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Improved Rail Wagon

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ABSTRACT

[0053] A rail wagon for transporting bulk material is described that is shorter and taller than wagons of the prior art that have a similar load bearing capacity. The rail wagon including a container for receiving the bulk material, wherein a length of the rail wagon is between about 10.9m and 14.9m, and a height of the rail wagon is between about 3.1m and 4.2m.
IMPROVED RAIL WAGON

TECHNICAL FIELD

[0001] The present invention generally relates to transport of bulk material, and in particular, although not exclusively, to hopper wagons for transporting coal, iron ore, grain or other materials by rail.

BACKGROUND ART

[0002] Rail is often used to transport bulk materials, such as coal, iron ore, grain and other materials. Rail is efficient for transporting such bulk materials, and very large amounts of material can be transported in a single train.

[0003] Hopper wagons are often used to transport loose bulk materials such as coal, iron ore and grain. In such case, the bulk material can be quickly and efficiently discharged from an underside of the wagon by gravity. Alternatively, gondola wagons can be inverted to discharge loose bulk materials.

[0004] It is generally accepted that rail transport becomes more efficient when larger amounts of materials are transported. As such, wagons are often coupled together to form long trains, often greater than 1km in length. A problem, however, with very long trains is that they become difficult to manage. As such, limits on the total length of trains are often provided.

[0005] As such, there is a need to improve the efficiency of rail transport, without further increasing the length of trains.

[0006] It will be clearly understood that, if a prior art publication is referred to herein, this reference does not constitute an admission that the publication forms part of the common general knowledge in the art in Australia or in any other country.

SUMMARY OF INVENTION

[0007] The present invention is directed to a rail wagon for transporting bulk material, which may at least partially overcome at least one of the abovementioned disadvantages or provide the consumer with a useful or commercial choice.

[0008] With the foregoing in view, the present invention in one form, resides broadly in a rail wagon for transporting bulk material, the rail wagon including a container for receiving the bulk material, wherein a length of the rail wagon is between about 10.9m and 14.9m, and a height of the
rail wagon is between about 3.1m and 4.2m.

For example, the length of the rail wagon can be about 10.9m, about 11m, about 11.5m, about 12m, about 12.5m, about 13m, about 13.5m, about 13.9m, about 14.5m or about 14.9m. Similarly, the height of the rail wagon can be about 3.1m, about 3.3m, about 3.5m, about 3.7m, about 4m, or about 4.2m.

The length of the rail wagon may be between about 12.9m and 14.9m, and the height of the rail wagon between about 3.4m and 3.8m. More specifically, the length of the rail wagon may be about 13m, about 13.5m, about 13.9m, about 14.5m or about 14.9m and the height of the rail wagon may be about 3.4m, about 3.5m, about 3.6m, about 3.7m, or about 3.8m.

Certain embodiments of the present invention provide a railway wagon that enables an increase in cargo-carrying capacity of a train without requiring an increase a total length of the train. In particular, railway wagons according to certain embodiments of the present invention are shorter in length and taller in height than similar wagons of the prior art that have a similar load capacity. As such, more wagons can be coupled together to form a train of a given length.

According to certain embodiments, the rail wagon includes at least one hopper formed in the container, wherein the at least one hopper includes a discharge gate, for enabling discharge of the bulk material from the container.

According to some embodiments, the rail wagon includes two hoppers. According to other embodiments, the rail wagon includes three hoppers.

According to some embodiments, the rail wagon includes a drawbar, for coupling to a coupler of a preceding rail wagon, and a coupler, for coupling to a drawbar of a succeeding rail wagon, wherein the length of the rail wagon comprises a coupled length of the wagon.

According to certain embodiments, the coupled length of the rail wagon is about 11.9m and a height of the rail wagon is about 3.6m. According to one embodiment of such certain embodiments, the gross capacity is about 63t, and according to another embodiment, the capacity of the container is about 50m³.

According to certain embodiments, the coupled length of the rail wagon is about 13.4m and a height of the rail wagon is about 3.6m. According to one embodiment of such certain embodiments, the gross capacity is about 80t, and according to another embodiment, the capacity of the container is about 66m³.
According to other embodiments, the coupled length of the rail wagon is about 13.9m and a height of the rail wagon is about 3.6m. According to one embodiment of such certain embodiments, the gross capacity is about 84t.

