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(54) BOGIE AND CARRIAGE STRUCTURE FOR RAIL VEHICLE

DREHGESTELL UND TRÄGERSTRUKTUR FÜR SCHIENENFAHRZEUG

BOGIE ET STRUCTURE DE CHARIOT POUR VÉHICULE FERROVIAIRE

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WO-A1-87/06550 WO-A1-2013/097963
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Description

Background of the invention

[0001] The invention relates to a bogie for a rail vehicle, the bogie comprising a bogie frame arranged to be fastened to the rail vehicle; two longitudinal beams of the bogie frame that are provided on opposite sides of the bogie and parallel to a direction of travel of the bogie; and rail wheels supported on the longitudinal beams, adjacent thereto. The bogie may be a pivoting one or a "fixed" one, in which case it may pivot slightly only within the limits allowed by the springiness of the bogie. The invention also relates to a carriage structure for a rail vehicle provided with such a bogie.

[0002] Conventionally in the bogies of a low-floor carriage designed for a 1.34 to 1.65 metre gauge, the longitudinal beams of the bogie frame and the support for the rail wheels are implemented by mounting the longitudinal beams in a space between the rail wheels, in which case the longitudinal beams determine a width of an aisle formed symmetrically therebetween inside the carriage. Examples of prior art bogies and carriage structures of this kind are known from WO 2013/097963 A1 and WO 87/06550 A1.

[0003] A problem with this solution is how, when necessary, to place the aisle of the carriage and arrange the seats asymmetrically, for instance in a pattern of 2 + 1 rather than in a symmetrical pattern, since the width of the aisle is limited because of the aforementioned conventional bogie structure. An example of prior art bogie and carriage structure showing a partial asymmetry in the arrangement of the longitudinal beams with respect to a centre line of the bogie is known from JP 2012 116 328 A, wherein, namely, a portion of each of two longitudinal beams provided on opposite sides of the bogie and parallel to a direction of travel of the bogie, is placed outside an area between the rail wheels located on the opposite sides of the bogie.

Summary of the invention

[0004] An object of the invention is thus to solve the problem described above. This object is achieved by a bogie and a carriage structure according to the invention, which is defined by the technical features set forth in independent claims 1 and 7. The bogie and the carriage structure defined in said claims, respectively, are inter alia characterized in that one longitudinal beam is placed within an area between the rail wheels located on the opposite sides of the bogie, and the other longitudinal beam is placed outside said area between the rail wheels, at an outer edge of the bogie, the longitudinal beams thus being located asymmetrically with respect to a centre line of the bogie. Preferred embodiments of the invention are disclosed in the dependent claims.

[0005] The invention is thus based on the asymmetrical placement of the longitudinal beams of the bogie frame

with respect to the centre line of the bogie.

[0006] In a preferred embodiment, a side of the bogie where the longitudinal beam is located within the area between the rail wheels is provided with bogie traction devices, preferably at the outer edge of the bogie, and a side of the bogie where the longitudinal beam is located outside the area between the rail wheels is provided with bogie braking devices, preferably at the outer edge of the bogie.

[0007] It is also possible that the side of the bogie where the longitudinal beam is located within the area between the rail wheels is provided with a combination of bogie traction and braking devices, preferably at the outer edge of the bogie. This may be implemented at least when a driving motor itself is not located in the bogie.

[0008] An advantage of the bogie according to the invention is that the aisle of the carriage can be made considerably wider without substantially impairing the use and driving properties of the carriage. This enables the seats to be arranged considerably more freely, when necessary. The solution according to the invention is applicable to rail vehicles designed for a gauge substantially of the order of 1.34 to 1.65 metres.

List of figures

[0009] The invention is now described in closer detail by means of one preferred embodiment thereof and with reference to the accompanying drawings, in which

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Figure 1 shows, in cross section, a carriage structure and a bogie according to the invention in a direction of travel of a rail vehicle;

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Figure 2 is a top view showing a bogie according to the invention implemented as a pivoting bogie;

Figure 3 is a functional top view showing how the bogie according to Figure 2 pivots in a curve with respect to a carriage body; and

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Figure 4 is a top view showing a bogie according to the invention implemented as a fixed one or as an only slightly pivoting bogie.

