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(54) **GONDOLA CAR CLEAN-OUT DOOR**

(71) Applicant: **JAC Operations, Inc.**, Chicago, IL (US)

(72) Inventor: **Dave Single**, Portage, PA (US)

(73) Assignee: **JAC OPERATIONS, INC.**, Chicago, IL (US)

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**Related U.S. Application Data**

(63) Continuation-in-part of application No. 15/289,466, filed on Oct. 10, 2016, now Pat. No. 10,017,191, which is a continuation-in-part of application No. PCT/US2015/025475, filed on Apr. 10, 2015.

(60) Provisional application No. 61/977,753, filed on Apr. 10, 2014.

(51) **Int. Cl.**

**B61D 19/00** (2006.01)

**B61D 3/00** (2006.01)

(52) **U.S. Cl.**

CPC ..... **B61D 19/001** (2013.01); **B61D 3/00** (2013.01)

(58) **Field of Classification Search**

CPC ..... B61D 3/00-10; B61D 17/00-10; B61D 7/18; B61D 7/22

See application file for complete search history.

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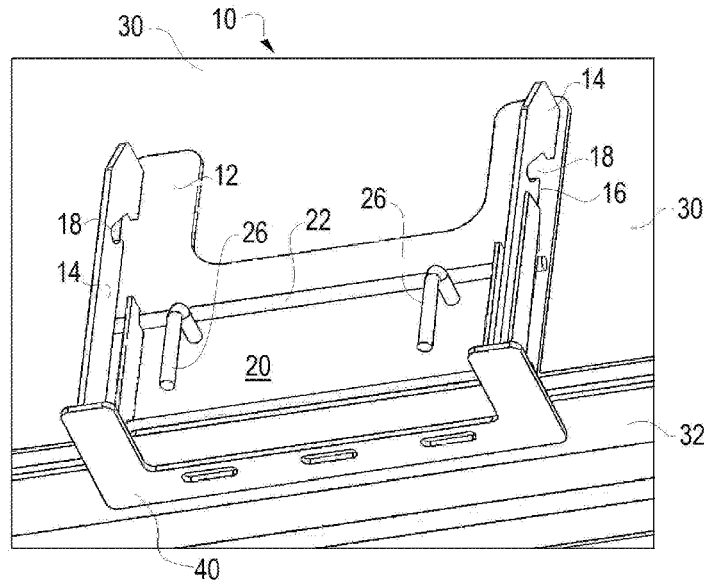
*Primary Examiner* — Jason C Smith

(74) *Attorney, Agent, or Firm* — Blynn L. Shideler; Krisanne Shideler; BLK Law Group

(57) **ABSTRACT**

A gondola railcar cleanout door is configured to be coupled to a side plate of a railcar adjacent a railcar floor wherein the side plate and floor each have an opening therein. The cleanout door includes a frame mountable to the railcar side plate structure, adjacent the side plate structure opening; and a door assembly coupled to the frame and moveable between an open position in which the openings in the floor and the side plate may be used to clean out the interior of the railcar, and a closed position substantially closing the openings in the side plate and the floor, wherein the door assembly includes a door side wall member configured to substantially close the opening in the side plate in the closed position and a door floor member configured to substantially close the opening in the floor in the closed position.

