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(54) **RAILWAY WAGON WITH IMPROVED LAUNCH BEAM MOUNTING**

(57) A railway wagon for transportation of semi-trailers has a first wagon end, a second wagon end, and a carrying section (4) with a front portion (5) releasably connected to the first wagon end (2). The carrying section (4) is movable between a closed position and an open position. The first wagon end (2) has a rail support beam (10) movable in a vertical direction and for abutment on a railway track for support and positioning during move-

ment of the front portion (5). A beam assembly (6) configured to support the front portion (5) while being turned is pivotally connected to the rail support beam (10). An actuator (11) between the first wagon end (2) and the beam assembly (6) is configured to move the beam assembly (6) between an inoperative position and an operative position. A displacement device is provided at the actuator (11).

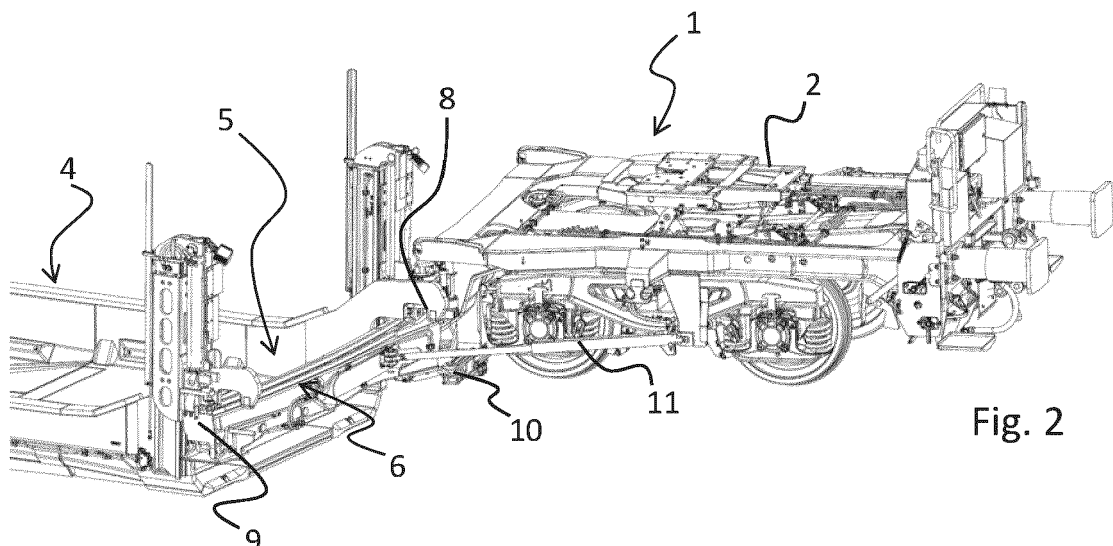


Fig. 2

Description

TECHNICAL FIELD

[0001] The present invention is directed to railway transportation, and in general it relates to a railway wagon for transportation of semi-trailers or the like.

BACKGROUND

[0002] It is well known to provide railway wagons for receiving and carrying semi-trailers during transport. By placing a semi-trailer normally intended for road transport on a railway wagon, a more efficient and environmentally friendly transportation is achieved compared to road transport. Railway is normally used for long distances. Examples of railway wagons for transport of semi-trailers are given in WO2010/120236A1 and WO2020/084081A1.

[0003] It is advantageous to load and unload a semi-trailer on a railway wagon as described above. In this regards a load-carrying section is turned out from and back to the railway wagon. To assist in the turning of the load-carrying section it is advantageous to use a beam arranged in connection with the railway wagon. The beam may be arranged in an operative position in which it supports the front portion of the load-carrying section, and in an inoperative position in which it is arranged along the railway wagon.

[0004] Even though this system functions quite well, it may happen that the beam unintendedly protrudes from the railway wagon in the inoperative position.

SUMMARY

[0005] An object of the invention is to provide a new type of railway wagon enabling secure mounting and operation of a beam assembly of the wagon used when the carrying section is moved from the closed position to the open position and vice versa.

[0006] This object has now been achieved by the solution set forth in appended claim 1, embodiments being defined in the related dependent claims.

[0007] In one aspect, there is provided a railway wagon for transportation of semi-trailers or the like. The railway wagon comprises a first wagon end, a second wagon end, and a carrying section therebetween. The carrying section has a front portion releasably connected to the first wagon end, and it is movable between a closed position in which the front portion is connected to the first wagon end, and an open position in which the front portion is turned out from the first wagon end for loading and unloading of a semi-trailer. The first wagon end comprises a rail support beam movable in a vertical direction and configured to be lowered onto a railway track for supporting and positioning of the first wagon end during movement between the closed position and the open position. A beam assembly configured to support the front portion

of the carrying section while it is being turned has a first end and a second end, the first end being pivotally connected to at least the rail support beam. An actuator is arranged between the first wagon end and the beam assembly for moving the beam assembly between an inoperative position and an operative position and vice versa. Furthermore, a displacement device is provided in connection with the actuator. By the improvement, it is possible to ensure that movable components of the railway wagon do not unintentionally protrude from the wagon in way that could jeopardize the operation and movements of the beam assembly.

[0008] The displacement device is configured to compensate for any longitudinal movements of the beam assembly in the inoperative position thereof during vertical movement of the rail support beam, whereby it is ensured that the beam assembly is not tilted out from the first wagon end to protrude therefrom in an undesired manner.

[0009] In addition, the actuator may have a first actuator end and a second actuator end, the first actuator end being connected with the first wagon end and the second actuator end being connected with the beam assembly.

[0010] Moreover, the displacement device may be arranged at the first actuator end and/or at the second actuator end.

[0011] Furthermore, the displacement device may be provided in the actuator or along an extension of the actuator.

[0012] Additionally, the displacement device may comprise an elastic element, preferably a biasing spring, such as a coil spring or a compression spring. The elastic element is configured to absorb possible movements.

[0013] In an embodiment, the first actuator end may be connected to the first wagon end via a first attachment pin and the second actuator end is connected with the beam assembly via a second attachment pin.

[0014] Also, the displacement device may comprise one or more spring-loaded pin(s) arranged on the opposite side of the attachment pin in relation to the actuator end.

