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(54) **Transshipment system including a lift unit for moving a well car floor of a railway well car**

(57) The transshipment system (1) is arranged for transferring a semi-trailer (20) to and fro a railway well car (10). The transshipment system comprises a transshipment station (30) and at least one railway well car. The transshipment station comprises a railroad area (32) and a platform (31). The at least one railway well car comprises a frame structure (11) which includes a well (13) for receiving at least partially at least one wheel set of a semi-trailer. The well is provided with a movable well car floor (131) for moving a semi-trailer. The well car floor is movable in between a lower position for transporting the semi-trailer and an upper position for loading and unloading the semi-trailer in or out the railway well car. The transshipment system is improved in that the transshipment station comprises a lift unit (50) for lifting and lowering the well car floor of the railway well car between the lower and upper position.

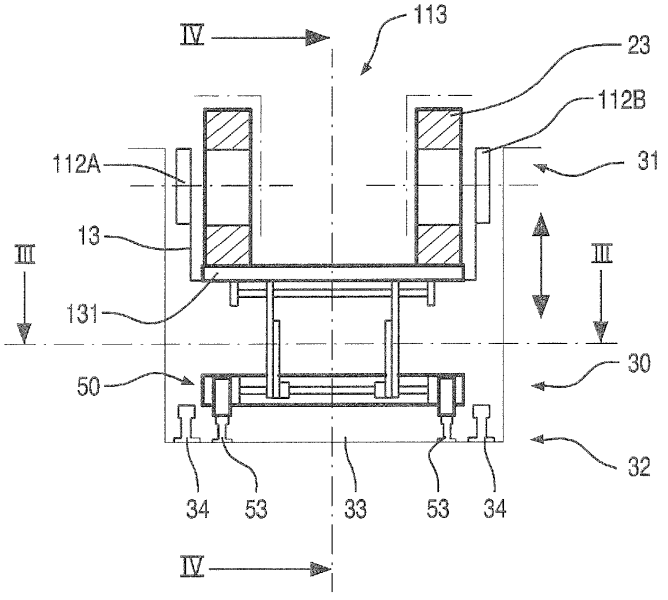

FIG.2

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Description

[0001] The invention relates to a transshipment system and method for transferring a semi-trailer to and fro a railway well car. The transshipment system comprises a transshipment station comprising a railroad area including at least one pair of rails for carrying a train and a platform for supporting at least one semi-trailer. Further, the transshipment system comprises at least one railway well car having a frame structure having a top surface which defines an upper plane, which frame structure is supported at its ends by a railway bogie. The frame structure includes a well, in particular a pocket for receiving wheels of a semi-trailer, in which the well is provided with a well car floor for moving a semi-trailer which well car floor is movable in between a lower position for transporting the semi-trailer and an upper position for loading and unloading the semi-trailer, in which upper position the well car floor is aligned with the upper plane,

[0002] DE 10.2006.013.018 discloses a transshipment station to transfer a semi-trailer from a platform onto a railway car. Before loading the semitrailer at the railway car, a combination of a truck with a semi-trailer can be parked at the platform beside the railway car. The railway car is positioned adjacent a rotatable rail track area. The rail track area is rotatable to rotate the railway car about a certain angle and align the railway car with the semitrailer at the platform. The height level of the platform mates with an upper floor of the railway car to allow a truck trailer to drive from the platform over the railway car. The semitrailer is decoupled from the truck when the semitrailer is in position at the railway car. After decoupling, the truck moves away from the semitrailer. Advantageously, herewith no cranes are necessary to get the semi-trailer onto the railway car.

[0003] The railway car is specially designed to carry the semi-trailer. The railway car is a railway well car, which is in particular also known as a pocket wagon. The pocket wagon has a main frame structure which is carried by two railway dollies. The two railway dollies are arranged at both ends of the railway car and pivotally support the main frame structure. The main frame structure has a pocket in between the railway dollies. The semitrailer is positioned with its tired wheels at the pocket. To lower the semi-trailer into the pocket, the pocket is provided with a movable pocket floor.

[0004] Before loading a semi-trailer onto the railway well car, the pocket floor is lifted to align the pocket floor with an upper plane of the main frame structure. After positioning and decoupling, the semi-trailer can be partly lowered into the pocket. The pocket floor is lowered to reduce the total height of the wagon during a train trip. The railway car is provided with respectively a first and second lift assembly. The lift assemblies are incorporated in the railway car to support the semitrailer at a front position and to lift and lower the pocket floor.

[0005] A drawback of the disclosed transshipment station and used railway well car is that it results in a complex transshipment system. Implementation of the system requires a large capital investment.

[0006] It is an object of the present invention to at least partially eliminate the above mentioned drawbacks and/or to provide a useable alternative. In particular, it is an object of the invention to provide a transshipment station which joins nowadays commonly used equipment and does for that reason require as less as possible specially designed equipment. In particular, it is an object to provide a transshipment station which reduces necessary capital investments for implementation.

[0007] According to the invention, this object is achieved by a transshipment system according to claim 1.

[0008] The transshipment system is arranged for transferring a semi-trailer to and fro a railway well car. The transshipment system comprises a transshipment station and at least one railway well car. The transshipment station comprises a railroad area including at least one pair of rails for carrying a train and comprises further a platform for supporting at least one semi-trailer. The platform is positioned adjacent the railroad area. A semitrailer may be parked on the platform before loading the semi-trailer on a railway well car.

[0009] The transshipment system comprises railway well cars. In contrast to railway flat cars, a railway well car comprises a well for at least partially receiving a load. Due to the available well, the railway well car provides more space in height for transporting large loads, like semi-trailers. The well is in particular a depressed centre in a middle region of the railway car for receiving a load in a lower position. The well may include a pocket. The pocket may have side walls in length direction of the railway car.

