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Reconfigurable mobile semi-trailer combination and method of reconfiguring such a combination.

(57)

A mobile semi-trailer combination has a front semi-trailer with, at its rear end, a coupling chassis with a coupling, and a rear semi-trailer having a set of wheels and a front frame portion extending forwardly of the set of wheels. The front frame portion has container support arms that are demountable, retractable or inwardly pivotable. The front semi-trailer and rear semi-trailer are connectable in a long mutually pivotable configuration and in a short mutually fixed configuration in which the front frame portion of the rear semi-trailer projects into a guide of the front semi-trailer so that the front and rear semi-trailers are prevented from pivoting relative to each other.

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TITLE: Reconfigurable mobile semi-trailer combination and method of reconfiguring such a combination

FIELD AND BACKGROUND OF THE INVENTION

The invention relates to a mobile semi-trailer combination and to a method for reconfiguring such a mobile trailer combination. For road transport of goods various types of combinations are known, such as a rigid vehicle
5 towing a trailer or a semi-trailer, an articulated vehicle towing a trailer, an articulated vehicle towing a semi-trailer also known as a "B-double", or an articulated vehicle towing a semi-trailer resting on a dolly (sometimes referred to as a "road train"). For all these combinations regulations are in place with
10 respect to safety and dimensions of the vehicle.

In the European Union, the maximum length for goods vehicles is set by EC directive 96/53/EC and is limited to 16.5 m for articulated vehicles and 18.75 m for full-trailer combinations. The directive does not set an absolute weight limit, but specifies certain limits which, if met, guarantee free
15 circulation of vehicles within the EU. The harmonised maximum weight for international transport is 40 tonnes. The cargo capacity of combinations for container transport can also be expressed in TEU (Twenty- feet Equivalence Unit) which stands for the equivalent of a standard 20 ft long container.

For domestic transport some countries inside and outside the EU, e.g.
20 the Netherlands, permit longer and heavier goods vehicles with more than one articulation, or are considering such permission. For example, vehicles weighing up to 60 tonnes and up to 25.25 m long, which can accommodate three TEU, are allowed in some EU countries. In the Netherlands, the Directorate of the office for road traffic has issued a rule of policy for an
25 exemption on the restrictions allowing such Longer and Heavier Goods Vehicles (LHV).

However, such exemptions are typically applicable to particular roads only. This complicates the logistics and planning of transportation involving the use of LHVs and limits advantages of the use LHVs.

5 SUMMARY OF THE INVENTION

It is an object of the present invention to provide a mobile trailer combination of which the length is adaptable to different maximum lengths allowed on different roads.

10 According to the invention, this object is achieved by providing a mobile trailer combination according to claim 1. The invention can also be embodied in a method for reconfiguring a mobile trailer combination according to claim 16.

Such a mobile trailer combination can be configured as a long trailer
15 combination as well as a short trailer combination with a length shorter than the length of the long trailer combination. The length of the vehicle can be changed to a large extent, so that for example reconfiguration between an LHV and a vehicle within the constraints of normal commercial vehicles or reconfiguration between a three TEU and a two TEU configuration can be
20 achieved. This allows a more flexible use of the trailer combination, for example as an LHV with three TEU until a first point of delivery and then as a conventional vehicle with two TEU load capacity to one or more further points of delivery, without being restricted to roads on which LHVs are allowed.

25 Particular elaborations and embodiments of the invention are set forth in the dependent claims.

Further features, effects and details of the invention appear from the detailed description and the drawings which are of schematic nature.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a side view of an embodiment of a mobile semi-trailer combination according to the invention in a long (LHV) configuration;

5 Fig. 2 is a side view of a front semi-trailer of the mobile semi-trailer combination of Fig. 1;

Fig. 3 is a side view of a rear semi-trailer of the mobile semi-trailer combination of Fig. 1 adjusted to its shortest length;

10 Fig. 4 is a top view of the rear semi-trailer of Fig. 3 in a long configuration;

Fig. 5 is a top view of the rear semi-trailer in the configuration shown in Fig. 3;

Fig. 6 is a top view of the front semi-trailer of Fig. 2 and a front portion of the rear semi-trailer of Figs. 3-5;

15 Fig. 7 is a side view of the mobile semi-trailer combination of Fig. 1 in a short configuration;

Fig. 8 is a side view of the mobile semi-trailer combination of Figs. 1 and 7 with the rear trailer in its longest configuration;

20 Fig. 9 is a side view of the mobile semi-trailer combination of Fig. 8 with the front end of the rear semi-trailer slid into the front semi-trailer;]

Fig. 10 is a side view of another mobile semi-trailer combination according to the invention carrying three containers;

Fig. 11 is a side view of yet another mobile semi-trailer combination according to the invention in a long configuration carrying three containers;

25 Fig. 12 is a side view of the semi-trailer of Fig. 11 in different long configuration;

Fig. 13 is a side view of the semi-trailer of Fig. 11 in a short configuration carrying two containers;

30 Fig. 14 is a top view of a rearmost semi-trailer of the mobile semi-trailer combination of Figs. 11-13;

Fig. 15 is a side view of a front end portion of the semi-trailer of Fig. 14;

Fig. 16 is a top view of a second semi-trailer of the mobile semi-trailer combination of Figs. 11-13;

Fig. 17 is a schematic cross-sectional view along the line XVII-XVII in
5 Fig. 16;

Fig. 18 is a schematic cross-sectional view along the line XVIII-XVIII in Fig. 16;

Fig. 19 is a schematic top view of the first and second semi-trailer of the mobile semi-trailer combination of Figs. 11-13; and

10 Fig. 20 is a cross-sectional view along the line XX-XX in Fig. 19.

DETAILED DESCRIPTION

A mobile semi-trailer combination 1 composed of a front semi-trailer 2
15 and a rear semi-trailer 3 is towed by a tractor 4 (Fig. 1). The front semi-trailer 2 is connected to the tractor 4 by a front coupling 5 of the kingpin-plate type. The rear semi-trailer 3 is connected to the front semi-trailer 2 by a rear coupling 6 also of the kingpin-plate type. The front semi-trailer 2 carries a 20 ft container 29 and the rear semi-trailer carries a 40 ft container 30.

