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(54) **ARRANGEMENT OF OPENED AND/OR CLOSED WAGONS FOR DOUBLE-DECK
TRANSPORTATION OF CARS**

(57) A system of opened and/or closed wagons for double-deck transportation of cars includes two outer wagons or two outer wagons and at least one central wagon, where each wagon has an upper loading deck

and a bottom loading deck, whereby the outer wagons are equipped with mechanisms for vertical adjustment of the upper deck and the upper loading decks and the bottom loading decks are straight.

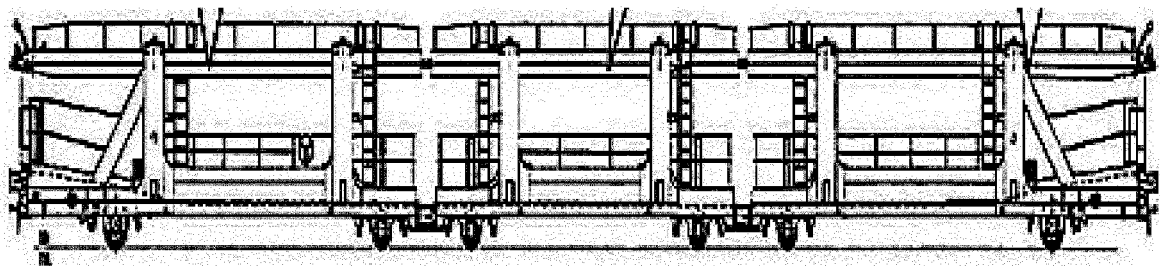


Fig. 1

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Description

Field of technology

[0001] Technical solution relates to opened and/or closed wagons for double-deck transportation of cars, which belongs to the field of car transportation by means of freight railway wagons with a possibility of double-deck loading. The wagon consists of two loading levels, bottom and top loading decks, whereby the wagon can be opened or closed.

State of the art

[0002] Transportation of cars on railways is greatly used at present due to its effectiveness for transportation of motor car company production, cars from factories to destination places. In most cases, they are terminals, from which cars are further distributed. Dimensions of cars constantly rise in every direction - length, width and height. It is height in combination with length that represent limiting factors for effective double-deck transportation of cars. With relation to railway transportation, it is interference to the upper running gauge. Existing car-carrying wagons have fixed length, when it is not possible to change the overall length of the wagon in order to extent loading capacity. On the other hand, with relation to cars, protection of cars in the area of their chassis during loading shall be considered. Mainly sport cars have small ground clearance, and they can be damaged during transition from one wagon to another, or during transition on the bottom deck considering this deck is not completely flat.

[0003] Existing solutions of double-deck wagons for transportation of cars are characterised in that they have fixed or vertically adjustable bottom loading platform, e. g. DE 1896140U, DE29516152U1, DE102013105655A1.

[0004] For double-deck loading of cars, and mainly for increasing transportation effectiveness, and, subsequently, for minimisation of a risk of over-reaching the upper gauge, the existing wagons are equipped with wheels with smaller radius than standard wheels used in freight wagons. Then, in order to create a necessary free area for wagon suspension, a free area above the wheel is solved by means of various protuberances or floor elevations in the area of wheels.

Nature of technical solution

[0005] Specified shortcomings are removed by the utility design described in this application, where nature of the technical solution is a whole concept of a system for transportation of cars, whereby each wagon of the system consists of two loading levels, the bottom and the upper loading deck, whereby the wagon can be opened or closed. The bottom loading decks are solved as straight without any protuberances, and they create a

solid surface. By application of small wheels, the bottom loading deck is low and access to the loading deck is thus fluent, with low boarding angles.

[0006] The system of wagons consists of two outer wagons, or of two outer wagons and at least one central wagon. According to length of transported cars, the central wagons can have various lengths in order to increase loading capacity.

[0007] The upper loading deck of the outer wagons is vertically adjustable by means of mechanisms. The upper loading deck of the central wagons is adjusted in the transportation height in a workshop by means of an external crane, by which carrying of dead load and loading mechanisms on the central segment is eliminated.

[0008] Adjustment of height in a workshop is performed according to height and type of transported cars. If necessary, the central wagons can be additionally equipped with a lifting mechanism.

Summary of figures in the drawings

[0009] In the Figure 1, there is displayed the system of opened and/or closed wagons for double-deck transportation of cars. In the Figure 2, there is displayed the bottom loading deck of the outer wagon with a fluent transition with an inclination from 4° with a fluent connection to the bottom deck floor.

Examples of embodiment of the technical solution

[0010] Each wagon of the system consists of two loading levels, the bottom and the upper loading deck, whereby the wagon can be opened or closed. The bottom loading decks are solved as straight without any protuberances, and they create a solid surface. By application of small wheels, the bottom loading deck is low and access to the loading deck is thus fluent, with low boarding angles.