[0010] The at least one railway well car comprises a frame structure having a top surface which defines an upper plane. Particularly, the frame structure comprises at least at one end a frame structure platform, which defines the upper plane. Preferably, the frame structure has a frame structure platform at both ends. Herewith, the upper plane of the framestructure may be ridable by a semi-trailer from one end to an opposite end. A semitrailer may be passed over a full length of the railway well car. The frame structure is supported at its ends by a railway bogie. The frame structure platform is arranged above the railway bogie. The railway bogie is pivotally connected to the frame structure and comprises at least one railway wheel set.

[0011] The frame structure includes a well, in particular a pocket, for receiving at least partially at least one wheel set of a semi-trailer. Herewith, the semi-trailer may be brought in a sunken position in between the railway bogies. In particular, the railway well car is a railway pocket car, wherein the railway pocket car comprises outer longitudinal members which form a side structure. The pocket may be situated at a lower level than the outer longitudinal members of the frame structure. In a first aspect according to the invention, the well is provided with a

movable well car floor, in particular a movable pocket floor, for moving a semi-trailer. The well car floor is movable in between a lower position for transporting the semi-trailer and an upper position for loading and unloading the semi-trailer in or out the railway well car. In the upper position the well car floor is aligned with the upper plane. The well car floor may have a solid or partly open top surface. The well car floor may comprise a grid. Herewith, a semi-trailer may be ridable over the railway well car from one end of the frame structure to an opposite end of the frame structure.

[0012] In particular, the well car floor supports at least one wheel at a rear region of a semi-trailer. In particular, the well car floor further supports the semi-trailer at a front region. The well car floor may support at least one support pillar of a semi-trailer.

[0013] Preferably, the frame structure further comprises a fifth wheel connector, also called a king plate, to receive a fifth-wheel connector, also called a king pin, of a semi-trailer. The king plate may be positioned at the frame structure above a railway bogie. The king plate may be arranged at the frame structure platform. Herewith, the semi-trailer can be transported without a truck.

[0014] The transshipment system according to the invention is improved in that the transshipment station further comprises a lift unit for lifting and lowering the well car floor of the railway well car between the lower and upper position. The transshipment station may comprise at least one lift unit for moving the well car floor. The lift unit is positioned at the transshipment station. The lift unit may get in engagement with a well car floor of a provided railway well car to lift or lower the well car floor of that railway well car. After operating the well car floor, the lift unit is released from the railway well car to operate a well car floor of a next railway well car. Herewith, the lift unit is arranged releasable from a railway well car.

[0015] The transshipment system according to the invention may provide a major financial investment advantage. Normally in a transshipment system, a lot of railway well cars are necessary for transporting semi-trailers. Sometimes more than hundred railway well cars are coupled in a train for transporting an equal amount of semi-trailers. In contrast with prior art railway well cars as shown in DE10.2006.013.018, the railway well cars according to the invention lack a lift unit as a special equipment for moving the well car floor which advantageously may result in a simple configuration of the railway car. The railway well car according to the invention may have a configuration which may advantageously remain close to a configuration of already commonly used conventional railway well cars. According to the invention, no major adjustments are necessary to use conventional railway well cars as railway well cars in the transshipment system according to the invention. In the transshipment system according to the invention, a necessary lift unit for operating a well car floor of a railway well car belongs to the transshipment station and remains at location at the transshipment station. The lift unit can be used again and again for rising and lowering a well car floor of different passing railway well cars. Herewith, the transshipment station may be provided with a single or just a few lift units to operate well car floors of a lot of railway well cars.

[0016] In an embodiment of the transshipment system according to the invention, the transshipment station may comprise a first and second lift unit. The first lift unit may be provided to support a semi-trailer at a rear region by supporting the well car floor e.g. by supporting a wheel set. The second lift unit may be provided to support a semi-trailer at a front region, e.g. by supporting at a support pillar or front part of a semi-trailer framework. The first and second lift unit may have a similar, in particular equal, configuration.

[0017] Preferably, the lift unit is suitable to support a semi-trailer by both supporting the well car floor and additionally by supporting the semi-trailer at a front region. Preferably, the well car floor has a total length of at least 5m, in particular at least 10m, which corresponds to a length of the semi-trailer, such that the semi-trailer is supported both at the front and rear region by the well car floor. The first and second lift unit may be incorporated into one lift unit for supporting the front and rear region of a semi-trailer. The lift unit may have a length which corresponds to a maximum distance between a rear and front support position, e.g. a maximum distance between a wheel set and a support pillar of a semi-trailer.

[0018] In an embodiment of the transshipment system according to the invention, the transshipment system comprises a railway well car which has a pocket in a middle region in between two railway bogies, in which the pocket includes a movable pocket floor and in which the pocket and pocket floor extend over a full length of the middle region. The middle region is limited by the railway bogies. Herewith the length of the pocket floor corresponds to a length of the semi-trailer, such that the semi-trailer is stably supported at a front region and a rear region by the pocket floor. The pocket floor may support at least one wheel set of the semi-trailer and a support pillar of the semi-trailer, such that the semi-trailer is fully supported by the pocket floor. Preferably, the transshipment system further comprises a single lift unit which is engagable to the pocket floor. The single lift unit is provided to lift and lower the pocket floor.

[0019] In an embodiment of the transshipment system according to the invention, the lift unit comprises a lift mechanism and driving means for rising and/or lowering of the well car floor.

[0020] In particular the lift mechanism is a link mechanism for lifting the well car floor. The link mechanism may have linked bars for levering a load upwards. In particular, the linked bars are connected to each other in a scissor configuration. In particular, the lift unit comprises a hydraulic cylinder to drive the link mechanism.

