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

(11) Publication number: **0 453 537 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication of patent specification: **22.02.95** (51) Int. Cl.[6]: **B61D 47/00**

(21) Application number: **90916350.3**

(22) Date of filing: **12.11.90**

(86) International application number:
PCT/GB90/01734

(87) International publication number:
WO 91/07301 (30.05.91 91/12)

(54) LOADING AND UNLOADING SYSTEM FOR THE RAILWAY TRANSPORT OF GIANT CONTAINERS AND SEMITRAILERS.

(30) Priority: **13.11.89 GB 8925645**

(43) Date of publication of application:
30.10.91 Bulletin 91/44

(45) Publication of the grant of the patent:
22.02.95 Bulletin 95/08

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL SE

(56) References cited:
EP-A- 0 023 372
WO-A-81/02142
DE-A- 3 805 496
US-A- 3 516 368

(73) Proprietor: **BROWN, John George**
3rd. Floor, Chrystals Building, Bowring Road
Ramsey, Isle of Man (GB)

(72) Inventor: **BROWN, John George**
3rd. Floor, Chrystals Building, Bowring Road
Ramsey, Isle of Man (GB)

EP 0 453 537 B1

Description

This, invention relates to swop-body transportation with particular relevance to railway shuttle type operations in which a series of bodies - coaches, tank-bodies, semitrailers, or the like - are carried on rail wagons.

Swop-body is in use in transport systems around the World especially road-to-rail, and vice-versa, interfaces. In some countries the system is known as 'Piggyback', and in some other countries it is called 'Kangaroo'.

Swop-body has application where the expense of long-haul on road transportation of driver/tractor/trailer can be defrayed by placing the road trailer on a low-slung rail wagon and moving it as part of a trainload on a trunk haul. Swop-body systems are not normally integral with shuttle systems, and the pace of turnround of swop-body trainloads is not critical. Swopping of bodies is normally one wagon at a time, lift off/lift on operation performed by a terminal crane; a straddle carrier; or by a lift truck. Road semitrailer loading may be accomplished by driving along the length of a train of low-slung wagons having bridging plates over the wagon couplings and buffers. A more recent variation is the provision of rail well-wagons in which the well may be turned out to one side of the track to permit a road semitrailer to enter/exit diagonally to the line of the rail track. This system suffers from the disadvantages of expensive well turnout mechanisms on each wagon; trailer discharge must be completed before trailer loading commences, and both discharged and loading trailers require to operate from one side of the trackway causing congestion - especially for customs at frontier terminals.

Other operational and proposed arrangements, for example EP-A-23 372, feature load-carrying beds pivotally secured to low-slung wagon frames, wherein the load-carrying beds are rotatable about vertical axes. When rotated accross the line of the rail trackway, arrival and departure loads may be moved from, and onto, the load-carrying beds from either side of the railtrack. Such arrangements, with load-carrying beds superimposed on wagon underframes, suffer from height restrictions of rail loading gauges; additionally some form of levelling the railwagon suspensions is usually necessary during load transfers from, and to, the load-carrying beds.

The present invention seeks to integrate swop-body and shuttle systems in a manner which maintains flexibility whilst reducing turnround times, with attendant economies of both speeded-up service and higher utilisation rates of expensive capital equipment.

Accordingly, the invention provides a system comprising shuttle trains with wagons having special features for discharging and loading swop-bodies at specially equipped terminal platforms in which discharge and load times for entire trainloads can be measured in minutes rather than hours.

A system of the invention is comprised of swop-bodies; single rail track terminal platforms with angularly displaced bays on both sides of the rail track; and elevation/rotation means to raise then rotate the arriving bodies to alignment with the angularly displaced bays of the terminal platform prior to swopping of the arriving bodies from the rail wagons onto empty arrival bays on one side of the platform simultaneously with departing bodies moving from departure bays on the opposite side of the rail track onto the rail wagons .

Practically all of the essential mechanisms for the swop operations are incorporated in the vicinity of the terminal platform trackway, thereby minimising the need for equipping all of the rail wagon and/or all of the swop bodies with expensive machinery.