20 The front semi-trailer 2 (shown in more detail in Fig. 2) has a support frame 14 carrying the container 29, a coupling chassis and an extendable ground support member 10 for supporting the front end of the front semi-trailer 2 when it is parked. A coupling chassis 7 at the rear of the front semi-trailer 2 has two wheel axes with wheels 8, 9. A plate 11 of the rear kingpin-plate coupling 6 is mounted on the coupling chassis 7. A kingpin 12 of the
25 front kingpin-plate coupling 5 is mounted at the front of the front semi-trailer 2 under the support frame 14. In this embodiment, the coupling chassis 7 is displaceable back and forth in a driving direction 13 with respect to the support frame 14 between different positions (see Figs. 4 and 5 as well as Figs.
30 1, and 7-9).

As is shown in Figs. 3 - 5, the rear semi-trailer 3 has a main frame 26 and three wheel axles 15-17. A front frame portion 18 of the rear semi-trailer 3 extends forwardly of the first wheel axle 15 and the main frame 26 in a direction of traffic 13. The front frame portion 18 has a front frame coupling member 27 complementary with the coupling member 11 of the coupling chassis 7. The front frame portion 18 is guided in longitudinal direction of the semi-trailer 3 in a guide 34 of the main frame 26 between an extended position (Fig. 4) and a position wherein the front frame portion 18 is partially retracted (Fig. 5). Thus, the distance over which the front frame portion 18 projects from the main frame 26, and accordingly the distance from the coupling member 27 to the main frame 26, is adjustable. In the present example, the guide 34 is in the form of a single box girder 34, which provides a better stiffness to weight relationship than for instance a guide constituted by two laterally and/or upwardly of downwardly open girders. Preferably, the coupling member 11 of the coupling chassis 7 is of the same type as the front coupling member 12 at the front of the front semi-trailer 3 and so that the rear semi-trailer 3 can also be coupled to the truck 4 by means of the front frame coupling member 27. The front frame coupling 27 is mounted to a central backbone portion 32 of the front frame portion 18.

The front frame portion 18 is further provided with a container support frame 19 having container support arms 20, 21 extending sideward with respect to the front frame portion 18. The container support arms 20, 21 are part of the container support frame portion 19 of which the position is adjustable in driving direction along backbone portion 32. Accordingly, also the position of the front frame coupling 27 relative to the container support arms 20, 21 is adjustable in driving direction. In this embodiment the most forwardly located container support arms 20 are inwardly pivotable as indicated by arrows 28 in Fig. 5, about hinges 22, 23, allowing the pivotable support arms 20 to be accommodated within front frame portion 18. In the extended position the container support arms 20 span a width 31 equal to the

width of the support frame 14 of the front semi-trailer 2. The container support arms 21 are fixed end portions of a single support beam. A further container support beam 24 is located at the rear of the rear semi-trailer 3. The container support beam 24 at the rear is mounted on a slideable rear frame portion 25 allowing to adjust the length of the rear semi-trailer 3 (see Figs. 4, 5). In the present example, the rear frame portion 25 has two parallel beams in longitudinal direction. Alternatively, such a retractable rear frame portion may also be of a different construction, for instance having a single central beam extending in longitudinal direction. Such a beam may for instance be arranged to slide telescopically in or around a central beam of the front frame, such as the backbone portion 32, so that when the front and rear frame portions are both extended, one still projects into the other over a small distance to keep the inner one of the beams positioned at its proximal end.

The container support arms may, instead of being pivotable, be retractable or demountable, which also results in a front end portion of the front frame portion 18 being free from laterally projecting parts. Furthermore, instead of two separate support arms 20 projecting on opposite sides of the front frame portion 18, a single container support beam or girder may be provided that extends over the total carrier platform width of the rear semi-trailer 3.

The slidable rear frame portion 25 and front frame portion 18 allow adjustment of the length of the rear semi-trailer 3. The length of the rear semi-trailer 3 may for instance be capable of being adjusted for carrying one container of 40 feet or 45 feet, two containers of 20 feet each or one container of 20 feet. Depending on the container length and the desired vehicle confirmation, either the fixed support arms 21 or the pivotable front support arms 20 may support the front end of the container. Besides containers, the semi-trailers can also be loaded with so called swap bodies, cradles or other cargo carriers.

The front semi-trailer 2 and rear semi-trailer 3 are connectable in a long mutually pivotable configuration as shown in Fig. 1 and in a short, mutually rigid configuration as shown in Fig. 7. In the long configuration the frame portion 18 of the rear semi-trailer 3 is pivotably connected to the coupling chassis 7 of the front semi-trailer 2 by the coupling 6. In the short configuration, the front frame portion 18 of the rear semi-trailer 3 is rigidly connected to the support frame 14 of the front semi-trailer 2, the container support arms 20 being pivoted inwardly. The front frame portion 18 of the rear semi-trailer 3 projects between longitudinal beams of the support frame 14 of the front semi-trailer 2. The front frame coupling member 27 in this example (the kingpin), is coupled to the plate 11 and the fixation of the connection between the front semi-trailer 2 and the rear semi-trailer 3 is provided by the immobilization of the front frame portion 18 in the support frame 14. As is best seen in Fig. 6, the support frame 14 is adapted for receiving the front frame portion 18 of the rear semi-trailer 3 such that the front frame portion 18 projects in the support frame 14 of the front semi-trailer 2. In this manner, the external width of the front frame portion 18 closely fits in the internal width of the frame 14. When the container support arms 20 are pivoted inwardly, the width of the front end portion of the rear semi-trailer 3 is reduced to the width 32 of the front frame portion 18. Thus, the free space in the support frame 14 required for allowing the front frame portion 18 to be inserted therein is reduced.

