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**Carriage with a lowered floor for railway vehicles.**

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## Description

The present invention relates to carriages for railway vehicles, of the type including a chassis carrying a pair of bogies and having a floor on which rests a body defining a passenger area and provided with side access doors, and wherein the floor has a lowered configuration below the upper portions of the wheels of the bogies and has no differences in level throughout the passenger area, and wherein the passenger area comprises a main zone which extends between the two bogies and has rows of seats, and two secondary zones situated at the ends of the main zone, over the bogies, and provided with seating elements arranged in correspondence with the wheel arches.

A carriage for railway vehicles of the above-mentioned type is disclosed in DE-A-2711646, wherein the lowered floor terminates prior to the opposite ends of the carriage, in front of respective rows of seats extending transverse to the longitudinal axis of the carriage and preventing intercommunication between two adjacent carriages.

The object of the present invention is to produce a carriage of the type defined above which, on the one hand, enables the passengers to board and alight easily and, on the other hand, has a more rational internal configuration than conventional carriages, so as to ensure greater comfort for the travellers.

In order to achieve this object, the subject of the invention is a carriage for railway vehicles, of the type specified above, characterised in that the floor in said secondary end zones extends as far as the ends of the carriage body.

The main zone may include two opposite compartments separated by a central area including two toilets and an intermediate passage for communication between the two compartments, and the two secondary zones may be provided with respective facing seats for the passengers. In this case, each of the secondary zones communicates at one end with the adjacent compartment of the main zone and at the opposite end with an end area for intercommunication with another carriage, in correspondence with which the access doors are situated.

Alternatively, the main zone may include a single compartment with seats arranged in two double rows and the two secondary zones may be provided with respective double rows of seats. In this case, the secondary zones each communicate at one end with an intermediate area which is in communication with the main zone and at the opposite end with an end area for intercommunication with another carriage, including two toilets and an intermediate passage. In this case, the access doors are arranged in correspondence with the intermediate areas.

In both cases, the lowered configuration of the floor eliminates the need for steps in correspondence

with the doors, which enables boarding and alighting to be made considerably easier for the passengers.

The invention will now be described in detail with reference to the appended drawings, provided purely by way of non-limiting example, in which :

Figure 1 is a side elevational view of a carriage for railway vehicles according to the invention, with access doors arranged at the ends of the body, Figure 2 is a schematic longitudinal section taken on the line II-II of Figure 1,

Figure 3 is a cross-section taken on the line III-III of Figure 1,

Figure 4 is a cross-section taken on the line IV-IV of Figure 1,

Figure 5 is a view similar to Figure 1 of a carriage for railway vehicles according to the invention, with access doors situated in positions intermediate the bogies,

Figure 6 is a schematic longitudinal section taken on the line VI-VI of Figure 5, and

Figure 7 is a cross-section taken on the line VII-VII of Figure 5.

Referring initially to Figures 1 to 4, a carriage for railway vehicles is generally indicated 1 and is connected at its ends, in known manner, to similar carriages 1 to form a railway train.

The carriage 1 comprises a chassis 2 connected near its ends to two supporting bogies 3 and defining a floor 4 on which a body 5 rests. The conformation of the bogies 3 and the body 5 is such that the floor 4 is at a lower level than the upper portions of the wheels 3a of the bogies 3, so as to facilitate the boarding and alighting of passengers through access doors 6,7 with which the sides of the body 5 are equipped near their ends.

In the embodiment of Figures 1 to 4, the passenger area defined by the body 5 comprises :

- a main zone 8 formed by two opposite compartments 9,10 (for example, for smokers and non-smokers respectively) provided with seats. In particular, the compartment 9 includes a double row of seats 11 extending along one side of the body 5 and a single row of seats 12 extending along the opposite side. The compartment 10 has a reversed configuration with a single row of seats 13 extending along the side corresponding to the double row 11 of the compartment 9 and a double row of seats 14 extending along the opposite side of the body 5. The seats of the rows 11, 12 and 13, 14 face in opposite directions ;

- a central area 15 interposed between the two compartments 9,10 of the main zone 8 and including two toilets 16 between which is situated an intermediate passage 17 for communication between the two compartments 9 and 10.