To achieve simultaneous discharging and loading of the bodies on all of the wagons in a trainset, the terminal is divided by a single rail track into arrival and departure platforms on opposing sides of the rail trackway. This feature is of considerable benefit in simplifying traffic flows and, in frontier locations, easing customs seperation of imports and/or immigrants from exports and/or emigrants..

Upon arrival of a trainset in a terminal, the locomotive stops precisely adjacent a platform marking, alternatively against arrestors/buffers, in which stopped position the centres of the wagons are plumbed over the elevation/rotation mechanisms located between the railway lines and retracted below rail surface level.

Where the system is used for the transport of unaccompanied road semi-trailers, these may be directly driven from, and onto, wagon wellfloor frames, perhaps using towbars to connect the arrival trailer to the departure trailer thereby effecting simultaneous transfer.

A shuttle system primarily, but not exclusively, for the transport of road semitrailers and/or other high unaccompanied commercial vehicles is equipped with railway bogie wellwagons in which loose frames form the floors of the wells. Suitably stiffened by longitudinal girder(s), each wellfloor frame is pushed up with swop-body superimposed by elevation/rotation mechanisms located below, and rising from, the centre of the rail trackway at or near midlength of the wagon. Fully raised and prior to rotation the lower edges of the wellfloor frame would be a small distance above the top surface of the wellwagon sides. Following rotation to alignment with arrival and departure bays the wellfloor frame lowers to rest upon the platform surfaces on both sides of the railway track at a level marginally

above the top of the wellwagon sides. After departure bodies have swopped with the arrival bodies the foregoing sequence is reversed and the tops of all of the high road vehicles are maintained within rail loading gauge height restrictions.

Rolling stock only earns for railway operators when rolling, and merchandise in transit is costing interest to consignors or consignees. The rapid turnround of, trainloads of semitrailers or other swop-bodies holds promise of economic benefits to operators and users.

A preferred embodiement of the invention will now be described, though by way of illustration only, with reference to the accompanying drawings in which -

Figure 1 is a longitudinal profile of a road semitrailer on a rail wellwagon where overall height restricted by rail loading gauge.

Figure 2 is a longitudinal profile of the wellwagon shown in Figure 1 in which the wellfloor platform has been elevated prior to rotation in a terminal platform.

Figure 3 is a plan view of the wellwagon shown in Figures 1 and 2 where the wellfloor platform has been rotated from alignment with the railway track to alignment with the arrival and departure bays on the terminal platform prior to swopping of the semitrailers.

Figure 4 is a longitudinal section of a coach body in which a vertically moveable car platform has been raised for an alternative mix of vehicle heights.

Figure 5 is a transverse section through the coach body shown in Figure 4.

Figure 6 is a longitudinal section of the coach body shown in Figures 4 and 5 in which the vertically moveable platform has been fully lowered for the single level transport of high commercial vehicles.

Figure 7 is a transverse section through the coach body shown in Figure 6.

A shuttle train of the invention shown in the accompanying drawings - intended for rail transport of swop-body traffic - has a series of rail wagons comprised of rail bogie wheels (1), a wellwagon (2) supporting a loose wellfloor frame (3). Transfer of the arriving swop-body, which typically may be a road semitrailer (4), with transfer of a departing swop-body (not shown) is carried out at special single track (5) platforms (6) characterised by elevation/rotation mechanisms (7) to raise the wellfloor frames (3) with swop-bodies/semitrailers atop, then to rotate about vertical axis (8) from alignment with the rail track (5) to alignment with angularly displaced arrival and departure bays on platforms (6) on opposing sides of rail track (5).

On arrival, the train of wellwagons powered by a locomotive (not shown) stops at a pre-determined marking on the platform - alternatively against arrestor/buffers (not shown).

When securely connected, the elevation of the wellfloor frame (3) with semitrailer (4) atop continues to a level above the top of the wellwagon, (2), and above platform surfaces (6). Following rotation about vertical axis (8), the wellfloor frame (3) is lowered to rest on the platform surfaces (6) on either side of the rail track (5), which surfaces are marginally higher than the tops of the wellwagons (2).