[0015] Moreover, the spring-loaded pin(s) may be connected to the actuator.

[0016] Further objects and advantages of the present invention and related embodiments will appear from the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Embodiments of the invention will be described in the following, reference being had to the appended diagrammatic drawings which illustrate non-limiting examples of how the inventive concept can be reduced into practice, wherein:

Fig. 1 is a perspective view of a railway wagon according to an embodiment with a carrying section in

open position,

Figs 2 to 3 show a front portion of the carrying section and a beam assembly in a perspective view and top view, respectively,

Figs 4a to 4c show a sequence of lowering a rail support beam onto a railway track,

Figs 5 to 6 show a displacement device according to an embodiment, and

Figs 7 to 11 are various views of a locking system for locking the beam assembly and the rail support beam.

DETAILED DESCRIPTION OF EMBODIMENTS

[0018] A railway wagon 1 for loading a semi-trailer thereon is shown in Fig. 1. The railway wagon 1 comprises a first wagon end 2 and a second wagon end 3. The wagon ends 2, 3 are often referred to as bogies or wheel sets. The first wagon end 2 and second wagon end 3 are configured to support a carrying section 4, often referred to as a pocket. The carrying section 4 has a front portion 5 releasably connected to the first wagon end 2, and it is movable between a closed position in which the front portion 5 is aligned with and connected to the first wagon end 2, and an open position in which the front portion 5 is turned out from the first wagon end 2 for loading or unloading of a semi-trailer (not shown). In Fig. 1, the carrying section 4 or pocket is shown in the open position.

[0019] The carrying section 4 and the first wagon end 2 are movable in relation to each other, but in the closed position they are connected with each other to form an entity (wagon to be run on a railway). In order to perform the swinging movement, the carrying section 4 is pivotally connected to the second wagon end 3 via a vertical pivot assembly (not shown).

[0020] An elongated beam or channel 40 extends between the two opposite wagon ends 2, 3. This channel 40 - also referred to as a media channel - is arranged beneath the wagon 1 and it may accommodate electrical cables, hydraulic tubes, air conduits, etc (not shown) safely kept together in the channel 40. When the carrying section 4 is turned out from the wagon 1 and lowered to the loading or unloading position, the media channel 40 is automatically lowered in a mechanical manner so the movement of the carrying section 4 can be carried out in a safe and convenient way.

[0021] As mentioned above the load-carrying section 4 or pocket is configured to accommodate and carry a semi-trailer or the like, and it is preferably through-shaped with an open end at the front portion 5 when pivoted out from the first wagon end 2, and with longitudinal sidewalls 7a and 7b.

[0022] The relative movability of the front portion 5 in relation to the first wagon end 2 has the purpose of en-

abling a rolling loading of the semi-trailer (not shown) onto the load- or cargo-carrying section 4 in the open position in which the front portion 5 of the carrying section 4 is pivoted out from the first wagon end 2 as shown in Fig. 1.

[0023] For facilitating the movement of the front portion 5, a beam assembly 6 is provided; often referred to as a launch beam. The beam assembly 6 is configured to support the front portion 5 of the carrying section 4 while this is being turned, and it has a first end 8 and a second end 9.

[0024] As seen in Fig. 2, the first wagon end 2 of the railway wagon 1 has a rail support beam 10 which is movable in a vertical direction, and configured to be lowered onto a railway track for supporting and positioning the first wagon end 2 during the movement between the closed position and the open position of the carrying section 4. The first end 8 of the beam assembly 6 is pivotally connected to at least the rail support beam 10.

[0025] In addition, an actuator 11 is mounted between the first wagon end 2 and the beam assembly 6 for moving the beam assembly 6 between the inoperative position and the operative position and vice versa. In Figs 1 to 3, the beam assembly 6 is shown in the operative position in which it extends out from the first wagon end 2. The beam assembly 6 also has an inoperative position in which it is moved away from the front portion 5 of the carrying section 4 so that the carrying section 4 may be loaded or unloaded. Alternatively, the inoperative position may be the position in which the beam assembly 6 is positioned at the railway wagon 1 and securely locked as well as ready to be transported with the railway wagon 1 (see Figs 9-11).

[0026] In the present embodiment, the beam assembly 6 is at least at one point pivotally connected to the rail support beam 10 of the first wagon end 2. In the embodiment shown in Figs 2 and 3, the beam assembly 6 is moved from the inoperative position to the operative position or vice versa by means of the actuator 11 arranged between the first wagon end 2 and the beam assembly 6. The actuator 11 - preferably a hydraulic cylinder - pushes the beam assembly 6 from the inoperative position to the operative position, or pulls the beam assembly 6 from the operative position to the inoperative position. In the circumstance where the beam assembly 6 is being moved to the operative position when the carrying section 4 has been loaded with a semi-trailer or has been unloaded, the actuator 11 positions the free end of the beam assembly 6 in the intended position in relation to the carrying section 4.

[0027] In Figs 4a to 4c, the beam assembly 6 is shown in the inoperative position in which it has been turned into abutment with the side of the first wagon end 2. Figs 4a to 4c show a sequence of lowering the rail support beam 10 to abutment with the railway track 16 (see Fig. 4c).

[0028] When the railway wagon 1 is to be altered from the closed position to the open position, the rail support beam 10 is lowered into abutment with the railway track

16 for stabilizing the first wagon end 2. The rail support beam 10 is connected to an actuating assembly, here in the shape of a hydraulic cylinder 12, which is configured to force the rail support beam 10 downwards. The hydraulic cylinder 12 is connected to the first wagon end 2 via an attachment plate 13.

[0029] As shown in Figs 4a-4c, the attachment plate 13 has a first connection point 14 pivotally connecting the attachment plate 13 to the first wagon end 2, and a second connection point 15 connecting the attachment plate 13 to the hydraulic cylinder 12. The first connection point 14 and the second connection point 15 are offset in a vertical plane so that the attachment plate 13 may function as a lever arm.

