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

(11) **EP 1 880 913 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.01.2008 Bulletin 2008/04

(51) Int Cl.:
B61D 15/00 *(2006.01)* ***B61D 15/06*** *(2006.01)*
E01B 37/00 *(2006.01)*

(21) Application number: **07014239.3**

(22) Date of filing: **20.07.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **21.07.2006 NL 1032219**

(71) Applicant: **VolkerRail Nederland BV**
4131 NJ Vianen (NL)

(72) Inventor: **Schoone, Clemens**
4131 NJ Vianen (NL)

(74) Representative: **Assendelft, Jacobus H.W.**
Keukenhofdreef 20
2161 AZ Lisse (NL)

(54) **Rail maintenance vehicle with impact protection**

(57) The invention relates to a floor/less rail maintenance vehicle, adapted to ride on a track. The roof and side wall structure are designed such that they buckle outwardly due to a frontal collision. For that reason inward directed projections (5) are provided on the side walls (4).

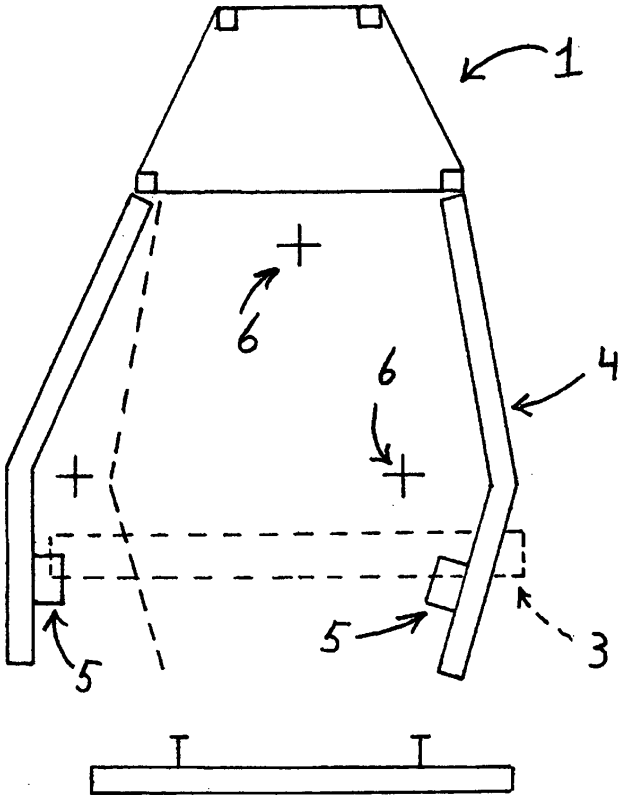

Fig. 1

EP 1 880 913 A2

Description

[0001] The proposal is a shop to work at a rail road, such that safety is ensured while the adjacent track remains in operation. This rail maintenance vehicle is mobile, such that during operation it is movable along the track, such that activities that move along the track can be carried out efficiently. Thus it is for sure that no person comes (to close) to the adjacent track to be caught by a train passing by.

[0002] As a rule such vehicle will provide some physical barrier, such as a fence (physical barrier means), such that a person is obstructed somehow to come outside some area and is forced to stay in a safety zone (preferably single level).

[0003] Besides, the persons, equipment and the location are protected against the weather, e.g. by application of sheets or a cover. The shop can have substantially wind and/or water proof roof and/or side walls. The lower side is obviously open, to get unobstructed access to the rails, sleepers, ballast, etc.

[0004] With this type of shop compared to traditional manners of safe working at the track, a substantial time saving is possible, such that the regular traffic is hindered less.

[0005] The prior art has some proposals, e.g. EP-A1-1.369.330 and WO 2006/027030 A1, both in the name of Robel. Both are concerned with rail constricted vehicles with an image that roughly can be specified as a railway wagon having at both its ends a rail carriage and lacking the interior and floor, such that within the vehicle there is a large free space to stand/walk at the track.

[0006] The inventors have recognised that particularly the flexibility and usability increase, if the shop has one or more of the further specified features or properties.

[0007] An embodiment is preferred, wherein the shop has a carrier frame extending at high level to carry opposing side walls and/or the roof. The carrier frame preferably has a level, such that workers within the shop can stand upright unimpeded. This means actually, that the lower side of the frame is at least 2.5 meter above the rails. The frame is further preferably a space frame to save materials and weight.

