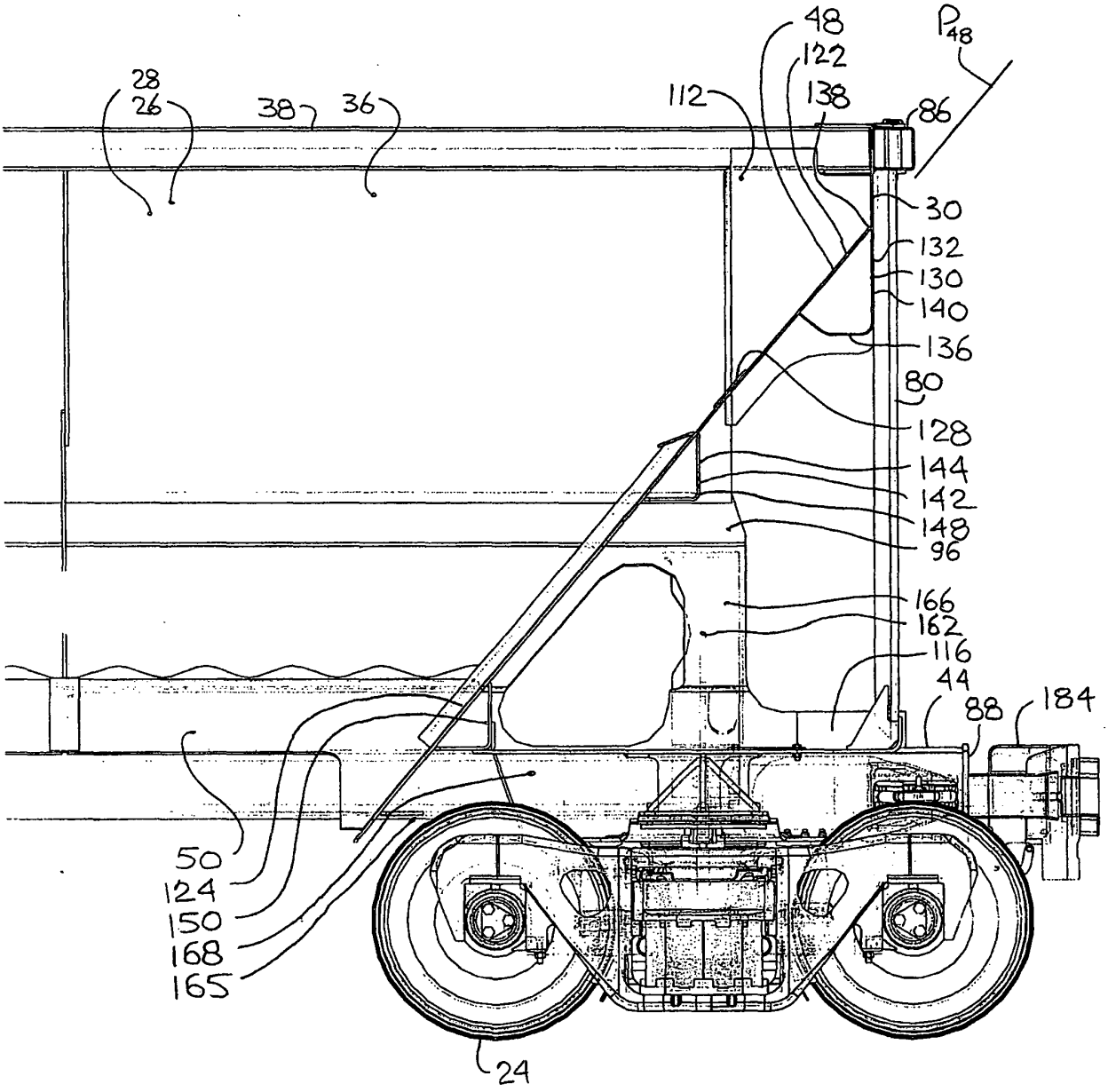


FIGURE 3b.

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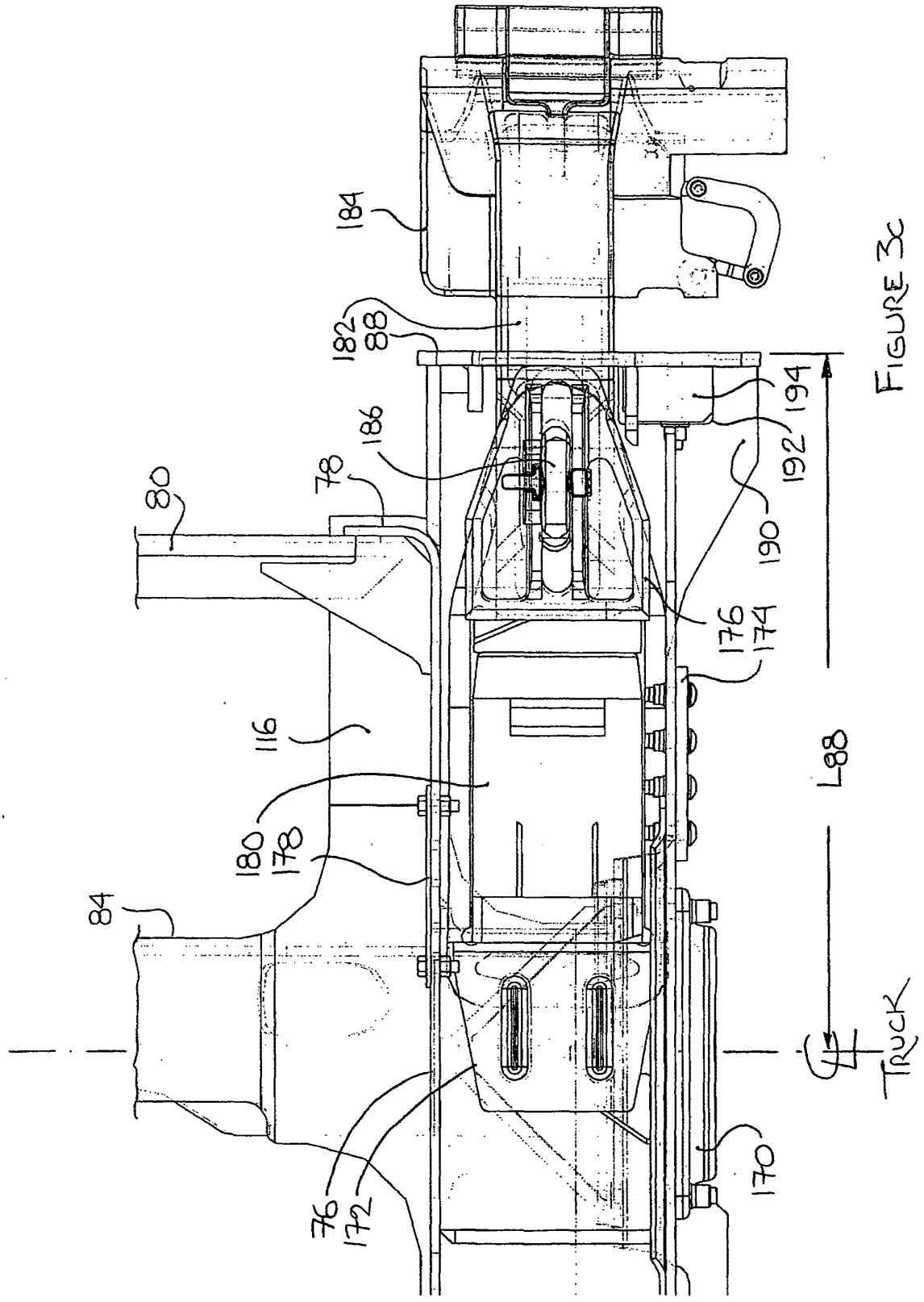


FIGURE 3c

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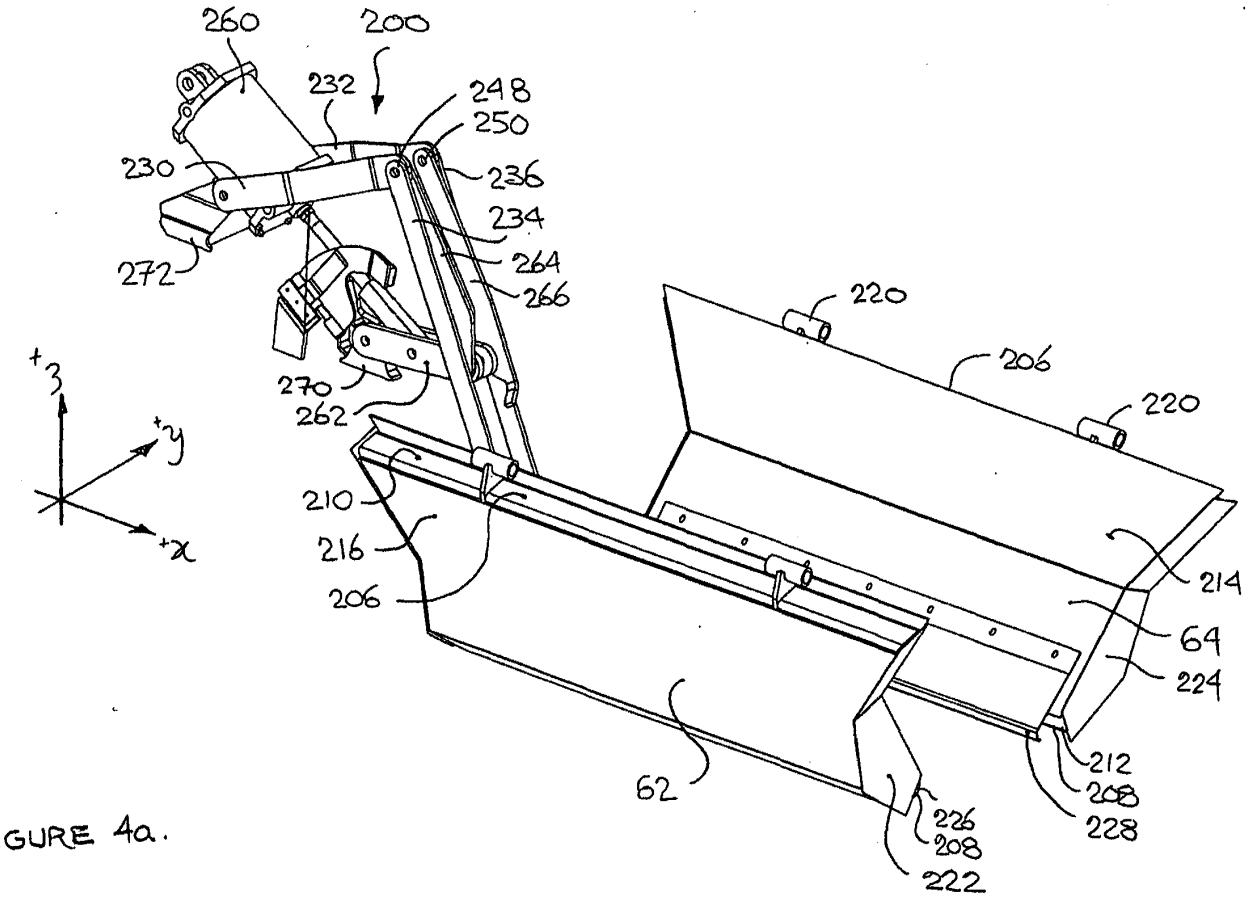


FIGURE 4a.

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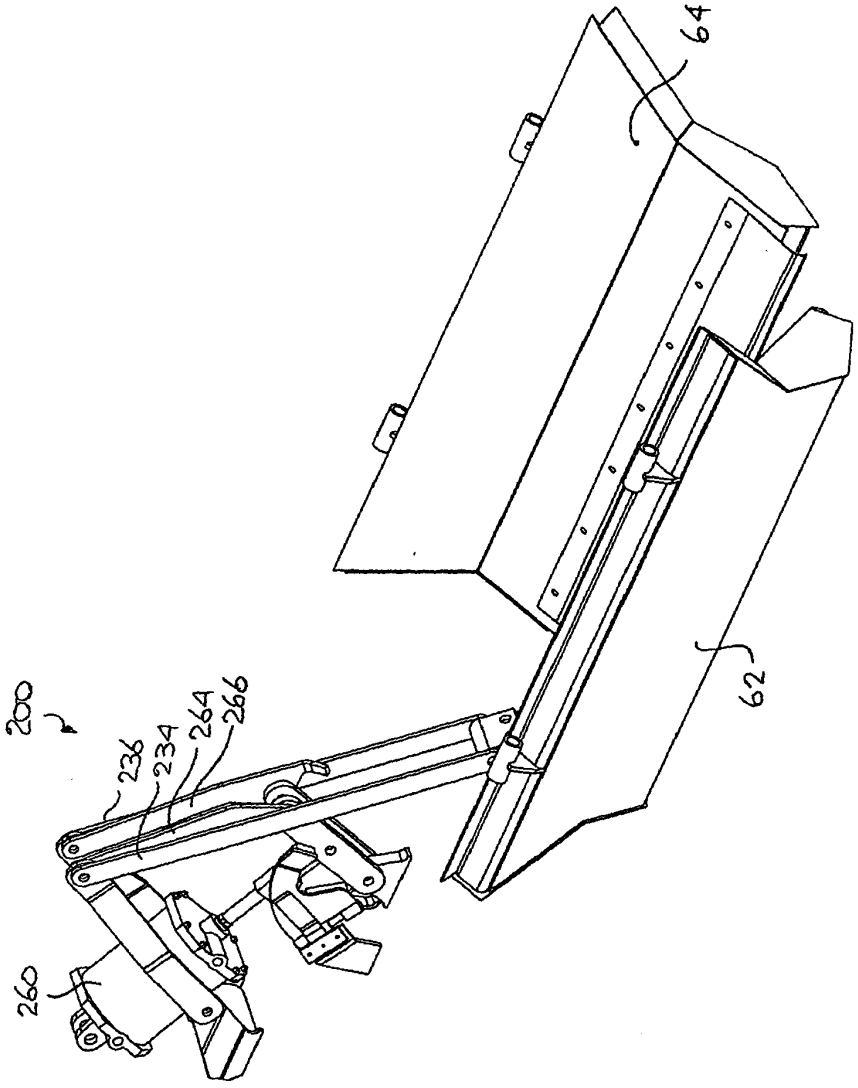


FIGURE 4b

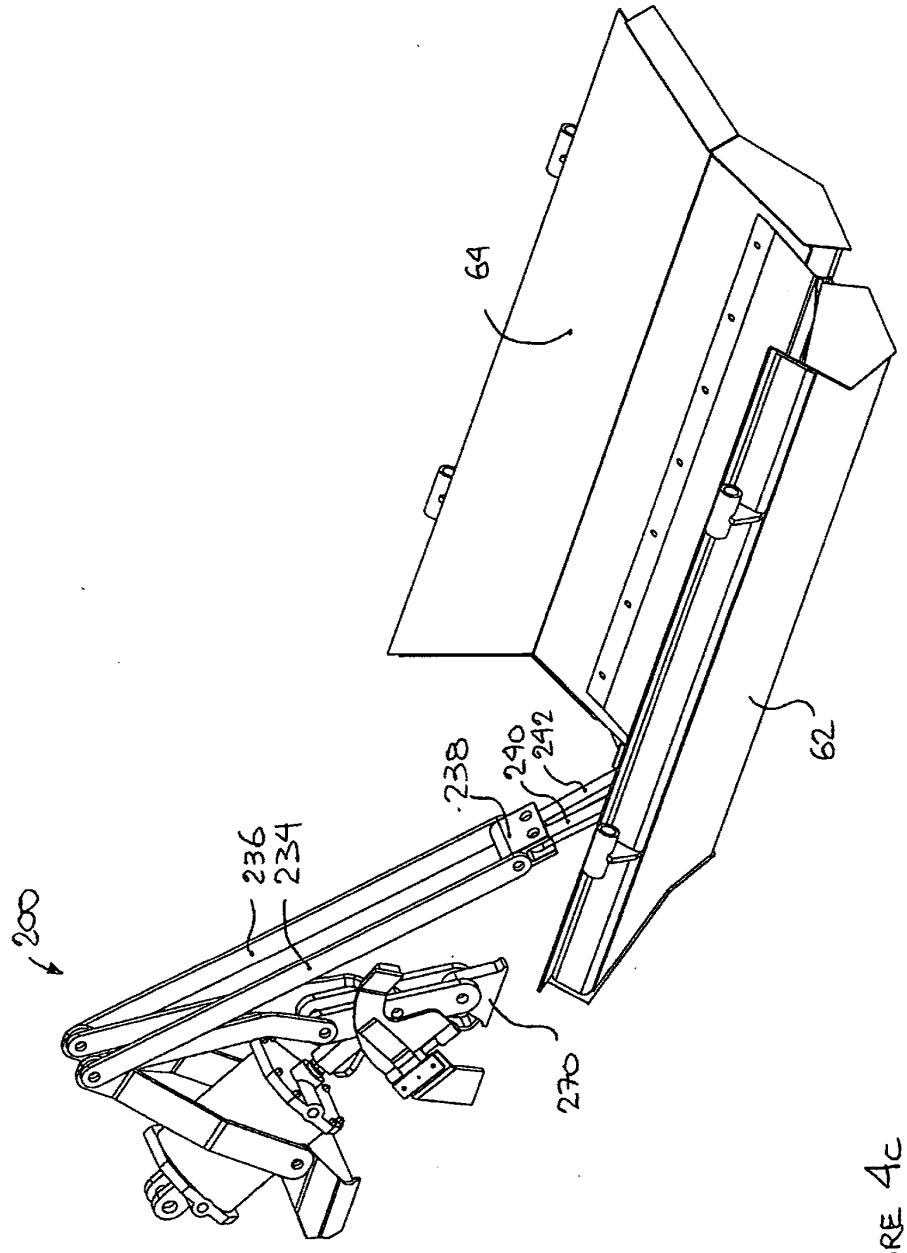


FIGURE 4c

(26)

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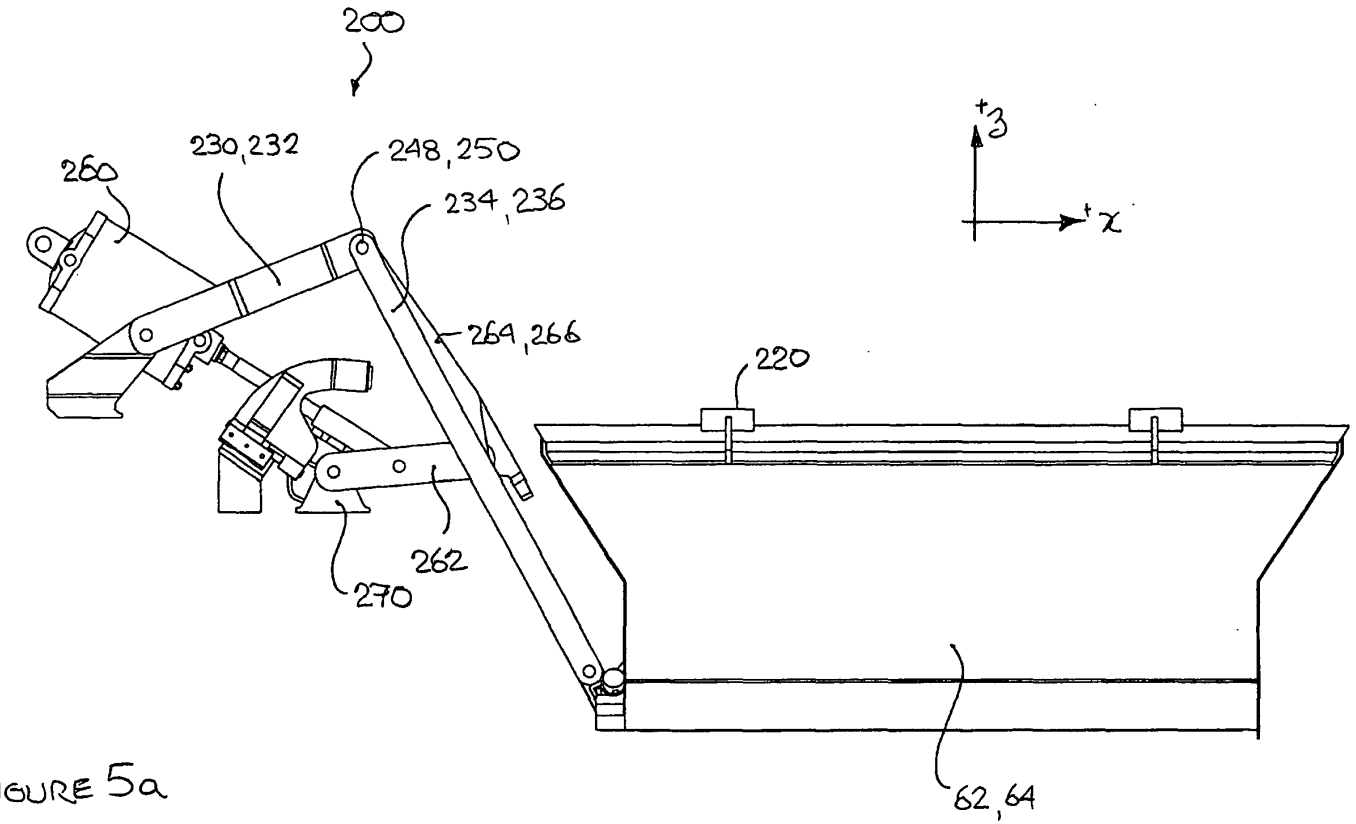


FIGURE 5a

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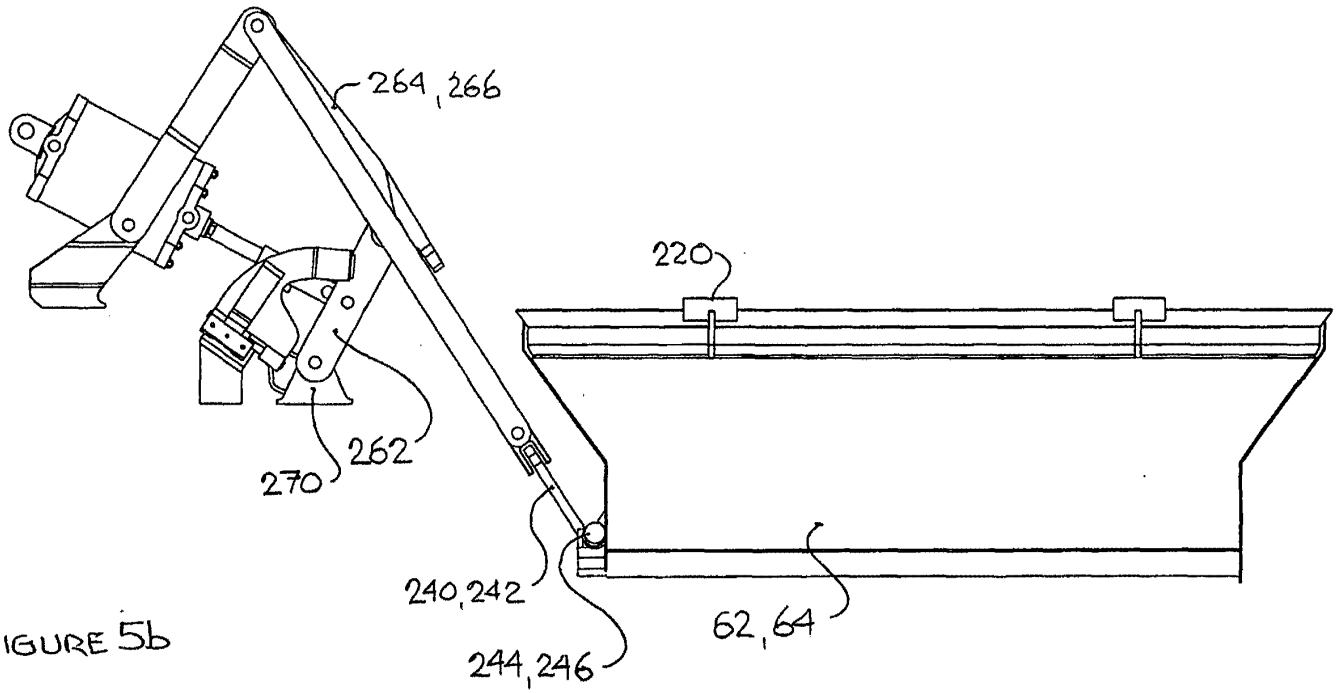


FIGURE 5b

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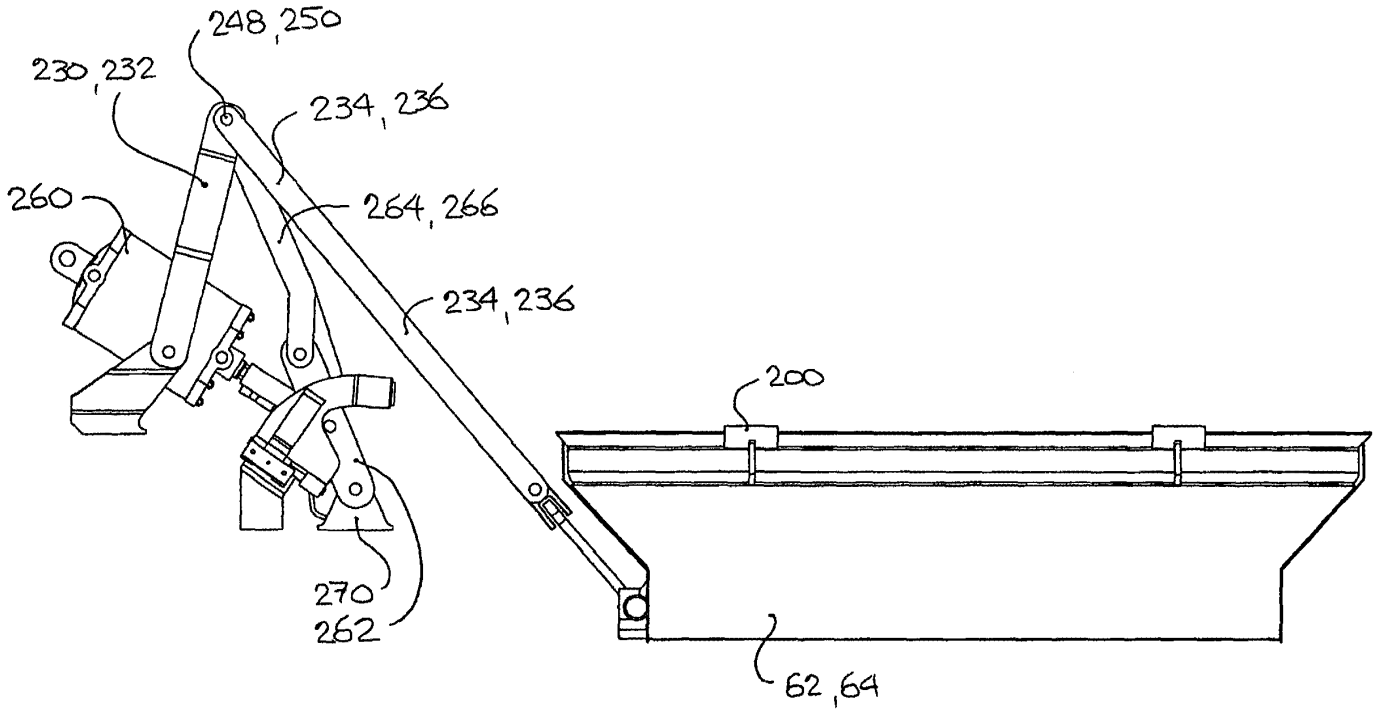


FIGURE 5C.

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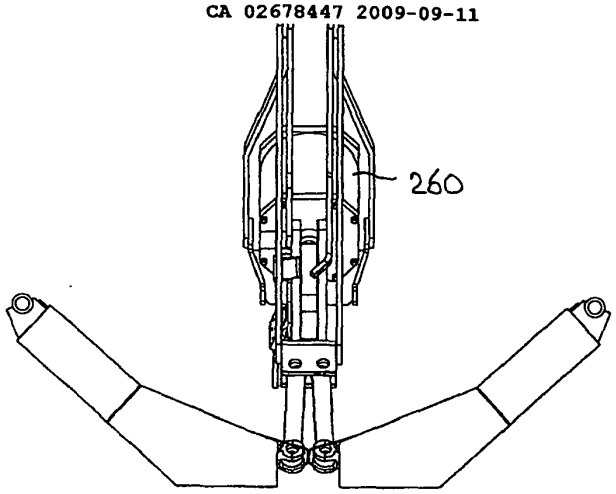


FIGURE 6C

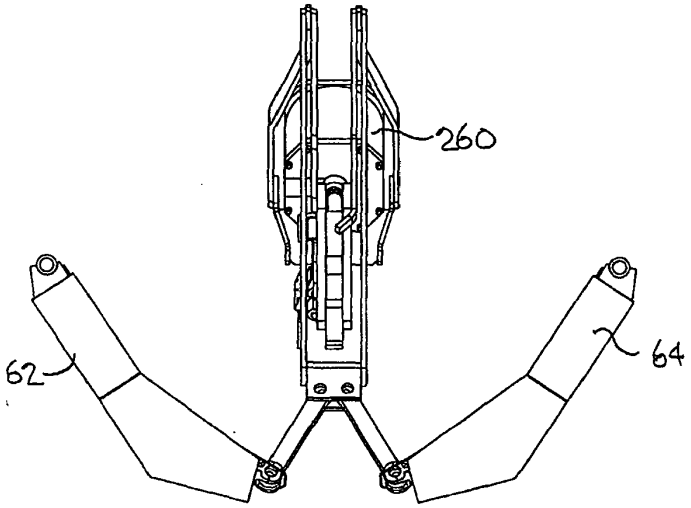


FIGURE 6b

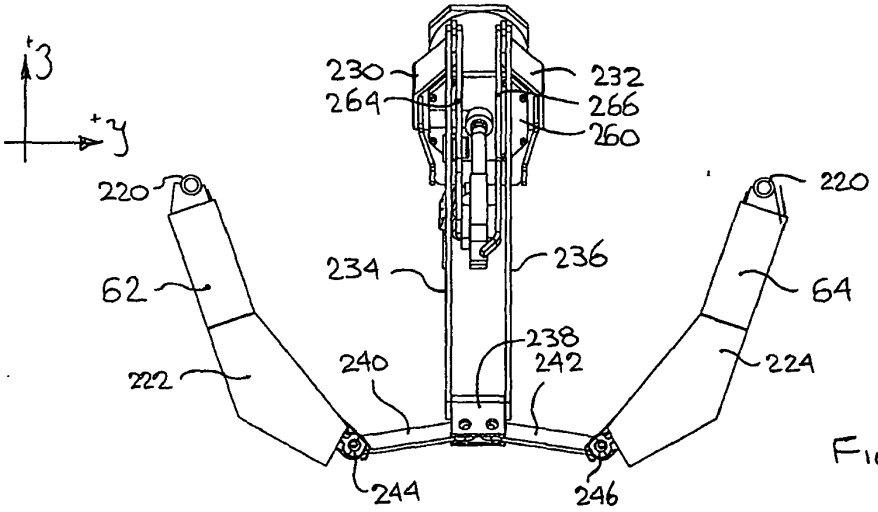


FIGURE 6a

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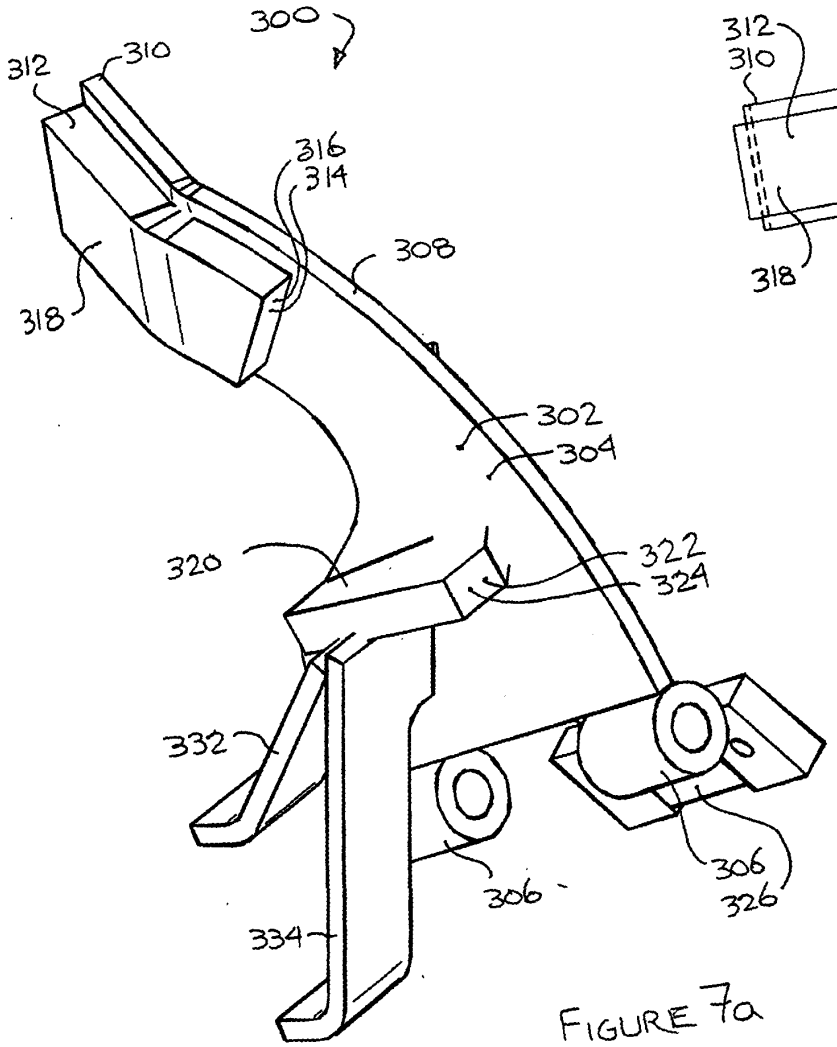


FIGURE 7a

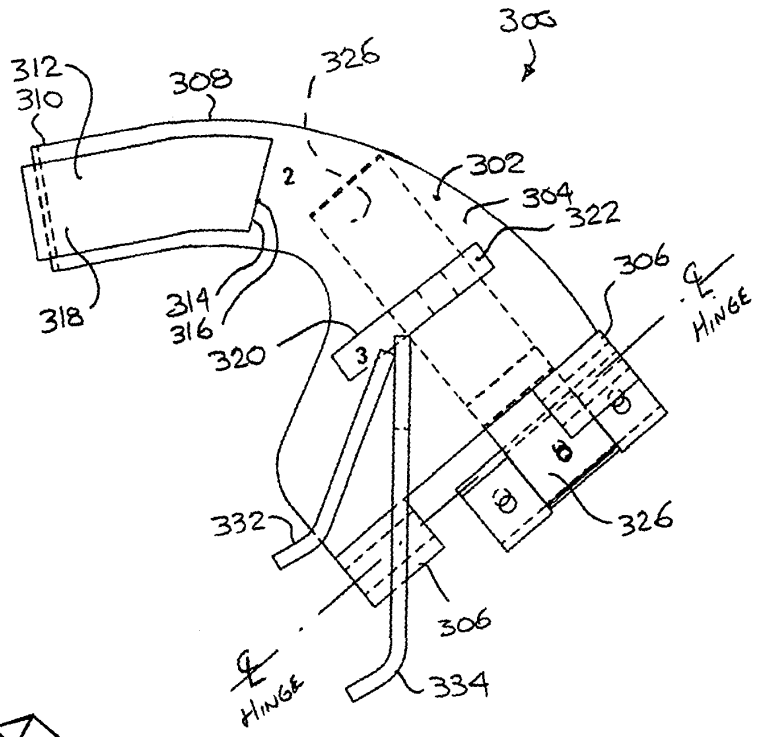
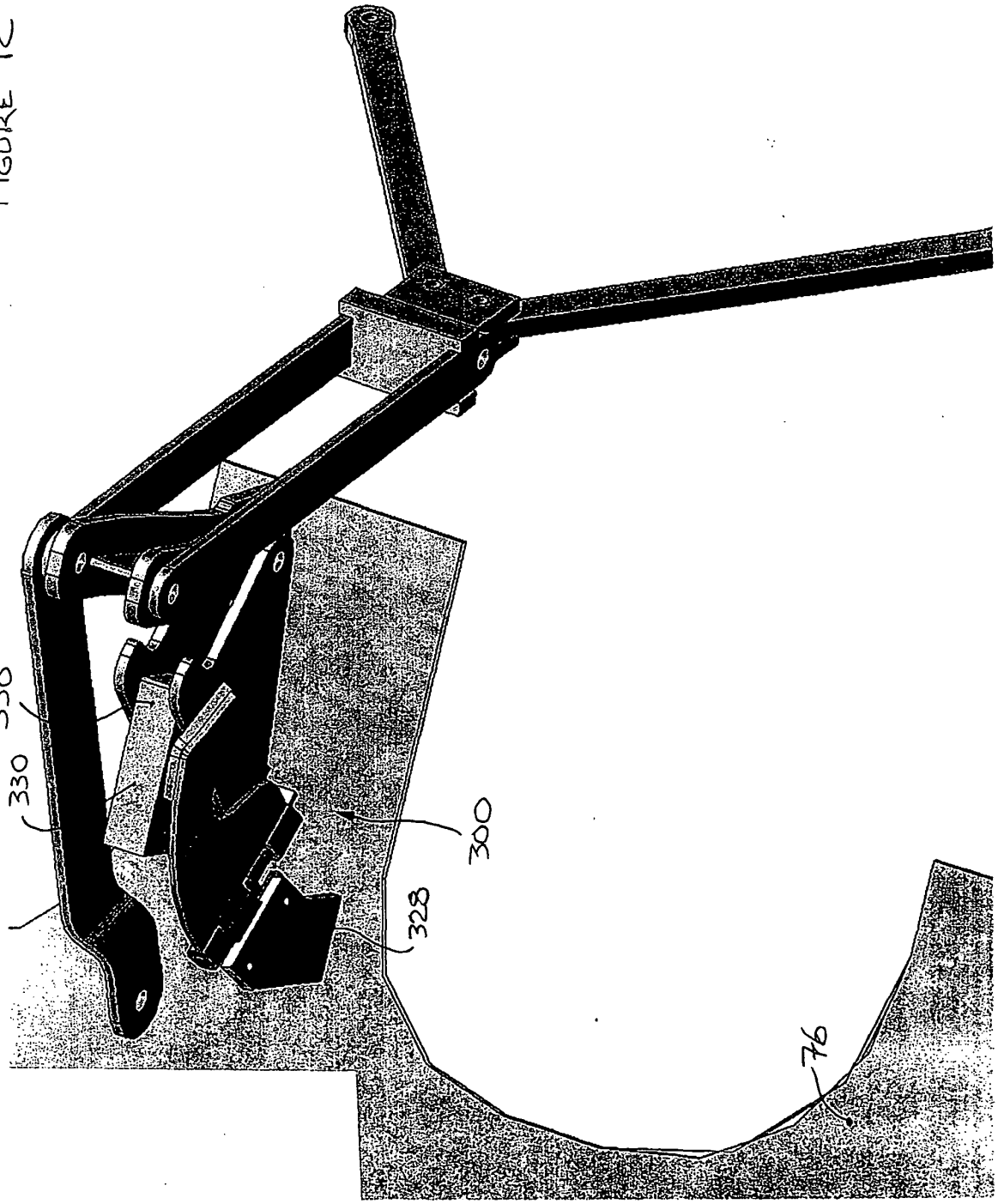


FIGURE 7b.

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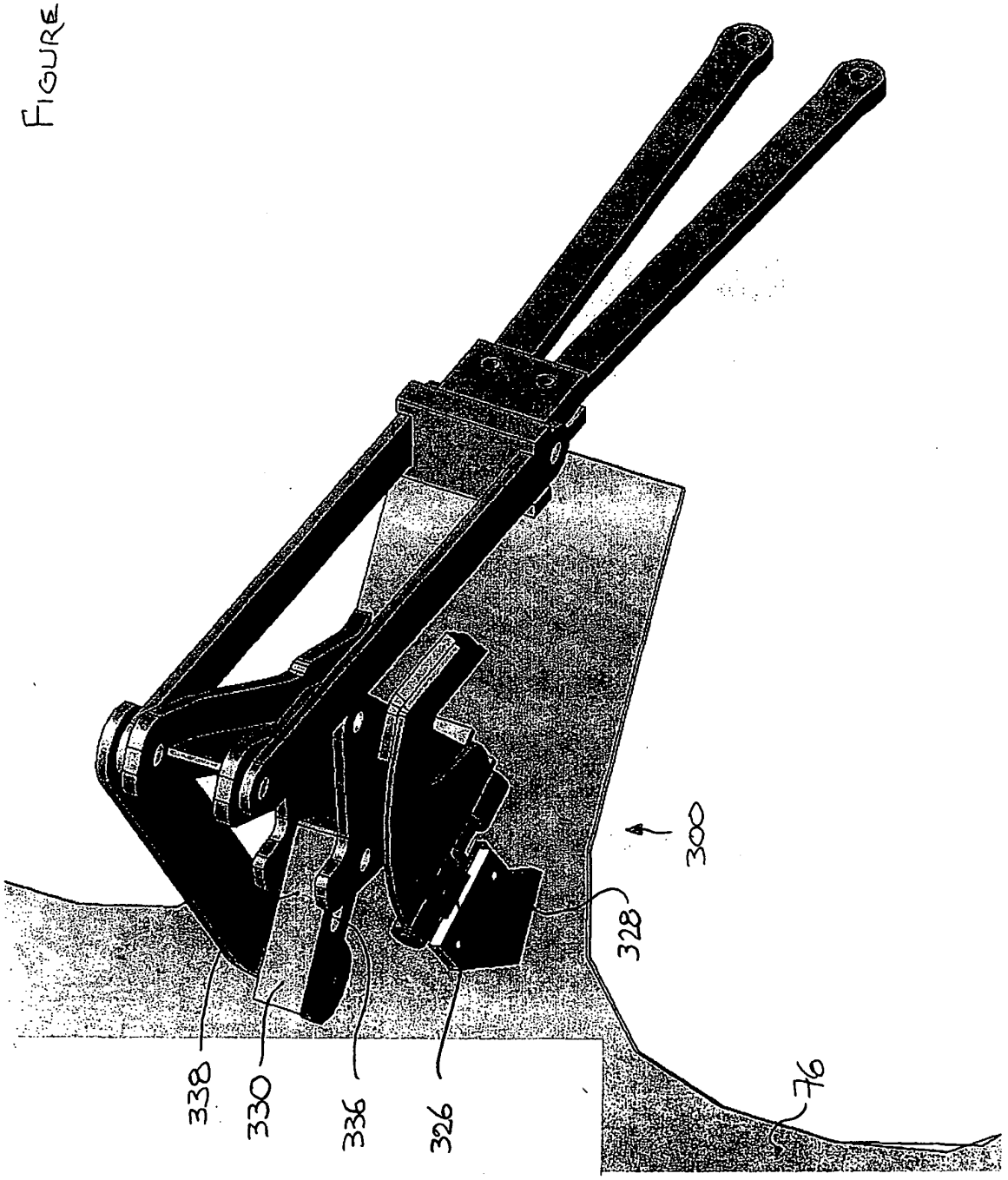
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FIGURE 7C



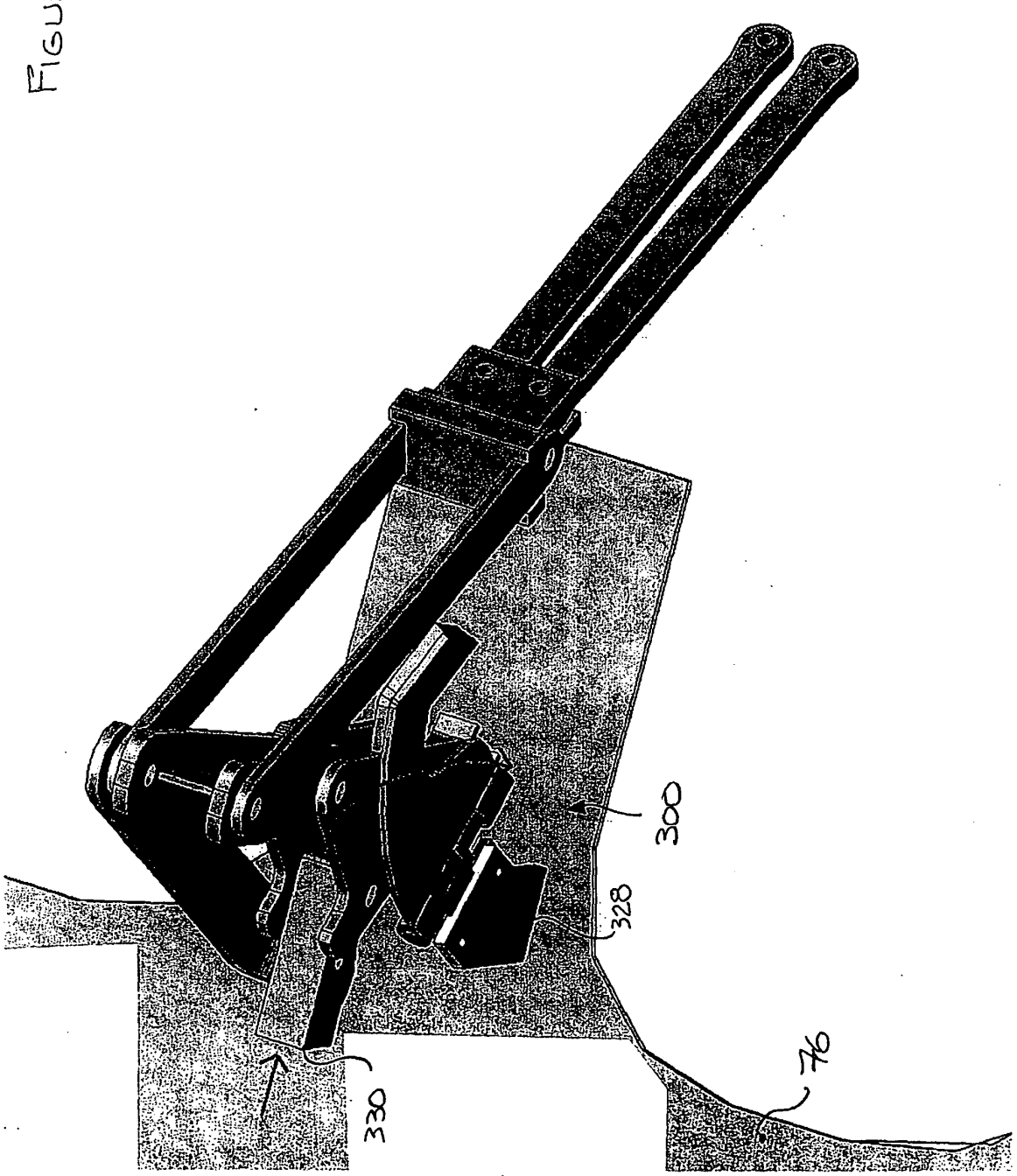
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FIGURE 7d.



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FIGURE 7e.



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IFW

OPAP JUN 03 2010 PATENT & TRADEMARK OFFICE

Practitioner's Docket No. 200405.00128 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Forbes et al.

Serial No.: 12/559,065

Filed: September 14, 2009

For: RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Transmitted herewith:

1) Certified copy of Canadian Application No. 2678447
2) Certified copy of Canadian Application No. 2678605
3) Return/Acknowledgment Card

Respectfully submitted,

Date: May 31, 2010

Michael H. Minns
Reg. No. 31,985

Hahn Loeser & Parks LLP
One GOJO Plaza, Suite 300
Akron, OH 44311
Tele: 330-864-5550
Fax: 330-864-7986

mhminns@hahnlaw.com

CERTIFICATION UNDER 37 C.F.R. §§ 1.8(a)

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/559,065	09/14/2009	James W. Forbes	200405.00128

CONFIRMATION NO. 7747

21324
HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076

EARLY PUBLICATION REQUEST LETTER

OC000000044964465

Date Mailed: 12/15/2010

NOTICE REGARDING EARLY PUBLICATION REQUEST

The request for voluntary publication, amended publication, early publication, redacted publication, republication, corrected publication or revised publication has been received for this application. The request, including payment of any necessary fee(s), is in compliance with 37 CFR 1.215, 1.217, 1.219 or 1.221.

The projected publication date is 02/24/2011.

/kebuchanan/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

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Application	Document	Mailroom Date	Attorney Docket No.
12559065	M327	12/15/2010	200405.00128

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IPR Petition - USP 8,166,892

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	200405.00128
	Application Number	12/559,065
Title of Invention	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR	

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.)

Applicant Information:

Applicant 1

Applicant Authority ◉ Inventor ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	James	W.	Forbes	

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

City		Country Of Residence i	CA
Citizenship under 37 CFR 1.41(b) i	CA		

Mailing Address of Applicant:

Address 1	15 Glenron Rd., RR #2		
Address 2			
City	Campbellville	State/Province	ON
Postal Code	L0P 1B0	Country i	CA

Applicant 2

Applicant Authority ◉ Inventor ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Marcus		Thiesen	

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

City	Hamilton	Country Of Residence i	CA
Citizenship under 37 CFR 1.41(b) i	CA		

Mailing Address of Applicant:

Address 1	31 Stirton St		
Address 2			
City	Hamilton	State/Province	ON
Postal Code	L8L 6E7	Country i	CA

Applicant 3

Applicant Authority ◉ Inventor ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Dave		Keats	

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

City	Brantford	Country Of Residence i	CA

PTO/SB/14 (07-07)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	200405.00128
	Application Number	
Title of Invention	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR	

Citizenship under 37 CFR 1.41(b)	CA		
Mailing Address of Applicant:			
Address 1	11 Digby Court		
Address 2			
City	Brantford	**State/Province**	ON
Postal Code	N3P 2A6	**Country**	CA

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

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	21324		
Email Address	patents@hahnlaw.com	Add Email	Remove Email

Application Information:

Title of the Invention	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR		
Attorney Docket Number	200405.00128	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		**Sub Class (if any)**	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	18	**Suggested Figure for Publication (if any)**	

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).
Enter either 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:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)

PTO/SB/14 (07-07)
Approved for use through 06/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	200405.00128
	Application Number	
Title of Invention	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR	

Customer Number	21324

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this 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(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. 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(a).

			Remove
Application Number	Country[i]	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
2678447	CA	2009-09-11	(•) Yes ( ) No
			Remove
Application Number	Country[i]	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
2678605	CA	2009-09-14	(•) Yes ( ) No

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

Assignee Information:

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

Assignee 1

If the Assignee is an Organization check here. ☒

Organization Name	NATIONAL STEEL CAR LIMITED		
Mailing Address Information:			
Address 1	602 Kenilworth Avenue North		
Address 2			
City	Hamilton	**State/Province**	ON
Country[i] CA		Postal Code	L8N 3J4
Phone Number		Fax Number	
Email Address			

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

PTO/SB/14 (07-07)
Approved for use through 06/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	200405.00128
	Application Number	
Title of Invention	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR	

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.					
Signature	/Michael H. Minns/			Date (YYYY-MM-DD)	2011-01-18
First Name	Michael H.	Last Name	Minns	Registration Number	31985

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.

Electronic Acknowledgement Receipt	
EFS ID:	9250911
Application Number:	12559065
International Application Number:	
Confirmation Number:	7747
Title of Invention:	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR
First Named Inventor/Applicant Name:	James W. Forbes
Customer Number:	21324
Filer:	Michael Howard Minns
Filer Authorized By:	
Attorney Docket Number:	200405.00128
Receipt Date:	18-JAN-2011
Filing Date:	14-SEP-2009
Time Stamp:	15:47:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	SUP_ADS.pdf	1508658 f46b80095ebaa7cbcfc2269dc6b53b9c81257e17	no	5

Warnings:
Information:

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

This is not an USPTO supplied ADS fillable form	
Total Files Size (in bytes):	1508658

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FreightCar America, Ex. 1002
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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/559,065	09/14/2009	James W. Forbes	200405.00128

CONFIRMATION NO. 7747

21324
HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076

PUBLICATION NOTICE

OC000000046165161

Title:RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR

Publication No.US-2011-0041724-A1
Publication Date:02/24/2011

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

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IPR Petition - USP 8,166,892

To: patents@hahnlaw.com,akron-docket@hotmail.com,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 21324

Feb 25, 2011 06:18:21 AM

Dear PAIR Customer:

HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 21324 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

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Application	Document	Mailroom Date	Attorney Docket No.
12559065	NTC.PUB	02/24/2011	200405.00128

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

FreightCar America, Ex. 1002
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/559,065	09/14/2009	James W. Forbes	200405.00128	7747

21324 7590 10/18/2011

HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076

EXAMINER	
SMITH, JASON C	
ART UNIT	**PAPER NUMBER**
3617	

NOTIFICATION DATE	DELIVERY MODE
10/18/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents@hahnlaw.com
akron-docket@hotmail.com

Office Action Summary	Application No.	Applicant(s)	
	12/559,065	FORBES ET AL.	
	Examiner	Art Unit	
	JASON C. SMITH	3617	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 September 2009*.

2a)☐ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-25* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☐ Claim(s) _____ is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☒ Claim(s) *1-25* are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-19, drawn to a hopper car with motor operated doors, classified in class 105, subclass 240.

   II. Claims 20-25, drawn to a hopper car with reinforced sidewalls, classified in class 105, subclass 247.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions s I and II are directed to related products. The related inventions are distinct if: (1) the inventions as claimed are either not capable of use together or can have a materially different design, mode of operation, function, or effect; (2) the inventions do not overlap in scope, i.e., are mutually exclusive; and (3) the inventions as claimed are not obvious variants. See MPEP § 806.05(j). In the instant case, the inventions as claimed have different functions. Furthermore, the inventions as claimed do not encompass overlapping subject matter and there is nothing of record to show them to be obvious variants.

3. Restriction for examination purposes as indicated is proper because all these inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and/or examination burden if restriction were not required because at least the following reason(s) apply:

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

The first group relates to hopper cars with motor operated doors, and the 2nd group relates to hopper cars with reinforced sidewalls.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a invention to be examined even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected invention**.

The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.

Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

4. A telephone call was made to 10/04/2011 on Michael Minns to request an oral election to the above restriction requirement, but did not result in an election being made.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON C. SMITH whose telephone number is (571)270-5225. The examiner can normally be reached on M- F, 7:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Morano can be reached on (571) 272-6684. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JASON C SMITH/
Examiner, Art Unit 3617

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12559065	FORBES ET AL.
	Examiner	Art Unit
	JASON C SMITH	3617

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	10/09/2011								
	1	÷								
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To: patents@hahnlaw.com,akron-docket@hotmail.com,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 21324

Oct 18, 2011 05:24:31 AM

Dear PAIR Customer:

HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 21324 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

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Application	Document	Mailroom Date	Attorney Docket No.
12559065	CTRS	10/18/2011	200405.00128

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If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE

PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	12559065
Filing Date	2009-09-14
First Named Inventor	James W. FORBES
Art Unit	3617
Examiner Name	Jason C. Smith
Attorney Docket Number	200405.00128

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	0763186		1904-06-21	Johnson, S. J.	
	2	1421439		1922-07-04	Finckh, F.	
	3	3173381		1965-03-16	Charles, A. F., et al.	
	4	3187684		1965-06-08	Ortner, R. C.	
	5	3408956		1968-11-05	Rebenok, A. G., et al.	
	6	3483830		1969-12-16	McGrath, E.	
	7	3577932		1971-05-11	Pulcrano, Frank C., et al.	
	8	3596609		1971-08-03	Ortner, Robert C.	