Detailed description of the invention

[0010] Figure 1 shows a carriage structure 1 according to the invention for a rail vehicle which may comprise a plurality of such carriage structures 1 connected directly or indirectly to one another. The carriage structure 1 comprises a carriage frame 2; a carriage body 3 arranged above the carriage frame 2; and at least one bogie 4. The bogie 4 comprises a bogie frame 5 arranged to be fastened to the carriage frame 2; two longitudinal beams 7 and 8 of the bogie frame 5 that are provided on opposite sides of the bogie 4 and parallel to a direction of travel of the bogie 4 and the rail vehicle; and rail wheels 9 supported on the longitudinal beams 7 and 8, adjacent thereto. When the bogie 4 is a pivoting bogie according to Figures 2 and 3, a fulcrum 6 is located centrally in the

bogie frame 5 in order to pivotally mount the carriage to the frame 2.

[0011] In a structure according to the invention, the essential point is that one longitudinal beam 7 of the bogie 4 is placed within an area between the rail wheels 9 located on the opposite sides of the bogie 4, and the other longitudinal beam 8 is placed outside said area between the rail wheels 9, at an outer edge of the bogie 4, the longitudinal beams 7 and 8 thus being located asymmetrically with respect to the centre line of the bogie 4 and the carriage structure 1.

[0012] Appropriately, in this example a side of the bogie 4 where the longitudinal beam 7 is located within the area between the rail wheels 9 is provided with traction devices 10 of the bogie 4. This arrangement is the most readily implementable since this side has more space available for the traction devices 10, which often require more space than braking devices. The traction devices 10 are then preferably located at the outer edge of the bogie 4.

[0013] Correspondingly, a side of the bogie 4 where the longitudinal beam 8 is located outside the area between the rail wheels 9 is provided with braking devices 11 of the bogie 4. The braking devices 11 usually take less space than the traction devices 10, so they can be accommodated on this side even if the longitudinal beam 8 is located outside the rail wheels 9, less space being thus available for the placeable components than on the opposite side. The braking devices 11 are then preferably located at the outer edge of the bogie 4.

[0014] It can be seen in Figures 1 and 3 how, on account of the above-described placement of the longitudinal beams 7 and 8, an aisle 12 of a low-floor carriage body 3 is wide enough so as to enable the asymmetrical arrangement of seats 13 to be easily implemented without in any way making the aisle 12 more difficult to move in.

[0015] Figure 4 also shows a bogie 4' according to the invention but implemented as a fixed one or as an only slightly pivoting one. Slight pivoting may be possible within the limits allowed by the suspension of the bogie (not shown). The structure of this bogie 4' is otherwise substantially similar to that shown in Figures 1 to 3 except for not having a fulcrum. Since the bogie pivots only very little, a wider aisle is possible which is suitable for use in a carriage provided with multiple articulations.

[0016] The above description of the invention is only intended to illustrate the basic idea of the invention. A person skilled in the art may thus vary its details within the scope of the attached claims. Consequently, solutions exist for the placement of the traction and braking devices also other than those described herein, including solutions where the traction device only includes gears and clutches necessary for transmitting power but the driving motor itself is not located in the bogie.

Claims

1. A bogie (4; 4') for a rail vehicle, the bogie comprising
 - a bogie frame (5) arranged to be fastened to the rail vehicle,
 - two longitudinal beams (7, 8) of the bogie frame (5) that are provided on opposite sides of the bogie (4; 4') and parallel to a direction of travel of the bogie (4; 4'), and
 - rail wheels (9) supported on the longitudinal beams (7, 8), adjacent thereto, rail wheels (9) on one side of the bogie on one longitudinal beam (7) and rail wheels (9) on the other side of the bogie on the other longitudinal beam (8),