Furthermore, by shortening a length of the wagon, less lateral overhang is observed when turning, which in turn enables wider wagons to be used.

Any of the features described herein can be combined in any combination with any one or more of the other features described herein within the scope of the invention.

The reference to any prior art in this specification is not, and should not be taken as an acknowledgement or any form of suggestion that the prior art forms part of the common general knowledge.

BRIEF DESCRIPTION OF DRAWINGS

Various embodiments of the invention will be described with reference to the following drawings, in which:

FIG. 1 illustrates an end view of a hopper wagon, according to an embodiment of the present invention.

FIG. 2 illustrates a side view of the hopper wagon of FIG. 1.

FIG. 3 illustrates a top view of the hopper wagon of FIG. 1.

FIG. 4 illustrates an end view of a hopper wagon, according to another embodiment of the present invention.

FIG. 5 illustrates a side view of the hopper wagon of FIG. 4.

FIG. 6 illustrates a top view of the hopper wagon of FIG. 4.

Preferred features, embodiments and variations of the invention may be discerned from the following Detailed Description which provides sufficient information for those skilled in the art to perform the invention. The Detailed Description is not to be regarded as limiting the scope of the preceding Summary of the Invention in any way.

DESCRIPTION OF EMBODIMENTS

FIG. 1 illustrates an end view of a hopper wagon 100, according to an embodiment of the present invention. FIG. 2 illustrates a side view of the hopper wagon 100, and FIG. 3 illustrates
a top view of the hopper wagon 100.

[0030] The hopper wagon 100 includes side walls 105 and end walls 110, which together define a container 115. The container 115 defines a volume of approximate 50 m$^3$ and can be used to store and transport coal, iron ore, grain or other similar materials.

[0031] As best illustrated in FIG. 1, the side walls 105 are convex in profile, which enables efficient usage of the container 115, while being structurally resilient and while remaining inside relevant outline gauges. Examples of relevant outline gauges including outline gauges of reference vehicles of Australian Standard 7507.2, “Railway Rolling Stock - Rolling Stock Outlines - Freight Rolling Stock”. Furthermore, as discussed below, the convex profile of the side walls 105 assists in emptying cargo from the container 115.

[0032] The side walls 105 and the end walls 110 are formed from steel and can be reinforced with supports, braces or the like. In particular, as best illustrated in FIG. 1, end walls 110 are reinforced by horizontal supports 120.

[0033] The container 115 is generally tapered in the longitudinal direction, and in particular the end walls 110 are diagonally mounted to the side walls 105. This further assists in unloading the container 115, as discussed further below.

[0034] The container 115 further includes first and second hoppers 125, the hoppers 125 including discharge gates 130 at the lowest points of the container 115, to enable dumping of cargo. The discharge gates 130 are hinged, and can be remotely controlled by actuators 135. As such, the discharge gates 130 can be closed, to prevent the discharge of cargo from the container 115, and opened, to enables the discharge of cargo from the container 115.

[0035] The container 115 is supported by longitudinal bearers 140, which are in turn supported by cross bearers 145 at respective ends of the container 115. The cross bearers 145 are in turn supported by bogies 150.

[0036] Each bogie 150 has two axles 155, and as such, the hopper wagon 100 has four axles 155 in total. Each axle 155 includes two laterally spaced wheels 160, which can, for example, comprise 850mm diameter wheels, as is known in the art.

[0037] The hopper wagon 100 further includes a drawbar 165, for coupling to a coupler of a preceding rail wagon, and a coupler 170, for coupling to a drawbar of a succeeding rail wagon. As such, several hopper wagons 100 can be coupled to form a train of required length.
The hopper wagon 100 is 11.9m long (coupling length between adjacent wagon couplers) and 3.611m high (from the rail to an upper edge of the container 115), and has a gross capacity of 63t. As such, the hopper wagon 100 is shorter and taller than similar wagons of the prior art that have a similar load bearing capacity.