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	First Named Inventor	James W. FORBES
	Art Unit	3617
	Examiner Name	Jason C. Smith
	Attorney Docket Number	200405.00128

	9	3611947		1971-10-12	Nagy, Ernest J.	
	10	3654873		1972-04-11	Floehr, Walter, L.	
	11	3710730		1973-01-16	Austgen, Kenneth J., et al.	
	12	3717109		1973-02-20	Miller, R. W.	
	13	3717110		1973-02-20	Miller, R. W.	
	14	3800711		1974-04-02	Tuttle, J. H.	
	15	3807316		1974-04-30	Miller, R. W.	
	16	3815514		1974-06-11	Heap, James C.	
	17	3818842		1974-06-25	Heap, James C.	
	18	3863986		1975-02-04	Mentessi	
	19	3872796		1975-03-25	Adler, Franklin P., et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	20	3878794		1975-04-22	Adler, F. P.	
	21	3931768		1976-01-13	Price, et al.	
	22	3949681		1976-04-13	Miller, R. W.	
	23	3994238		1976-11-30	Adler, F. P.	
	24	4106813		1978-08-15	Goodbary, E. R.	
	25	4120409		1978-10-17	vander Werff, B.	
	26	4194450		1980-03-25	Miller, R. W.	
	27	4222334		1980-09-16	Peterson, William H.	
	28	4224877		1980-09-30	Stark, Marvin, et al.	
	29	4232989		1980-11-11	Miller, R. W.	
	30	4246849		1981-01-27	Gramse, Harold E.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Art Unit	3617
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	31	4252068		1981-02-24	Nolan, Harry E.	
	32	4250814		1981-02-17	Stark, M. et al.	
	33	4348962		1982-09-14	Smith, Stephen W.	
	34	4542701		1985-09-24	Fischer, Robert T., et al.	
	35	4555033		1985-11-26	Miller, R. W.	
	36	4601244		1986-07-22	Fischer, Robert T.	
	37	4740130		1988-04-26	Prins, P. D.	
	38	4800820		1989-01-31	Tomaka, Jan Z.	
	39	4843974		1989-07-04	Ritter John A., et al.	
	40	4884511		1989-12-05	Hallam, Keith J., et al.	
	41	5063858		1991-11-12	Dugge, Richard H.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	42	5086709		1992-02-11	Fischer Robert T., et al.	
	43	5144895		1992-09-08	Murray, J. R.	
	44	5163372		1992-11-17	Galvan, G. L., et al.	
	45	5249531		1993-10-05	Taylor, Fred J.	
	46	5261333		1993-11-16	Miller, D. L.	
	47	5823118		1998-10-20	Manstrom	
	48	6604469	B1	2003-08-12	Galvan, Guadalupe L., et al.	
	49	6745701	B2	2004-06-08	Elder, John B.	
	50	7367272	B2	2008-05-06	Taylor, Fred J.	
	51	7780021	B2	2010-08-24	Forbes, James W.	
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	1	1082524	CA	A1	2009-07-22			☐
	2	101486347	CN		2009-07-22			☐
	3	0543279	EP	B1	1995-05-17	ABB HENSCHEL WAGGON UNI-ON		☐
	4	1798103	EP	A1	2007-06-20	Wagony Swidnica SA		☐
	5	1790547	EP	A1	2007-05-30			☐
	6	1318571	GB		1973-05-31			☐
	7	2013598	GB		1979-08-15	Luossavaara-Kiirunavaara Aktiebolag		☐

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	1	FREIGHT CARS: Hopper, Ore; Car Builders' Cyclopedia, 1937, pp. 313-320, 14th ed., Simmons-Boardman Publishing Corporation, New York, NY.	☐
	2	A.C.F. Covered and Open Top Hopper Cars; Car Builders' Cyclopedia, 1943, pp. 281-289, 16th ed., Simmons-Boardman Publishing Corporation, New York, NY.	☐
	3	FREIGHT CARS: Hopper, Ore, Class HMA; Car Builders' Cyclopedia, 1957, pp. 265-272, 20th ed., Simmons-Boardman Publishing Corporation, New York, NY.	☐
	4	FREIGHT CARS: Hopper, Ore, Class HMA; Car Builders' Cyclopedia, 1961, pp. 246-258, 21st ed., Simmons-Boardman Publishing Corporation, New York, NY.	☐
	5	Car and Locomotive Cyclopedia, 1966, 10 pages, 1st ed., Simmons-Boardman Publishing Corporation, New York, NY.	☐
	6	5 Photographs of Quebec Iron and Titanium (QIT) ore hopper car No. 556, dated August 15, 2007.	☐
	7	Drawing of QIT car dated August 27, 2007.	☐
	8	2 Sheets of Details of End Structure of an Admitted Prior Art Grain Car of National Steel Car showing End Post, Lateral Intermediate Stub Wall, Elephant Ears Arrangement and End Slope Sheet to Shear Plate Connection at least as early as January 1, 2001.	☐
	9	Reproduction of Design Drawing of Dulth, Missabi & Iron Range (DM&IR) Open Topped Ore Hopper Car General Arrangement Drawing 8760 Drawn April 8, 1950, (Quality Poor in Original), Showing Rear Draft Stops Extending Inboard of Truck Center.	☐
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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Michael H. Minns/	Date (YYYY-MM-DD)	2011-10-27
Name/Print	Michael H. Minns	Registration Number	31985

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(19) (CA) **CANADIAN PATENT** (12)

(54) DOOR OPERATING MECHANISM FOR HOPPER CARS

(72) Miller, Roy W.,
U.S.A.

(73) Granted to Pullman Incorporated
U.S.A.

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No. OF CLAIMS 10

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Abstract of the Disclosure

A door operating mechanism for a bottom dump hopper car including a plurality of transversely mounted bottom discharge gates arranged in oppositely opening pairs and operatively connected by compression struts to pendulously mounted vertical levers. The levers are movable divergently outward by linkages connecting them to a lever mounted on a longitudinally extending rotatable actuating shaft. The invention further provides that in the locked position the vertical levers and compression struts be in an overcenter position relative to each pair of associated discharge gates, thereby assuring positive locking of the mechanism.

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DOOR OPERATING MECHANISM FOR HOPPER CARS

Background of the Invention

1. Field of the Invention

This invention pertains to railway hopper cars and door operating mechanisms.

2. Description of the Prior Art

The prior art door operating mechanisms are exemplified by the operating mechanism shown in the Floehr U.S. Patent No. 3,316,857 which provides for opening and closing of a plurality of transversely disposed discharge gates in unison, but requires longitudinally reciprocable operating shafts. Experience has shown that such devices are relatively difficult to fabricate and difficult to repair due to the close tolerances essential to assure proper sealing of discharge gates. Additionally, warping-like jamming flexure of a fully loaded hopper car can act to bind the operating mechanism and thus render the mechanism marginally serviceable or inoperative after extended use. Other arrangements used to open transverse discharge gates such as the Novelli U.S. Patent No. 3,122,106 utilize a vertically disposed piston which consumes much space and is difficult to reach for repair and maintenance.

The present invention improves upon prior designs by utilizing a longitudinally rotatable actuating shaft operatively connected to an arrangement of pendulously mounted levers and compression struts for selective operation of the hopper discharge gates. An overcenter locking configuration of the vertical levers and compression struts assures positive locking of the discharge gates when closed, and simplicity of design facilitates fabrication and field service and repair or maintenance.

Summary of the Invention

This invention pertains to an overcenter door operating

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mechanism for a railway hopper car which provides for the opening of a plurality of transversely disposed discharge gates by means of a longitudinally extending actuating shaft shielded beneath the hoppers of the car.

Each oppositely opening pair of transversely disposed discharge gates is so constructed and arranged as to be separated from its respective pair by the center sill of the car and each pair is operatively connected by compression struts to a vertical lever pendulously mounted to the cross-ridge web of the car. The range of motion of these levers is limited by guiding members to a vertical plane midway between the gates of each pair. These guiding members extend from the center sill to the side sill of the car and contain a cross-bolt which acts as a positive lock to limit the inward travel of the vertical levers when in the closed position. Each door of the pair is operatively connected by means of a compression strut to the vertical lever of that pair. The vertical levers and the compression struts are arranged to be positioned in an overcenter locking configuration when in the closed position to positively secure the discharge gates in their respective positions. Each vertical lever is attached by a linkage to one arm of a double-arm lever affixed to the longitudinally rotatable torque tube located in the longitudinal hood above the center sill and running between the ends of the car. The tube is rotated by appropriate means but the preferred embodiment incorporates a pneumatic cylinder located vertically below the center cross-ridge of a car attached to a lever affixed perpendicularly to the mid-point of the torque tube. Actuation of the cylinder when the discharge gates are in the closed position causes the torque tube to rotate, thus causing each arm of the double-arm levers to push outward on its linkage. The vertical levers are swung outward by the linkages, drawing their respective compression struts with them through and beyond the center position, causing the discharge gates to open.

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To close the gates after discharge of the lading, the pneumatic cylinder travel is reverse rotating the torque tube in the opposite direction, causing the gates to close. The vertical levers and compression struts pass through the center position and move to their overcenter closed positions. The vertical levers are restrained from further inward travel by cross-bolt stops incorporated into the guide member channels.

The two-piece compression struts include a strut end that rotates within the strut tube to accommodate relative angular rotation of the vertical levers and the discharge doors during operation. Spherical pins operatively connect the compression struts to the vertical levers to further accommodate this angular rotation. The arrangement of one vertical lever connected by compression struts to each gate on an oppositely opening pair eliminates longitudinal stress on the vertical lever and causes each gate of the pair to act as a lock against accidental opening for the other.

To accommodate the movement of the vertical levers and compression struts from an overcenter configuration, a sufficient clearance is allowed between the discharge gates and discharge openings when the doors are in the closed position. This permits smooth operation of the invention, yet maintains the security of the gate seals because of the conventional relative overlapping configuration of the discharge gates and openings.

Comprehensively, the invention contemplates a bottom dump railway hopper car having an underframe and a hopper having a pair of laterally spaced bottom discharge openings and a pair of discharge gates associated therewith hinged from the hopper for movement between open and closed positions. The improvement is in a gate operating mechanism operatively associated therewith

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which comprises an actuating shaft rotatable about its longitudinal axis in a first direction to open and a second direction to close the discharge gates located between the ends of the hopper car, lever means rigidly affixed to the actuating shaft and extending outwardly therefrom and vertical levers pendulously connected to the underframe of the hopper car and having pivot means attaching the vertical levers and having lower ends. Linkages operatively connect the lever means to each vertical lever in order to swing the vertical levers outward when the lever means rotate in the first direction, and strut means having first and second ends with the first ends being pivotally connected to the lower ends of the vertical levers. The discharge gates are hingedly connected to the hoppers and have a pivotal connection with the second ends of the strut means.

In a further embodiment, the invention contemplates a bottom dump railway car having an underframe and a hopper having discharge openings arranged in pairs on opposite sides of the car center sill and swinging gates associated therewith with the swinging gates being hinged from the hopper for movement between open and closed positions and to swing toward the adjacent swinging gate of the associated pair. The improved swinging gate operating mechanism includes a selectively movable actuating member mounted on the underframe, a pivot means which attaches a vertical lever to the car underframe and disposing the vertical lever for transverse swinging movement away from the center sill to open the swinging gates and toward the center sill to close the swinging gates, and a linkage means operatively connecting the actuating member and the vertical lever such that movement of the actuating member causes the vertical lever to swing. The vertical lever has a lower portion, and a strut means extends in opposite directions from the lower

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portion of the vertical lever and connects the vertical lever and associated swinging gates, whereby selective mo ement of the vertical lever causes the strut means to be drawn in the direction of movement, thereby opening and closing the discharge openings.

The invention may be operated either by electrical or mechanical means, but the preferred embodiment includes a pneumatic cylinder supplied by an air reservoir with sufficient reserve to completely cycle the gates several times permitting discharge of the lading at any discharge site without the aid of trackside equipment.

Brief Description of the Drawings

FIG. 1 is a side elevation view of a hopper car, showing a preferred embodiment of the dumping mechanism of the present invention in the closed position;

FIG. 2 is a transverse fragmentary sectional view on an enlarged scale taken along lines 2-2 of FIG. 1;

FIG. 3 is a transverse fragmentary sectional view on an enlarged scale taken along lines 2-2 of FIG. 1;

FIG. 4 is a transverse fragmentary sectional view on an enlarged scale taken along lines 4-4 of FIG. 1 showing the vertically mounted pneumatic cylinder and its linkage to the longitudinal torque tube;

FIG. 5 is a perspective view of all operative components of the invention with the broken lines indicating the relative position of the hopper car body and discharge gates to the operating mechanism.

Description of the Preferred Embodiment

By referring to FIG. 1, there shown is a

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hopper car 1 and including the usual transversely spaced side walls 12 and associated slope sheets 13. Longitudinally extending side sill units 14 extend along the lower margin of the side walls 12. The hopper car may include a longitudinally extending continuous center sill 4 which projects outwardly from opposite ends of the car. The vehicle is supported on the usual wheeled trucks 16 which ride on tracks 17.

The improved dumping mechanism is of the type that dumps between the rails and includes a plurality of hoppers 18 which are divided transversely of the car by the center sill 4 extending longitudinally of the car and including opposing discharge openings 2.

Conventional discharge gates or doors 3 are provided for closing the opposing discharge openings 2 of each adjacent pair of hoppers 18 and are attached by transverse hinges 33 at the top of the discharge opening 2, and in closing swing away from each other to the inclined or sloping closed position shown in FIG. 1.

The discharge gates 3 are held in position by compression struts 7 including longitudinally rotatable strut end 8 and strut tube 9, and are operatively connected by pivot 6. The compression struts 7 are operatively connected by spherical pins 10 to vertical levers 11, the vertical levers 11 being confined to travel in a vertical plane by guiding members 21.

FIG. 1 further illustrates the vertical placement position of pneumatic cylinder 19 on center sill 4

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and the longitudinal placement of torque tube 20 within the longitudinal hood 5. FIG. 4 illustrates the vertical placement of pneumatic cylinder 19 on center sill 4, connected by means of pivot 22. Pneumatic cylinder piston 23 is operatively connected by pivot 24 to lever 25 which is rigidly attached perpendicularly to torque tube 20.

Referring to FIG. 2, discharge gates 3 are shown in their closed position over discharge openings 2, connected by pivots 6 to compression struts 7, which in turn are connected by spherical pin 10 to vertical levers 11. Pivots 6 are pivotally connected to spreaders 15 which are transversely rigidly attached to discharge gates 3, spreaders 15 being channel members which act to resist bending stress generated at the inner and outer edges of discharge gates 3. Vertical levers 11 are pendulously connected at pivots 26 to cross-ridge web 27 and are guided in movement by guiding members 21, rigidly connected between center sill 4 and side sills 14. In the closed position, vertical levers 11 rest against cross-bolts 28 in order to restrict their travel inward within guiding members 21 and act as positive locks so that discharge gates 3 will not mistakably open in the closed position.

Vertical levers 11 are operatively connected at pivot 29 to linkages 30, which exert outward force on vertical levers 11 when the double-arm lever 31 is rotated in the direction as indicated by the arrows in FIG. 2. Linkages 30 are operatively attached to double-arm lever 31 at pivots 32. Double-arm lever 31 is rigidly affixed to torque tube 20 so that rotation of double-arm lever 31 is restricted to a vertical plane.

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Referring to FIG. 3, double-arm lever 31 is shown in its open position. The rotation of double-arm lever 31 acts through pivots 29 to cause linkages 30 to move away from the longitudinal axis of the car. Linkages 30 act against vertical levers 11 through pivots 29, thereby causing the divergent swinging of vertical levers 11. The divergent motion of vertical levers 11 causes compression struts 7, including strut end 8 and strut 9, to move from their overcenter locking position through the center position, and then be drawn outward by vertical levers 11. Sufficient clearance between discharge gates 3 in their closed position and discharge openings 2 accomodates smooth movement of the compression struts 7 and vertical levers 11 through the over-center position. Rotation of strut end 8 within strut tube 9 accomodates relative angular rotation of compression struts 7 and discharge gates 3.

Spherical pin 10 permits proper angular realign-ment of vertical levers 11 and compression struts 7 with respect to each other. The outward motion of compression struts 7 causes discharge gates 3 to be opened, and the lading to be discharged through discharge opening 2.

FIG. 5 illustrates the placement of essential elements of the invention in a closed position as envisioned within a conventional hopper car. Centrally located pneumatic cylinder 19, pivotally mounted to center sill 4 by pivot 22, is operatively connected by its cylinder piston 23 to lever 25 by pivot 24. Lever 25 is rigidly attached

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perpendicularly to longitudinally rotatable torque tube 20. Torque tube 20 extends beneath the longitudinal hood 5 to end cross-ridge webs 27 where double-arm levers 31 are rigidly affixed to torque tube 20. Double-arm levers 31 are operatively connected by pivots 32 to linkages 30, which in turn are operatively connected to vertical levers 11 through pivots 29. Vertical levers 11, which are pendulously connected by pivots 26 to cross-ridge webs 27, are operatively connected by spherical pins 10 to compression struts 7, which include strut tubes 9 and strut ends 8. Strut ends 8 of compression struts 7 are pivotally attached to spreaders 15, which are transversely rigidly affixed to the outside surface of discharge gates 3. Vertical levers 11 are confined to travel within a vertical plane by guiding members 21 which are rigidly attached between center sill 4 and outer sills 14. Cross-bolts 28 act as positive stops to the inward travel of vertical levers 11 and provide a positive lock to prevent accidental opening of discharge gates 3.

The Operation

In operation, the door opening mechanism of the present invention is selectively operable independently of track side equipment.

When the hopper car is in the position of desired discharge of its lading, either manual or automatic means are employed to activate pneumatic cylinder 19. The activation of pneumatic cylinder 19 causes pneumatic cylinder piston 23 to act through pivot 24 to rotate lever 25, thereby causing torque tube 20 to rotate longitudinally. Pneumatic

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cylinder pivot 22 allows pneumatic cylinder 19 to properly align itself with respect to center sill 4.

As torque tube 20 rotates, double-arm levers 31, rigidly affixed to torque tube 20, rotate through a corresponding angle. The rotation of double-arm levers 31 causes linkages 30 to move outward. The outward motion is transmitted by pivots 29 to vertical levers 11. Guiding members 21 restrict vertical levers 11 to motion in a vertical plane only. The outward motion of vertical levers 11 forces them from their overcenter positions with respect to compression struts 7 and discharge gates 3. Sufficient clearance is allowed between discharge gates 3 and discharge openings 2 to accomodate smooth movement of vertical levers 11 and compression struts 7 through their center positions relative to gates 3. As vertical levers 11 continue to move outward past their center positions, compression struts 7 are drawn in the same direction, properly aligning themselves between vertical levers 11 and discharge gate pivots 6 by means of spherical pins 10 and rotation of strut end 8 within strut tube 9. The realignment of compression struts 7 cause spreaders 15 and discharge gates 3 to be drawn from their closed positions, allowing the lading to be discharged through discharge openings 2.

When the discharge of the lading is complete, pneumatic cylinder 19 is caused to operate in reverse. Pneumatic cylinder piston 23 pulls on lever 25 through pivot 24 causing lever 25 and torque tube 20 to rotate back to their closed positions. Double-arm lever 31 rotates correspondingly,

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causing linkages 30 to be pulled inward. Connecting links 30 act upon vertical levers 11 through pivots 29 causing the vertical levers 11 to pivot inward to their closed positions. Compression struts 7 are drawn inward with vertical levers 11, causing compression struts 7 to push against discharge gate spreaders 15 and discharge gates 3, returning the latter to their closed positions covering discharge openings 2. As vertical levers 11 move to their overcenter position relative to compression struts 7 and discharge gates 3, discharge openings 2 are completely closed and vertical levers 11 are limited from further travel by cross-bolts 28. Discharge gates 3 are now positively locked in the closed position because of the limitation by cross-bolts 28 upon further inward travel of vertical levers 11. In the closed position, each compression strut 7 of each vertical lever 11 acts together with the other compression strut 7 of that vertical lever 11 to cancel longitudinal stresses on that lever 11, further facilitating durability of the mechanism and security of the lading. The air supply to pneumatic cylinder 19 may now be disconnected, and the hopper car is ready for relocation and reloading.

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The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A bottom dump railway hopper car having an underframe and a hopper having a pair of laterally spaced bottom discharge openings and a pair of discharge gates associated therewith hinged from said hopper for movement between open and closed positions, the improvement comprising a gate operating mechanism operatively associated therewith comprising:

an actuating shaft rotatable about its longitudinal axis in a first direction to open and a second direction to close said discharge gates and located between the ends of said hopper car,

lever means rigidly affixed to said actuating shaft and extending outwardly therefrom,

vertical levers pendulously connected to said underframe of said hopper car and having pivot means attaching said vertical levers and having lower ends,

linkages operatively connecting said lever means to each vertical lever in order to swing said vertical levers outward when said lever means rotate in said first direction,

strut means having first and second ends, said first ends being pivotally connected to the lower ends of said vertical levers, and

said discharge gates hingedly connected to said hoppers and having a pivotal connection with the second ends of said strut means.

2. The invention in accordance with Claim 1, and fluid power actuating means for selectively rotating said actuating shaft in clockwise and counter-clockwise directions.

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3. The invention in accordance with Claim 1, and

said hopper car having a center sill and side sills spaced outwardly therefrom;

said vertical levers being restricted in travel to a vertical plane by guiding members running essentially between the center sill and the side sills of the car.

4. The invention in accordance with Claim 3, and

said guiding members including means limiting lateral, inward movement of said vertical levers.

5. The invention in accordance with Claim 1, and

said strut means having a ball and socket connection to said vertical levers.

6. The invention in accordance with Claim 1, and

said strut means comprising a strut tube containing a biasing spring and telescoping strut end thereon,

said strut end being longitudinally resiliently compressible within the associated strut tube.

7. The invention in accordance with Claim 1, and

said gate attachment means comprising:

spreaders affixed transversely to the outside surface of said discharge gates providing mounting means for said pivotal connection to the second end of said strut means.

8. The invention in accordance with Claim 1, and

said vertical levers being in an over-center position with respect to said strut means and said discharge gates when the latter are in their respective closed positions whereby the first end of the strut means is located more inwardly of the hopper car than the location of the second end of the strut means attached to the discharge gates.

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9. The invention in accordance with Claim 1, and said strut means having telescoping means being compressed when said discharge gates are in their closed position.

10. A bottom dump railway car having an underframe and a hopper having discharge openings arranged in pairs on opposite sides of the car center sill and swinging gates associated therewith, said swinging gates being hinged from said hopper for movement between open and closed positions and to swing toward the adjacent swinging gate of the associated pair, an improved swinging gate operating mechanism including:

a selectively movable actuating member mounted on the underframe;

pivot means attaching a vertical lever to the car underframe and disposing the vertical lever for transverse swinging movement away from the center sill to open the swinging gates and toward the center sill to close the swinging gates;

linkage means operatively connecting the actuating member and said vertical lever such that movement of the actuating member causes the vertical lever to swing,

said vertical lever having a lower portion; and

strut means extending in opposite directions from the lower portion of the vertical lever and connecting the vertical lever and associated swinging gates, whereby selective movement of said vertical lever causes said strut means to be drawn in the direction of movement, thereby opening and closing said discharge openings.

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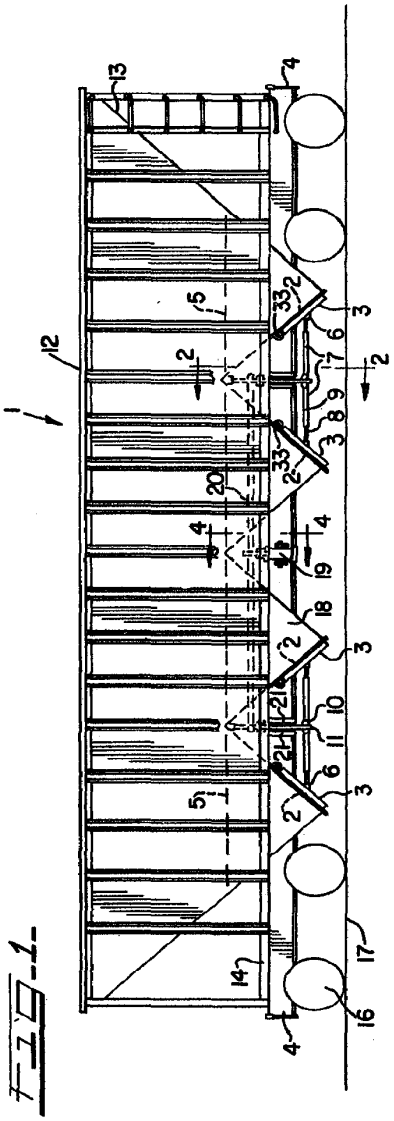


FIG-1

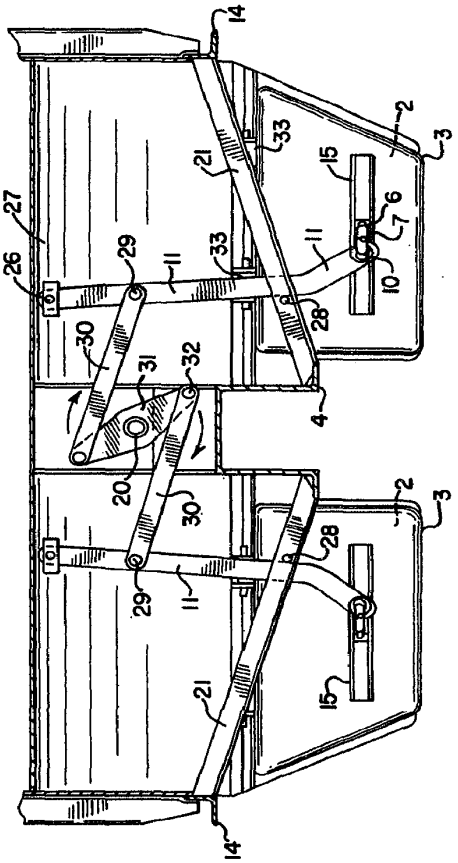


FIG-2

INVENTOR
ROY W. MILLER
Meredith & Finlayson
PATENT AGENTS

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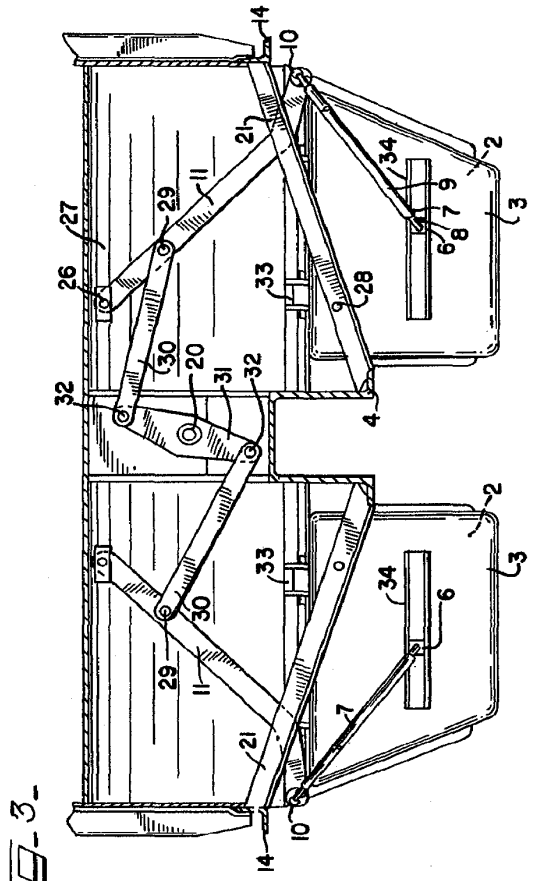


FIG. 3.

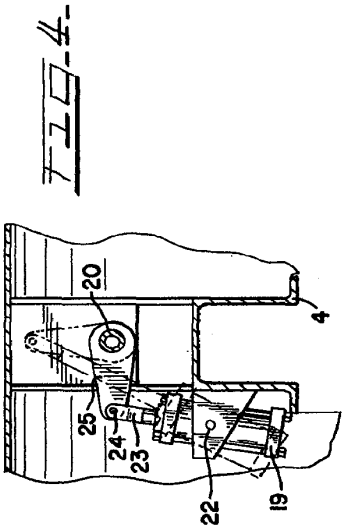


FIG. 4.

INVENTOR
ROY W. MILLER
Meredith & Finlayson
PATENT AGENTS

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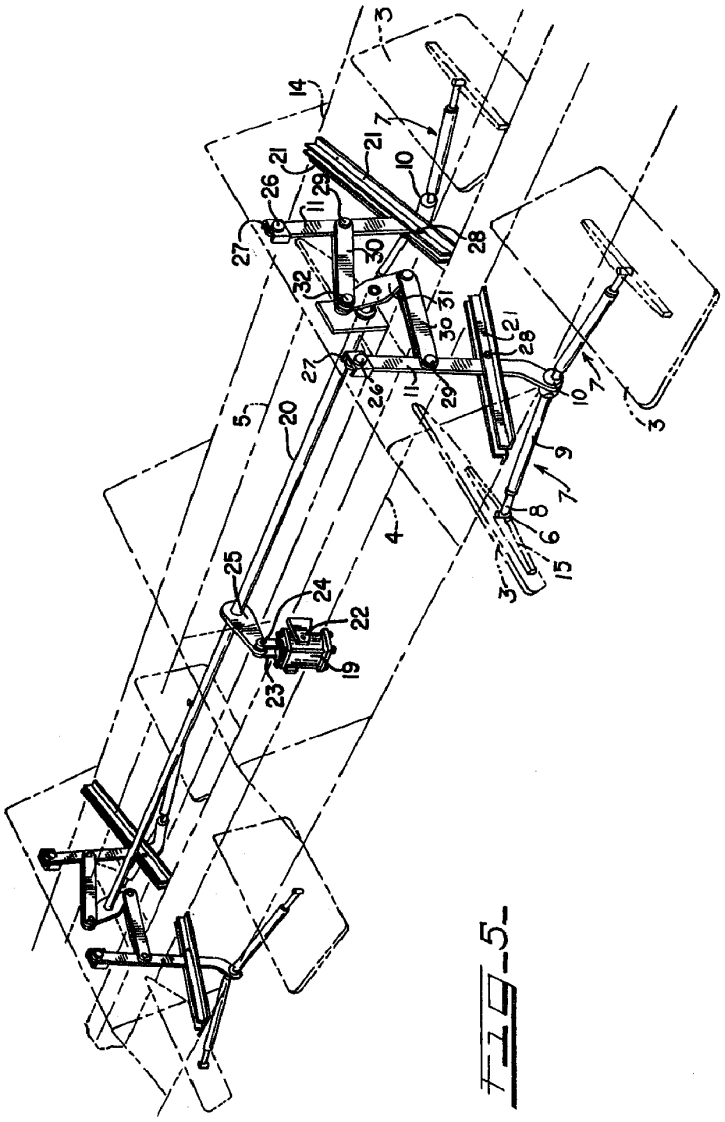


FIG-5-

INVENTOR
ROY W. MILLER
Meredith & Finlayson
PATENT AGENTS

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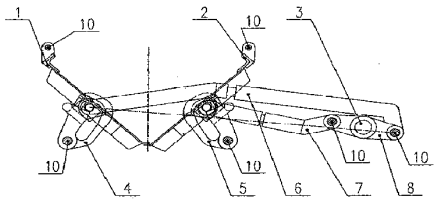
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[71] 申请人 济南轨道交通装备有限责任公司
地址 250022 山东省济南市槐荫区槐村街 73 号
[72] 发明人 王保通 刘 华 杨知猛 刘安全
[74] 专利代理机构 济南圣达专利商标事务所有限公司
代理人 张 勇
权利要求书 1 页 说明书 2 页 附图 2 页

[54] 发明名称

铁路漏斗车的底门开闭装置

[57] 摘要

本发明公开了一种铁路漏斗车的底门开闭装置。它能将货物卸在钢轨中间的受料设施，底门在开门状态下不超机车车辆限界，可实现边走边卸。其结构为：它包括左底门、右底门、传动轴、左锁体、右锁体、长顶杆、短顶杆、双联杠杆，其中，左底门和右底门沿车辆纵向中心对称布置在车体底部，同时左底门和左锁体连接并固装在车体上，右底门和右锁体连接并固定在车体上；传动轴通过轴承座与车体固连，传动轴则与动力装置连接，长顶杆末端与双联杠杆一端连接，双联杠杆另一端则与短顶杆连接，长顶杆另一端与左底门连接，短顶杆另一端则与右底门连接。



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1. 一种铁路漏斗车的底门开闭装置，其特征是，它包括左底门、右底门、传动轴、左锁体、右锁体、长顶杆、短顶杆、双联杠杆，其中，左底门和右底门沿车辆纵向中心对称布置在车体底部，同时左底门和左锁体连接并固装在车体上，右底门和右锁体连接并固定在车体上；传动轴通过轴承座与车体固连，传动轴则与动力装置连接，长顶杆末端与双联杠杆一端连接，双联杠杆另一端则与短顶杆连接，长顶杆另一端与左底门连接，短顶杆另一端则与右底门连接。

2. 如权利要求 1 所述的铁路漏斗车的底门开闭装置，其特征是，所述左底门和右底门的下缘相结合处为搭接式。

3. 如权利要求 1 或 2 所述的铁路漏斗车的底门开闭装置，其特征是，所述左底门和右门体分别通过各自对应的圆销与车体连接。

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铁路漏斗车的底门开闭装置

技术领域

本发明涉及铁路漏斗车的底门开闭装置。

背景技术

目前用于装运煤炭、矿石、硫磺等散装货物的铁路漏斗车，其车体底部装有一套底门开闭装置，通过空气传动装置或手传动装置驱动底门开闭机构，实现底门的打开和关闭。现有漏斗车的底门开闭机构只能开闭车体两侧的底门、将货物卸在钢轨两侧，底门在开门状态下一般超出机车车辆限界、需停车卸货，仅适用于地面设有可供两侧同时卸货的受料沟或高栈台的场所使用，不能将货物卸在钢轨中间的受料设施。

发明内容

本发明的目的就是针对上述机构存在的不足，提供一种铁路漏斗车的底门开闭装置，它能将货物卸在钢轨中间的受料设施，底门在开门状态下不超机车车辆限界，可实现边走边卸。

为实现上述目的，本发明采用以下技术解决方案：

一种铁路漏斗车的底门开闭装置，它包括左底门、右底门、传动轴、左锁体、右锁体、长顶杆、短顶杆、双联杠杆，其中，左底门和右底门沿车辆纵向中心对称布置在车体底部，同时左底门和左锁体连接并固装在车体上，右底门和右锁体连接并固定在车体上；传动轴通过轴承座与车体固连，传动轴则与动力装置连接，长顶杆末端与双联杠杆一端连接，双联杠杆另一端则与短顶杆连接，长顶杆另一端与左底门连接，短顶杆另一端则与右底门连接。

所述左底门和右底门的下缘相结合处为搭接式。

所述左底门和右门体分别通过各自对应的圆销与车体连接。

本发明采用对开搭接式底门、顶锁式锁闭机构，主要包括左、右底门、传动轴、左、右锁体、长、短顶杆、双联杠杆。底门和锁体通过圆销、传动轴通过轴承座分别固定在车体上。左右底门沿车辆纵向中心对称布置在车体底部，以实现货物卸在钢轨中间的受料设施内；左右底门下缘采用搭接式结构，避免因承受货物重量和车辆振动而造成门缝间隙增大；底门在开门状态下不超机车车辆限界，可实现边走边卸；采用顶锁式锁闭机构，在关门状态具有二级锁闭功能，开启底门过程所需的作用力较小。

采用本发明的铁路漏斗车，通过装设不同的手传动装置可分别操作一对底门或同时操作多对底门，通过装设离合器和不同的空气控制、传动装置可分别操作一对底门或同时操作多对底门或同时操作整列车组的底门。

关闭底门的动作过程：通过空气或手传动装置驱动传动轴和双联杠杆→通过圆销驱动长、短顶杆→通过销轴孔驱动左右锁体的销轴→左右锁体的沟槽面驱动底门的销轴→左右底门同步关闭，即可装运货物。

开启底门的动作过程：通过空气或手传动装置反向驱动传动轴，左右底门同步开启，即可实施卸货。

本发明的有益效果是：结构简单，使用方便，它能将货物卸在钢轨中间的受料设施，底门在开门状态下不超机车车辆限界，可实现边走边卸。

附图说明

图 1 是本发明的新型底门开闭机构的结构示意图；

图 2 是图 1 的左视图（闭门状态）；

图 3 是图 1 的左视图（开门状态）。

图中，1、左底门，2、右底门，3、传动轴，4、左锁体，5、右锁体，6、长顶杆，7、短顶杆，8、双联杠杆，9、轴承座，10、圆销。

具体实施方式

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下面结合附图与实施例对本发明作进一步说明。

如图 1 和图 2 所示，本发明主要由左底门 1、右底门 2、传动轴 3、左锁体 4、右锁体 5、长顶杆 6、短顶杆 7、双联杠杆 8 等组成；底门和锁体通过圆销 10、传动轴通过轴承座 9 分别固定在车体上。左底门 1 和右底门 2 沿车辆纵向中心对称布置在车体底部；左底门 1 和右底门 2 下缘采用搭接式结构，门缝间隙不会因承受货物重量和车辆振动而增大；如图 3 所示，左底门 1 和右底门 2 在开门状态下不超机车车辆限界。

关闭底门的动作过程：通过空气或手传动装置驱动传动轴 3 和双联杠杆 8→通过圆销驱动长顶杆 6、短顶杆 7→通过销轴孔驱动左锁体 4、右锁体 5 的销轴→左锁体 4、右锁体 5 的沟槽面驱动左底门 1、右底门 2 的销轴→左底门 1、右底门 2 同步关闭，即可装运货物。

开启底门的动作过程：通过空气或手传动装置反向驱动传动轴 3，左底门 1、右底门 2 同步开启，即可实施卸货。

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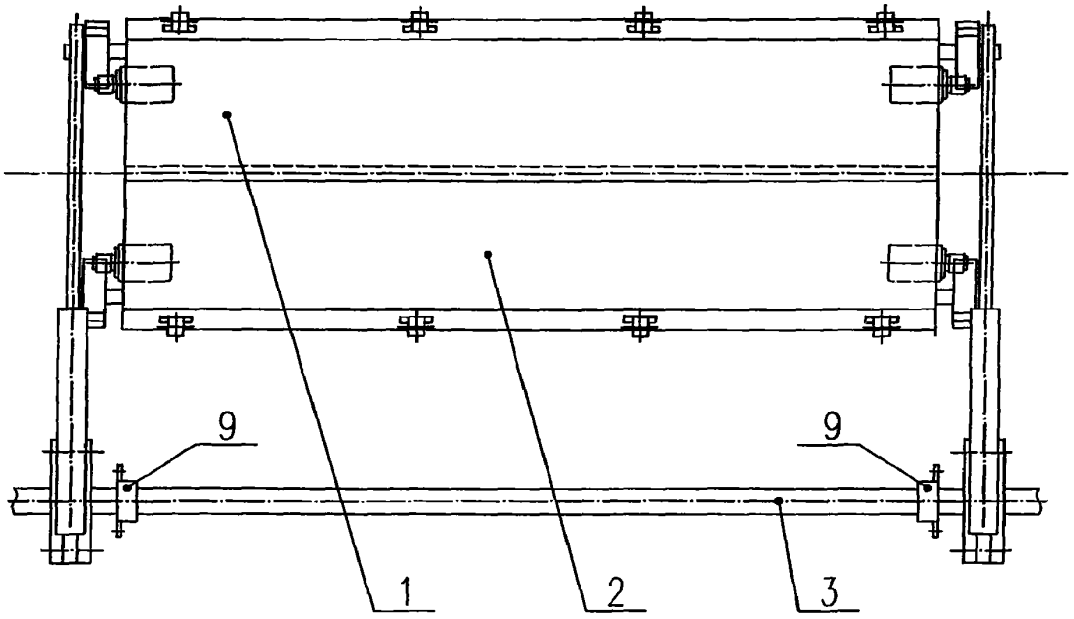


图 1

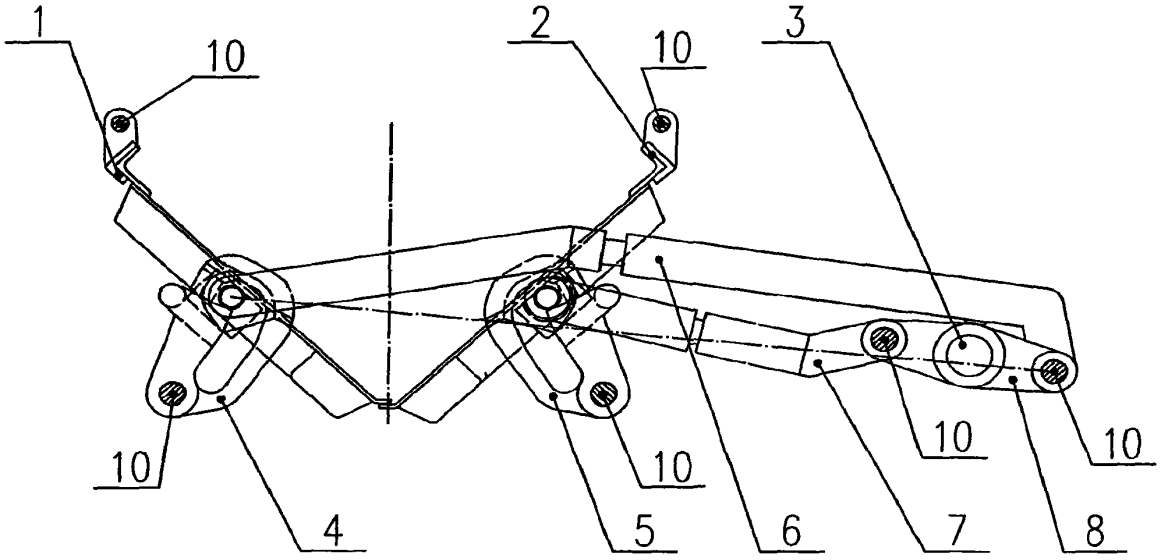


图 2

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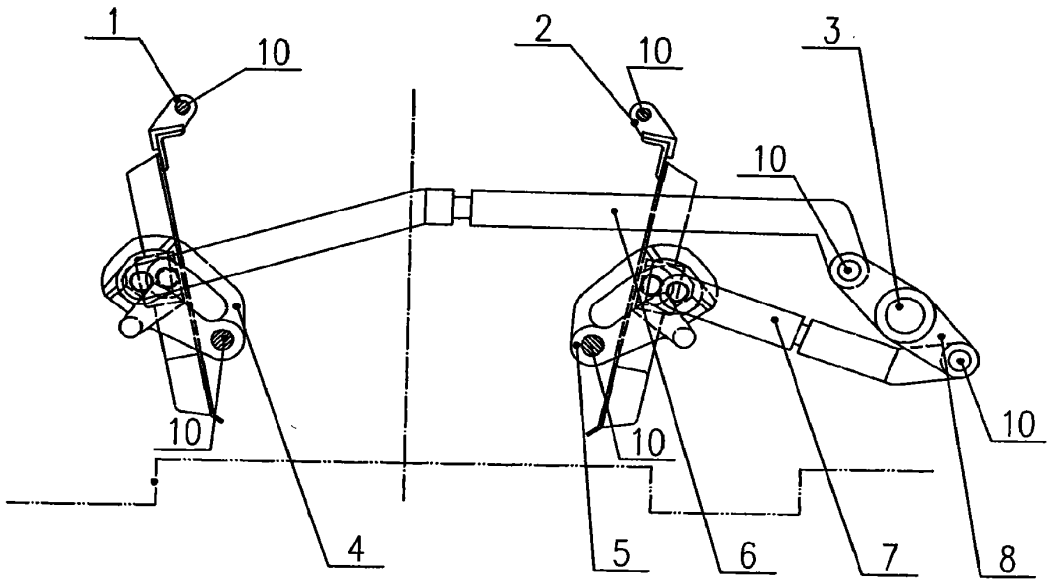


图 3

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(54) **Getriebe zum Öffnen und Schliessen der Entladeklappen eines Sattelboden-Selbstentladewagens.**

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(73) Patentinhaber: **ABB HENSCHEL WAGGON UNION GmbH**
Miraustrasse 30
D-13509 Berlin (DE)

(72) Erfinder: **Köhler, Günter, Dr.**
Aehlstrasse 22
W-5900 Siegen (DE)
Erfinder: **Munske, Helmut**
Am Wacholder 10
W-3160 Lehrte (DE)
Erfinder: **Wagener, Paul-Werner**
An der Netphe 39
W-5902 Netphen 1 (DE)

(74) Vertreter: **Rupprecht, Klaus, Dipl.-Ing. et al**
c/o ABB Patent GmbH,
Postfach 10 03 51
D-68128 Mannheim (DE)

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Beschreibung

Die Erfindung betrifft ein Getriebe zum Öffnen und Schließen der seitlichen, je in einer horizontalen Welle hängenden und um diese schwenkbaren Entladeklappe eines Sattelboden-Selbstentladewagens, wobei die Entladeklappe mittels an ihren Längsenden angelenkten, in Schließstellung in Übertotpunktlage stehenden Lenkerstangen über Hebel von einer etwa in Wagenlängsmitte gelagerten Betätigungswelle betätigbar ist.

Getriebe der vorstehend genannten Art sind beispielsweise in der DE-OS 33 07 686 vorbeschrieben. Bei den durch diese Getriebe betätigten Entladeklappen für Sattelboden-Selbstentladewagen ist in der Entladeklappe an derem unteren Ende entweder ein biege- und verwindungssteifer Längsträger vorgesehen oder der untere Längsträger der Entladeklappe ist mit Vorsprengung gegen den Sattelboden versehen, um eine Abdichtung der Entladeklappe gegen den Sattelboden zu gewährleisten.

Bei den heute üblichen großen Längen der Entladeklappen für Sattelboden-Selbstentlader tritt jedoch im mittleren Bereich der Entladeklappen eine so große elastische Verformung durch anliegendes Ladegut auf, daß eine funktionsgerechte Abdichtung der Entladeklappe gegen den Sattelboden nur durch die zusätzliche Anordnung von aufwendigen Dichtelementen gewährleistet werden kann.

Es sind auch bereits Getriebe zum Öffnen und Schließen der Entladeklappen für Sattelboden-Selbstentladewagen bekannt, bei denen die Entladeklappe über Hebel und Schubstangen mit einer am unteren Ende des Sattelbodens gelagerten, ihrerseits von einer etwa in Wagenlängsmitte laufenden Betätigungswelle angetriebenen Daumenwelle getrieblich verbunden ist, und die Daumenwelle Daumen trägt, die in Schließstellung der Entladeklappe die untere Längsseite der Entladeklappe umgreifen und die Entladeklappe in Schließstellung gegen den Sattelboden anpressen. Ein derartiges Getriebe ist beispielsweise in der DE-PS 27 16 294 vorbeschrieben. Hierbei wirkt die Betätigungswelle über paarweise angeordnete und in Übertotpunktlage schwenkbare Lenkerstangen auf einen drehfest mit der Daumenwelle verbundenen Hebel und verschwenkt die Daumenwelle gleichzeitig mit den Lenkerstangen in Schließstellung beziehungsweise Offenstellung der Entladeklappe. Nachteilig bei der Anordnung von Daumenwellen mit Daumen zum Abdichten der unteren Längsseite der Entladeklappe gegen den Sattelboden ist die erforderliche aufwendige Einstellung jeden einzelnen Daumens, um ein gleichmäßiges Anpressen der Entladeklappe zu gewährleisten. Weiter ist von Nachteil, daß jeder Daumen bei dem Schließvorgang einen bestimmten Gleitweg an dem unteren Ende der Entladeklappe durchführt, wodurch schon bei minimal verformten Entladeklappen ein sicherer Schließvorgang behindert wird.

Die Aufgabe vorliegender Erfindung bestand darin, ein Getriebe der eingangs genannten Art so auszubilden, daß ein sicheres Anliegen der Entladeklappe im Bereich deren unterer Längsseite mit einfachen Mitteln auch bei leicht verformten Entladeklappen gewährleistet ist, daß das Getriebe wirtschaftlich herstellbar und mit einfachen Mitteln montierbar ist und daß aufwendige Anpaßarbeiten bei der Montage vermieden werden.

Gemäß der Erfindung wird diese Aufgabe bei einem Getriebe der eingangs genannten Art dadurch gelöst, daß in dem Sattelboden für jede Entladeklappe mindestens eine Riegelstange verschieblich angeordnet ist, die in Schließstellung der Entladeklappe einen Schließhaken an der unteren Längsseite der Entladeklappe umgreift.

Hierbei ist die Riegelstange quer zur Wagenlängsachse etwa in Neigung des Sattelbodens unter dem Sattelboden gelagert angeordnet. Jede Riegelstange ist über Hebel und Schubstangen von der Betätigungswelle beaufschlagbar. Durch die Riegelstangen und Schließhaken wird auf einfache Weise eine zusätzliche Sicherung für die Entladeklappe in Schließstellung gewährleistet. Die in Neigung des Sattelbodens unter dem Sattelboden angeordneten Riegelstangen sind auf einfache Weise über Hebel und Schubstangen von der Betätigungswelle beaufschlagbar, so daß gleichzeitig beim Betätigen der Lenkerstangen die durch Riegelstange und Schließhaken gebildete Zusatzeinrichtung in ihre jeweilige Offen- oder Schließstellung verfahrbar ist.

Vorteilhaft sind die Riegelstangen der Entladeklappen beider Wagenlängsseiten gegenüberliegend angeordnet und über Hebel und Schubstangen verbunden, gleichlaufend betätigbar. Durch diese Anordnung der Riegelstangen wird der Aufwand für deren Antrieb über Hebel und Schubstangen auf ein Minimum begrenzt.

Der für ein zwängungsfreies Öffnen und Schließen der Entladeklappe erforderliche Vorlauf der Riegelstange beim Öffnen und der erforderliche Nachlauf der Riegelstange beim Schließen der Entladeklappe ist durch den Übertotpunktweg der Lenkerstangen einstellbar. Durch den einstellbaren Vor- beziehungsweise Nachlauf der Riegelstange wird ein Verzwängen der Entladeklappe oder des Getriebes vermieden. Die Verbindung (Hebel, Schubstange) zwischen Riegelstange und Betätigungswelle steht in Schließstellung der Riegelstange in Übertotpunktstellung. Ein Hebel der Verbindung zwischen Riegelstange und Betätigungswelle liegt in Schließstellung der Riegelstange gegen einen Anschlag an. Durch diese Übertotpunktstellung

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der Hebel und Schubstangen der Verbindung zwischen Riegelstange und Betätigungswelle wird eine Beaufschlagung der Betätigungswelle durch an die Entladeklappe anliegendes Ladegut vermieden.

Einzelheiten der Erfindung sind in der Zeichnung anhand eines Ausführungsbeispiels erläutert.

Es zeigen

Figur 1 Die Seitenansicht eines Sattelboden-Selbstentladewagens mit einer Getriebe gemäß der Erfindung,

Figur 2 die Stirnansicht des Sattelboden-Selbstentladewagens nach Figur 1,

Figur 3 den Schnitt nach Linie III-III der Figur 1,

Figur 4 den Schnitt nach Figur 3 mit teilweise geöffneten Entladeklappen.

Der Sattelboden-Selbstentladewagen weist an jeder Wagenlängsseite Entladeklappen 1 auf, die schwenkbar an einer horizontalen Welle 2 an den Längsseiten des Selbstentladewagens hängen. Jede Entladeklappe 1 liegt mit ihrer unteren Längsseite dicht gegen das untere Ende des Sattelbodens 3 des Selbstentladewagens an. In Längsmittenebene des Selbstentladewagens ist drehbar eine Betätigungswelle 4 gelagert, die mechanisch oder hydraulisch drehbar ist. Die Betätigungswelle 4 wirkt über Hebel 5 auf Lenkerstangen 6, die gelenkig seitlich an den Entladeklappen 1 gelagert sind. In Schließstellung der Entladeklappen 1 befinden sich Hebel 5 und Lenkerstangen 6 bezogen auf die Betätigungswelle 4 in Übertotpunktstellung, so daß an die Entladeklappen 1 anliegendes Ladegut das Betätigungsgestänge in Schließrichtung beaufschlagt. Die Betätigungswelle 4 weist weiter für jedes Paar der Entladeklappen 1 mindestens einen drehfest angeordneten Hebel 7 auf, der eine an seinem freien Ende gelenkig angelenkte Schubstange 8 beaufschlagt. Die Schubstange 8 ist mit ihrem zweiten Ende gelenkig an einem doppelarmigen Hebel 9 befestigt, der um eine in Wagenlängsrichtung angeordnete Achse 10 drehbar im Sattelboden 3 gelagert ist. An seinem zweiten Arm trägt der doppelarmige Hebel 9 gelenkig eine Lasche 11, die wiederum gelenkig an dem einen Arm eines zweiten doppelarmigen Hebels 12 gelenkig befestigt ist. Dieser zweite doppelarmige Hebel 12 ist ebenfalls um eine in Wagenlängsrichtung angeordnete Achse 13 im Sattelboden 3 drehbar gelagert. An seinem zweiten Ende trägt der doppelarmige Hebel 12 gelenkig eine Schubstange 14, die mit ihrem zweiten Ende gelenkig an einer Riegelstange 15 befestigt ist. Die Riegelstange 15 ist unterhalb des Sattelbodens 3 in Wagenquerrichtung etwa in der Neigung des Sattelbodens 3 längsverschieblich gelagert. An ihrem freien Ende weist die Riegelstange 15 eine Öse 16 auf, die in Schließstellung der Entladeklappen 1 einen Schließhaken 17 an der unteren Längsseite der Entladeklappe 1 umgreift.

Auf der Achse 13 des doppelarmigen Hebels 12 ist drehfest mit dem doppelarmigen Hebel 12 weiter ein Hebel 18 angeordnet. Der Hebel 18 trägt an seinem freien Ende gelenkig eine Schubstange 19, die gelenkig auf einen Hebelarm eines dritten doppelarmigen Hebels 20 wirkt, der ebenfalls im Untergestell 3 um eine in Wagenlängsrichtung angeordnete Achse 21 drehbar gelagert ist. Der zweite Arm des doppelarmigen Hebels 20 wirkt wiederum gelenkig auf eine Schubstange 14, die mit ihrem anderen Ende gelenkig an einer zweiten Riegelstange 15 befestigt ist. Diese zweite Riegelstange 15 wirkt wieder über ihre Öse 16 auf einen Schließhaken 17 an der unteren Längsseite der zugehörigen Entladeklappe 1.

Beide sich gegenüberliegenden Entladeklappen 1 auf den Längsseiten des Sattelboden-Selbstentladewagens werden somit gleichzeitig beim Verdrehen der Betätigungswelle 4 über die Lenkerstangen 6 zum Öffnen beziehungsweise zum Schließen betätigt. Gleichzeitig wird beim Verdrehen der Betätigungswelle 4 jede Riegelstange 15 der sich gegenüberliegenden Entladeklappen 1 in Offenbeziehungsweise Schließstellung verschoben.

Die Gelenkverbindung der Lasche 11 mit den doppelarmigen Hebeln 9 und 12 ist so gewählt, daß bei sich in Schließstellung befindlicher und mit Ladegut beaufschlagter Entladeklappe 1 und dem dadurch erfolgenden Zug auf die Riegelstange 15 ein den doppelarmigen Hebel 9 in Schließrichtung verschwenkendes Moment entsteht. Zur Begrenzung des Schwenkweges des doppelarmigen Hebels 9 ist ein Anschlag 24 vorgesehen, der die Betätigungswelle 4 und deren Antrieb entlastet.

Die Ausbildung der Öse 16 am freien Ende der Riegelstange 15 und die Ausbildung des Schließhakens 17 an der unteren Längsseite der Entladeklappe 1 ist erfindungsunwesentlich. Es ist auch denkbar, den Riegelhaken an dem freien Ende der Riegelstange 15 und die Öse an der unteren Längsseite der Entladeklappe 1 anzuordnen.

Patentansprüche

1. Getriebe zum Öffnen und Schließen der seitlichen, je in einer horizontalen Welle (2) hängenden und um diese schwenkbaren Entladeklappe (1) eines Sattelboden-Selbstentladewagens (3), wobei die Entladeklappe (1) mittels an ihren Längsenden angelenkten, in Schließstellung in Übertotpunktlage stehenden Lenkerstangen (6) über Hebel (5) und Schubstangen von einer etwa in Wagenlängsmitte gelagerter Betätigungswelle (4) betätigbar ist, dadurch gekennzeichnet, daß in dem Sattelboden (3) für jede Entladeklappe (1) mindestens eine Riegelstange (15) verschieblich angeordnet ist, die in Schließstellung der Entladeklappe (1)

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einen Schließhaken (17) an der unteren Längsseite der Entladeklappe (1) umgreift.

2. Getriebe nach Anspruch 1, dadurch gekennzeichnet, daß die Riegelstange (15) quer zur Wagenlängsachse etwa in Neigung des Sattelbodens (3) unter dem Sattelboden (3) gelagert, angeordnet ist.

3. Getriebe nach den Ansprüchen 1 und 2, dadurch gekennzeichnet, daß die Riegelstange (15) über Hebel und Schubstangen (7 bis 14) von der Betätigungswelle (4) beaufschlagbar ist.

4. Getriebe nach den Ansprüchen 1 bis 3, dadurch gekennzeichnet, daß die Riegelstangen (15) der Entladeklappen (1) beider Wagenlängsseiten gegenüberliegend angeordnet und über Hebel und Schubstangen (18 bis 20) verbunden, gleichlaufend betätigbar sind.

5. Getriebe nach den Ansprüchen 1 bis 4, dadurch gekennzeichnet, daß der für ein zwängungsfreies Öffnen und Schließen der Entladeklappen (1) erforderliche Vorlauf der Riegelstange (15) beim Öffnen und der erforderliche Nachlauf der Riegelstange (15) beim Schließen der Entladeklappen (1) durch den Übertotpunktweg der Lenkerstangen (6) einstellbar ist.

6. Getriebe nach den Ansprüchen 1 bis 5, dadurch gekennzeichnet, daß die Verbindung (Hebel, Schubstange 9, 11, 12) zwischen Riegelstange (15) und Betätigungswelle (4) in Schließstellung der Riegelstange (15) in Übertotpunktstellung steht.

7. Getriebe nach den Ansprüchen 1 bis 6, dadurch gekennzeichnet, daß ein Hebel der Verbindung zwischen Riegelstange (15) und Betätigungswelle (4) in Schließstellung der Riegelstange (15) gegen einen Anschlag (24) anliegt.

Claims

1. Mechanism for opening and closing the side discharge flap (1) of a saddle bottom self-discharging waggon (3) in which each discharge flap (1) is suspended on a horizontal shaft (2), is pivotable about the latter and can be actuated, by an actuation shaft (4) supported approximately in the longitudinal centre of the waggon, by means of linkage rods (6) hinged at their longitudinal ends and coming to rest beyond their dead centre position in the closed position of the discharge flap, via levers (5) and thrust rods, characterised in that for each discharge flap (1), at least one locking rod (15) is displaceably located in the saddle bottom (3) and, in the closed position of the discharge flap (1), encompasses a closing hook (17) on the lower longitudinal side of the discharge flap (1).

2. Mechanism according to Claim 1, characterised in that the locking rod (15) is located and supported under the saddle bottom (3), transverse to the waggon longitudinal axis and approximately at the inclination of the saddle bottom (3).

3. Mechanism according to Claims 1 and 2, characterised in that the locking rod (15) can be acted upon by the actuation shaft (4) via levers and thrust rods (7 to 14).