characterised in that one longitudinal beam (7) with its whole length is placed within an area between the rail wheels (9) located on the opposite sides of the bogie (4; 4'), and the other longitudinal beam (8) with its whole length is placed outside said area between the rail wheels (9), at an outer edge of the bogie (4; 4'), all longitudinal beams (7, 8) of the bogie thus being located asymmetrically with respect to a centre line of the bogie (4; 4').
2. A bogie as claimed in claim 1, **characterised in that** a side of the bogie (4; 4') where the longitudinal beam (7) is located within the area between the rail wheels (9) is provided with bogie traction devices (10).
3. A bogie as claimed in claim 2, **characterised in that** the traction devices (10) are located at the outer edge of the bogie (4; 4').
4. A bogie as claimed in any one of the preceding claims, **characterised in that** a side of the bogie (4; 4') where the longitudinal beam (8) is located outside the area between the rail wheels (9) is provided with bogie braking devices (11).
5. A bogie as claimed in claim 4, **characterised in that** the traction devices (10) are located at the outer edge of the bogie (4; 4').
6. A bogie as claimed in claim 1, **characterised in that** a side of the bogie (4; 4') where the longitudinal beam (7) is located within the area between the rail wheels (9) is provided with a combination of bogie traction and braking devices.
7. A bogie as claimed in claim 6, **characterised in that** the combination of traction and braking devices is located at the outer edge of the bogie (4; 4').
8. A carriage structure (1) for a rail vehicle, the carriage structure (1) comprising

- a carriage frame (2),
 - a carriage body (3) arranged above the carriage frame (2); and
 - at least one bogie (4; 4') provided with a bogie frame (5) arranged to be fastened to the carriage frame (2); two longitudinal beams (7, 8) of the bogie frame (5) that are provided on opposite sides of the bogie (4; 4') and parallel to a direction of travel of the bogie (4; 4'); and rail wheels (9) supported on the longitudinal beams (7, 8), adjacent thereto, rail wheels (9) on one side of the bogie on one longitudinal beam (7) and rail wheels (9) on the other side of the bogie on the other longitudinal beam (8),

characterised in that

one longitudinal beam (7) of at least one bogie (4; 4') with its whole length is placed within an area between the rail wheels (9) located on the opposite sides of the bogie (4; 4'), and the other longitudinal beam (8) with its whole length is placed outside said area between the rail wheels (9), at an outer edge of the bogie (4; 4'), all longitudinal beams (7, 8) of the bogie thus being located asymmetrically with respect to a centre line of the bogie (4; 4').

9. A carriage structure as claimed in claim 8, **characterised in that** a side of the bogie (4; 4') where the longitudinal beam (7) is located within the area between the rail wheels (9) is provided with bogie traction devices (10).
10. A carriage structure as claimed in claim 9, **characterised in that** the traction devices (10) are located at the outer edge of the bogie (4; 4').
11. A carriage structure as claimed in any one of claims 8 to 10, **characterised in that** a side of the bogie (4; 4') where the longitudinal beam (8) is located outside the area between the rail wheels (9) is provided with bogie braking devices (11).
12. A carriage structure as claimed in claim 11, **characterised in that** the braking devices (11) are located at the outer edge of the bogie (4; 4').
13. A carriage structure as claimed in claim 8, **characterised in that** a side of the bogie (4; 4') where the longitudinal beam (7) is located within the area between the rail wheels (9) is provided with a combination of bogie traction and braking devices.
14. A carriage structure as claimed in claim 13, **characterised in that** the combination of traction and braking devices is located at the outer edge of the bogie (4; 4').

Patentansprüche

1. Drehgestell (4; 4') für ein Schienenfahrzeug, wobei das Drehgestell umfasst:

einen Drehgestellrahmen (5), der dazu eingerichtet ist, an dem Schienenfahrzeug befestigt zu werden,
 zwei Längsträger (7, 8) des Drehgestellrahmens (5), die an den gegenüberliegenden Seiten des Drehgestells (4; 4') und parallel zu einer Bewegungsrichtung des Drehgestells (4; 4') angeordnet sind, und
 Schienenräder (9), die an den Längsträgern (7, 8) in Angrenzung dazu gelagert sind, wobei Schienenräder (9) auf einer Seite des Drehgestells an einem Längsträger (7) und Schienenräder (9) auf der anderen Seite des Drehgestells an dem anderen Längsträger (8) angeordnet sind,

dadurch gekennzeichnet, dass

ein Längsträger (7) mit seiner gesamten Länge in einem Bereich zwischen den Schienenrädern (9) platziert ist, die auf gegenüberliegenden Seiten des Drehgestells (4; 4') angeordnet sind, und der andere Längsträger (8) mit seiner gesamten Länge außerhalb des Bereichs zwischen den Schienenrädern (9) an einem äußeren Rand des Drehgestells (4; 4') platziert ist, wobei alle Längsträger (7, 8) des Drehgestells somit symmetrisch bezüglich einer Mittellinie des Drehgestells (4; 4') angeordnet sind.