When retractable or inwardly pivotable container support arms are provided, the arms are preferably retractable or pivotable to a position completely within the contour of the front frame portion in frontal cross-sectional view, so that the container support arms require no additional space in the support frame 14.

As a result of the front frame portion 18 of the rear semi-trailer 3 projecting in the support frame 12 of the front semi-trailer 2 over a substantial distance, the length of the mobile semi-trailer combination is reduced. When

the front frame 18 is also partially slid in the guide 34, the length of the mobile semi-trailer combination is further reduced. When the rear frame portion 25 is retracted in the main frame 26, the length of the mobile semi-trailer combination is reduced even further.

5 Prior to reconfiguration of the mobile semi-trailer combination 1 into the short configuration, a container 30 on the rear semi-trailer 3 is to be removed to allow the length of the rear semi-trailer 3 to be reduced. Adjustment of the length can be performed while the semi-trailers 2, 3 are coupled, but also in uncoupled condition. Also prior to the actual adjustment of the length to the
10 shortened length, the container support arms 20 are pivoted inwardly into the front frame portion 18 of the rear semi-trailer 3. Next, the coupling chassis 7 of the front semi-trailer 2 is placed in the inward retracted position. This can for instance be done by blocking the wheels 8, 9 of the coupling chassis 7 and driving the truck 4 backwards, but also by pushing the chassis 7 underneath
15 the support surface 14. The front frame 18 of the rear semi-trailer 3 is inserted into the support frame 14 of the front semi-trailer 2 and pushed partially into the guide 34 of the main frame 26 of the rear semi-trailer 3. This may be carried out by reversing the front semi-trailer 2 with the brakes of the axles 16, 17, 18 of the rear semi-trailer applied so that the rear trailer is prevented
20 from rolling backwardly. When the semi-trailers 2, 3 were uncoupled prior to displacing the coupling chassis 7, the rear semi-trailer 3 can be coupled and inserted after the coupling chassis 7 has been displaced to its retracted position. Also, the rear frame portion 25 is pushed to the retracted position. In the short configuration, the mobile semi-trailer combination has a reduced
25 length equal to the size of two 20 ft containers 29 or one 40 or 45 ft container and is within the normal maximum length of commercial vehicles.

For reconfiguration of the mobile semi-trailer combination into the long configuration, the steps described above are carried out in reversed sense.

30 The adjustment of the length of the rear semi-trailer 3, the displacement of the coupling chassis 7 and the insertion of the front frame

portion 18 in the support frame 14 can in principle be carried out in any order, although it is recommended that the coupling members 11, 27 of the front and rear semi-trailers are coupled before the coupling chassis 7 is moved forward and the front frame portion 18 is inserted into the support frame 14.

5 In another embodiment, the front semi-trailer is further provided with a bay equipped with releasable fasteners for receiving and immobilizing the front frame of the rear semi-trailer to the support frame of the front semi-trailer, so that the mobile semi-trailer combination is connectable in a short mutually rigid configuration without a connection via the coupling for
10 articulated coupling of the front semi-trailer to the rear semi-trailer.

 In its long configuration as shown in Fig. 1, a semi-trailer combination and the tractor coupled thereto have two points of articulation: one between the tractor and the front semi-trailer and one between the front semi-trailer and the rear semi-trailer. Driving backwards with a vehicle having such a
15 double articulation is quite difficult. According to the present embodiment of the invention, the container can be positioned on the rear semi-trailer 3 in a position (see Figs. 8 and 9) shifted slightly backwards relative to the position shown in Fig. 1.

 To this end, the most forwardly located container support arms 20 can
20 be repositioned by dismounting and remounting in a position 20' shown in Fig. 4 in which the container locks at the distal ends of the arms 20' are positioned slightly backward from the position of the container locks if the container arms 20 are positioned in the most forward position 20. Alternatively, the repositioning of the container locks can be achieved by providing that the
25 container arms are pivotable between two operating positions for carrying a container.

 If the container 30 is positioned on the rear semi-trailer 3 in the rearward position shown in Figs. 8 and 9, a front end of the frame of the rear semi-trailer 3 projects forwardly of the container 30. From the driving
30 configuration shown in Fig. 8, the front frame end of the rear semi-trailer 3

can be inserted into the front semi-trailer 2 by reversing the front semi-trailer 2 relative to the rear semi-trailer 3 while the coupling chassis 7 of the front semi-trailer 2 is also maintained stationary, until the configuration in Fig. 9 has been reached. In the configuration shown in Fig. 9, articulation between the front semi-trailer 2 and the rear semi-trailer 3 is prevented, because the front frame end of the rear semi-trailer 3 projecting forwardly of the container 30 is guided in the rear end portion of the front semi-trailer 2.

The elimination of one of the two articulations facilitates reversing of the tractor trailer combination, since the front and rear semi-trailers 2, 3 are prevented from mutual jackknifing. In the extended LHV driving configuration shown in Fig. 8, the distance between the containers 29, 30 on the front and rear semi-trailers 2, 3 is larger than in the normal LHV driving configuration shown in Fig. 1. This entails a slightly increased drag. Whether the extended driving configuration shown in Fig. 8, which, in practice, can be selected only before loading of the container 30 and which allows reversing in the configuration shown in Fig. 9 will depend on the extent of maneuvering including reversing that is anticipated, the skill of the driver and the distance to be covered in the LHV configuration. Also the smallest radius of bends to be negotiated along the route may affect the decision to opt for the configuration shown in Fig. 8.