[0030] Hence, the rail support beam 10 will follow the rotation of the attachment plate 13 around the first connection point 14. Since the rail support beam 10 follows the rotation of the attachment plate 13, the rail support beam 10 will be slightly displaced in a direction away from the attachment plate 13 at the same time as it moves vertically downwards. As mentioned above, the beam assembly 6 is connected to the rail support beam 10, which has the consequence that the beam assembly 6 will also be forced in a horizontal direction away from the attachment plate 13 at the same time as the rail support beam 10 is moved vertically downwards.

[0031] Since the actuator 11 has a predetermined length, a movement of the beam assembly 6 in the horizontal direction will force the free end of the beam assembly 6 slightly outwards from the first wagon end 2 which is the circumstance shown in Fig. 4b.

[0032] In Fig. 4c, the rail support beam 10 is in contact with the railway track 16. However, the beam assembly 6 will still be tilted slightly outwards from the first wagon end 2. This has the disadvantage that the beam assembly 6 might not be in its intended position in relation to the first wagon end 2.

[0033] This disadvantage is mitigated or eliminated by providing a displacement device 17 in connection with the actuator 11 as seen in Figs 5-6. The displacement device 17 is configured to compensate for any longitudinal movements of the beam assembly 6 in the inoperative position thereof during vertical movement of the rail support beam 10 as described above.

[0034] The actuator 11 has a first actuator end 18 and a second actuator end 19, the first actuator end 18 being pivotally connected to the first wagon end 2 and the second actuator end 19 being pivotally connected to the beam assembly 6.

[0035] In the embodiment shown in Figs 5 and 6, the displacement device 17 is arranged at the first actuator end 18. In other embodiments, the displacement device 17 may be arranged at the second actuator end 19, or it may be arranged at both actuator ends.

[0036] The displacement device 17 may comprise an elastic element, preferably a biasing spring, such as a coil spring or a compression spring

[0037] In the present embodiment, the first actuator

end 18 is pivotally connected to the first wagon end 2 via a first attachment pin 20 and the second actuator end 19 is pivotally connected to the beam assembly 6 via a second attachment pin 21. The displacement device 17 comprises two spring-loaded pins 22a, 22b arranged at the opposite side of the attachment pin 20 in relation to the actuator end.

[0038] As shown in Figs 5-6, where the beam assembly 6 is folded into the inoperative position, the actuator 11 pulls the attachment pin 20 to the right in Figs 5-6, which compresses the two spring-loaded pins 22a, 22b and thereby presses a roller 23 of the beam assembly 6 into contact with a vertical track 24 on the first wagon end 2. When the rail support beam 10 is displacing the beam assembly 6 longitudinally as described above, this slack is taken by the compression springs attached to the spring-loaded pins 22a, 22b and the roller 23 of the beam assembly 6 is guiding the same during its vertical movement. Hereby is ensured that the beam assembly 6 will be maintained in the intended inoperative position despite any movements of the beam assembly 6 caused by the displacement of the rail support beam 10. This advantage is obtained by arranging the displacement device 17 in connection with the actuator 11.

[0039] In the embodiment described above, the beam assembly actuator 11 comprises a hydraulic cylinder. It should be noted, though, that this actuator 11 can be of different design. As an alternative to the hydraulic cylinder described above, the actuator can also be pneumatically and/or electro-mechanically operated.

[0040] In an embodiment, the displacement device 17 may be provided in the actuator hydraulic cylinder or along the actuator hydraulic cylinder.

[0041] In Figs 7 to 11, a locking unit 50 is shown. The railway wagon 1 comprises the locking unit 50 which is configured to engage and secure the beam assembly 6 and the rail support beam 10 when the railway wagon 1 is in the closed position and ready for transport.

[0042] In Fig. 7, a part of the locking unit 50 is shown. The locking unit 50 comprises a control spring-loaded handle 51 both operatively and visible from both sides of the railway wagon 1. The locking unit 50 comprises a projection 52 connected to an end part 53 which is tapering off into an arrow as best shown in Fig. 8.

[0043] The projection 52 is moveable between a locked position and an unlocked position. In addition, an indicator 54 is arranged in connection with the projection 52, preferably above the end part 53 (i.e. arrow). In the present embodiment, the indicator 54 has a lock sign 55 and an unlock sign 56.

[0044] The end part 53 connected to the projection 52 is configured to point at the lock sign 55 when the locking unit 50 is locked, and to point at the unlock sign 56 when the locking unit 50 is unlocked, whereby an operator easily may detect if the locking unit 50 is locked or unlocked.

[0045] Hence, the spring-loaded or biased handle 51 constitutes an additional security measure added to the locking unit 50 for ensuring that the indication has been

controlled, so that it is detected that the locking unit 50 has locked the beam assembly 6 and the rail support beam 10 so they are in the engaged position and ready for transport.

[0046] During terminal handling before departure of the railway wagon 1, the control spring-loaded handle 51 ensures a second verification of whether the locking unit 50 is fully engaged (i.e. locked) or not.

[0047] Finally, it should be mentioned that the inventive concept is by no means limited to the embodiments described herein, and modifications are feasible within the scope defined by the appended claims. The improved railway wagon may be used for transportation of not only semi-trailers but also tractors, haulers and the like.