Due to the reversed configuration of the seats in the two compartments 9 and 10, the longitudinal passageways between the rows 11 and the row 12 and

between the row 13 and the rows 14 are staggered relative to each other : consequently, the intermediate passage 17 is angled so that its two ends open in correspondence with the passageways ;

— two secondary zones 18, 19 (for example, for smokers and non-smokers respectively) arranged at the ends of the two compartments 9, 10 opposite the central area 15. These secondary zones 18, 19 communicate with the main zone 8 and are provided with respective settees 20, 21 facing each other so as to form small passenger lounges. These settees 20, 21 are arranged in correspondence with raised wheel arches 3b projecting from the floor 4, so as to hide them.

At their ends opposite the main zone 8, the secondary zones 18 and 19 communicate through doors 22, 23 with two end areas 24, 25 into which the access doors 6, 7 open and which act as passages for intercommunication with the adjacent carriages 1 through sliding doors 26, 27.

By virtue of the lowered configuration of the floor 4, the access doors 6, 7 may be arranged in any intermediate zone between the two bogies 3, instead of at the ends of the carriage 1. An arrangement of this type is illustrated in Figures 5 to 7, in which parts identical or similar to those already described above are indicated with the same reference numerals.

In this case, the passenger area defined by the body 5 comprises :

— a main zone constituted by a single compartment 28 (for example, for non-smokers) provided with two rows of seats 29,

— two secondary zones 31, 32 (for example, for smokers) arranged at the ends of the main zone 28, over the bogies 3, and provided with respective double rows of seats 33, 34 arranged so as to hide the wheel arches 3b. At one end, the secondary zones 31, 32 communicate through doors 35, 36 with respective intermediate areas 37, 38 through which there is access to the main zone 28 by means of doors 39, 40. The side access doors 6, 7 open into these intermediate areas 37, 38.

At the opposite end, the secondary zones 31, 32 communicate through respective doors 41, 42 with two end areas 43, 44, each including two toilets 45, 46 between which is situated a passage 47, 48 for intercommunication with the adjacent carriages 1 through the sliding doors 26 and 27.

## Claims

1. A carriage (1) for railway vehicles, including a chassis (2) carrying a pair of bogies (3) and having a floor (4) on which rests a body (5) defining an area for the passengers and provided with side access doors, (6, 7) wherein the floor (4) has a lowered configuration below the upper portions of the wheels (3a) of the

bogies (3) and has no differences in level throughout the passenger area, and the passenger area comprises a main zone (8 ; 28) which extends between the two bogies (3) and has rows of seats (11, 12, 13, 14 ; 29), and two secondary zones (18, 19 ; 31, 32) situated at the ends of the main zone (8 ; 28), over the bogies (3), and provided with seating elements (20, 21 ; 33, 34) arranged in correspondence with raised wheel arches (3b), characterised in that the floor (4) in said secondary end zones (18, 19 ; 31, 32) extends as far as the ends of the carriage body (1).

2. A carriage according to Claim 1, characterised in that the main zone (8) includes two opposite compartments (9, 10) separated by a central area (15) including two toilets (16) and an intermediate passage (17) for communication between the two compartments (9, 10), and the two secondary zones (18, 19) are provided with respective facing seats (20, 21) for the passengers ; each of the secondary zones (18, 19) communicating at one end with the adjacent compartment (9, 10) of the main zone (8) and at the opposite end with an end area (24, 25) for intercommunication with another carriage (1), in correspondence with which the access doors (6, 7) are situated.

3. A carriage according to Claim 2, characterised in that the seats (11, 12 ; 13, 14) of the two compartments (9, 10) of the main zone (8) face in opposite directions.

4. A carriage according to Claim 2 or Claim 3, characterised in that the seats of the two compartments (9, 10) of the main zone (8) are arranged in three rows of which one (11 ; 14) is double and one (12 ; 13) is single and which extend along the sides of a body (5).

5. A carriage according to Claim 4, characterised in that the single rows (12 ; 13) and the double rows (11 ; 14) of seats in the two compartments (9, 10) of the main zone (8) are arranged in a reversed configuration, and in that the intermediate passage (17) of the central separation area (15) is angled so that its two ends open in correspondence with the longitudinal passageways between the single row (12 ; 13) and the double row (11 ; 14) of seats of the two compartments (9, 10) of the main zone (8).