4. Mechanism according to Claims 1 to 3, characterised in that the locking rods (15) of the discharge flaps (1) on both longitudinal sides of the waggon are located opposite to one another, can be actuated simultaneously and are connected by levers and thrust rods (18 to 20).

5. Mechanism according to Claims 1 to 4, characterised in that the advanced movement of the locking rod (15) necessary for unforced opening of the discharge flaps (1) and the retarded movement of the locking rod (15) necessary for unforced closing of the discharge flaps (1) can be achieved by means of the displacement beyond dead centre of the linkage rods (6).

6. Mechanism according to Claims 1 to 5, characterised in that the linkage (levers, thrust rods 9, 11, 12) between the locking rod (15) and the actuation shaft (4) is in its position beyond dead centre in the closed position of the locking rod (15).

7. Mechanism according to Claims 1 to 6, characterised in that a lever in the linkage between the locking rod (15) and the actuation shaft (4) is in contact with a stop (24) in the closed position of the locking rod (15).

Revendications

1. Mécanisme d'ouverture et de fermeture des trappes de déchargement latérales (1) d'un wagon à trémies (3) à déversoirs latéraux, chaque trappe de fermeture étant suspendue à un axe horizontal (2) de manière à pouvoir pivoter autour de ce dernier et pouvant être actionnée

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par des leviers (5) et des barres de poussée, au moyen de bielles (6) articulées sur ses extrémités longitudinales et se trouvant en position de dépassement de point mort à l'état fermé, à partir d'un arbre d'actionnement (4) monté à peu près dans le plan médian longitudinal du wagon, caractérisé par le fait qu'au moins une barre de verrouillage (15) est montée déplaçable en translation dans le plancher (3) en dos d'âne pour chaque trappe de déchargement (1), cette barre entourant, en position de fermeture de la trappe (1), un crochet de fermeture (17) sur le côté longitudinal inférieur de la trappe de déchargement (1).

2. Mécanisme suivant la revendication 1, caractérisé par le fait que la barre de verrouillage (15) est disposée transversalement à l'axe longitudinal du wagon en dessous du plancher (3) en dos d'âne, à peu près suivant l'inclinaison du plancher (3) en dos d'âne.

3. Mécanisme suivant les revendications 1 et 2, caractérisé par le fait que la barre de verrouillage (15) peut être manoeuvrée par l'arbre d'actionnement (4) en passant par des leviers et des barres de poussée (7 à 14).

4. Mécanisme suivant les revendications 1 à 3, caractérisé par le fait que les barres de verrouillage (15) des trappes de déchargement (2) sur les deux côtés longitudinaux du wagon sont disposées face à face et, reliées par des leviers et des barres de poussée (18 à 20), peuvent être actionnées en synchronisme.

5. Mécanisme suivant les revendications 1 à 4, caractérisé par le fait que le mouvement antérieur de la barre de verrouillage (15) lors de l'ouverture de la trappe de déchargement (1) et le mouvement postérieur de la barre de verrouillage (15) lors de la fermeture de la trappe de déchargement (1), nécessaires en vue d'une ouverture et fermeture sans coincement des trappes de déchargement (1), sont réglables par le trajet de dépassement de point mort des bielles (6).

6. Mécanisme suivant les revendications 1 à 5, caractérisé par le fait que la liaison (levier, barre de poussée 9,11,12) entre la barre de verrouillage (12) et l'arbre d'actionnement (4), en position de fermeture de la barre de verrouillage (15), se trouve en position de dépassement de point mort.

7. Mécanisme suivant les revendications 1 à 6, caractérisé par le fait qu'un levier de la liaison entre la barre de verrouillage (15) et l'arbre d'actionnement (4) est appliqué contre une butée (24) en position de fermeture de la barre de verrouillage (15).

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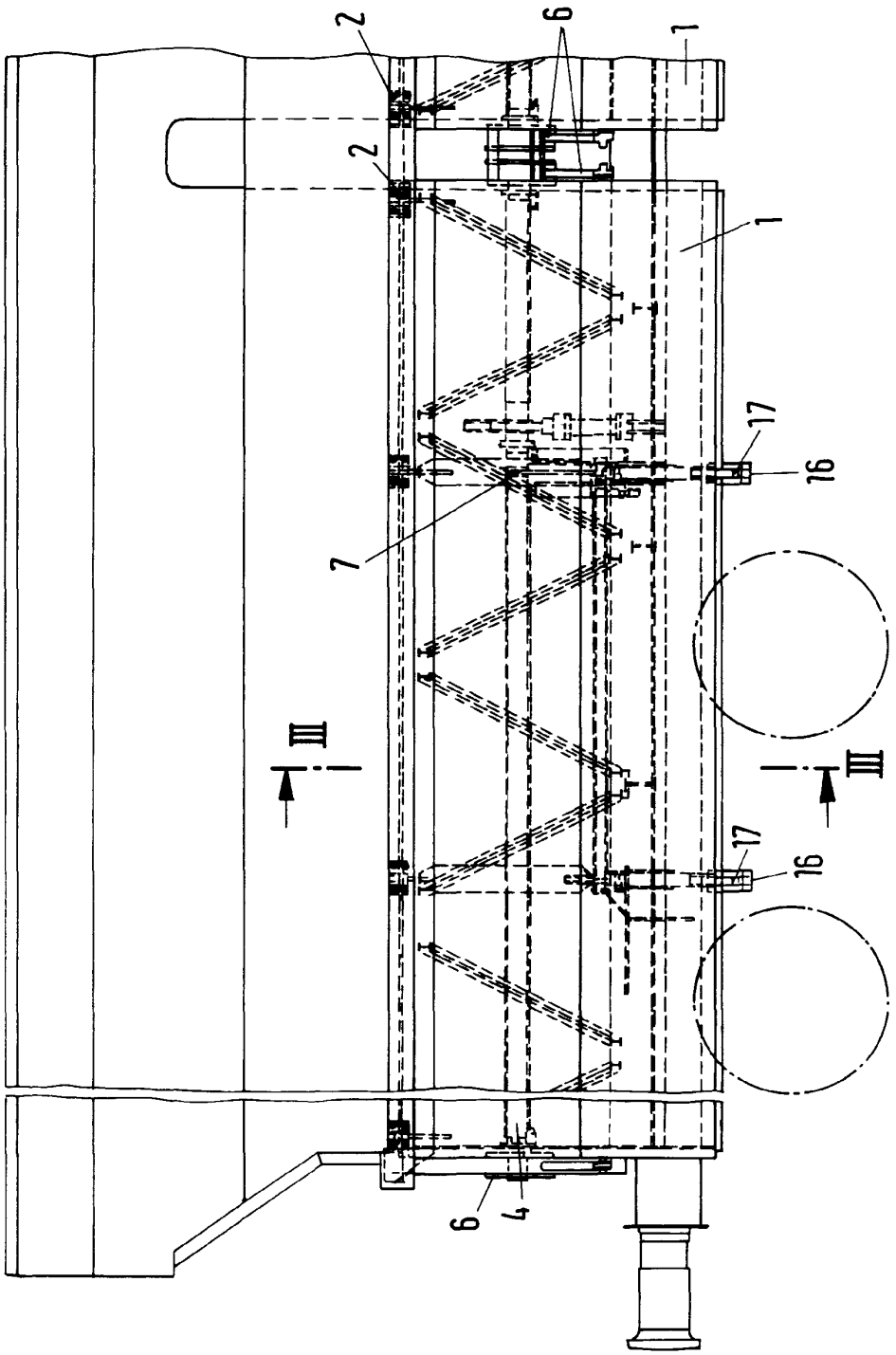
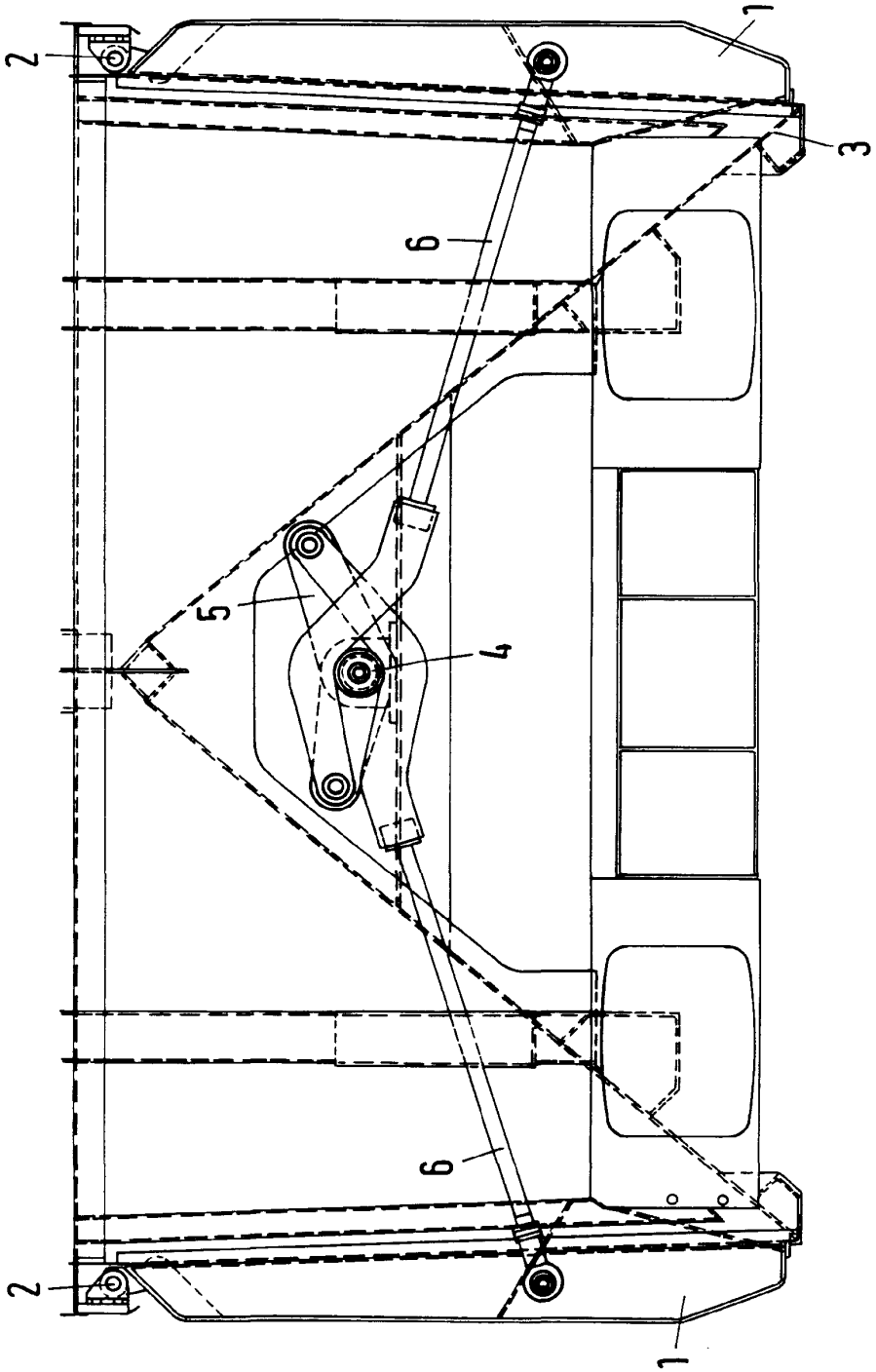


Fig.1

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Fig.2



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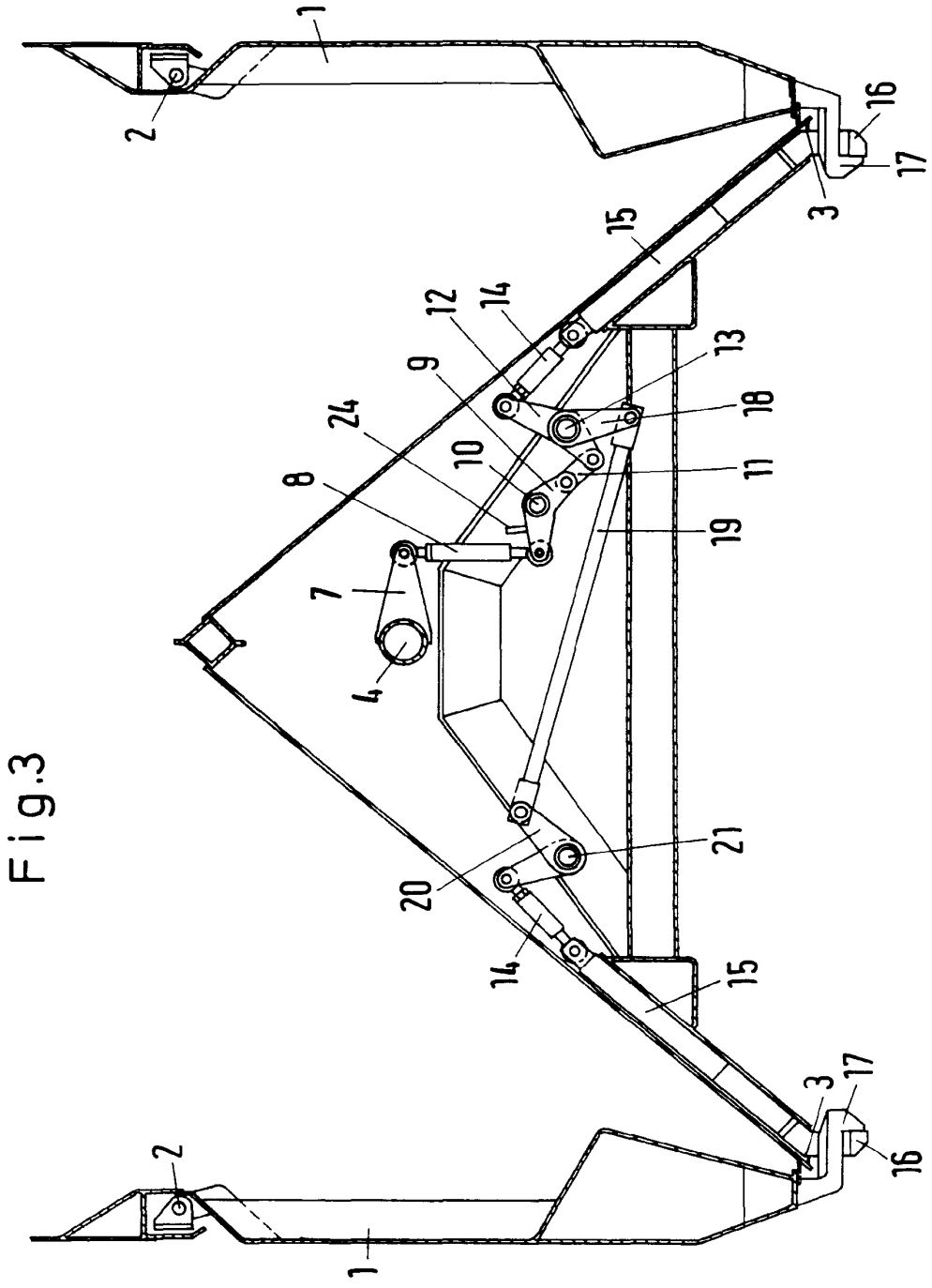


Fig.3

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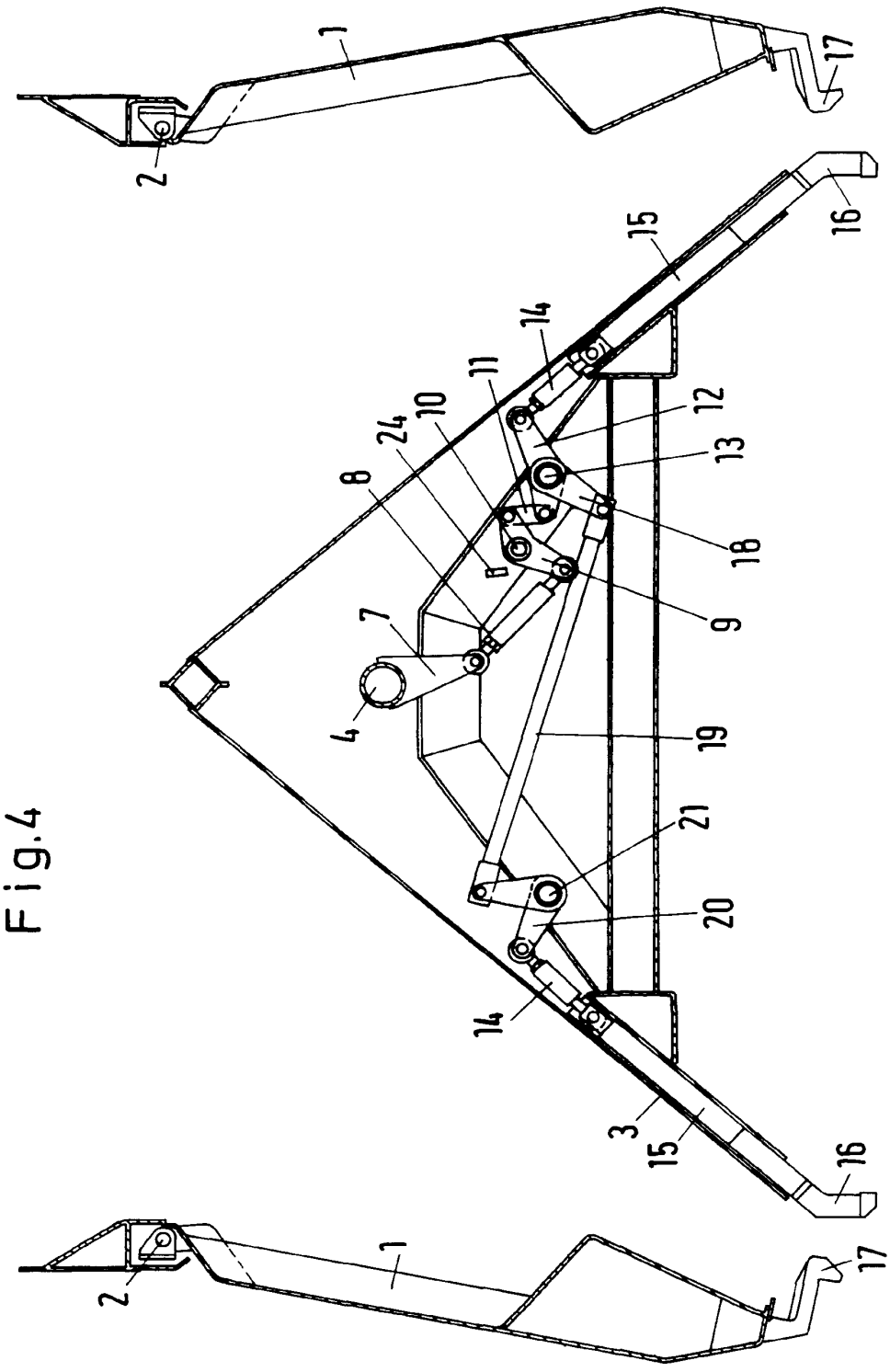


Fig.4

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(71) Applicant: **Wagony Swidnica SA**
58100 Swidnica (PL)

(72) Inventors:
- **Pazdzierniak, Przemyslaw**
  58 160 Swiebodzice (PL)
- **Jarecki, Witold**
  58 100 Swidnica (PL)
- **Konstanty, Piotr**
  58 100 Swidnica (PL)
- **Kozbial, Stanislaw**
  58 100 Swidnica (PL)
- **Studzinski, Dionizy**
  58 100 Swidnica (PL)

(74) Representative: **Kozlowska, Regina**
ul. Pomorska 4/16
50-218 Wroclaw (PL)

(54) Unloading mechanism of discharge flaps in hopper-bottom cars

(57) The mechanism is provided with a pair of flaps closing a hopper hole, pneumatic actuators for driving the flaps, catches (7) attached to the left flap, hooks (4) mounted to actuator cylinders (8), and a locking unit to secure the flaps in closed position. The left flap is provided with a longitudinal shaft (1) ending in levers (2) that are connected to heads (5) of piston rods of the actuator on each side of the flap. At the end of each lever (2) there is a disc (6), which is mating with a comb flank of a hook (4) cam, while an arm of the lever (2) is placed between right (10) and left (11) stoppers, which are part of the left flap. Flanks of flaps are connected to each other through synchronous couplers (9).
The mechanism is intended for dump cars of the hopper-bottom type.

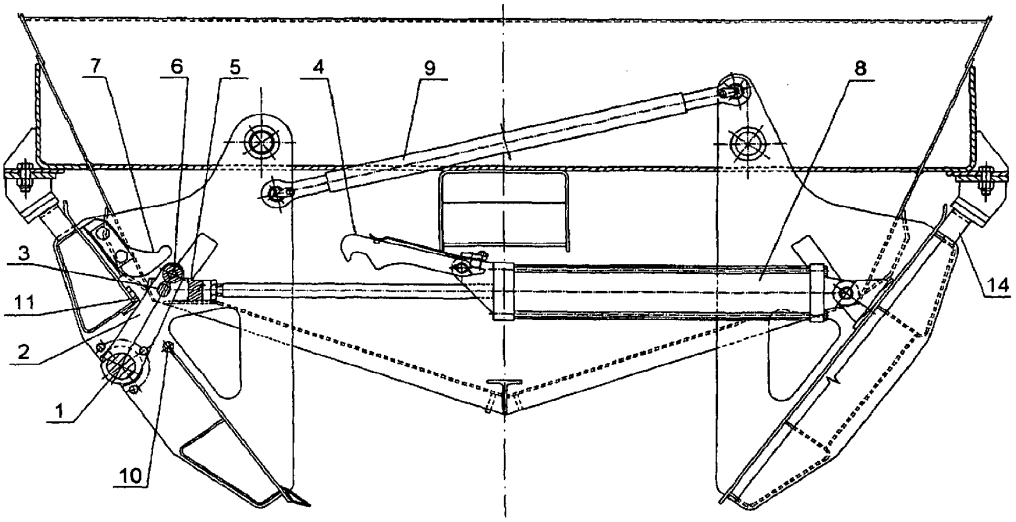


FIG. 2

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Description

[0001] The object of the present invention is the air-operated unloading mechanism of discharge flaps in hopper-bottom cars for transport of aggregate.

[0002] The hopper-bottom cars known so far are discharged to the intertrack space, they are provided with at least one pair of swivel-mounted flaps on both sides of a longitudinal beam in the car body supporting structure. The longitudinal beam is placed in a symmetry plane of the chassis frame. Flap flanks are pivotally attached to the car body that ends at the bottom with a discharge hopper. Flaps are driven by two pneumatic actuators, one on each side with a pair of flaps. A cylinder base of each actuator is attached through a flat articulated joint to one flap, and the end of a piston rod is attached to another flap through a pin which is fit loose in an eye of a catch that is attached to this flap. A hook provided with a compression spring is mounted to the cylinder body on front side. Flanks of flaps are connected to each other through synchronous couplers. One articulated joint is mounted below the axis of rotation of one flap, and the other joint - below the axis of rotation of the second flap. When the flaps are closed, the hooks, which are components of pneumatic cylinders, are in mesh with catches of the second flap. In the base part of each hook there is a disc that is in contact with a cam formed in the catch jig. Flaps are locked in a closed position by a locking unit composed of a transverse shaft provided with cam locks for preventing from opening the flaps. When in closed position, the cam locks stay in rectangular slots made in flap flanks. Turning the transverse shaft manually or using the pneumatic actuator, effects in retracting the cam locks.

[0003] In initial phase of the piston rod movement, within the clearance range of the head-mounting pin, the hook moves up over the cam flank and gets meshed off the catch; all that takes place under elevated working pressure in cylinders.

[0004] According to the invention, the entire air-operated unloading mechanism of discharge flaps in hopper-bottom cars - provided with a pair of flaps closing a hopper hole, synchronous couplers to connect the flap flanks, pneumatic actuators for driving the flaps, catches attached to the left flap, hooks mounted to actuator cylinders, and a locking unit to secure the flaps in closed position - is characterized in that the left flap is provided with a longitudinal shaft ending in levers that are connected to heads of piston rods of the actuator on each side of a flap, where at the end of each lever there is a disc, which is mating with comb flank of a hook cam. In addition, a lever arm is placed between left and right stoppers, which are part of the left flap.

[0005] In the preferable version of the mechanism, there is a bean-like hole in each lever near its free end, where the pin of the head of the cylinder piston rod is fit in; the stoppers are fixed to edges of the hole made in the bottom panel of the left flap, and the lever arm passes through this hole.

[0006] In the solution according to the invention, the longitudinal shaft with levers, and with discs at its end, provides for simultaneous operation of both cylinders, thus minimizing the cylinder pressures, necessary to mesh off the hooks; owing to this, the control of the flap closing action can be carried out smoothly, also it is possible to control the goods volume flow rate when unloading the cars. By mounting the piston rod head in the bean-like hole made in the lever of the longitudinal shaft, elimination of shearing forces on piston rods is obtained, and thereby the working life of the actuator can be extended.

[0007] The object of the invention has been represented as an exemplary solution in figures 1 to 5. Flaps with the unloading mechanism in closed position are shown in Fig. 1, viewed from the front; Fig. 2 - Flaps with the flap opening mechanism in open position, front view; Fig. 3 - Longitudinal shaft with a lever, side view; Fig. 4 -Broken-out cross-section of the left flap, rear view; Fig. 5 - Fragmentary view of the left flap in the A-A cross-section as in Fig. 4.

[0008] When flaps are in closed position, as shown in Fig. 1, the hopper bottom holes on both sides of the car longitudinal beam are closed. Flanks of flaps are swivel-mounted to walls of the car body supporting structure. One pair of flaps, consisting of a left flap and a right flap, is provided with two pneumatic actuators, which have cylinders **8** attached to the right flap. Hooks **4** being the part of the air cylinders **8** are in mesh with catches **7** attached to the left flap. Flat springs adhere to the hooks **4** in the upper part of the hooks. The springs force the hooks in a snap mesh with catches **7.** A longitudinal shaft **1,** ended with levers **2** is mounted in the base part of the left flap. Stoppers that are part of the bottom panel of the left flap limit rotation of the lever **2.** In the closing position the arm of the lever **2** rests on the right-side stopper made of a bar, and in the opening position the lever arm rests on the left-side stopper **11,** made of an angle section. A bean-like hole **3** is made in each of levers **2,** near its free end, and the pin that serves to mount the head 5 of the cylinder piston rod, is fit therein. Bean-like holes that are above the hole in the bottom flank of the left flap, which lets the arm of the lever **2** through, connect the lever **2** to the heads **5** of the cylinder **8** piston rods. Owing to this type connection, occurrence of shearing forces on piston rods during the action of closing and opening flaps is eliminated. At the ends of the levers **2,** above the bean-like holes, there are discs **6** mating with a suitably shaped flank of the cam, over which hooks **4** move. Range of rotation of the lever **2** corresponds to the cylinder piston rod travel, necessary to mesh the hooks **4** off the catches **7.** Both flaps are connected to each other through a synchronous coupler **9.** The coupler is attached to the right flap, above the axis of rotation of this flap, and to the left flap - below its axis of rotation. A locking unit for securing a pair of flaps in closed position consists of a transverse shaft **12** provided with cam locks **13** that mesh in rectangular slots made in flap flanks. While meshing in the rec-

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tangular slot in the left flap, the cam lock **13** at the same time locks the hook **4** in its bottom position, thus preventing it from being lifted and meshed off the catch **7.** Rotation of the transverse shaft **12** is performed by a side pneumatic actuator of the locking unit, attached to the side car frame, or manually, using a lever type mechanism attached at the end of the transverse shaft **12.**

[0009] As presented in Fig. 2, the flaps in open position are pulled away from the longitudinal beam, and the stoppers **14** that are located on outside panel of each flap, touch the stoppers fixed to the side car-frame. On unlocking the flaps, the piston rods of cylinders **8** retract, which effects in lifting the hooks **4** on the disc **6** placed at the end of the lever **2.** Then the hooks **4** disengage from catches **7.** Further movement of the piston rod results in that the lever **2** rests on the left stopper **11,** and the flap is turning until the stopper **14** touches the stopper at the side car-frame. Through the longitudinal shaft **1,** hooks **4** are disengaged at the same time on both sides of the pair of flaps. The synchronous coupler **9** makes that both flaps are lifted simultaneously. Mutual position of a beam-like hole and a disc **6** on the lever **2** of the longitudinal shaft **1** has been shown in Fig. 3. Position of stoppers **10** (right stopper) and **11** (left one) against the catch **7** and the hub of the longitudinal shaft **1** have been shown in Fig. 4. In Fig. 5 there has been shown an attachment of the catch **7** and the left stopper **11** to the flank of the left flap, and also an extra reinforcement of the longitudinal shaft **1** mounted to a section that is stiffening the bottom panel of the flap. Stoppers are welded to edges of the hole made in the bottom panel of the flap and used as a through-hole for the lever **2;** the catch **7** together with control components, is screwed to the panel of the left flap. Stoppers in the left flat are arranged so as to provide for correct kinematics of the system, both when opening and closing the flaps.

[0010] In the solution according to the invention, the longitudinal shaft **1** together with levers **2** ended with discs **6** assures that the air pressure in cylinders, necessary to effect the disengagement of hooks **4,** is minimized, owing to which also the control of the goods volume flow rate is possible when unloading the cars.

[0011] The solution can be used in four-wheel cars as well as in cars having more than two axles; in cars having boxes provided with a bottom hopper for gravity unloading of loose materials. In case that a car box is provided with more than one pair of flaps, the pneumatic actuator of one pair of flaps can be coupled with the adjacent pair of flaps.

Claims

1. The air-operated unloading mechanism of discharge flaps in a hopper-bottom car, provided with a pair of flaps closing a hopper hole, synchronous couplers to connect the flap flanks, pneumatic actuators for driving the flaps, catches attached to the left flap, hooks mounted to actuator cylinders, and a locking unit to secure the flaps in closed position, **characterized in that** the left flap is provided with a longitudinal shaft (1) ending in levers (2) that are connected to heads (5) of piston rods of the actuator on each side of the flap, where at the end of each lever (2) there is a disc (6), which is mating with a comb flank of a hook (4) cam, while an arm of the lever (2) is placed between left (11) and right (10) stoppers, which are part of the left flap.

2. The mechanism according to the claim 1, **characterized in that** there is a bean-like hole (3) in each lever (2) near its free end, where the pin of the head (5) of the cylinder piston rod is fit in.

3. The mechanism according to the claim 1, **characterized in that** the stoppers are fixed to edges of the hole made in the bottom panel of the left flap, and the arm of the lever (2) passes through this hole.

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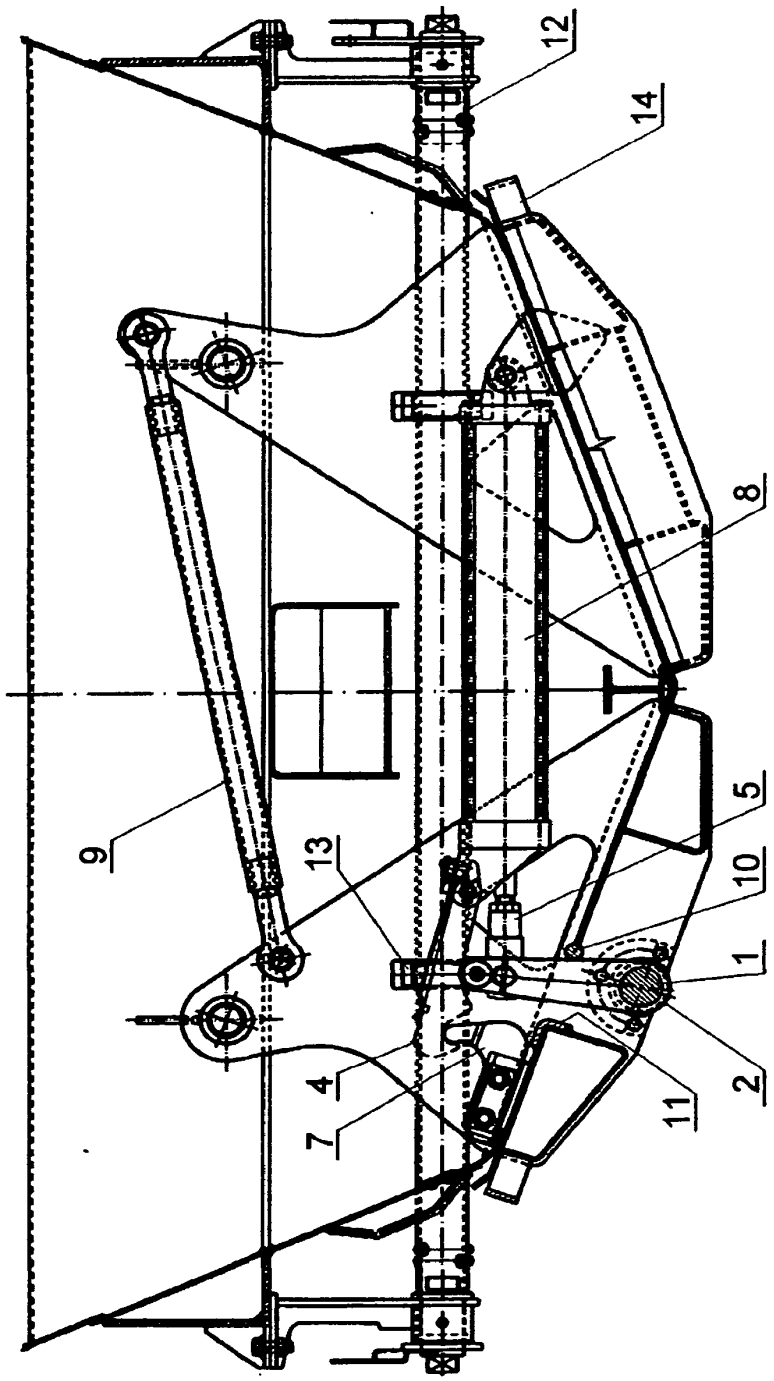


FIG. 1

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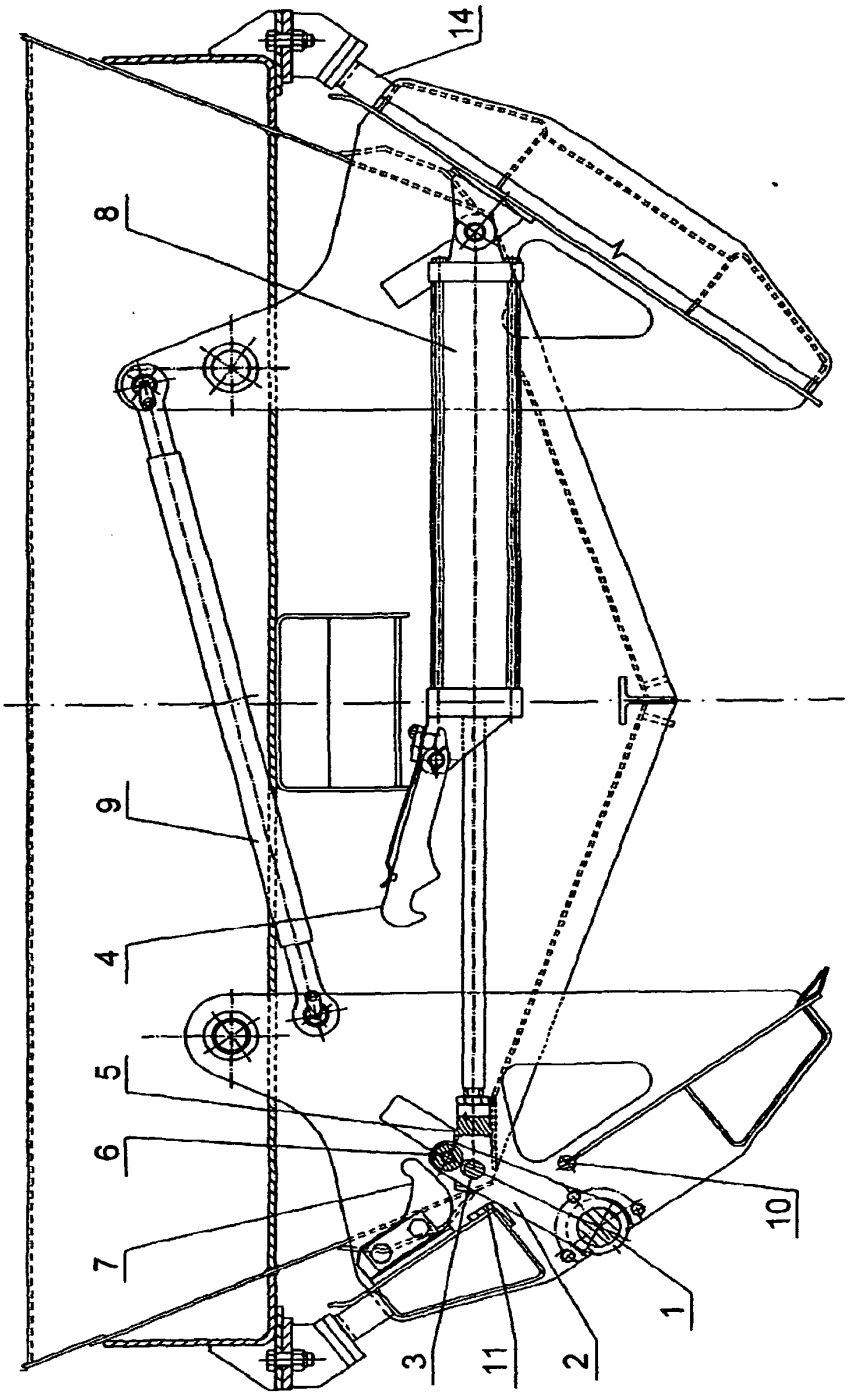


FIG. 2

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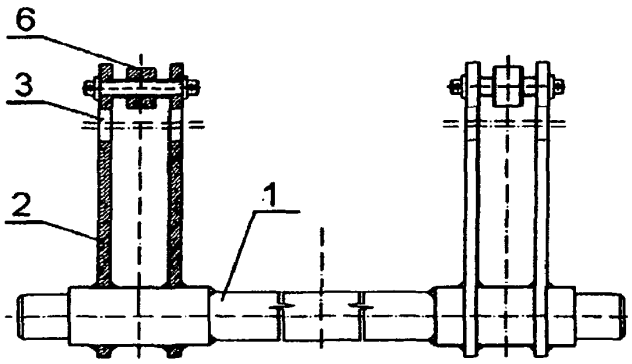


FIG. 3

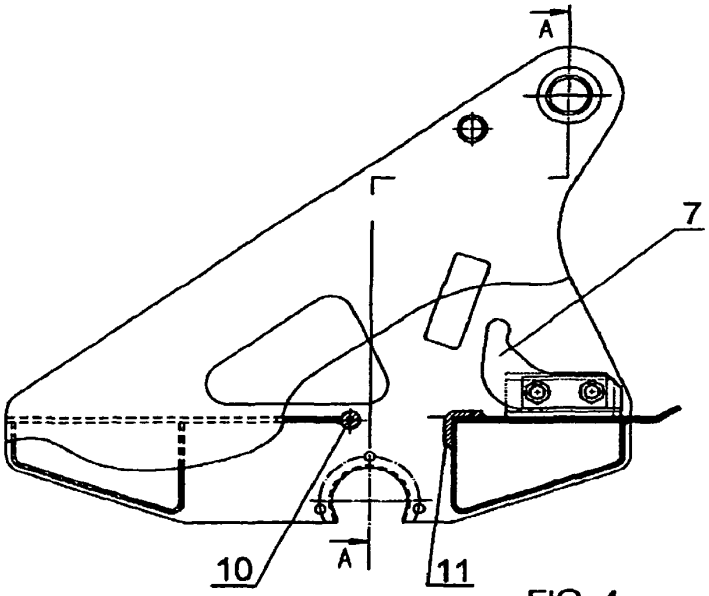


FIG. 4

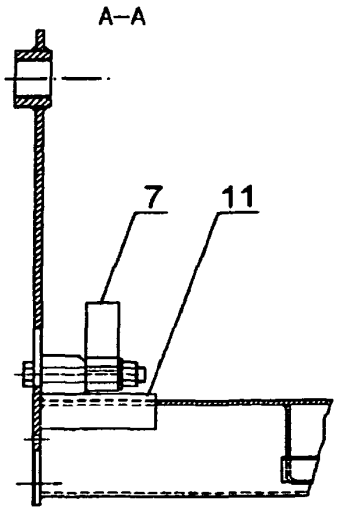


FIG. 5

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(71) Applicant: **Wagony Swidnica SA**
58100 Swidnica (PL)

(72) Inventors:
- **Studzinski, Dionizy**
  58-100 Swidnica (PL)
- **Kozbial, Stanislaw**
  58-100 Swidnica (PL)
- **Adamczewski, Tomasz**
  58-100 Swidnica (PL)
- **Pazdzierniak, Przemyslaw**
  58-160 Swiebodzice (PL)

(74) Representative: **Kozlowska, Regina**
ul. Pomorska 4/16
50-218 Wroclaw (PL)

(54) Suspension system of railway vehicles

(57) The invention provides a design solution for a suspension system of a railway vehicle, especially four-wheel freight car, that assures the system functioning at possibly low rolling resistance; at the same time this is solution assures that wheel sets can be correctly aligned in relation to tracks and stabilized, owing to which increased rolling resistance and wear-and-tear of both the wheel sets and rails is reduced. The objective has been achieved in such a way that in order to reduce friction resistance, rollers (9), preferably up to two of them, were incorporated in friction wedges (6) on a sloped surface, while other surfaces were provided with friction lining pads (7) and (8). Working surfaces of the wedge (13), also mating surfaces of the base plate (1) and saddle column (5) were provided with friction pads (7) of a material having low friction factor, below 0.2. For better stabilization of the suspension system, the crosswise rigidity of spring sets (2) was enhanced, and rigidity of conventional spring sets was increased by dividing the springs with a plate (10) at half height. Further increase of the spring system rigidity was achieved by connecting the dividing plates (10) from adjoining spring sets (2) to each other, and joining the matching connected plates (10) on both sides of a car by use of stabilizing rods (12).

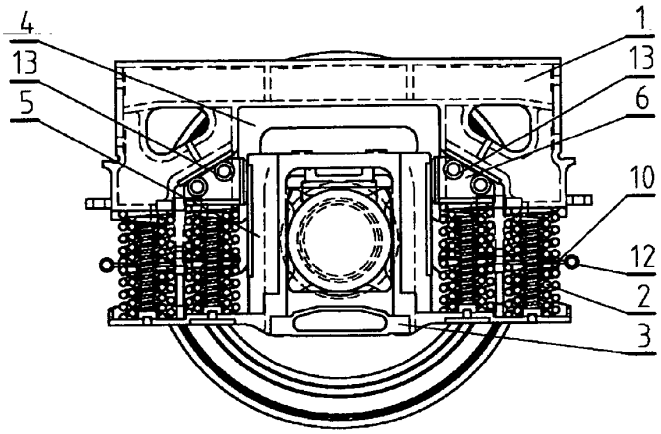


Fig. 1.

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Description

[0001] Field of technology. The object of the present invention is a suspension system of railway vehicles, especially four-wheel freight cars, consisting of a set of springs, a saddle and friction wedges.

[0002] State of knowledge. Suspension systems known so far are designed in such a way that a chassis frame at both ends, and on both sides of a car is provided with base plates, where each of them is supported by a set of suspension springs mounted on a matching saddle. The saddle in turn, is seated on a bearing shell of a wheel set. In the central part of each base plate there is a space surrounded by surfaces that are mating with saddle columns. Between the saddle columns and the mating surfaces of base plates on both sides of the column, there are friction wedges supported by sets of saddle-seated springs. Usually a friction wedge is of a triangular shape, with different inclination of planes, and mating surfaces of the wedge, saddle and base plate are lined with pads. Resistance to sliding motion of the friction wedge relative to the base plate and saddle, which results in damping the motion, is induced by friction forces occurring between the wedge and the saddle column. With such combination of technical means, under certain weather conditions, while maybe having selected wrong materials (too high friction factor value), designed mating parts to improperly shape, or if the springs that stabilize the suspension system functioning are of insufficient rigidity, especially in crosswise direction, then different forces may occur and disturb the damping action of the wedges on motion of a car. Such disadvantageous changes may lead to jamming which in turn may result in a wrong position of a wheel set on a straight or curved track as well. As the consequence, rolling resistance increases, and wheel sets as well as rails become increasingly damaged.

[0003] Essence of the invention. The object of the present invention is to develop such a design of friction wedges that a low value of friction factor between the inclined wedge surface and mating base plate could be assured. As such solutions make operation of the car suspension system unstable when running straight, thus the rigidity of spring sets both lengthwise and crosswise of the car, needs increasing while keeping its vertical characteristics and dimensions unchanged. Neither the base nor the saddle need design modifications.

[0004] This problem has been solved so that in the first version of the invention the wedge surface formed by rollers, preferably up to two of them, is inclined. In case of two-roller wedge the surface formed by the rollers is inclined at an angle of 35° to the level, and the vertical surface forms a sector of a cylinder aligned with a horizontal axis. The vertical surface of a one-roller wedge is lined with material having a friction factor lower than 0.2, and the wedge next to the roller is provided with a bumper, in order to hinder its rotation. Springs of enhanced crosswise rigidity have been used. By dividing the springs, preferably into two parts, with a dividing plate, the rigidity of springs in use till that time was modified. Dividing plates belonging to adjoining springs that support a base plate and a wedge, are mutually connected, and also the dividing plates located on one side of a car are connected with the matching dividing plates that are located on the other side of the car. According to the second version of my invention, the wedge plane is inclined to the level at an angle of 10° ÷ 40°, preferably at 30°, and at the same time its vertical plane is inclined towards the wedge slope at an angle of up to 5°, preferably 3°. The plane of the base plate that is mating the inclined wedge plane, and the saddle column plane, are both lined with a material having the friction factor lower than 0.2. Springs of enhanced crosswise rigidity have been used. By dividing the springs, preferably into two parts, with a dividing plate, the rigidity of springs in use till that time was modified. Dividing plates belonging to adjoining springs that support a base plate and a wedge, are mutually connected, and also the dividing plates located on one side of a car are connected with the matching dividing plates that are located on the other side of the car.

[0005] Explanation of pictures. The object of the invention has been presented as an exemplary design in the following figures. Fig. 1 - Suspension system, version 1, two-roller wedge solution; Fig. 2 - Suspension system, version 1, one-roller wedge solution; Fig. 3 - Suspension system, version 2, non-roller wedge solution; Fig. 4 - second version design, two-roller wedge solution; and Fig. 5 - second version design, one-roller wedge solution.

Example of a design according to the invention, version 1.

[0006] A suspension system consists of base plates **1** fixed to a chassis frame at both ends of a car in the area where wheel sets are located; the base plates are supported by sets of suspension springs **2** mounted on matching saddles **3**. The saddle **3** is seated on a bearing shell (axle box) of a wheel set. In the central part of each base plate **1** there is a space **4** surrounded by surfaces that are mating with saddle columns **5**. Between the saddle columns **5** and the mating surfaces of base plates **1**, on both sides, friction wedges **6** are applied. Rollers, preferably one or two of them, are incorporated in the friction wedges **6**. In the two-roller friction wedge **6**, the surface formed by rollers is inclined at an angle of 30° to the level, and a lining pad **7** of a friction factor lower than 0.2 is applied over the vertical surface of the wedge. On the outside this vertical surface forms a sector of a cylinder aligned with a horizontal axis. In the one-roller friction wedge **6** the vertical surface is inclined towards the wedge slope at an angle of 3°, and a lining pad **8** of a friction factor lower than 0.2 is applied over the surface. A bumper **9** is mounted on the sloped plane next to the roller, on the lower side. A plate 10 divides spring sets **2**, preferably at half height. The plates 10 belonging to each of the two adjoining spring sets **2** are mutually con-

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nected. The matching connected plates **7** on both sides of a car are connected through a stabilizing rod **11**.

[0007] Example of a design according to the invention, version 2. A suspension system consists of base plates **1** fixed to a chassis frame at both ends of a car in the area where wheel sets are located; the base plates are supported by sets of suspension springs **2** mounted on matching saddles **3**. The saddle **3** is seated on a bearing shell (axle box) of a wheel set. In the central part of each base plate **1** there is a space **4** surrounded by surfaces that are mating with columns **5** of the saddle **3**. Between the saddle columns **5** and the mating surfaces of base plates **1**, on both sides, friction wedges **10** are applied. The top surface of the friction wedge **10** is inclined to the level at an angle of 10° to 40°, preferably 30°, and its vertical surface is inclined towards the wedge slope at an angle of 3°. Lining pads **11** of a friction factor lower than 0.2 are applied over the base plate that is mating the inclined surface of the wedge **10**, and over the surface of the column **5** of the saddle **3**. Spring sets **2** are divided by the plate **10**, preferably at half height. The plates **10** belonging to each of the two adjoining spring sets **2** are mutually connected. The matching connected plates **10** on both sides of a car are connected through a stabilizing rod **12**.

[0008] Such combination of technical means assures that so designed suspension system will function properly.

Claims

1. A suspension system of a railway vehicle, especially four-wheel freight car, consisting of a base plate, saddle, friction wedges, spring sets, **characterized in that** a friction wedge (6) has a sloped surface formed by rollers (13) incorporated therein, preferably up to two of them, and at the same time, both the friction wedge (6) and the base plate (1) are supported by spring sets (2).

2. A suspension system of a railway vehicle, especially four-wheel freight car, consisting of a base plate, saddle, friction wedges, spring sets, **characterized in that** the top surface of the friction wedge (6) is inclined to the level at an angle of 10° to 40°, preferably 30°, and the inclined surface as well as the vertical surface are provided with friction lining pads (11) of a material having a friction factor lower than 0.2, and both the wedge (6) and base plate (1) are supported by spring sets (2) that are seated on a saddle (5).

3. A suspension system according to claim 1 or 2, **characterized in that** spring sets (2) are divided by a dividing plate (10) into parts, preferably into two parts, and at the same time the plates (10) belonging to adjoining spring sets (3) are mutually connected, and the matching connected plates (10) on both sides of a car are connected to each other through a stabilizing rod (12).

4. A suspension system according to claim 2, **characterized in that** the outside surface of a friction lining pad (11) over the vertical surface of the friction wedge (6) is shaped in form of a sector of a cylinder aligned with a horizontal axis.

5. A suspension system according to claim 1 or 2, **characterized in that** there is a hole (16) in a panel (4), aligned with an axis of a spring set (2), and the inner spring (15) is left undivided.

6. A suspension system according to claim 1, **characterized in that** a one-roller friction wedge (6) is provided with a bumper (17) next to the roller (9) at the end of the friction wedge (6).

7. A suspension system according to claim 1, **characterized in that** in a two-roller friction wedge (6) the surface formed by rollers is inclined at an angle of 10° ÷ 40°, preferably 35°, to the level.

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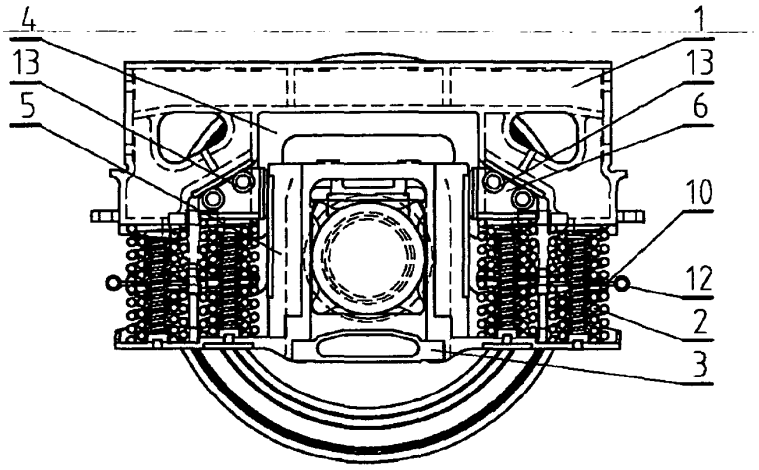


Fig. 1.

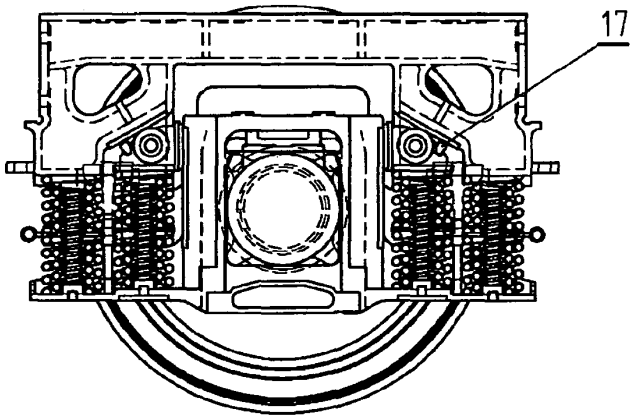


Fig. 2.

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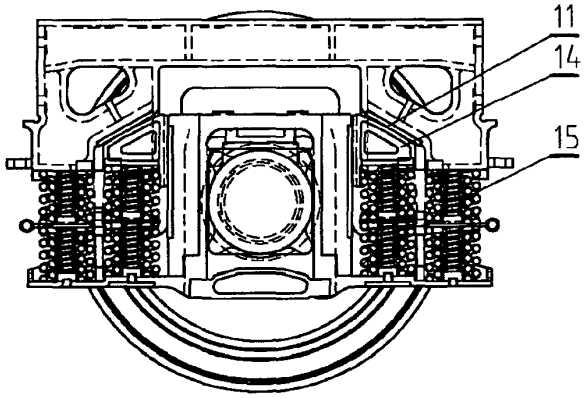


Fig. 3.

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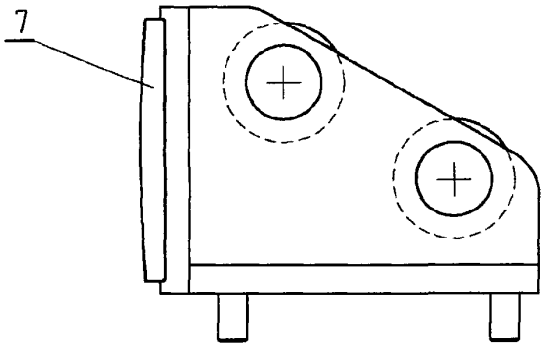


Fig. 4.

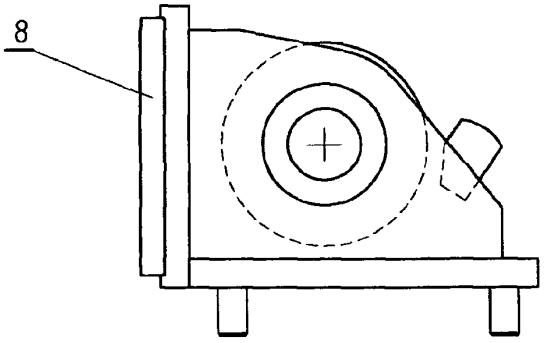


Fig. 5.

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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 46 0038

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2005/022689 A1 (FORBES JAMES W [CA] ET AL) 3 February 2005 (2005-02-03) * paragraph [0208] - paragraph [0213] * * figures 1a,1e,1d,6a *	2	INV. B61F5/32
A		1	
Y		3-5	

Y	US 2 326 993 A (BUCKWALTER TRACY V) 17 August 1943 (1943-08-17) * column 2, line 23 - line 26 * * column 2, line 62 - line 65 * * figures 2,6 *	3,5	

Y	US 5 176 083 A (BULLOCK ROBERT L [US]) 5 January 1993 (1993-01-05) * column 3, line 1 - line 28 * * figures 1,2 *	4	

A	GB 1 240 914 A (MIDLAND ROSS CORP [US]) 28 July 1971 (1971-07-28) * figures 1,7 *	1-7	
	-----		TECHNICAL FIELDS SEARCHED (IPC)
A	US 2 731 923 A (GLENN F. COUCH) 24 January 1956 (1956-01-24) * figures 1,3 *	1-7	B61F

A	US 4 915 031 A (WIEBE DONALD [US]) 10 April 1990 (1990-04-10) * abstract * * claims 25,32 * * figures 13-18 *	1-7	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 March 2007	Awad, Philippe

CATEGORY OF CITED DOCUMENTS

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28-03-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005022689 A1	03-02-2005	AU 2004255283 A1	20-01-2005
		BR PI0411955 A	15-08-2006
		WO 2005005219 A2	20-01-2005
		EP 1651498 A2	03-05-2006
		GB 2421936 A	12-07-2006
		KR 20060034280 A	21-04-2006
		MX PA06000308 A	10-07-2006
		US 2007051270 A1	08-03-2007
US 2326993 A	17-08-1943	NONE	
US 5176083 A	05-01-1993	AU 641590 B2	23-09-1993
		AU 1506092 A	29-10-1992
		CA 2066881 A1	24-10-1992
GB 1240914 A	28-07-1971	NONE	
US 2731923 A	24-01-1956	NONE	
US 4915031 A	10-04-1990	AU 630163 B2	22-10-1992
		AU 5074790 A	12-09-1991

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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PATENT SPECIFICATION (11) 1 318 571

DRAWINGS ATTACHED

1 318 571

(21) Application No. 32677/70 (22) Filed 6 July 1970

(44) Complete Specification published 31 May 1973

(51) International Classification B61D 7/00

(52) Index at acceptance
B7L 2A4A



(54) DROP BOTTOM DISCHARGE HOPPER CAR

(71) I, GEORGE BINET DOREY, a Citizen of Canada, of 540 Cote Saint Antoine Road, Westmount, Province of Quebec, Canada, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a drop bottom discharge hopper car having longitudinally extending oppositely swinging doors adapted to be sequentially moved to closed position by axially movable connections.