Claims

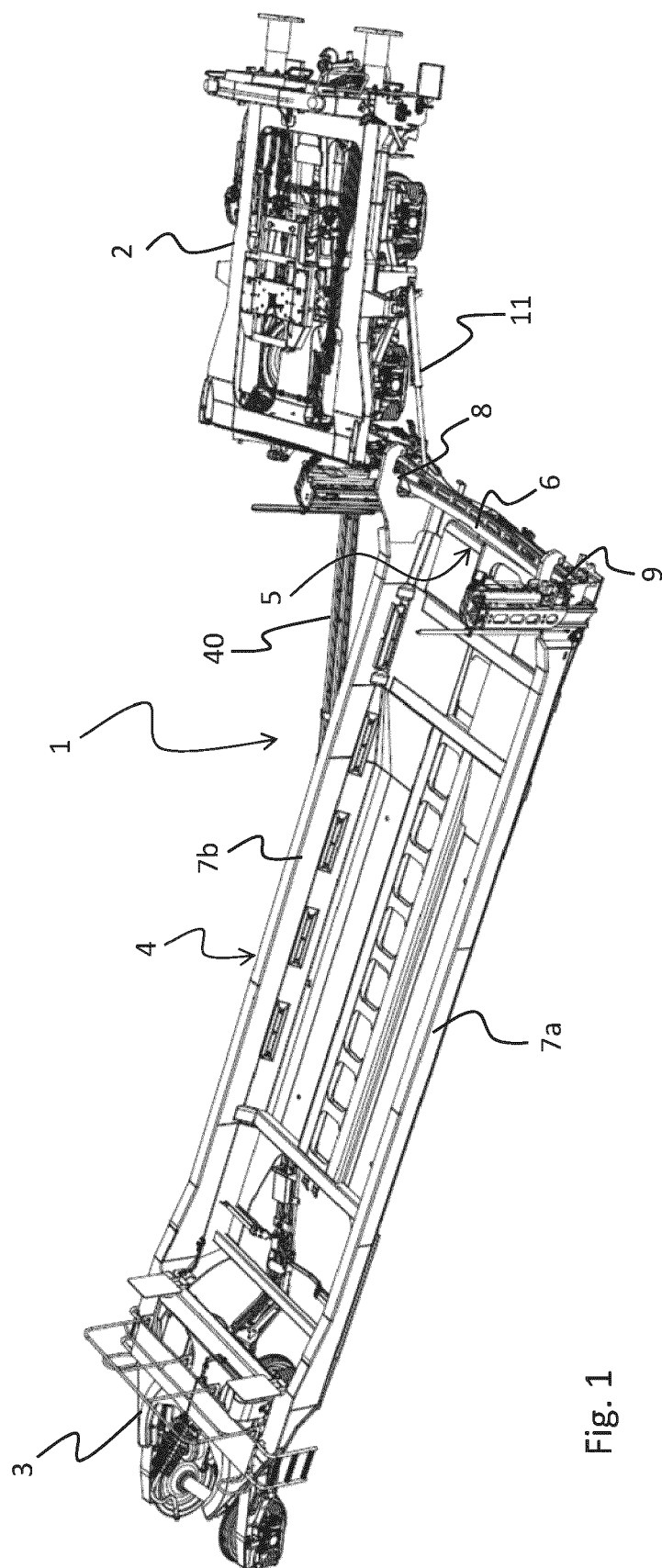
1. A railway wagon for transportation of semi-trailers or the like, comprising:

a first wagon end (2), a second wagon end (3) and a carrying section (4) therebetween; the carrying section (4) having a front portion (5) releasably connected to the first wagon end (2), the carrying section (4) being movable between a closed position in which the front portion (5) is connected to the first wagon end (2), and an open position in which the front portion (5) is turned out from the first wagon end (2) for loading and unloading of a semi-trailer; the first wagon end (2) comprising a rail support beam (10) being movable in a vertical direction, the rail support beam (10) being configured to be lowered onto a railway track (16) for supporting and positioning the first wagon end (2) during movement of the front portion (5) between the closed position and the open position; and a beam assembly (6) configured to support the front portion (5) while the front portion is being turned, the beam assembly (6) having a first end (8) and a second end (9), the first end (8) being pivotally connected to at least the rail support beam (10); an actuator (11) arranged between the first wagon end (2) and the beam assembly (6) for moving the beam assembly between an inoperative position and an operative position and vice versa; wherein a displacement device (17) is provided in connection with the actuator (11).

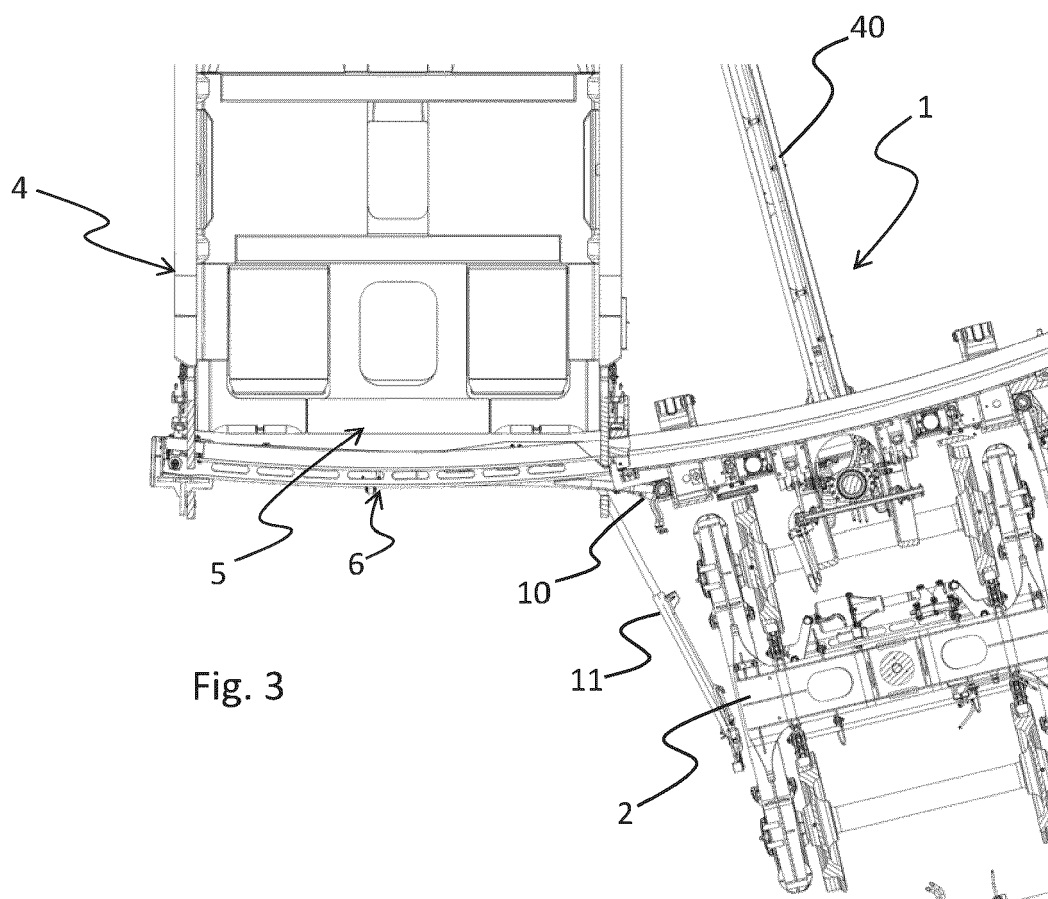
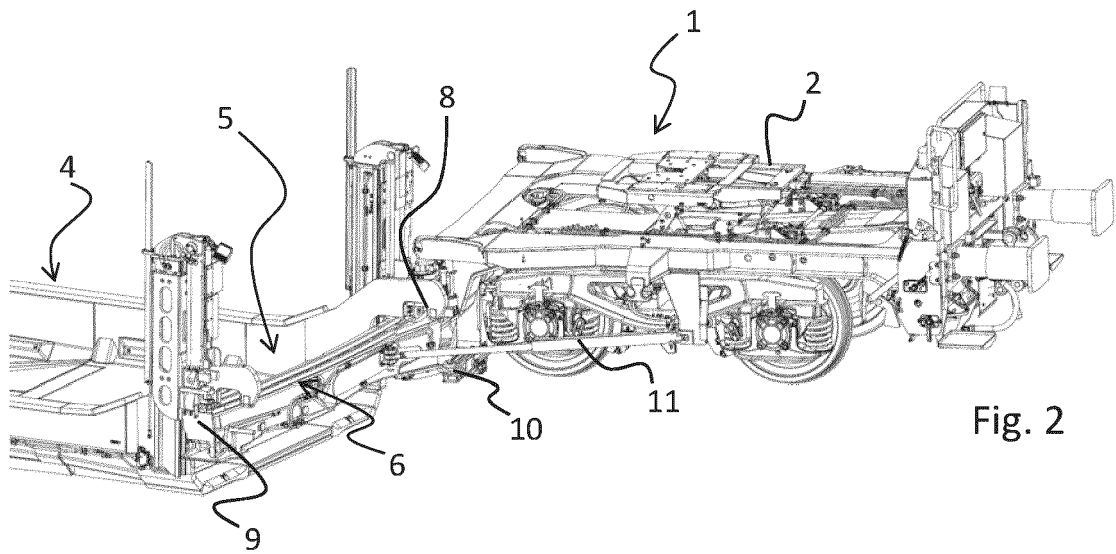
2. The railway wagon according to claim 1, wherein the actuator (11) comprises a hydraulic cylinder.
3. The railway wagon according to claim 1 or 2, wherein the actuator (11) has a predetermined length.
4. The railway wagon according to any of the preceding