6. A carriage according to Claim 1, characterised in that the main zone includes a single compartment (28) with seats arranged in two double rows (29), in that the two secondary zones (31, 32) are provided with respective double rows of seats (33, 34) and each communicate at one end with an intermediate area (37, 38) in communication with the main zone (28) and at the opposite end with an end area (43, 44) for intercommunication with another carriage (1), including two toilets (45, 46) and an intermediate passage (47, 48), and in that the side access doors (6, 7) are arranged in correspondence with the intermediate area (37, 38).

## Patentansprüche

1. Wagen (1) für Schienenfahrzeuge, wobei der Wagen ein Chassis (2) aufweist, das ein Paar von Drehgestellen (3) trägt und einen Boden (4) besitzt, auf dem ein Wagenkörper (5) ruht, der einen Passagierbereich festlegt und mit seitlichen Zugangstüren (6, 7) versehen ist, wobei der Boden (4) einen abgesenkten Aufbau besitzt, der unter die oberen Teile der Räder (3a) der Drehgestelle (3) abgesenkt ist und im gesamten Passagierbereich keine Niveauunterschiede aufweist, und wobei der Passagierbereich einen Hauptbereich (8 ; 28), der zwischen den beiden Drehgestellen (3) verläuft und mit Sitzreihen (11, 12, 13, 14 ; 29) versehen ist, sowie zwei Sekundärbereiche (18, 19 ; 31, 32) besitzt, die an den Enden des Hauptbereichs (8 ; 28) über den Drehgestellen (3) angeordnet und mit Sitzelementen (20, 21 ; 33, 34) versehen sind, die in Übereinstimmung mit den erhabenen Radkästen (3b) angeordnet sind, dadurch gekennzeichnet, daß der Boden (4) in den Sekundärbereichen (18, 19 ; 31, 32) bis zu den Enden des Wagenkörpers (1) verläuft.

2. Wagen gemäß Anspruch 1, dadurch gekennzeichnet, daß der Hauptbereich (8) zwei gegenüberliegende Abteile (9, 10) aufweist, die durch einen Mittelbereich (15) getrennt sind, der zwei Toiletten (16) sowie einen Zwischendurchgang (17) aufweist, um eine Verbindung zwischen den beiden Abteilen (9, 10) herzustellen, und wobei die beiden Sekundärbereiche (18, 19) mit entsprechenden gegenüberliegenden Sitzen (20, 21) für die Passagiere versehen sind; wobei jeder Sekundärbereich (18, 19) an einem Ende mit dem benachbarten Abteil (9, 10) des Hauptbereichs (8) und am gegenüberliegenden Ende mit einem Endbereich (24, 25) in Verbindung steht, um eine gegenseitige Verbindung mit einem anderen Wagen (1) zu ermöglichen, wobei die Zugangstüren (6, 7) in Übereinstimmung mit den Endbereichen (24, 25) angeordnet sind.

3. Wagen gemäß Anspruch 2, dadurch gekennzeichnet, daß die Sitze (11, 12 ; 13, 14) der beiden Abteile (9, 10) des Hauptbereichs (8) entgegengesetzt gerichtet sind.

4. Wagen gemäß Anspruch 2 oder 3, dadurch gekennzeichnet, daß die Sitze der beiden Abteile (9, 10) des Hauptbereichs (8) in drei Reihen angeordnet sind, wobei eine Reihe (11 ; 14) eine Doppelreihe und eine Reihe (12 ; 13) eine Einzelreihe ist, wobei die Reihen längs den Seiten eines Wagenkörpers (5) verlaufen.

5. Wagen gemäß Anspruch 4, dadurch gekennzeichnet, daß die Einzelreihen (12 ; 13) und die Doppelreihen (11 ; 14) von Sitzen in den beiden Abteilen (9, 10) des Hauptbereichs (8) umgekehrt angeordnet sind, und daß der Zwischendurchgang (17) des mittleren Trennbereichs (15) schräg angeordnet ist, so daß sich seine beiden Enden in Übereinstimmung mit

den Längsdurchgängen zwischen der Einzelreihe (12 ; 13) und der Doppelreihe (11 ; 14) von Sitzen der beiden Abteile (9, 10) des Hauptbereichs (8) öffnen.