2. Drehgestell nach Anspruch 1, **dadurch gekennzeichnet, dass** eine Seite des Drehgestells (4; 4'), an welcher sich der Längsträger (7) in dem Bereich zwischen den Schienenrädern (9) befindet, mit Drehgestell-Triebvorrichtungen (10) versehen ist.
3. Drehgestell nach Anspruch 2, **dadurch gekennzeichnet, dass** sich die Triebvorrichtungen (10) am äußeren Rand des Drehgestells (4; 4') befinden.
4. Drehgestell nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** eine Seite des Drehgestells (4; 4'), an welcher sich der Längsträger (8) außerhalb des Bereiches zwischen den Schienenrädern (9) befindet, mit Drehgestell-Bremsvorrichtungen (11) versehen ist.
5. Drehgestell nach Anspruch 4, **dadurch gekennzeichnet, dass** sich die Triebvorrichtungen (10) am äußeren Rand des Drehgestells (4; 4') befinden.
6. Drehgestell nach Anspruch 1, **dadurch gekennzeichnet, dass** eine Seite des Drehgestells (4; 4'), an welcher sich der Längsträger (7) in dem Bereich zwischen den Schienenrädern (9) befindet, mit einer

Kombination aus Drehgestell-Triebvorrichtungen und Bremsvorrichtungen versehen ist.

7. Drehgestell nach Anspruch 6, **dadurch gekennzeichnet, dass** sich die Kombination aus Triebvorrichtungen und Bremsvorrichtungen am äußeren Rand des Drehgestells (4; 4') befindet.

8. Wagenstruktur (1) für ein Schienenfahrzeug, wobei die Wagenstruktur (1) umfasst:

einen Wagenrahmen (2),
einen Wagenkasten (3), der über dem Wagenrahmen (2) angeordnet ist; und
mindestens ein Drehgestell (4; 4'), das mit einem Drehgestellrahmen (5) versehen ist, der dazu eingerichtet ist, an dem Wagenrahmen (2) befestigt zu werden; zwei Längsträger (7, 8) des Drehgestellrahmens (5), die auf gegenüberliegenden Seiten des Drehgestells (4; 4') und parallel zu einer Bewegungsrichtung des Drehgestells (4; 4') bereitgestellt sind; und Schienenräder (9), die an den Längsträgern (7, 8) in Angrenzung dazu gelagert sind, wobei Schienenräder (9) auf einer Seite des Drehgestells an einem Längsträger (7) und Schienenräder (9) auf der anderen Seite des Drehgestells an dem anderen Längsträger (8) angeordnet sind,

dadurch gekennzeichnet, dass

ein Längsträger (7) von mindestens einem Drehgestell (4; 4') mit seiner gesamten Länge in einem Bereich zwischen den Schienenrädern (9) platziert ist, die auf gegenüberliegenden Seiten des Drehgestells (4; 4') angeordnet sind, und der andere Längsträger (8) mit seiner gesamten Länge außerhalb des Bereichs zwischen den Schienenrädern (9) an einem äußeren Rand des Drehgestells (4; 4') platziert ist, wobei alle Längsträger (7, 8) des Drehgestells somit symmetrisch bezüglich einer Mittellinie des Drehgestells (4; 4') angeordnet sind.

9. Wagenstruktur nach Anspruch 8, **dadurch gekennzeichnet, dass** eine Seite des Drehgestells (4; 4'), an welcher sich der Längsträger (7) in dem Bereich zwischen den Schienenrädern (9) befindet, mit Drehgestell-Triebvorrichtungen (10) versehen ist.