In another embodiment shown in Fig. 10, a mobile semi-trailer combination 101 is composed of two of the front type semi-trailers 2, 2' and one rear type semi-trailer 103. The two front type semi-trailers 2, 2' are coupled so as to be articulatable relative to each other about the coupling between the coupling chassis 7 of the front one of the front type semi-trailers and the front end of the rear one of the front type semi-trailers 2'. The rear one of the front type semi-trailers 2' and the rear semi-trailer 103 are coupled such that articulation between these semi-trailers 2', 103 is blocked. Together, the rear one of the front type semi-trailers 2' and the rear semi-trailer 103 constitute a rear semi-trailer that can carry two TEU. Thus, the semi-trailer combination

101 is in a long LHV type configuration allowing the transportation of three TEU.

By uncoupling the rear type semi-trailer 103 carrying the rearmost 20 ft container 29, the rear doors of the middle 20 ft container 29 can be made
5 accessible for loading and unloading.

With the coupling chassis 7 of the front one of the front type semi-trailers 2 slid forward to a position as shown in Fig. 7, the front type semi-trailers 2, 2' can be coupled to each other in a short configuration blocked against mutual articulation. With the coupling chassis 7 of the rear one of the
10 front type semi-trailers 2' slid forward, the rear type semi-trailer 103 can be coupled to the rear one of the front type semi-trailers 2' in a short configuration with the front frame portion of the rear semi-trailer 103 inserted into the rear one of the front type semi-trailers 2', so that also mutual
15 articulation between the rear semi-trailer 103 and the rear one of the front type semi-trailers 2 is blocked. Moreover, the rear frame portion of the rear semi-trailer 103 can be retracted in a manner similar to the rear frame portion 25 as illustrated by Figs. 4 and 5. Thus, the semi-trailer combination 101 can be brought in a normal two TEU configuration, which is allowed to circulate on most roads without special permission, without having to leave back one of
20 the semi-trailers.

Alternatively, at a point of delivery, one of the front type semi-trailers 2 or the rear semi-trailer 103 can be uncoupled and left behind. Subsequently, the combination can for instance travel further as a conventional commercial vehicle with a two TEU cargo capacity in the short configuration, which is
25 allowed to circulate on most roads without special permission.

Furthermore, by adding yet another front type semi-trailer 2 as the front, middle or rear one of the front type semi-trailers 2 an additional semi-trailer can be added to be transported along with the configuration having an overall length as shown in Fig. 10 and three TEU transport capacity, i.e.
30 within standard maximum dimensions of an LHV combination.

In Figs. 11-20 overall views and details of yet another example of a mobile semi-trailer combination 201 according to the invention is shown. The semi-trailer combination 201 according to this example is composed of a front semi-trailer 202 and a rear semi-trailer 203 articulated to the first semi-trailer 202 at the front of the combination 201. The rear semi trailer is composed of a second semi-trailer 235 and a third semi-trailer 236 rigidly (in the sense of not articulatable) but detachably coupled to the second semi-trailer 235.

The semi-trailer combination 201 according to this example can be shortened from long configurations as shown in Figs. 11 and 12 to a particularly short configuration as shown in Fig. 13 including all of the three semi-trailers 202, 235 and 236 and vice versa. This allows to change between the long LZV configuration and a short configuration, which is road legal without making use of exemptions such as LZV rules, without removing or adding semi-trailers. This provides an important increase in logistic flexibility and in many cases it will be possible to carry out combined logistic transport requirements with fewer semi-trailers and a smaller overall mileage, because the need of leaving semi-trailers behind is obviated.

Additionally, also a mobile semi-trailer combination 201 according to the present example allows to leave behind semi-trailers. The three semi-trailers 202, 235 and 236 can also be disconnected so that the tractor 204 can pull only the first, the second or the third semi-trailer 202, 235 or 236, only the first and the second semi-trailers 202, 235, 236 or only the second and the third semi-trailers 235, 236. The tractor 204 is similar to the tractor 4 shown in Figs. 1, 7, 8, 9 and 10, but its kingpin-plate coupling 205 has a top surface at a lower level than the kingpin-plate coupling 5 than the tractor 4 shown in Figs. 1, 7, 8, 9 and 10. This allows the second and third semi-trailers 235, 236 to have a relatively low front end in line with the load deck and capable of being guided by a guide or guide profiles under the load deck of the semi-trailer directly in front of the second or third semi-trailer.

The first semi-trailer 202 has a wheel set including three axles 237, 238, 239. The second semi-trailer 235 has a wheel set including two axles 240, 241 and the third semi-trailer 236 has a wheel set including two axles 242, 243. The wheel sets of the semi-trailers may have different numbers of axes,
 5 depending on the load carrying requirements and the allowable axle loads.

The first semi-trailer 202 has a wheel frame 207 carried by the axles 237, 238, 239 of the first semi-trailer 202 via suspension members of those axles 237, 238, 239. The wheel frame 207 also constitutes the coupling chassis 207 of the front semi-trailer 202.

10 The second semi-trailer 235 has a wheel frame 244 carried by the axles 240, 241 of the second semi-trailer 235 via suspension members of those axles 240, 241. The wheel frame 244 is slidably mounted to the front frame portion 218 of the second semi-trailer 235, which front frame portion also constitutes the front frame portion of the rear semi-trailer 203 as a whole, which front
 15 frame portion 218 is insertable into the frame 214 of the first semi-trailer 202 (see Figs. 13 and 19). The front frame portion 218 includes a load support frame 219 and a backbone portion 232.

The third semi-trailer has a frame 246 and front frame portion 248 slidably mounted relative to a wheel frame 247 of the third semi-trailer 236.