Accordingly this invention consists in a drop bottom discharge hopper car having a bottom opening for discharge of lading and pivotally mounted oppositely swingable doors for the opening which are movable to a closed position in overlapping mating relation with the swinging end of one door underlying the swinging end of the other door, in combination: an overcenter toggle locking mechanism for moving the doors and retaining said doors in closed position: including a shaft rotatably mounted on one of the doors at a position spaced from its pivotal mounting, radial arm means non-rotatably carried by the shaft, a linkage pivotally connected at one end thereof to the radial arm means and at the opposite end thereof pivotally connected to the companion door at a position spaced from its pivotal mounting, said linkage and arm means being foldable to an overcenter toggle locked position to assume a substantially horizontal position when the doors are closed, said radial arm means with the mechanism in over center toggle locked position presenting an upwardly and outwardly projecting extension constituting with the radial arm means a bell crank lever, power transmitting means acting on said extension for imparting a movement of rotation to the arm means comprising: a depending lever pivotally mounted at one end on the car above the level of the arm means and pivotally connected at the other end to a means extending between the depending lever and the extension, and a double acting fluid actuated pressure transmitting means mounted on the car and acting on said depending lever for moving said depending lever in directions to open or close the doors by movement of the radial arm means.

Referring to the accompanying drawings:—

Figure 1 is a vertical transverse sectional view taken through the car showing on one side of the longitudinal center line the doors in open position and showing on the right-hand side the doors in closed position.

Figure 2 is a plan view of one of the connections and associated toggle mechanism shown in Figure 1.

In said drawings the reference numeral 10 indicates the rails and 11 the wheels associated with the improved railway car. The body of the car includes side sill members 12 - 12 carrying side walls 13 - 13 which slope downwardly inwardly at a steep angle and intermediate said side walls a ridge structure 14 of inverted V-section extends longitudinally of the car thereby forming spaced hoppers terminating in discharge openings 15. Transversely extending walls 16 are disposed at the ends of the hoppers which carry hinge plates 17 for pivotally supporting as at 18 inner and outer doors indicated as 19 and 20 respectively. The respective inner and outer doors are interconnected by toggle and linkage mechanism including radially extending arms 21 and linkages 22.

The arms 21 include spaced arms 23 - 23 each having one end non-rotatably mounted on shafts 24, which shafts in turn are rotatably mounted on the outer doors 20, each of the other ends of arms 23 - 23 are pivot-

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ally united with one end of each linkages 22 as at 25. The opposite ends of the linkages 22 are pivotally connected with the inner doors 19 as at 26. Said toggle mechanisms are adapted to fold in over center toggle locked relation for retaining the doors in closed position.

The doors are generally of scoop shape with end walls as shown as 27 for doors 19 and at 28 for doors 20 and are reinforced on their underside longitudinally and transversely, each door 20 being provided with a longitudinally extending box-like beam 29 adjacent its swinging end and being reinforced at its opposite end by a longitudinal and downwardly extending flange 30, and transverse beams 31 extend between the said longitudinal members. Each door 19 is reinforced adjacent its swinging end by an L-section member 32 and at the opposite end by a longitudinal and downwardly extending flange 33 and transverse beams 34 extend between said longitudinal members.

The doors are movable to the closed position with the swinging end of each door 20 extending beneath the swinging end of each associated door 19 and in consequence it is necessary that the doors be operated to close in a given sequence with each overlapping outer door 20 lagging behind the associated overlapped inner door 19.

To ensure the required sequential closing movement of the doors it is necessary that the shaft rotating means e.g. cylinders 43, levers 40 and connections, act thereon to exert turning movement beyond the pivotal connection 25 of the radial arms 21 with the linkage 22 and to this end certain of the arms 23 are formed with extensions 35 which are preferably inclined to arms 23 in bell crank relation as indicated at 36, it being understood that each door system is fitted with a plurality of radial arms and associated linkages.

Transversely movable connections 37 are each pivotally connected at one end with the extensions 35 by means of pintles 38. The connections 37 extend transversely of the car and have their other ends pivotally connected at 39 with levers 40. The levers 40 are pivotally mounted to the car at 41 on brackets 42 carried by the side sill members 12.

Movement of the levers 40 is carried out by double acting fluid operated pressure applying means preferably in the form of air pressure operated cylinders 43 acting on connecting rods 44 which in turn pivotally connect at 45 with the levers 40 at a location intermediate the pivots 39 and 41.

The cylinders 43 are preferably pivotally mounted at one end at 46 on brackets 47 carried by the car structure and are provided with air apertures at opposite ends as seen at 48 and 49 for connection with a conventional arrangement of air piping and controls (not shown).

Angular opening movement of the radial arms and linkages is limited by the pintles 38 which are arranged to contact the linkages 22 when the doors 19 and 20 are fully opened and thus position the extensions 35 for receiving direct pressure from the transversely movable connections 37.

The operation of the mechanisms is as follows: Assuming the doors in closed position as viewed in the right hand part of Figure 1, it will be seen that admission of air in aperture 48 of the cylinder 43 will force operating rod 44 outwardly to move the lever 40 alone with the transversely movable connection 37 in an outward direction to release the toggle lock and force the doors 19 and 20 open. The extent of lever movement is preferably sufficient to act on the doors 19 and 20 throughout the entire range of door movement thus assuring complete opening of the doors even with frozen or heavily compacted lading.

Although the extent of door opening shown in the left hand half of Figure 1 is the expected condition which prevails under the influence of discharging lading it is to be understood that the balanced mounting of the doors tends to return them towards closed position, therefore upon reverse movement of the connections to close the doors it will be appreciated that the initial closing movement will be assisted by the gravitational swing of the doors towards closed position. The reference to "balance mounting of the doors" and "Gravitational swing" applies to the offset hinges which dispose a certain proportion of the door's weight of the other side of the hinge, and thus facilitates the door lifting operation to the closed position.

A force exerted on the bell crank extensions 35 operates to first close the inner doors 19 to abut the marginal edge of the end walls 15 whereupon the outer door 20 is toggled to closed position with the swinging end underlying the other door as seen in the right hand part of Figure 1.

WHAT I CLAIM IS:

1. In a drop bottom discharge hopper car having a bottom opening for discharge of lading and pivotally mounted oppositely swingable doors for the opening which are movable to a closed position in overlapping mating relation with the swinging end of one door underlying the swinging end of the other door, in combination: an over-center toggle locking mechanism for moving the doors and retaining said doors in closed position including: a shaft rotat-

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ably mounted on one of the doors at a position spaced from its pivotal mounting, radial arm means non-rotatably carried by the shaft, a linkage pivotally connected at one end thereof to the radial arm means and at the opposite end thereof pivotally connected to the companion door at a position spaced from its pivotal mounting, said linkage and arm means being foldable to an overcenter toggle locked position to assume a substantially horizontal position when the doors are closed, said radial arm means with the mechanism in over centre toggle locked position presenting an upwardly and outwardly projecting extension constituting with the radial arm means a bell crank lever, power transmitting means acting on said extension for imparting a movement of rotation to the arm means comprising: a depending lever pivotally mounted at one end on the car above the level of the arm means and pivotally connected at the other end to a connecting means extending between the depending lever and the extension, and a double acting acting fluid actuated pressure transmitting means mounted on the car and acting on said depending lever for moving said depending lever in directions to open or close the doors by movement of the radial arm means.

2. The combination set forth in claim 1 wherein the pivotal connection between the extension and the connecting means may act on the linkage to limit angular movement of the toggle members when the doors are in open position.

3. A drop bottom discharge hopper car substantially as hereinbefore described, having reference to the accompanying drawings.

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Chartered Patent Agents,

Agents for the Applicants.

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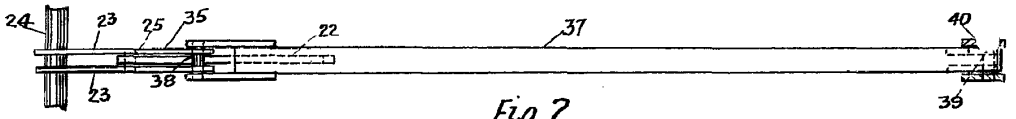


Fig. 2.

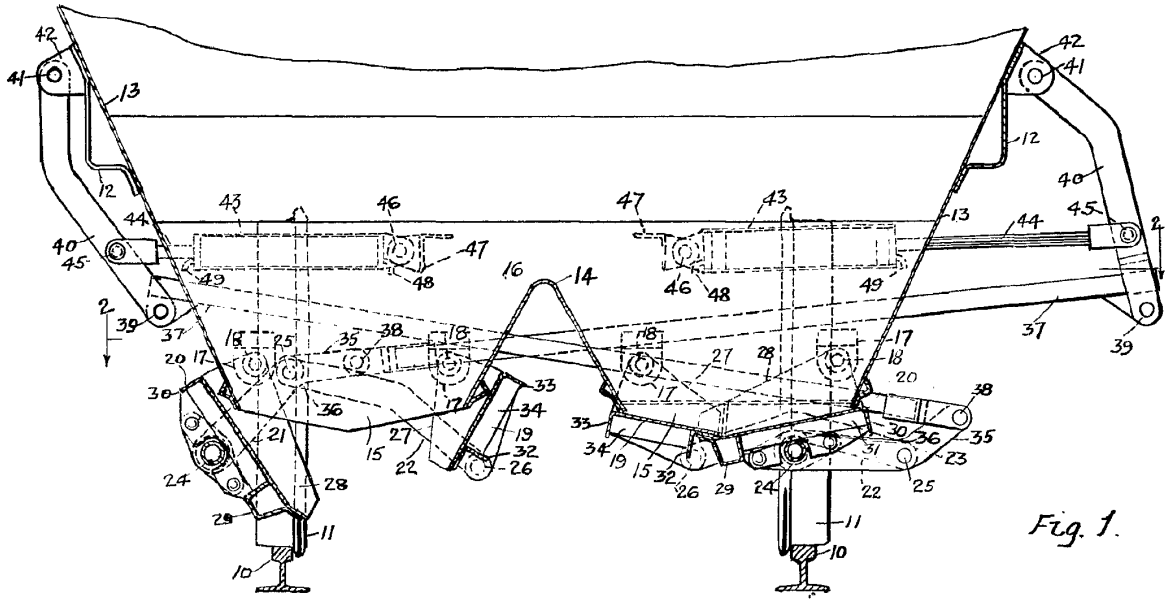


Fig. 1.

1318571 COMPLETE SPECIFICATION
1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

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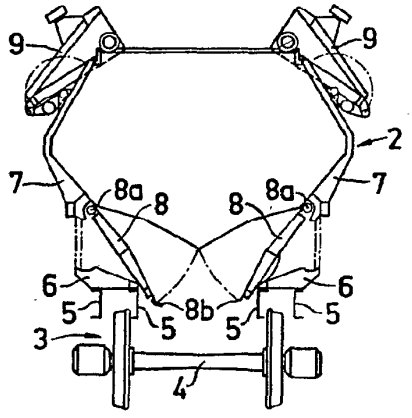
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(71) Applicants
Luossavaara-Kiirunavaara Aktiebolag, Fack S—100 41, Stockholm, Sweden
(72) Inventor
Hilding Månström
(74) Agents
Brewer & Son

(54) **Hopper waggon**

(57) A waggon for transport of preferably loose material is of the type comprising a body (2) having fixed side walls (7) and bottom discharge doors (8) and a wheeled base frame (3) having seats (6), on which the body (2) rests in the transport position.

Known railway waggons of this type are emptied in certain cases by vertical separation of the body and the base frame, this separating motion being transmitted via links to open the emptying doors. These links are avoided in the waggon according to the present invention, by arranging that (a) the discharge doors (8), are rotatably connected with the side walls merely via simple hinges (8a) and (b), the body (2) rests only loosely on the base frame (3).

FIG. 4



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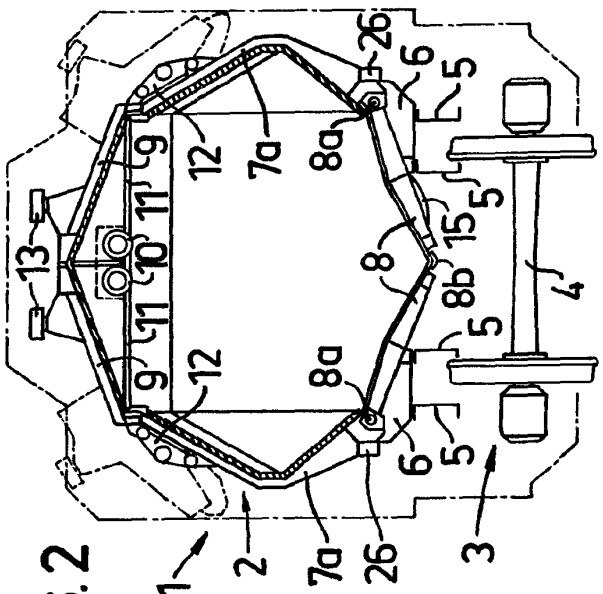


FIG.2

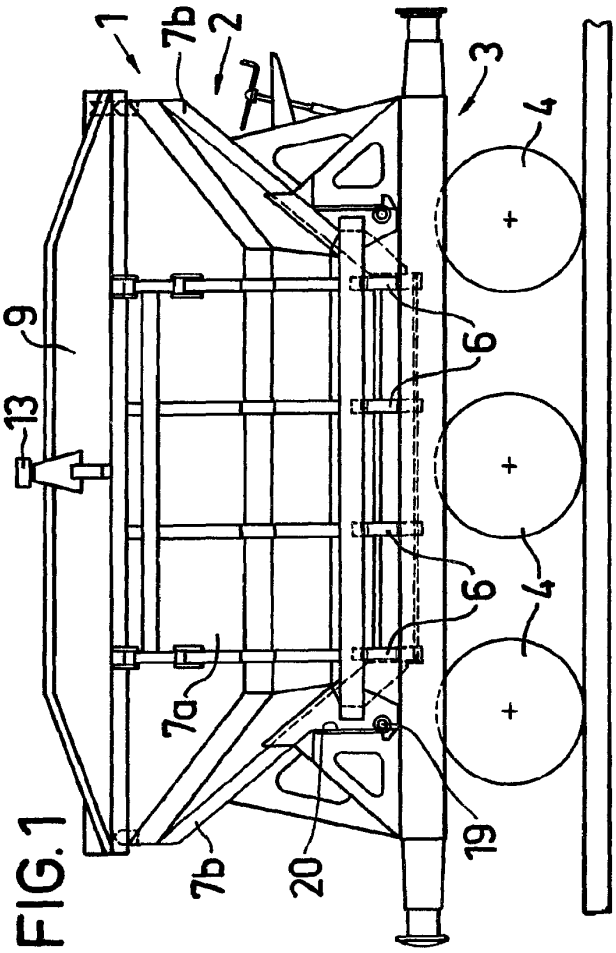


FIG.1

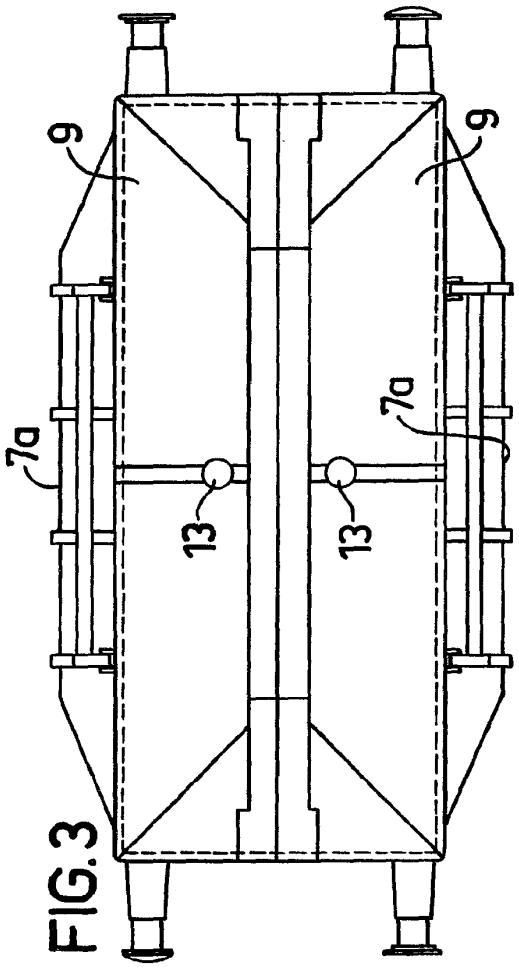


FIG.3

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FIG. 4

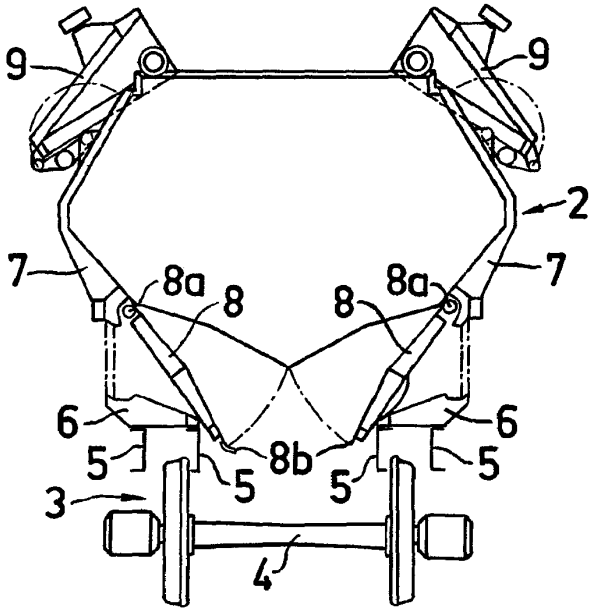
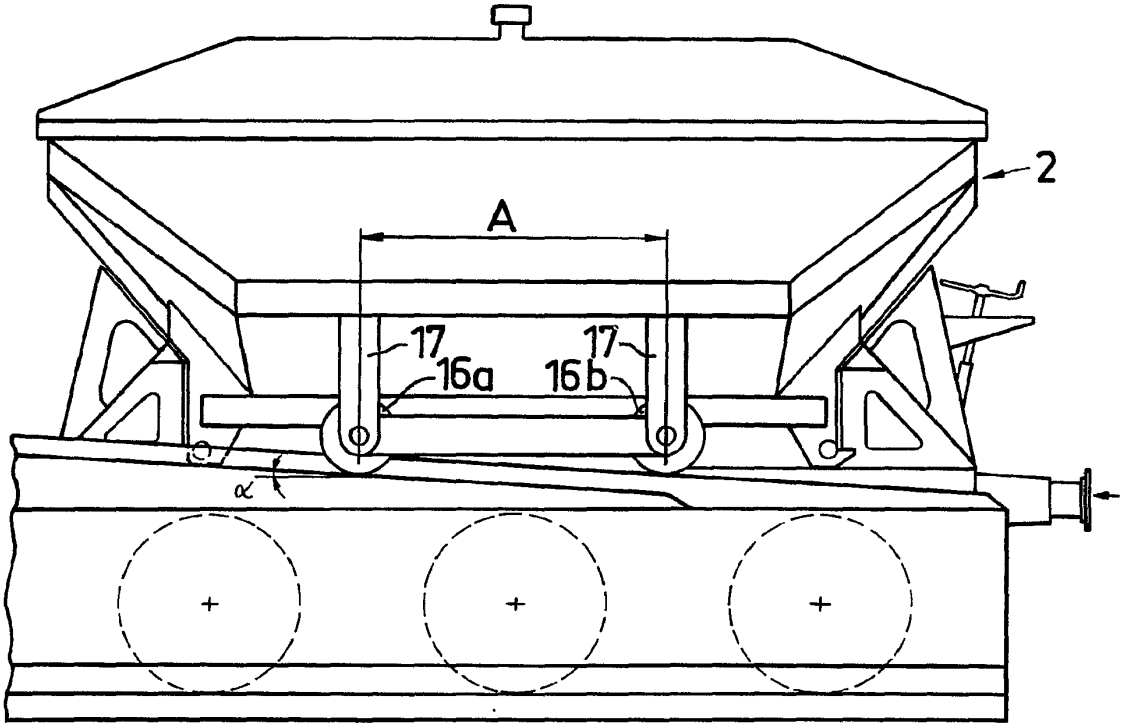


FIG. 5



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FIG. 6

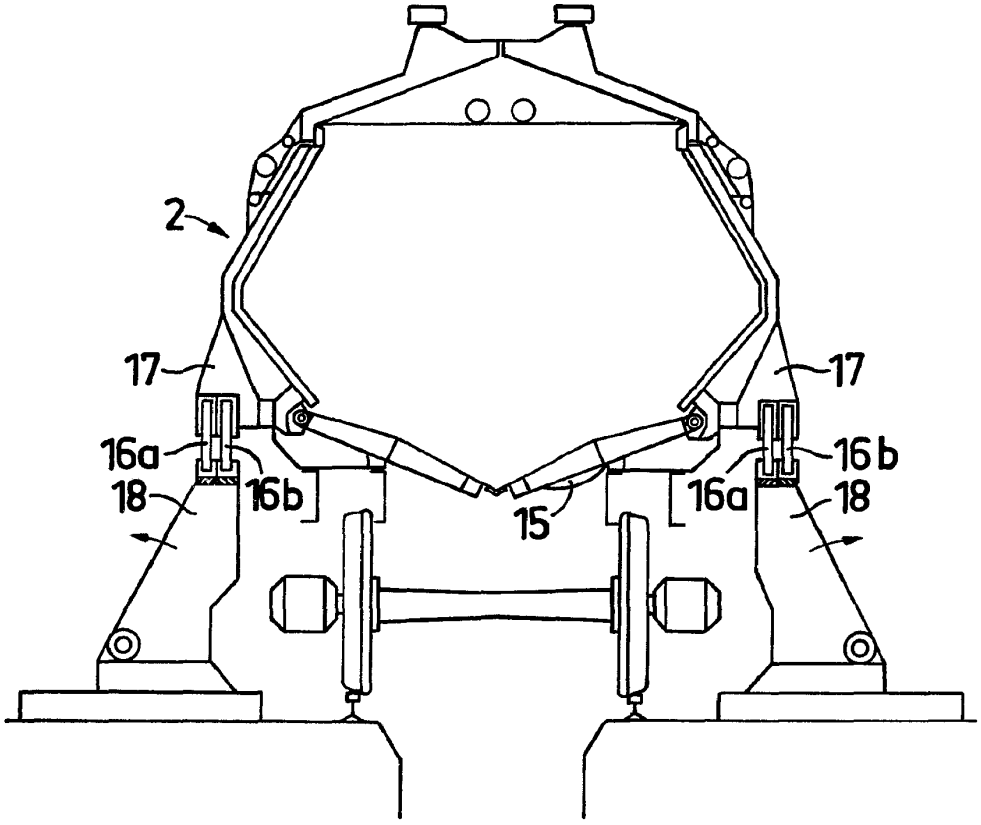
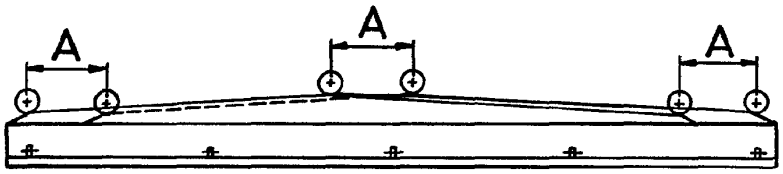


FIG. 7



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FIG.8

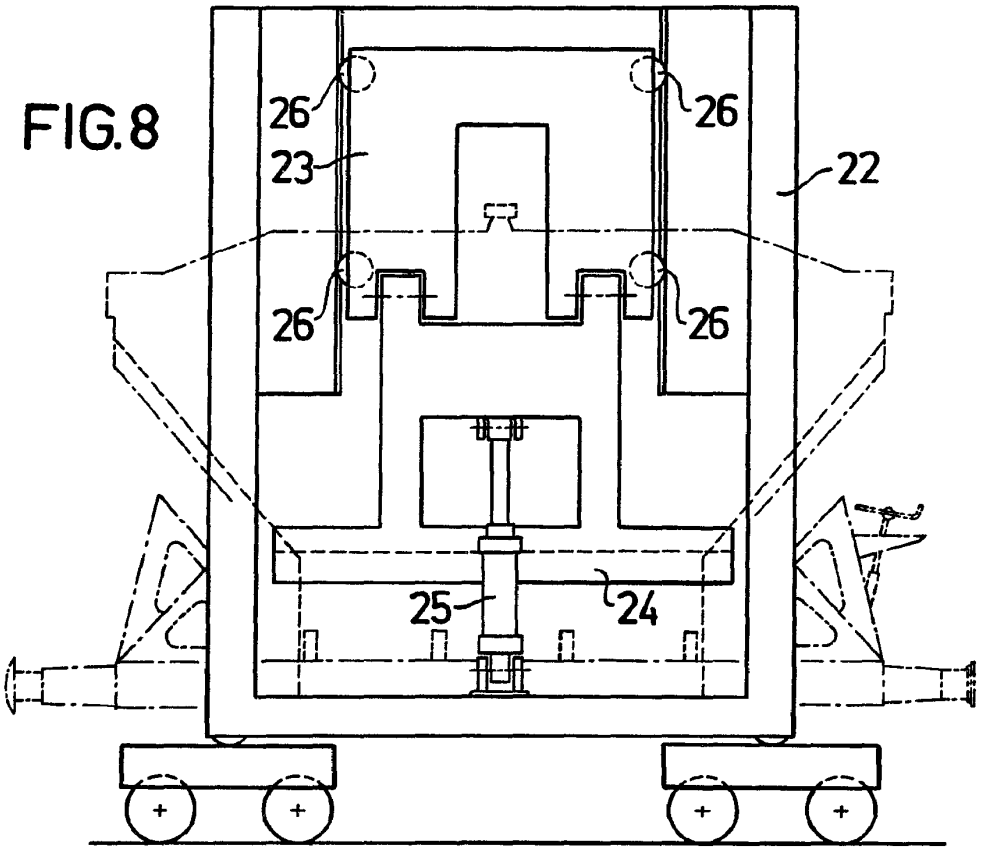
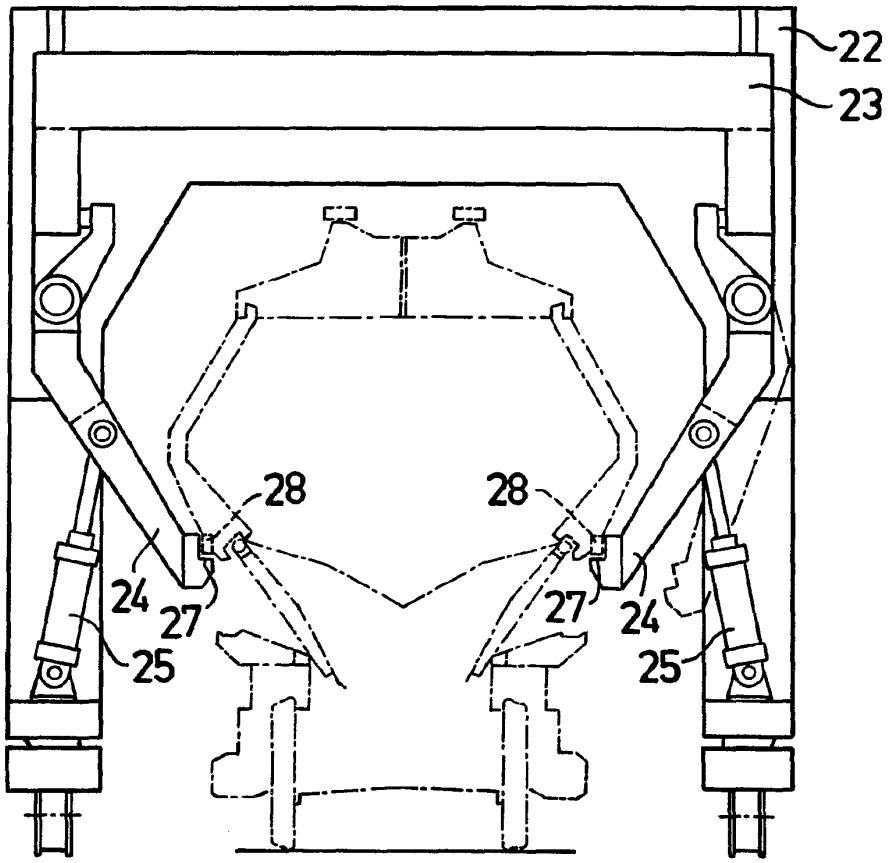


FIG.9



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SPECIFICATION
Waggon

This invention relates to a waggon for transport of preferably loose material, said waggon comprising a waggon body and a base frame carried by wheels, said waggon body having fixed side walls and doors for emptying at the bottom and said frame including seats, on which the waggon body is resting in transport position.

Railway waggons are previously known, at the bottom of which doors for emptying the material contents of the waggon are arranged. Certain types of such waggons are emptied by vertically separating the waggon body and the base frame, this separating motion being transmitted via links to open the emptying doors. One disadvantage of such constructions is that owing to the link system the emptying mechanism may easily be mechanically complicated with risks of functional disorder. A mechanism with a relatively large amount of components will also involve risks of disturbance in the form of material errors.

It is the object of the invention to provide an emptying mechanism for a waggon of the type mentioned above, the construction of which is extraordinarily simple. The doors are not opened via links but merely by the pressure of the enclosed material.

To this end the waggon has been provided with the characteristic features set out in the following claims.

An illustrative example of the invention will be described below with reference to the enclosed drawings, where *Fig. 1* is a lateral view of a waggon according to the invention, *Fig. 2* is a vertical section of the waggon according to Fig. 1, *Fig. 3* is a plan view of the waggon according to Fig. 1, *Fig. 4* shows the waggon according to the invention in emptying position, *Figs. 5—7* show a device for movable emptying of the waggon according to the invention and *Figs. 8—9* show a device for so-called stop discharge of the waggon according to the invention.

The ore truck 1 shown in Figs. 1—3 comprises a waggon body 2, which is supported by a base frame 3. The frame comprises a number of wheel pairs 4, supporting beams 5 carried by these, and seats 6 for the waggon body 2 arranged on the supporting beams 5.

In the illustrative example shown the waggon body 2 comprises fixed longitudinal and transversal lateral walls 7a and 7b, respectively, emptying doors 8 rotatably mounted at the lower edges of the longitudinal lateral walls 7a and filling doors 9 movably mounted laterally at the upper edges of the lateral walls 7a and 7b.

As is most apparent from Fig. 2 the emptying doors 8 are supported in a hinge 8a. This hinge is the only connection of the emptying doors 8 with the lateral walls 7. At the ends of the emptying doors 8 facing each other a material labyrinth 8b is arranged, which only lets through liquid.

The filling doors 9 are provided with runners 10 at their ends. These runners 10 bear against support rails 11. Moreover, the filling doors 9 are connected with the upper portions of the longitudinal lateral walls 7a by means of links 12. The links 12 are so designed that when the filling doors 9 are moved aside, preferably by guide tracks actuating the control pulleys 13, the filling doors 9 will be substantially inside a definite load profile, which is indicated by dash and dot lines in Fig. 2.

In the illustrative example shown the waggon body 2 is provided with internal insulation 14 to prevent freezing of the contents in winter.

As is most evident from Fig. 2 the lower portions of the longitudinal walls 7a and parts of the emptying doors 8 rest on the seats 6 of the base frame 3. There is no connection between the waggon body 2 and the frame 3 but the waggon body 2 rests loosely on the seats 6.

When emptying the material from the waggon body 2 the latter and the frame 3 are separated to the position shown in Fig. 4, where the emptying doors 8 enter an open position by their own weight. The doors 8 open more easily by the enclosed materal pressing the doors towards an open position.

When the material lying in the waggon body 2 has flowed out of the aperture in the bottom, the waggon body 2 is again lowered towards the frame 3. The doors 8 will then automatically move towards a closed position. To make sure that the right door in Fig. 4 enters its closing position before the left door, which is necessary in order that the parts of the material labyrinth 8b should enter correct position when the doors 8 close the bottom aperture, the right door is provided with a cushion 15.

Vertical separation of the waggon body 2 and the frame 3 can be carried out in a plurality of various manners. Two illustrative examples of devices for carrying out this separation will be described below.

The device shown in Figs. 5—7 is intended to be used with so-called movable discharge.

Two support rolls 16a and 16b carried by a stand 17 are adapted on both the longitudinal sides of the waggon body 2. The support rolls 16a and 16b are separated both in the longitudinal direction of the waggon 1 and in the latitudinal direction thereof.

In the range of the emptying place on both sides of the waggon 1 two support tracks 18a and 18b are arranged, which like the support rolls 16a and 16b are separated in their longitudinal and latitudinal directions respectively.

As is apparent from Figs. 5 and 7 the support tracks 18a, 18b are inclined so that at displacement of the support rolls 16a, 16b along the support tracks 18a, 18b the waggon body 2 will at first be raised from the frame 3, emptying of the enclosed material taking place. Owing to the design and arrangement of support tracks and support rolls described above the waggon body 2 will remain in horizontal position for the whole period that the waggon body 2 and the frame are separated.

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After the waggon body 2 has reached the highest point of the support tracks 18a, 18b, it is again lowered towards the frame 3 to be combined with this at the end of the support tracks 18a, 18b.

A prerequisite of this is of course that the frame 3 is displaced synchronously with the waggon body 2 along the support tracks 18a, 18b, which is brought about by the waggon body 2 and the frame 3 not getting out of engagement with each other in horizontal direction during the emptying process.

The waggon body 2 can be displaced vertically along guide surfaces 20 via guide rolls 19 (see Fig. 1). A stop arranged at the upper ends of the guide surfaces 20 prevents, however, the vertical displacement of the waggon from being so great that the engagement between waggon body 2 and frame 3 is eliminated.

It is evident from Fig. 6 that the support tracks 18a, 18b are provided with a link 21, by means of which these can be moved aside when emptying is not to take place.

An alternative of the illustrative example described above with the guide rolls 19 and the guide surfaces 20 is that the waggon body and the frame are connected by means of a link. Certainly the motion path of the waggon body will not be quite vertical in this case, but this is of no practical importance.

Instead of arranging support rolls on the waggon body, as described above, it is impossible to have sliding planes on the waggon body, these sliding planes being displaced along stationary support rolls.

In Figs. 8 and 9 there is shown a device for so-called stop discharge. The device comprises a frame 22 movable on wheels, which is provided with a yoke 23 with two pivoting lifting arms 24, which are operated by two hydraulic cylinders 25. Moreover, the whole yoke 23 is displaceable relative to the frame 22, the yoke 23 having guide rolls 26 for coaction with guide tracks of the frame 22.

When discharge is to be carried out by means of the device according to Figs. 8 and 9, the device is positioned relative to the waggon 1. Then the hydraulic cylinders 25 are activated so that the lifting arms are swung, recesses 27 in these engaging shoulders 28 of the waggon body 2. A continued activation of the hydraulic cylinders 25 will displace the whole yoke 23 upwards relative to the frame 22, the waggon body 2 being raised from the base frame 3 and entering the position shown in Figs. 8 and 9 where emptying of the material contents takes place.

After finished emptying the waggon body 2 is again lowered on the base frame 3, the emptying doors 8 being automatically closed.

The waggon described above is provided with doors at the top as well as internal insulation to adapt it to severe climatologic conditions. However, the invention is of course not restricted to this embodiment.

What characterizes the invention, i.e. the emptying mechanism, can also be used with open waggons without internal insulation. The invention can also be freely varied in other respects within the scope of the following claims.

CLAIMS

1. A waggon for transport of preferably loose material, said waggon comprises a waggon body (2) and a base frame (3) carried by wheels, said waggon body (2) having fixed side walls (7) and doors (8) for emptying arranged at the bottom, and said frame including seats (6), on which the waggon body (2) rests in transport position, characterized in that the emptying doors (8) are pivotally connected to the side walls (7) via a simple hinge (8a) and that the waggon body (2) rests loosely on the base frame (3).

2. The waggon as claimed in claim 1, characterized in that the emptying doors (8) are connected with the longitudinal lateral walls of the waggon body (2).

3. The waggon as claimed in claim 1 or 2, characterized in that the waggon body (2) comprises filling doors (9) arranged at the top.

4. The waggon as claimed in claim 3, characterized in that the filling doors (9) are laterally displaceable on the transversal lateral walls (7b) and connected with the longitudinal lateral walls (7a) by means of links (12).

5. The waggon as claimed in any one of the preceding claims, characterized in that the waggon body (2) is provided with internal insulation (14).

6. The waggon as claimed in any one of the preceding claims, characterized in that the waggon body (2) is provided with support wheels (16a, 16b) arranged on both sides, which are intended to coact with inclined support tracks (18a, 18b).

7. The waggon as claimed in any one of claims 1—5, characterized in that the waggon body (2) is provided with shoulders (28), which are intended to engage with lifting arms (27).

8. A waggon substantially as hereinbefore described with reference to Figures 1 to 4, Figures 5 to 7 or Figures 8 and 9 of the accompanying drawings.

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Car Builders' Cyclopedia

Of American Practice

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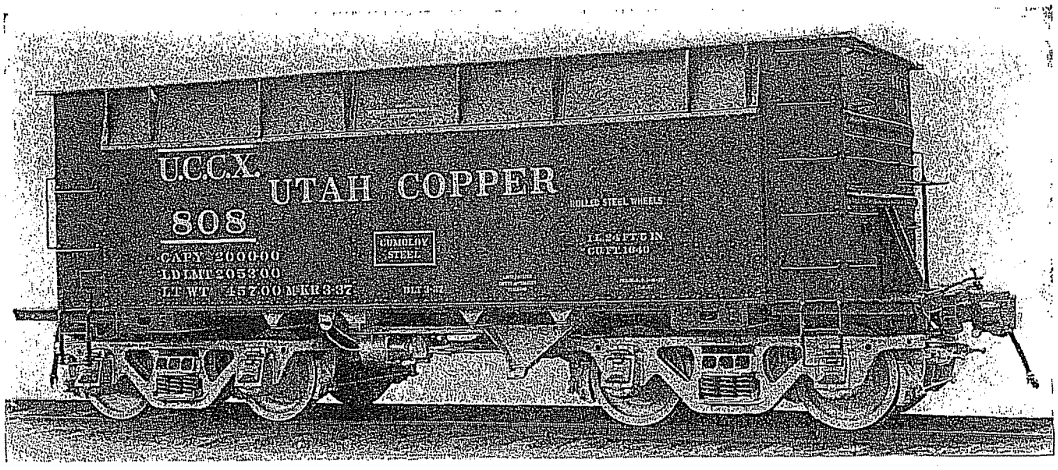


Fig. 404—Utah Copper Company 200,000-lb. Capacity High-Tensile Steel Ore Car. Light Weight 45,700 lb. Inside, Length 24 ft. 5 in.; Width 10 ft. 6 in.; Height 6 ft. 6¾ in. Builder, Pressed Steel Car Company, Inc.

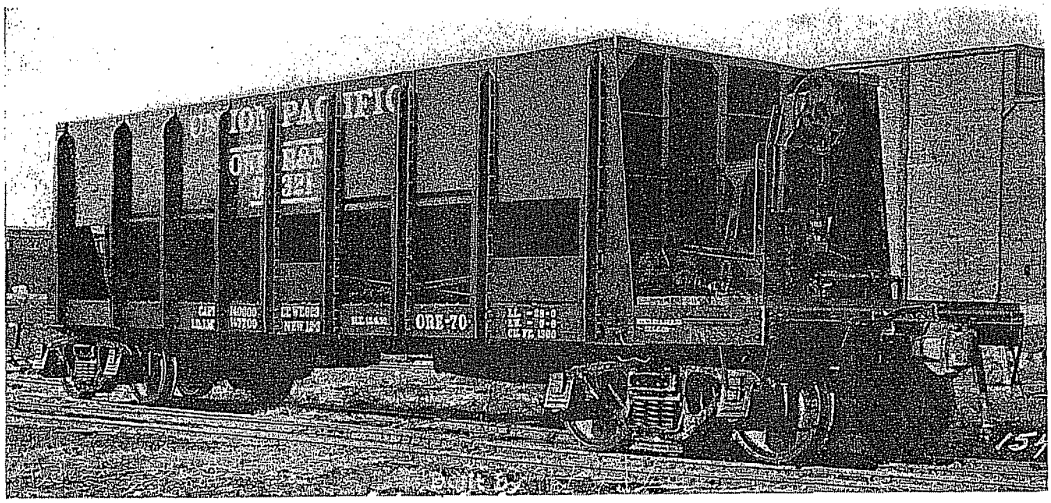


Fig. 405—Union Pacific (O.-W. R. R. & N.) 70-Ton Ore Car, A. A. R. Class GA. Weight 62,300 lb.; Load Limit 147,700 lb.; Capacity 1360 cu. ft.; Inside Length 28 ft. 0 in.; Inside Width 9 ft. 6 in. Builder, St. Louis Car Company

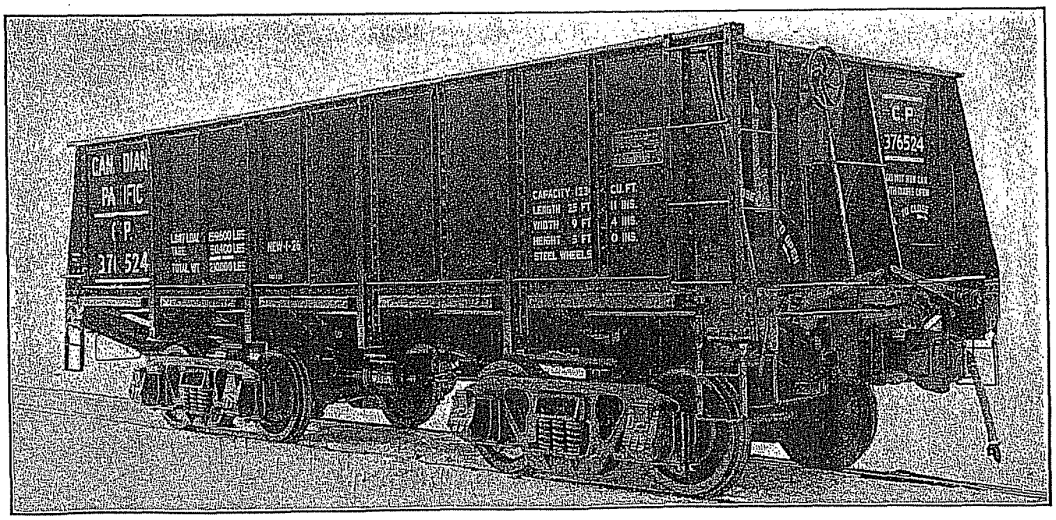


Fig. 406—Canadian Pacific 75-Ton All-Steel Ore Car with Five Drop Bottom Doors, Each Side, A. A. R. Class GA. Weight, 50,400 lb.; Load Limit, 159,600 lb.; Capacity, 1,230 cu. ft.; Length Inside, 25 ft. 11 in.

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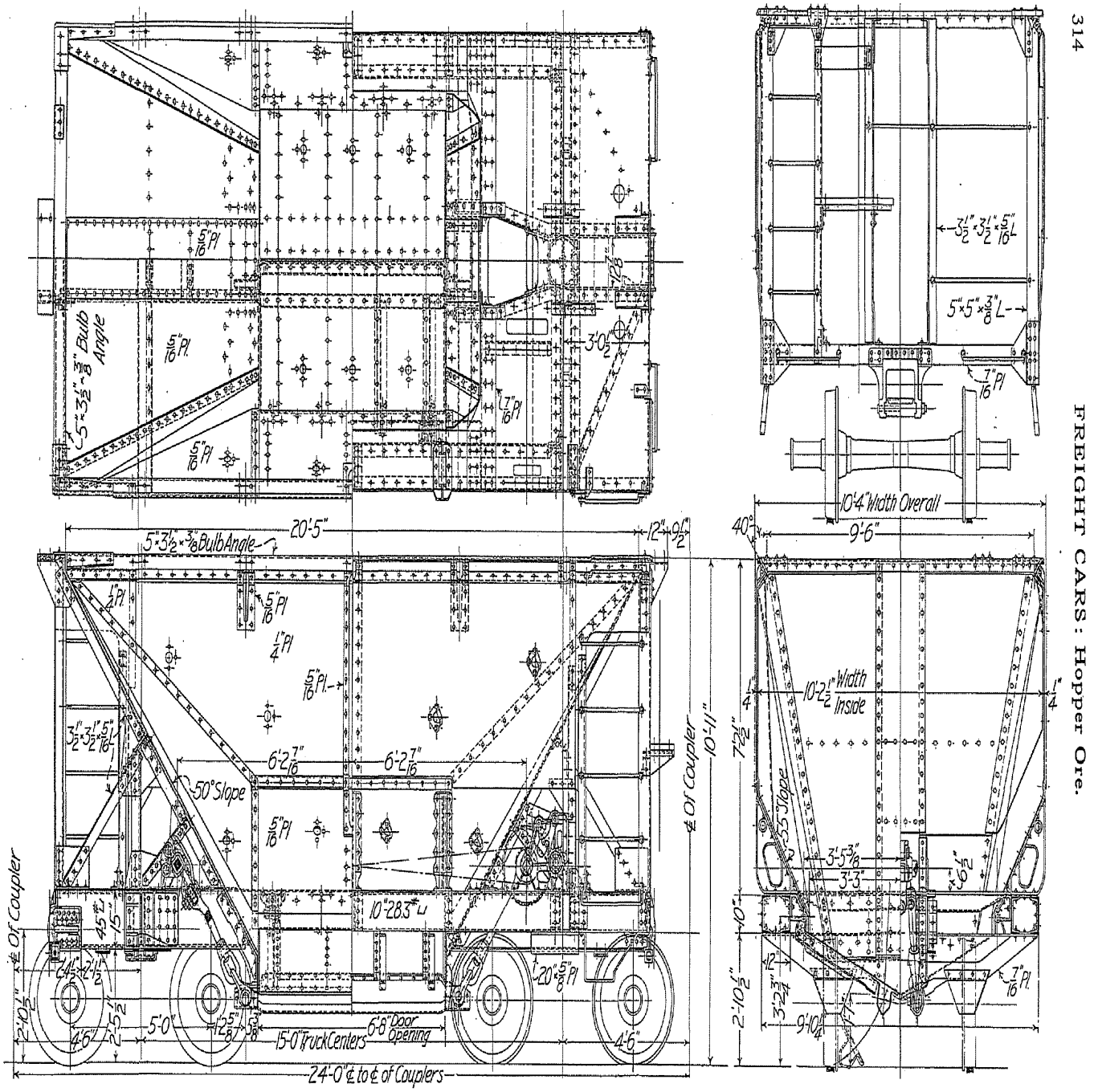


Fig. 407—90-Ton All-Steel 6½ in. by 12 in. Axle Load Enterprise Hopper Ore Car, Center Discharge. Cubic Capacity, 1121 cu. ft. Level or 1325 cu. ft. with 12 in. Average Heap.

Patented

Enterprise Railway Equipment Company.

- (*See also Page 301*)

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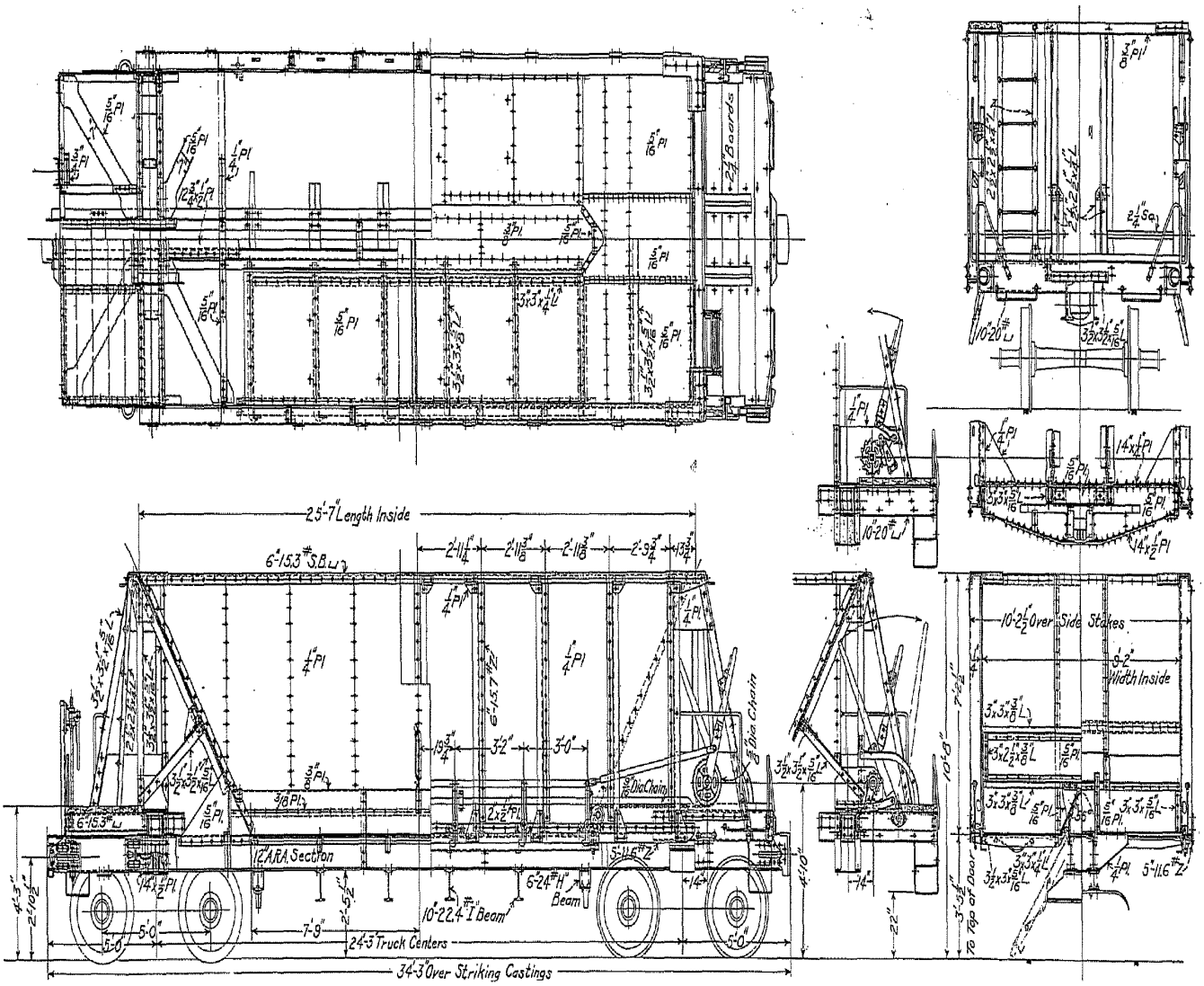


Fig. 408—80-Ton All-Steel 6 in. by 11 in. Axle Load Ingoldsby-Enterprise Ore Car, Side Discharge for Copper Mining. Cubic Capacity, 1335 cu. ft. Level or 1570 cu. ft. with 12 in. Average Heap.

Patented

Enterprise Railway Equipment Company.

(*See also Page 301*)

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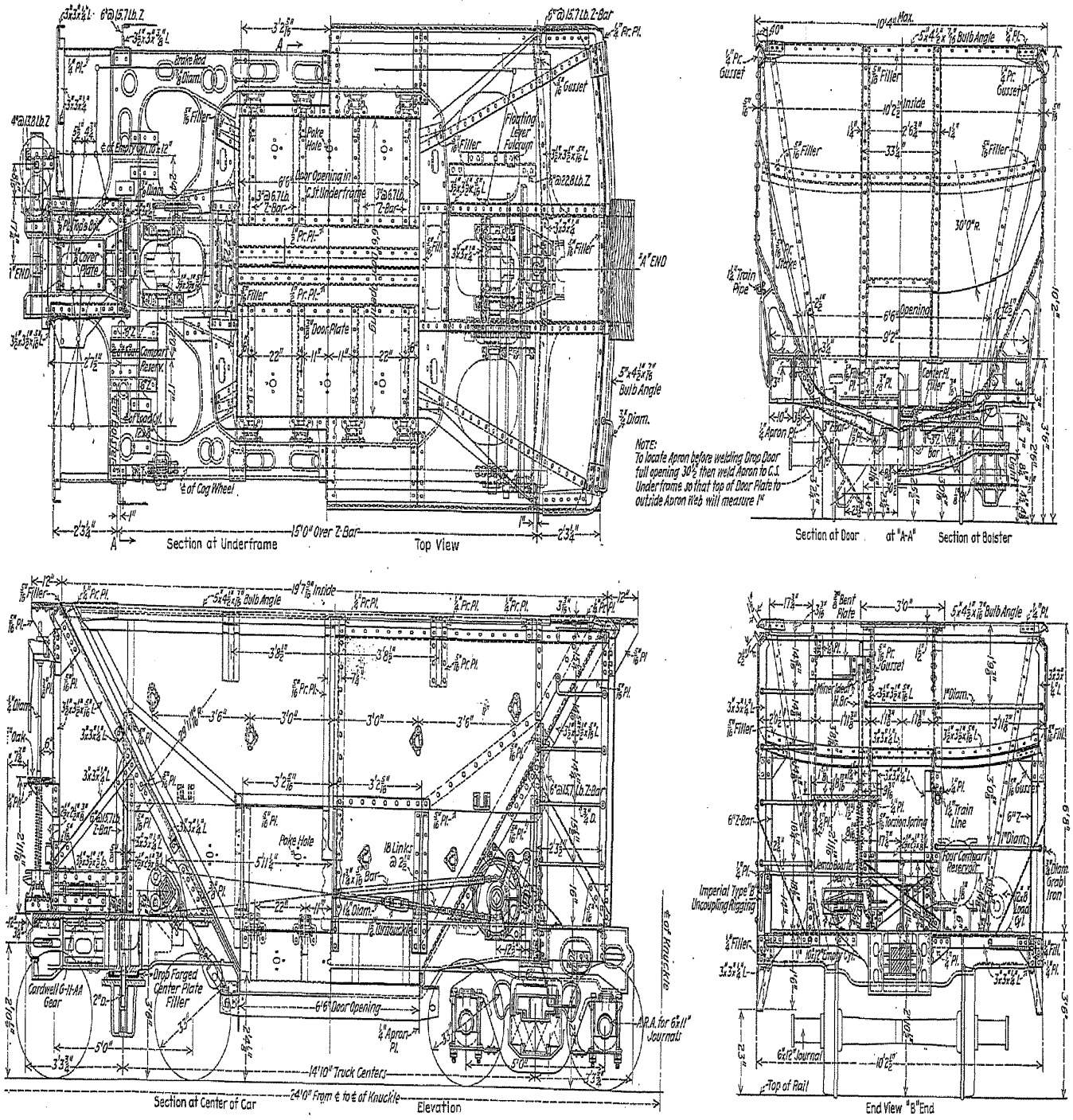


Fig. 409—Plan, Elevation and Sections of Duluth, Missabe & Northern 96-Ton Capacity Hopper Ore Car with Commonwealth Cast Steel Underframe.