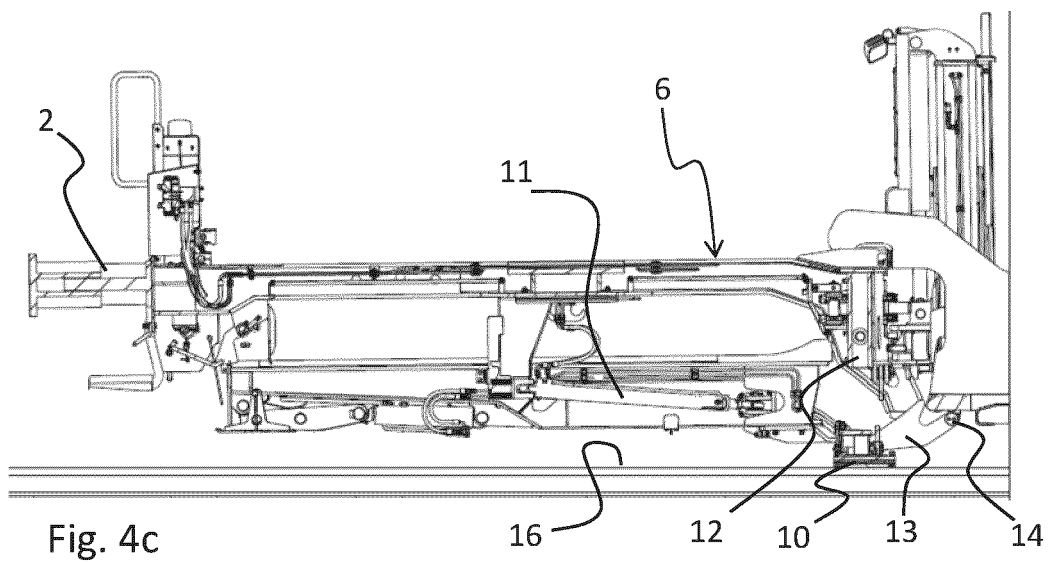
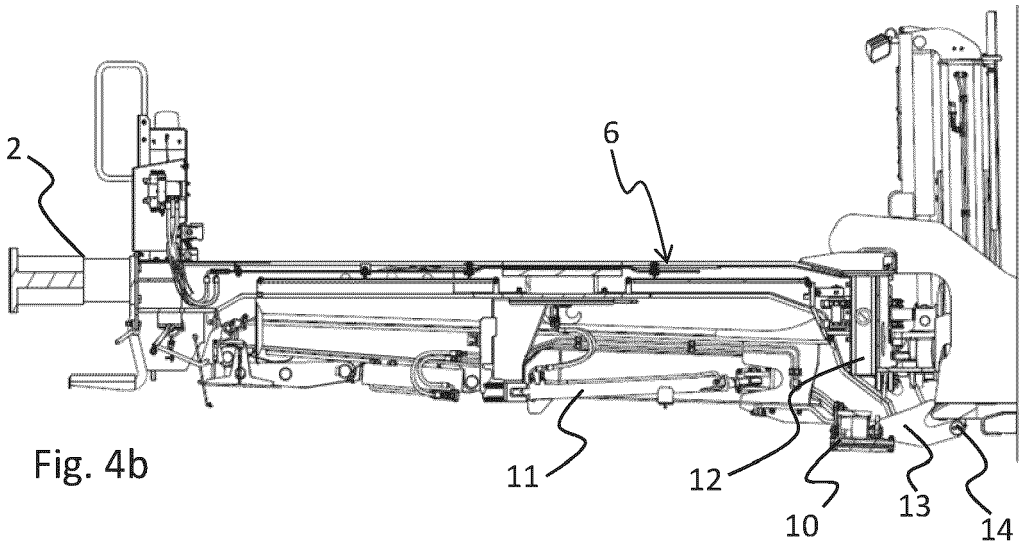
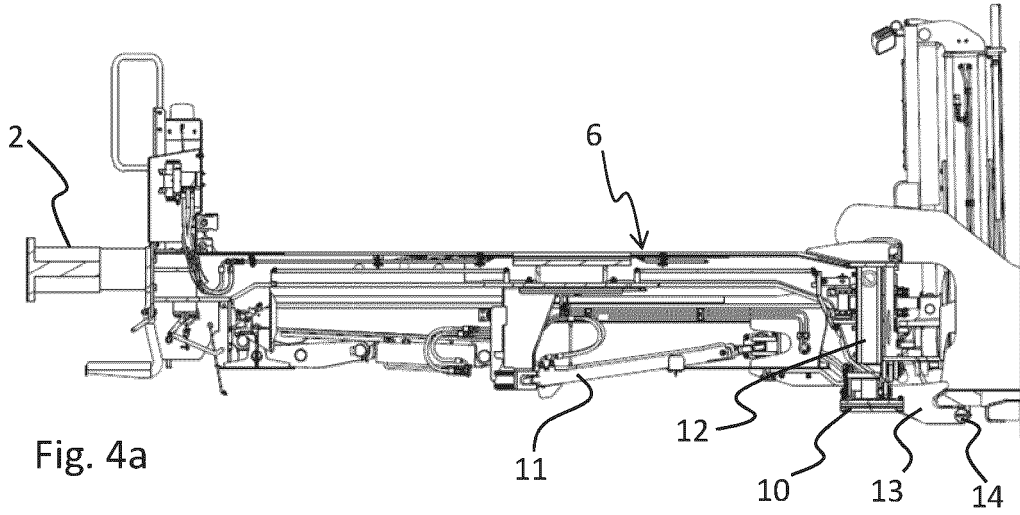
claims, wherein the actuator (11) has a first actuator end (18) and a second actuator end (19), the first actuator end (18) being connected to the first wagon end (2) and the second actuator end (19) being connected to the beam assembly (6).