20 The backbone portion 232 of the rear semi-trailer 203 is guided by the front support frame 219 to allow movement of the front frame portion 218 to and fro in the driving direction relative to the front support frame 219 and the wheel frame 244 of the second semi-trailer 235, between an extended position and a retracted position. The front support frame 219 is guided relative to the
 25 wheel frame 244 of the second semi-trailer 235 to allow movement of the front support frame 219 to and fro in the driving direction relative to the wheel frame 244 of the second semi-trailer 235, between an extended position and a retracted position.

As is best seen in Figs. 13 and 16-18, in the short configuration, an
 30 overlap in longitudinal (driving) direction exists between the front frame

portion 218 of the second semi-trailer 235 and the frame 246 of the third semi-trailer 236. This allows to reduce the length of the rear semi-trailer 203 (composed of the second and third semi-trailers 235 and 236) to a particularly important extent. Depending on the number of axles and the legislation on allowable vehicle length, the thus achievable shortest length provides a particularly important contribution to reducing the length of the semi-trailer combination 201 in its shortest length with all three semi-trailers 202, 235, 236 to within the limitations applicable to a regular semi-trailer combination.

In the present example the overlap is such that the front frame portion 218 of the second semi-trailer 235 extends above a portion of the frame 246 of the third semi-trailer 236. It however also possible to provide that the overlap is in the form of front frame portion of the second semi-trailer extending under and/or laterally inside or outside a portion of the frame of the third semi-trailer.

While the possibility of providing an overlap in longitudinal (driving) direction between the front frame portion 218 of the second semi-trailer 235 and the frame 246 of the third semi-trailer 236 is advantageous in combination with the previously described features that, in the short configuration, the front frame portion 218 of the rear semi trailer 203 is rigidly (non-articulatably) coupled to the front frame portion of the front semi-trailer 202, the support arms 220 being dismounted, retracted or inwardly pivoted and the front frame portion 218 of the rear semi trailer 203 extending into the front frame portion of the front semi-trailer 202, the feature that an overlap in longitudinal (driving) direction between the front frame portion 218 of the second semi-trailer 235 and the frame 246 of the third semi-trailer 236 can be provided is also of advantage for allowing a particularly large amount of shortening from the long configuration to the short configuration without such previously described features.

As is illustrated by Fig. 16, more specifically, an overlap exists between the front portion 248 of the frame 246 of the third semi-trailer 236 and the

front frame portion 218 of the second semi-trailer 235. In Fig. 16, the front support frame 219 is shown in its most retracted position, the fixed support arms 221 being directly in front of the wheel frame 244 of the second semi-trailer 235. The backbone 232 is extended and the rear support beam is
 5 retracted in a position directly to the rear of the wheel frame 244 of the second semi-trailer 235.

As is shown in Fig. 18, in coupled condition, a front frame coupling member 251 (in this example a kingpin) of the third semi-trailer 236 (see also Fig. 14) is coupled to a plate 252 of the second semi-trailer 235 (see also Fig.
 10 16). However, instead of the example 251, 252 shown, also alternative coupling constructions allowing to catch a coupling member of one of the second and third semi-trailers into a coupling member of the third or, respectively, second semi-trailers can be provided.

As is best seen in Figs. 11 and 12, in the long configuration, the wheel
 15 frame 244 of the second semi-trailer 235 is slidably guided for guided displacement along a front portion 248 of the frame of the third semi-trailer 236. This feature allows to relocate the position of the axles 240, 241 of the second semi-trailer 235 further backward when the second semi-trailer 235 and the third semi-trailer 236 are rigidly connected to each other, to allow to
 20 position the axles 240, 241 of the second semi-trailer 235 for a more even distribution of axle loads in the event freight having a centre of gravity located relatively far to the rear of the combined semi-trailer 203 is to be transported.

While it is advantageous for the versatility of a semi-trailer combination to provide that the wheel frame 244 of the second semi-trailer 235 is slidably
 25 guided for guided displacement along a front portion 248 of the frame of the third semi-trailer 236 in combination with the previously described features that, in the short configuration, the front frame portion 218 of the rear semi trailer 203 is rigidly (non-articulatably) coupled to the front frame portion of the front semi-trailer 202, the support arms 220 being dismounted, retracted
 30 or inwardly pivoted and the front frame portion 218 of the rear semi trailer

203 extending into the front frame portion of the front semi-trailer 202, the
feature that the wheel frame 244 of the second semi-trailer 235 is slidably
guided for guided displacement along a front portion 248 of the frame of the
third semi-trailer 236 is also of advantage for allowing a more even axle load
5 distribution without such previously described features.

As is best seen in Fig. 14, the frame 246 of the third semi-trailer 236 is
guided in driving direction relative to the wheel frame 247 of the third semi-
trailer 236 between an extended position for use in the long configuration
(shown in Fig. 14) and a retracted position for use in a short configuration as
10 shown in Fig. 13. According to the present example, the frame 246 of the third
semi-trailer 236 has two beams extending in driving direction. However, also
different numbers of beams can be provided, such as a central beam
construction as shown in Fig. 4.

The rear frame portion 224 of the third semi-trailer 236 and the rear
15 frame portion 249 of the second semi-trailer are also guided in driving
direction relative to the associated wheel frame 247 and, respectively, 244 for
displacement between an extended position for use in the long configuration
(shown in Fig. 14 for the third semi-trailer 236) and a retracted position
(shown in Figs. 13 and 16 for the second semi-trailer 235) for use in a short
20 configuration. depending on the desired or allowable lengths in the long
configuration and the short configuration, extendable rear frame portions of
the second and/or third semi-trailer may be omitted.