10. Wagenstruktur nach Anspruch 9, **dadurch gekennzeichnet, dass** sich die Triebvorrichtungen (10) am äußeren Rand des Drehgestells (4; 4') befinden.

11. Wagenstruktur nach einem der Ansprüche 8 bis 10, **dadurch gekennzeichnet, dass** eine Seite des Drehgestells (4; 4'), an welcher sich der Längsträger (8) außerhalb des Bereichs zwischen den Schienenrädern (9) befindet, mit Drehgestell-Bremsvorrichtungen (11) versehen ist.

12. Wagenstruktur nach Anspruch 11, **dadurch gekennzeichnet, dass** sich die Bremsvorrichtungen (11) am äußeren Rand des Drehgestells (4; 4') befinden.

13. Wagenstruktur nach Anspruch 8, **dadurch gekennzeichnet, dass** eine Seite des Drehgestells (4; 4'), an welcher sich der Längsträger (7) in dem Bereich zwischen den Schienenrädern (9) befindet, mit einer Kombination aus Drehgestell-Triebvorrichtungen und Bremsvorrichtungen versehen ist.

14. Wagenstruktur nach Anspruch 13, **dadurch gekennzeichnet, dass** sich die Kombination aus Triebvorrichtungen und Bremsvorrichtungen am äußeren Rand des Drehgestells (4; 4') befindet.

Revendications

1. Bogie (4 ; 4') destiné à un véhicule ferroviaire, le bogie comprenant :

- un châssis de bogie (5) agencé pour être fixé sur le véhicule ferroviaire,
- deux poutres longitudinales (7, 8) du châssis de bogie (5) qui sont disposées sur des côtés opposés du bogie (4 ; 4') et parallèles à la direction de déplacement du bogie (4 ; 4'), et
- des roues ferroviaires (9) supportées sur les poutres longitudinales (7, 8) de façon adjacente à celles-ci, des roues ferroviaires (9) sur un premier côté du bogie sur une poutre longitudinale (7) et des roues ferroviaires (9) sur l'autre côté du bogie sur l'autre poutre longitudinale (8),

caractérisé en ce que

la première poutre longitudinale (7), sur toute sa longueur, est placée à l'intérieur d'une zone localisée entre les roues ferroviaires (9) situées sur des côtés opposés du bogie (4 ; 4'), et l'autre poutre longitudinale (8), sur toute sa longueur est placée, à l'extérieur de ladite zone entre lesdites roues ferroviaires (9) sur une bordure externe du bogie (4 ; 4'), les poutres longitudinales (7, 8) du bogie étant ainsi situées de façon asymétrique par rapport à l'axe central du bogie (4 ; 4').

2. Bogie selon la revendication 1, **caractérisé en ce qu'un** côté du bogie (4 ; 4') où est située la poutre longitudinale (7) à l'intérieur de la zone entre les roues ferroviaires (9) est muni de dispositifs de traction du bogie (10).

3. Bogie selon la revendication 2, **caractérisé en ce que** les dispositifs de traction (10) sont situés sur la bordure externe du bogie (4 ; 4').