(See also Fig. 410)

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IPR Petition - USP 8,166,892

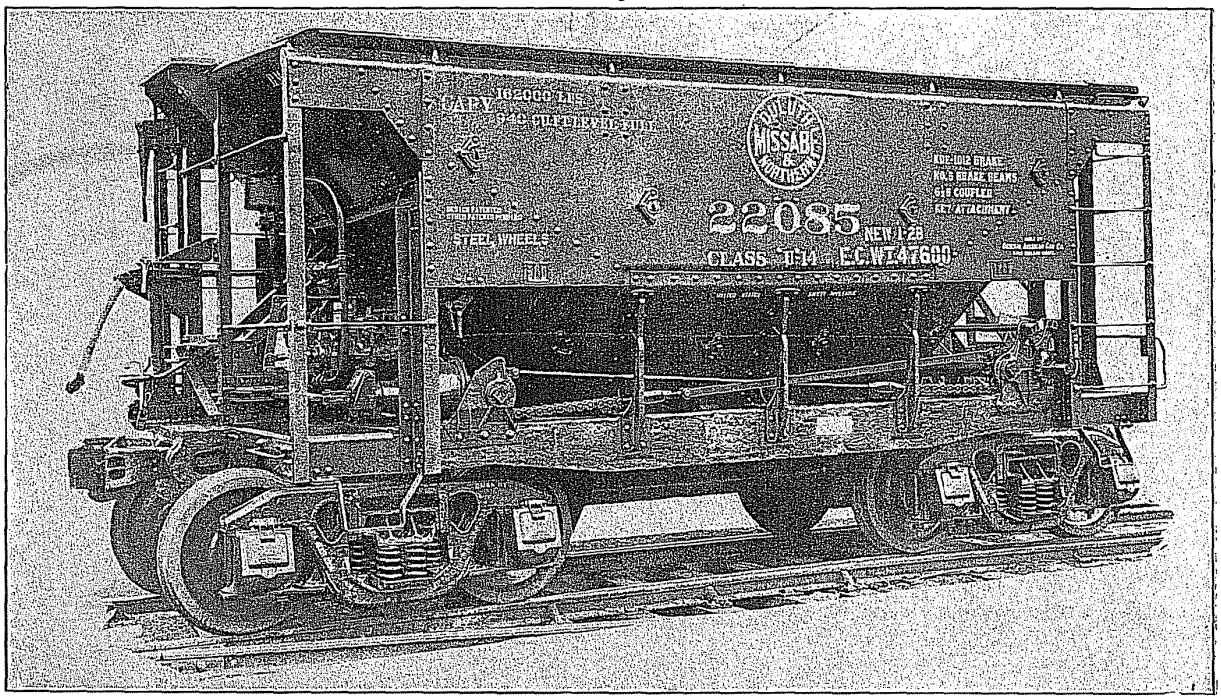


Fig. 410—Duluth, Missabe & Northern 96-Ton Capacity, Hopper Ore Car, Road Class U14, With Commonwealth Cast Steel Underframe. Builder, General American Car Company.
(*See also Fig.* 409)

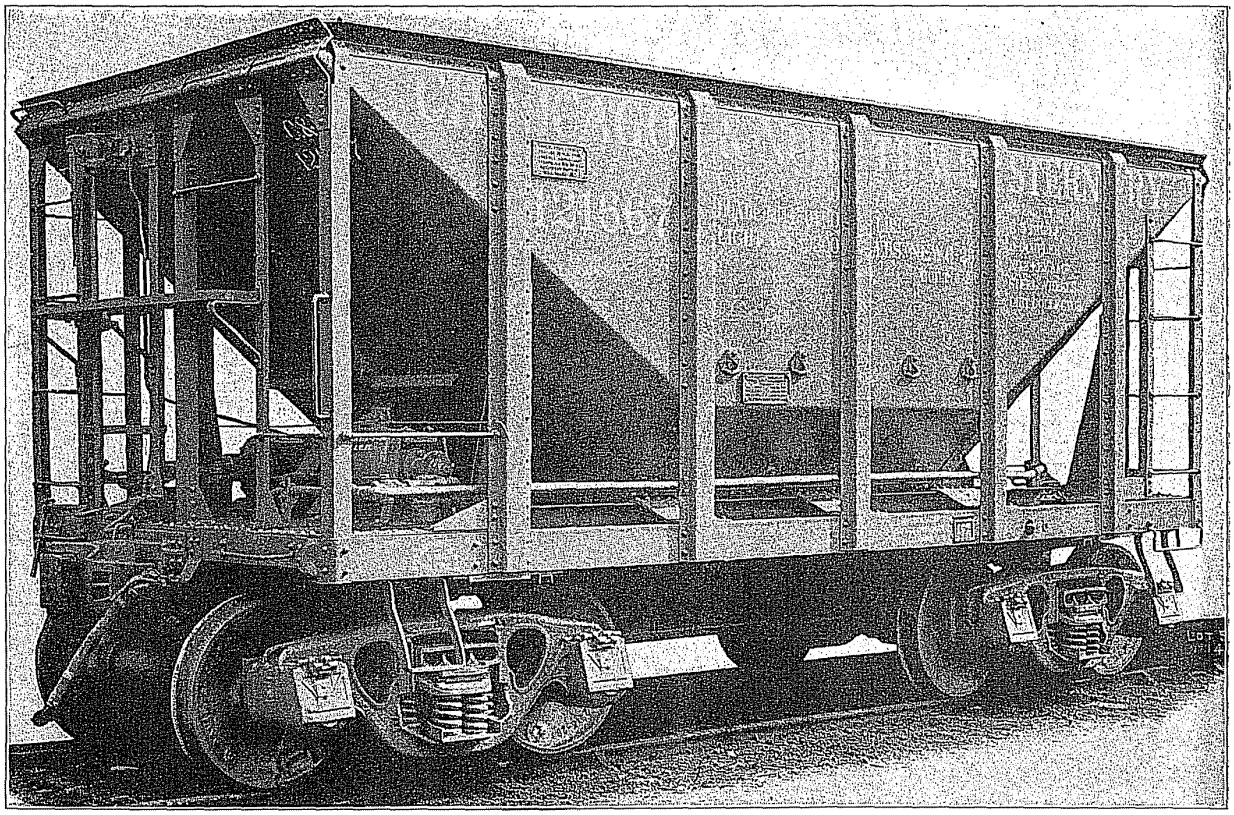


Fig. 411—Chicago & North Western 70-Ton Capacity Hopper Ore Car.

Capacity	140,000 lb.—975 cu. ft.	Length inside	21 ft. 2½ in.
Light weight	39,300 lb.	Length over striking faces	21 ft. 6½ in.
Load limit	170,700 lb.	Truck centers	15 ft. 0 in.
Door opening	39 sq. ft.	Height of side	10 ft. 6½ in.

(*See also Fig.* 412)

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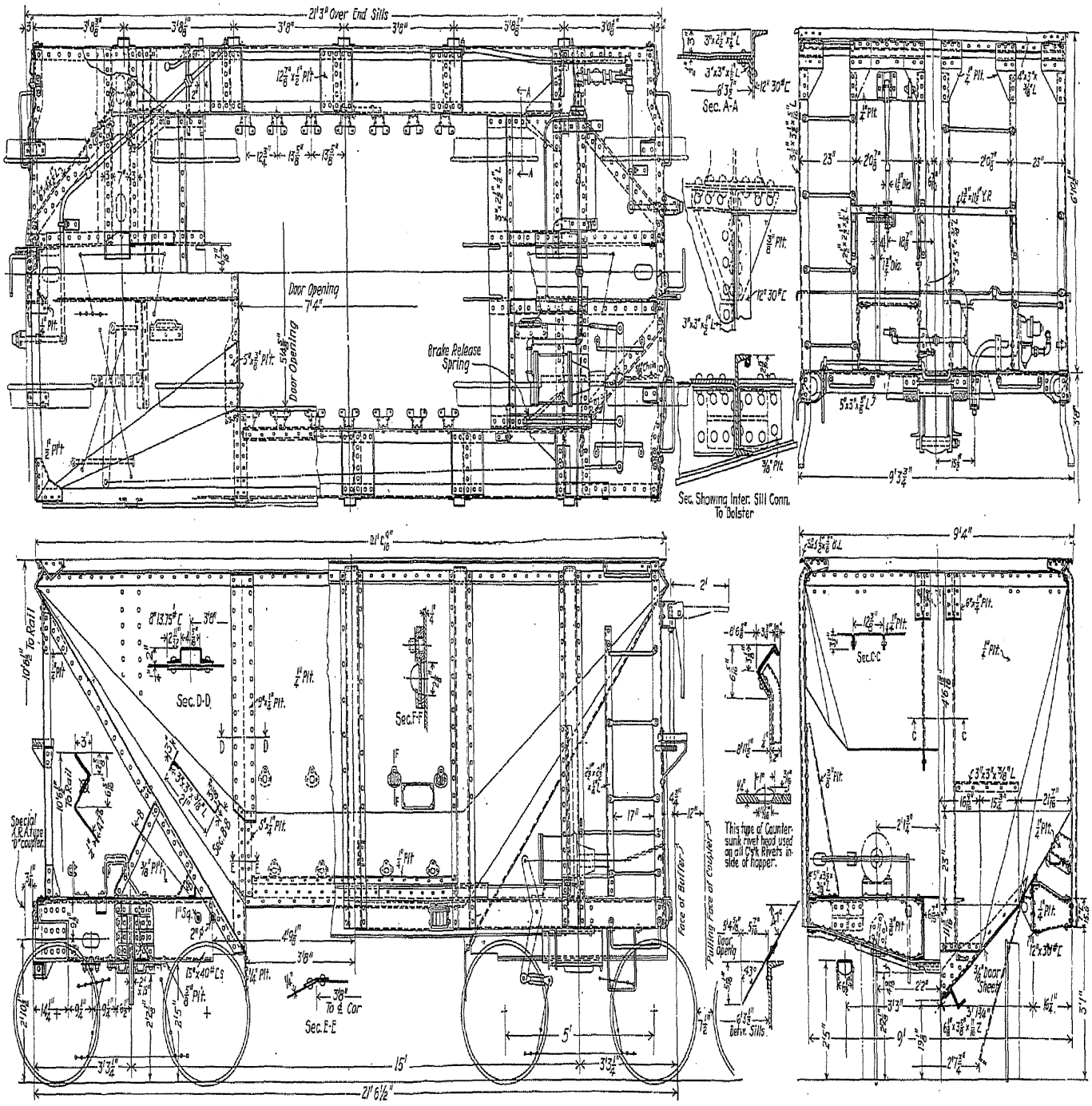


Fig. 412—Plan, Elevation and Sections of Chicago & North Western 70-Ton Capacity Hopper Ore Car.

(See also Fig. 411 and Section 3 for Details of Door Operating Mechanism)

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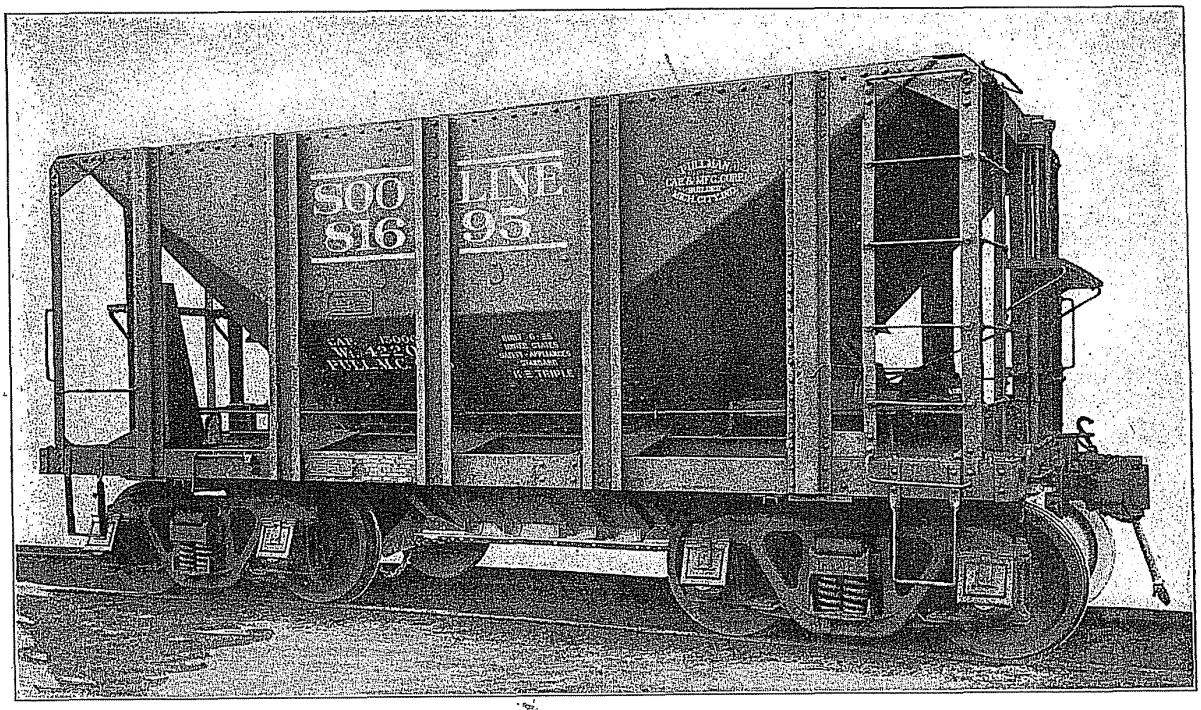


Fig. 413—Minneapolis, St. Paul & Sault Ste. Marie (Soo Line) 75-Ton Capacity Hopper Ore Car.

A. A. R. Class	HM
Nominal capacity	150,000 lb.
Load limit	167,800 lb.
Cubic capacity, level	1,080 cu. ft.
Light weight	42,200 lb.
Axle journals	6 in. × 11 in.
Length inside	19 ft. 8⅝ in.
Width inside	10 ft. 1½ in.
Height inside	8 ft. 6⅞ in.
Length over strikers	21 ft. 3 in.
Width outside	10 ft. 6 in.
Height of sides	10 ft. 2 in.

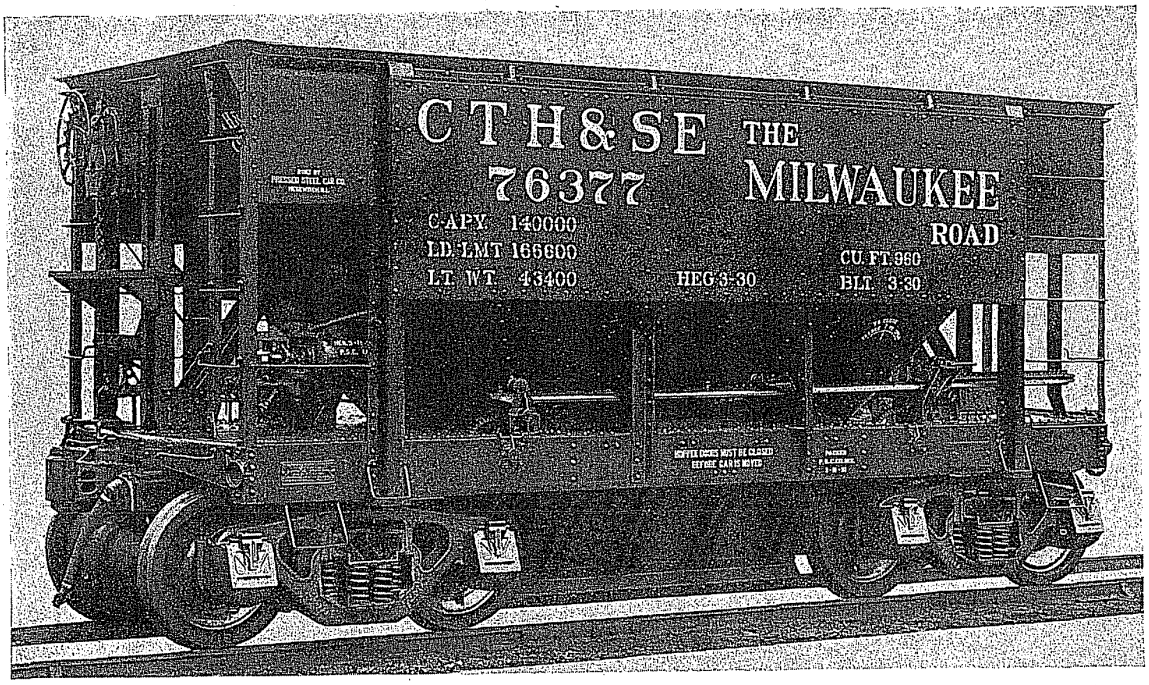


Fig. 414—Chicago, Terre Haute & Southeastern (C. M. St. P. & P.) 70-Ton Capacity Hopper Ore Car. Builder, Pressed Steel Car Company.

A. A. R. Class	HM
Nominal capacity	150,000 lb.
Load limit	166,600 lb.
Cubic capacity, level	960 cu. ft.
Cubic capacity, heaped	1,153 cu. ft.
Light weight	43,400 lb.
Axle journals	6 in. × 11 in.
Length over strikers	21 ft. 5¼ in.
Length inside	20 ft. 10½ in.
Width inside	9 ft. 2½ in.
Height of sides	10 ft. 6½ in.
Door opening, length	6 ft. 5½ in.
Door opening, width	5 ft. 11 in.

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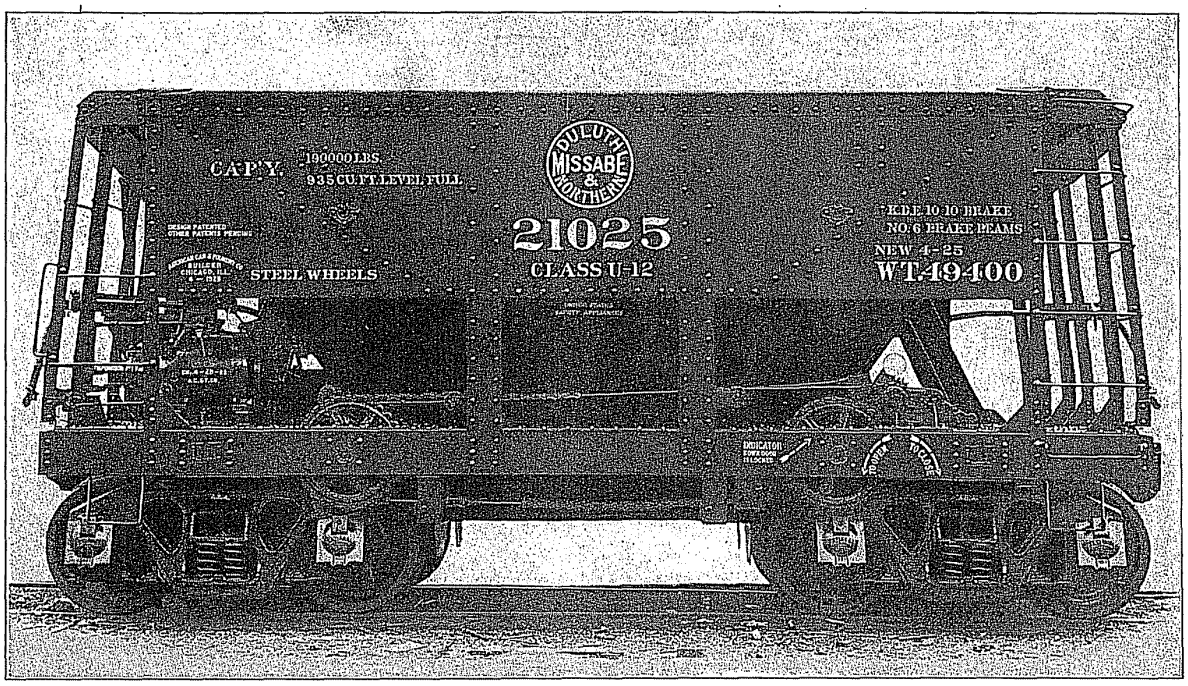


Fig. 415—Duluth, Missabe & Northern 95-Ton Capacity Hopper Ore Car, Road Class U12.

Nominal capacity	190,000 lb.	Length inside	19 ft. 5 in.
Load limit	201,600 lb.	Width inside	10 ft. 2 in.
Cubic capacity, level	935 cu. ft.	Height inside	6 ft. 6 in.
Light weight	49,400 lb.	Length over strikers	21 ft. 5½ in.
Axle journals	6½ in. × 12 in.	Width outside	10 ft. 5 in.
Truck centers	14 ft. 10 in.	Height of sides	10 ft. 2 in.



Fig. 416—Great Northern 75-Ton Capacity Hopper Ore Car, A. A. R. Class HM.

Nominal capacity	150,000 lb.	Length inside	19 ft. 10 in.
Load limit	168,700 lb.	Width inside	9 ft. 9⅝ in.
Cubic capacity, level	1,080 cu. ft.	Length over strikers	21 ft. 5½ in.
Light weight	41,300 lb.	Width outside	10 ft. 3¾ in.
Axle journals	6 in. × 11 in.	Height of sides	10 ft. 2 in.

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1943
Car Builders' Cyclopedia
Of American Practice

Definitions and Typical Illustrations of Railroad and Industrial Cars, Their Parts and Equipment; Cars Built in America for Export to Foreign Countries; Descriptions and Illustrations of Shops and Equipment Employed in Car Construction and Repair

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A.C.F. Covered and Open Top Hopper Cars

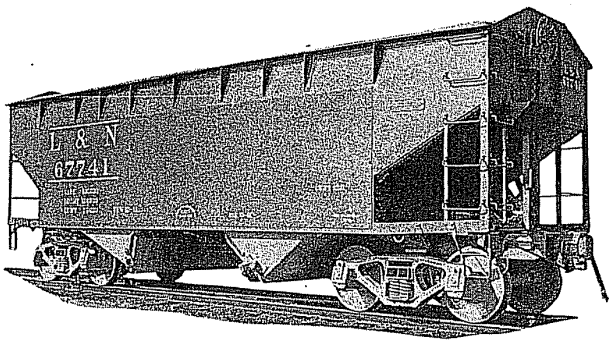
Covered types designed especially for bulk shipment of granular lading
Rugged, dependable open top equipment for economy in general service

A.C.F. has developed during recent years, many new and interesting hopper cars expressly created for the better, safer, more economical handling of specific ladings.

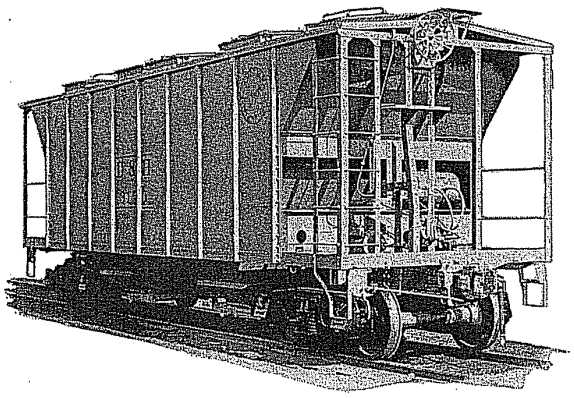
Covered Hopper Cars for Pulverized and Granular Substances

Improved and highly refined designs of covered hopper cars, originated and built by A.C.F. have been furnished to many railroads for the carriage of cement and other granular commodities. Dusttight and watertight construction affords perfect protection for the lading, the cost of bags and bagging is saved, and loading and unloading are quick and economical.

Commodities other than cement are also being handled in bulk shipments in cars built by A.C.F. These include carbon black, edible grains, wood flour, fullers' earth, soda ash, and similar finely divided or granular substances.

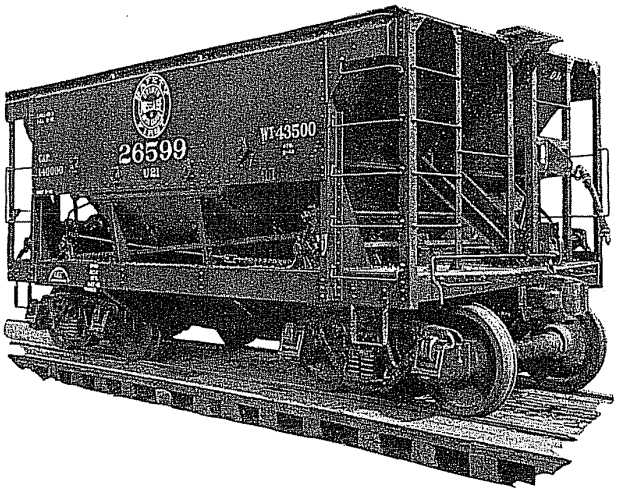


Above:—Louisville & Nashville, 50-ton twin hopper car. Inside length, 33 ft. 0 in.; width, 10 ft. 4 in.; height of sides, 10 ft. 8 in.; capacity, 2191 cu. ft.; weight, 39,300 lb.; load limit, 129,700 lb.



Late design of covered hopper car for bulk shipment of cement. Capacity, 140,000 lb.; load limit, 161,700 lb.; light weight, 48,300 lb.; cubic capacity, 2,040 cu. ft.

Below:—Duluth, Missabe & Iron Range, 75-ton hopper ore car. Length inside, 19 ft. 10⅞ in.; width, 10 ft. 5½ in.; height of sides, 10 ft. 2 in.; door opening, 2 ft. 7¾ in. wide by 6 ft. 10 in. long; weight, 43,500 lb.; load limit, 166,500 lb.



Open Top Cars for Ore and Coal

Numerous designs of open top hopper cars have also been developed, some with special provisions for improved handling of the wide variety of commodities shipped in this general type of freight car.

Some are fabricated from low-alloy steels to obtain light weight construction—others are built of copper-bearing steels to resist corrosion—and still others follow conventional lines employing ordinary carbon steels. The principal commodities which these cars are designed to handle include not only coal and ore, but also coke, limestone, gravel, trap rock, sand, and all materials of this character.

AMERICAN CAR AND FOUNDRY COMPANY, NEW YORK, N. Y.

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IPR Petition - USP 8,166,892

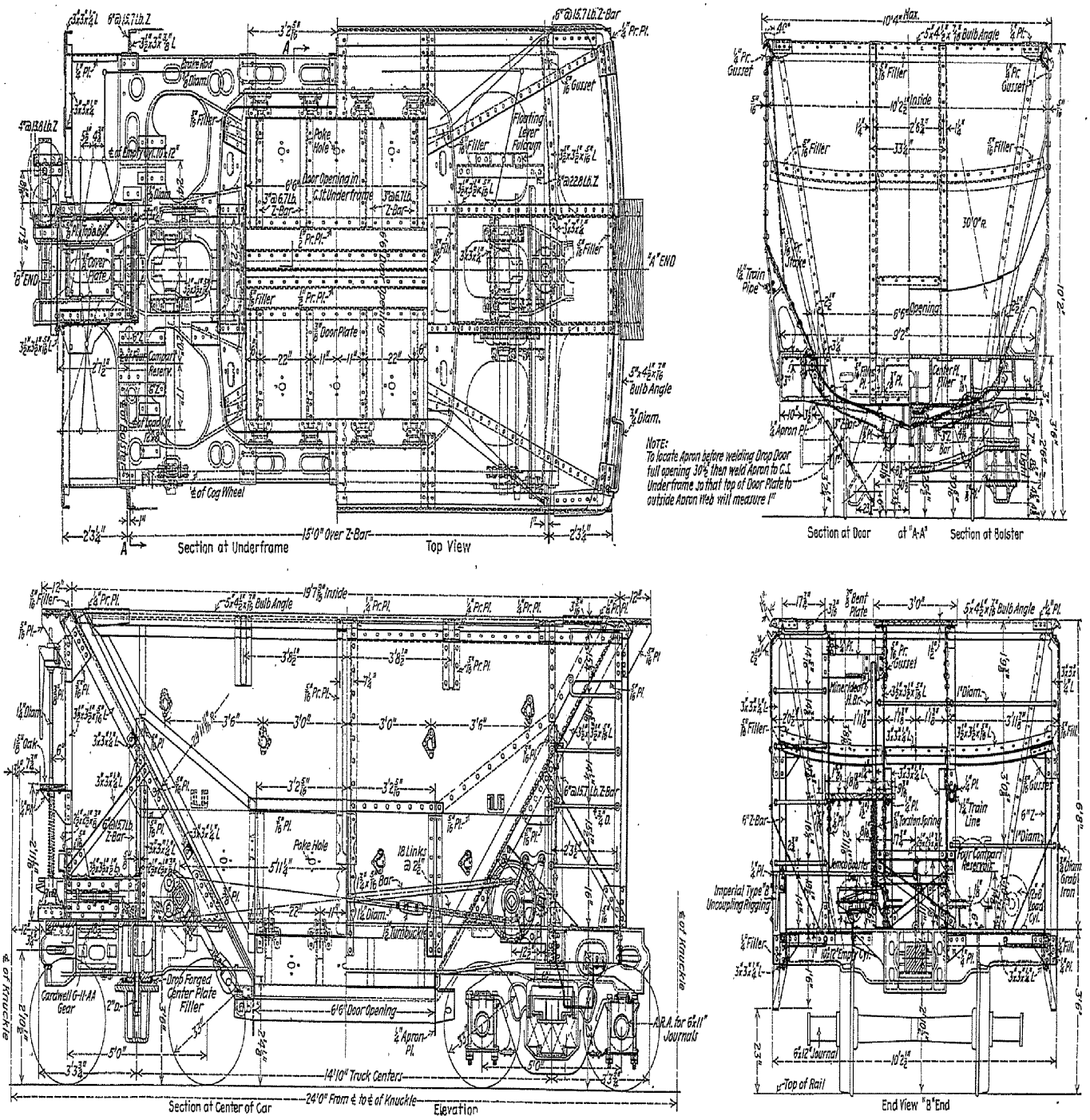


Fig. 2.666—Plan, elevation and sections of Duluth, Missabe & Iron Range 80-ton capacity hopper ore car with Commonwealth cast steel underframe. Road Class U-14.
Roads Nos. 22,001-22,125; capacity, 935 cu. ft.; light weight, 47,600 lb.; load limit, 162,400 lb.
Descriptions: *Railway Age*, Feb. 8, 1928. *Railway Mechanical Engineer*, May 1928
(Later cars have been of fabricated type. See Fig. 2.667)
(For ore car door operating mechanism see Sec. 3)

FreightCar America, Ex. 1002
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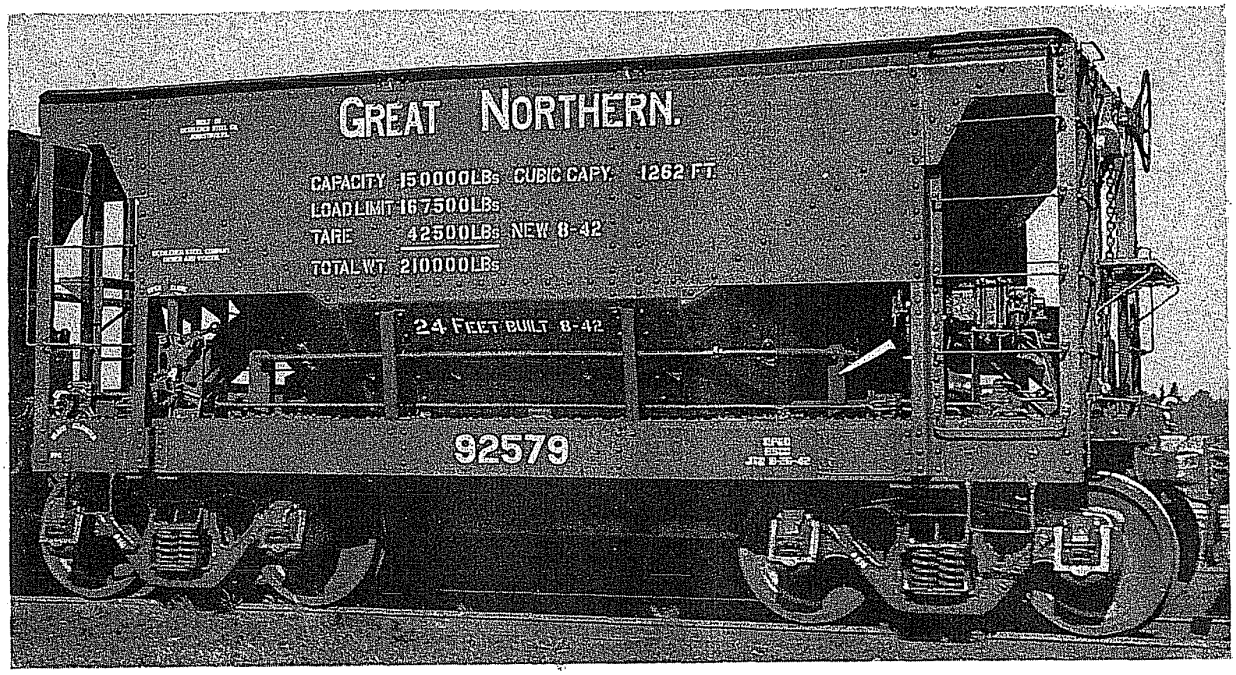


Fig. 2.667—Great Northern 75-ton capacity hopper iron ore car. Series 90,000-92,999. Builder, Bethlehem Steel Company.

A. A. R. Class	HMA	Length inside	19 ft. 10⅞ in.
Nominal capacity	150,000 lb.	Width inside	10 ft. 5½ in.
Load limit	167,500 lb.	Coupled length	24 ft. 0 in.
Cubic capacity, level	1,262 cu. ft.	Length over strikers	21 ft. 5¼ in.
Light weight	42,500 lb.	Width outside	10 ft. 6 in.
Axle journals	6 in. x 11 in.	Height of sides	10 ft. 2 in.



Fig. 2.668—Duluth, Missabe & Iron Range 70-ton capacity hopper iron ore car. Road Class U19. Builder, Pullman-Standard Car Manufacturing Co.

A. A. R. Class	HMA	Axle journals	6 in. x 11 in.
Nominal capacity	140,000 lb.	Length over strikers	21 ft. 6 in.
Load limit	166,400 lb.	Length inside	19 ft. 10 in.
Cubic capacity, level	1,000 cu. ft.	Width inside	10 ft. 5 in.
Light weight	43,600 lb.	Height of sides	10 ft. 2 in.

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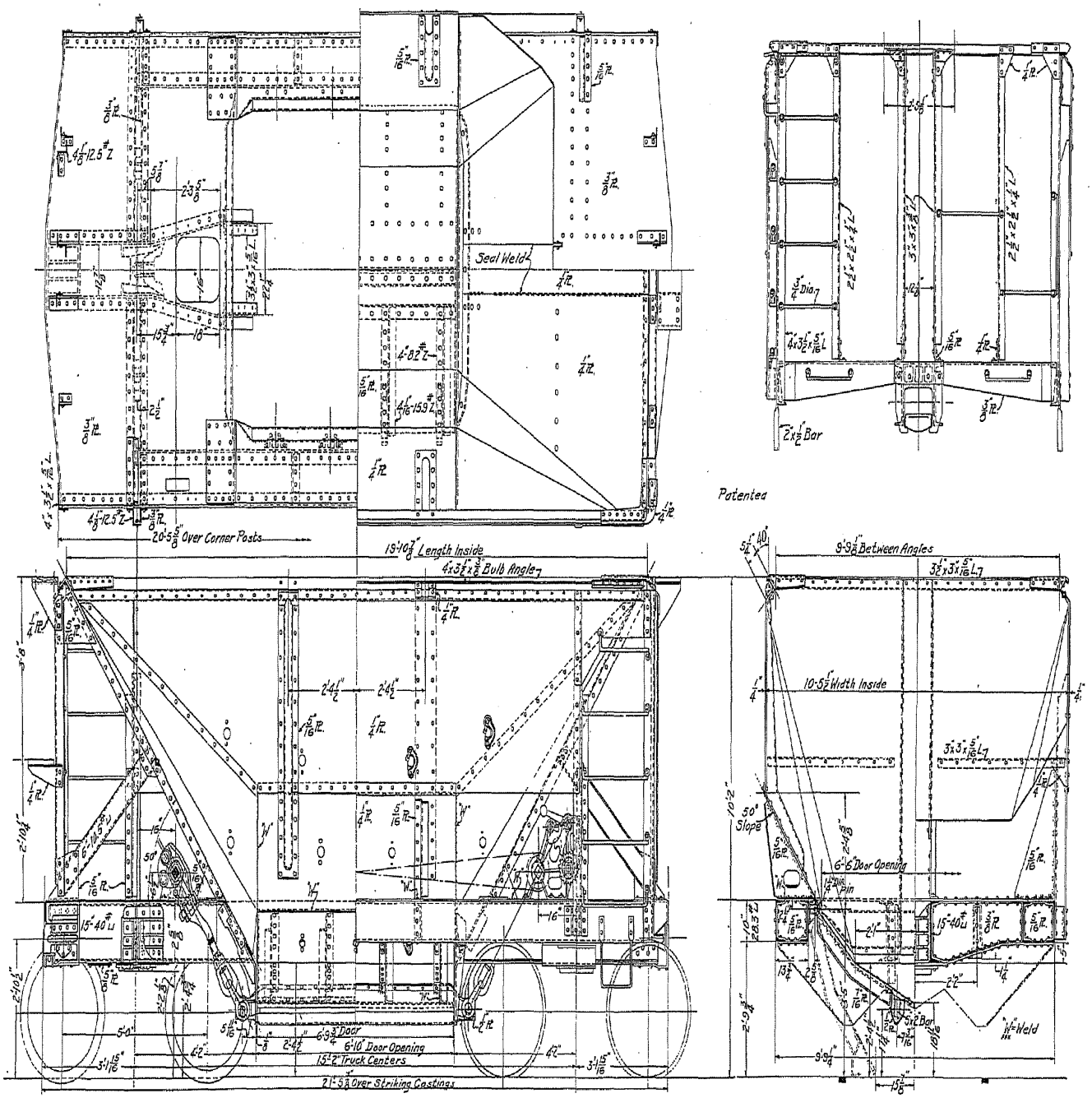


Fig. 2.669—75-Ton all-steel 6 in. by 11 in. axle load Enterprise hopper iron ore car, center discharge. Cubic capacity, 1,040 cu. ft. level or 1,244 cu. ft. with 12-in. average heap.

Enterprise Railway Equipment Company

(See also Page 289)

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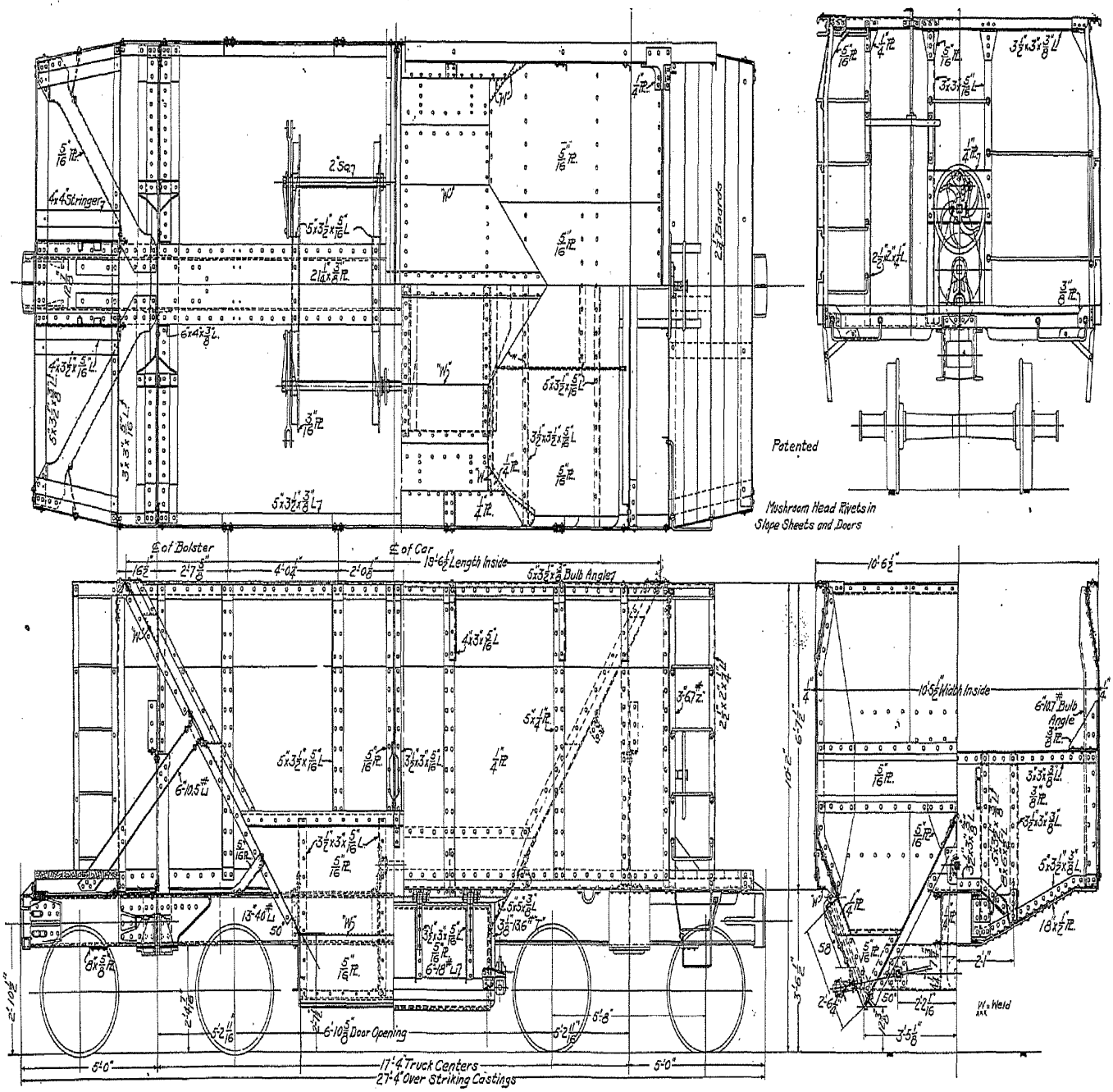


Fig. 2.670—70-Ton all-steel Enterprise hopper ore car, side discharge. Cubic capacity, 981 cu. ft. level or 1,170 cu. ft. with 12 in. average heap.

Enterprise Railway Equipment Company

(See also Page 289)

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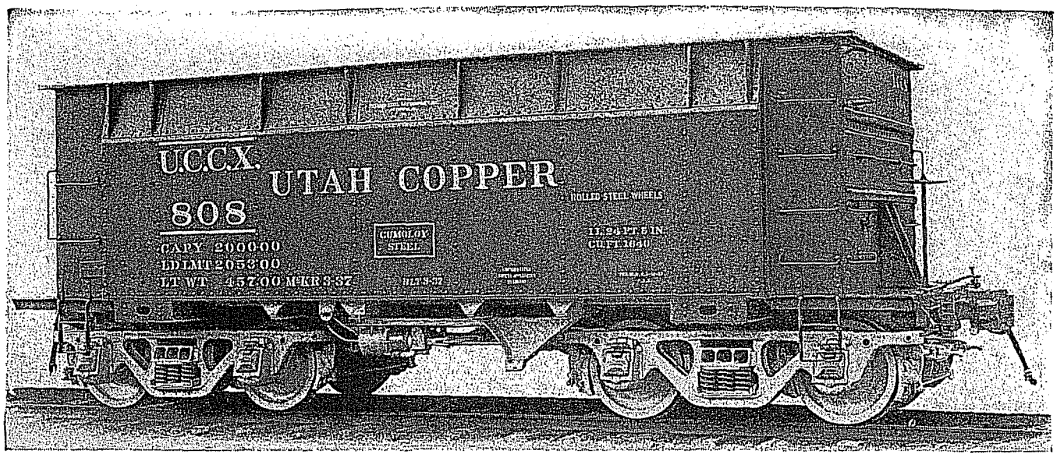


Fig. 2.671—Utah Copper Company 200,000-lb. capacity high-tensile steel ore car. Unloaded by car dumper. Builder, Pressed Steel Car Company, Inc.

Light weight, 45,700 lb.; load limit, 205,300 lb.; capacity, 1,640 cu. ft.; inside, length 24 ft. 5 in.; width 10 ft. 6 in.; height 6 ft. 6¾ in.

Description: Railway Age, October 30, 1937

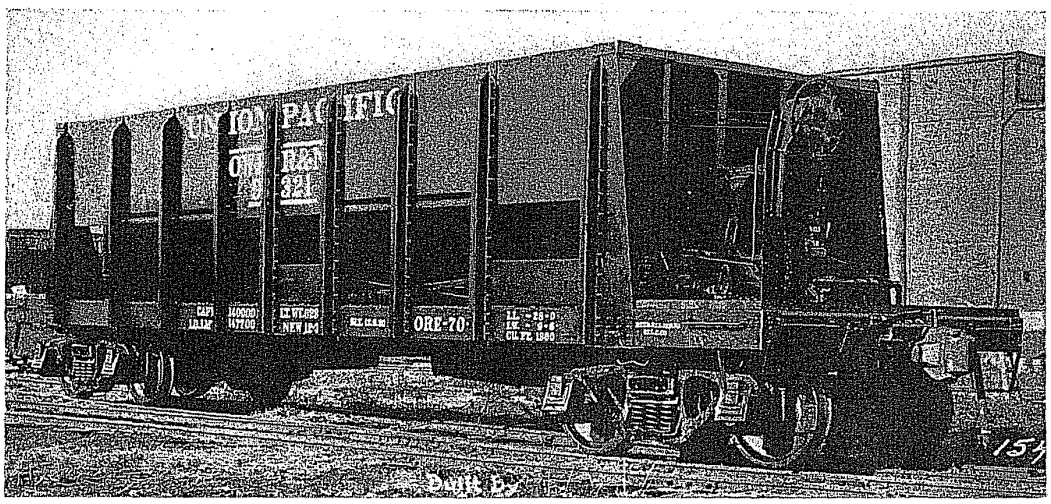


Fig. 2.672—Union Pacific (O.-W. R. & N.) 70-ton ore car, AAR Class HMA. Builder, St. Louis Car Company.

Light weight, 62,300 lb.; load limit, 147,700 lb.; capacity, 1,360 cu. ft.; inside, length 28 ft. 0 in.; inside, width 9 ft. 6 in.



Fig. 2.673—Canadian National 80-ton ore car with four drop bottom doors, each side, AAR Class GS.

Light weight, 48,700 lb.; load limit, 161,300 lb.; capacity, 1,080 cu. ft.; length inside, 22 ft. 11 in.

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Enterprise Bulk Commodity, Ore and Ballast Cars

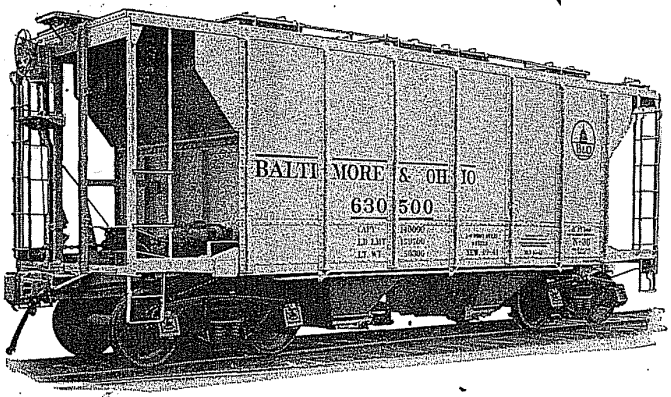


Fig. 2.678—70-ton Bulk Commodity Covered Hopper Car

THE Bulk Commodity Covered Hopper Car has become a standard service car for many commodities formerly hauled in sack, barrel or loosely in box cars.

The Enterprise Outlet Unit illustrated in Fig. 2.679

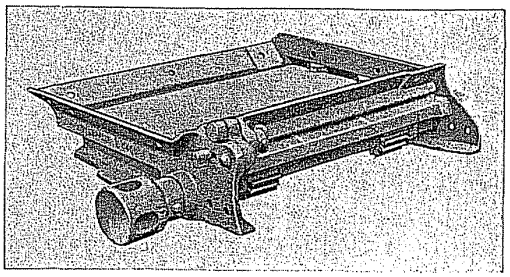


Fig. 2.679—Enterprise Bulk Commodity Outlet

is of cast steel, a finished machined product which provides a close, tight seal against leakage, a large opening and convenient means for operating. For general plan of Enterprise 70-ton car see Fig. 2.677, page 288 and application of outlet see Fig. 3.227, page 475.

The Enterprise has also developed a new seal tight Hatch with Door Lock for use in loading this type of car, which is illustrated and shown applied in Fig. 2.677, page 288, details, Figs. 3.231 and 3.233, page 477.

Enterprise Multi-Service Ballast Cars

The Enterprise Type A Multi-Service Ballast Car illustrated in Fig. 2.680 is of 55 tons capacity and of Standard A.A.R. dimensions, 34 ft. 0 in. overall length and 10 ft. 8 in. height.

The car is designed to release ballast from a moving train to the sides or center of the track, free of the rails and in quantities as desired by the operator. The floors of the car are steep; corner pockets are eliminated and the passageways between the floors and outlet hoppers are wide, providing for a free unrestricted flow of the ballast which is essential to prompt and clean unloading of the car. For general design, see page 275.

There is also an Enterprise Type B Coal-Ballast Car, the 50-60-70-80. This is a standard A.A.R. hopper car (modified in hoppers only) using Enterprise Ballasting Hoppers, doors and door-operating mechanism. This design of car provides for an increased use of standard A.A.R. car parts and with the lower position and lesser slope of the car floors makes available an increase in the capacity for coal. The general dimensions of this car are the same as an A.A.R. 50-ton hopper and the finished weight substantially the same as the Enterprise Type A Multi-Service Ballast Car. This car is suitable for 61 tons of coal or other lading.

By a slight increase in thickness of the Body Bolster and the use of 70-ton trucks, the car would be suitable for 65 tons of coal or 80 tons of ballast and other heavy materials. For general design see page 278.



Fig. 2.680—55-ton Multi-Service Car

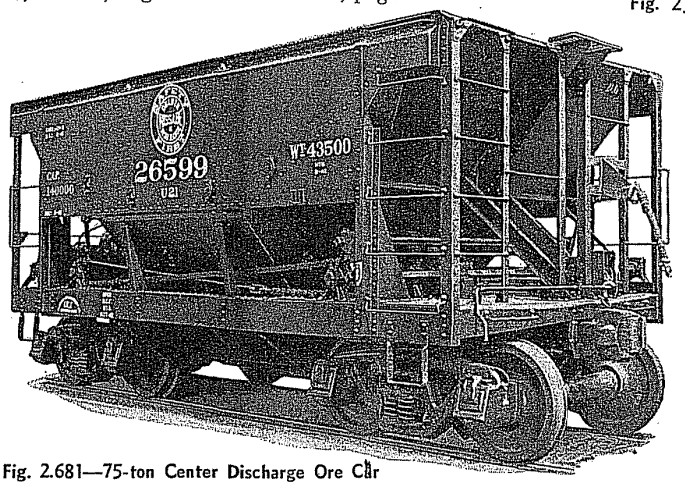


Fig. 2.681—75-ton Center Discharge Ore Car

Enterprise Ore Car—Door Mechanism

The 75-ton Hopper Ore Car shown in Fig. 2.681 illustrates the Center Discharge Car commonly used in the Iron Ore Service. Steep floors, rounded corners and a large door opening are essential to quick and free discharge of the load. The door opening is closed by a pair of longitudinally hinged doors which are controlled by the Enterprise Door Mechanism which is operative from either side of the car and securely locks the doors when in closed position. A general plan of Enterprise 75-ton ore car is illustrated in Fig. 2.669, page 284. A side discharge ore or concentrate car is illustrated in Fig. 3.670, page 285.

ENTERPRISE RAILWAY EQUIPMENT COMPANY, 59 E. Van Buren St., CHICAGO, ILL.

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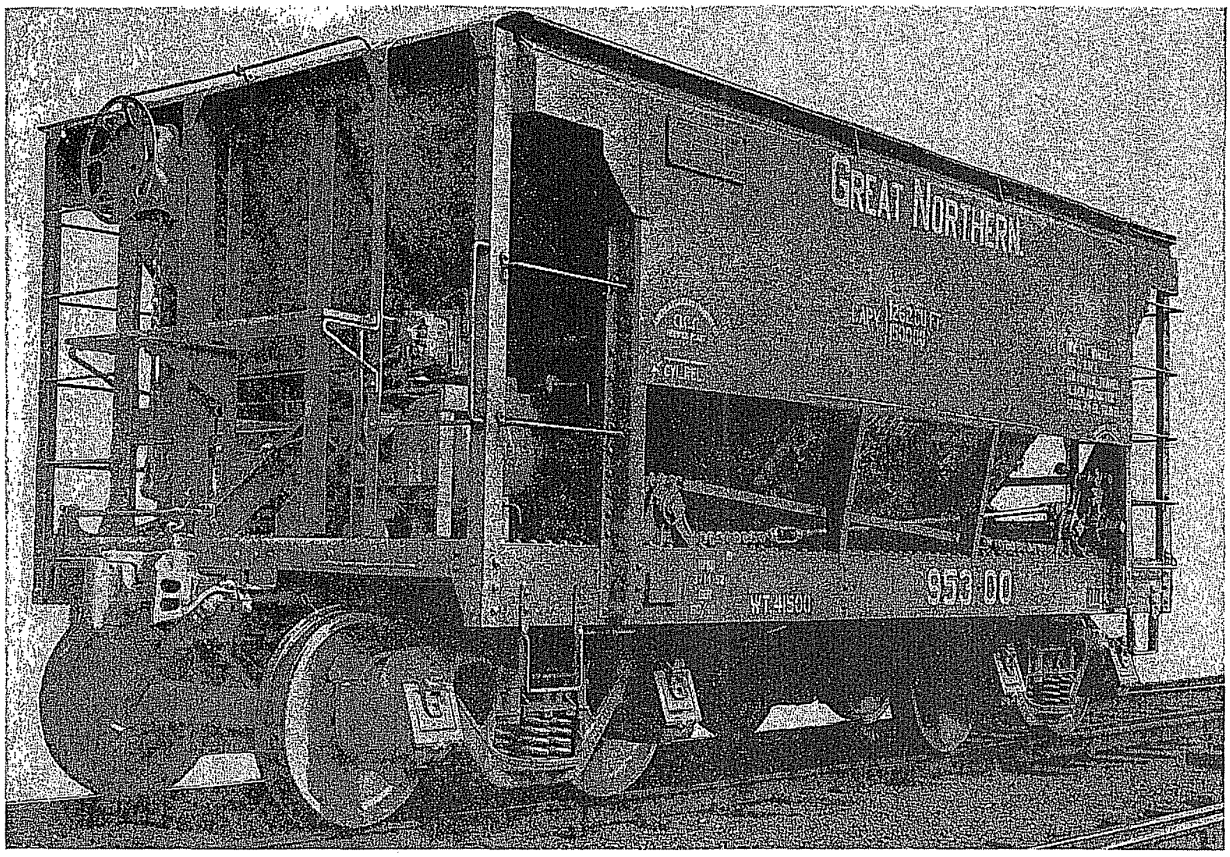
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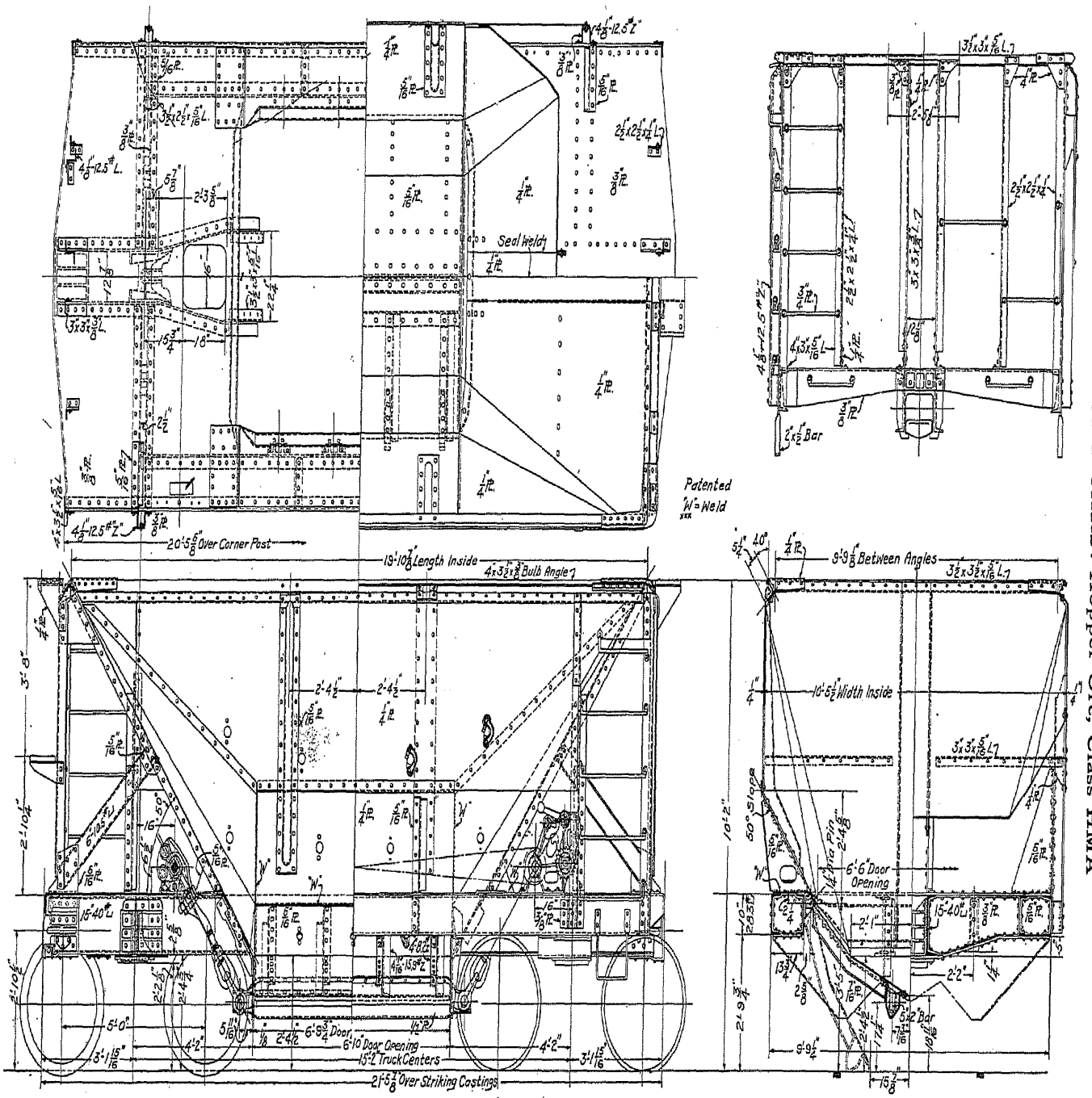


Great Northern 75-ton hopper ore car. Builder, American Car and Foundry Div., ACF Industries, Inc.
Light weight 41,500 lb.; capacity 1,262 cu. ft.; inside length 19 ft. 10 in.; width 10 ft. 5 in.; height to top of car 10 ft. 2 in.



Union Pacific 70-ton hopper ore car. Built in Company shops at Omaha, Neb.
Light weight 48,300 lb.; load limit 161,700 lb.; capacity 1,096 cu. ft.; inside length 20 ft. 9 in.; width 10 ft. 5 in.