**17 Claims, 6 Drawing Sheets**



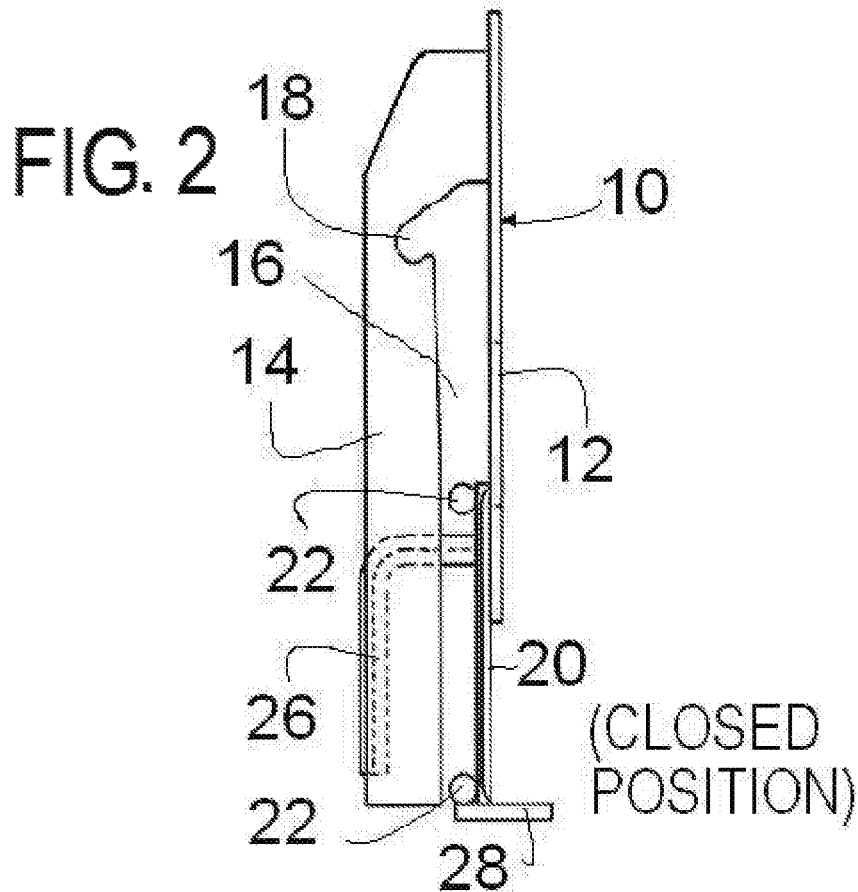
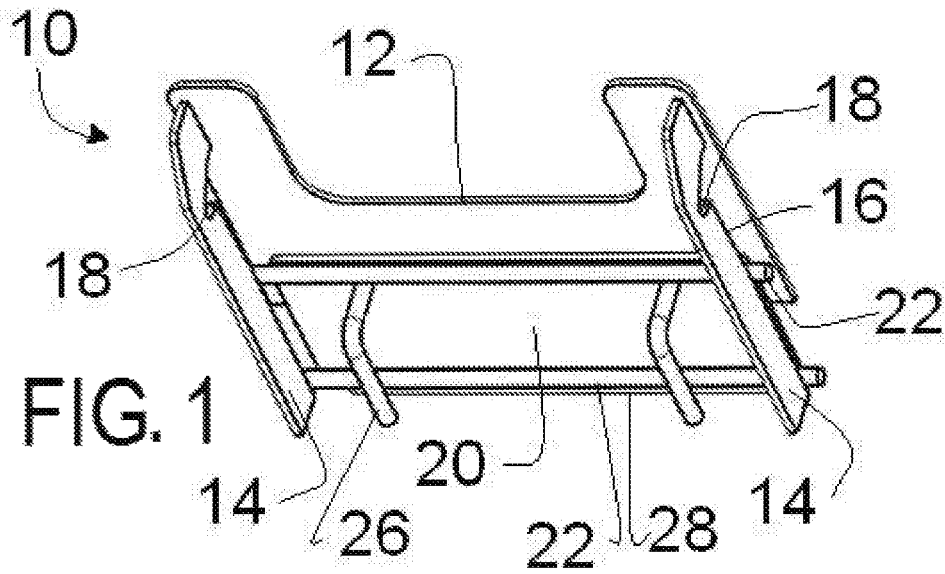
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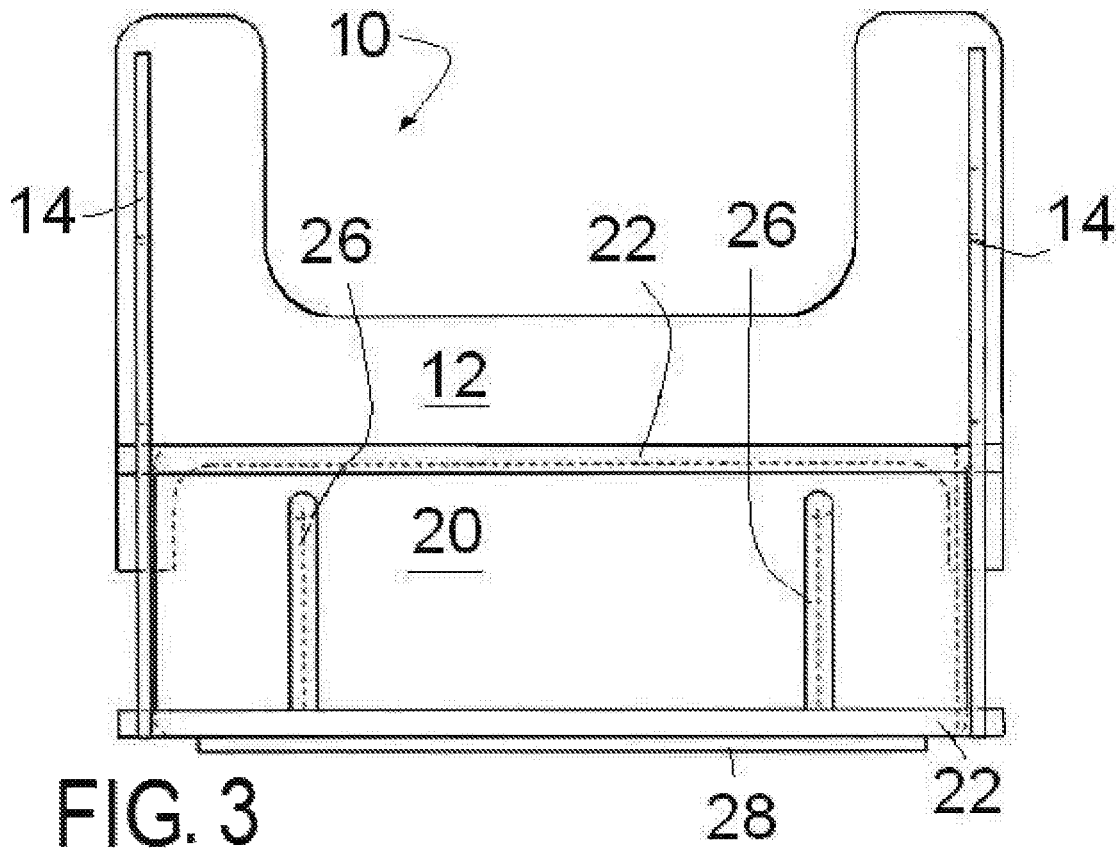