[0021] In an embodiment of the transshipment system according to the invention, the lift unit has a lift mechanism which has a lift position and a down position. In the lift position a supported well car floor may be brought into

the upper position for loading a semi-trailer and in the down position, the lift mechanism may be free from the well car floor. In the down position, the lift unit may have a limited height which allows a positioning of the lift mechanism substantially completely under a well car floor of a railway well car. Substantially completely means that e.g. small components like boxes for storing electronic devices and control cables for controlling a movement may still extend from the region under the pocket floor. In particular, the height of the lift mechanism is limited such that a railway well car is allowed to pass over the lift mechanism in the flat position without interference.

[0022] In an embodiment of the transshipment system according to the invention, the lift unit for lifting a well car floor is a stand alone lift unit which may be freely movable over the transshipment station. The lift unit may have lift unit wheels to drive the lift unit over the platform or railroad area to bring the lift unit into position to lift a pocket floor. The lift unit wheels may be provided with tires. The lift unit wheels may be steerable to steer the lift unit freely in any direction over the transshipment station.

[0023] In an embodiment of the transshipment system according to the invention, the at least one lift unit of the transshipment station is arranged at the railroad area and preferably in between the pair of rails. The lift unit may be arranged at a fixed or movable position at a same level of a rail bed at the railroad area. Alternatively, the lift unit may be arranged in a lift unit pit to get the lift unit in the down position below a desired height level. The lift unit pit may extend over a length corresponding with a length of at least one railway well car.

[0024] The lift unit may have a compact or flat configuration in a collapsed non-working position. The lift unit may have a maximum height of e.g. at most 30cm above a rail bed in the collapsed position which allows a train to pass over the lift unit. Preferably, the lift unit has a total height of at most 30cm which allows the lift unit to be arranged at rail bed level. To operate a well car floor, a railway well car may be positioned above the lift unit. By positioning the lift unit in between the pair of rails, the well car floor may be engaged from underneath. By operating the lift unit, the well car floor of the positioned railway well car may be moved up- or downwards. Generated counter forces during lifting may directly be supported by the rail bed. Advantageously, the lift unit at the railroad area may have its own working zone and may remain below the platform. The lower arranged lift unit may provide a free working space for loading and unloading semi-trailers on and off a railway well car. The working zone of the lift unit may be outside the working space for loading and undloading semi-trailers. In this way, the lift unit does not form an obstacle for loading semi-trailers.

[0025] In a further embodiment of the transshipment system according to the invention, the lift unit comprises a lift unit track for moving the lift unit in a length direction of the rails. The lift unit track may be arranged in between the pair of rails of the railroad area. The lift unit track may allow the lift unit to travel underneath a railway well car to obtain a desired position for lifting a well car floor. Advantageously, the lift unit track may improve an accurate positioning of the lift unit. The lift unit track may improve a computer controlled positioning of the lift unit with respect to a movable well car floor. Possibly, the lift unit track may allow the lift unit to pass underneath a railway car and operate well car floors of several coupled railway well cars. In particular, the lift unit track is a narrow-gauge railway. The narrow-gauge railway may provide sufficient support in width direction to the lift unit to prevent tilting of the lift unit. A narrow-gauge railway may be particularly suitable to support heavy loads like fully loaded semi-trailers.

[0026] In an embodiment of the transshipment system according to the invention, the lift unit track may be arranged at the railroad area beside the pair of rails. In a particular embodiment, a first and second lift unit track may be provided at the rail road area at both sides of the pair of rails. A first and second lift unit may respectively be arranged on the first and second lift unit track to engage with a well car floor.

[0027] In an alternative embodiment of the transshipment system according to the invention, the lift unit may be positioned at the platform.

[0028] In an embodiment of the transshipment system according to the invention, the platform is arranged adjacent the railroad area at a certain height level with respect to the railroad area. At the certain height level, the platform is aligned with the upper plane of the railway car. Herewith, a semi-trailer is drivable with a pulling vehicle from the platform onto the railway car.

[0029] The lift unit may have a fixed position at the platform. The lift unit may be connected to the platform. The lift unit may be arranged in a lift unit pit at the platform. The lift unit pit may have a depth which allows the lift unit to reach easily in a side direction underneath a well car floor of a railway well car. The lift unit may have at least one extendable member, which may be extended to the railroad area to reach under a well car floor. At a proximal end, the extendable member may be rotatable or telescopically connected to a main frame of the lift unit to extend from the recess to the railroad area. The extendable member may comprise a lift mechanism at a distal end for lifting and lowering a pocket floor. Further, the extendable member may have a support foot at the distal end for supporting the extendable member to a fixed point, in particular to the rail bed, ground or rail, when exerting a force to the pocket floor. The support foot may be movable to withdraw the support foot from the ground after finishing a lifting or lowering operation.

[0030] In an embodiment of the transshipment system according to the invention, the railway well car comprises at least one locking mechanism to lock the well car floor at the upper position to the frame structure of the railway well car. The locking mechanism may have a locking member which may be connected to the well car floor. In particular, the railway well car further has at least one

locking member to lock the well car floor in the lower position. The locking member to lock the well car floor in the lower position may be a supporting member which supports the well car floor in the lower position. The locking mechanism may engage to the frame structure of the railway well car to lock the well car floor to the frame structure in the upper and/or lower position.

[0031] In an embodiment, the locking member is a rotatable locking lever. The locking lever may be connected respectively to the well car floor or frame structure. One end of the locking lever may engage into a recess or rill of the frame structure respectively the well car floor to connect the well car floor to the frame structure. Another end of the locking lever may be operated to lock or unlock the well car floor from the frame structure. Advantageously, in contrast to a slidable locking member, the rotatable locking member is less susceptible for failure due to contamination. Preferably, the lift unit comprises an operating member to operate the locking member.