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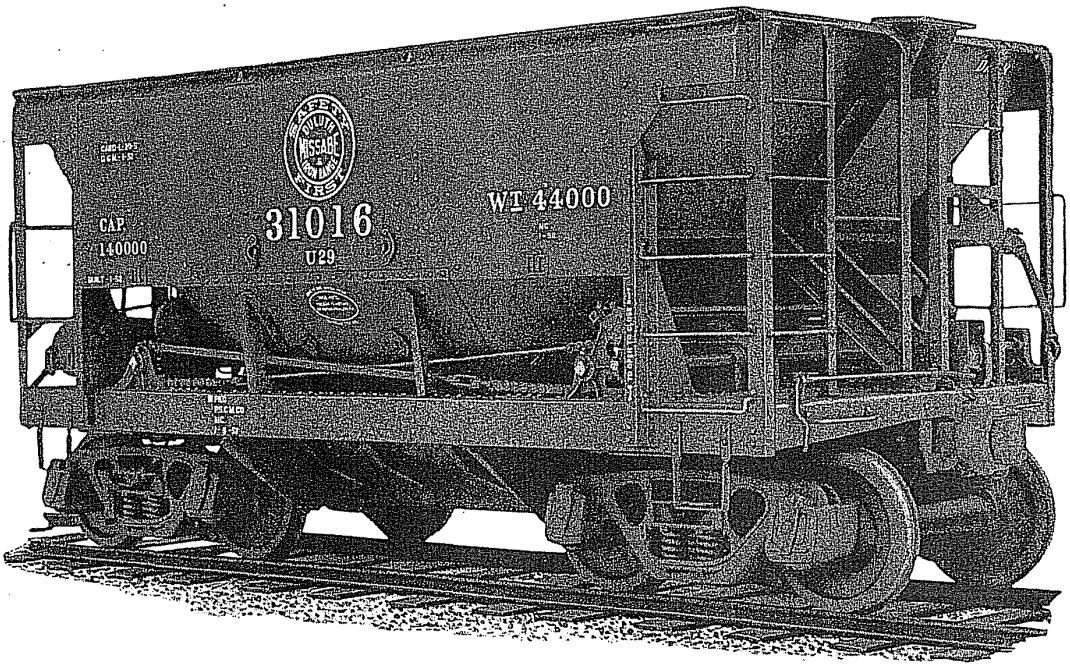
70-Ton all-steel 6 in. by 11 in. axle load Enterprise hopper iron ore car, center discharge. Cubic capacity 1,040 cu. ft. level or 1,244 cu. ft. with 12-in. average heap.

Enterprise Railway Equipment Company

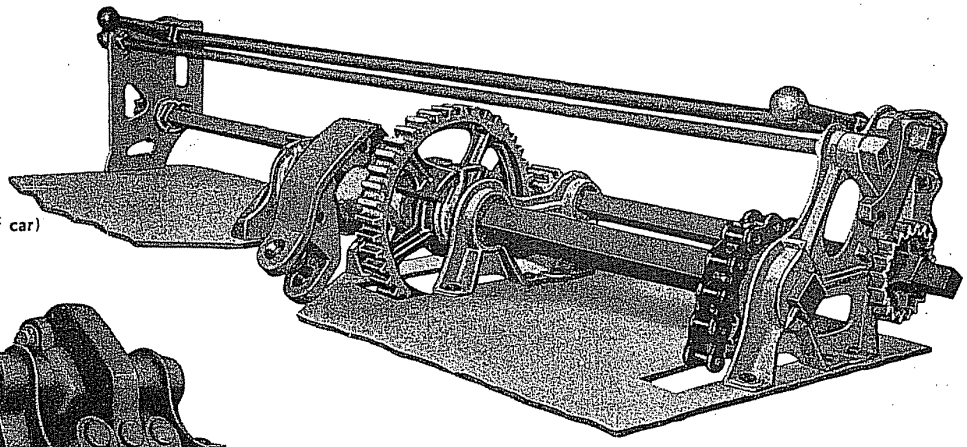
(See also opposite page)

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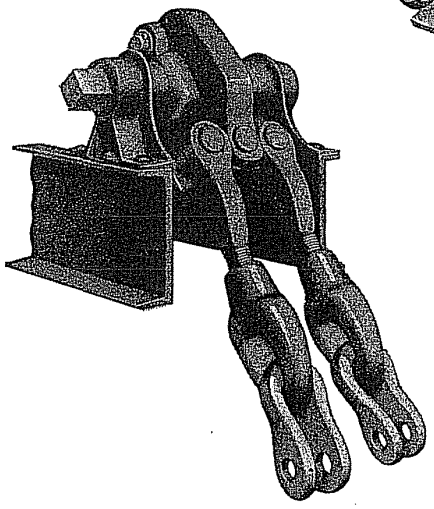
Enterprise Door Operating Mechanism for Ore Cars



70-ton Center Discharge Ore Car.



Enterprise Door Latch and Operating Mechanism (Operative from either side of car)



Enterprise Ore Car Dumping Mechanism.

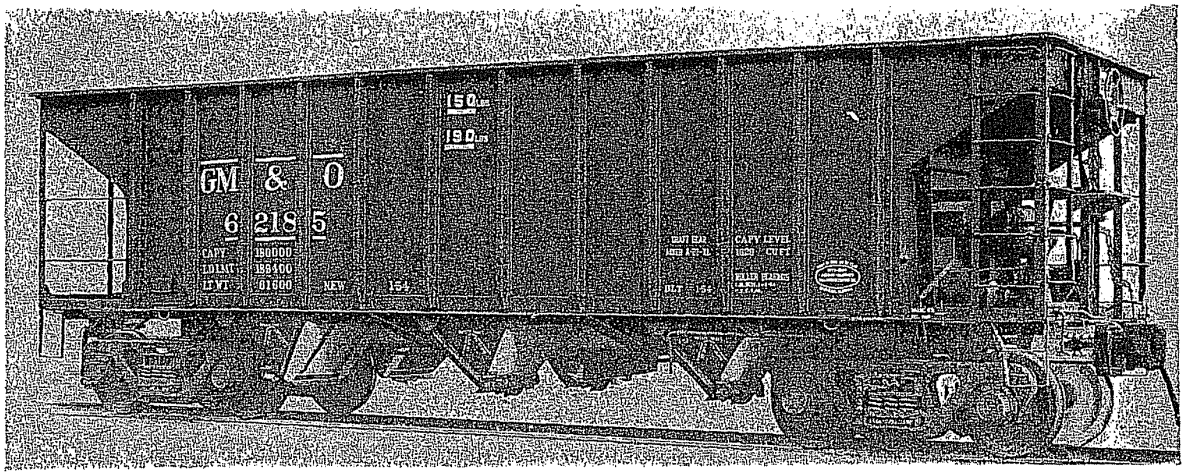
The 70-ton Hopper Ore Car shown above illustrates the center discharge car commonly used in iron ore service. Steep floors, rounded corners and large door openings insure quick and free discharge of the load. The door opening is closed by a pair of longitudinally hinged doors which are controlled by the Enterprise Door Mechanism, which is operative from either side of the car and securely locks the doors when in closed position. A general plan of the Enterprise 70-ton ore car is illustrated on page 266.

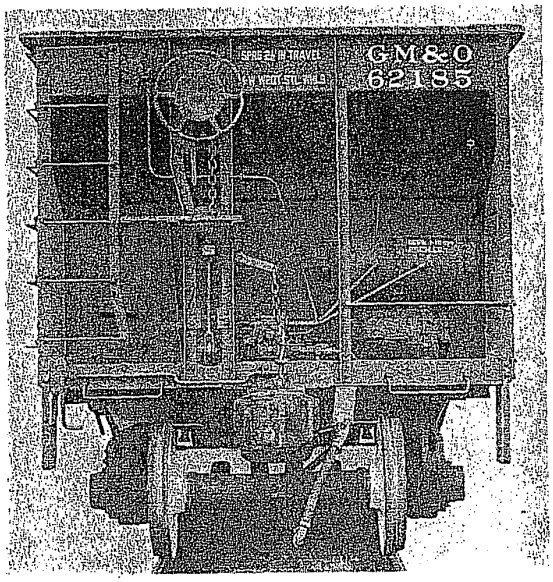
Blueprints of the standard Enterprise 70-ton center discharge ore car are available on request. Blueprints and information on Enterprise side discharge ore cars are also available.

ENTERPRISE RAILWAY EQUIPMENT COMPANY, 59 E. Van Buren St., CHICAGO 5, ILL.

Products and Branch Offices Are Listed in the Classified Indexes

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

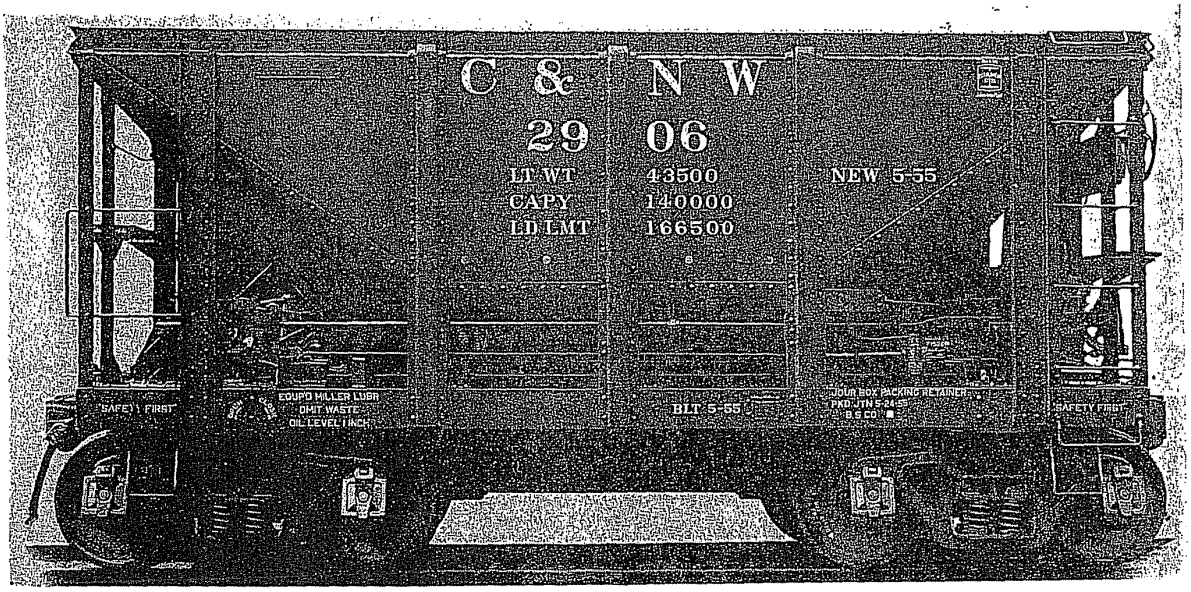




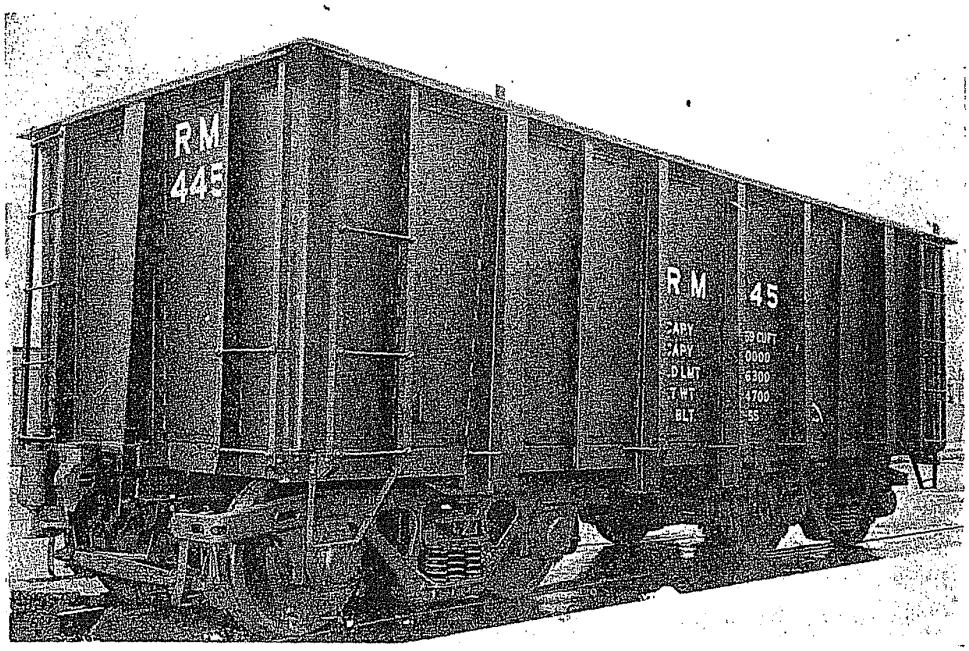
Above—Gulf, Mobile & Ohio 95-ton bulk iron ore car. Builder, Pullman-Standard Car Manufacturing Co.
Light weight 61,600 lb.; load limit 189,400 lb.; capacity 1,629 cu. ft.; inside length 29 ft. 8 in.; width 9 ft. 8 in.; height 7 ft. 2.

Left—End view of car shown above.

Below—Chicago & North Western 70-ton iron ore car. Builder, Bethlehem Steel Co.
Light weight 43,500 lb.; load limit 166,500 lb.; capacity 975 cu. ft.; inside length 21 ft. 2½ in.; width 8 ft. 11½ in.; height 10 ft. 6½ in.

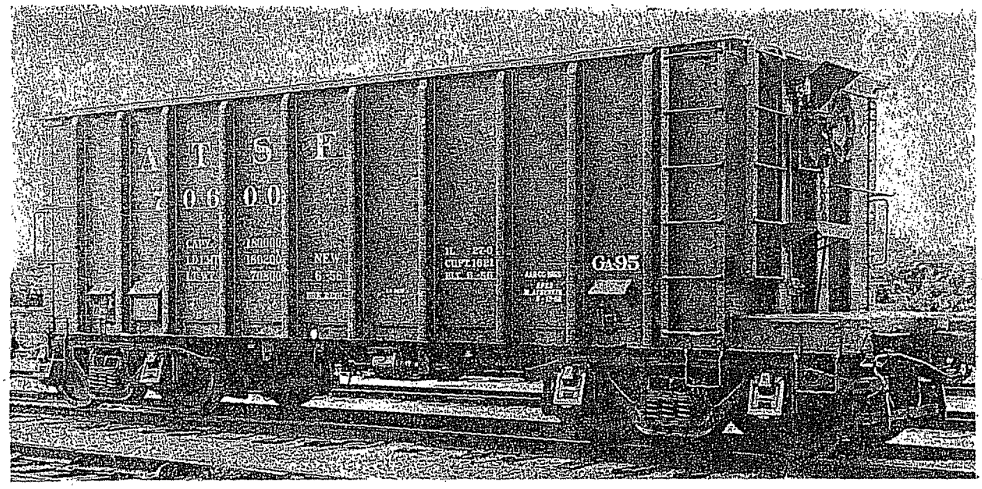


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Reserve Mining 95-ton ore car, roller bearing equipped. Builder, American Car and Foundry Div., ACF Industries, Inc.

Inside length at top 25 ft. 8 in., at floor 25 ft. 2¼ in.; width at top 9 ft. 9 in., at floor 9 ft. 3¼ in.; height 6 ft. 6-5/16 in.; light weight 54,700 lb.; load limit 196,300 lb.



Atchison, Topeka & Santa Fe 90-ton solid bottom ore car with Commonwealth one piece cast steel underframe.

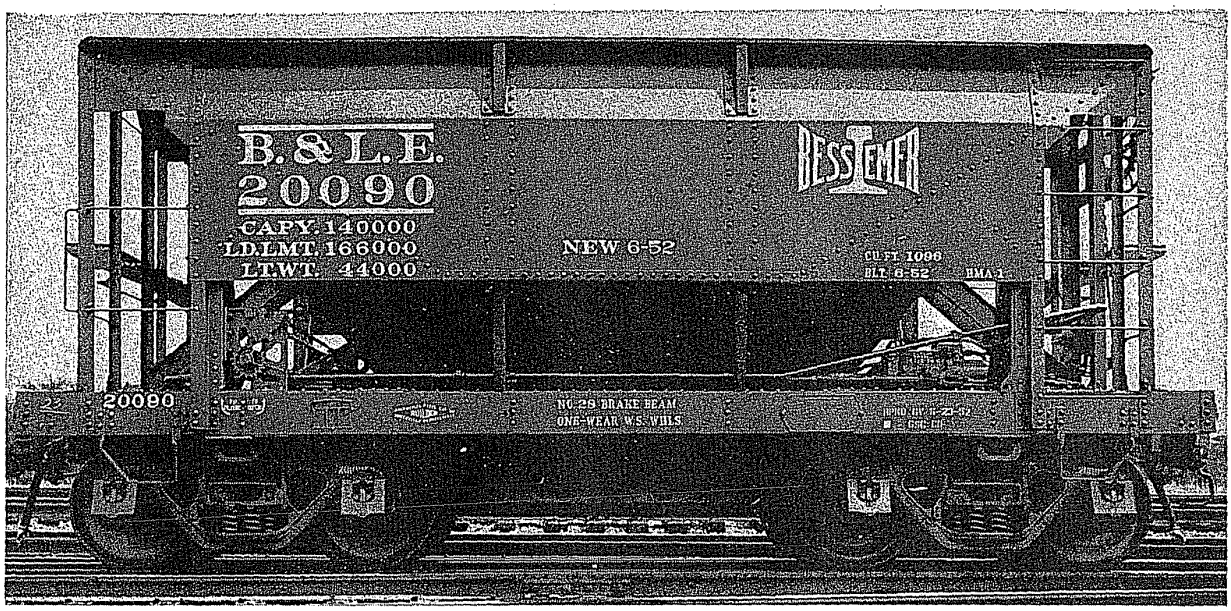
Inside length 27 ft. 0 in.; width 9 ft. 3 in.; height 6 ft. 6 in.; capacity 1,623 cu. ft.; light weight 70,800 lb.; load limit 180,200 lb.



Canadian National 100-ton center flow hopper ore car. Built by National Steel Car Corporation, Ltd.

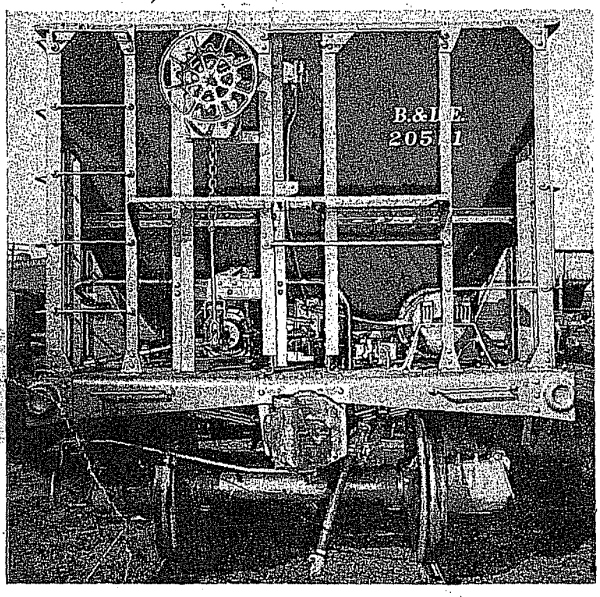
Inside length 19 ft. 10 in.; width 10 ft. 5 in.; capacity 1,000 cu. ft.; light weight 43,000 lb.; load limit 167,000 lb.

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892



Bessemer & Lake Erie 70-ton hopper ore car, Road Class HMA1.

Length, inside at top	20 ft. 9 in.	Capacity	1,096 cu. ft.
Length over striking plate	24 ft. 8 in.	Capacity	140,000 lb.
Length, coupled	27 ft. 2 in.	Load limit	166,000 lb.
Width, outside	10 ft. 6 in.	Light weight	44,000 lb.
Height, from rail to top of car	10 ft. 8 in.	Slope, floor	50 deg.



End and three-quarter view of B. & L. E. hopper ore car. Road Class HMA2.



Greenville Steel Car Co.

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1961
Car Builders' Cyclopedia
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Definitions and Typical Illustrations of Railroad and Industrial Cars, Their Parts and Equipment; Cars Built in America for Export to Foreign Countries; Descriptions and Illustrations of Shops and Equipment Employed in the Construction and Repair of Cars

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EDITOR
C. L. Combes
Editor, Railway Locomotives and Cars and Mechanical Department, Railway Age

MANAGING EDITOR
A. G. Oehler
Consulting Editor, Railway Locomotives and Cars

CONSULTING EDITOR
F. N. Houser
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EDITORIAL ASSISTANT
Elsie M. Koch

PUBLISHER
R. G. Lewis
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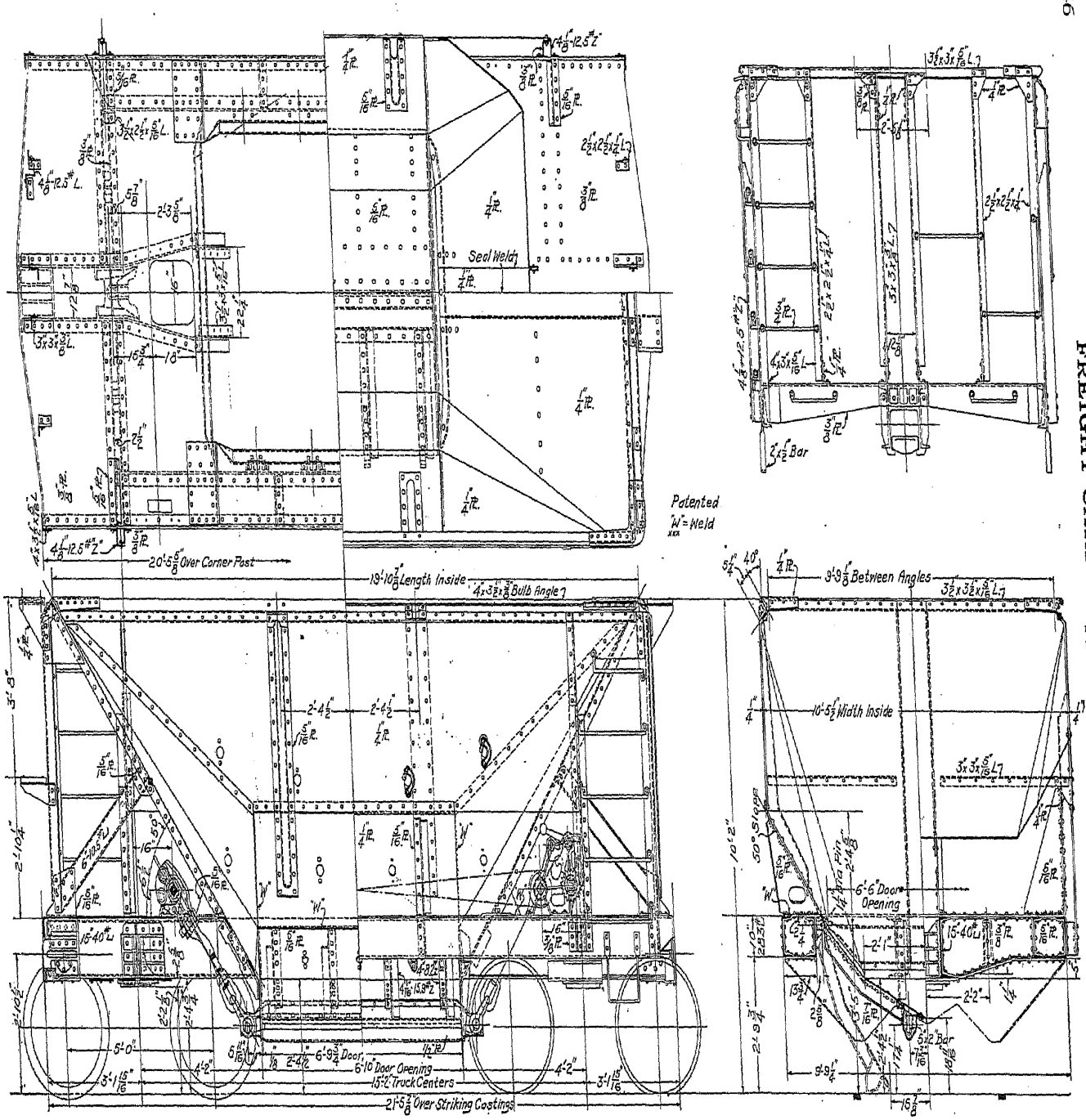
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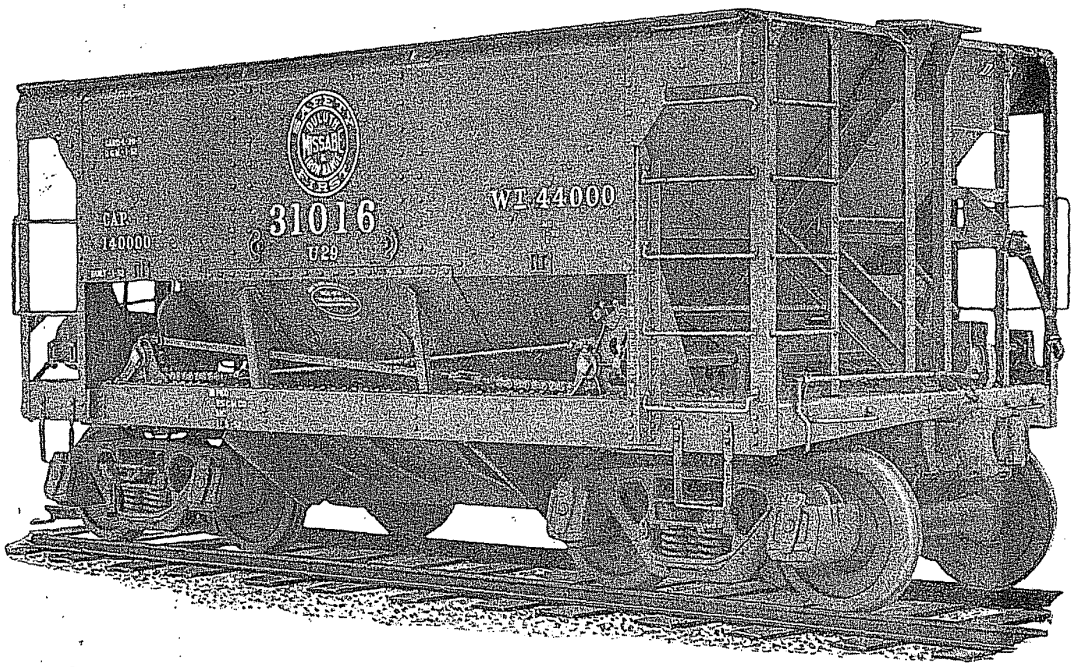
70-Ton all-steel 6 in. by 11 in. axle load Enterprise hopper iron ore car, center discharge. Cubic capacity 1,040 cu. ft. level or 1,244 cu. ft. with 12-in. average heap.

Enterprise Railway Equipment Company

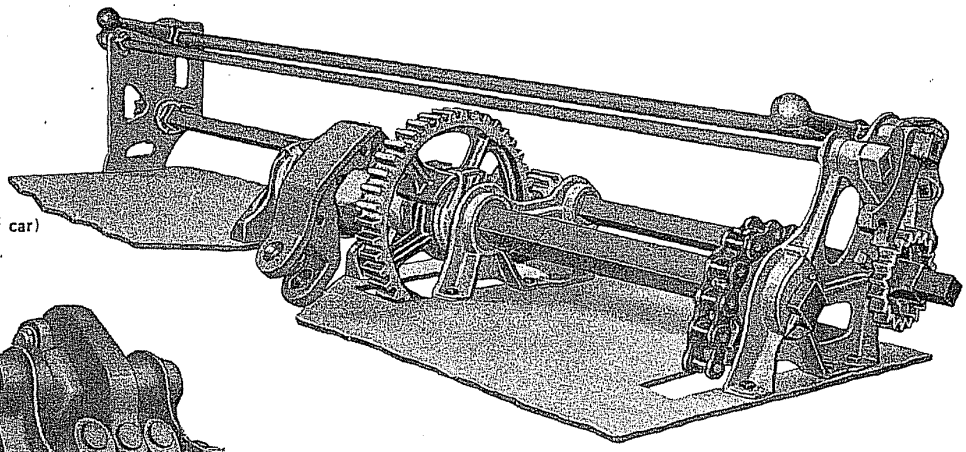
(See also opposite page)

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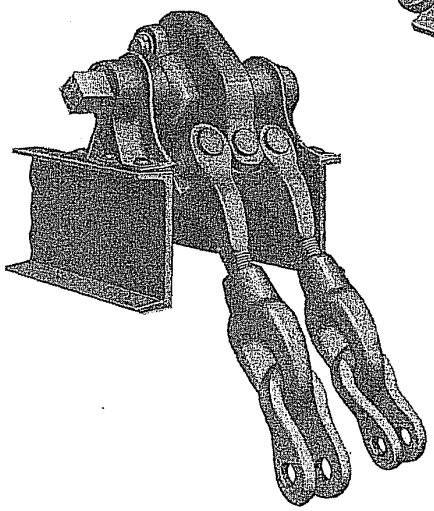
Enterprise Door Operating Mechanism for Ore Cars



70-ton Center Discharge Ore Car.



Enterprise Door Latch and Operating Mechanism (Operative from either side of car)



Enterprise Ore Car Dumping Mechanism.

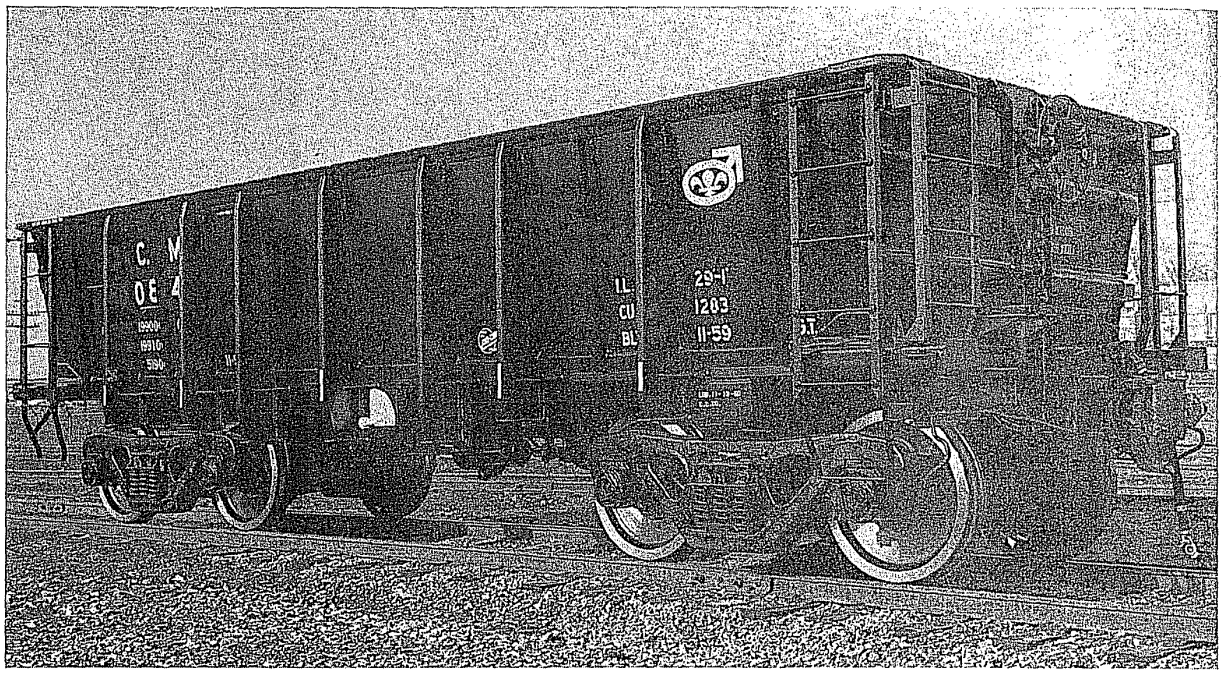
THE 70-ton Hopper Ore Car shown above illustrates the center discharge car commonly used in iron ore service. Steep floors, rounded corners and large door openings insure quick and free discharge of the load. The door opening is closed by a pair of longitudinally hinged doors which are controlled by the Enterprise Door Mechanism, which is operative from either side of the car and securely locks the doors when in closed position. A general plan of the Enterprise 70-ton ore car is illustrated on page 246.

Blueprints of the standard Enterprise 70-ton center discharge ore car are available on request. Blueprints and information on Enterprise side discharge ore cars are also available.

ENTERPRISE RAILWAY EQUIPMENT COMPANY, 59 E. Van Buren St., CHICAGO 5, ILL.

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Quebec Cartier Mining Co. 100-ton hopper ore car with Timken bearings. Builder, Canadian Car Division A. V. Roe Canada Limited.
Inside length 29 ft. 1⅜ in.; width 9 ft. 7¼.; light weight 51,900 lb.; load limit 199,100 lb.; capacity—2,283 cu.ft.; 199,000 lb.

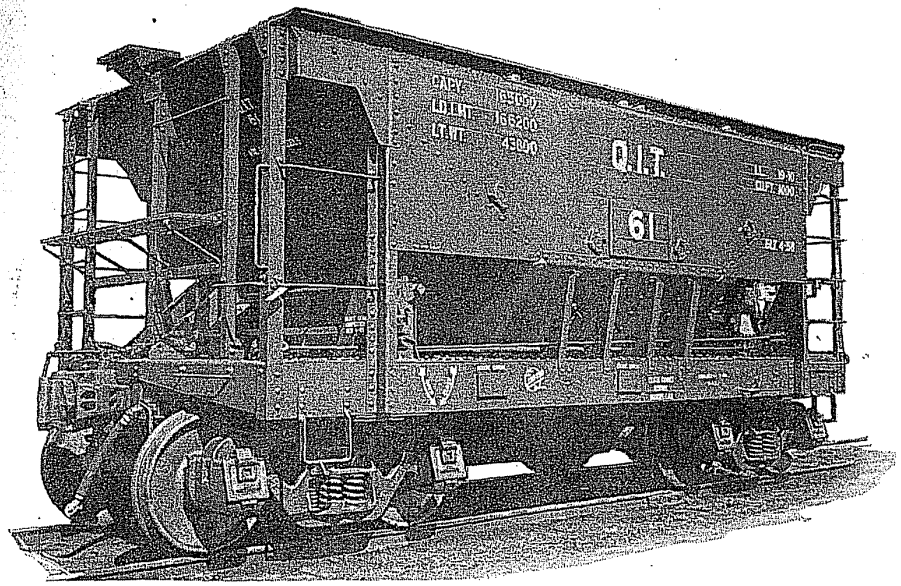


Great Northern 75-ton hopper ore car. Builder, American Car and Foundry Div., ACF Industries, Inc.
Light weight 41,500 lb.; capacity 1,262 cu. ft.; inside length 19 ft. 10 in.; width 10 ft. 5 in.; height to top of car 10 ft. 2 in.

FreightCar America, Ex. 1002
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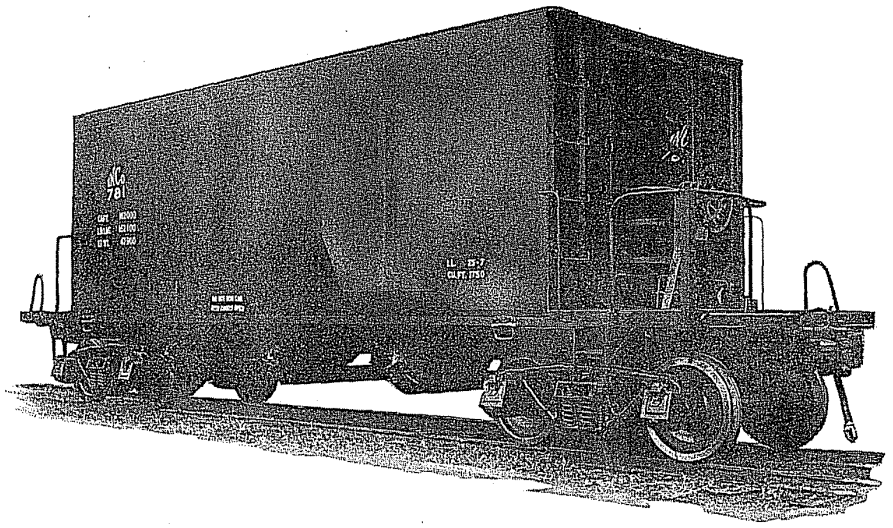
Canadian Car Division A.V. Roe Canada Limited

Canada's largest manufacturer of Railway Rolling Stock and Equipment



75-ton Ore car with cast steel wheels with roller bearings.

Capacity	165,000 lbs.
Load limit	166,200 lbs.
Light weight	43,800 lbs.
Cu. ft.	1,000
Inside length	19 ft. 9⅝ in.
Inside width	10 ft. 5½ in.
Extreme height	10 ft. 2-11/16 in.
Length over strikers	21 ft. 7 in.



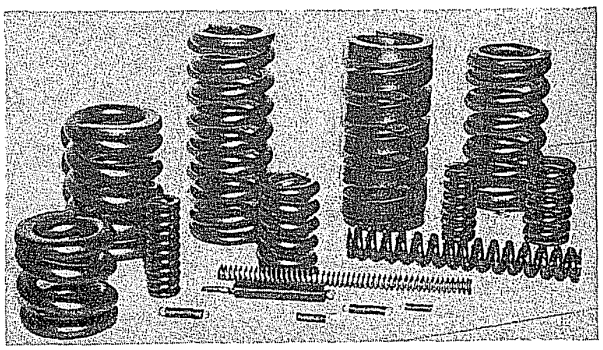
75 ton Triple Hopper Sand Car of welded construction.

Capacity	162,000 lbs.
Capacity	1,750 cu. ft.
Load Limit	162,100 lbs.
Light weight	47,900 lbs.
Length over strikers	36 ft.
Inside width	25 ft. 7⅝ in.
Inside length	9 ft. 11 in.
Extreme height	12 ft. 0-¾ in.

THE ore car, sand car and the springs shown on this page are typical examples of the high quality design, workmanship and materials that go into Canadian Car products.

Springs

Canadian Car Division, with one of Canada's most modern Spring Shops, is prepared to supply the finest quality Springs to the Transportation industry. The high quality indicative of this Company's products, is incorporated in each and every unit.

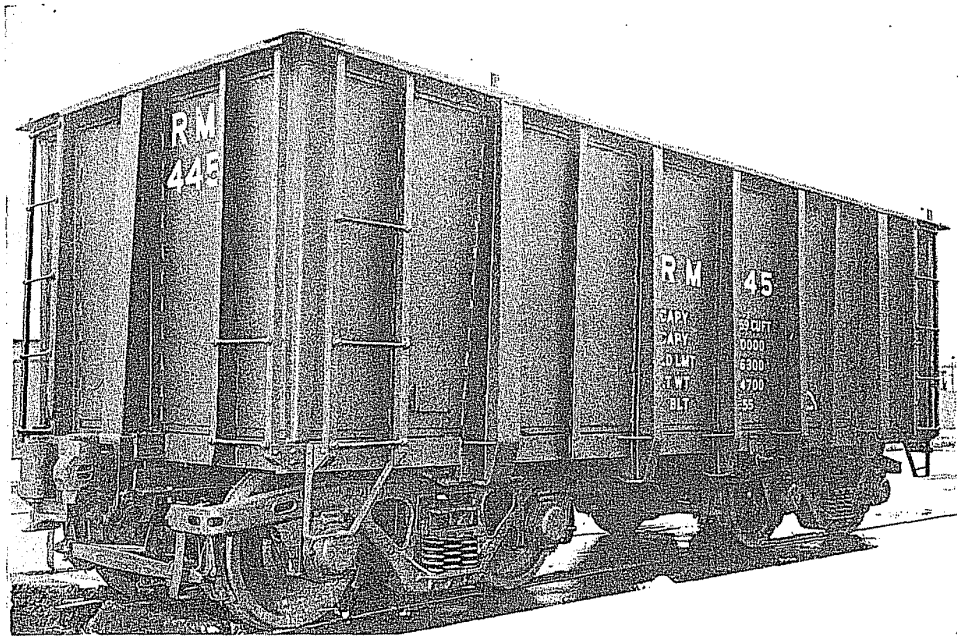


Coil Springs

CANADIAN CAR DIVISION A. V. ROE CANADA LIMITED, MONTREAL, QUE., CANADA

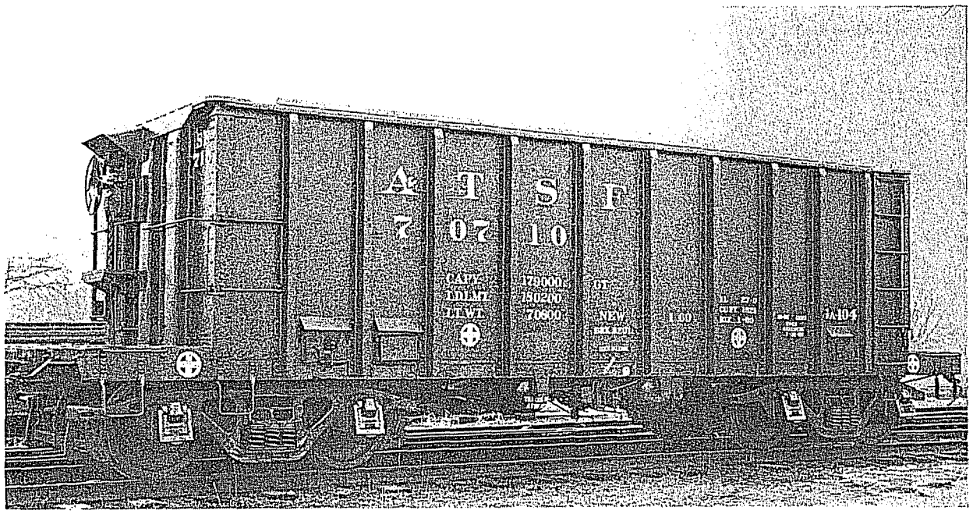
Products and Branch Offices Are Listed in the Classified Indexes

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892



Reserve Mining 95-ton ore car, roller bearing equipped. Builder, American Car and Foundry Div., ACF Industries, Inc.

Inside length at top 25 ft. 8 in., at floor 25 ft. 2¼ in.; width at top 9 ft. 9 in., at floor 9 ft. 3¼ in.; height 6 ft. 6-5/16 in.; light weight 54,700 lb.; load limit 196,-300 lb.



Atchison, Topeka & Santa Fe Class GA-104 solid bottom ore car with one piece cast steel underframe.

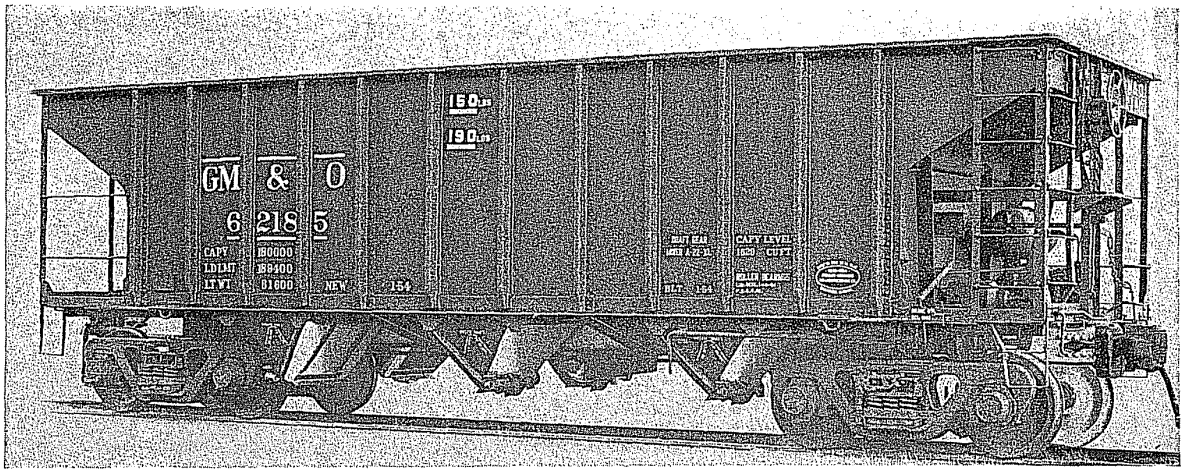
Inside length 27 ft. 0 in.; width 9 ft. 3 in.; height 6 ft. 6 in.; capacity 1,621 cu. ft.; light weight 70,800 lb.; load limit 180,200 lb.



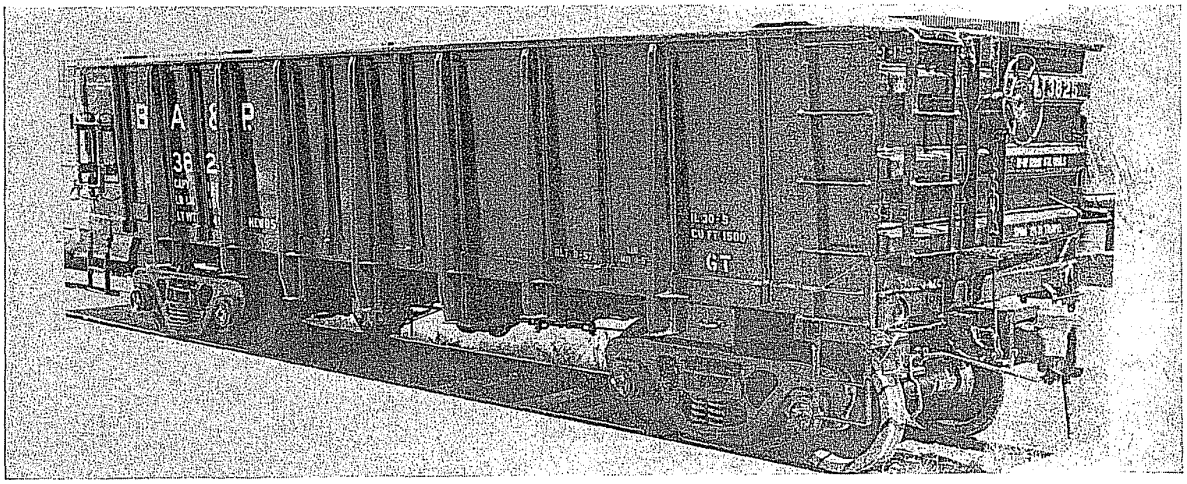
Canadian National 75-ton center dump hopper ore car. Builder, National Steel Car Corporation, Ltd.

Inside length 19 ft. 10 in.; width 10 ft. 5 in.; capacity 1,000 cu. ft.; light weight 43,600 lb.; load limit 166,-400 lb.

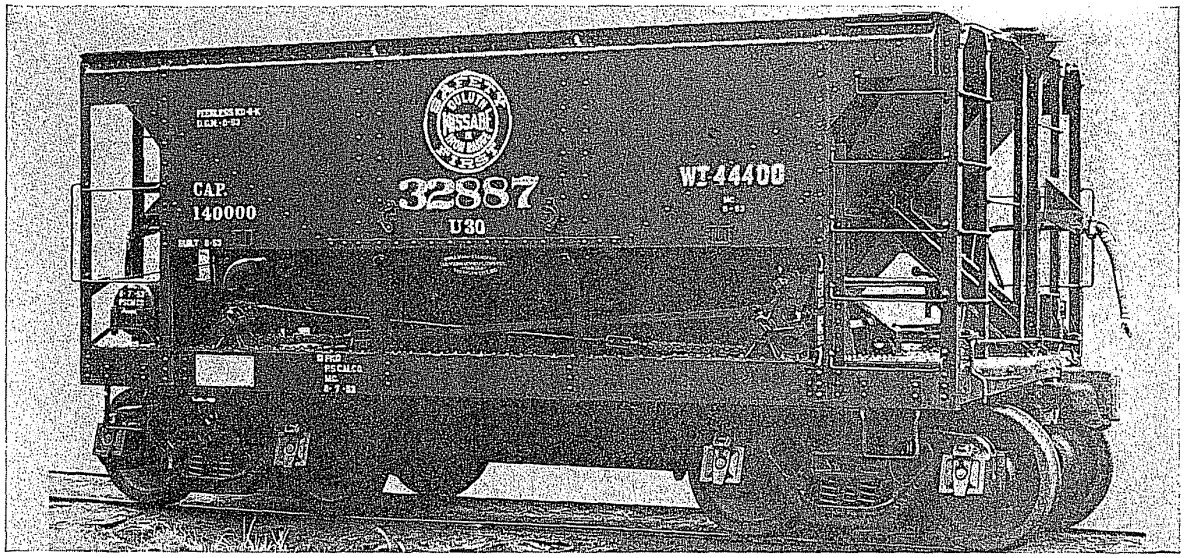
FreightCar America, Ex. 1002
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Above—Gulf, Mobile & Ohio 95-ton bulk iron ore car.
Light weight 61,600 lb.; load limit 189,400 lb.; capacity 1,629 cu. ft.; inside length 29 ft. 8 in.; width 9 ft. 8 in.; height 7 ft 2 in.



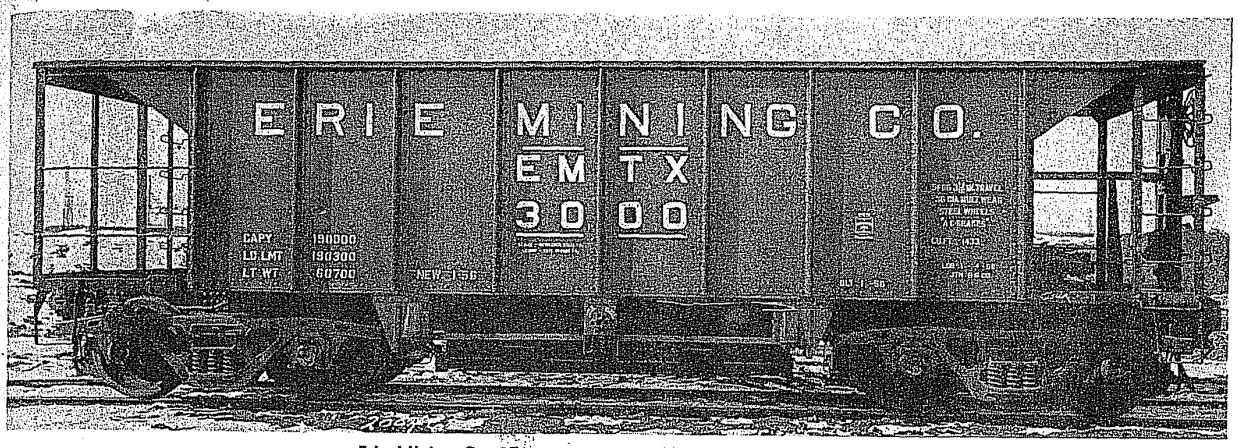
Butte, Anaconda & Pacific 75-ton flat bottom ore car.
Inside length 30 ft. 5 in.; width at top 9 ft. 1½ in.; width at side 8 ft. 7½ in.; light weight 52,000 lb.; capacity 1,500 cu. ft.



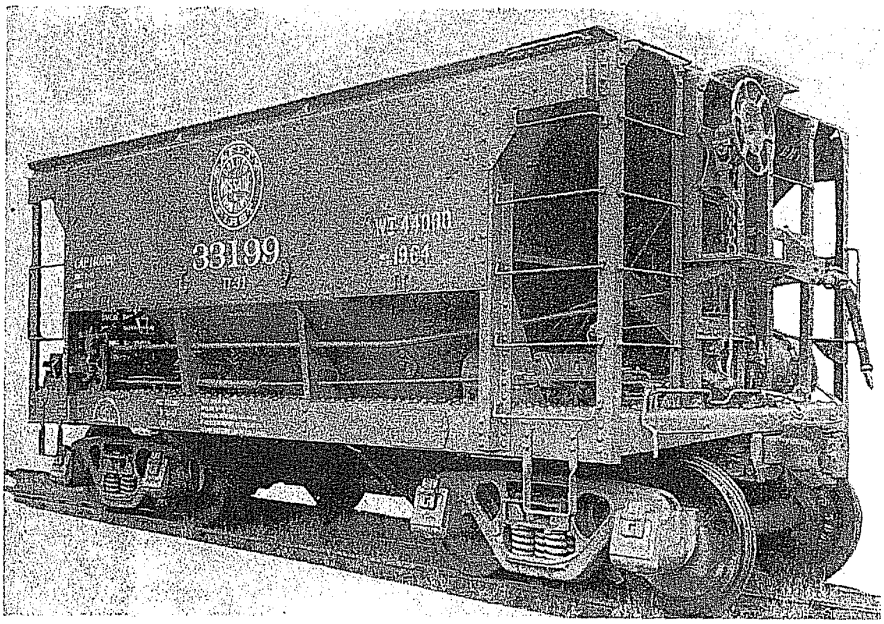
Duluth, Missabe & Iron Range 70-ton drop bottom ore car.
Inside length 19 ft. 10⅞ in.; width 10 ft. 5½ in.; overall height 10 ft. 2 in.; light weight 44,400 lb.; capacity 1,000 cu. ft.; load limit 140,000 lb.

Pullman-Standard

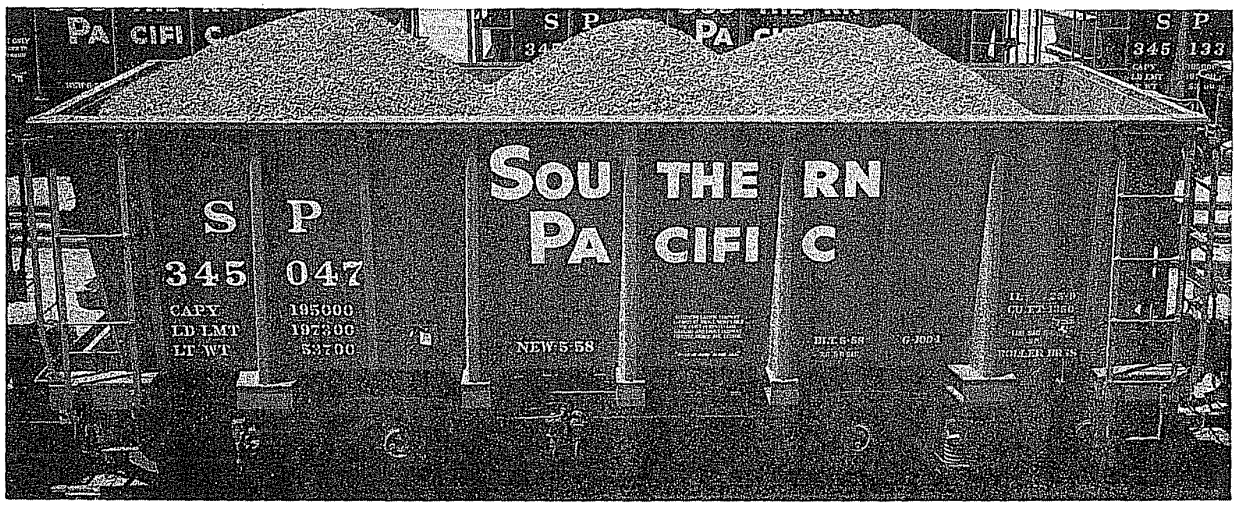
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Erie Mining Co. 95-ton ore car. Builder, Bethlehem Steel Co.
Inside length 29 ft. 7 in.; width 9 ft. 10 in.; capacity 1,433 cu. ft.; light weight 60,700 lb.; load limit 190,300 lb.

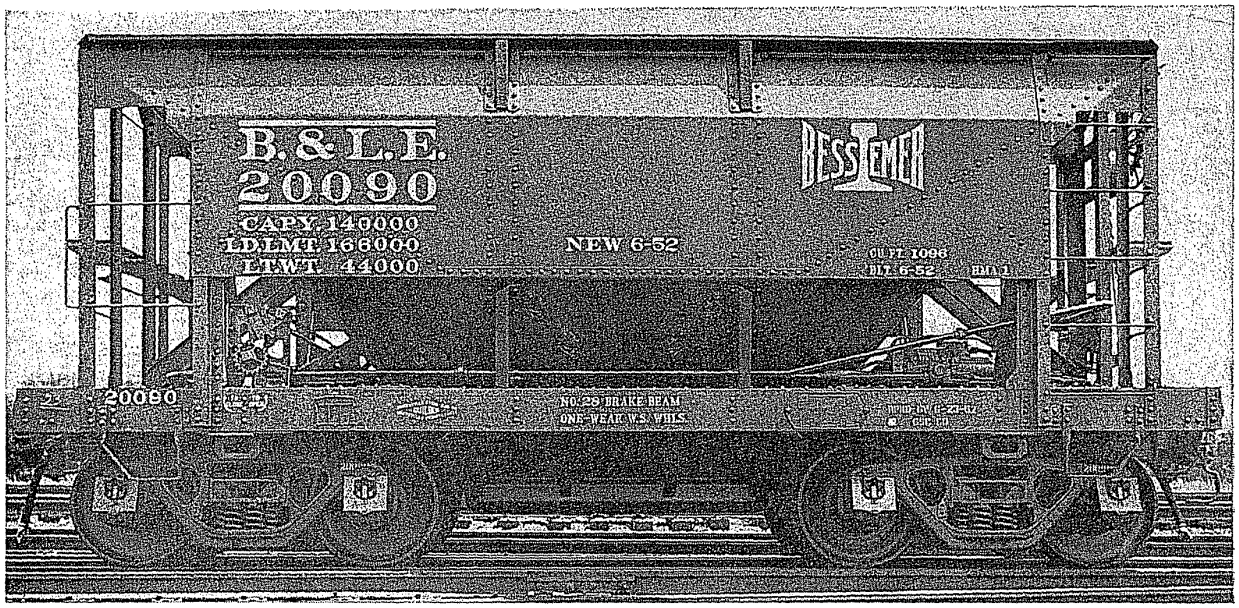


Duluth, Missabe & Iron Range 70-ton ore car. Builder, American Car and Foundry Div., ACF Industries, Inc.
Inside length 19 ft. 10 in.; width 10 ft. 5 in.; capacity 1,000 cu. ft.



