(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 053 802 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
22.04.2020 Bulletin 2020/17

(51) Int Cl.:
B61D 15/06 *(2006.01)* ***B61G 11/00*** *(2006.01)*

(21) Application number: **15305171.9**

(22) Date of filing: **06.02.2015**

(54) **Train set with crash absorbers that can be deactivated**

Zugverband mit Crash-Absorbern, die deaktivierbar sind

Train électrique avec des absorbeurs de choc qui peuvent être désactivés

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(43) Date of publication of application:
10.08.2016 Bulletin 2016/32

(73) Proprietor: **ALSTOM Transport Technologies**
93400 Saint-Ouen (FR)

(72) Inventors:
- **Boos, Michael**
  38173 Sickte (DE)
- **Bergmann, Olaf**
  38124 Braunschweig (DE)

(74) Representative: **Lavoix**
Bayerstrasse 83
80335 München (DE)

(56) References cited:
EP-A1- 0 605 367
GB-A- 1 051 636
JP-A- 2010 202 087
US-A1- 2004 020 888
US-A1- 2014 360 402
US-B1- 6 393 999

EP 3 053 802 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The present invention relates to a train set comprising a first railway vehicle and a second railway vehicle, the first railway vehicle having a first front and a first rear, the second railway vehicle having a second front and a second rear, wherein the first front corresponds to a first end of the train set, wherein the second front corresponds to a second end of the train set, and wherein the train set comprises a coupling zone at which the first rear is coupled to the second rear, wherein each railway vehicle includes at least one front crash absorber at its front and at least one rear crash absorber at its rear.

[0002] Such a train set is widely known and an example is shown in figure 1. However, due to the crash absorbers located in the coupling zone, the total length of the train set is increased. Therefore, a ratio of seats per meter of train length is reduced. Furthermore, such a train set does not allow connection of the two coupled railway vehicles via a gangway connection. Therefore, the train set is poorly adapted to urban or suburban transportation.

[0003] Document EP-A-0 605 367 describes a buffer for railway vehicles.

[0004] Document JP-A-2010 202087 describes a shock absorbing device, a shock absorbing member being vertically stored in a leading part of a railway vehicle.

[0005] Document JP 2010-241305 shows a railway vehicle with two crash absorbers at the front end of the railway vehicle. During normal operation of the railway vehicle the crash absorbers are in a passive stowed configuration. The railway vehicle driver has to activate the crash absorbers into an active crash absorbing configuration before a crash of the railway vehicle.

[0006] The disadvantage of JP 2010-241305 is that the presented railway vehicle provides no crash protection through the crash absorbers when the driver has no time to activate the crash absorbers or fails to do so, for example if the railway vehicle derails. Therefore this railway vehicle does not satisfy security standards.

[0007] Accordingly, it is an object of the present invention to provide a train set with improved safety and an increased ratio of seats per meter.

[0008] At the same time, the railway vehicles forming the train set should be interchangeable, i.e. it should be possible to use the same type of railway vehicle, irrespective of its position within the train set.

[0009] These objects are achieved with the train set according to claim 1.

[0010] Since the front crash absorbers are in an active crash absorbing configuration, they will reliably absorb an impact during an accident, without any need for prior deployment or activation. Thus, safety is improved. Furthermore, since the rear crash absorbers in the coupling zone are in a passive stowed configuration, the coupling zone is shortened, thus increasing the train set's ratio of seats per meter. On top of that, since the crash absorbers can move from one configuration to the other, the railway vehicles of the invention can be used at any position within the train set. Equally, the train set according to the invention can be easily separated into two independent railway vehicles which both satisfy security standards.

[0011] The train set according to the invention can comprise one or more of the features of claims 2 to 8, in all technically possible combinations.

[0012] Exemplary embodiments of the invention will now be described in detail with reference to the drawings, wherein:

Figure 1 shows a side view of a prior art of train set with fixed crash absorbers;
Figure 2 presents a side view of a train set with two coupled railway vehicles of the present invention;
Figure 3 illustrates a side view of a first embodiment of a railway vehicle of figure 2 with crash absorbers that can be deactivated;
Figure 4 shows a front view of the railway vehicle of figure 3;
Figure 5 presents a top view of the railway vehicle of figure 3;
Figure 6 is a detailed view of one crash absorber of the railway vehicle shown in figure 4;
Figure 7 illustrates a side view of a second embodiment of a railway vehicle of figure 2;
Figure 8 shows a front view of the railway vehicle of figure 7;
Figure 9 illustrates a side view of a third embodiment of a railway vehicle of figure 2;
Figure 10 shows a front view of the railway vehicle of figure 9.

[0013] With reference to figure 2, there is shown a train set 1 with two coupled railway vehicles 10, 100. The first railway vehicle 10 has a first front 12 and a first rear 14, both capable to be coupled to another railway vehicle. The second railway vehicle 100 has a second front 120 and a second rear 140, both capable to be coupled to another railway vehicle. In the embodiment shown in figure 2, the first and second railway vehicles 10, 100 are coupled at their rear ends 14, 140.

[0014] In the drawings, the train set's driving direction is identified by a longitudinal horizontal X axis. The vertical direction is identified by a Z-axis, and the transversal direction by a horizontal Y-axis. The wording "laterally" is defined as to be sideward of a plane defined by the X-axis and Z-axis.