[0032] In a second aspect according to the invention, the well is provided with a fixedly connected and open worked well car floor, in particular a fixed open worked pocket floor, for supporting a semi-trailer. The well car floor is fixed, for example welded, to a well car framework structure, such that the well car floor is immovable connected to the railway well car. The open worked well car floor comprises at least one support member for supporting a semitrailer. The support member may be a wheel support which is designed to support at least one wheel of a semitrailer or may be designed as a pillar support or a kings pin support to support a support pillar or kings pin at a front region of the semitrailer. Further, the open worked well car floor comprises at least one through opening. The through opening is open from beneath the well car. The through opening allows to directly engage to a semi trailer from beneath by a first lift unit which may be arranged as described in the embodiments, clauses and in relation to the drawings. The lift unit may comprise at least one strut for a direct engagement with a semitrailer. The strut of the lift unit may for example engage to a wheel shaft or a framework of a semitrailer at a rear region of the semitrailer. By operating the lift unit, the semitrailer may be lifted and lowered to and fro the well car. After lifting a semitrailer to a position above the railway well car, the semitrailer may be moved in a sideward direction by a second lift unit away from the well car to position the semitrailer on a platform.

[0033] Further embodiments are defined in the claims.

[0034] The invention further relates to a method for transferring a semi-trailer to and fro a railway well car as defined in claim 14.

[0035] The invention will be explained in more detail with reference to the appended drawings. The drawings show a practical embodiment according to the invention, which may not be interpreted as limiting the scope of the invention. Specific features may also be considered apart from the shown embodiment and may be taken into account in a broader context as a delimiting feature, not only for the shown embodiment but as a common feature for all embodiments falling within the scope of the appended claims, in which:

Fig. 1 shows a side view of an embodiment of a railway well car for use in a transshipment system according to the invention;
Fig. 2 shows a cross sectional view of the railway well car of Fig. 1 including a lift unit for lifting a pocket floor;
Fig. 3 shows a top view of the lift unit of Fig. 2; and
Fig. 4 shows a cross sectional view in a length direction of the lift unit of Fig. 2.

[0036] In the following drawings, identical reference numbers indicate identical or similar components.

[0037] Fig. 1 shows in a side view a railway well car 10 including an onto the railway well car loaded semitrailer 20. The railway well car 10 is used in a transshipment system 1 according to the invention. The configuration of the railway well car 10 comes close to conventionally used railway well cars in conventional transshipments systems, wherein semi-trailers are loaded by a crane into a well of the railway well car. The conventional railway well cars are used on a large scale. A Sdgkms type railway car is an example of such a conventional railway well car. According to the invention, hardly any adjustments to the conventionally used railway well cars are necessary which may advantageously reduce necessary capital investment to implement a transshipment system 1 according to the invention.

[0038] The railway well car 10 has a frame structure 11 which is supported by two railway bogies 12A, 12B. The frame structure 11 is one solid entity. The frame structure 11 cannot be separated by decoupling several entities into several frame structure portions. The solid frame structure 11 is a welded frame structure.

[0039] The railway bogies 12A, 12B are each positioned at respectively a front and rear end of the frame structure 11. The railway bogie 12 is fixedly connected to the frame structure to carry the frame structure 11 at one end. The railway bogie 12 is fixedly connected to the frame structure 11 to disable a temporary detachment of the railway bogie 12 during operation of the transshipment system 1. The railway bogie 12 has at least one wheel set 121. The railway bogie pivotally connects the wheel set 121 to the frame structure 11.

[0040] At least at one end, the frame structure 11 has a frame structure platform 111. The frame structure platform 111 is situated at a region of the railway bogie 12. The frame structure platform 111 defines an upper plane of the frame structure 11. As shown, the frame structure 11 has a frame structure platform 111A, 111 B at both front and rear end. At a front end, the frame structure platform 111 is provided with a fifth wheel connector 14 to connect a fifth-wheel trailer hitch end 24 of a semitrailer to the frame structure 11. The fifth wheel connector 14, or so called king plate, is adjustable in length direction

to compensate for different lengths of semi-trailers. A semi-trailer can be loaded to the railway well car 10 and supported at a front region by the frame structure platform 111 by connecting the semi-trailer 20 to the fifth wheel connector 14.

[0041] The frame structure has a longitudinal extending side structure 112 which comprises two longitudinally extending members. The side structure has a pair of side walls 112A, 112B which include an open region 113. In contrast to a flat type, the railway car is of a well type, wherein the frame structure has a well 113 in a middle region, in particular in between the railway bogies 12. The open region 113 in between the railway bogies 12A, 12B defines the well. The well 113 allows a load (20) to be sunken with respect to the frame structure platform 111. During transport, the load can be lowered in the well 113 in between the side structure 112. The well is provided with a pocket 13. The pocket extends at least partially in the well. In the shown embodiment, the pocket extends over the whole length of the well. The pocket has a pocket floor 131. The length of the pocket floor corresponds to the length of the pocket. The pocket floor 131 is arranged to support a load (20). In particular, the pocket floor 131 is arranged to support a semi-trailer 20, wherein the pocket floor 131 has trailer wheel support elements to support and enclose a trailer wheel 23. The pocket floor 131 is movable in an upwards direction (as indicated by an arrow in Fig. 2) from a lower position to an upper position. In the upper position the load (20) can be brought to a height level corresponding with a height level of the frame structure platform 111. In the upper position, a semi-trailer can be driven from the frame structure platform 111 onto the pocket floor 131. Herewith, the upper plane of the railway well car is ridable by a semi-trailer. The pocket floor 131 extends at least partly in the well. The semi-trailer 20 has at a front region a support pillar 25 which is after loading supported by the pocket floor 131 .