[0011] The system of wagons consists of two outer wagons, or of two outer wagons and at least one central wagon. According to length of transported cars, the central wagons can have various lengths in order to increase loading capacity.

[0012] The upper loading deck of the outer wagons is vertically adjustable by means of mechanisms. The upper loading deck of the central wagons is adjusted in the transportation height in a workshop by means of an external crane, by which carrying of dead load and loading mechanisms on the central segment is eliminated.

[0013] Adjustment of height in a workshop is performed according to height and type of transported cars. If necessary, the central wagons can be additionally equipped with a lifting mechanism.

[0014] The outer wagons can be preferably equipped with an outer wheelset with greater radius as is the radius of other wagon wheelsets. Entrance of the wagon with the fluent transition is with the angle beginning at 4° with further fluent connection to the bottom deck floor.

[0015] The central wheelsets have a radius of 600 mm, the outer wheelsets can have a radius of 600 mm also or greater. By that, it will be provided that boarding of the wagon will be fluent with small inclination. Each loading deck is straight and it does not contain any protuberances. Low position of the bottom loading deck provides sufficient free area for loading on the upper deck. The protuberance-free bottom deck provides a fluent transition of loaded cars on the wagon. The outer wagons are equipped with mechanisms for vertical adjustment of the upper deck. It enables loading from a single-level loading ramp, as well as from two-level loading ramp. The central wagons are preferably adjusted to the required vertical level in a workshop. In case of change of transport conditions, the deck can be adjusted to other more suitable position for loading. Of course, the central wagons can also be equipped with separate mechanisms if necessary.

[0016] A minimal wagon configuration consists of two central segments. According to transport requirements, required number of central segments can be inserted between the outer segments, by which required length of the train set for the optimal transportation of the specific types of cars can be provided.

[0017] The central segments can be of different length in order to provide an optimal transportation of different cars.

Claims 30

1. System of opened and/or closed wagons for double-deck transportation of cars, **characterised in that** it includes two outer wagons or two outer wagons and at least one central wagon, where each wagon has an upper loading deck and a bottom loading deck, whereby the outer wagons are equipped with mechanisms for vertical adjustment of the upper deck, the upper loading decks and the bottom loading decks are straight.
2. System of opened and/or closed wagons for double-deck transportation of cars according to the claim 1, **characterised in that** the central wagon includes mechanisms for vertical adjustment of the upper deck.
3. System of opened and/or closed wagons for double-deck transportation of cars according to the claim 1 and 2, **characterised in that** the outer wagons have outer wheelsets with greater radius as radiuses of other wheelsets of the wagon for boarding of the wagon with a fluent transition with an angle from 4° and with fluent connection to the bottom deck floor.

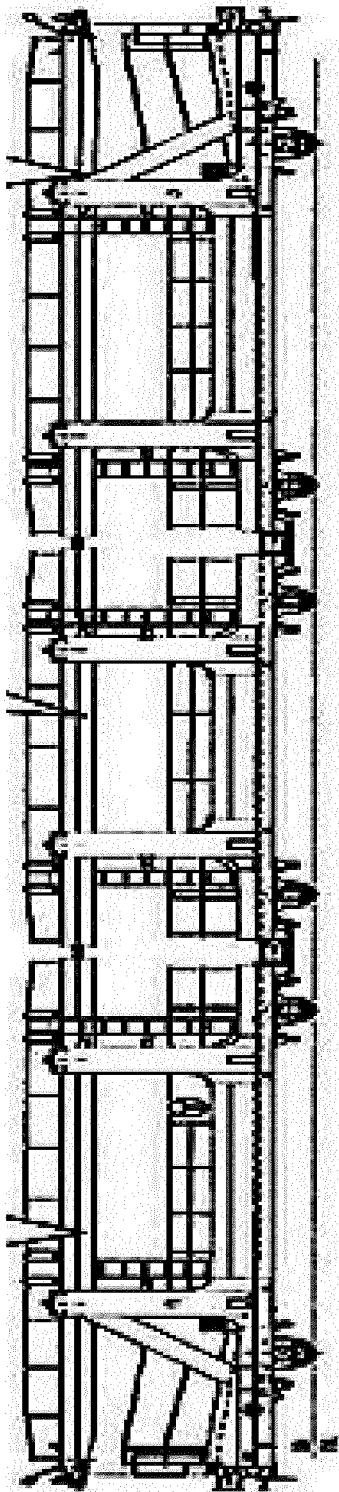


Fig. 1



Fig. 2



EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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			TECHNICAL FIELDS SEARCHED (IPC)
			B61D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 12 June 2019	Examiner Denis, Marco
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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