FIG. 4

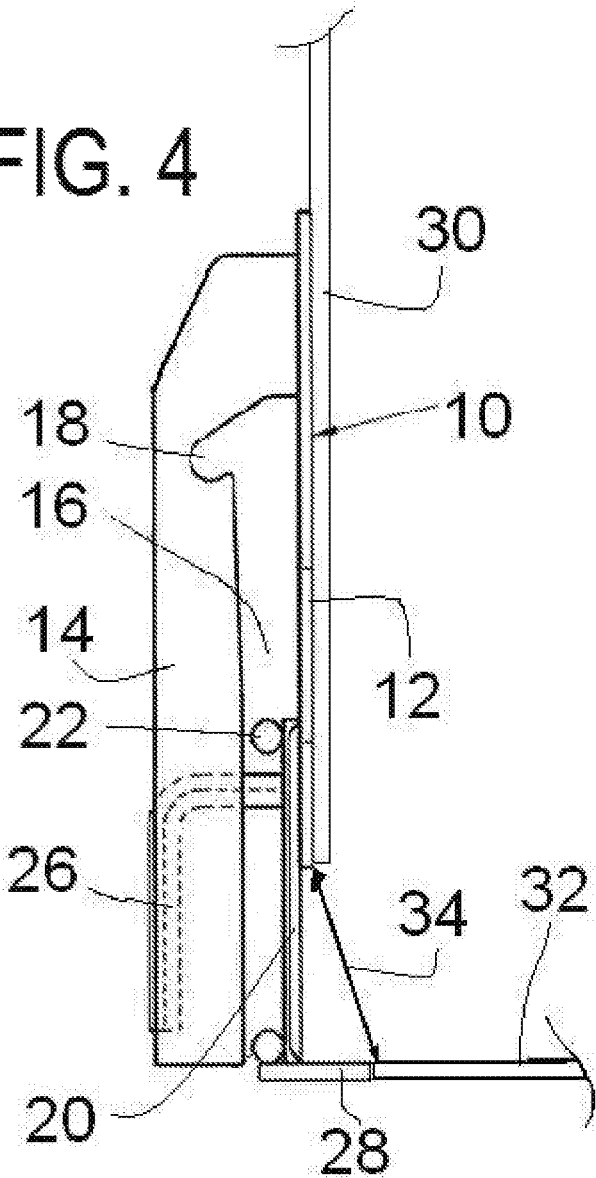


FIG. 5A

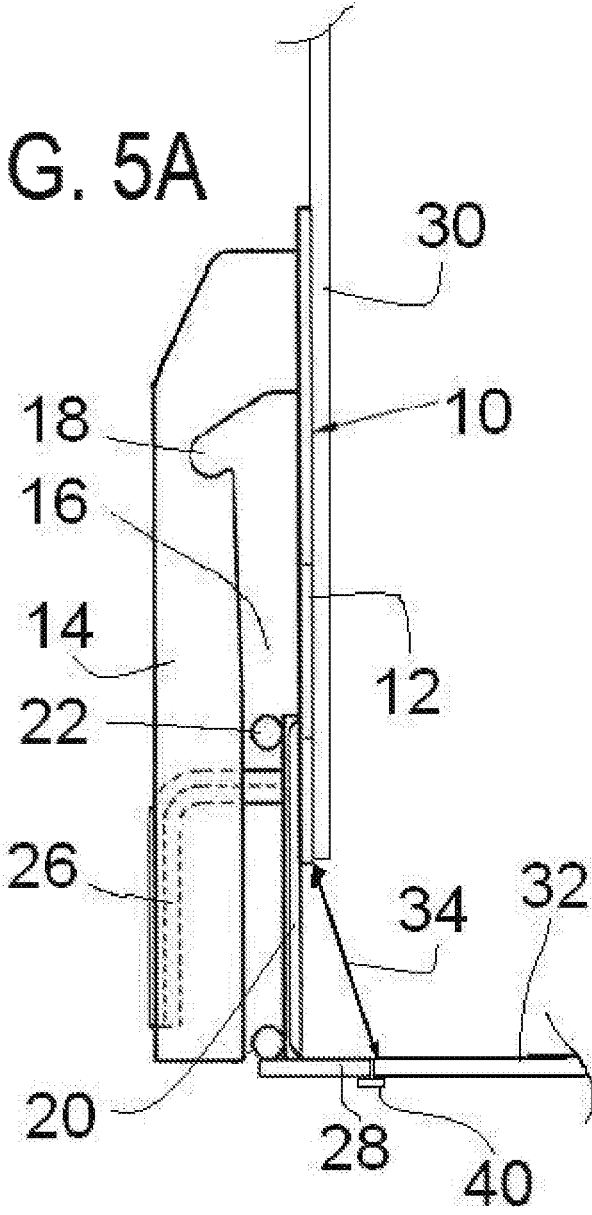


FIG. 5B

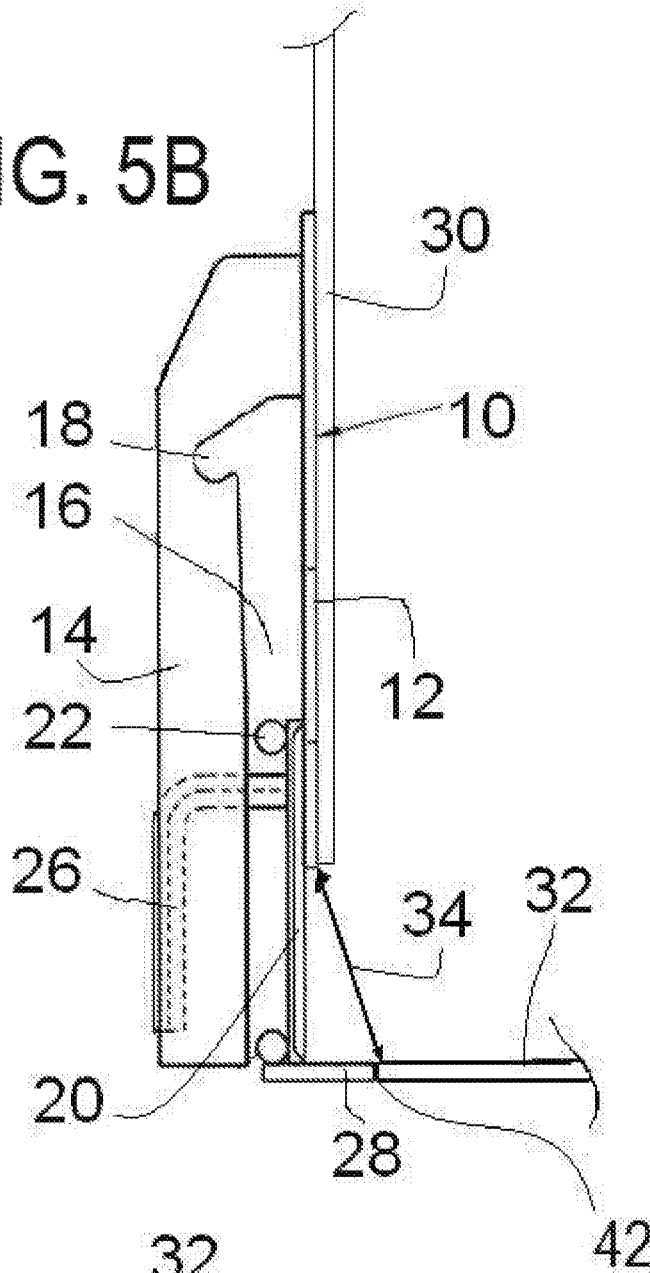
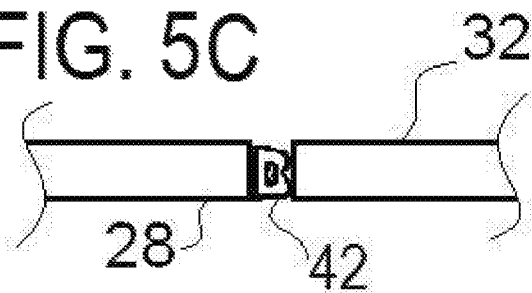