[0008] The shop is preferably width wise adjustable between a slender storage and transport position and a wider operative position, such that workers inside have more movability. This can be obtained to provide that one or both side walls are sideways displaceable. Preferably a wall is there fore at a high level pivoting mounted, such that a lower part of the side wall can be sideways displaced. This offers, a.o., structural simplicity and reliable and safe operation. Besides it is easy to offer entrance from aside, e.g. by pivoting the side wall over a large angle.

[0009] Preferably the side walls have a space frame and/or are bulged/buckled in upward direction, a.o. for a low weight and a wide as possible working space.

[0010] The shop is preferably supported at its ends by an undercarriage and is there between without supports. The carrier frame preferably connects to the undercarriage via an S-shaped frame part.

[0011] Preferably the shop is part of a train with a locomotive at the front and back. Between the locomotives only the shop is preferably present. This offers the possibility to use the undercarriage of the locomotive to carry the shop, such that the shop has no undercarriage of its own. On the other hand the locomotives offer in that case optimum collision protection. Besides, within this train the shop can have undercarriages of its own.

[0012] The locomotives are preferably of shunting type. Preferably they are of diesel or diesel electric type, without pantograph. Preferably they have two or three and preferably no more than four wheel shafts, preferably without bogy. The weight is preferably approximately 60 ton and at least 40 and at the most 80 ton. Thus it is easy and cheap to obtain a short length of the train at maximum length of working space within the shop. Besides a reliable detection by the train detection system is possible, e.g. ATB-system, which provides safety against low costs. The shop further offers flexible applicability.

[0013] Due to impact safety the carrier frame is preferably constructed such that it deforms/buckles upward when a longitudinal compression load is applied. Thus additional safety can be offered to persons within the shop. The carrier frame has for that features, such as a designed weakness.

[0014] Preferably the side walls are suspended from the carrier frame such that the carrier frame relative to the side walls, or vice versa, can make a free displacement of several centimetres, preferably between 2 and 10 cm.

[0015] The invention is further illustrated by way of a non-limiting embodiment, shown in the drawing.

[0016] Fig. 1 shows in front view and fig. 2 in side view a rail maintenance vehicle. It has at the ends a dual shaft bogie set below a platform. From the platform a carrier frame as a space frame extends first upward and than horizontally and in cantilever fashion above the track. Between the bogies, downward extending sidewalls are mounted to the carrier frame. The side walls are mounted near the under side of the carrier frame such that they can pivot aside. To the left in fig. 1 an inner storage position and an outer operative position of the side wall are shown. By pivoting the side wall from the storage position beyond the operative position, one can access to the working space by sideways passing below the side wall.

[0017] As fig. 1 also shows, the substantially straight side walls are buckled in upward direction such that within the profile of free space the working space can be as wide as possible. The buckle is at a level above the track between about 1.5 and 2.5 meter. A similar effect can be obtained by a bulge as an alternative to the buckle. The roof can not be adjusted width wise.

[0018] Fig. 2 shows that the lower part of the side walls is closed while the upper part is open. The upper part

can also be closed and then preferably light transmissive. The roof can be closed with e.g. locating a cloth over the carrier frame.

[0019] For safety reasons during working at the track the shop can only be entered via the front ends. For that the upward extending part of the carrier frame is provided with a passage opening in the central area. Through said entrance opening a person can walk across the platform above a bogie and into the shop and descend to the ballast bed via a stairs (not shown) at the platform. In fig. 1 a person standing at the platform and two persons standing at the ballast bed are illustrated. The lower side of the horizontally extending part of the carrier frame is at a level above the heads of all three persons.

[0020] The side walls are mounted to the carrier frame such that its centre can deflect about 10 cm upward or downward, without forcing the side walls to follow this deflection. Thus the side walls remain free from deformation during collision.

[0021] The platforms above the bogies are provided with bumpers and couplings with which during operation a locomotive is directly coupled. The forces acting between the locomotives are transferred via the carrier frame. The carrier frame provides so to speak a spine for the shop.