Swop coach bodies (9) for two-level loading of passenger cars and small vans may be made interchangeable with single level loading swop-bodies by arranging the half-height platform (10) vertically moveable, either slightly upwards as shown in Figs.4 and 5, or fully lowered to rest on the coach floor for the transport of high vehicles as shown in Figs.6 and 7.

It will be appreciated that a system of the invention works equally well to opposite hand from that depicted in the drawing Fig 3, also the swopping of the bodies/semitrailers can alternate to either side of the trackway (5).

Claims

1. A swop-body rail transport system in which rail wellwagons (2) have well-floor frames (3) capable of being raised by in-terminal elevation/rotation mechanisms (7) to a level above the tops of the wagons and slightly above platform level (6), at which level the wellfloor frames (3) with semitrailers (4) or the like superimposed turn about vertical axes (8) to align with angularly displaced arrival and departure bays on opposing sides of a single rail track terminal, followed by lowering of the wellfloor frames (3) to rest on the platform surfaces (6) permitting rapid swopping of the bodies from and onto the said wellfloor frames (3).

2. A swop-body rail transport system as in Claim 1 in which wellwagons have wellfloor frames (3) capable of being raised with road semitrailers (4) or the like superimposed to the level of the decking over the rail wheel bogies, permitting road vehicle access along the lengths of the wagons.

3. A swop-body rail transport system as in Claims 1 or 2 in which swoppable coach bodies (9) are each fitted with a vertically moveable deck (10) to permit loading of low-height vehicles on two levels, or high commercial road vehicles on one level on top of the fully lowered deck.

4. A swop-body rail transport system as in Claim 1 in which the bodies are giant containers fitted with add-on wheels for transfer from and to rail wagon wellfloor frames (3).

Patentansprüche

1. Ein Eisenbahntransportsystem mit auswechselbaren Wagenkästen, wobei Eisenbahnwellwagen (2) Wellbodenrahmen (3) haben, die von In-Terminal-Hebe/Drehmechanismen (7) bis zu einer Höhe über dem oberen Rand der Wagen und etwas über Bahnsteighöhe (6) erhoben werden können. Auf dieser Höhe drehen sich die Wellbodenrahmen (3) mit daraufliegenden Sattelaufliegern (4) oder Ähnlichem um senkrechte Achsen (8), um mit schräg versetzten Ankunfts- und Abfahrtsbays auf entgegensetzten Seiten einer eingleisigen Eisenbahnendstation eine Linie zu bilden. Die Wellbodenrahmen (3) werden dann heruntergelassen, um auf den Bahnsteigflächen (6) zu liegen, damit die auf den erwähnten Wellbodenrahmen (3) liegenden Wagenkästen schnell ausgewechselt werden können.

2. Ein wie in Anspruch 1 erwähntes Eisenbahntransportsystem mit auswechselbaren Wagenkästen, wobei Wellwagen Wellbodenrahmen (3) haben, die mit daraufliegenden Straßen-Sattelaufliegern (4) oder Ähnlichem zur Höhe des Bodens über dem Eisenbahndrehgestell erhoben werden können, so daß Straßenfahrzeuge die Länge der Wagen entlang Zufahrt haben.

3. Ein wie in Anspruch 1 oder 2 erwähntes Eisenbahntransportsystem mit auswechselbaren Wagenkästen, wobei jeder auswechselbare Wagenkasten (9) mit senkrecht verstellbarem Deck (10) ausgerüstet ist, so daß niedrige Fahrzeuge auf zwei Höhenlagen, oder hohe Handelsstraßenfahrzeuge auf einer Höhenlage auf das vollgesenkte Deck geladen werden können.

4. Ein wie in Anspruch 1 erwähntes Eisenbahntransportsystem mit auswechselbaren Wagenkästen, wobei es sich bei den Wagenkästen um Riesenbahälter mit montierbaren Rädern zum Transport von und zu Eisenbahnwagen-Wellbodenrahmen (3) handelt.