[0015] In the following, the term "deactivation" refers to the action of displacing a crash absorber from an active crash absorbing configuration into a passive stowed configuration. Equally, the term "deactivated" refers to a crash absorber which is in a passive stowed configuration. Correspondingly, the term "activation" refers to the action of displacing a crash absorber from a passive stowed configuration into an active crash absorbing configuration and the term "activated" refers to a crash absorber in an active crash absorbing configuration.

[0016] In fig. 2, the train set travels from right to left,

as indicated by the arrow on the X-axis.

[0017] The train set 1 has at least one coupling zone 2 where the first and second railway vehicle 10, 100 are coupled using a coupling 6, to form the train set 1. The coupling 6 is a conventional coupling used for coupling two railway vehicles.

[0018] Each railway vehicle 10, 100 is equipped with at least one front crash absorber 20, 200 at its front end 12, 120 to absorb a shock with a train or obstacle running into the front end 12, 120 of the railway vehicle 10, 100 and at least one rear crash absorber 30, 300 at its rear end 14, 140. The crash absorbers 20, 200, 30, 300 will at least partially absorb a shock, for example, if another train set is running into the train set 1 of the invention, or if the train set 1 runs into an obstacle.

[0019] The coupling zone 2 extends in the longitudinal direction along the X- axis over a distance smaller than the longitudinal length, defined along the X- axis, of two activated crash absorbers 30, 300. A gangway connection 8 is in the coupling zone 2 to provide a gangway for passengers between the two coupled railway vehicles 10, 100 and has a length in the driving direction that is shorter than twice the length in the driving direction of one crash absorber 30. Advantageously, the front crash absorbers 20, 200 and the rear crash absorbers 30, 300 are displaceable between an active crash absorbing and overdimensioned configuration allowing reduction of a shock of the railway vehicle 10, 100, and a passive space-saving stowed configuration allowing reduction of the total length of the railway vehicle 10, 100 or train set 1 along the X- axis.

[0020] According to the present invention, each front crash absorber 20, 200 of the railway vehicles 10, 100 is arranged in the active crash absorbing configuration at least when the train set 1 is in use in order to provide protection to potential passengers.

[0021] As shown in figure 2, each rear crash absorber 30, 300 of the railway vehicles 10, 100 is arranged in the passive space-saving stowed configuration for reduction of the total length of the train set 1. The passive space-saving stowed configuration of the rear crash absorbers 30, 300 permits to reduce the total length of the train set 1 by the longitudinal length of the two crash absorbers 30, 300. For example, the total length reduction of the train set 1 is more than one meter per deactivated crash absorber. In particular, one crash absorber can for example have a total length of 1131mm or 1070mm.

[0022] The train set 1 of the invention (cf. Fig. 2) therefore has an increased ratio of passenger seats per meter of train-set-length compared to a train set of the prior art shown in figure 1, while providing a high security level for passengers and the train driver.

[0023] The comparatively shorter length of the train set 1 is better suited for urban or suburban passenger transportation.

[0024] The train set 1 comprises a gangway connection 8, which interconnects the first and second railway vehicles 10, 100 for passenger transit between the two vehicles in order to equalize the passenger load between the railway vehicles 10, 100 of the train set 1. This gangway connection 8 is particularly important for urban or suburban passenger transportation. The longitudinal length of the gangway connection 8, defined along the X-axis, is smaller than the longitudinal length of two activated crash absorbers. Therefore, the total length of the train set 1 is minimized and the ratio of passenger-seats per meter of the train set 1 is increased.

[0025] In the following, for the sake of simplicity, only the first railway vehicle 10 is explained in detail, but it is evident that all the following also applies for the second railway vehicle 100.

[0026] According to one preferred embodiment of the invention, shown in figures 3, 4, 5 and 6, the front crash absorber 20 and the rear crash absorber 30 are rotatable about a vertical rotation axis Z-Z' perpendicular to the driving direction, in order to displace the crash absorbers from the active crash absorbing configuration to the passive space-saving stowed configuration and vice versa. In this case, the displacement of the crash absorbers 20, 30 is done by a lateral 180° rotation about the vertical rotation axis Z-Z'.

[0027] As shown in figure 6, the vertical rotation axis Z-Z' can be centered on a vertical bolt.

[0028] The activation and deactivation of the crash absorbers 20, 30 is done by a crash absorber displacing device (not shown).

[0029] The crash absorbers 20, 30 can be locked in their current configuration using a locking device 40, for example a pair of bolts, as shown in the detailed view in figure 6, in order to maintain the crash absorbers 20, 30 in their activated or deactivated configuration.

[0030] In the present embodiment, the locking device 40 can be moved vertically in a direction parallel to the vertical rotation axis Z-Z' between a locking position, configured for locking the activated or deactivated crash absorber 20, 30, and a release position, configured for allowing a deactivated crash absorber 20, 30 to rotate around the vertical rotation axis Z-Z' into the active crash absorbing configuration and vice-versa.

[0031] The locking device 40 allows additional stabilization of the activated crash absorbers 20, 30, which is in particular important during a crash. The locking device 40 also prevents accidental deactivation or activation of the crash absorbers 20, 30.

[0032] The railway vehicle 10 has a body 16 comprising stowage spaces 18 for stowing the crash absorbers 20, 30 in their passive space-saving stowed configuration.