[0022] Different embodiments also belong to the invention. E.g. wherein bogies are absent. Then the platforms are rigidly coupled with the locomotives, such that the loads from the shop are carried by the wheels of the locomotives. The carrier frame is mounted to the platform such that it is able to pivot around a vertical axis, such that the train can pass a curve without a problem. E.g. the bumpers are removed from the locomotives and at that location the platform (also without the bumpers) is screwed to the locomotive.

[0023] A side wall is preferably near its upper edge at its end pivotably mounted to the from the platform upward extending structure. Between said ends the side wall makes contact with the there above extending carrier frame at spaced locations along its length. Said contact is designed such that the relevant contact point of the side wall can freely move up and down and to the front and back and is only held by the carrier frame in sideways direction to the inside and/or outside. Thus the carrier frame offers the side wall merely support along its length in case of sideways wind loads.

[0024] During collision with e.g. a different train at the same track (frontal impact), the side walls preferably deform outwardly. This is preferably provided by eccentrically loading the side walls during collision or to generate torsion in it. Preferably during impact another part of the train/shop applies a load to the side wall, which load is preferably applied after sufficient deformation is obtained in a structural part due to the impact. The side wall preferably has a convenient projection at preferably its inner side, to which the load can be applied. The projection is preferably present substantially at the level of the platform or another level substantially below the level of its pivoting mounting.

[0025] The carrier frame is bend upward during collision since it has a torsion stiff connection with the structure extending upward from the platform.

[0026] In an example the collision behaviour can be specified as follows: The collision forces are applied a low level, e.g. at the platform. The carrier frame will first bend upward and then possibly buckle upward. The side walls remain initially undeformed while the carrier frame bends upward. The distance between the platforms decreases. Thus each platform or a component of it applies a load to the projection of the side wall, directed towards the opposite platform. The side wall will thus first bend outward and subsequently possibly buckle outwardly. Prior to the impact the projection of the side wall was longitudinally spaced from the relative component/platform, such that unimpeded movement of the side wall was allowed.

[0027] All specified or in the drawing illustrated features provide in isolation or arbitrary combination the subject matter of this invention.

[0028] Meaning of references in drawing: carrier frame 1; upward extending structure 2; platform 3; side wall 4; projection 5; location of person's head 6; undercarriage 7.

Claims

1. Rail maintenance vehicle, provided with one or more undercarriages, preferably near each end, such that it is adapted to run at the rails of a track, to provide a floor less rail vehicle.

2. Device according to claim 1, wherein the roof and/or side wall structure is adapted such that it deforms/deflects/buckles outwardly if a longitudinally compression load is applied to it, e.g. due to a collision against the undercarriage (3, 7); and/or the lower part of a side wall is wind tight and its upper part is air and/or light transmitting.

3. Device according to claim 1 or 2, designed such that during a frontal collision the roof and/or side wall is eccentrically loaded or a torsion load is generated in it; and/or the roof and/or side wall has a space frame.

4. Device according to any of claims 1-3, with means to apply a load to the side wall after sufficient deformation is generated, e.g. because two spaced components join during frontal collision.

5. Device according to any of claims 1-4, wherein a side wall has an inward or outward projection which during frontal collision serves as an engagement point for a longitudinally acting load, e.g. from an undercarriage, wherein preferably said projection is present at the level of the platform or a different level substantially below the level of the side wall mount-

ing.

6. Device according to any of claims 1-5, wherein a side wall is mounted to a supporting structure, such as an overhead carrier frame, at locations spaced along its length, to be held sideways and freely movable front/back and/or up/down for a stroke of several centimetres at a minimum.

7. Device according to any of claims 1-6, wherein the side walls are kinked or bulged in upward direction, preferably with the hollow side turned inside; and/or the side walls and/or roof are width wise adjustable.

8. Device according to any of claims 1-7, wherein the side walls are pivotably mounted, preferably near their upper edge and/or at least a lower side wall part extends in a first position substantially vertically and in a second position inward.

9. Device according to any of claims 1-8, being part of a train with a locomotive at the front and back, preferably comprising merely the locomotive and device, wherein the device is possibly directly carried by a locomotive.

10. Device according to claim 9, wherein the locomotives comprise one or more of the following: of shunting type; of diesel or diesel electric type; without pantograph; two or three and preferably no more than four wheel shafts; without a bogy; weight approximately 60 ton and at least 40 and at the most 80 ton.