Where successive ones of the semi-trailers are non-articulatably coupled
to each other, rotational movement about a longitudinal axis in driving
25 direction of the coupled semi-trailers relative to each other is disadvantageous
because of loads exerted on the parts that are slidingly coupled to each other
and associated wear caused thereby. As is shown in Figs. 19 and 20, non-
articulatably coupled semi-trailers 202 and 235, when non-articulatably
coupled to each other, have horizontal cross-beams 221, 250 perpendicular to
30 the driving direction on the ends of the coupled semi-trailers 202, 235 facing

each other that are coupled directly to each other. In the present example this direct coupling is a form-locked engagement in which part of the front cross beam 221 of the second semi-trailer 235 is received in a recess in the rear cross-beams 250 of the first-semi-trailer 202. Alternatively, part of the rear cross beam of the first semi-trailer could be received in a recess in the front cross-beams of the second-semi-trailer. Preferably, the mutual engagement preventing vertical movement of the cross beams 221, 250 relative to each other extends to positions close (preferably less than 10% of the trailer width) away from the extreme lateral ends of the trailers. In the example shown in Figs. 19 and 20, the cross-beams 221, 250 are provided with twist locks 252, 252 for engaging standard freight containers positioned thereon. However, the mutual engagement between the directly coupled cross-beams may also be achieved in another manner for example by complementary shaped projections and recesses on and, respectively, in opposing faces of the cross-beams that are to be fixedly coupled relative to each other.

Thus, a large variety of configurations within LHV and standard maximum dimensions is allowed by the insertability of the front frame portion of the rear semi-trailer into a front type semi-trailer in combination with the ability to shift the position of the coupling chassis of each front type semi-trailer in longitudinal direction and adjustability of the distance over which the front and rear portions of the rear semi-trailer project from the wheel set. This large variety of configurations allows a particularly large flexibility in logistic planning of road transport including circulation over some roads in LHV mode and circulation over roads where circulation is allowed in standard mode only.

While the invention has been illustrated and described in detail in the drawing and foregoing description, such illustration and description are to be considered illustrative or exemplary and not restrictive; the invention is not limited to the disclosed embodiments. For example instead of couplings of the kingpin-plate type, other suitable types of coupling can be implemented.

Furthermore, the number of wheel axes of each of the semi-trailers, may be larger or smaller and/or the position of the wheel frame of a second semi-trailer may be restricted to a position or positions coupled to a frame of that semi-trailer only. Furthermore, where transportation of a 40 ft container or two 20 ft containers directly adjacent each other is described, it is generally also possible to transport a 45 ft container within the applicable maximum length according to standard or LHV regulations. Alternatively, single or double module swap bodies specifically designed for road transport can be transported. Typical standard modular lengths of such swap bodies are 7.15 m, 7.45 m and 7.82 m.

Other variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of the drawings, the disclosure, and the appended claims.

Conclusies

1. Verrijdbare opleggercombinatie, omvattende:

een voorste oplegger (2; 202) met een voorframedeel (14) en, aan een achterzijde, een koppelonderstel (7; 207) voorzien van een koppeldeel (11); en

een achterste oplegger (3; 2', 103; 203) met een wielstel (15, 16, 17; 115, 116; 240, 241, 241, 243), een zich ten opzichte van het wielstel (15, 16, 17; 115, 116; 240, 241, 241, 243) in rijrichting (13) naar voren uitstrekkend voorframedeel (18; 218) met een koppeldeel (27; 227) complementair met het koppeldeel (11) van het koppelonderstel (7; 207), en zijwaarts uitstekende container-steunarmen (20; 220) welke demonteerbaar, intrekbaar of
inzwenkbaar zijn;

waarbij de voorste en achterste opleggers (2, 3; 2', 103; 202, 203) koppelbaar zijn in een lange, onderling zwenkbare configuratie en in een korte, onderling starre configuratie;

waarbij in de lange configuratie het koppeldeel (27; 227) van het voorframedeel (18; 218) van de achterste oplegger (3; 2', 103; 203) zwenkbaar is gekoppeld met het koppeldeel (11) van het koppelonderstel (7; 207) van de voorste oplegger (2, 202); en

waarbij in de korte configuratie het voorframedeel (18; 218) van de achterste oplegger (3; 2', 103, 203) star is gekoppeld met het voorframedeel (14; 214) van de voorste oplegger (2; 202), genoemde container-steunarmen (20; 220) zijn gedemonteerd, ingetrokken of ingezwenkt, en het voorframedeel (18; 218) van de achterste oplegger (3, 2', 103; 203) in het voorframedeel (14; 214) van de voorste oplegger (2; 202) uitsteekt.

2. Opleggercombinatie volgens conclusie 1,

waarbij de achterste oplegger (203) is samengesteld uit een tweede oplegger (235) met een wielstelframe (244) en een derde oplegger (236) met een frame (246),

5 waarbij het voorframedeel (218) van de achterste oplegger (203) deel uitmaakt van de tweede oplegger (235) en in rijrichting ten opzichte van het wielstelframe (244) van de tweede oplegger (235) verschuifbaar is tussen een uitgeschoven stand en een ingeschoven stand,

 waarbij de derde oplegger (236) star en loskoppelbaar aan de tweede oplegger (235) is gekoppeld,

10 waarbij in de korte configuratie een overlap in lengterichting aanwezig is tussen het voorframedeel (218) van de tweede oplegger (235) en het frame (246) van de derde oplegger (236).

3. Opleggercombinatie volgens conclusie 1 of 2,

15 waarbij de achterste oplegger (203) is samengesteld uit een tweede oplegger (235) met een wielstelframe (244) en een derde oplegger (236) met een frame (246),

 waarbij de derde oplegger (236) star en loskoppelbaar aan de tweede oplegger (235) is gekoppeld,

20 waarbij in de lange configuratie het wielstelframe (244) van de tweede oplegger (235) verschuifbaar geleid is door ten minste een gedeelte van het frame (246) van de derde oplegger (236).