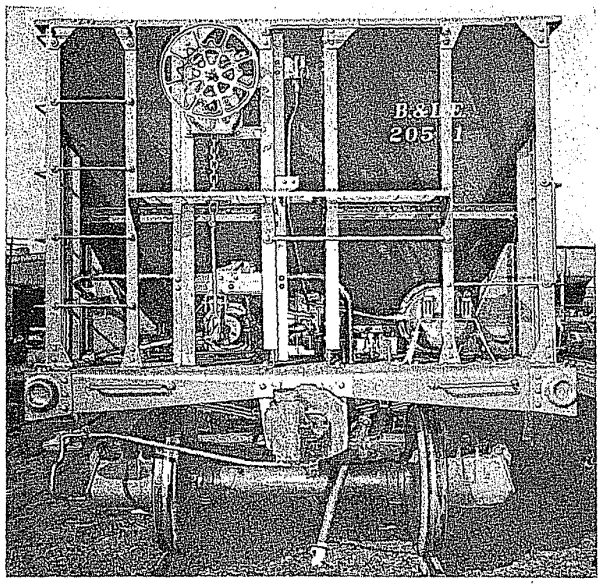
Southern Pacific 100-ton tight bottom gondola car for ore service. Builder, Southern Pacific Equipment Co.
Inside length 25 ft. 9⅜ in.; width 9 ft. 9⅜ in.; height 6 ft. 1½ in.; capacity 1,350 cu. ft.; light weight 53,700 lb.; load limit 197,300 lb.

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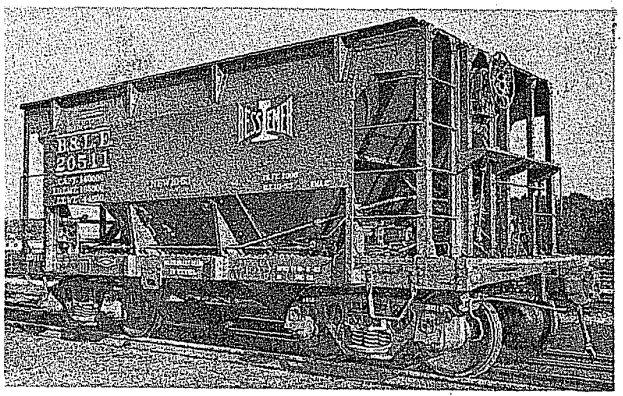


Bessemer & Lake Erie 70-ton hopper ore car, Road Class HMA1.

Length, inside at top	20 ft. 9 in.	Capacity	1,096 cu. ft.
Length over striking plate	24 ft. 8 in.	Capacity	140,000 lb.
Length, coupled	27 ft. 2 in.	Load limit	166,000 lb.
Width, outside	10 ft. 6 in.	Light weight	44,000 lb.
Height, from rail to top of car	10 ft. 8 in.	Slope, floor	50 deg.

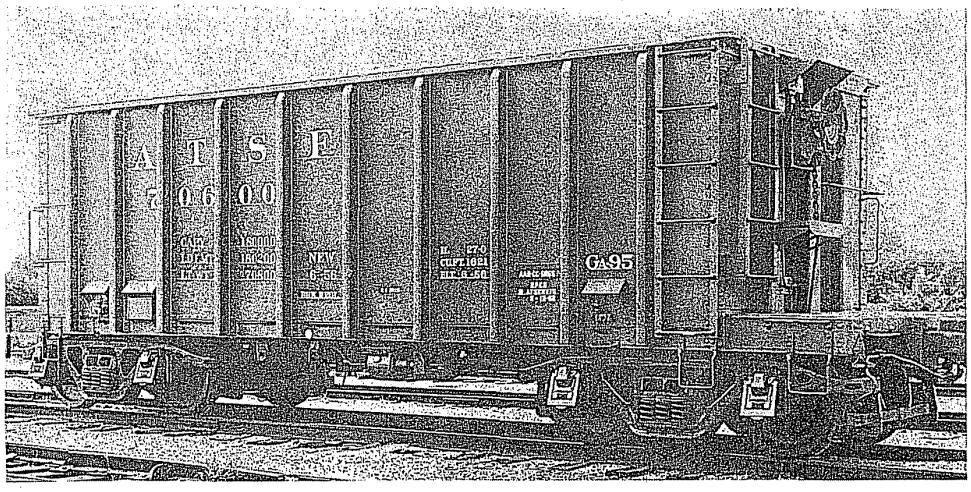


End and three-quarter view of B. & L. E. hopper ore car. Road Class HMA2.



Greenville Steel Car Co.

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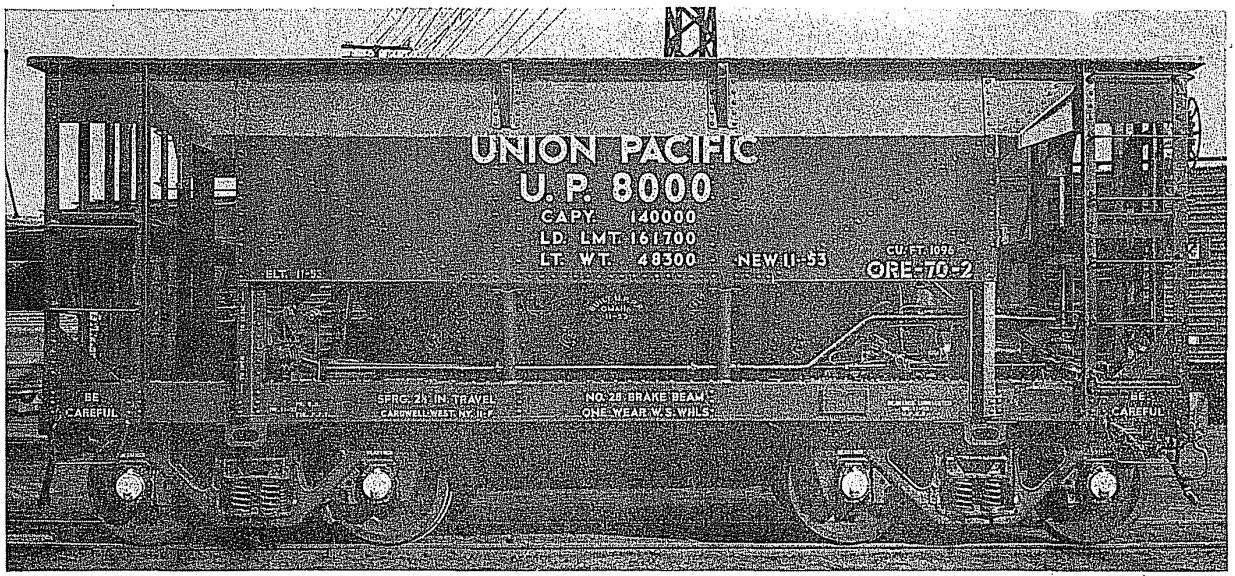
Atchison, Topeka & Santa Fe 90-ton solid bottom ore car with General Steel one piece cast steel underframe.

Inside length 27 ft. 0 in.; width 9 ft. 3 in.; height 6 ft. 6 in.; capacity 1,623 cu. ft.; light weight 70,800 lb.; load limit 180,200 lb.



Canadian National 82½-ton center dump hopper ore car. Builder, National Steel Car Corporation, Ltd.

Inside length 19 ft. 10 in.; width 10 ft. 5 in.; capacity 1,000 cu. ft.; light weight 43,000 lb.; load limit 167,000 lb.



Union Pacific 70-ton hopper ore car. Built in Company shops at Omaha, Neb.

Light weight 48,300 lb.; load limit 161,700 lb.; capacity 1,096 cu. ft.; inside length 20 ft. 9 in.; width 10 ft. 5 in.

FreightCar America, Ex. 1002
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1966
Car and Locomotive Cyclopedia
Of American Practice

Definitions and Illustrations of Railroad Cars and Locomotives and their Components built for Domestic and Export Service, and including Shop Practices and Electrical Fundamentals.

First Edition

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EDITOR
C. L. Combes
Editor, Railway Locomotives and Cars and Mechanical Department, Railway Age

MANAGING EDITOR
A. G. Oehler
Consulting Editor, Railway Locomotives and Cars

LOCOMOTIVE EDITOR
G. M. Davies
Mechanical Engineer—Locomotives, New York Central System (Retired)

CONSULTING EDITOR
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Managing Editor, Railway Locomotives and Cars

EDITORIAL ASSISTANT
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Section 1

Dictionary of Car and Locomotive Terms

Used in Railway Practice

SEE THE LEAD PAGES OF SECTIONS 3, 5, 6 AND 7 FOR THE CLASSIFICATION AND DESCRIPTION OF EACH TYPE OF CAR.

A

"A" End of Car. The end opposite that on which the hand brake is mounted. See "B" End of Car.

"A" Unit. A Diesel unit equipped with a cab and operating controls. Also called LEAD UNIT.

Accordion Hood. A term sometimes applied to the top transverse portion of a vestibule diaphragm. See DIAPHRAGM.

Air Brake. In its widest sense, the term "Air Brake" may include any system of braking in which the mechanism is actuated by the manipulation of air pressures exerted on different parts of the apparatus. A more restricted meaning of term is general in the United States and covers only brakes which employ air under pressures above atmospheric as distinguished from "Vacuum Brakes" which employ pressures below atmospheric. With train speeds of the order of 90 m. p. h. and above in passenger service, and 50 to 70 m. p. h. in freight service, the conditions under which the air brakes must function have become more exacting and the equipment correspondingly intricate. See Section 13 for details covering the latest American practices. For definitions of current air brakes schedules see AB BRAKE, AC BRAKE VALVE, AUTOMATIC AIR BRAKE, AUTOMATIC EMPTY-AND-LOAD BRAKE, ELECTRO-PNEUMATIC STRAIGHT AIR BRAKE, PC BRAKE EQUIPMENT, UC PASSENGER-CAR BRAKE and '26 BRAKE EQUIPMENT.

AB Brake. The current standard freight-car brake. The car equipment consists of the AB valve, a brake cylinder, auxiliary and emergency reservoirs combined in a single unit, a combined dust collector and cut-out cock, and a retaining valve. Its functions are high-speed serial action in service applications effective through a train of 150 cars, effective cylinder pressures throughout the train with light brake-pipe reductions, assured release, uniform recharge, emergency always available after application or release, controlled emergency which prevents severe shocks, and quicker and more positive release after emergency than with previous freight brake schedules. See Section 13

AB Brake Valve. The operating valve of the AB freight-car brake. It has three portions: service, emergency and pipe bracket. It charges, applies and releases the brakes.

A B D Brake Valve. A modification of the A B Valve effected by the substitution of diaphram—operated pistons, and O-ring spool valves in the service and emergency portions which cause its performance to be similar to that of the A C Valve. The change over also includes accelerated service release and an integral brake-cylinder release valve on the service portion. See Sec. 13

Adjusting Spring. A heavy spiral spring or nest of springs used for controlling the side motion of a two-wheel radial trailing truck. Also called centering spring.

Also used for moving four-wheeled trucks back to the central position when they have been displaced by passage over a curve.

Used to bring the coupler or drawbar back to central position after passing over a curve.

Used on a brake head to hold the brake shoe in its proper position. See BRAKE HEAD ADJUSTING SPRING.

Aftercooler. A radiator unit for cooling the compressed air of the air brake system. See COOLING COIL.

AC Brake Valve. A freight car brake operating valve which performs essentially the same functions as the AB brake valve and operates in entire harmony with it but provides a very rapid serial release action not provided by the AB valve. Simpler in design and lighter in weight.

Air Brake Hose. Armored or otherwise reinforced tubing which is attached to a nipple that screws into the angle cock at the end of the brake pipe. The other end of the hose is fitted with a coupling which engages with a similar coupling on the adjoining car. The complete arrangement forms a flexible air connection between the brake pipes of cars or locomotives. Manual, Sec. A.

Air Brake Hose Clamp. See HOSE CLAMP.

Air Brake Hose Coupling. A special type of standardized fitting which is attached to one end of an air brake hose in order to provide means for connection and disconnection, quickly and securely, of the hoses by which the air brake pipe and also signal pipe are carried from car to car. Manual Sec. E.

Air Brake Hose Coupling Gasket. A rubber-composition gasket which fits into the air brake hose coupling to seal the connection against air leakage. This gasket is of standard A. A. R. design and must meet standard specifications of the Association. Manual Sec. A and E.

Air Brake Hose Label. A label of red or white rubber vulcanized to the air-brake hose near one end. On the label is branded the initials or name of the railroad or other purchaser; the name of the manu-

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Elliptic Spring. A spring whose shape resembles an ellipse. Made of two sets of parallel steel plates, called leaves, of constantly decreasing length. Such springs are generally used for bolster springs for passenger cars.

The set of elliptic springs is the total amount of bend or compression of which the spring is capable. Elliptic springs in service are termed double or duplicate, triplets or triplicate, quadruple, quintuple, sextuple, etc., according to the number of springs used side by side and connected, so as to constitute practically one spring.

Emergency Application. The type of brake application made when a train must be stopped in the minimum distance possible for the equipment. It may be made from a Conductor's Valve or on a car, from a "Back-up Valve," or from the Engineer's Brake Valve on the locomotive or power car. An emergency application may also occur when a brake pipe is broken, or when air hoses between cars are disconnected with angle cocks open. In any event an emergency application is brought about by inexhausting of air pressure from the brake pipe.

Emergency Brake Valve. A valve for applying the train brakes in emergency which is placed at some convenient point in each passenger-train car. It is connected to the brake pipe by a branch pipe and operated by releasing brake-pipe air to the atmosphere. Long known as the Conductor's Valve.

Emergency Coupler Knuckle. A knuckle which is designed for use in case of damage to the knuckle of automatic couplers.

Emergency Coupling Device. A short shank coupler which can be chained in place if the standard coupler is pulled out or broken.

Emergency Head Back-Up Connection. A device for application to an automatic connector in order that a back-up cock, brake or signal hose may be coupled to it.

Emergency Reservoir. A part of the car equipment of the AB freight brake system and the D-22-P passenger brake system to provide quick recharge, graduated release and high emergency cylinder pressure. It supplements the supply from the auxiliary reservoir.

Emergency Tool Box. A container carrying a hammer, axe, chisel, bar and other tools to be used in case of a wreck.

Empty and Load Brake Equipment (Freight). A double-capacity brake equipment used on cars which move empty or fully loaded. The changeover may be manual or automatic.

Empty-and-Load Valve. An operating valve for a double-capacity brake used on cars that operate empty or fully loaded.

End Belt Rail. See BELT RAIL.

End Brace. See BRACE.

End Door. A door in the end of a car.

In some box cars this door, when used, is small and generally about half way up to the roof. It is used for loading and unloading long material, which cannot be handled through the side door. Sometimes called lumber door.

On some automobile cars one end of the car is arranged in the form of a double swing door.

The term is used in connection with passenger cars to differentiate from the vestibule side door.

End Frame. The frame which forms the end of a car body. It includes the posts, braces, belt rail and end plate.

End Loading. See CIRCUS LOADING.

End Panel. A panel at the end and on the outside of a passenger equipment car below the window.

End Plate. A member across the end and connecting the tops of the end posts of a car body and fastened at the ends to the two side plates. It is usually made of the proper form to serve as an end carline.

End Play (Axle). The movement, or space left for movement between journals. (Truck bolster.) Usually called lateral motion.

End Post. The vertical members in the end body framing between the corner posts.

(Hopper Car.) A vertical support for the overhang of the hopper floor, resting on the end sill.

End Rail. See WAINSCOT RAILS.

End Sheet. A plate used in closing the end of a steel car.

End Sill. The transverse member of the underframe of a car, extending across the ends of all the longitudinal sills. In steel underframe cars a rolled or cast section, or a pressed plate. In passenger cars the end sill comes directly under the end door. The platform, with its various parts, may be a separate construction or an integral part of the complete end construction.

End Sill Brackets (Steel-Frame Cars). Angle plates used to connect the longitudinal sills and the end sill. In bridge building such plates are termed brackets. When of triangular section they are termed gussets.

End Sill Diagonal Brace. A horizontal brace extending from the end sill diagonally back to or beyond the bolster.

End Sill Plate. A plate extending the full length and width of a built-up end sill, and attached to the other members.

End Slope. The sloping floor from the end of a hopper car to the hopper door. See HOPPER SLOPE SHEET.

End Top Angle. On open-top cars the end sheets are usually reinforced by this member which corresponds to the end plate on closed cars.

End Train-Pipe Valve (Steam Heating). A valve in the train steam pipe at the end of the car by which the entire car may be cut out. Usually operated by an extension handle extending up to the platform or out to the side of the car.

End Ventilator. An aperture for the admission or escape of air at the end of a car. See VENTILATOR.

End Window Panel. A panel at the end and on the outside of a passenger car alongside the window, in distinction from the end panel proper, which is below the window. See PANEL.

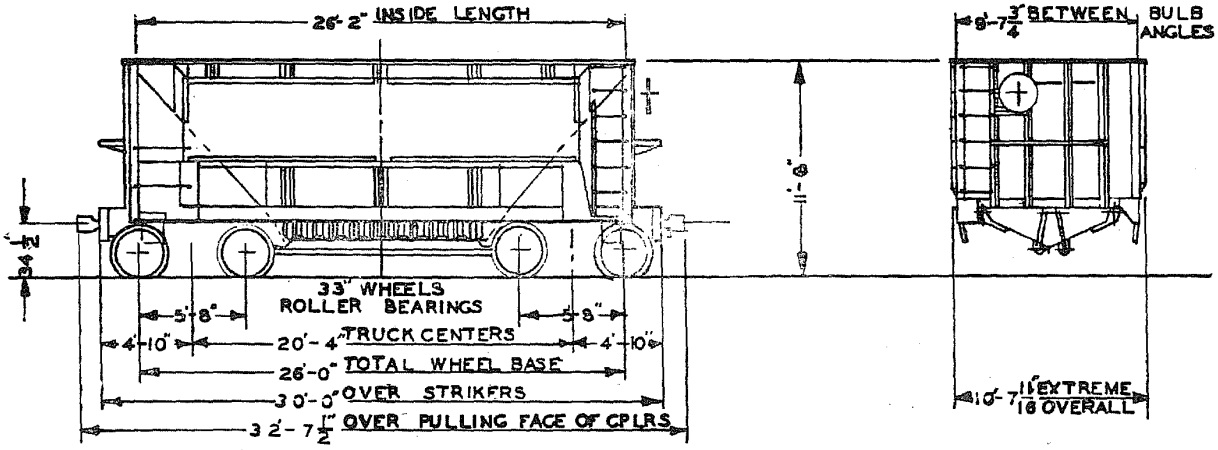
Engine. A mechanism for converting the energy in steam, air or other gas under pressure into mechanical energy in the form of motion. Usually restricted to reciprocating engines having a cylinder, reciprocating piston and means for causing the gas under pressure to expand alternately on one or both sides of the piston and move it back and forth in the cylinder. The term includes also the means of transforming the reciprocating motion of the piston into rotary motion, consisting usually of a connecting rod and crank. Frequently used as meaning the entire locomotive. See also INTERNAL COMBUSTION ENGINE.

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Canadian National 90-ton ore car, four wheels 6½-in. x 12-in trucks anti-friction-type bearing standard gauge. Built by Marine Industries Limited.

Inside length 36 ft. 10 in.; width 10 ft. 5 in.; height 7 ft. 0 in.; capacity 1,600 cu. ft.; light weight 51,400 lb.

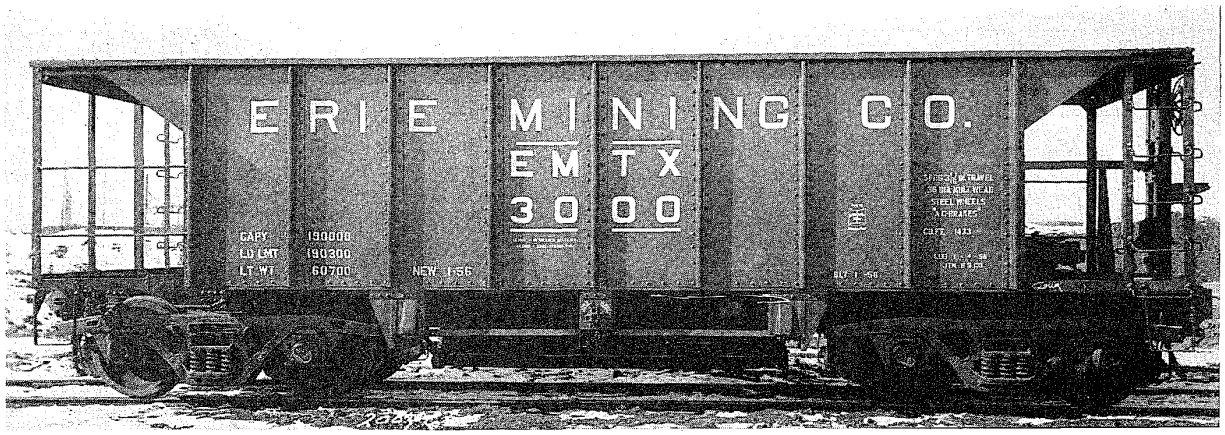




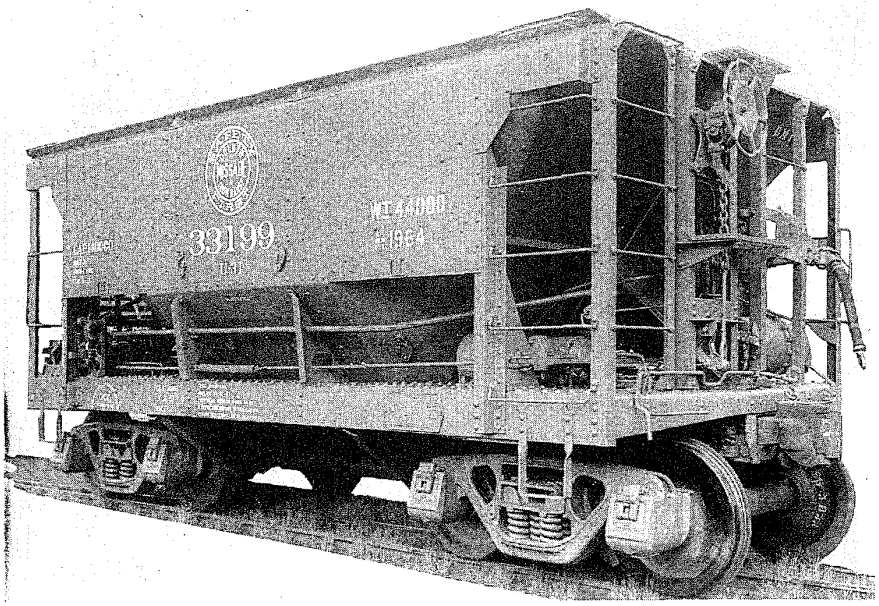
Union Pacific 90-ton ore car. Built by the railroad.

Inside length 26 ft. 2 in.; width 10 ft. 5 in.; capacity 1,580 cu. ft.; light weight 58,800 lb.; load limit 204,200 lb., capacity 1,580 cu. ft.; light weight 58,800 lb.; load limit 204,200 lb.

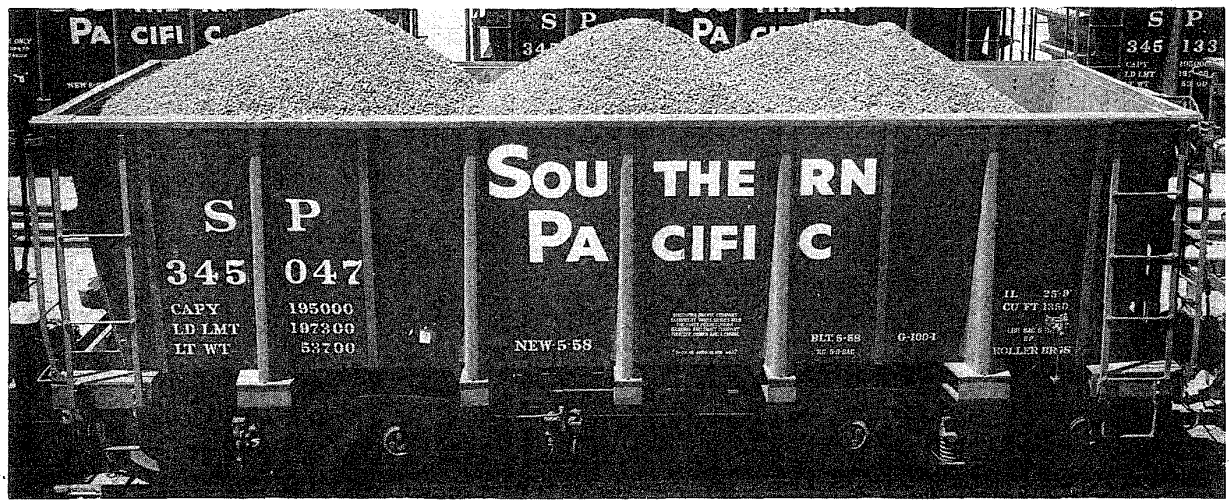
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Erie Mining Co. 95-ton ore car. Builder, Bethlehem Steel Co.
Inside length 29 ft. 7 in.; width 9 ft. 10 in.; capacity 1,433 cu. ft.; light weight 60,700 lb.; load limit 190,300 lb.

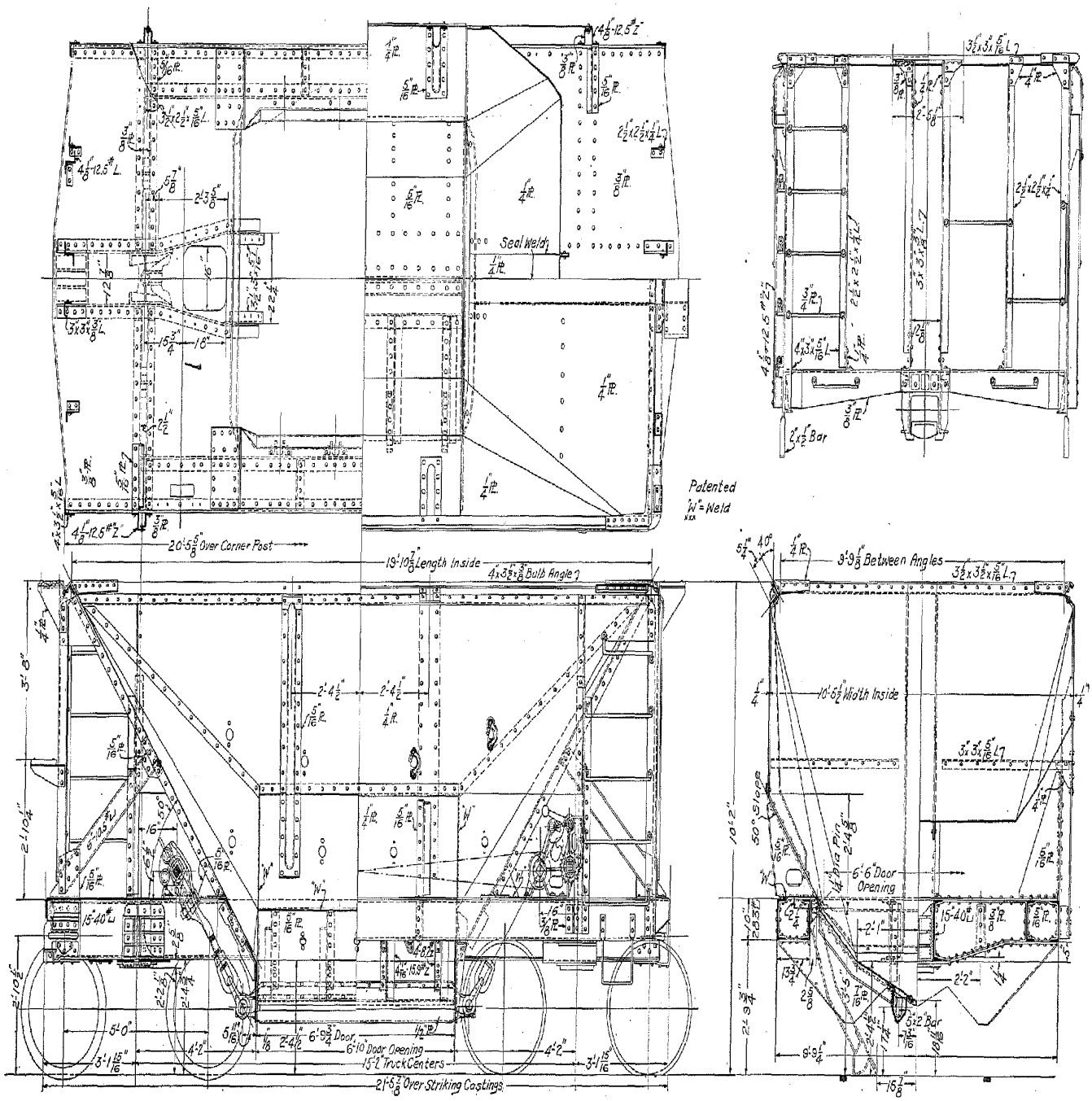


Duluth, Missabe & Iron Range 70-ton ore car. Builder, American Car and Foundry Div., ACF Industries, Inc.
Inside length 19 ft. 10⅞ in.; width 10 ft. 5 in.; capacity 1,000 cu. ft.



Southern Pacific 100-ton tight bottom gondola car for ore service. Builder, Southern Pacific Equipment Co.
Inside length 25 ft. 9⅜ in.; width 9 ft. 9⅛ in.; height 6 ft. 1½ in.; capacity 1,350 cu. ft.; light weight 53,700 lb.; load limit 197,300 lb.

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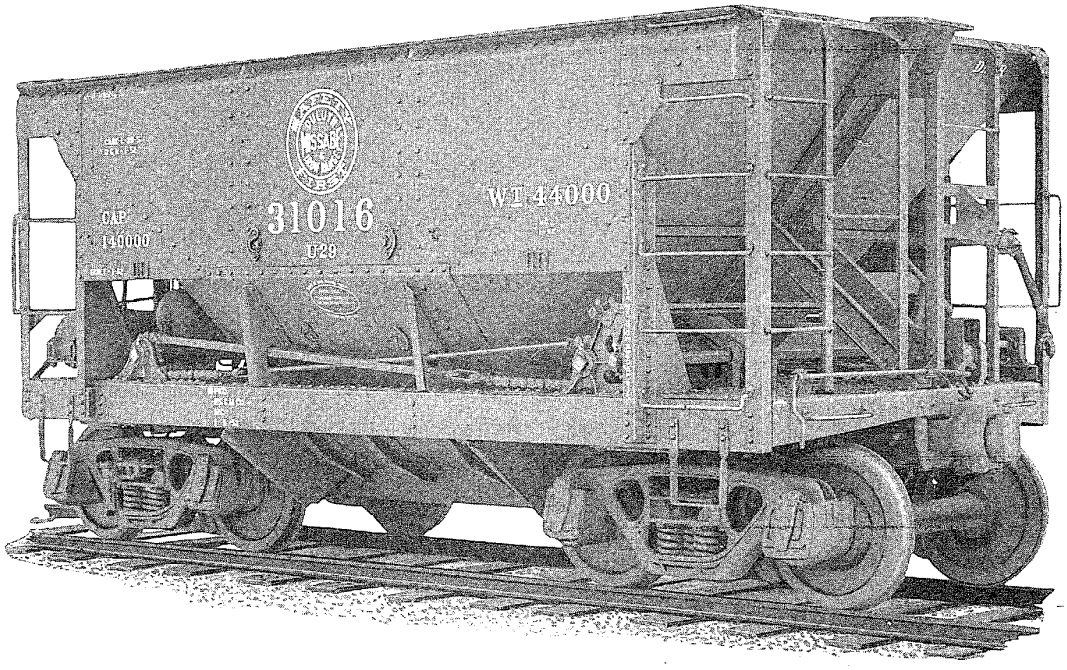
Enterprise equipped hopper iron ore cars, center discharge.

Enterprise Railway Equipment Company

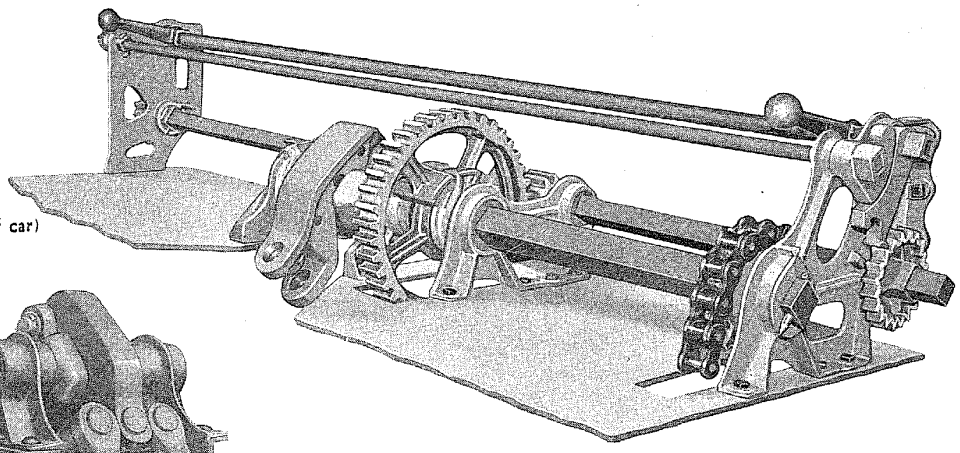
(See also opposite page)

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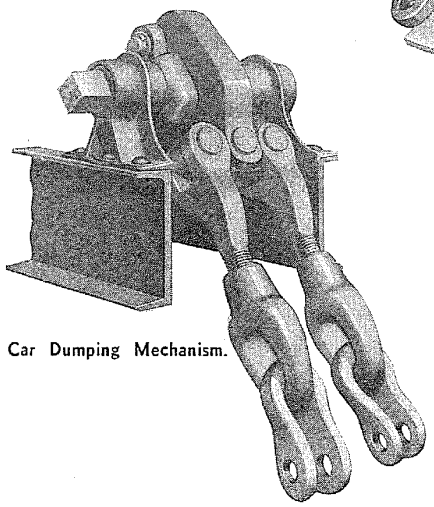
Enterprise Door Operating Mechanism for Ore Cars



Center Discharge Ore Car.



Enterprise Door Latch and Operating Mechanism (Operative from either side of car)



Enterprise Ore Car Dumping Mechanism.

THE 70-ton Hopper Ore Car shown above illustrates the center discharge car commonly used in iron ore service. Steep floors, rounded corners and large door openings insure quick and free discharge of the load. The door opening is closed by a pair of longitudinally hinged doors which are controlled by the Enterprise Door Mechanism, which is operative from either side of the car and securely locks the doors when in closed position. For illustration see page 194.

Blueprints and information on Enterprise side discharge ore car mechanisms are also available.

ENTERPRISE RAILWAY EQUIPMENT COMPANY

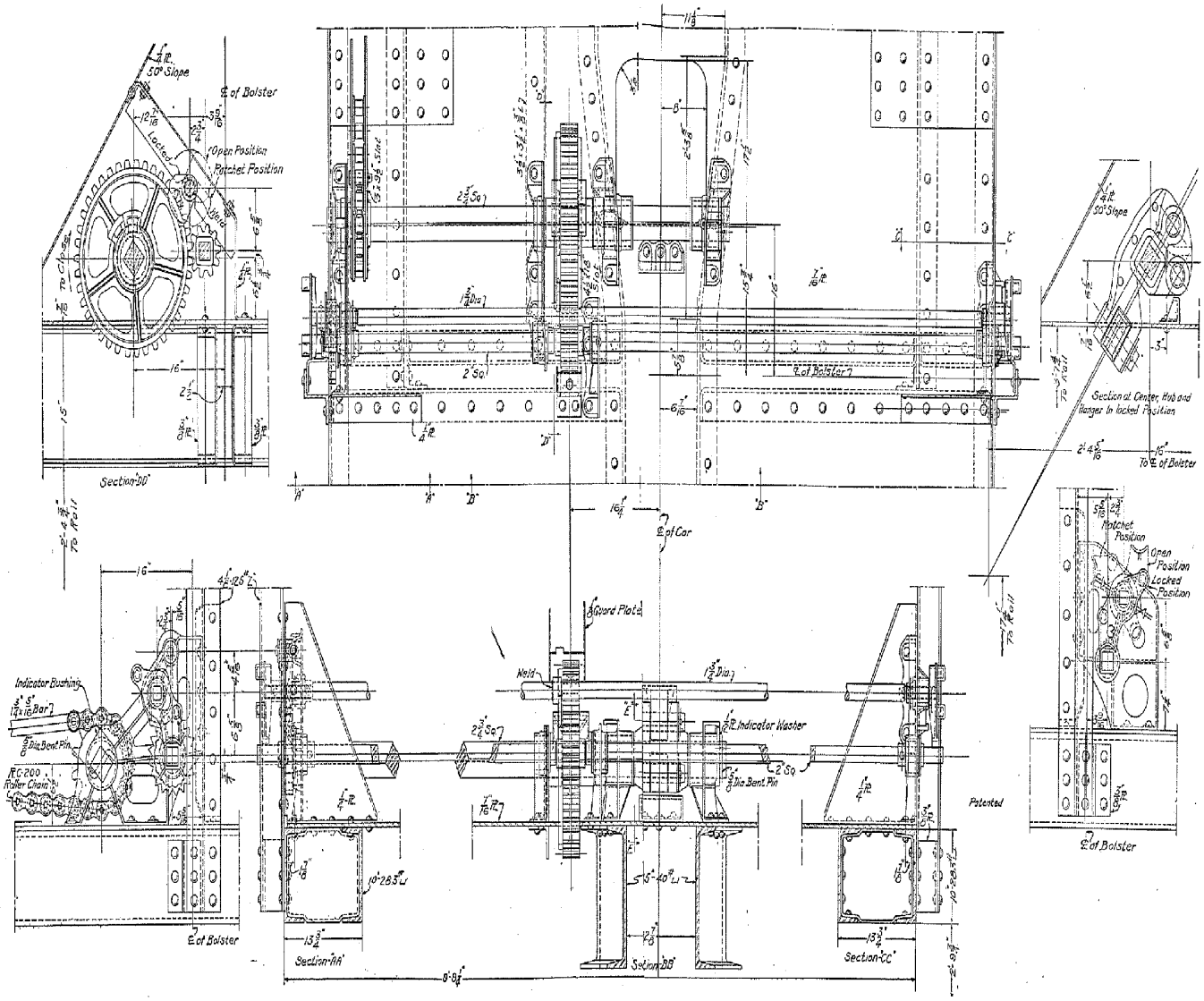
Headquarters: 8754 S. Dobson Avenue / Chicago, Illinois 60619, U.S.A. / Area Code 312, Phone 221-4800

Office of International Operations: 1212 Pennsylvania Building / 425 Thirteenth St., N.W. / Washington, D.C., 20004, U.S.A. / Cable: Enterco Washington, D.C., TWX 710-822-9362

Products and Branch Offices Are Listed in the Classified Indexes

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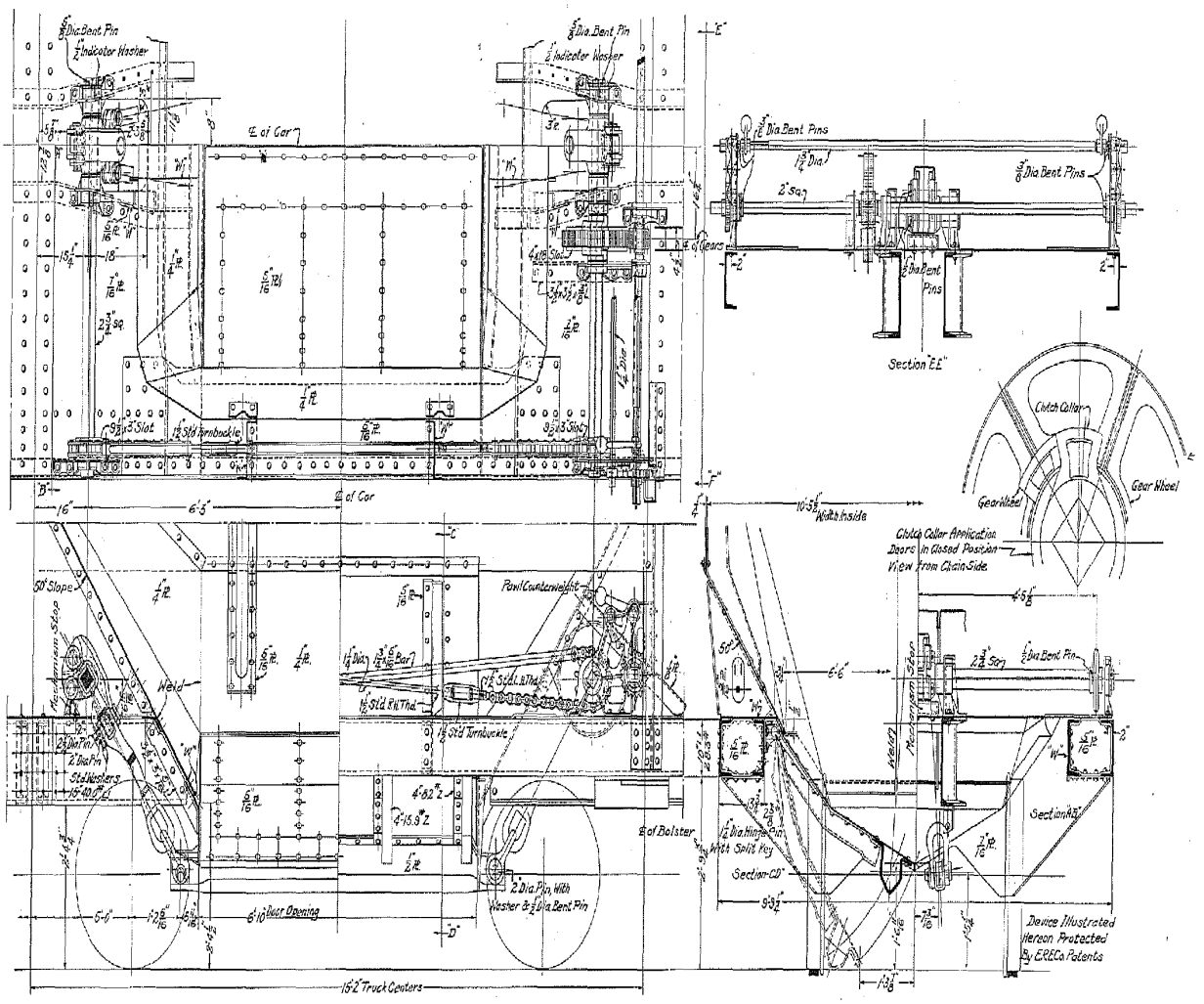


Safety Door Operating Mechanism for ore car.

Enterprise Railway Equipment Company.

(See also Pages 194, 195 and 197)

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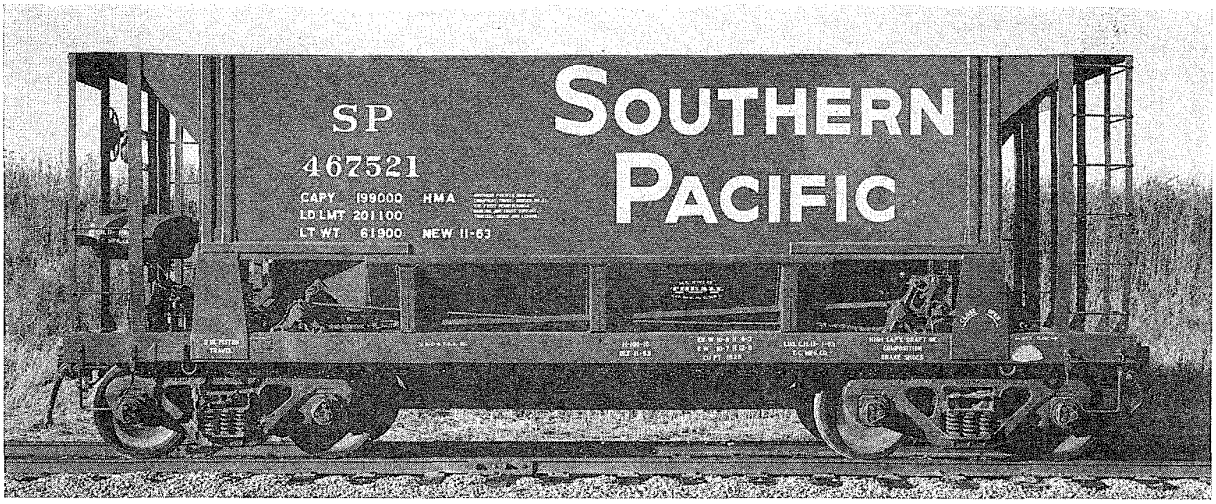


Standard Door Operating Mechanism for center discharge ore car.

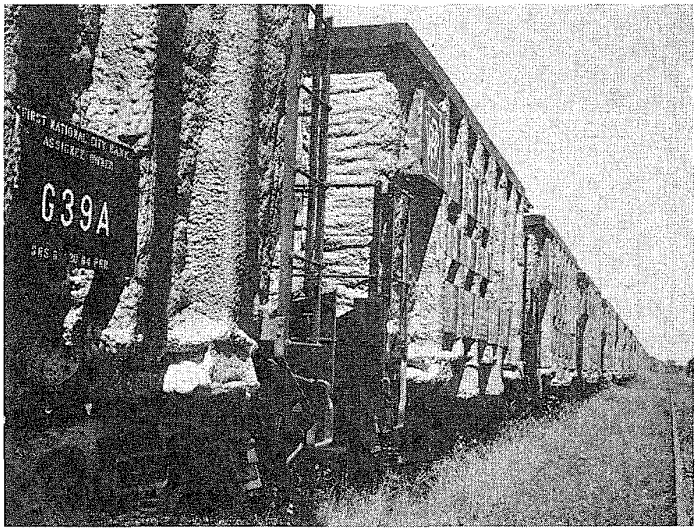
Enterprise Railway Equipment Company

(See also Pages 194, 195 and 196)

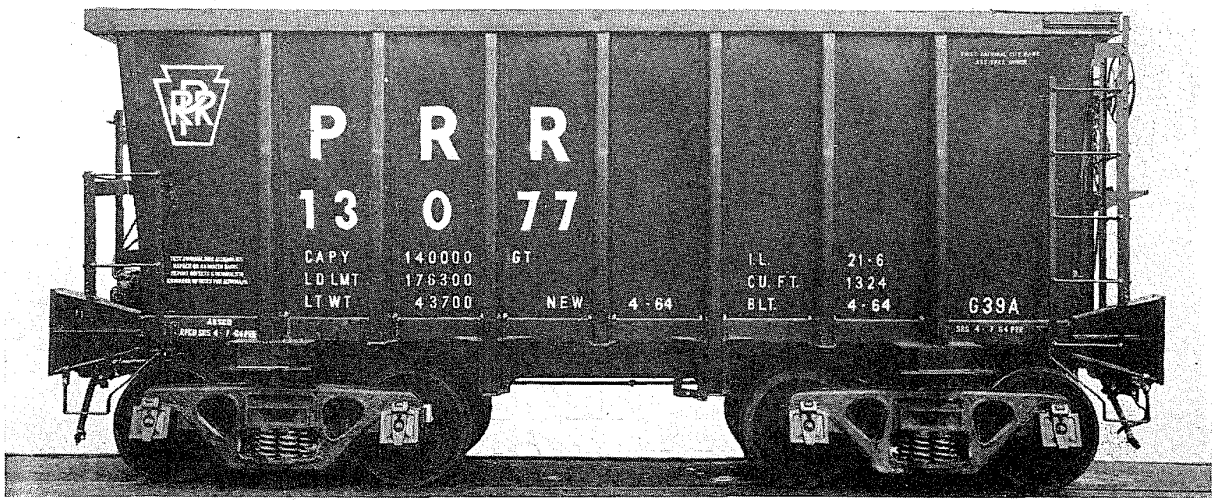
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Southern Pacific 100-ton 27-ft. 6-in. drop bottom ore car specially designed for handling copper concentrate. Car is equipped for pneumatic door operation. Built by Thrall Car Mfg. Company.
Inside length 27 ft. 6 in.; width 10 ft. 5 in.; capacity 1,825 cu. ft.; light weight 61,900 lb.; load limit 201,100 lb.



Pennsylvania Railroad 70-ton foam insulated ore jenny. Built by the railroad. This is the same car as shown below except for the foam insulation which adds about 500 lb to the car's light weight.

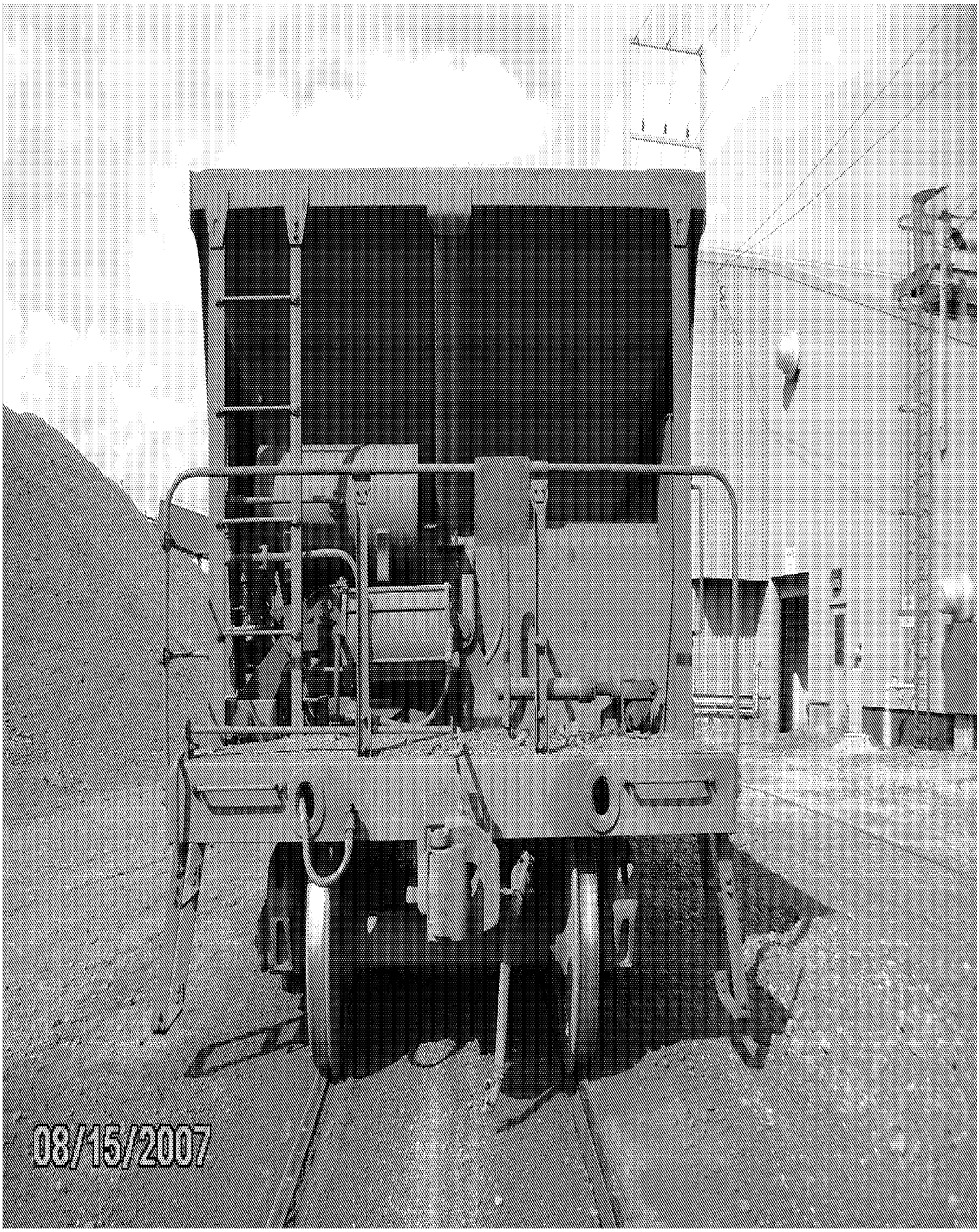


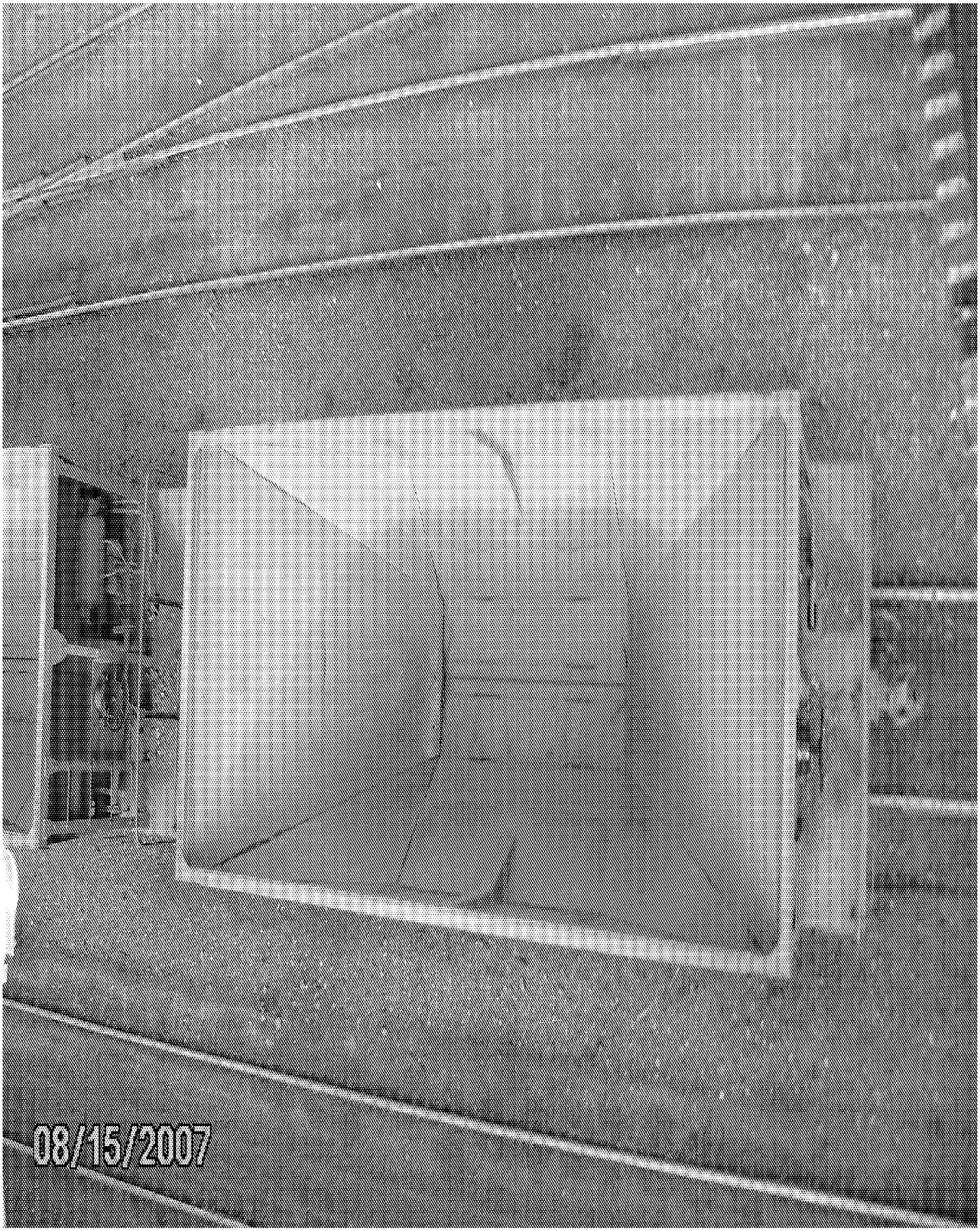
Pennsylvania Railroad 70-ton 22 ft. ore car with 6-in. slope. Built by the Railroad in their Samuel Rea Shop.
Inside length 22 ft. at top with 6 in. slope; width 9 ft.; height 7 ft. 2 in.; capacity 1,324 cu. ft.; light weight 43,700 lb.; load limit 176,300 lb.