[0033] The body 16 of the railway vehicle 10 may comprise flaps 19, shown in figures 4 and 5, covering the stowage spaces 18 and having an open position and a closed position.

[0034] In the open position, the flaps 19 extend from the body 16 laterally upwardly. This laterally opens the stowage space 18 and allows the crash absorber 20, 30 to be deactivated and stowed into the stowage space 18

or to be activated and to be rotated out of the stowage space 18.

[0035] In the closed position, each flap 19 closes laterally flush with the body 16 of the railway vehicle 10 in order to hide the deactivated crash absorbers 20, 30, or to close the stowage space 18 when the crash absorbers 20, 30 are activated.

[0036] The opening and closing of the flaps 19 is done by a device for closing and opening the flaps 19.

[0037] The backside 22, 32 of each crash absorber 20, 30 is arranged to close flush with the body 16 of the railway vehicle 10, 100 when the crash absorber 20, 30 is rotated into the passive space-saving stowed configuration. This allows closing the stowage space 18 in the front end 12 and the rear end 14 of the railway vehicle 10.

[0038] A second embodiment, shown in figure 7 and 8, comprises a horizontal rotation axis Y-Y' for each crash absorber 20, 30. In this embodiment, each crash absorber 20, 30 can rotate about 180° downwardly in order to change from the active crash absorbing configuration to the passive space-saving stowed configuration. The locking device is in this embodiment also horizontally aligned, parallel to the Y-Y' axis.

[0039] The flap 19 (not shown in figures 7 and 8) can be arranged below the stowage space 18 to allow hiding of the deactivated crash absorber 20, 30 in the stowage space 18. One advantage of this embodiment is that for a railway vehicle 10, 100 that is parked, for example in a depot laterally adjacent to a second railway vehicle, the crash absorbers 20, 30 can be activated or deactivated without be hindered by any laterally standing vehicle or obstacle.

[0040] In this embodiment, the flaps 19 can be arranged below the body 16 of the railway vehicle 10, 100 in order to close the stowage space 18 when the crash absorber 20, 30 is in its activated or deactivated configuration.

[0041] Alternatively, when an activated crash absorber 20, 30 is deactivated, a rotation about the horizontal axis Y-Y' can be limited to only 90° (not shown). This means that the crash absorber 20, 30 is extending downwardly. In this alternative embodiment, no stowage space 18 inside the body 16 of the railway vehicle 10, 100 is needed. The deactivation of a crash absorber 20, 30 can be done by simply unlocking the locking device 40, which allows the crash absorber 20, 30 to swing 90° downwardly into the passive space-saving stowed configuration. In this case, flaps 19 could be arranged at the front end 12, 120 and the rear end 14, 140 of the railway vehicle 10, 100 in order to cover the area vacated by the crash absorber 20, 30.

[0042] The crash absorber displacing device can be hydraulically driven or pneumatically driven or electrically driven or manually driven.

[0043] In another embodiment, shown in figures 9 and 10, the crash absorbers 20, 30 are activated and deactivated by a longitudinal movement along the X-axis.

[0044] In this case, the crash absorber displacing device may include a screw thread or a hydraulic cylinder or a pneumatic cylinder. This embodiment does not need any lateral space or space below the body 16 of the railway vehicle 10, 100 for the displacement of the crash absorbers. A shock receiving end of the deactivated crash absorbers 20, 30 closes flush with the body 16 of the railway vehicle 10, 100 in order to hide the deactivated crash absorbers 20, 30.

[0045] In an alternative embodiment, the train set 1 can also be split up into two separate railway vehicles 10, 100, for example if few passengers have to be transported. In this case, the front crash absorbers 20, 200 and the rear crash absorbers 30, 300 are all arranged in the active crash absorbing configuration to absorb a shock with an obstacle running into the front end 12, 120 or the rear end 14, 140 of the railway vehicles 10, 100.

Claims

1. A train set (1) comprising a first railway vehicle (10) and a second railway vehicle (100), the first railway vehicle (10) having a first front (12) and a first rear (14), the second railway vehicle (100) having a second front (120) and a second rear (140), wherein the first front (12) corresponds to a first end of the train set (1), wherein the second front (120) corresponds to a second end of the train set (1), and wherein the train set (1) comprises a coupling zone (2) at which the first rear (14) is coupled to the second rear (140), wherein each railway vehicle (10, 100) includes at least one front crash absorber (20, 200) at its front (12, 120) and at least one rear crash absorber (30, 300) at its rear (14, 140), **characterized:**

   - **in that** each crash absorber is displaceable, on the railway vehicle, between an active crash absorbing configuration and a passive stowed configuration,
   - by, for each crash absorber, a crash absorber displacing device adapted to displace the crash absorber between the active crash absorbing configuration and the passive stowed configuration,
   - **in that** each front crash absorber is arranged in the active crash absorbing configuration,
   - **in that** each rear crash absorber is arranged in the passive stowed configuration,
   - **in that** each crash absorber displacing device is adapted to rotate its crash absorber (20) about a vertical axis (Z-Z') perpendicular to the driving direction laterally away from the railway vehicle, or about a horizontal axis (Y-Y') perpendicular to the driving direction downwardly, from the active crash absorbing configuration to the passive stowed configuration, and
   - **in that** the backside (22, 32) of each crash absorber (20, 30) is arranged to close flush with

the body (16) of the railway vehicle (10, 100) when the crash absorber (20, 30) is rotated into the passive stowed configuration.