4. Opleggercombinatie volgens conclusie 2 of 3, waarbij het frame (246)
25 van de derde oplegger (236) een wielstelframe (247) en een voorframedeel (248) omvat, welk voorframedeel (248) in rijrichting ten opzichte van het wielstelframe (247) van de derde oplegger (236) verschuifbaar is tussen een uitgeschoven stand en een ingeschoven stand.

5. Opleggercombinatie volgens conclusie 4, waarbij ten minste het frame van de tweede oplegger (235) of het frame (246) van de derde oplegger (236) een achterframedeel (249, 224) omvat dat in rijrichting ten opzichte van het wielstelframe (244, 247) van genoemde oplegger (235, 236) verschuifbaar is
 5 tussen een uitgeschoven stand en een ingeschoven stand.

6. Opleggercombinatie volgens een der voorgaande conclusies, waarbij ten minste twee opeenvolgende van de opleggers (202, 235, 236) in onderling starre configuratie, aan naar elkaar toe gekeerde, onderling star gekoppelde
 10 uiteinden direct aan elkaar gekoppelde dwarsbalken (221, 250) hebben.

7. Opleggercombinatie volgens een der voorgaande conclusies, waarbij het koppelonderstel (7; 207) in rijrichting (13) verschuifbaar is ten opzichte van het voorframedeel (14) van de voorste oplegger tussen een ingeschoven
 15 positie waarin het koppeldeel (11) van het koppelonderstel (7; 207) zich binnen het voorframedeel (14) van de voorste oplegger (2; 202) bevindt en een uitgeschoven positie waarin het koppeldeel (11) van het koppelonderstel (7; 207) zich, in rijrichting (13) beschouwd, achter het voorframedeel (14) van de voorste oplegger (2; 202) bevindt.

20

8. Opleggercombinatie volgens een der voorgaande conclusies, waarbij genoemde container-steunarmen (20; 220) intrekbaar of inzwenkbaar tot binnen het voorframedeel (18; 218) van de achterste oplegger (3; 2', 103; 203) zijn.

25

9. Opleggercombinatie volgens een der voorgaande conclusies, waarbij genoemde container-steunarmen (20; 220) deel uitmaken van een container-steunframe (19; 219) van het voorframedeel (18; 218) van de achterste oplegger (3; 2', 103; 203) in een in rijrichting ten opzichte van een

ruggegraatdeel (32; 232) van het voorframedeel (18; 218) van de achterste oplegger (3; 2', 103; 203) verstelbare positie.

10. Opleggercombinatie volgens een der voorgaande conclusies, waarbij
5 genoemde container-steunarmen (20; 220) zich in gemonteerde, uitgestoken of uitgezwenkte stand uitstrekken over een breedte gelijk aan de breedte van het voorframedeel (14) van de voorste oplegger (2; 202).

11. Opleggercombinatie volgens een der voorgaande conclusies, waarbij
10 in de korte configuratie de koppeling (27; 227) van het framedeel (18; 218) van de achterste oplegger (3; 2', 103; 203) is gekoppeld met de koppeling (6) van het koppelonderstel (7; 207) van de voorste oplegger (2; 202).

12. Opleggercombinatie volgens een der voorgaande conclusies, waarbij
15 het voorframedeel (14) van de voorste oplegger (2; 202) een opnamestructuur met vergrendelingsmiddelen omvat voor het opnemen en vergrendelen van het voorframedeel (18; 218) van de achterste oplegger (3; 2', 103; 203).

13. Opleggercombinatie volgens conclusie 12, waarbij in de korte
20 configuratie het voorframedeel (18; 218) van de achterste oplegger (3; 2', 103; 203) star is gekoppeld met de opnamestructuur, en waarbij het koppeldeel (11) van het koppelonderstel (7; 207) vrij is van directe aangrijping met de koppeling (27; 227) van het voorframedeel (18; 218) van de achterste oplegger (3; 2', 103; 203).

25

14. Opleggercombinatie volgens een der voorgaande conclusies, waarbij de achterste oplegger (3; 2', 103; 203) in lengte verstelbaar is.

15. Opleggercombinatie volgens conclusie 14, waarbij het voorframedeel
30 (18; 218) van de achterste oplegger (3; 2', 103; 203) in lengte verstelbaar is.

16. Werkwijze voor het herconfigureren van een opleggersamenstel, omvattende:

- het verschaffen van een verrijdbare opleggercombinatie (1; 101; 201)
- 5 volgens een der voorgaande conclusies;
- voor het configureren van een korte configuratie, uitgaande van de lange configuratie;
- het verplaatsen van het koppelonderstel (7; 207) naar de ingeschoven positie;
- 10 het demonteren, intrekken of inzwenken van genoemde container-steunarmen (20; 220); en
- het koppelen van de achterste oplegger (3; 2', 103; 203) aan de voorste oplegger (2; 202), waarbij het voorframedeel (18; 218) van de achterste oplegger (3; 2', 103; 203) ten minste gedeeltelijk
- 15 voorwaarts in het voorframedeel (14) van de voorste oplegger (2; 202) wordt gestoken; of
- voor het configureren van een lange configuratie, uitgaande van de korte configuratie;
- het verplaatsen van het koppelonderstel (7; 207) naar de
- 20 uitgeschoven positie;
- het monteren, uittrekken of uitzwenken van genoemde container-steunarmen (20; 220) voor het ondersteunen van een container (29; 30); en
- het koppelen van de koppeling (27; 227) van achterste oplegger
- 25 (3; 2', 103; 203) aan de koppeling (6) van voorste oplegger (2; 202) op het koppelonderstel (7; 227).