FIG. 5C



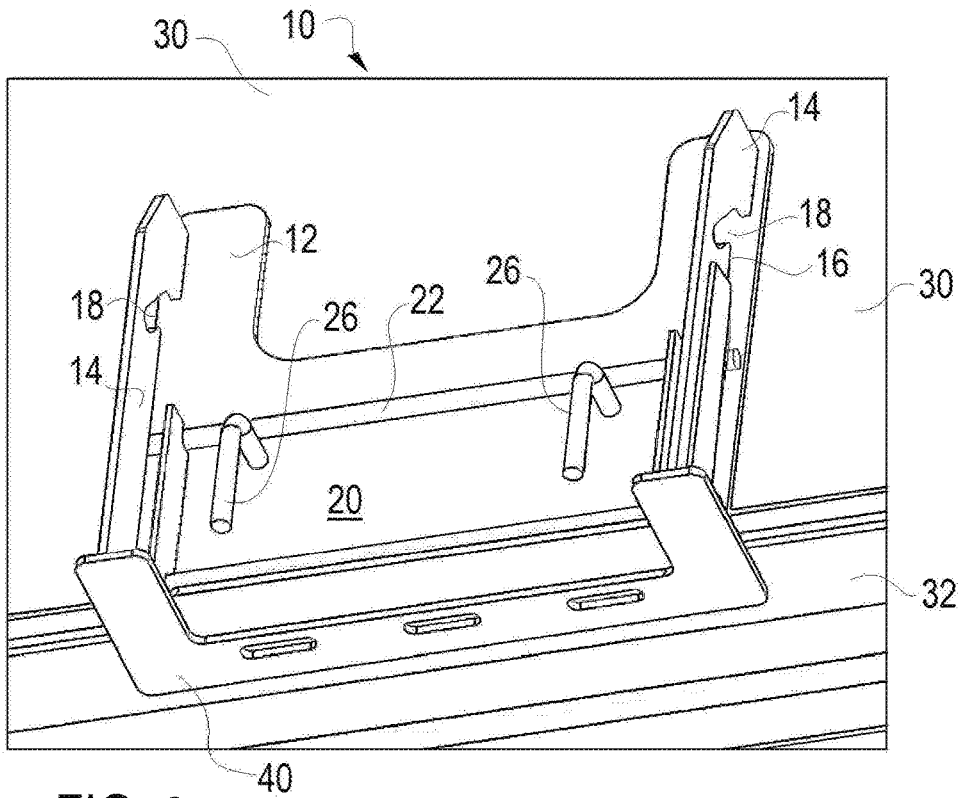


FIG. 6

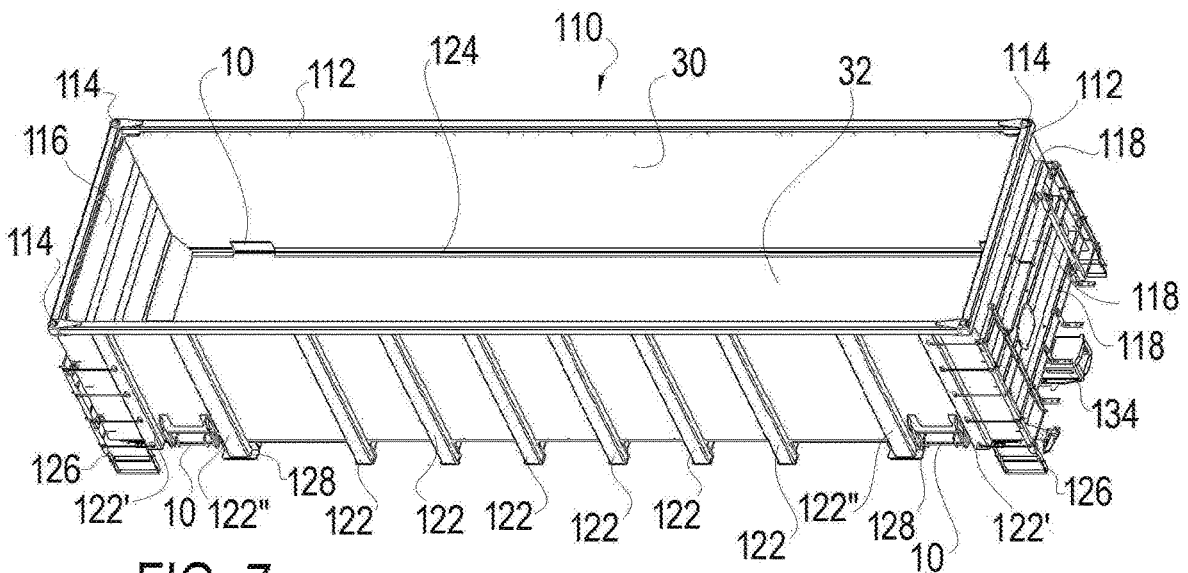


FIG. 7

**GONDOLA CAR CLEAN-OUT DOOR**

## RELATED APPLICATIONS

This application is a continuation in part of U.S. patent application Ser. No. 15/289,466 filed Oct. 10, 2016 and which published May 11, 2017 as Publication 2017-0129504 and issued Jul. 10, 2018 as U.S. Pat. No. 10,017,191 U.S. patent application Ser. No. 15/289,466. is a continuation in part of international patent application PCT/US15/25475 filed Apr. 10, 2015 and which claims priority to U.S. patent application Ser. No. 61/977,753 filed Apr. 10, 2014, entitled "Gondola Car Clean-Out Door" which applications are incorporated herein by reference in their entirety. International patent application PCT/US15/25475 published Oct. 15, 2015 as WO 2015-157,734. The above identified publications and patent are incorporated herein by reference.

## BACKGROUND INFORMATION

## 1. Field of the Invention

The present invention relates to a railcar cleanout door, particularly a gondola railcar cleanout door.

## 2. Background Information

In the railroad art, rolling stock comprises all vehicles that move on a railway. A gondola railcar, or simply gondola, is an open-top type of rolling stock used for carrying loose bulk materials. One explanation for the seemingly oddly named railcar is that prior to the proliferation of rail transport in America a significant amount of coal was shipped via flat boats that were termed "gondolas," generally in satirical reference to the famous Venetian rowing boats.

With the advancement of rail transport, the railroad cars first employed in the haulage of coal were thus named after these shallow-draft "gondola" boats and called "gondola cars". In the second half of the 20th century, coal haulage shifted from open hopper cars to high-sided gondolas. Using a gondola, the railroads are able to haul a larger amount of coal per car. Examples of gondola cars are illustrated in U.S. Pat. No. 4,212,252; 4,361,097; 4,911,082; 5,253,593; 5,335,603; 5,488,912; 5,813,353; 6,148,735; 6,978,720; 8,132,515; 8,240,256, which patents are incorporated herein by reference establishing the general nature of the relevant art.

It is common for aggregate gondola cars to have multiple clean-out doors, also called access doors, built into the side structure for removing small amounts of residual material from the car and/or to wash out the railcar interior. The clean out/wash out can be particularly important if the car is changing from hauling one type of lading to another. Car maintenance is another reason for requiring a thorough removal of residual lading. Typically the cleanout doors are simply hatches or doors that close against the floor of the gondola railcar, examples of which can be seen in U.S. Pat. Nos. 2,681,470; 2,722,899; 7,434,519; 7,461,600; 7,559,284; 7,757,611; 7,878,125, and 8,025,014 which patents are also incorporated herein by reference. Russian Patent 2271292 discloses a hatch formed on the rounded gondola tub of a railcar.

Some of these prior art gondola railcar cleanout door constructions fail to provide sufficient access to the railcar interior, while others prove structure that is difficult to open or provides a structure that is insufficiently robust to withstand the harsh working environment and/or lifespan of components expected for gondola railcars.

It is an object of the present invention to address these deficiencies of the existing prior art and provide a cost effective cleanout door structure that simultaneously provides sufficient access to the railcar interior, and that is easy to open and that is sufficiently robust to withstand the working environment and long lifespan of components expected for gondola railcars.