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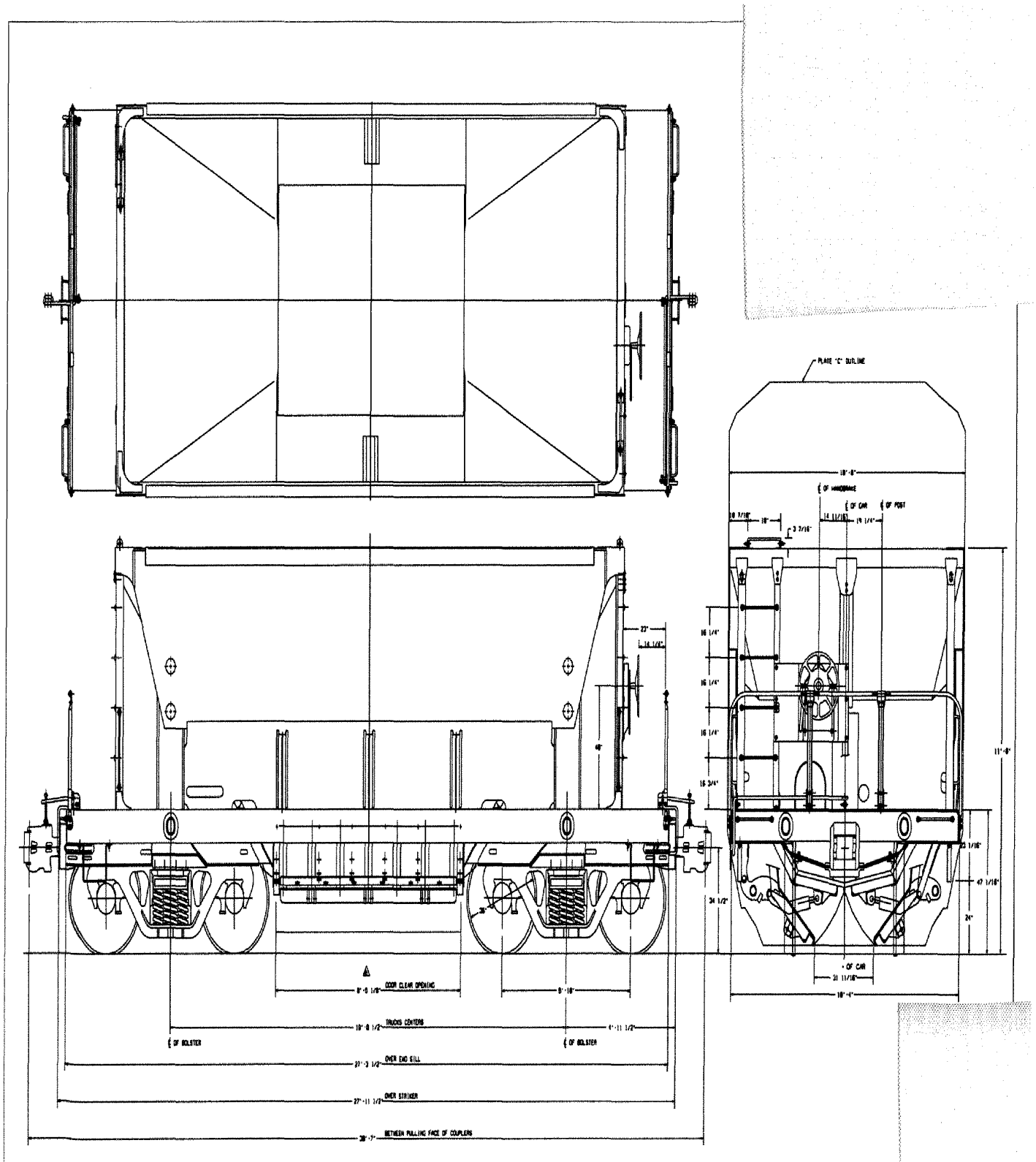

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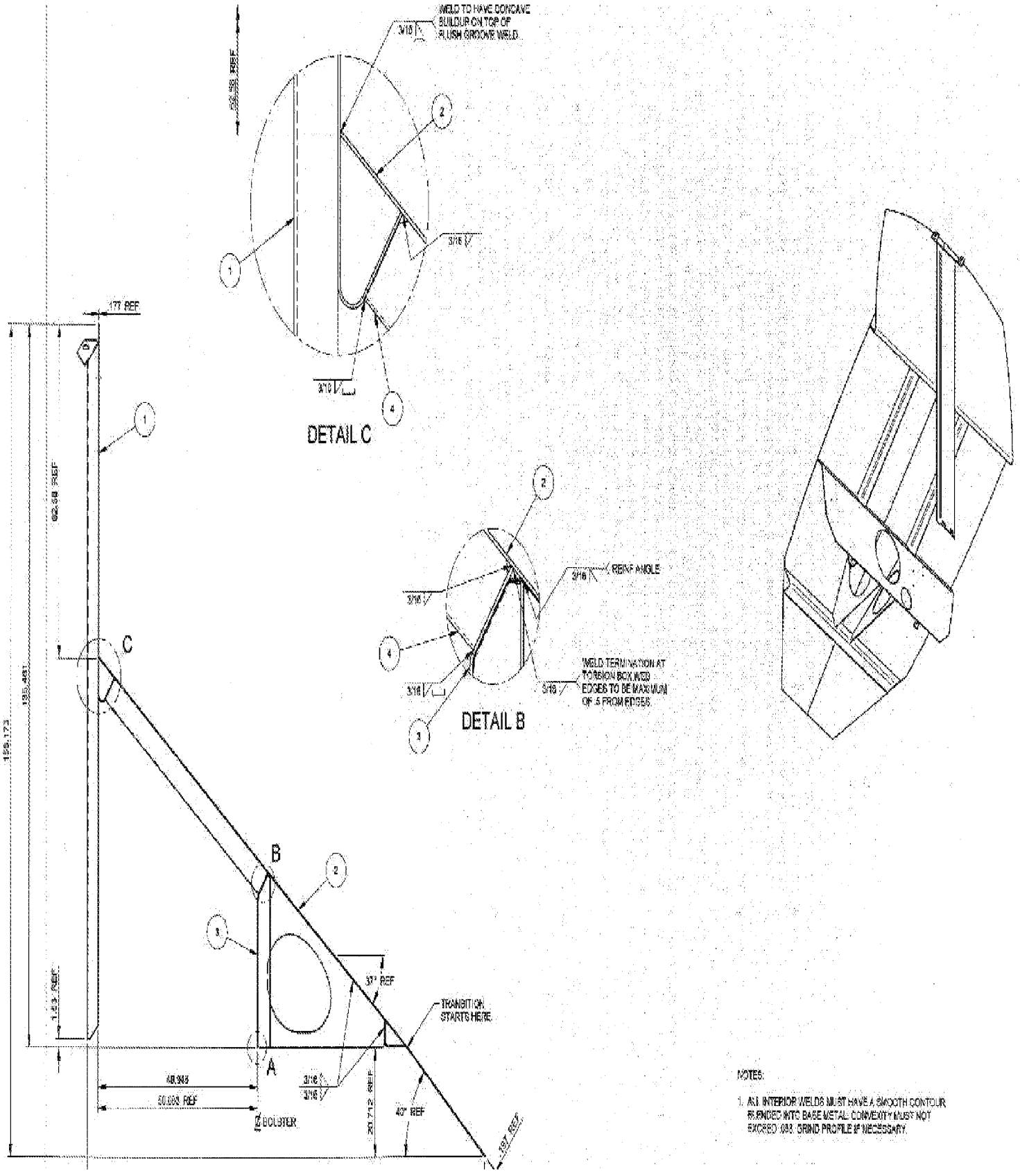

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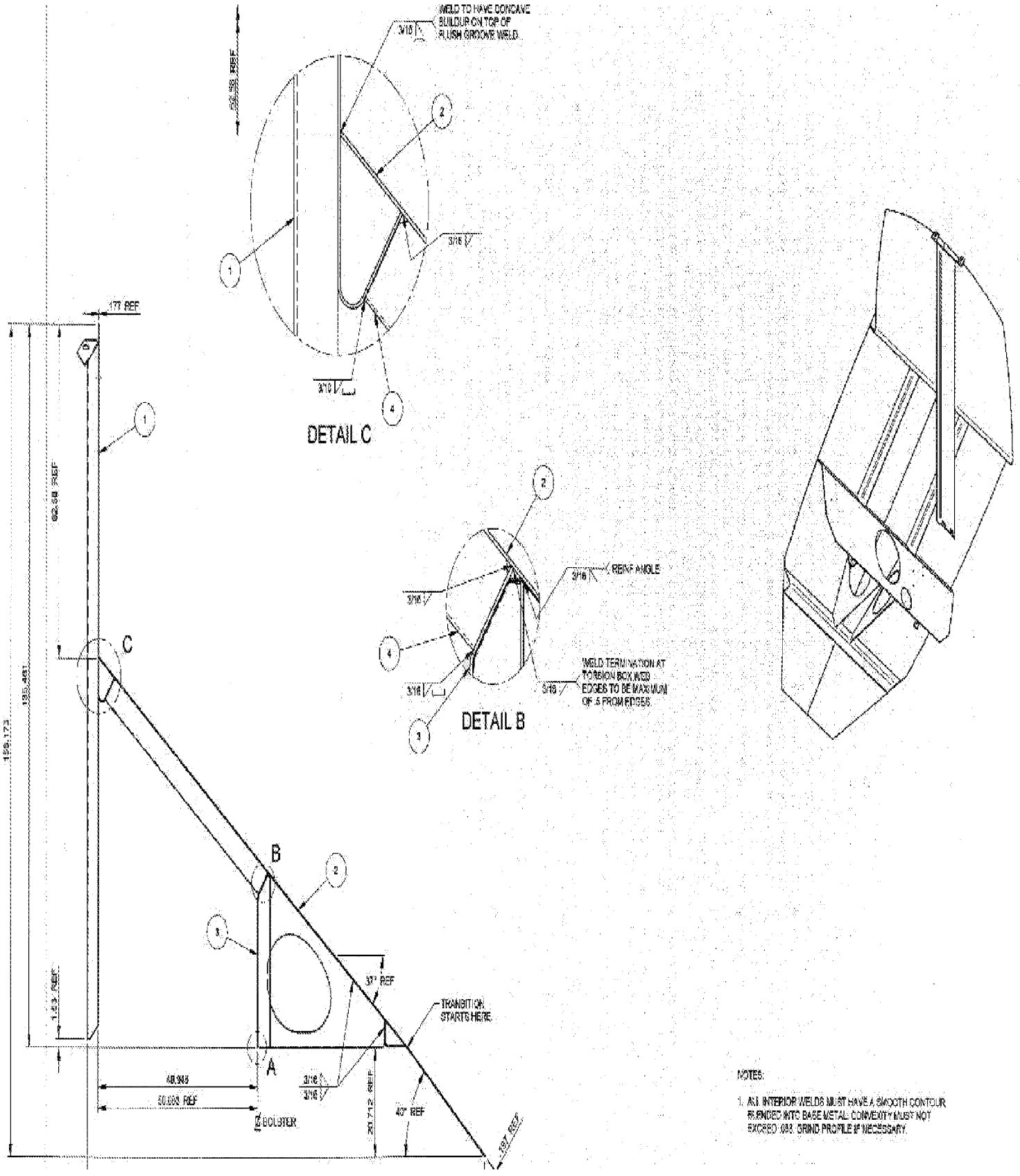


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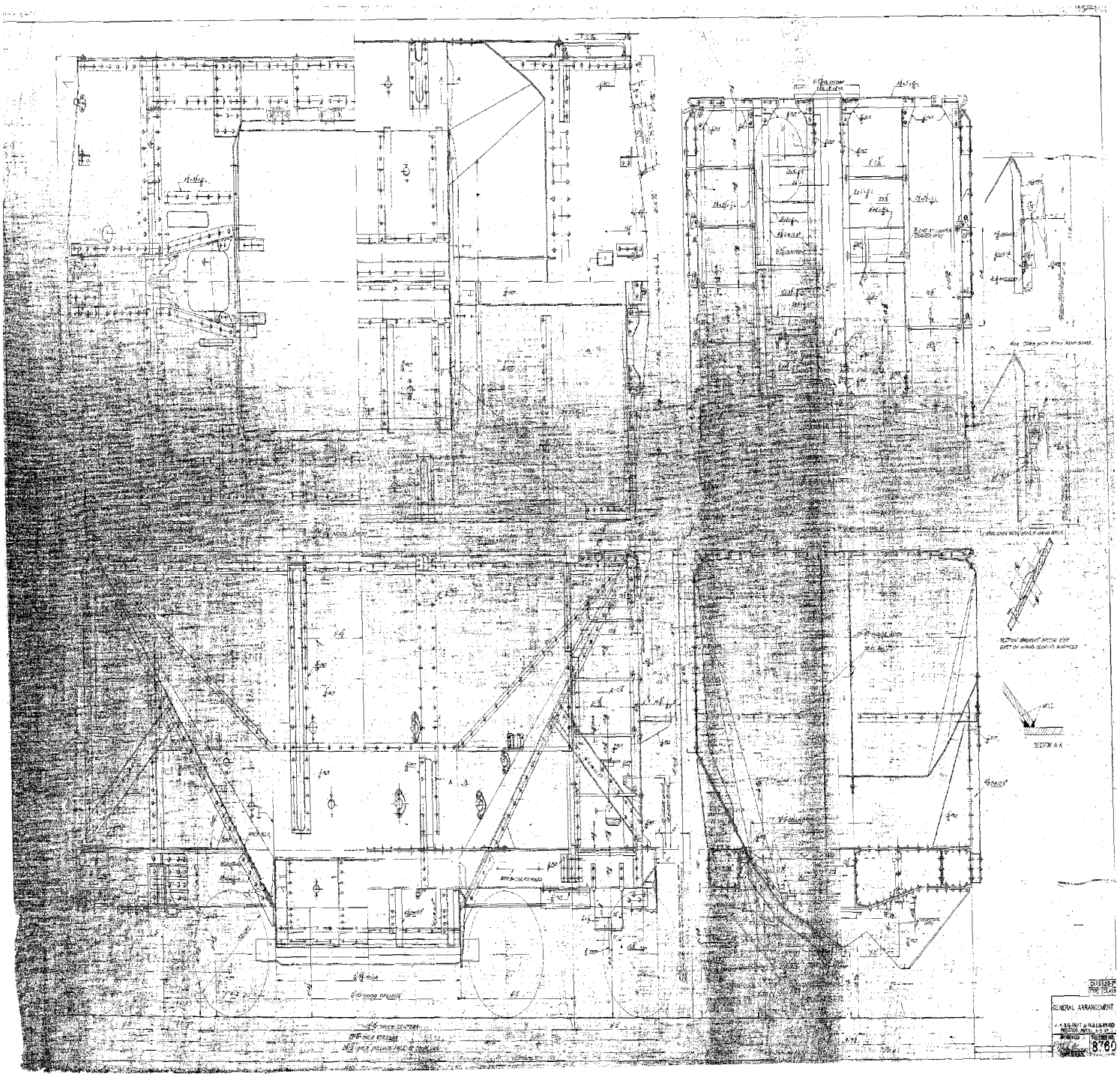
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GENERAL ARRANGEMENT
8760

Electronic Acknowledgement Receipt	
EFS ID:	11281322
Application Number:	12559065
International Application Number:	
Confirmation Number:	7747
Title of Invention:	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR
First Named Inventor/Applicant Name:	James W. Forbes
Customer Number:	21324
Filer:	Michael Howard Minns
Filer Authorized By:	
Attorney Docket Number:	200405.00128
Receipt Date:	28-OCT-2011
Filing Date:	14-SEP-2009
Time Stamp:	13:55:13
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	IDS.pdf	614914 bd64d49eb7415bc7939571095e85e2ea8f21696f	no	10

Warnings:
Information:

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2	Foreign Reference	CA1082524.pdf	732334 226847b477bd022ac8b730881470e023e518e4a5	no	19
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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IPR Petition - USP 8,166,892

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Patent Application of: Confirmation No.: 7747

Title:	Railroad Gondola Car Structure and Mechanism Therefor
Inventor:	James W. Forbes et al.
Assignee:	National Steel Car Ltd.
Filed:	September 14, 2009
Serial No:	12/559,065
Art Unit:	3617
Examiner:	Smith, Jason C.,

To: Mail Stop Amendment
The Honorable Commissioner of Patents and Trademarks
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO REQUIREMENT FOR RESTRICTION

Sir:

This letter is responsive to the Official Action dated October 18, 2011, and is timely filed to meet the one month due date for response of November 18, 2011. Please amend the above-identified application as follows:

Amendments to the Specification – None at this time.

Amendments to the Claims begin on page 2 of this paper.

Amendments to the Drawings – None at this time.

Remarks begin on page 7 of this paper.

Please charge any additional fees or fee deficiency required by this paper to Deposit Account 15-0450.

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Amendments to the Claims

The following listing of claims supersedes all previous listings of claims in this matter.

1. – 19. (Cancelled).

20. A rail road hopper car comprising:

a hopper carried between a pair of trucks, said hopper having first and second upstanding sidewalls running lengthwise therealong;

said hopper having a lower discharge and convergent slope sheets giving onto said discharge;

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;

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;

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;

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;

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;

said first sidewall having a continuous section between said first and second regions thereof; and

said sidewall stiffener having web continuity between said first and second portions thereof.

21. – 25. (Cancelled)

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26. (New) 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;

said hopper having first and second upstanding sidewalls running lengthwise therealong;

said hopper having a lower discharge and convergent slope sheets that slope downward toward said discharge;

said discharge having a door movable between a closed position and an open position to govern egress of lading from said hopper;

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;

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;

said draft sill having a striker longitudinally outboard of said first truck center;

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;

said upper, longitudinally outboard end of said first end slope sheet being reinforced by a first cross-wise extending beam;

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

said first end slope sheet overhanging said shear plate;

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;

said first end section being free of longitudinally oriented elephant ears extending between said draft sill and said first end slope sheet;

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;

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;

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;

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;

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;

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;

said first sidewall having a continuous section between said first and second regions thereof; and

said sidewall stiffener having web continuity between said first and second portions thereof.

27. (New) The rail road hopper car of claim 26 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.

28. (New) The rail road hopper car of claim 26 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.

29. (New) The rail road hopper car of claim 26 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;

said hopper includes first and second sloped side sheets; and

said first sloped side sheet meets said first sidewall at said transition portion.

30. (New) The rail road hopper car of claim 28 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 ¼ to 2/3 L.

31. (New) The rail road hopper car of claim 29 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 ¼ to 2/3 L above said first side sill.

32. (New) The rail road hopper car of claim 26 wherein said hopper has a cross-wise extending outboard end top chord; 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.

33. (New) The rail road hopper car of claim 32 wherein:

said hopper has an end wall extending downward of said end top chord;

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.

34. (New) The rail road hopper car of claim 32 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.

35. (New) The rail road hopper car of claim 34 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.

36. (New) The rail road hopper car of claim 26 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.

37. (New) The rail road hopper car of claim 36 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.

38. (New) The rail road hopper car of claim 26 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.

39. (New) The rail road hopper car of claim 26 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.

Remarks

1. Status of the Case

Claims 1 – 25 were pending in this case.

By the Office Action of October 18, 2011 the Examiner requires restriction as between two groups of claims, namely:

Group A – Claims 1 – 19; and
Group B – Claims 20 – 25.

2. Submission of IDS Materials

The Applicant has submitted a fairly extensive listing of Information Disclosure Statement materials in this matter. There materials are intended to include:

(a) non-patent admitted prior art, including photographs and drawings of cars built and operated in public before the date of the present invention; and
(b) patent references relating to hopper car cars and gondolas.

The Applicant also draws the Examiner's attention to the following co-pending cases:

1) USSN 13/195,664 filed May 11, 2011
2) USSN 12/694,896 filed January 27, 2010
3) USSN 12/781,741 filed May 14, 2010; and
4) USSN 12/816,660 filed June 16, 2010

The Applicant draws the Examiner's attention to the non-patent references. The original search in this matter may not necessarily have included comparable materials.

The reproduction quality of DM & IR Drawings 8760 of April 8, 1950 is very poor. However, when seen in full scale it shows a very short draft sill dimensions. It also indicates rivet-installed rear draft gear having trailing ends extending longitudinally inboard of the truck center. This car appears to be substantially the same design as the DM & IR car shown at page 283 of the *1943 Cyclopedia*.

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3. Election and Amendments to the Claims

The Applicant Elects to prosecute the claims of Group B, namely claims 20 – 25. Of those claims, the Applicant has cancelled claims 21 – 25.

Claims 1 – 19 have been cancelled without prejudice to the filing of a divisional case to pursue the subject matter of those claims.

New claims 26 – 39 have been introduced. Independent claim 26 is incorporates substantially similar subject matter to that of claim 20, and, to the extent that the subject matter of claim 20 is searchable within class 105, subclass 247, it is thought that independent claim 26 is also searchable within class 105, subclass 247.

4. Concluding Commentary

The Applicant respectfully submits that all of the claims pending in the case are in a condition for allowance. The Applicant therefore requests early and favorable disposition of this matter.

Yours very truly,
Hahn Loeser & Parks LLP

/Michael H. Minns/
Michael H. Minns
Registration No. 31,985

Date: November 18, 2011
One GOJO Plaza
Suite 300
Akron, OH 44311
330-864-5550

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Electronic Acknowledgement Receipt	
EFS ID:	11444515
Application Number:	12559065
International Application Number:	
Confirmation Number:	7747
Title of Invention:	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR
First Named Inventor/Applicant Name:	James W. Forbes
Customer Number:	21324
Filer:	Michael Howard Minns
Filer Authorized By:	
Attorney Docket Number:	200405.00128
Receipt Date:	18-NOV-2011
Filing Date:	14-SEP-2009
Time Stamp:	17:05:40
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Election.pdf	103782 670206f3231db96740aae7989d0cc1b646e38781	yes	8

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	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Response to Election / Restriction Filed	1	1
	Claims	2	6
	Applicant Arguments/Remarks Made in an Amendment	7	8
Warnings:			
Information:			
	Total Files Size (in bytes):	103782	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

PTO/SB/06 (07-06)
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PATENT APPLICATION FEE DETERMINATION RECORD
Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
12/559,065	09/14/2009	

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY ☐ RATE ($)	SMALL ENTITY ☐ FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 11/18/2011	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 15	Minus	** 20	= 0	X $ =		OR	X $60=	0
Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $ =		OR	X $250=	0
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)	OR	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/STEFANIE BRYCE/

This collection of information is required by 37 CFR 1.16. 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 12 minutes to complete, including gathering, preparing, and submitting the completed application 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.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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NOTICE OF ALLOWANCE AND FEE(S) DUE

21324 7590 01/03/2012

HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076

EXAMINER	
SMITH, JASON C	
ART UNIT	PAPER NUMBER
3617	

DATE MAILED: 01/03/2012

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/559,065	09/14/2009	James W. Forbes	200405.00128	7747

TITLE OF INVENTION: RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1740	$0	$0	$1740	04/03/2012

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

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Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
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HAHN LOESER & PARKS, LLP
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AKRON, OH 44311-1076

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

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I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/559,065	09/14/2009	James W. Forbes	200405.00128	7747

TITLE OF INVENTION: RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1740	$0	$0	$1740	04/03/2012

EXAMINER	ART UNIT	CLASS-SUBCLASS
SMITH, JASON C	3617	105-406100

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:

❑ Issue Fee

❑ Publication Fee (No small entity discount permitted)

❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): (**Please first reapply any previously paid issue fee shown above**)

❑ A check is enclosed.

❑ Payment by credit card. Form PTO-2038 is attached.

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

❑ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

❑ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. 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 12 minutes to complete, including gathering, preparing, and submitting the completed application 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, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/559,065	09/14/2009	James W. Forbes	200405.00128	7747

21324 7590 01/03/2012

HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076

EXAMINER	
SMITH, JASON C	
ART UNIT	**PAPER NUMBER**
3617	

DATE MAILED: 01/03/2012

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 338 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 338 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

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 disclosure of these records is required by the Freedom of Information Act.
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 inspection 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.

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Notice of Allowability	Application No.	Applicant(s)	
	12/559,065	FORBES ET AL.	
	Examiner	Art Unit	
	JASON C. SMITH	3617	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *11/18/2011*.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are *20 and 26-39*.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 10/28/2011
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/JASON C SMITH/
Examiner, Art Unit 3617

FreightCar America, Ex. 1002
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REASONS FOR ALLOWANCE

1. 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.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON C. SMITH whose telephone number is (571)270-5225. The examiner can normally be reached on M- F, 7:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Morano can be reached on (571) 272-6684. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JASON C SMITH/
Examiner, Art Unit 3617

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Notice of References Cited	Application/Control No. 12/559,065	Applicant(s)/Patent Under Reexamination FORBES ET AL.	
	Examiner JASON C. SMITH	Art Unit 3617	Page 1 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-673,103 A	04-1901	Name not available	105/248
*	B	US-3,405,655 A	10-1968	DOREY GEORGE B	105/250
*	C	US-3,710,730 A	01-1973	Austgen et al.	105/250
*	D	US-4,224,877 A	09-1980	Stark et al.	105/250
*	E	US-4,232,989 A	11-1980	Miller, Roy W.	414/387
*	F	US-4,246,849 A	01-1981	Gramse, Harold E.	105/251
*	G	US-4,348,962 A	09-1982	Smith, Stephen W.	105/248
*	H	US-4,361,097 A	11-1982	Jones et al.	105/406.1
*	I	US-4,484,527 A	11-1984	O'Hara, James C.	105/247
*	J	US-RE32,189 E	06-1986	Adler et al.	105/377.07
*	K	US-4,637,320 A	01-1987	Paton et al.	105/406.1
*	L	US-4,800,820 A	01-1989	Tomaka, Jan Z.	105/406.1
*	M	US-4,893,568 A	01-1990	Adams, Norman S.	105/416

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Notice of References Cited	Application/Control No. 12/559,065	Applicant(s)/Patent Under Reexamination FORBES ET AL.	
	Examiner JASON C. SMITH	Art Unit 3617	Page 2 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-4,898,101 A	02-1990	Harter, Lynn J.	105/247
*	B	US-5,181,474 A	01-1993	Miller, Roy W.	105/355
*	C	US-5,813,353 A	09-1998	Sauter, Lynn B.	105/406.1
*	D	US-6,877,440 B1	04-2005	Kilian et al.	105/406.1
*	E	US-7,080,598 B2	07-2006	Creighton et al.	105/247
*	F	US-2007/0277696 A1	12-2007	Forbes, James W.	105/406.1
*	G	US-2010/0011987 A1	01-2010	Forbes, James W.	105/406.1
*	H	US-7,681,507 B2	03-2010	Herzog et al.	105/286
*	I	US-7,735,426 B2	06-2010	Creighton et al.	105/286
*	J	US-7,784,411 B2	08-2010	Forbes, James W.	105/406.1
*	K	US-2010/0219148 A1	09-2010	Forbes et al.	213/51
*	L	US-2010/0251922 A1	10-2010	Forbes et al.	105/240
*	M	US-2011/0041724 A1	02-2011	Forbes et al.	105/240

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12559065	FORBES ET AL.
	Examiner	Art Unit
	JASON C SMITH	3617

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	10/09/2011	12/15/2011							
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9	33		=							
10	34		=							
11	35		=							
12	36		=							

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	Examiner	Art Unit
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CLAIM		DATE								
Final	Original	10/09/2011	12/15/2011							
13	37		=							
14	38		=							
15	39		=							

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12559065	FORBES ET AL.
	Examiner	**Art Unit**
	JASON C SMITH	3617

ORIGINAL		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
105	406.1	B	6	1	D	17 / 00 (2006.01.01)						

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
105	396	404			

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		17	9	33										
	2		18	10	34										
	3		19	11	35										
	4	1	20	12	36										
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	16	8	32												

/JASON C SMITH/ Examiner.Art Unit 3617	12/15/2011	**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	15	
/S. JOSEPH MORANO/ Supervisory Patent Examiner.Art Unit 3617	12/19/2011	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	20	1

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CONFIRMATION NO. 7747

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
12/559,065	09/14/2009 RULE	105	3617	200405.00128

APPLICANTS

James W. Forbes, Campbellville, CANADA;
Marcus Thiesen, Hamilton, CANADA;
Dave Keats, Brantford, CANADA;

**** CONTINUING DATA ***************************

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****
09/28/2009

Foreign Priority claimed	Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
❑ Yes ☑ No	❑	CANADA	18	25	4
35 USC 119(a-d) conditions met ❑ Yes ☑ No					
Verified and Acknowledged /JASON C SMITH/ Examiner's Signature	Initials				

ADDRESS

HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076
UNITED STATES

TITLE

RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR

FILING FEE RECEIVED		
2000	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	❑ All Fees ❑ 1.16 Fees (Filing) ❑ 1.17 Fees (Processing Ext. of time) ❑ 1.18 Fees (Issue) ❑ Other _____ ❑ Credit

BIB (Rev. 05/07).

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	12559065
	Filing Date	2009-09-14
	First Named Inventor	James W. FORBES
	Art Unit	3617
	Examiner Name	Jason C. Smith
	Attorney Docket Number	200405.00128

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	0763186		1904-06-21	Johnson, S. J.	
	2	1421439		1922-07-04	Finckh, F.	
	3	3173381		1965-03-16	Charles, A. F., et al.	
	4	3187684		1965-06-08	Ortner, R. C.	
	5	3408956		1968-11-05	Rebenok, A. G., et al.	
	6	3483830		1969-12-16	McGrath, E.	
	7	3577932		1971-05-11	Pulcrano, Frank C., et al.	
	8	3596609		1971-08-03	Ortner, Robert C.	

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FreightCar America, Ex. 1002
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Receipt date: 10/28/2011	Application Number	12559065 12559065 - GAU: 3617
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	First Named Inventor	James W. FORBES
	Art Unit	3617
(Not for submission under 37 CFR 1.99)	Examiner Name	Jason C. Smith
	Attorney Docket Number	200405.00128

	9	3611947		1971-10-12	Nagy, Ernest J.	
	10	3654873		1972-04-11	Floehr, Walter, L.	
	11	3710730		1973-01-16	Austgen, Kenneth J., et al.	
	12	3717109		1973-02-20	Miller, R. W.	
	13	3717110		1973-02-20	Miller, R. W.	
	14	3800711		1974-04-02	Tuttle, J. H.	
	15	3807316		1974-04-30	Miller, R. W.	
	16	3815514		1974-06-11	Heap, James C.	
	17	3818842		1974-06-25	Heap, James C.	
	18	3863986		1975-02-04	Mentessi	
	19	3872796		1975-03-25	Adler, Franklin P., et al.	

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	Examiner Name	Jason C. Smith	
	Attorney Docket Number	200405.00128	

	20	3878794		1975-04-22	Adler, F. P.	
	21	3931768		1976-01-13	Price, et al.	
	22	3949681		1976-04-13	Miller, R. W.	
	23	3994238		1976-11-30	Adler, F. P.	
	24	4106813		1978-08-15	Goodbary, E. R.	
	25	4120409		1978-10-17	vander Werff, B.	
	26	4194450		1980-03-25	Miller, R. W.	
	27	4222334		1980-09-16	Peterson, William H.	
	28	4224877		1980-09-30	Stark, Marvin, et al.	
	29	4232989		1980-11-11	Miller, R. W.	
	30	4246849		1981-01-27	Gramse, Harold E.	

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	Attorney Docket Number	200405.00128

	31	4252068		1981-02-24	Nolan, Harry E.	
	32	4250814		1981-02-17	Stark, M. et al.	
	33	4348962		1982-09-14	Smith, Stephen W.	
	34	4542701		1985-09-24	Fischer, Robert T., et al.	
	35	4555033		1985-11-26	Miller, R. W.	
	36	4601244		1986-07-22	Fischer, Robert T.	
	37	4740130		1988-04-26	Prins, P. D.	
	38	4800820		1989-01-31	Tomaka, Jan Z.	
	39	4843974		1989-07-04	Ritter John A., et al.	
	40	4884511		1989-12-05	Hallam, Keith J., et al.	
	41	5063858		1991-11-12	Dugge, Richard H.	

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	First Named Inventor	James W. FORBES	
	Art Unit	3617	
	Examiner Name	Jason C. Smith	
	Attorney Docket Number	200405.00128	

	42	5086709		1992-02-11	Fischer Robert T., et al.	
	43	5144895		1992-09-08	Murray, J. R.	
	44	5163372		1992-11-17	Galvan, G. L., et al.	
	45	5249531		1993-10-05	Taylor, Fred J.	
	46	5261333		1993-11-16	Miller, D. L.	
	47	5823118		1998-10-20	Manstrom	
	48	6604469	B1	2003-08-12	Galvan, Guadalupe L., et al.	
	49	6745701	B2	2004-06-08	Elder, John B.	
	50	7367272	B2	2008-05-06	Taylor, Fred J.	
	51	7780021	B2	2010-08-24	Forbes, James W.	

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	1	1082524	CA	A1	2009-07-22			☐
	2	101486347	CN		2009-07-22			☐
	3	0543279	EP	B1	1995-05-17	ABB HENSCHEL WAGGON UNI-ON		☐
	4	1798103	EP	A1	2007-06-20	Wagony Swidnica SA		☐
	5	1790547	EP	A1	2007-05-30			☐
	6	1318571	GB		1973-05-31			☐
	7	2013598	GB		1979-08-15	Luossavaara-Kiirunavaara Aktiebolag		☐

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FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Receipt date: 10/28/2011	Application Number	12559065 12559065 - GAU: 3617
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Filing Date	2009-09-14
	First Named Inventor	James W. FORBES
(Not for submission under 37 CFR 1.99)	Art Unit	3617
	Examiner Name	Jason C. Smith
	Attorney Docket Number	200405.00128

NON-PATENT LITERATURE DOCUMENTS			Remove
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
	1	FREIGHT CARS: Hopper, Ore; Car Builders' Cyclopedia, 1937, pp. 313-320, 14th ed., Simmons-Boardman Publishing Corporation, New York, NY.	☐
	2	A.C.F. Covered and Open Top Hopper Cars; Car Builders' Cyclopedia, 1943, pp. 281-289, 16th ed., Simmons-Boardman Publishing Corporation, New York, NY.	☐
	3	FREIGHT CARS: Hopper, Ore, Class HMA; Car Builders' Cyclopedia, 1957, pp. 265-272, 20th ed., Simmons-Boardman Publishing Corporation, New York, NY.	☐
	4	FREIGHT CARS: Hopper, Ore, Class HMA; Car Builders' Cyclopedia, 1961, pp. 246-258, 21st ed., Simmons-Boardman Publishing Corporation, New York, NY.	☐
	5	Car and Locomotive Cyclopedia, 1966, 10 pages, 1st ed., Simmons-Boardman Publishing Corporation, New York, NY.	☐
	6	5 Photographs of Quebec Iron and Titanium (QIT) ore hopper car No. 556, dated August 15, 2007.	☐
	7	Drawing of QIT car dated August 27, 2007.	☐
	8	2 Sheets of Details of End Structure of an Admitted Prior Art Grain Car of National Steel Car showing End Post, Lateral Intermediate Stub Wall, Elephant Ears Arrangement and End Slope Sheet to Shear Plate Connection at least as early as January 1, 2001.	☐
	9	Reproduction of Design Drawing of Dulth, Missabi & Iron Range (DM&IR) Open Topped Ore Hopper Car General Arrangement Drawing 8760 Drawn April 8, 1950, (Quality Poor in Original), Showing Rear Draft Stops Extending Inboard of Truck Center.	☐
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FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Receipt date: 10/28/2011	Application Number	12559065 12559065 - GAU: 3617
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(Not for submission under 37 CFR 1.99)	Art Unit	3617
	Examiner Name	Jason C. Smith
	Attorney Docket Number	200405.00128

EXAMINER SIGNATURE			
Examiner Signature	/Jason Smith/	Date Considered	12/15/2011

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Receipt date: 10/28/2011	Application Number	12559065	12559065 - GAU: 3617
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Filing Date	2009-09-14	
	First Named Inventor	James W. FORBES	
	Art Unit	3617	
	Examiner Name	Jason C. Smith	
	Attorney Docket Number	200405.00128	

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Michael H. Minns/	Date (YYYY-MM-DD)	2011-10-27
Name/Print	Michael H. Minns	Registration Number	31985

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour to complete, including gathering, preparing and submitting the completed application 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.**

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FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12559065	FORBES ET AL.
	Examiner	Art Unit
	JASON C SMITH	3617

SEARCHED			
Class	Subclass	Date	Examiner
105	199.4, 406.1, 413, 414, 415, 420, 247, 244, 250, 254, 396, 404	12/15/2011	jcs
213	50, 51, 56, 60, 61, 75R	12/15/2011	jcs

SEARCH NOTES		
Search Notes	Date	Examiner
east text search	12/15/2011	jcs

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
105	199.4, 406.1, 413, 414, 415, 420, 247, 244, 250, 254, 396, 404	12/15/2011	jcs
213	50, 51, 56, 60, 61, 75R	12/15/2011	jcs

/JASON C SMITH/ Examiner.Art Unit 3617	

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	0	296/181.ccls.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/12/15 11:53
L2	0	296/182.ccls.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/12/15 11:53
L3	0	296/183.ccls.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/12/15 11:53
L4	846	220/669.ccls.	US-PGPUB; USPAT; USOCR	OR	OFF	2011/12/15 11:53
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S5	423	105/250.ccls.	US-PGPUB; USPAT; USOCR	OR	OFF	2010/11/08 01:11
S6	557	105/406.1.ccls.	US-PGPUB; USPAT; USOCR	OR	OFF	2010/11/08 01:12
S7	4	105/250.ccls. and gondola	US-PGPUB; USPAT; USOCR	OR	OFF	2010/11/08 01:14
S8	0	105/406.1.ccls. and longitudinal adj door$2	US-PGPUB; USPAT; USOCR	OR	OFF	2010/11/08 01:16
S9	0	105/406.1.ccls. and longitudinal adj doors	US-PGPUB; USPAT; USOCR	OR	OFF	2010/11/08 01:16
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S12	101	105/254.ccls.	US-PGPUB; USPAT; USOCR	OR	OFF	2010/11/08 01:21
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S14	25	("0975861" | "1422133" | "2970553" | "2989929" | "3127851" | "3253556" | "3596608" | "3710730" | "3769910" | "3868913").PN. OR ("4246849").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2010/11/22 02:01
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S31	32	"3490387"	US-PGPUB; USPAT; USOCR	OR	OFF	2011/05/06 00:42
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S38	15	"105"/$.ccls. and sidewall adj stiffener	US-PGPUB; USPAT; USOCR	OR	OFF	2011/12/14 09:55
S39	467	"105"/$.ccls. and stiffener	US-PGPUB; USPAT; USOCR	OR	OFF	2011/12/14 09:59
S40	16	"105"/$.ccls. and sidewall near3 stiffener	US-PGPUB; USPAT; USOCR	OR	OFF	2011/12/14 10:00
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12/15/2011 12:03:26 PM
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Application	Document	Mailroom Date	Attorney Docket No.
12559065	NOA	01/03/2012	200405.00128
	892	01/03/2012	200405.00128
	1449	01/03/2012	200405.00128

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IPR Petition - USP 8,166,892

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
12/559,065	09/14/2009	3617	2000	200405.00128	25	4

CONFIRMATION NO. 7747

CORRECTED FILING RECEIPT

21324
HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076

OC000000052577618

Date Mailed: 02/15/2012

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Applicant(s)

James W. Forbes, Campbellville, CANADA;
Marcus Thiesen, Hamilton, CANADA;
Dave Keats, Brantford, CANADA;

Assignment For Published Patent Application

NATIONAL STEEL CAR LIMITED, Hamilton, CANADA

Power of Attorney: The patent practitioners associated with Customer Number 021324

Domestic Priority data as claimed by applicant

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
CANADA 2678447 09/11/2009
CANADA 2678605 09/14/2009

If Required, Foreign Filing License Granted: 09/28/2009

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/559,065**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: Yes

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Title

RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR

Preliminary Class

105

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage, facilitate, and accelerate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

To: patents@hahnlaw.com,akron-docket@hotmail.com,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 21324

Feb 15, 2012 05:24:55 AM

Dear PAIR Customer:

HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 21324 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

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Application	Document	Mailroom Date	Attorney Docket No.
12559065	APP.FILE.REC	02/15/2012	200405.00128

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

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PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/559,065	09/14/2009	James W. Forbes	200405.00128	7747

7590 02/16/2012

HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076

EXAMINER	
SMITH, JASON C	
ART UNIT	PAPER NUMBER
3617	

DATE MAILED: 02/16/2012

PRIORITY ACKNOWLEDGMENT

☑ 1. Receipt is acknowledged of priority papers submitted under 35 U.S.C. 119. The papers have been placed of record in the file.

☐ 2. Applicant's claim for priority, based on papers filed in parent Application Number _____ submitted under 35 U.S.C. 119, is acknowledged.

☐ 3. The priority papers, submitted _____, after payment of the issue fee are

- ☐ acknowledged
  While the priority claim or certified copy filed will be placed in the file record, neither will be reviewed and the patent when published will not include the priority claim.
  See 37 CFR 1.55(a)(2).
- ☐ not acknowledged since the processing fee in 37 CFR 1.17(i) has not been received.

☐ 4. For utility and plant applications filed on or after November 29, 2000, the priority claim is not entered because the claim was not presented within the time limit required by 37 CFR 1.55(a)(1). A petition to accept a delayed claim for priority under 35 U.S.C. 119(a) - (d) or (f), or 365(a) may be filed. See 37 CFR 1.55(c) and MPEP 201.14(a).

Dexx H. Patel, for

571-272-4200 or 1-888-786-0101
Application Assistance Unit
Office of Data Management

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

To: patents@hahnlaw.com,akron-docket@hotmail.com,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
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Feb 17, 2012 05:24:13 AM

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HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 21324 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

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Application	Document	Mailroom Date	Attorney Docket No.
12559065	M327	02/16/2012	200405.00128

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

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PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/559,065	09/14/2009	James W. Forbes	200405.00128	7747

21324 7590 02/22/2012

HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076

EXAMINER	
SMITH, JASON C	
ART UNIT	PAPER NUMBER
3617	

NOTIFICATION DATE	DELIVERY MODE
02/22/2012	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents@hahnlaw.com
akron-docket@hotmail.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Application No. : 12559065
Applicant : Forbes
Filing Date : 09/14/2009
Date Mailed : 02/22/2012

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Notice of Allowance Mailed

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

Applicant is given 2 month(s) from the mail date of this Notice, or the time remaining from the Notice of Allowance and Fee(s) Due, whichever is longer, within which to respond.

The informalities requiring correction are indicated in the attachment(s). If the informality pertains to the abstract, specification (including claims) or drawings, the informality must be corrected with an amendment in compliance with 37 CFR 1.121 (or, if the application is a reissue application, 37 CFR 1.173). Such an amendment may be filed after payment of the issue fee if limited to correction of informalities noted herein. See Waiver of 37 CFR 1.312 for Documents Required by the Office of Patent Publication, 1280 Off. Gaz. Patent Office 918 (March 23, 2004). In addition, if the informality is not corrected until after payment of the issue fee, for purposes of 35 U.S.C. 154(b)(1)(iv), "all outstanding requirements" will be considered to have been satisfied when the informality has been corrected. A failure to respond within the above-identified time period will result in the application being ABANDONED. **This period for reply is NOT extendable under 37 CFR 1.136(a).**

See attachment(s).

A copy of this notice MUST be returned with the reply. Please address response to "Mail Stop Issue Fee,Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450".

/Daxa Patel/
Publication Branch
Office of Data Management
(571) 272-4200

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Application No. 12559065 **Drawings filed: 01/04/2010**

IDENTIFICATION OF DRAWING DEFICIENCIES

- [ ] There is a hole or the image thereof within the illustration. FIG(s)
- [ ] The illustration is penetrated or traversed by a solid or broken line that is not intended to be part of the drawing, such as a dark line caused by a flaw in the copying process. FIG(s)
- [ ] An ink stamp or the image thereof obscures part of the illustration. FIG(s)
- [ ] The drawing is marred by black smudges, obliterations, or fax/copier marks (for example, speckles or dots in a substantial portion of the drawing). FIG(s)
- [ ] Figure numbers are duplicated or missing. FIG(s)
- [ ] Drawing sheet or figure is missing. FIG(s)
- [ ] Numbers, letters, or reference characters in the drawing have been crossed out or are illegibly handwritten. FIG(s)
- [ ] The character of the lines, numbers, and letters is poor. FIG(s)
- [ ] The drawing's background shows that the original drawing was made on graph paper or other paper with a pattern or decoration. FIG(s)
- [ ] The FIG. number label is placed in a location that causes the drawing to be read upside down. FIG(s)
- [X] Data, a reference number, or part of the drawing is truncated or missing, or a lead line has no reference number. FIG(s) 7e
- [ ] The drawing and/or the FIG. label contain(s) foreign language. FIG(s)
- [ ] This utility application contains a photograph of a view that is capable of being illustrated as a line drawing. FIG(s)
- [ ] A petition under 37 CFR 1.84(a)(2) to accept color drawings has been granted, but the brief description of the drawings in the specification does not contain (or has not been amended to contain) the paragraph required by 37 CFR 1.84(a)(2)(iii).
- [ ] This reissue application contains amended drawings that are not labeled as "Amended" as required by 37 CFR 1.173(b)(3). FIG(s)
- [ ] OTHER:
- [ ] COMMENTS:

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

To: patents@hahnlaw.com,akron-docket@hotmail.com,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 21324

Feb 22, 2012 05:24:37 AM

Dear PAIR Customer:

HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076
UNITED STATES

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Application	Document	Mailroom Date	Attorney Docket No.
12559065	M327	02/22/2012	200405.00128

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PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Patent Application of: Confirmation No.: 7747

Title:	Railroad Gondola Car Structure and Mechanism Therefor
Inventor:	James W. Forbes et al.
Assignee:	National Steel Car Ltd.
Filed:	September 14, 2009
Serial No:	12/559,065
Art Unit:	3617
Examiner:	Smith, Jason C.,

To: Mail Stop Issue Fee
The Honorable Commissioner of Patents and Trademarks
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

Sir:

This letter is responsive to the Notice to File Corrected Application Papers dated February 22, 2012

Please amend the above-identified application as follows:

Amendments to the Specification – None at this time.

Amendments to the Claims – None at this time.

Amendments to the Drawings begin on page 2 of this paper.

Remarks begin on page 3 of this paper.

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Amendments to the Drawings

Enclosed is one sheet of corrected drawings for FIG. 7e.

The lead line without a reference number in the upper left portion of the drawing along with the arrow on the left side of the drawing have been removed.

Remarks

The Notice to File Corrected Application Papers stated that "Data, a reference number, or part of the drawing is truncated or missing, or a lead line has no reference number. FIG. 7e.

The lead line without a reference number in the upper left portion of the drawing along with the arrow on the left side of the drawing have been removed.

The Applicant therefore requests early and favorable disposition of this matter.

Yours very truly,
Hahn Loeser & Parks LLP

Date: March 8, 2012

/Michael H. Minns/
Michael H. Minns
Registration No. 31,985

One GOJO Plaza
Suite 300
Akron, OH 44311
330-864-5550

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/559,065	09/14/2009	James W. Forbes	200405.00128	7747

21324 7590 02/22/2012
HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076

EXAMINER	
SMITH, JASON C	
ART UNIT	**PAPER NUMBER**
3617	

NOTIFICATION DATE	DELIVERY MODE
02/22/2012	ELECTRONIC

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The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents@hahnlaw.com
akron-docket@hotmail.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Application No. : 12559065
Applicant : Forbes
Filing Date : 09/14/2009
Date Mailed : 02/22/2012

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Notice of Allowance Mailed

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

Applicant is given 2 month(s) from the mail date of this Notice, or the time remaining from the Notice of Allowance and Fee(s) Due, whichever is longer, within which to respond.

The informalities requiring correction are indicated in the attachment(s). If the informality pertains to the abstract, specification (including claims) or drawings, the informality must be corrected with an amendment in compliance with 37 CFR 1.121 (or, if the application is a reissue application, 37 CFR 1.173). Such an amendment may be filed after payment of the issue fee if limited to correction of informalities noted herein. See Waiver of 37 CFR 1.312 for Documents Required by the Office of Patent Publication, 1280 Off. Gaz. Patent Office 918 (March 23, 2004). In addition, if the informality is not corrected until after payment of the issue fee, for purposes of 35 U.S.C. 154(b)(1)(iv), "all outstanding requirements" will be considered to have been satisfied when the informality has been corrected. A failure to respond within the above-identified time period will result in the application being ABANDONED. **This period for reply is NOT extendable under 37 CFR 1.136(a).**

See attachment(s).

A copy of this notice MUST be returned with the reply. Please address response to "Mail Stop Issue Fee,Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450".

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(571) 272-4200

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

Application No. 12559065 **Drawings filed: 01/04/2010**

IDENTIFICATION OF DRAWING DEFICIENCIES

- [ ] There is a hole or the image thereof within the illustration. FIG(s)
- [ ] The illustration is penetrated or traversed by a solid or broken line that is not intended to be part of the drawing, such as a dark line caused by a flaw in the copying process. FIG(s)
- [ ] An ink stamp or the image thereof obscures part of the illustration. FIG(s)
- [ ] The drawing is marred by black smudges, obliterations, or fax/copier marks (for example, speckles or dots in a substantial portion of the drawing). FIG(s)
- [ ] Figure numbers are duplicated or missing. FIG(s)
- [ ] Drawing sheet or figure is missing. FIG(s)
- [ ] Numbers, letters, or reference characters in the drawing have been crossed out or are illegibly handwritten. FIG(s)
- [ ] The character of the lines, numbers, and letters is poor. FIG(s)
- [ ] The drawing's background shows that the original drawing was made on graph paper or other paper with a pattern or decoration. FIG(s)
- [ ] The FIG. number label is placed in a location that causes the drawing to be read upside down. FIG(s)
- [X] Data, a reference number, or part of the drawing is truncated or missing, or a lead line has no reference number. FIG(s) 7e
- [ ] The drawing and/or the FIG. label contain(s) foreign language. FIG(s)
- [ ] This utility application contains a photograph of a view that is capable of being illustrated as a line drawing. FIG(s)
- [ ] A petition under 37 CFR 1.84(a)(2) to accept color drawings has been granted, but the brief description of the drawings in the specification does not contain (or has not been amended to contain) the paragraph required by 37 CFR 1.84(a)(2)(iii).
- [ ] This reissue application contains amended drawings that are not labeled as "Amended" as required by 37 CFR 1.173(b)(3). FIG(s)
- [ ] OTHER:
- [ ] COMMENTS:

FreightCar America, Ex. 1002
IPR Petition - USP 8,166,892

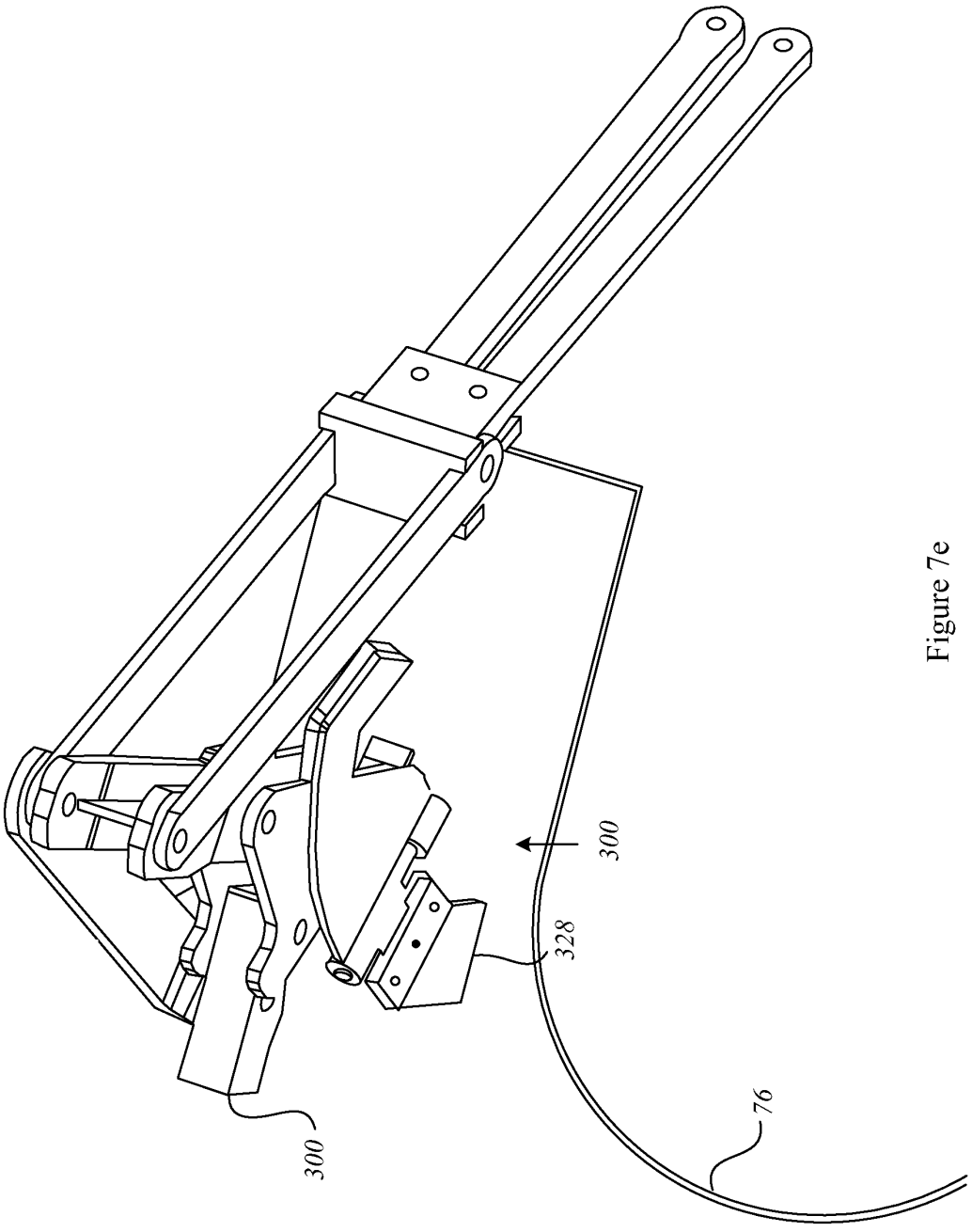


Figure 7e

Electronic Acknowledgement Receipt	
EFS ID:	12258188
Application Number:	12559065
International Application Number:	
Confirmation Number:	7747
Title of Invention:	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR
First Named Inventor/Applicant Name:	James W. Forbes
Customer Number:	21324
Filer:	Michael Howard Minns
Filer Authorized By:	
Attorney Docket Number:	200405.00128
Receipt Date:	09-MAR-2012
Filing Date:	14-SEP-2009
Time Stamp:	13:31:05
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		ResponseToNoticeToFileCorrectedPapers.pdf	619170 3bdbc8f72dd885f2348599c49f9610888250cd61	yes	7

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	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment after Notice of Allowance (Rule 312)	1	2
	Applicant Arguments/Remarks Made in an Amendment	3	3
	Miscellaneous Incoming Letter	4	6
	Drawings-only black and white line drawings	7	7
Warnings:			
Information:			
	Total Files Size (in bytes):	619170	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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IPR Petition - USP 8,166,892

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

21324 7590 01/03/2012
HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/559,065	09/14/2009	James W. Forbes	200405.00128	7747

TITLE OF INVENTION: RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1740	$0	$0	$1740	04/03/2012

EXAMINER	ART UNIT	CLASS-SUBCLASS
SMITH, JASON C	3617	105-406100

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Hahn Loeser & Parks LLP
2 Michael H. Minns
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: National Steel Car Limited

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Canada

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
- ☒ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (**Please first reapply any previously paid issue fee shown above**)
- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 150450 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
- ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /Michael H. Minns/ Date March 28, 2012

Typed or printed name Michael H. Minns Registration No. 31,985

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Electronic Patent Application Fee Transmittal

Application Number:	12559065
Filing Date:	14-Sep-2009
Title of Invention:	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR
First Named Inventor/Applicant Name:	James W. Forbes
Filer:	Michael Howard Minns/Teri Naehring
Attorney Docket Number:	200405.00128

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl issue fee	1501	1	1740	1740
Extension-of-Time:				

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Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
		Total in USD ($)		**1740**

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Electronic Acknowledgement Receipt	
EFS ID:	12408995
Application Number:	12559065
International Application Number:	
Confirmation Number:	7747
Title of Invention:	RAILROAD GONDOLA CAR STRUCTURE AND MECHANISM THEREFOR
First Named Inventor/Applicant Name:	James W. Forbes
Customer Number:	21324
Filer:	Michael Howard Minns/Teri Naehring
Filer Authorized By:	Michael Howard Minns
Attorney Docket Number:	200405.00128
Receipt Date:	28-MAR-2012
Filing Date:	14-SEP-2009
Time Stamp:	10:00:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1740
RAM confirmation Number	8610
Deposit Account	150450
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

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1	Issue Fee Payment (PTO-85B)	IssueFeeTransmittal.pdf	1204369 5d8ca3a2b41cb6154f4253ff1e8343342ec35bda	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30412 31a3b0786089858637340 94e32bc2c5c0c393255	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	1234781	

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
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Notice of References Cited	Application/Control No. 12/559,065	Applicant(s)/Patent Under Reexamination FORBES ET AL.	
	Examiner JASON C. SMITH	Art Unit 3617	Page 1 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-673,103 A	04-1901	~~Name not available~~ WILLIAMSON	105/248
*	B	US-3,405,655 A	10-1968	DOREY GEORGE B	105/250
*	C	US-3,710,730 A	01-1973	Austgen et al.	105/250
*	D	US-4,224,877 A	09-1980	Stark et al.	105/250
*	E	US-4,232,989 A	11-1980	Miller, Roy W.	414/387
*	F	US-4,246,849 A	01-1981	Gramse, Harold E.	105/251
*	G	US-4,348,962 A	09-1982	Smith, Stephen W.	105/248
*	H	US-4,361,097 A	11-1982	Jones et al.	105/406.1
*	I	US-4,484,527 A	11-1984	O'Hara, James C.	105/247
*	J	US-RE32,189 E	06-1986	Adler et al.	105/377.07
*	K	US-4,637,320 A	01-1987	Paton et al.	105/406.1
*	L	US-4,800,820 A	01-1989	Tomaka, Jan Z.	105/406.1
*	M	US-4,893,568 A	01-1990	Adams, Norman S.	105/416

Change(s) applied to document, /D.HPV/ 2/14/2012

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
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	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	V	
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/559,065	05/01/2012	8166892	200405.00128	7747

21324 7590 04/11/2012

HAHN LOESER & PARKS, LLP
One GOJO Plaza
Suite 300
AKRON, OH 44311-1076

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 284 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

James W. Forbes, Campbellville, CANADA;
Marcus Thiesen, Hamilton, CANADA;
Dave Keats, Brantford, CANADA;

IR103 (Rev. 10/09)

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Application	Document	Mailroom Date	Attorney Docket No.
12559065	ISSUE.NTF	04/11/2012	200405.00128

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IPR Petition - USP 8,166,892

United States Patent and Trademark Office

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Document Code:WFEE

User :Angela Grear

Sale Accounting Date:10/24/2023

Sale Item Reference Number	Effective Date
12559065	10/24/2023

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I20230NG14168502	1553	MAINTENANCE FEE DUE AT 11.5 YEARS	$7,700.00	Check

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IPR Petition - USP 8,166,892