Revendications

1. Un système de transport ferroviaire pour équipements interchangeables, dans lequel des wagons à plate-forme surbaissée (2) ont un chassis surbaissé (3) qui peut être soulever légèrement au-dessus du wagon et du niveau du quai (6) par un dispositif élévateur/pivotant (7). Le chassis ainsi que sa semi-remorque (4) ou autre charge peuvent ensuite être pivotés autour d'un axe vertical (8) pour être aligner avec les quais d'arrivée ou de départ, aménagés obliquement des deux côtes d'une voie ferrée unique. Enfin, le chassis peut être rebaissé pour reposer sur le quai (6), permettant le déchargement/chargement rapides des équipements interchangeables transportés.

2. Un système de transport ferroviaire pour équipements interchangeables, tel que décrit au Para.1 ci-dessus, dont le chassis surbaissé (3), chargé d'une semi-remorque ou autre équipement (4), peut être soulevé au niveau du plancher au-dessus des bogies, permettant aux véhicules d'accéder au wagon dans toute sa longueur.

3. Un système de transport ferroviaire pour équipements interchangeable, tel que décrit aux Paras.1 et 2 ci-dessus, où les wagons sont munis de carrosseries interchangeables (9) avec plate-forme élévatrice (10) permettant le transport des véhicules bas sur deux niveaux, ou de véhicules hauts sur un niveau, sur plateforme en position basse.

4. Un système de transport ferroviaire pour équipements interchangeables, tel que décrit au Para.1 ci-dessus, dont la carrosserie est formée de conteneurs géants munis de roues pour le chargement et déchargement de châssis wagons (3).