6. Wagen gemäß Anspruch 1, dadurch gekennzeichnet, daß der Hauptbereich ein einziges Abteil (28) aufweist, dessen Sitze in zwei Doppelreihen (29) angeordnet sind, daß die beiden Sekundärbereiche (31, 32) mit entsprechenden Doppelreihen von Sitzen (33, 34) versehen sind, wobei jeder Sekundärbereich (31, 32) an einem Ende mit einem Zwischenbereich (37, 38), der mit dem Hauptbereich (28) in Verbindung steht, und am gegenüberliegenden Ende mit einem Endbereich (43, 44) in Verbindung steht, um eine gegenseitige Verbindung mit einem anderen Wagen (1) zu ermöglichen, wobei die Endbereiche (43, 44) zwei Toiletten (45, 46) sowie einen Zwischendurchgang (47, 48) aufweisen, und daß die seitlichen Zugangstüren (6, 7) in Übereinstimmung mit dem Zwischenbereich (37, 38) angeordnet sind.

## Revendications

1. Voiture (1) pour véhicules ferroviaires comprenant un châssis (2) qui porte une paire de bogies (3) et possède un plancher (4) sur lequel repose une caisse (5) qui définit une région affectée aux passagers, et est munie de portes d'accès latérales (6, 7), voiture dans laquelle le plancher (4) possède une configuration surbaissée au-dessous du niveau des parties supérieures des roues (3a) des bogies (3) et ne présente aucune différence de niveau dans toute la région affectée aux passagers, et dans laquelle la région affectée aux passagers comprend une zone principale (8 ; 28), qui s'étend entre les deux bogies (3) et possède des rangées de sièges (11, 12, 13, 14 ; 29), et deux zones secondaires (18, 19 ; 31, 32), situées aux extrémités de la zone principale (8 ; 28) et au-dessus des bogies (3), et munies d'éléments de places assises (20, 21 ; 33, 34) agencés au droit des passages de roues (3b), caractérisé en ce que, dans lesdites zones secondaires d'extrémités (18, 19 ; 31, 32), le plancher (4) se prolonge jusqu'aux extrémités de la caisse (1) de la voiture.

2. Voiture selon la revendication 1, caractérisée en ce que la zone principale (8) comprend deux compartiments opposés (9, 10) séparés par une région centrale (15) qui renferme deux cabinets (16) et un passage intermédiaire (17) servant pour la communication entre les deux compartiments (9, 10), et les deux zones secondaires (18, 19) sont munies de sièges respectivement opposés face à face (20, 21) pour les passagers ; chacune des zones secondaires (18, 19) communiquant, à une première extrémité, avec le compartiment adjacent (9, 10) de la zone principale (8) et, à l'extrémité opposée, avec une région d'extrémité (24, 25) servant pour l'intercommunication avec une autre voiture (1), au droit de

laquelle sont situées les portes d'accès (6, 7).

3. Voiture selon la revendication 2, caractérisée en ce que les sièges (11, 12 ; 13, 124) des deux compartiments (9, 10) de la zone principale (8) regardent dans des directions opposées.

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4. Voiture selon la revendication 2 ou la revendication 3, caractérisée en ce que les sièges des deux compartiments (9, 10) de la zone principale (8) sont agencés en trois rangées dont une (11 ; 14) est double et une (12 ; 13) est simple et qui s'étendent le long des flancs de la caisse (5).

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5. Voiture selon la revendication 4, caractérisée en ce que les rangées simples (12 ; 13) et les rangées doubles (11 ; 14) des sièges des deux compartiments (9, 10) de la zone principale (8) sont agencées dans une configuration inversée et en ce que le passage intermédiaire (17) de la région de séparation centrale (15) est oblique, de manière que ses deux extrémités s'ouvrent en face des passages longitudinaux prévus entre la rangée simple (12 ; 13) et la rangée double (11 ; 14) des sièges des deux compartiments (9, 10) de la zone principale (8).

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6. Voiture selon la revendication 1, caractérisée en ce que la zone principale comprend un compartiment unique (28) avec des sièges agencés en deux rangées doubles (29), en ce que les deux zones secondaires (31, 32) sont équipées de rangées doubles respectives de sièges (33, 34) et qu'elles communiquent chacune à une extrémité avec une région intermédiaire (37, 38) en communication avec la zone principale (28) et, à l'extrémité opposée, avec une région d'extrémité (43, 44) servant pour l'intercommunication avec une autre voiture (1), et comprenant deux cabinets (45, 46) et un passage intermédiaire (47, 48), et en ce que les portes d'accès latérales (6, 7) sont agencées au droit de la région intermédiaire (37, 38).

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