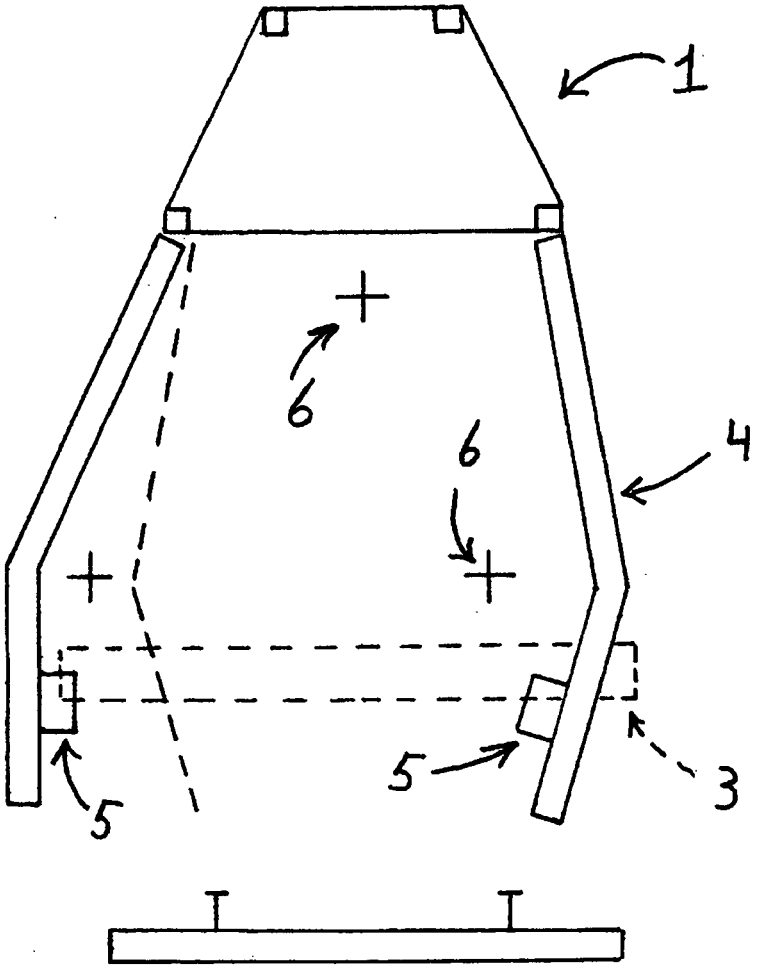

Fig. 1

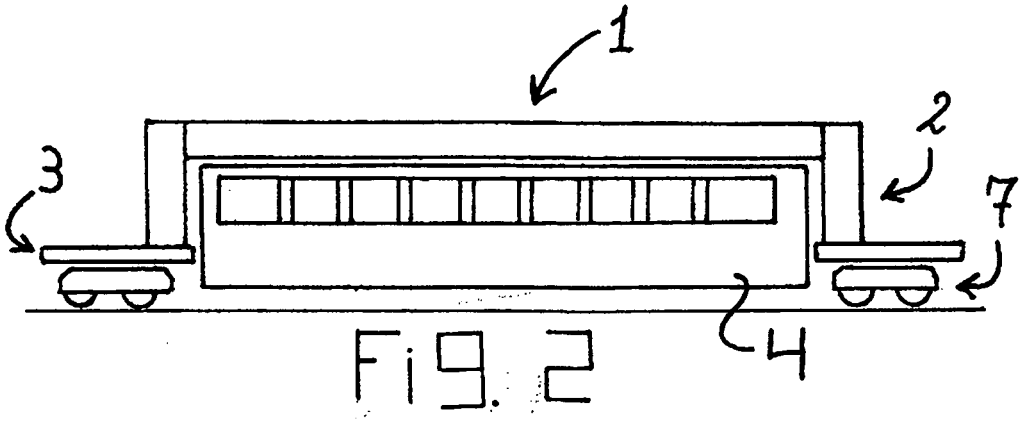

Fig. 2

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 1369330 A1 **[0005]**
- WO 2006027030 A1 **[0005]**