## SUMMARY OF THE INVENTION

This invention is directed to a cost effective, efficient, gondola railcar cleanout door that overcomes at least some of the drawbacks of the existing designs.

One aspect of the present invention provides a gondola railcar cleanout door is configured to be coupled to a side plate of a gondola car adjacent a floor of the gondola car wherein the side plate has an opening therein and the floor has an opening therein. The gondola railcar cleanout door includes a frame mountable to the side plate structure of the gondola railcar, adjacent the opening in the side plate structure; and a door assembly coupled to the frame and moveable between an open position in which the opening in the floor and the opening in the side plate may be used to clean out the interior of the gondola rail car, and a closed position substantially closing the opening in the side plate and the opening in the floor, wherein the door assembly includes a door side wall member configured to substantially close the opening in the side plate in the closed position and a door floor member configured to substantially close the opening in the floor in the closed position.

One aspect of the present invention provides a gondola railcar comprising a railcar body including a side plate and a floor, wherein the side plate has at least one opening therein and the floor has at least one opening therein and one side plate opening and one floor opening combine to form at least one clean out opening for the railcar; and at least one cleanout door configured to be coupled to the side plate of a gondola railcar body adjacent the floor of the gondola car at each clean out opening, wherein the gondola railcar cleanout door includes: i) a frame mountable to the side plate structure of the gondola railcar, adjacent the opening in the side plate structure; and ii) a door assembly coupled to the frame and moveable between an open position in which the opening in the floor and the opening in the side plate may be used to clean out the interior of the gondola rail car, and a closed position substantially closing the opening in the side plate and the opening in the floor, wherein the door assembly includes a door side wall member configured to substantially close the opening in the side plate in the closed position and a door floor member configured to substantially close the opening in the floor in the closed position.

One aspect of the present invention provides a method of retrofitting a gondola railcar with at least one clean out opening comprising the steps of: A) providing one opening in the sidewall and an associated opening in the floor for each clean out opening, wherein the side plate opening and floor opening combine to form the clean out opening for the railcar; and B) coupling one cleanout door to the side plate of a gondola railcar body adjacent the floor of the gondola car at each clean out opening, wherein the gondola railcar cleanout door includes: i) a frame mountable to the side plate structure of the gondola railcar, adjacent the opening in the side plate structure; and ii) a door assembly coupled to the frame and moveable between an open position in which the opening in the floor and the opening in the side plate may be used to clean out the interior of the gondola rail car, and a closed position substantially closing the opening in the side

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plate and the opening in the floor, wherein the door assembly includes a door side wall member configured to substantially close the opening in the side plate in the closed position and a door floor member configured to substantially close the opening in the floor in the closed position.