2. The train set (1) of claim 1 , wherein a gangway connection (8) connects the first rear to the second rear in the coupling zone.

3. The train set (1) of claim 2, wherein the gangway connection (8) has a length in the driving direction that is shorter than twice the length in the driving direction of one crash absorber (20).

4. The train set (1) of any one of the previous claims, wherein at least one crash absorber displacing device includes a screw thread for displacing its crash absorber between the active crash absorbing configuration and the passive stowed configuration.

5. The train set (1) of any one of claims 1 to 4, wherein at least one crash absorber displacing device is hydraulically driven or pneumatically driven or electrically driven or manually driven.

6. The train set (1) of any one of the previous claims, further comprising a stowage space (18) within one of the railway vehicles for stowing one of the crash absorbers in its passive stowed configuration.

7. The train set (1) of any one of claims 1 to 6, further comprising a locking device (40) for locking one of the crash absorbers (20) in its active crash absorbing configuration or in its passive stowed configuration.

8. The train set (1) of claim 7, wherein said locking device (40) comprises at least one bolt that can be moved along a vertical axis (Z) perpendicular to the driving direction between a locking position and a release position.

Patentansprüche

1. Zugverband (1), ein erstes Schienenfahrzeug (10) und ein zweites Schienenfahrzeug (100) umfassend, wobei das erste Schienenfahrzeug (10) einen ersten Bug (12) und ein erstes Heck (14) aufweist, das zweite Schienenfahrzeug (100) einen zweiten Bug (120) und ein zweites Heck (140) aufweist, wobei der erste Bug (12) einem ersten Ende des Zugverbandes (1) entspricht, wobei der zweite Bug (120) einem zweiten Ende des Zugverbandes (1) entspricht und wobei der Zugverband (1) eine Kopplungszone (2) umfasst, in der das erste Heck (14) an das zweite Heck (140) gekoppelt sind,
wobei jedes Schienenfahrzeug (10, 100) mindestens einen Bugaufprallabsorber (20, 200) an seinem Bug (12, 120) und mindestens einen Heckaufprallabsorber (20, 300) an seinem Heck (14, 140) beinhaltet,
gekennzeichnet:

- **dadurch, dass** jeder Aufprallabsorber an dem Schienenfahrzeug zwischen einer aktiven, aufprallabsorbierenden Gestaltung und einer passiven, verstauten Gestaltung versetzbar ist,
- durch eine Aufprallabsorber-Versetzungsvorrichtung für jeden Aufprallabsorber, die dafür eingerichtet ist, den Aufprallabsorber zwischen der aktiven, aufprallabsorbierenden Gestaltung und der passiven, verstauten Gestaltung zu versetzen,
- dadurch, dass jeder Bugaufprallabsorber in der aktiven, aufprallabsorbierenden Gestaltung angeordnet ist,
- dadurch, dass jeder Heckaufprallabsorber in der passiven, verstauten Gestaltung angeordnet ist,
- dadurch, dass jede Aufprallabsorber-Versetzungsvorrichtung dafür eingerichtet ist, ihren Aufprallabsorber (20) von der aktiven, aufprallabsorbierenden Gestaltung um eine vertikale Achse (Z-Z') senkrecht zur Fahrtrichtung seitlich weg vom Schienenfahrzeug oder um eine horizontale Achse (Y-Y') senkrecht zur Fahrtrichtung nach unten in die passive, verstaute Gestaltung zu drehen, und
- dadurch, dass die Rückseite (22, 32) jedes Aufprallabsorbers (20, 30) dafür angeordnet ist, bündig mit dem Körper (16) des Schienenfahrzeugs (10, 100) abzuschließen, wenn der Aufprallabsorber (20, 30) in die passive, verstaute Gestaltung gedreht ist.

2. Zugverband (1) nach Anspruch 1, wobei in der Kopplungszone eine Laufstegverbindung (8) das erste Heck und das zweite Heck verbindet.

3. Zugverband (1) nach Anspruch 2, wobei die Laufstegverbindung (8) in der Fahrtrichtung eine Länge aufweist, die kürzer als das Doppelte der Länge eines Aufprallabsorbers (20) in der Fahrtrichtung ist.

4. Zugverband (1) nach einem der vorhergehenden Ansprüche, wobei mindestens eine Aufprallabsorber-Versetzungsvorrichtung ein Schraubgewinde zum Versetzten ihres Aufprallabsorbers zwischen der aktiven, aufprallabsorbierenden Gestaltung und der passiven, verstauten Gestaltung beinhaltet.

5. Zugverband (1) nach einem der Ansprüche 1 bis 4, wobei mindestens eine Aufprallabsorber-Versetzungsvorrichtung hydraulisch betrieben oder pneumatisch betrieben oder elektrisch betrieben oder manuell betrieben ist.

6. Zugverband (1) nach einem der vorhergehenden Ansprüche, ferner einen Stauraum (18) in einem der Schienenfahrzeuge umfassend, um einen der Aufprallabsorber in seiner passiven verstauten Gestaltung zu verstauen.

7. Zugverband (1) nach einem der Ansprüche 1 bis 6, ferner eine Arretierungsvorrichtung (40) umfassend, um einen der Aufprallabsorber (20) in seiner aktiven, aufprallabsorbierenden Gestaltung oder in seiner passiven, verstauten Gestaltung zu arretieren.