5. The railway wagon according to any of the preceding claims, wherein the displacement device (17) is arranged at the first actuator end (18) and/or at the second actuator end (19).
6. The railway wagon according to any of the claims 1 to 4, wherein the displacement device (17) is provided in the actuator (11) or along an extension of the actuator (11).
7. The railway wagon according to any of the preceding claims, wherein the displacement device (17) comprises an elastic element, preferably a biasing spring, such as a coil spring or a compression spring.
8. The railway wagon according to any of claims 4-7, wherein the first actuator end (18) is connected to the first wagon end (2) via a first attachment pin (20) and the second actuator end (19) is connected to the beam assembly (6) via a second attachment pin (21).
9. The railway wagon according to claim 8, wherein the displacement device (17) comprises one or more spring-loaded pin(s) (22a, 22b) arranged on an opposite side of the attachment pin (20, 21) in relation to the actuator end (18, 19).
10. The railway wagon according to claim 9, wherein the spring-loaded pin(s) (22a, 22b) is/are connected to the actuator (11).
11. The railway wagon according to any of the preceding claims, wherein the rail support beam (10) is connected to an actuating assembly (12), preferably a hydraulic cylinder, configured to move the rail support beam (10) downwards and/or upwards.
12. The railway wagon according to claim 11, wherein the actuating assembly (12) is connected to the first wagon end (2) via an attachment plate (13), the attachment plate (13) having a first connection point (14) pivotally connecting the attachment plate (13) to the first wagon end (2), and a second connection point (15) connecting the attachment plate (13) to the actuating device (12), the first connection point (14) and the second connection point (15) being offset in a vertical plane.