[0042] The transshipment system 1 is arranged to load and unload a semi-trailer on and off a railway well car 10. The transshipment system has a transshipment station 30. The transshipment station has a platform 31 and a railroad area 32. The platform 31 is arranged to support trailers. The platform 31 may have at least one mark to indicate a desired parking position for a truck-trailer or a semi-trailer 20 alone. The platform 31 provides a height level with respect to the railroad area 32. The height level of the platform 31 corresponds with the upper plane (111) of a railway well car 10. The corresponding height levels allow an easy loading of trailers onto the railway well car 10 by driving the trailers from the platform 31 to the railway well car 10. The platform 31 may have a height level above a rail bed 33. A platform ramp may be provided to enter the platform 31. The platform may be provided at ground level, wherein the railroad area 32 is sunken with respect to ground level.

[0043] The platform 31 may comprise bridge elements to overcome a gap in between the platform 31 and a railway well car 10 which has to be loaded or unloaded. The bridge element may cover coupling elements of a railway well car to allow a semi-trailer to pass over the bridge element onto a frame structure platform and onto a well car floor. Herewith, the trailers may be driven over the railway well car from a rear end of the railway well car to a front end of the railway well car. The bridge elements may be manually or automatically operated. The bridge element may be plate shaped. The bridge element may be pivotally connected to the platform. The bridge element may be connected at a longitudinal upper edge of the platform.

[0044] Fig. 2 shows a schematic cross sectional view of the railway well car 10 about section line II-II of Fig. 1. The railway well car is positioned at the railroad area 32 beside the platform 31. The railroad area 32 comprises a main railway 34 including at least one pair of rails to carry railway cars. In between at least one pair of rails a narrow gauge railway 53 is provided to carry a lift unit 50. The lift unit 50 has a lift unit frame 51 which has lift unit wheels 52 to bear the lift unit 50 at the narrow gauge railway 53. The lift unit 50 is provided to lift and lower the movable pocket floor 131 of a railway well car 10 to and fro a lower and upper position. As shown in Fig. 1, the pocket floor 131 extends over the whole length of the well 113 in the middle region. Herewith, the pocket floor 131 supports a semi-trailer at a front and rear region. The pocket floor 131 supports the semi-trailer at a wheel set 23 and at a support pillar 25. As shown in Fig. 3 and 4, the lift unit supports the pocket floor 131 at a front and rear region. The single lift unit may be arranged modular by connecting a first and second lift unit to each other.

[0045] In an alternative not illustrated embodiment, wherein the pocket extends partly in the well, the well 113 may have an open area adjacent the pocket floor 131, which is open from beneath for passing an engaging member of the lift unit 50 from underneath to a front region of the semi-trailer. Herewith, the lift unit 50 may engage at the front and rear region of the semi-trailer. Thus, the semi-trailer is supported indirectly at a rear region via the pocket floor 131 and at a front region directly via the lift unit 50.

[0046] The narrow gauge railway 53 extends in a direction of the railway. Due to the narrow gauge railway 53, the lift unit 50 is arranged displaceable at the railroad area 52 in the length direction of the railway 34. The lift unit 50 is displaceable underneath several coupled railway cars 10 to operate successively different stationary arranged railway well cars.

[0047] The lift unit 50 comprises a lift mechanism 54 and a driving means 55. Fig. 3 shows a top view of the lift mechanism 54 of the lift unit 50. Fig. 4 shows the lift mechanism 54 in a cross sectional side view. The lift mechanism 54 comprises a link mechanism. The link mechanism is driven by a hydraulic cylinder 55. The hydraulic cylinder 55 is connected at one end to the lift unit frame 51 and at the other end to a link of the link mechanism to bring the link mechanism from a collapsed con-

figuration to a lift position. The link mechanism is configured to lever the pocket floor in upwards direction.

[0048] Numerous variants are possible in addition to the embodiment shown. In a variant, it is further possible to transfer both a truck and a semi-trailer to a railway well car. In a variant the railway well car may comprise a well formed by a lower positioned subframe which extends in length direction in the middle region of the railway well car, wherein the well car floor is arranged onto and supported by said subframe.

[0049] Although the invention has been disclosed with reference to particular embodiments, from reading this description those of skilled in the art may appreciate changes and modification that may be possible from a technical point of view but which do not depart from the scope of the invention as described above and claimed hereafter. It will be understood by those of skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention. Modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiments disclosed in the above detailed description, but that the invention will include all embodiments falling within the scope of the appended claims.

[0050] Thus, the invention provides a transshipment system having a transshipment station which provides a lift unit for operating a movable pocket floor of a railway well car to indirectly lift or lower a semitrailer or a lift unit for engaging directly to a semitrailer to lift or lower the semitrailer with respect to a railway well car. The transshipment system may advantageously require minimal adjustments to conventional used railway well cars which may reduce a capital investment when implementing a transshipment system according to the invention.

The invention is further described by the following clauses:

[0051]

1. Transshipment system (1) for transferring a semi-trailer (20) to and fro a railway well car (10) comprising

- a transshipment station (30) comprising a railroad area (32) including at least one pair of rails (34) for guiding a train and comprising a platform (31) for supporting at least one semi-trailer (20); and
- at least one railway well car (10) having a frame structure (11) including a top surface which defines an upper plane, which frame structure (11) is supported at its ends by a railway bogie (12), in which the frame structure (11) includes a well (13) for receiving wheels of a semi-trailer, in which the well (13) is provided with a well car floor (131) for moving a semi-trailer (20) which well car floor (131) is movable in between a lower position for transporting the semi-trailer (20) and an upper position for loading and unloading the semi-trailer, in which upper position the well car floor (131) is aligned with the upper plane, **characterised in that** the transshipment station (30) further comprises a lift unit (50) for lifting and lowering the well car floor (13) of the railway well car (10) between the lower and upper position.

2. Transshipment system (1) according to clause 1, wherein the well comprises a pocket (13) and wherein the well car floor is a pocket floor (131).