8. Zugverband (1) nach Anspruch 7, wobei die Arretierungsvorrichtung (40) mindestens einen Bolzen umfasst, der entlang einer vertikalen Achse (Z) senkrecht zur Fahrtrichtung zwischen einer Arretierungsposition und einer Freigabeposition bewegt werden kann.

Revendications

1. Train électrique (1) comprenant un premier véhicule ferroviaire (10) et un second véhicule ferroviaire (100), le premier véhicule ferroviaire (10) ayant une première partie avant (12) et une première partie arrière (14), le second véhicule ferroviaire (100) ayant une seconde partie avant (120) et une seconde partie arrière (140), dans lequel la première partie avant (12) correspond à une première extrémité du train électrique (1), dans lequel la seconde partie avant (120) correspond à une seconde extrémité du train électrique (1), et dans lequel le train électrique (1) comprend une zone de couplage (2) au niveau de laquelle la première partie arrière (14) est couplée à la seconde partie arrière (140),
   Dans lequel chaque véhicule ferroviaire (10, 100) comprend au moins un absorbeur de chocs avant (20, 200) au niveau de sa partie avant (12, 120) et au moins un absorbeur de chocs arrière (30, 300) au niveau de sa partie arrière (14, 140),
   caractérisé :

   - **en ce que** chaque absorbeur de chocs est mobile, sur le véhicule ferroviaire, entre une configuration d'absorption de chocs active et une configuration arrimée passive,
   - par, pour chaque absorbeur de chocs, un dispositif de déplacement d'absorbeur de chocs adapté pour déplacer l'absorbeur de chocs entre la configuration d'absorption de chocs active et la configuration arrimée passive,
   - **en ce que** chaque absorbeur de chocs avant est placé dans la configuration d'absorption de chocs active,
   - **en ce que** chaque absorbeur de chocs arrière est placé dans la configuration arrimée passive,
   - **en ce que** chaque dispositif de déplacement d'absorbeur de chocs est adapté pour faire pivoter son absorbeur de chocs (20) autour d'un axe vertical (Z-Z') perpendiculaire à la direction d'entraînement latéralement à l'écart du véhicule ferroviaire, ou autour d'un axe horizontal (Y-Y') perpendiculaire à la direction d'entraînement vers le bas, entre la configuration d'absorption de chocs active et la configuration arrimée passive, et
   - **en ce que** la partie arrière (22, 32) de chaque absorbeur de chocs (20, 30) est prévue pour se fermer au ras du châssis (16) du véhicule ferroviaire (10, 100) lorsque l'absorbeur de chocs (20, 30) est tourné en configuration arrimée passive.

2. Train électrique (1) selon la revendication 1, dans lequel une passerelle (8) relie la première partie arrière à la seconde partie arrière dans la zone de couplage.

3. Train électrique (1) selon la revendication 2, dans lequel la passerelle (8) possède une longueur dans la direction d'entraînement inférieure à deux fois la longueur dans la direction d'entraînement d'un absorbeur de chocs (20).

4. Train électrique (1) selon l'une quelconque des revendications précédentes, dans lequel au moins un dispositif de déplacement d'absorbeur de chocs comprend un filetage à vis destiné à déplacer son absorbeur de chocs entre la configuration d'absorption de chocs active et la configuration arrimée passive.

5. Train électrique (1) selon l'une quelconque des revendications 1 à 4, dans lequel au moins un dispositif de déplacement d'absorbeur de chocs est entraîné de manière hydraulique ou pneumatique ou est entraîné de manière électrique ou manuelle.

6. Train électrique (1) selon l'une quelconque des revendications précédentes, comprenant en outre un espace d'arrimage (18) dans l'un des véhicules ferroviaires destiné à arrimer l'un des absorbeurs de chocs dans sa configuration arrimée passive.

7. Train électrique (1) selon l'une quelconque des revendications 1 à 6, comprenant en outre un dispositif de verrouillage (40) destiné à verrouiller l'un des absorbeurs de chocs (20) dans sa configuration d'absorption de chocs active ou dans sa configuration arrimée passive.

8. Train électrique (1) selon la revendication 7, dans lequel ledit dispositif de verrouillage (40) comprend au moins un boulon qui peut être déplacé le long d'un axe vertical (Z) perpendiculaire à la direction

d'entraînement entre une position de verrouillage et une position de libération.