These and other aspects of the present invention will be clarified in the description of the preferred embodiment of the present invention described below in connection with the attached figures in which like reference numerals represent like elements throughout.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective schematic view of a Gondola Railcar Cleanout Door according to one embodiment of the present invention;

FIG. 2 is a end view of the Gondola Railcar Cleanout Door according to FIG. 1;

FIG. 3 is a side elevation view of the Gondola Railcar Cleanout Door according to FIG. 1;

FIG. 4 is schematic end view of the Gondola Railcar Cleanout Door according to FIG. 1 on a gondola car shown partially in section;

FIG. 5A is schematic end view of the Gondola Railcar Cleanout Door according to FIG. 1 on a gondola car shown partially in section, with an added floor sealing member;

FIG. 5B is schematic end view of the Gondola Railcar Cleanout Door according to FIG. 1 on a gondola car shown partially in section, with an added floor sealing member;

FIG. 5C is an enlarged schematic end view of the floor sealing member of FIG. 5B;

FIG. 6 is a bottom schematic perspective view of a Gondola Railcar Cleanout Door according to one embodiment of the present invention; and

FIG. 7 is a perspective view of a gondola railcar implementing the Gondola Railcar Cleanout Door according to the one embodiment of the present invention.

#### BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENTS

This invention is directed to a cost effective, efficient, gondola railcar cleanout door **10** that overcomes at least some of the drawbacks of the existing door designs. The gondola cleanout door **10** of the present invention as described herein provides a cleanout door structure that simultaneously provides sufficient access to the railcar interior, and that is easy to open and that is sufficiently robust to withstand the working environment and long lifespan of components expected for gondola railcars.

One embodiment of the present invention is shown in FIGS. 1-4 and provides a gondola railcar comprising a railcar body including a side plate **30** (also called a side wall), shown schematically in FIG. 4, and a floor **32**. As shown the side wall or side plate **30** has at least one opening therein and the floor **32** has at least one opening therein and the side plate opening and the floor opening combine to form a clean out opening **34** for the gondola railcar.

The details of the construction of the gondola railcar and railcar body are well known in the art as represented in the above cited patents which are incorporated herein by reference. Additional reference is made to gondola car construction provided by the assignee of the present invention who, directly and through predecessors, has been building aluminum, steel, and stainless steel coal cars for over a century.

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The present invention provides one cleanout door **10** configured to be coupled to the side plate **30** of a gondola railcar body adjacent the floor **32** of the gondola car at each clean out opening **34**.

The gondola railcar cleanout door **10** includes a frame **12** mountable to the side plate **30** structure of the gondola railcar, adjacent the opening in the side plate **30** that is forming part of the clean out opening **34**. The frame **12** may be coupled to the side plate **30** with fasteners or welding or other conventional fastening methods.

The clean out door **10** includes a door assembly coupled to the frame **12**, as discussed below. The door assembly is moveable between an open position in which the clean out opening **34**, formed by the combination of the opening in the floor **32** and the opening in the side plate **30**, may be used to clean out the interior of the gondola rail car, and a closed position substantially closing the clean out opening **34** by closing both the opening in the side plate **30** and the opening in the floor **32**.

The frame **12** includes a pair of rail members **14** extending generally vertically and configured to guide the door assembly for movement between the open and closed position. A slot **16** extends in each rail member **14** for guiding the door assembly for movement between the open and closed position. Each rail member further includes a notch **18** configured to support the door assembly in the open position.

The door assembly **10** includes a door side wall member **20** configured to substantially close the opening in the side plate **30** with the door assembly in the closed position. The door assembly includes a pair of spaced bars **22** coupled to the door side wall member **20** and the bars **22** are received in each rail member slot **16** guiding the door assembly for movement between the open and closed position.

The upper bar **22** may be positioned in the notch **18** with the door assembly in the open position to support the door assembly in the open position. The door assembly includes a pair of handle members **26** coupled to the door assembly to allow easy manual movement of the door assembly. The guide bars **22** and handle members **26** may be welded to the door side wall member **20**.

The door assembly includes a door floor member **28** configured to substantially close the opening in the floor **30** with the door assembly in the closed position. The door floor member **28** may be welded to the door side wall member **20**. The gondola railcar cleanout door **10** preferably provides that the door floor member **28** is substantially aligned with the floor **32** when the door assembly is in the closed position as shown in FIG. 4.

The gondola railcar cleanout door **10** according to embodiment shown provides that the door floor member **28** extends inwardly of the door side wall member **20** toward the interior of the railcar. Further as shown, the door side wall member **20** is substantially parallel with the side plate **30**.

The size of the opening **34** can be altered easily via altering the size of the opening in the floor **32** and providing an appropriately sized door floor member **28**. Additionally the door floor member **28** may be provided with a drain hole for allowing liquid to seep out of the lading. As shown in FIG. 5A-C, sealing members (e.g. rubber gasket **42**) can be provided around the edge of the door floor member **28** and the inward face of the door side wall member **20** to provide a tight seal in the closed position.