3. Transshipment system (1) according to clause 1 or 2, wherein the transshipment station (30) comprises a first and second lift unit (50), wherein the first lift unit is provided to support a semi-trailer (20) at a rear region via the well car floor (131) and wherein the second lift unit is provided to support a semi-trailer at a front region (25).

4. Transshipment system (1) according to clause 3, wherein the first and second lift unit are incorporated into a single lift unit (50) for supporting the front and rear region of a semi-trailer.

5. Transshipment system (1) according to any of the preceding clauses, wherein the transshipment system comprises a railway well car which has a middle region in between the railway bogies, which middle region has a length which is limited by the railway bogies, in which the well and well car floor extend over the substantially full length of the middle region.

6. Transshipment system (1) according to any of the preceding clauses, wherein the lift unit comprises a lift mechanism (54) and driving means (55) for rising and/or lowering of the well car floor (131).

7. Transshipment system (1) according to clause 6, wherein the lift mechanism (54) comprises a link mechanism comprising linked bars for levering the well car floor (131).

8. Transshipment system (1) according to clause 6 or 7, wherein the lift unit (50) comprises at least one hydraulic cylinder as a driving means (55) to drive the link mechanism.

9. Transshipment system (1) according to any of the preceding clauses, wherein the lift unit (50) is a stand alone lift unit which is freely movable over the transshipment station (30).

10. Transshipment system (1) according to any of

the preceding clauses, wherein the lift unit (50) is arranged at the railroad area (32).

11. Transshipment system (1) according to any of the preceding clauses, wherein the lift unit (50) comprises a lift unit track (53) which is arranged in between or beside the pair of rails (34) of the railroad area (32) for moving the lift unit (50) in a length direction of the railway.

12. Transshipment system (1) according to clause 11, wherein the lift unit track (53) is a narrow-gauge railway.

13. Transshipment system (1) according to any of the preceding clauses, wherein the lift mechanism (54) has a lift position to engage to a well car floor (131) in an upper position and a down position defining a limited height of the lift unit (50) to remain free from engagement with an above situated well car floor (131) in a lower position.

14. Transshipment system (1) according to any of the clauses 1-9, wherein the lift unit (50) is arranged at the platform (31).

15. Transshipment system (1) according to any of the preceding clauses, wherein the platform (31) is arranged aside the railroad area (32) at a relative height level with respect to the railroad area, wherein the platform (31) is aligned with an upper plane (111) of a railway well car (10), such that a semi-trailer (20) is drivable from the platform (31) onto the railway car (10), wherein the platform (31) comprises a lift unit pit, wherein the lift unit (50) is arranged in the lift unit pit which lift unit pit has a depth which allows the lift unit (50) to reach from aside underneath the well car floor (131) of the railway well car (10), wherein the lift unit comprises a main frame (51) and at least one extendable member for reaching sideward under a well car floor (131), which extendable member is at a proximal end connected to the main frame (51) and wherein the lift mechanism (54) is connected to a distal end of the extendable member to place the lift mechanism (54) under the well car floor (131).

16. Transshipment system (1) according to clause 15, wherein the lift unit (50) further comprises a support foot at the distal end of the extendable member to support the lift mechanism to the rail bed (33).

17. Transshipment system (1) according to any of the preceding clauses, wherein the railway well car (10) comprises at least one locking mechanism to lock the well car floor (131) at the upper position to the frame structure (11).

18. Transshipment system (1) according to any of the preceding clauses, wherein the lift unit (50) is configured to operate the locking mechanism to unlock the well car floor before lowering or lifting the well car floor.

19. Transshipment station (30) for use in a transshipment system (1) according to any of the preceding clauses, wherein the transshipment station (30) comprises a lift unit (50) for moving a well car floor (131) of a railway well car (10).

20. Railway well car (10) for use in a transshipment system (1) according to any of the preceding clauses comprising a movable well car floor (131) for moving a semi-trailer (20) in between a lower position for transporting the semi-trailer and an upper position for transferring the semi-trailer, wherein the railway well car (10) per se is free from a lift unit (50) for moving the well car floor (131).

21. Method for transferring a semi-trailer (20) to and fro a railway well car (10), comprising the steps of:

- providing a transshipment system (1) according to clause 1;
- receiving the railway well car (10) at the railroad area (32) of the transshipment station (30);
- receiving the semi-trailer (20) at the transshipment station (30);
- using the lift unit (50) of the transshipment station (30) to lift the well car floor (131) of the railway well car (10) to the upper position;
- transferring the semi-trailer (20)to or fro the railway well car;
- using the lift unit (50) of the transshipment station (30) to lower the well car floor (131) of the railway well car to the lower position.

Claims

1. Transshipment system (1) for transferring a semi-trailer (20) to and fro a railway well car (10) comprising

- a transshipment station (30) comprising a railroad area (32) including at least one pair of rails (34) for guiding a train and comprising a platform (31) for supporting at least one semi-trailer (20); and
- at least one railway well car (10) having a frame structure (11) including a top surface which defines an upper plane, which frame structure (11) is supported at its ends by a railway bogie (12), in which the frame structure (11) includes a well (13) for receiving wheels of a semi-trailer, in which the well (13) is provided with a well car floor (131) for supporting a semi-trailer (20)

which well car floor (131) is in particular movable in between a lower position for transporting the semi-trailer (20) and an upper position for loading and unloading the semi-trailer, in which upper position the well car floor (131) is aligned with the upper plane, **characterised in that** the transshipment station (30) further comprises a lift unit (50) for lifting and lowering a semitrailer which is supported by the well car floor (13) of the railway well car (10), wherein the lift unit (50) comprises a lift mechanism (54), wherein the lift mechanism (54) has a lift position to engage to a semitrailer (20) and a down position defining a limited height of the lift unit (50) to remain free from engagement with the semitrailer (20).