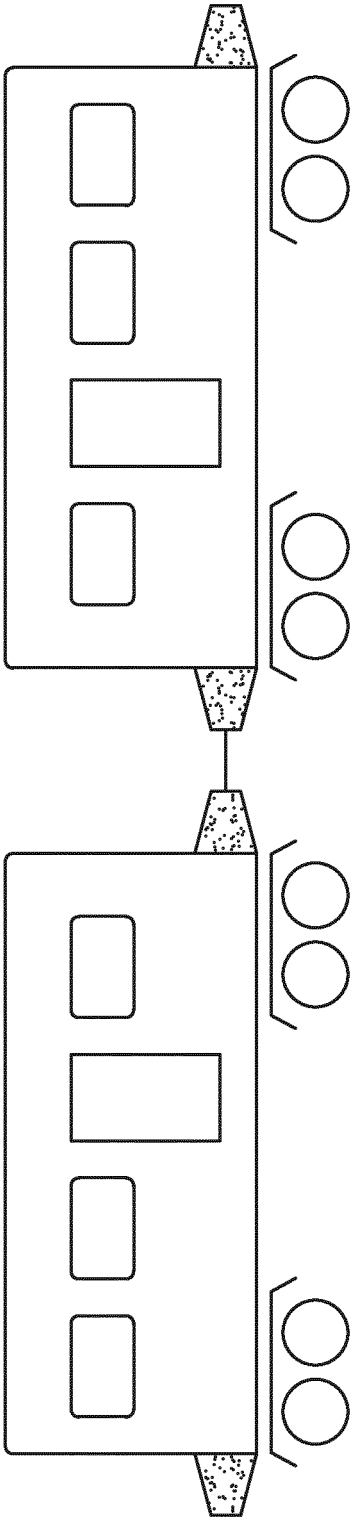

FIG.1 PRIOR ART

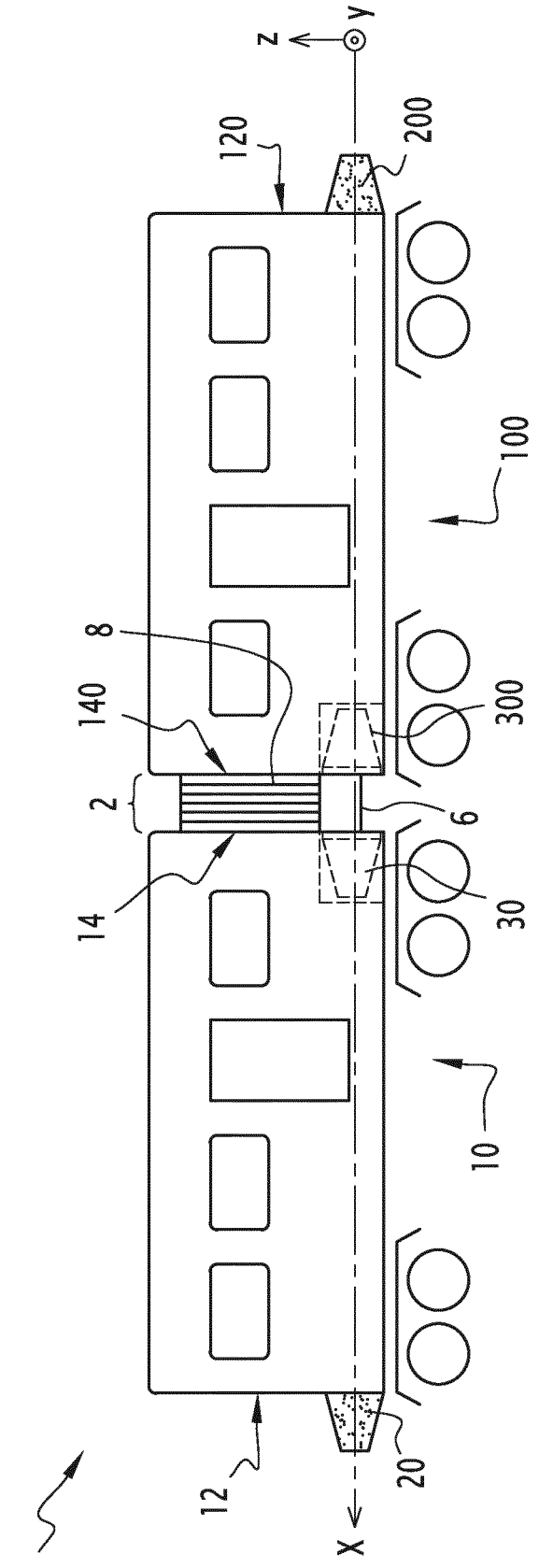

FIG.2

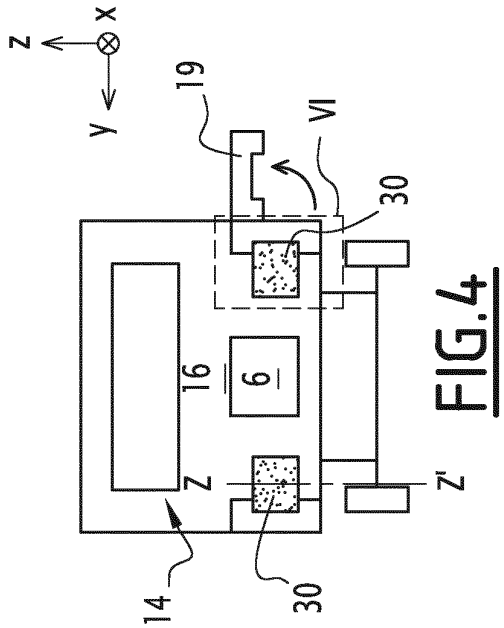

FIG.4

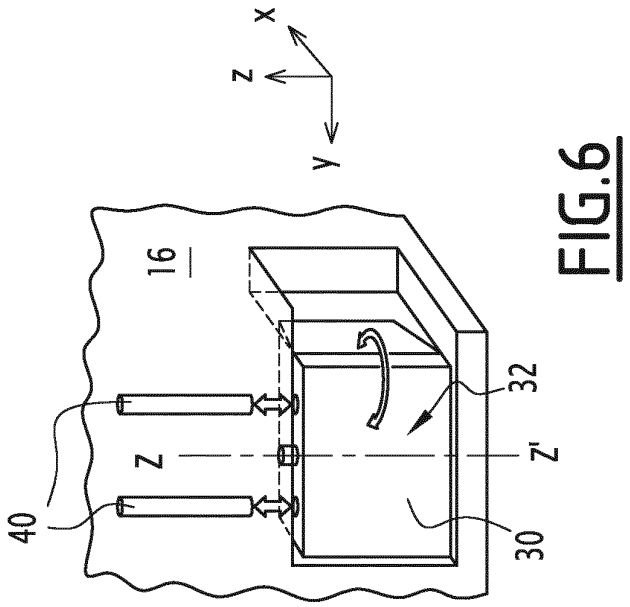

FIG.6