FIG. 5A is schematic end view of gondola railcar cleanout door **10** according to FIG. 4 on a gondola car shown partially in section, with the door floor member **28** substantially aligned with the floor **32** when the door **10** is in the closed

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position. This embodiment further adds a floor sealing member in the form of a closing strip **40** that overlays the connection between the door floor member **28** and the floor **32**. The strip **40** is tack welded to one of the door floor member **28** or the floor **32**. If a gap is formed between the door floor member **28** substantially aligned with the floor **32** in the closed position the strip **40** will prevent the loss of lading. The strip **40** may be a thin piece of metal as shown in FIG. **5A** or a plate as shown in FIG. **6** and in neither case is the strip **40** acting as a floor member as it does not primarily support any lading (only the lading that might fit between a gap between the closed door floor member **28** and the floor **32**). The strip **40** extends across the meeting of the closed door floor member **28** and the floor **32** only a distance sufficient for welding to one or the other structure. Further, even if on the floor **32**, the strip **40** will not interfere with, or limit the size of, the opening **34**. Similarly the embodiment of FIG. **6** further adds a floor sealing member in the form of a U shaped closing strip **40**, in this case a plate, that overlays the connection between the door floor member **28** and the floor **32**. The U-shaped strip **40** is welded to one of the door floor member **28** or the floor **32**. If a gap is formed between the door floor member **28** substantially aligned with the floor **32** in the closed position the strip **40** of FIG. **6** again will prevent the loss of lading.

Alternatively, as shown in FIGS. **5B** and **5C**, the gondola railcar cleanout door according to another embodiment of the invention may include an added floor sealing member; in the form of a rubber gasket **42**. FIG. **5C** is an enlarged schematic end view of the rubber gasket **42** floor sealing member of FIG. **5B**. The gasket **42** fills a gap between the closed door floor member **28** and the floor **32**, as shown, and may be attached via adhesive or the like, to either the closed door floor member **28** or the floor **32**. The gasket **42** is preferably below the top surface of the closed door floor member **28** and the floor **32**, as shown. The rubber gasket is preferably formed of a durable material such as Neoprene or polychloroprene which is a family of synthetic rubbers that are produced by polymerization of chloroprene and which exhibits good chemical stability and maintains flexibility over a wide temperature range. The illustrated gasket **42** is shown in an enlarged relatively exaggerated fashion merely for clarification of its placement and purpose as a relatively tight fit between the closed door floor member **28** and the floor **32** can be obtained and a narrow single layer gasket **42** is more than sufficient. The attaching of the gasket **42** to the door floor member **28** keeps the gasket **42** out of the way when using the clean out opening **34**, however the attaching of the gasket **42** to the floor **32** can provide some protection to tools or operator arms extending through the opening **34** without limiting opening **34**.

If desired a latching mechanism (and locking) may be provided to keep the door assembly in the closed position and to avoid tampering. However even without such additions, the formation of the door assembly will serve to maintain the door assembly properly closed when lading is present as the weight of the lading on the door floor **28** will act to hold it closed.

The provision of a latch or locking mechanism better accommodates a redesign of the opening and closing that may minimize the size of the frame. Namely elimination of the interference with the lower end of the guide members **14** and the lower guide bar **22** and a pivoting movement to the open position for the door is easily accommodated with a latch, as the latch will act to assist in holding the door **10** in the closed position. In one such alternative arrangement the slot **16** is only sized to allow the door floor **28** to be raised

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far enough to pivot outwardly, with the guide member **14** shortened to provide clearance for the lower guide bar **22** which is then pivoted to an open position above the upper guide bar **22** inverting the door side wall member. A receiving notch (not shown) in the upper part of the frame can be added to hold the inverted lower guide bar **22**, while the original upper guide bar **22** is in the notch **18**. The pivoting arrangement, not shown, is noted as an alternative but the sliding arrangement shown is preferred as simpler and easier manipulation because the handles **26** remain in an ergonomic position throughout the movement.

The formation of the cleanout opening **34** in the side wall structure (plate **30**) and the floor **32** allows for a greater access of tools into the interior than is provided with similar sized wall only openings. The formation of the cleanout opening **34** as shown also provides increased visibility for inspecting the cleanout operation than with prior clean out opening construction, all without substantially increasing the size. The height of the cleanout opening will typically be less than 6" along the side plate **30**.

The present invention is also easily retrofitted to existing gondola railcars, both those that have existing clean out doors and those that do not. The method of retrofitting a gondola railcar with at least one clean out opening **34** comprises the steps of: providing one opening in the side-wall and an associated opening in the floor for each clean out opening **34**, wherein the side plate opening and floor opening combine to form the clean out opening **34** for the railcar. For railcars having a cleanout opening in the side this step is merely forming the floor opening. The second step is coupling one cleanout door **10** to the side plate **30** of a gondola railcar body adjacent the floor **32** of the gondola car at each clean out opening.

The present invention provides an open top gondola railcar **110** as shown in FIG. **7** with effective cleanout doors **10**. The railcar **110** as shown includes a number of conventional features that need not be described herein in detail as they are generally well known in the art such as a pair of spaced trucks and coupler assemblies for connecting adjacent cars, and generally only the underframe and sidewall construction are described in detail herein.

The railcar **110** includes top chord sections **112** above the sidewalls and end-walls. Extruded closed sections can effectively form the top chord sections **112** although other top chord configurations are possible. The railcar **110** includes a pin connection or coupling **14** between the end wall top chord **112** and the side wall top chord **112** as shown.

The end-walls of railcar **110** are generally formed of end sheet **116** and cross supports **118**. The end sheet **116** can be formed a plurality of coupled sheet materials extending from the top chord **112** to the floor structure, however one piece structure forming the end sheet **116** is preferred. The cross supports may be extruded channel sections, I-beam, t-sections or a variety of supporting beam shapes.

The sidewalls are generally formed of side sheet or plate **30**, side stakes **122** and side sill **124**. The side sheet or plate **30** can be formed a plurality of coupled sheet materials extending from the top chord **112** to the side sill **124**, however a single sheet forming the side sheet or plate **30** is preferred. The side stakes **122** are coupled to the top chord **112** and the side sheet **120** and are preferably mainly formed as extruded channels and are aligned with cross braces between the bolsters **128**. The side sill **124** may be a closed section like the top chord **112**, or other conventional shape such as a solid bar, but a pressed angle or structural angle is

preferred as it represents a cost effective design that does not take away from the cargo carrying capacity of the railcar **110**.