2. Transshipment system (1) according to claim 1, wherein the well comprises a pocket (13) and wherein the well car floor is a pocket floor (131).

3. Transshipment system (1) according to claim 1 or 2, wherein the transshipment station (30) comprises a first and second lift unit (50), wherein the first lift unit is provided to support a semi-trailer (20) at a rear region via the well car floor (131) and wherein the second lift unit is provided to support a semi-trailer at a front region (25).

4. Transshipment system (1) according to claim 3, wherein the first and second lift unit are incorporated into a single lift unit (50) for supporting the front and rear region of a semi-trailer.

5. Transshipment system (1) according to any of the preceding claims, wherein the lift unit (50) is a stand alone lift unit which is freely movable over the transshipment station (30).

6. Transshipment system (1) according to any of the preceding claims, wherein the lift unit (50) is arranged at the railroad area (32).

7. Transshipment system (1) according to any of the preceding claims, wherein the lift unit (50) comprises a lift unit track (53) which is arranged in between or beside the pair of rails (34) of the railroad area (32) for moving the lift unit (50) in a length direction of the railway.

8. Transshipment system (1) according to any of the claims 1-5, wherein the lift unit (50) is arranged at the platform (31).

9. Transshipment system (1) according to claim 8, wherein the platform (31) is arranged aside the railroad area (32) at a relative height level with respect to the railroad area, wherein the platform (31) is aligned with an upper plane (111) of a railway well car (10), such that a semi-trailer (20) is drivable from the platform (31) onto the railway car (10), wherein the platform (31) comprises a lift unit pit, wherein the lift unit (50) is arranged in the lift unit pit which lift unit pit has a depth which allows the lift unit (50) to reach from aside underneath the well car floor (131) of the railway well car (10), wherein the lift unit comprises a main frame (51) and at least one extendable member for reaching sideward under a well car floor (131), which extendable member is at a proximal end connected to the main frame (51) and wherein the lift mechanism (54) is connected to a distal end of the extendable member to place the lift mechanism (54) under the well car floor (131).

10. Transshipment system (1) according to claim 9, wherein the lift unit (50) further comprises a support foot at the distal end of the extendable member to support the lift mechanism to the rail bed (33).

11. Transshipment system (1) according to any of the preceding claims, wherein the railway well car (10) comprises at least one locking mechanism to lock the well car floor (131) at the upper position to the frame structure (11), wherein the lift unit (50) is configured to operate the locking mechanism to unlock the well car floor before lowering or lifting the well car floor.

12. Transshipment station (30) for use in a transshipment system (1) according to any of the preceding claims, wherein the transshipment station (30) comprises a lift unit (50) for moving a well car floor (131) of a railway well car (10).

13. Railway well car (10) for use in a transshipment system (1) according to any of the preceding claims comprising a movable well car floor (131) for moving a semi-trailer (20) in between a lower position for transporting the semi-trailer and an upper position for transferring the semi-trailer, wherein the railway well car (10) per se is free from a lift unit (50) for moving the well car floor (131).

14. Method for transferring a semi-trailer (20) to and fro a railway well car (10), comprising the steps of:

- providing a transshipment system (1) according to any of the claims 1-11;
- receiving the railway well car (10) at the railroad area (32) of the transshipment station (30);
- receiving the semi-trailer (20) at the transshipment station (30);
- using the lift unit (50) of the transshipment station (30) to lift the well car floor (131) of the railway well car (10) to the upper position;
- transferring the semi-trailer (20)to or fro the railway well car;

• using the lift unit (50) of the transshipment station (30) to lower the well car floor (131) of the railway well car to the lower position.

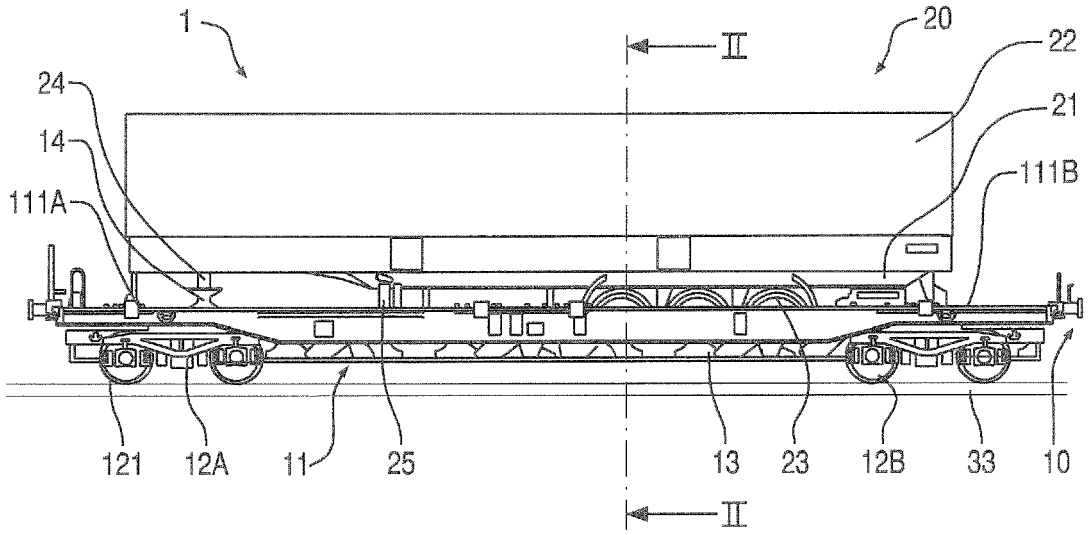
1
II
20
22
24
21
14
111B
111A
121
12A
11
25
13
23
12B
33
10
II