4. Bogie selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**un côté du bogie (4 ; 4') où est située la poutre longitudinale (8) à l'extérieur de la zone entre les roues ferroviaires (9) est muni de dispositifs de freinage du bogie (11).
5. Bogie selon la revendication 4, **caractérisé en ce que** les dispositifs de traction (10) sont situés au niveau de la bordure externe du bogie (4 ; 4').
6. Bogie selon la revendication 1, **caractérisé en ce qu'**un côté du bogie (4 ; 4') où est située la poutre longitudinale (7) à l'intérieur de la zone entre les roues ferroviaires (9) est muni d'une combinaison de dispositifs de traction et de freinage du bogie.
7. Bogie selon la revendication 6, **caractérisé en ce que** la combinaison de dispositifs de traction et de freinage est située au niveau de la bordure externe du bogie (4 ; 4').
8. Structure de chariot (1) pour un véhicule ferroviaire, la structure de chariot (1) comprenant :
- un châssis de chariot (2),
 - une carrosserie de chariot (3) agencée au-dessus du châssis de chariot (2), et
 - au moins un bogie (4 ; 4') doté d'un châssis de bogie (5) agencé pour être fixé sur le châssis de chariot (2) ; deux poutres longitudinales (7, 8) du châssis de bogie (5) qui sont disposées sur des côtés opposés du bogie (4 ; 4') ; ainsi que des roues ferroviaires (9) supportées sur les poutres longitudinales (7, 8) de façon adjacente à celles-ci, des roues ferroviaires (9) sur un premier côté du bogie sur une première poutre longitudinale (7) et des roues ferroviaires (9) sur l'autre côté du bogie sur l'autre poutre longitudinale (8),
- caractérisée en ce que** la première poutre longitudinale (7) d'au moins un bogie (4 ; 4'), sur toute sa longueur, est placée à l'intérieur d'une zone localisée entre les roues ferroviaires (9) situées sur les côtés opposés du bogie (4 ; 4'), et l'autre poutre longitudinale (8), sur toute sa longueur, est placée à l'extérieur de ladite zone entre les roues ferroviaires (9) au niveau d'une bordure externe du bogie (4 ; 4'), les poutres longitudinales (7, 8) du bogie étant ainsi situées de façon asymétrique par rapport à l'axe central du bogie (4 ; 4').
9. Structure de chariot selon la revendication 8, **caractérisée en ce qu'**un côté du bogie (4 ; 4') où est située la poutre longitudinale (7) à l'intérieur de la zone entre les roues ferroviaires (9) est muni de dispositifs de traction du bogie (10).
10. Structure de chariot selon la revendication 9, **caractérisée en ce que** les dispositifs de traction (10) sont situés sur la bordure externe du bogie (4 ; 4').
11. Structure de chariot selon l'une quelconque des revendications 8 à 10, **caractérisée en ce qu'**un côté du bogie (4 ; 4') où est située la poutre longitudinale (8) à l'extérieur de la zone entre les roues ferroviaires (9) est muni de dispositifs de freinage du bogie (11).
12. Structure de chariot selon la revendication 11, **caractérisée en ce que** les dispositifs de freinage (11) sont situés au niveau de la bordure externe du bogie (4 ; 4').
13. Structure de chariot selon la revendication 8, **caractérisée en ce qu'**un côté du bogie (4 ; 4') où est située la poutre longitudinale (7) à l'intérieur de la zone entre les roues ferroviaires (9) est muni d'une combinaison de dispositifs de traction et de freinage du bogie.
14. Structure de chariot selon la revendication 13, **caractérisée en ce que** la combinaison de dispositifs de traction et de freinage est située au niveau de la bordure externe du bogie (4 ; 4').