Two side stakes (**122'** and **122"**) differ from the side stake **124** construction between the bolsters. Ladder side stakes **122'** are at the ends of each sidewall and in addition to functioning as a side stake it forms an attaching point for a corner ladder **126**. Each ladder side stake **122'** is not associated with a cross bearer and mainly functions as a side wall support and as one attachment for the corner ladder **126**. The second specialized side stake is the bolster side stake **122"** that extends from the top chord **112** to a laterally extending part of a bolster **128**. The bolster side stake **122"** sees more structural loading and is generally thicker and/or dimensioned larger (e.g. a wider channel) to accommodate the extra loading.

The gondola car **110** also includes multiple clean-out doors **10** of the present invention between the ladder side stake **122'** and the bolster side stake **122** built into the side wall and floor structure for removing small amounts of residual material from the car and/or to wash out the railcar interior. The clean out/wash out doors **10** can be particularly important if the car **110** is changing from hauling one type of lading to another. Car maintenance is another reason for requiring a thorough removal of residual lading.

It is apparent that many variations to the present invention may be made without departing from the spirit and scope of the invention. The present invention is defined by the appended claims and equivalents thereto.

What is claimed is:

**1.** A gondola railcar cleanout door configured to be coupled to a side plate of a gondola car adjacent a floor of the gondola car wherein the side plate has an opening therein and the floor has an opening therein, wherein the gondola railcar cleanout door comprises:

A frame mountable to the gondola railcar, adjacent the opening in the side plate structure;

A door assembly coupled to the frame and moveable between an open position in which the opening in the floor and the opening in the side plate may be used to clean out the interior of the gondola rail car, and a closed position substantially closing the opening in the side plate and the opening in the floor, wherein the door assembly includes a door side wall member configured to substantially close the opening in the side plate in the closed position and a door floor member configured to substantially close the opening in the floor in the closed position, and wherein the frame includes a pair of rail members configured to guide the door assembly for movement between the open and closed position.

**2.** The gondola railcar cleanout door according to claim **1** further including a slot extending in each rail member and wherein the door assembly includes at least one bar coupled to the door side wall member and received in each rail member slot.

**3.** The gondola railcar cleanout door according to claim **2** wherein each rail member includes a notch configured to receive at least one bar and support the door assembly in the open position.

**4.** The gondola railcar cleanout door according to claim **2** wherein two spaced bars are coupled to the door side wall member.

**5.** The gondola railcar cleanout door according to claim **2** further including at least one handle member coupled to the door assembly.

**6.** The gondola railcar cleanout door according to claim **2** wherein the door floor member is substantially aligned with the floor when the door is in the closed position.

**7.** The gondola railcar cleanout door according to claim **2** further including a floor sealing member in the form of a rubber gasket or a closing strip.

**8.** The gondola railcar cleanout door according to claim **2** wherein the door floor member extends inwardly of the door side wall member toward the interior of the railcar.

**9.** A gondola railcar comprising:

A) A railcar body including a side plate and a floor, wherein the side plate has at least one opening therein and the floor has at least one opening therein and one side plate opening and one floor opening combine to form at least one clean out opening for the railcar; and

B) A plurality of cleanout doors, each door configured to be coupled to the side plate of a gondola railcar body adjacent the floor of the gondola car at each clean out opening, wherein the gondola railcar cleanout door includes:

i) A frame mountable to the side plate structure of the gondola railcar, adjacent the opening in the side plate structure; and

ii) a door assembly coupled to the frame and moveable between an open position in which the opening in the floor and the opening in the side plate may be used to clean out the interior of the gondola rail car, and a closed position substantially closing the opening in the side plate and the opening in the floor, wherein the door assembly includes a door side wall member configured to substantially close the opening in the side plate in the closed position and a door floor member configured to substantially close the opening in the floor in the closed position, and wherein the frame of each clean out door includes a pair of rail members configured to guide the door assembly for movement between the open and closed position.

**10.** The gondola railcar according to claim **9** wherein each clean out door further includes a slot extending in each rail member and wherein the door assembly includes at least one bar coupled to the door side wall member and received in each rail member slot.

**11.** The gondola railcar according to claim **10** wherein each rail member of each clean out door includes a notch configured to receive at least one bar and support the door assembly in the open position.

**12.** The gondola railcar according to claim **10** wherein each clean out door includes two spaced bars coupled to the door side wall member.

**13.** The gondola railcar according to claim **10** wherein each clean out door further includes at least one handle member coupled to the door assembly.

**14.** The gondola railcar according to claim **10** wherein each clean out door is configured wherein the door floor member is substantially aligned with the floor when the door assembly is in the closed position.

**15.** The gondola railcar according to claim **10** wherein the door side wall member of each clean out door is substantially parallel with the side plate.

**16.** The gondola railcar according to claim **10** wherein the door floor member of each clean out door extends inwardly of the door side wall member toward the interior of the railcar.

**17.** A method of retrofitting a gondola railcar with at least one clean out opening comprising the steps of:  
providing a plurality of openings in the sidewall and associated openings in the floor for each clean out

opening, wherein each side plate opening and an associated floor opening combine to form the clean out opening for the railcar; and  
coupling one cleanout door to the side plate of a gondola railcar body adjacent the floor of the gondola car at each clean out opening, wherein the gondola railcar cleanout door includes:  
i. A frame mountable to the side plate structure of the gondola railcar, adjacent the opening in the side plate structure; and  
ii. a door assembly coupled to the frame and moveable between an open position in which the opening in the floor and the opening in the side plate may be used to clean out the interior of the gondola rail car, and a closed position substantially closing the opening in the side plate and the opening in the floor, wherein the door assembly includes a door side wall member configured to substantially close the opening in the side plate in the closed position and a door floor member configured to substantially close the opening in the floor in the closed position, and wherein the door floor member of each clean out door extends inwardly of the door side wall member toward the interior of the railcar.

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