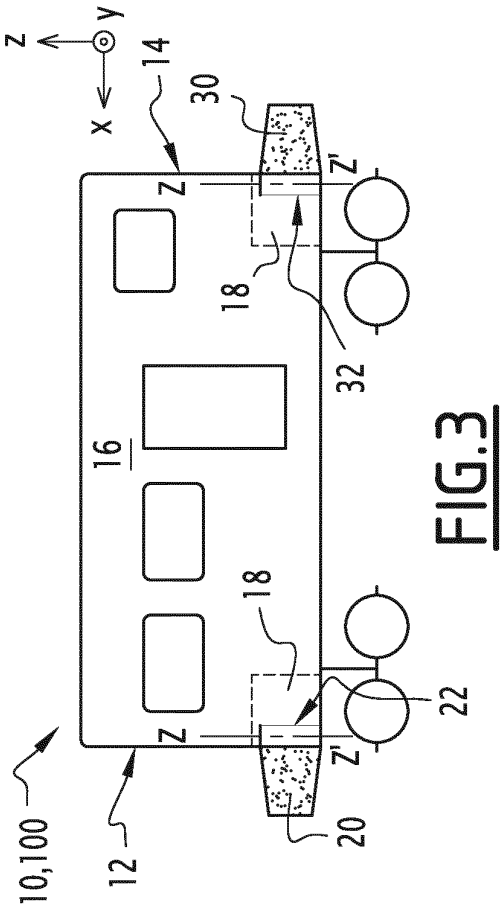

FIG.3

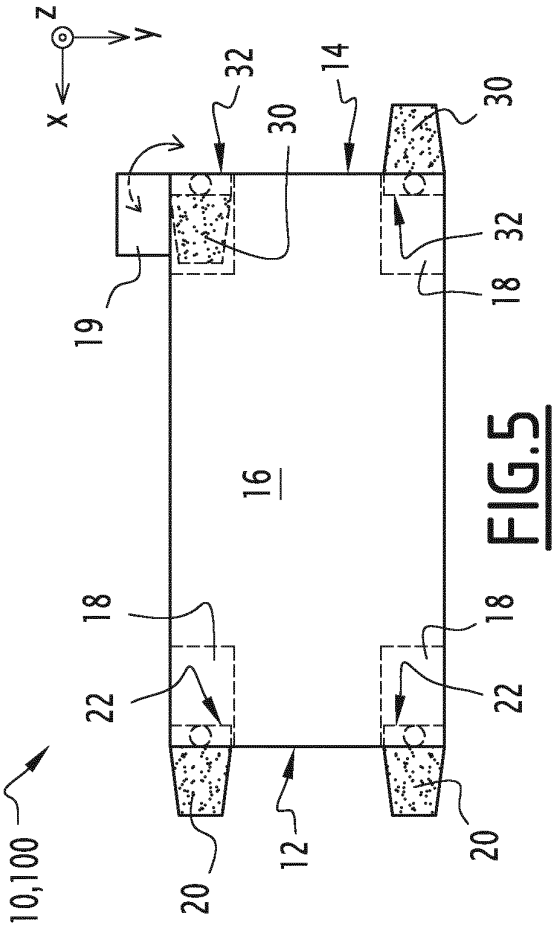

FIG.5

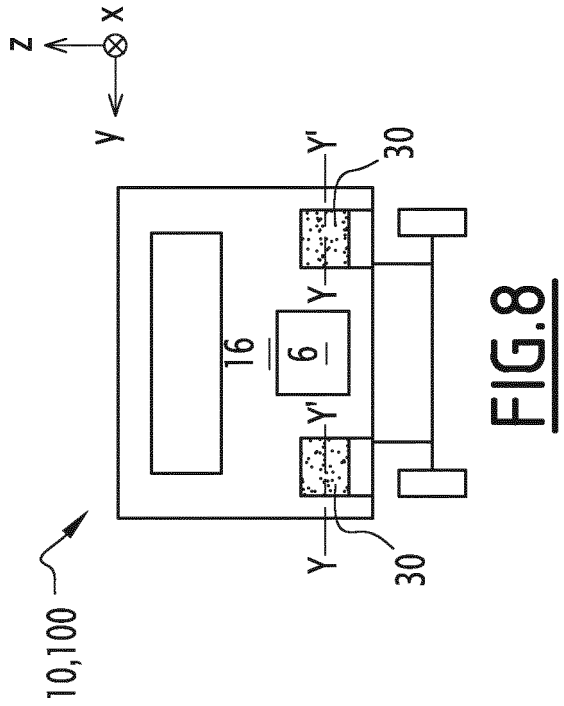

FIG.8

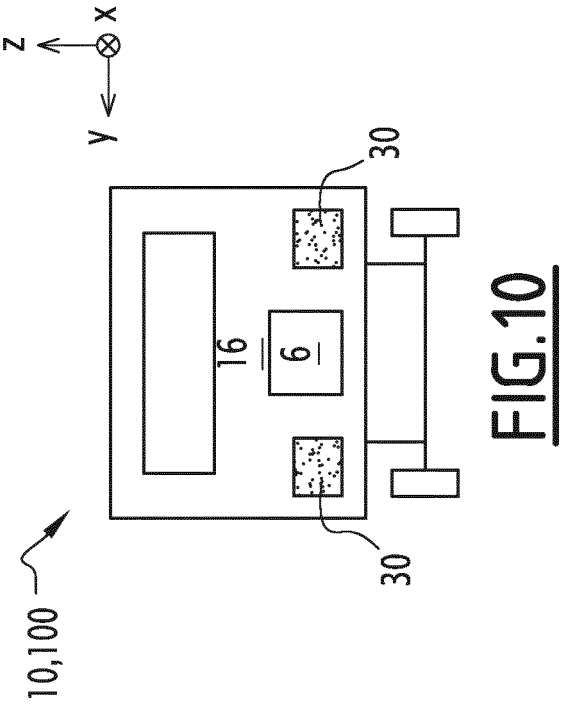

FIG.10

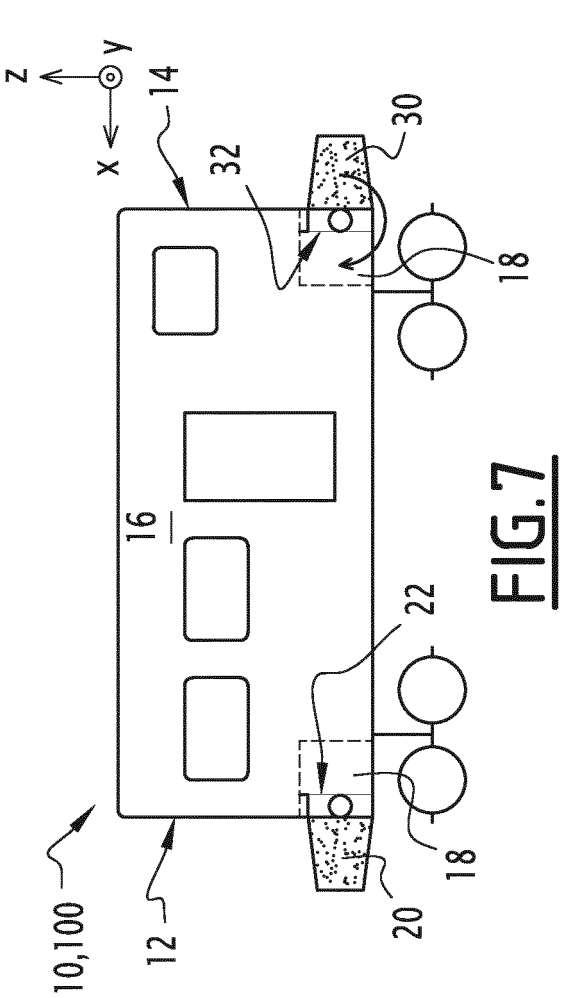