FIG.1

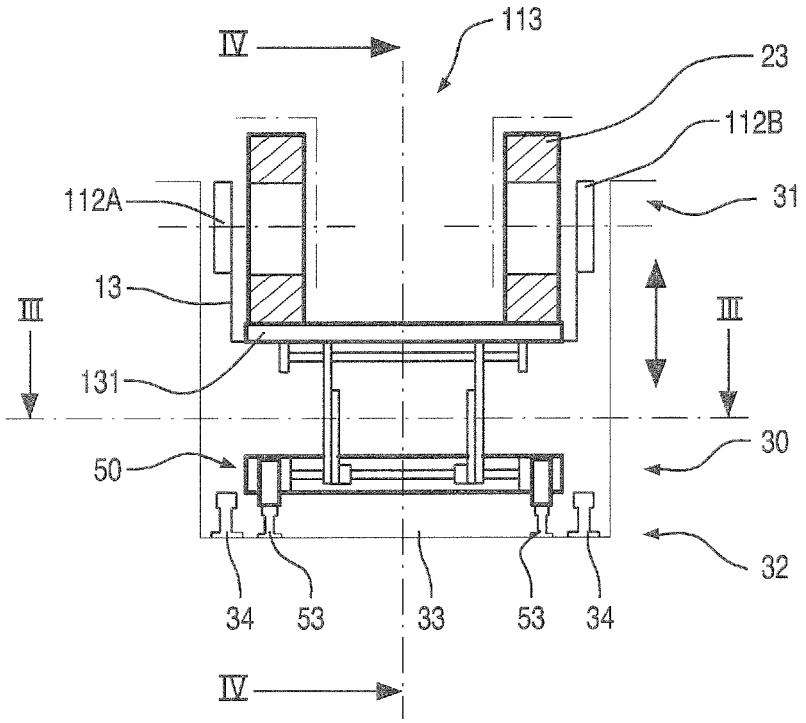
IV
113
23
112B
112A
31
III
13
III
131
50
30
32
34
53
33
53
34
IV

FIG.2

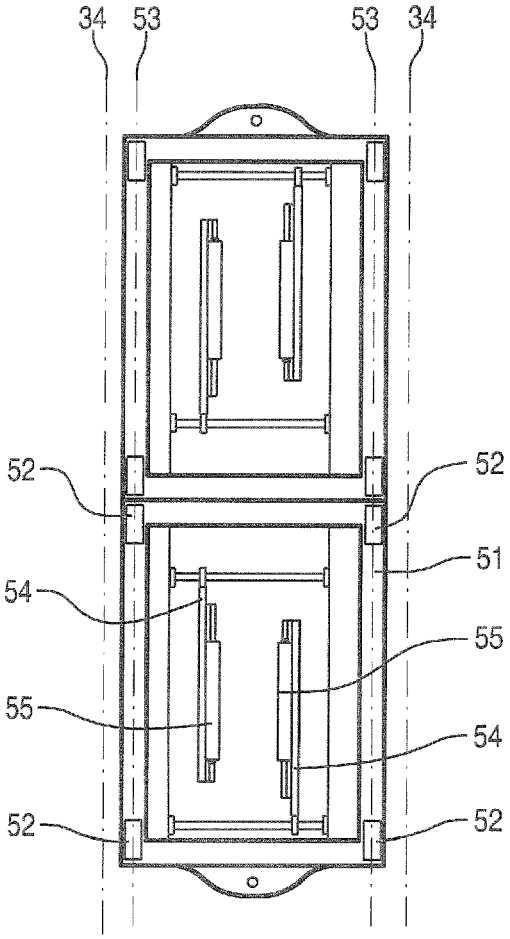

FIG.3

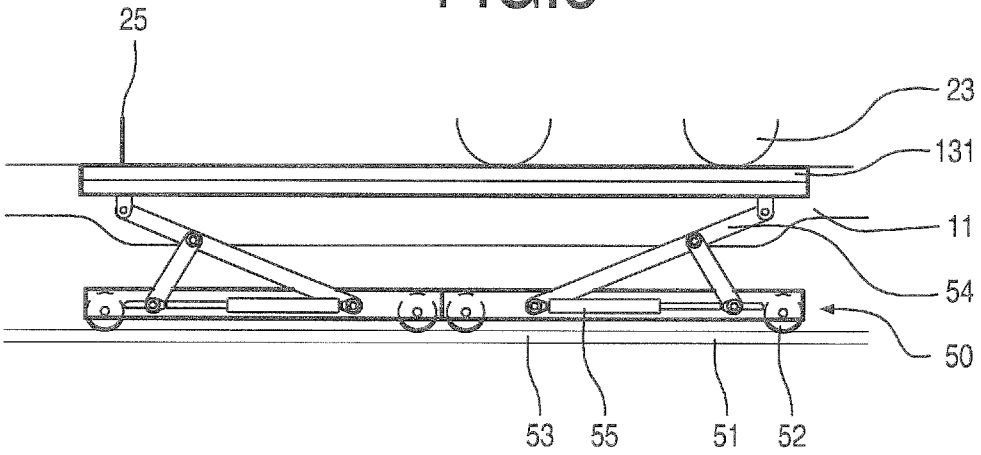

FIG.4

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EUROPEAN SEARCH REPORT

Application Number
EP 12 15 6064

DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	* paragraph [0007] - paragraph [0013] * * paragraph [0015]; figures 1-5 *	3-5	
Y	EP 1 348 603 A1 (BARTOS CASTELO FELIPE [CH]) 1 October 2003 (2003-10-01) * paragraph [0020] - paragraph [0023] * * paragraph [0025] * * paragraph [0031] - paragraph [0034] * * paragraph [0043] - paragraph [0046]; figures 1,6,13-16 *	1-14	
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TECHNICAL FIELDS SEARCHED (IPC)

B61D
B61B
B61J
B61K
B65G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 May 2012	Chlosta, Peter

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29-05-2012

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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