As such, the present invention enables a similar amount of cargo to be transported as wagons in the prior art, while requiring a shorter length. As such, more wagons can be connected for a given train length, and as such, cargo can be transported more efficiently.

FIG. 4 illustrates an end view of a hopper wagon 200, according to an embodiment of the present invention. FIG. 5 illustrates a side view of the hopper wagon 200, and FIG. 6 illustrates a top view of the hopper wagon 200.

The hopper wagon 200 is similar to the hopper wagon 100, and includes side walls 205 and end walls 210, which define a container 215. The container 215 is longer than the container 115 of the hopper wagon 100, and defines a volume of approximate 66 m³.

The container 215 includes three hoppers 225, the hoppers 225 similar to the hoppers 125 of the hopper wagon 100, to enable dumping of cargo. The hoppers 225 are substantially evenly placed along a longitudinal axis of the container 215.

The hopper wagon 200 is 13.4m long (coupling length) and 3.611m high, and has a gross capacity of 80t. As such, the hopper wagon 200 is shorter and taller than similar wagons of the prior art that have a similar load bearing capacity.

According to yet another embodiment (not illustrated), the coupling length of a hopper wagon similar to the hopper wagon 200 is about 13.9m, has a height of about 3.6m and a gross capacity of about 84t. As such, the hopper wagon is shorter and taller than similar wagons of the prior art that have a similar load bearing capacity.

This enables an increase in cargo-carrying capacity of a train without requiring an increase a total length of the train. In particular, railway wagons according to certain embodiments of the present invention are shorter in length and taller in height than similar wagons of the prior art that have a similar load capacity. As such, more wagons can be coupled together to form a train.

Furthermore, by shortening a length of the wagon, less lateral overhang is observed when turning, which in turn enables wider wagons to be used without risking damage to adjacent structures.
[0047] The skilled addressee will readily appreciate that the present invention is not limited to the dimensions disclosed in regard to the hopper wagons 100, 200. In particular, dimensions of a hopper wagon according to the present invention include a length of between about 10.975m and 14.11m, and a height of between about 2.845m and 4.2m.

[0048] The hopper wagons 100, 200 are illustrated without a lid. However, the skilled addressee will readily appreciate that the hopper wagons 100, 200 can be adapted to include a lid (not shown), without deviating from the present invention. In particular, a lid can be provided to protect grain or other cargo from rain, and/or to contain the cargo.

[0049] While the present disclosure describes hopper wagons, other types of railway cars may incorporate the teachings of the present invention, including gondola cars.

[0050] In the present specification and claims (if any), the word ‘comprising’ and its derivatives including ‘comprises’ and ‘comprise’ include each of the stated integers but does not exclude the inclusion of one or more further integers.

[0051] Reference throughout this specification to ‘one embodiment’ or ‘an embodiment’ means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, the appearance of the phrases ‘in one embodiment’ or ‘in an embodiment’ in various places throughout this specification are not necessarily all referring to the same embodiment. Furthermore, the particular features, structures, or characteristics may be combined in any suitable manner in one or more combinations.

[0052] In compliance with the statute, the invention has been described in language more or less specific to structural or methodical features. It is to be understood that the invention is not limited to specific features shown or described since the means herein described comprises preferred forms of putting the invention into effect. The invention is, therefore, claimed in any of its forms or modifications within the proper scope of the appended claims (if any) appropriately interpreted by those skilled in the art.
CLAIMS

1. A rail wagon for transporting bulk material, the rail wagon including a container for receiving the bulk material, wherein a length of the rail wagon is between about 10.9m and 14.9m, and a height of the rail wagon is between about 3.1m and 4.2m.

2. A rail wagon according to claim 1, wherein the length of the rail wagon is between about 12.9m and 14.9m, and the height of the rail wagon is between about 3.4m and 3.8m.

3. A rail wagon according to claim 2, wherein a length of the rail wagon is about 13.9m, and a height of the rail wagon is about 3.6m.

4. A rail wagon according to any one of the preceding claims, wherein a capacity of the rail wagon is about 84t.

5. A rail wagon according to any one of the preceding claims, wherein the bulk material is coal, iron ore or grain.