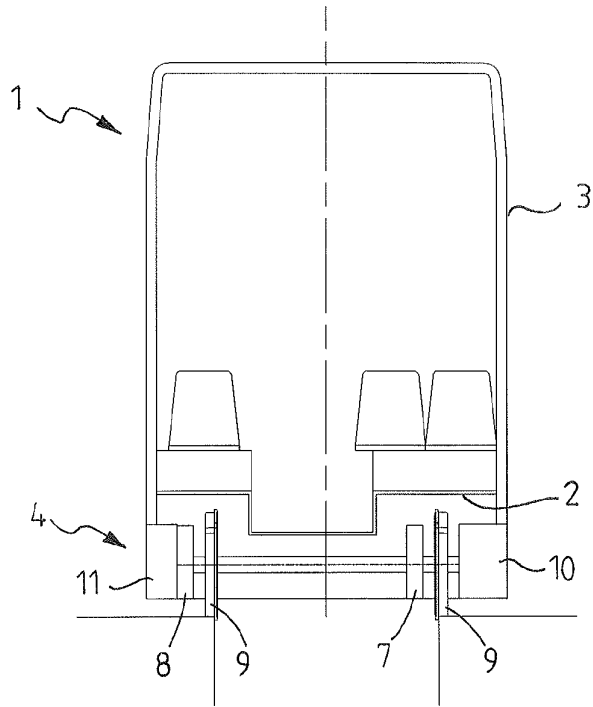


Fig. 1

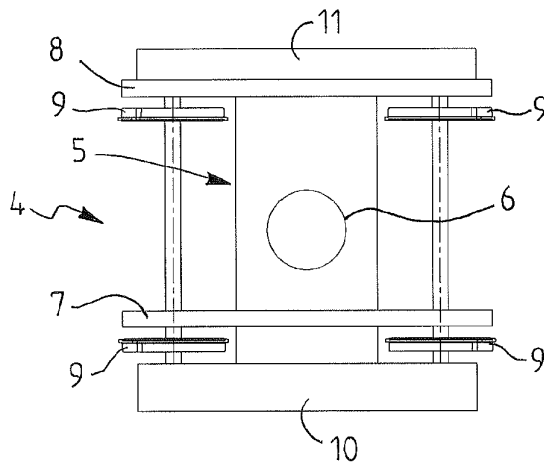


Fig. 2

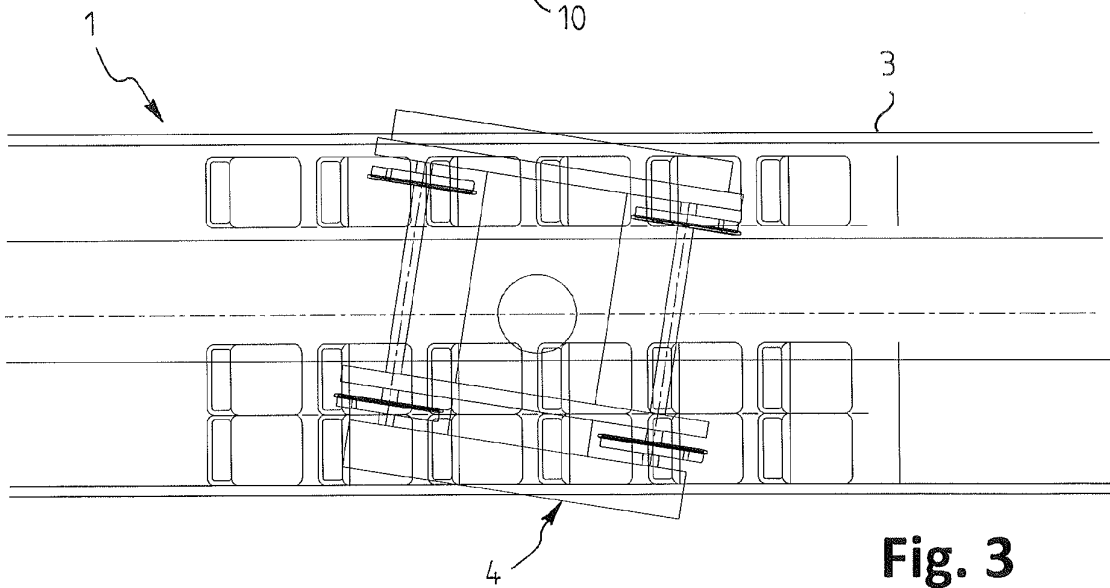


Fig. 3

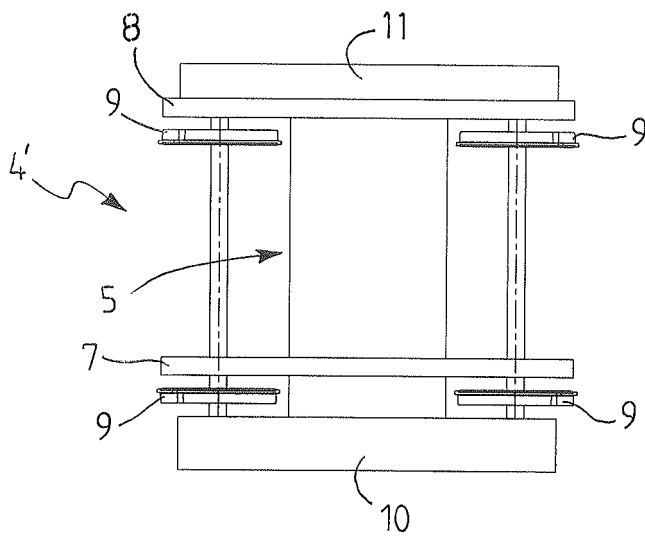


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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