File 1





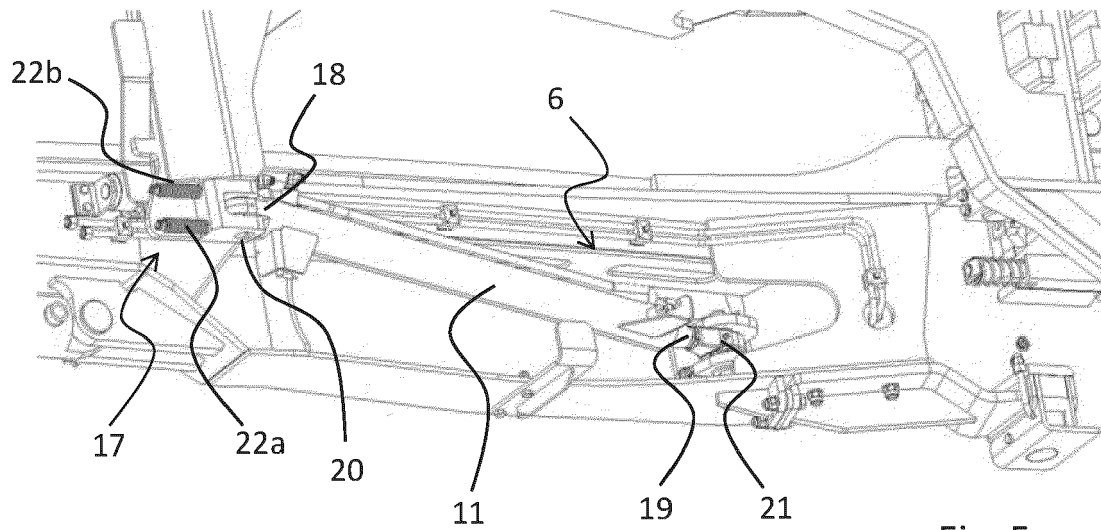


Fig. 5

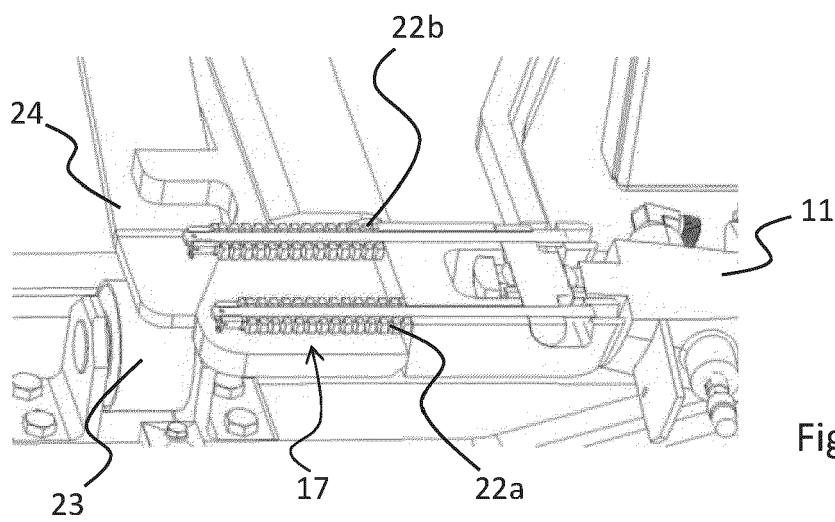


Fig. 6

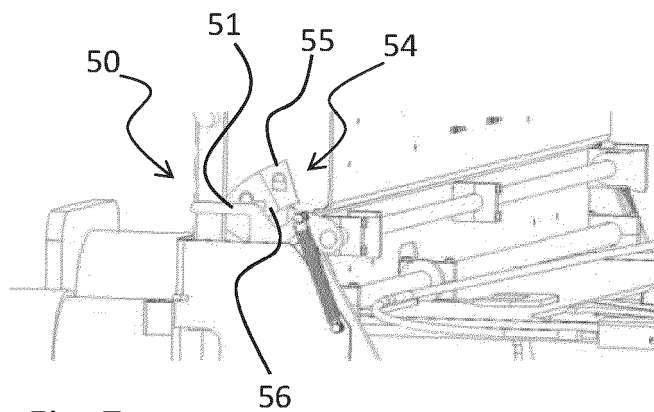


Fig. 7

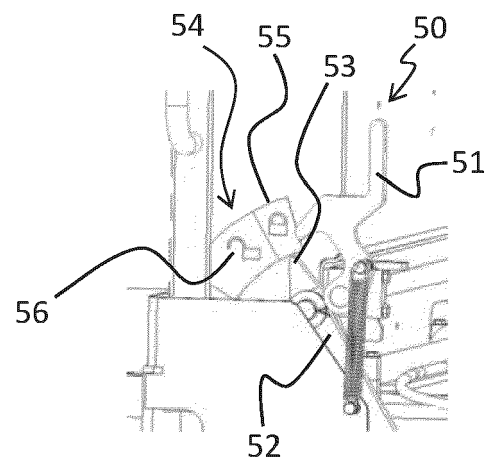


Fig. 8

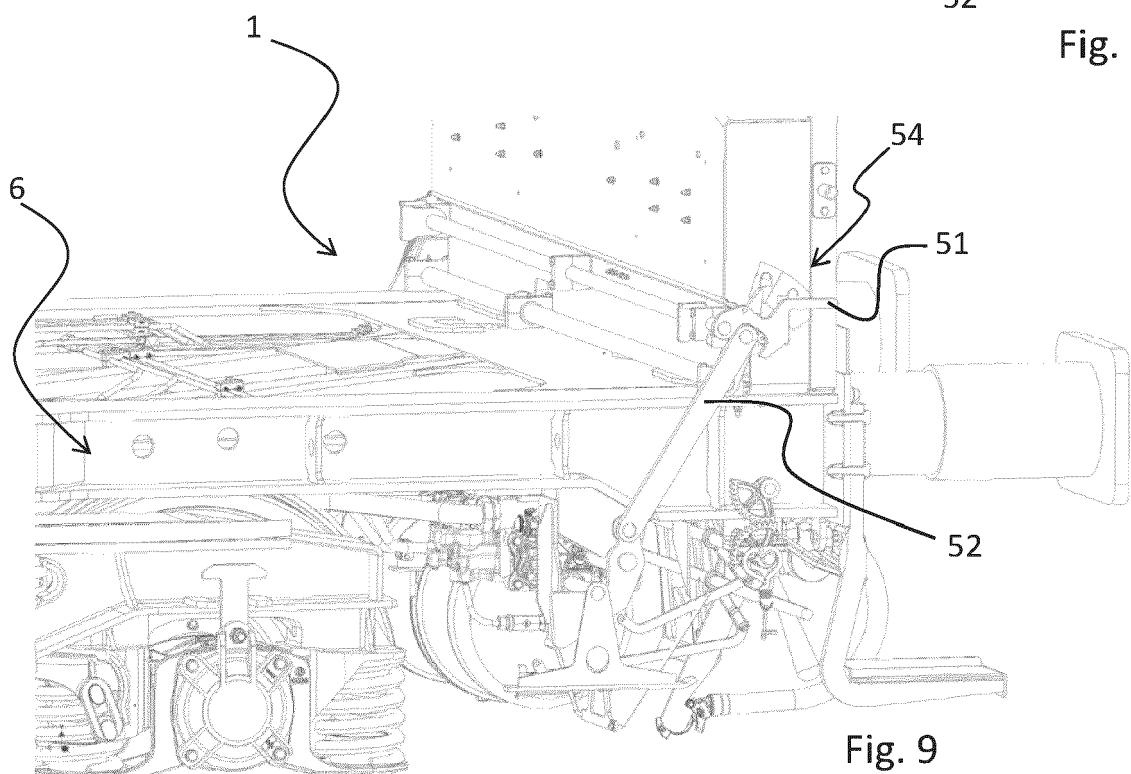


Fig. 9

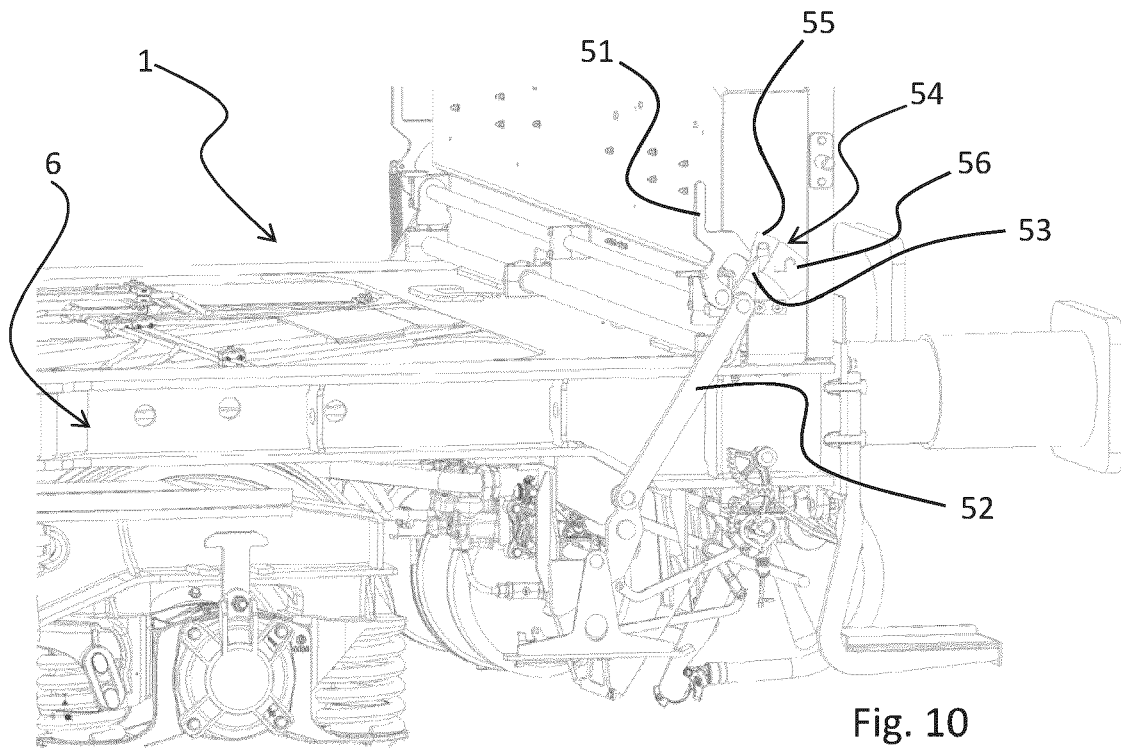


Fig. 10

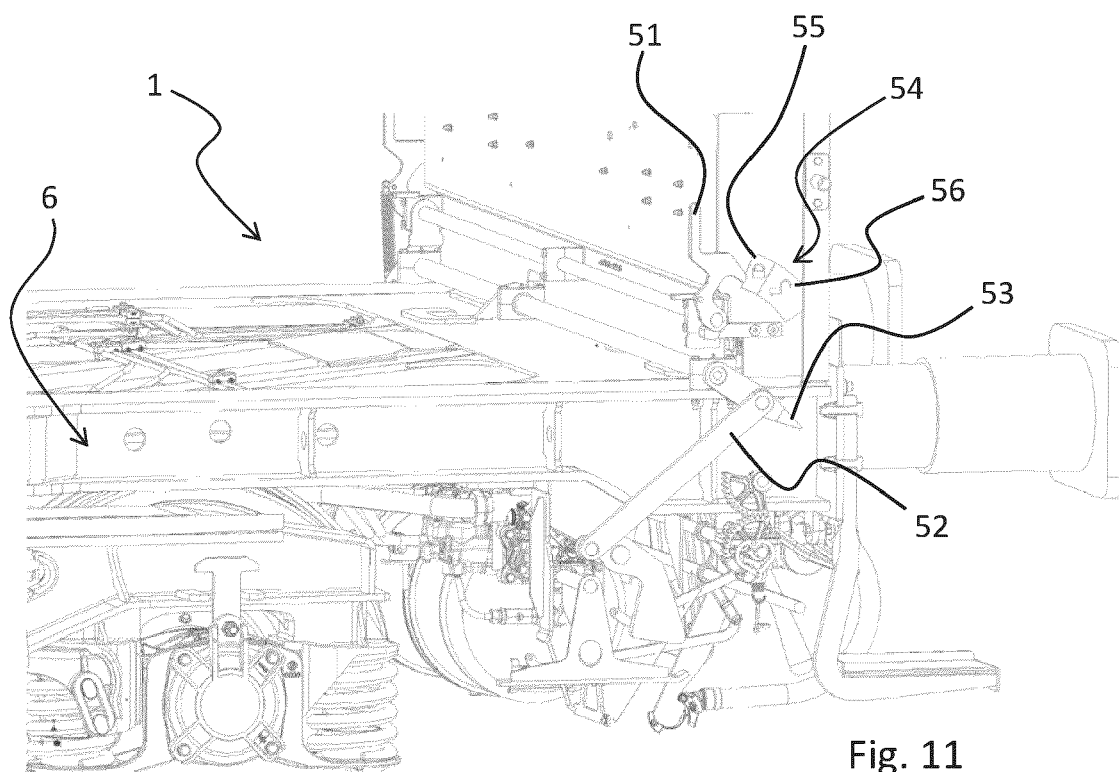


Fig. 11



EUROPEAN SEARCH REPORT

Application Number

EP 22 20 7576

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	SE 533 690 C2 (TECHNOLOGY AB K [SE]) 7 December 2010 (2010-12-07) * figures 16-23 *	1-12	INV. B61D3/04 B61D3/18
A	WO 2020/139134 A1 (ZHAKALOV ANDREY VALENTINOVICH [RU]) 2 July 2020 (2020-07-02) * figures 1-8 *	1-12	
A	RU 2 700 100 C1 (ZHAKALOV ANDREJ VALENTINOVICH [RU]) 12 September 2019 (2019-09-12) * figures 2, 4-6 *	1-12	
A	SE 534 222 C2 (TECHNOLOGY AB K [SE]) 7 June 2011 (2011-06-07) * page 4, line 1 - line 3 *	1-12	

TECHNICAL FIELDS
SEARCHED (IPC)

B61D

The present search report has been drawn up for all claims

1

Place of search

Munich

Date of completion of the search

4 April 2023

Examiner

Crama, Yves

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
 Y : particularly relevant if combined with another document of the same category
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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 22 20 7576

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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04-04-2023

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SE 533690	C2	07-12-2010	NONE
WO 2020139134	A1	02-07-2020	CN 111376927 A 07-07-2020
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REFERENCES CITED IN THE DESCRIPTION

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- WO 2020084081 A1 [0002]