FIG.7

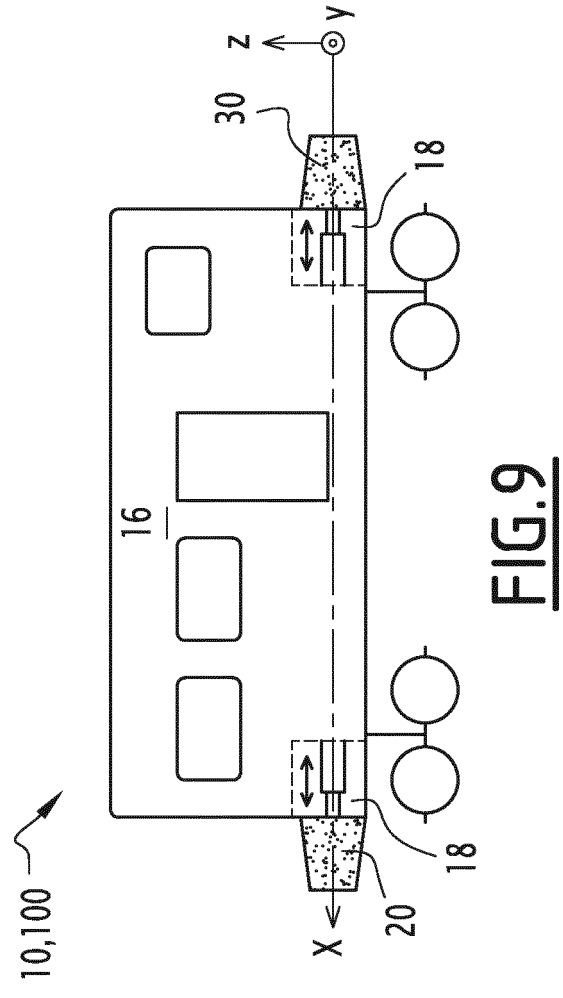

FIG.9

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 0605367 A **[0003]**
- JP 2010202087 A **[0004]**
- JP 2010241305 A **[0005] [0006]**