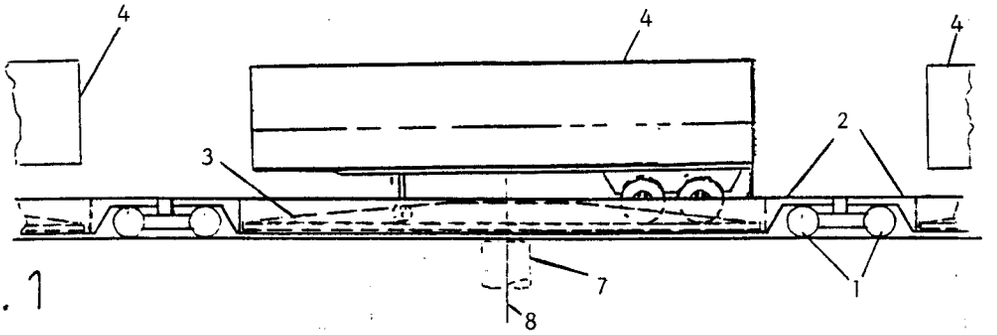

FIG. 1

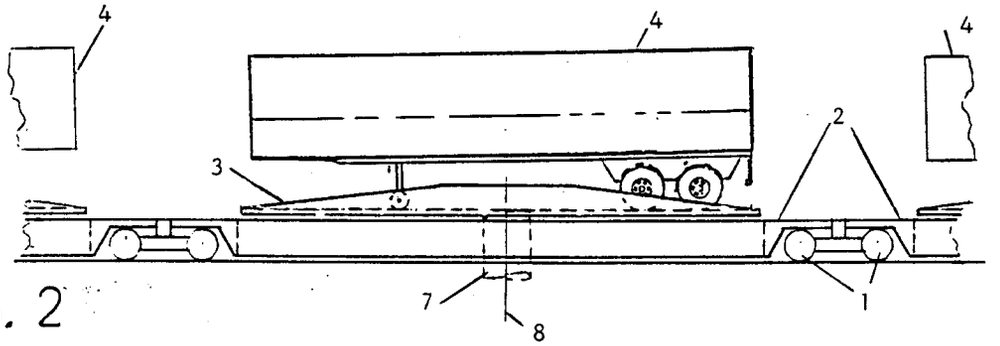

FIG. 2

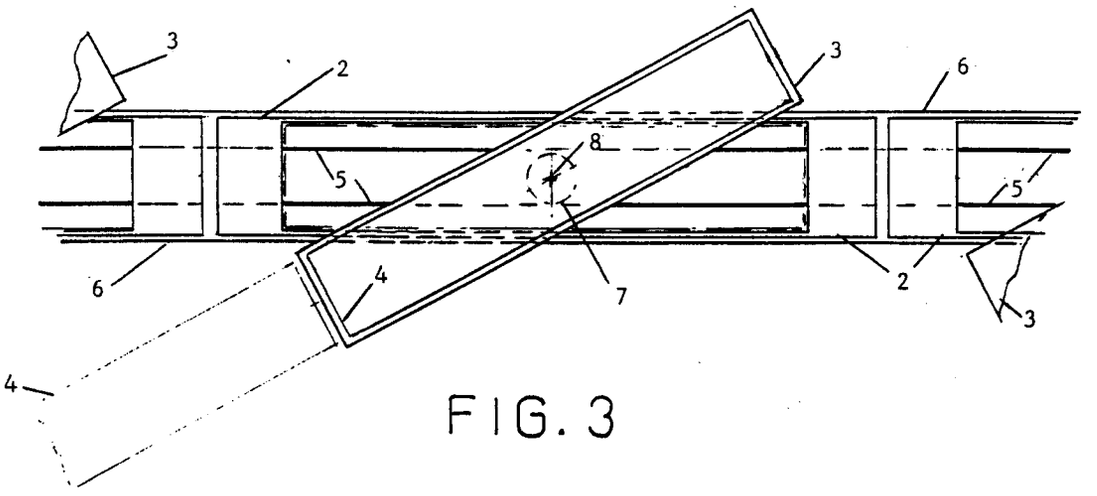

FIG. 3

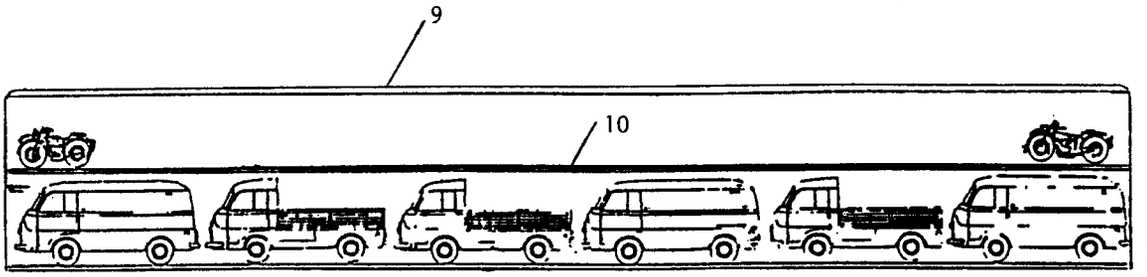

FIG. 4

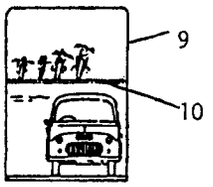

FIG. 5

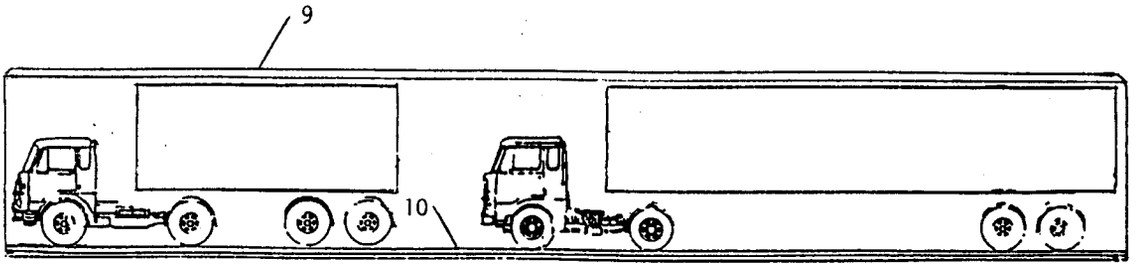

FIG. 6

FIG. 7