17. Werkwijze volgens conclusie 16, verder omvattende het loskoppelen van de achterste oplegger (3; 2', 103; 203) van de voorste oplegger (2; 202)

30 voorafgaand aan het verplaatsen van het koppelonderstel (7; 207).

18. Werkwijze volgens conclusie 16 of 17, waarbij, voor het configureren van een korte configuratie, het verplaatsen van het koppelonderstel (7; 207) naar de ingeschoven positie plaats vindt na het koppelen van de achterste oplegger (3; 2', 103; 203) aan de voorste oplegger (2; 202).

19. Werkwijze volgens een der conclusies 16-18, verder omvattende, voor het configureren van een lange configuratie, het verlengen van de achterste oplegger (3; 2', 103; 203).

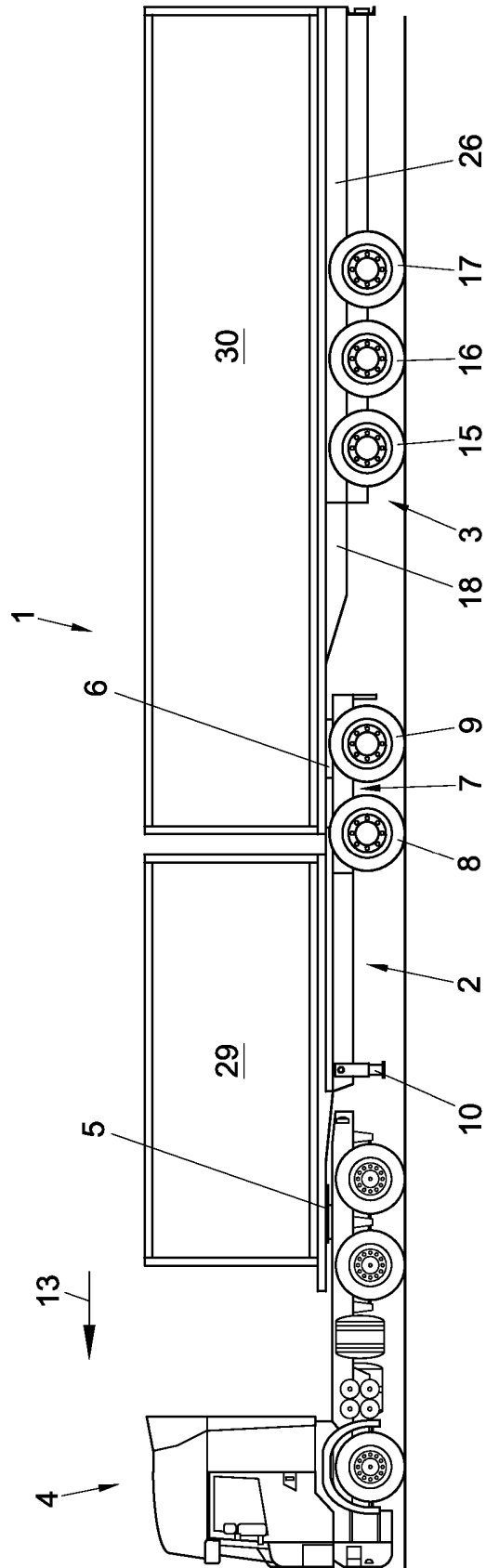


Fig. 1

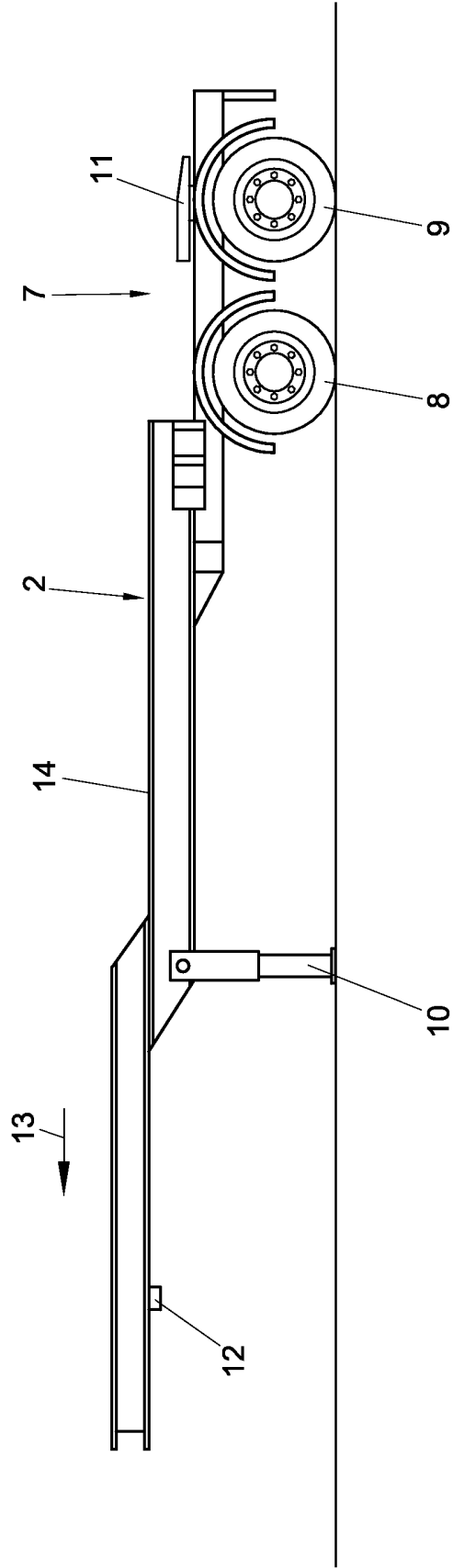


Fig. 2

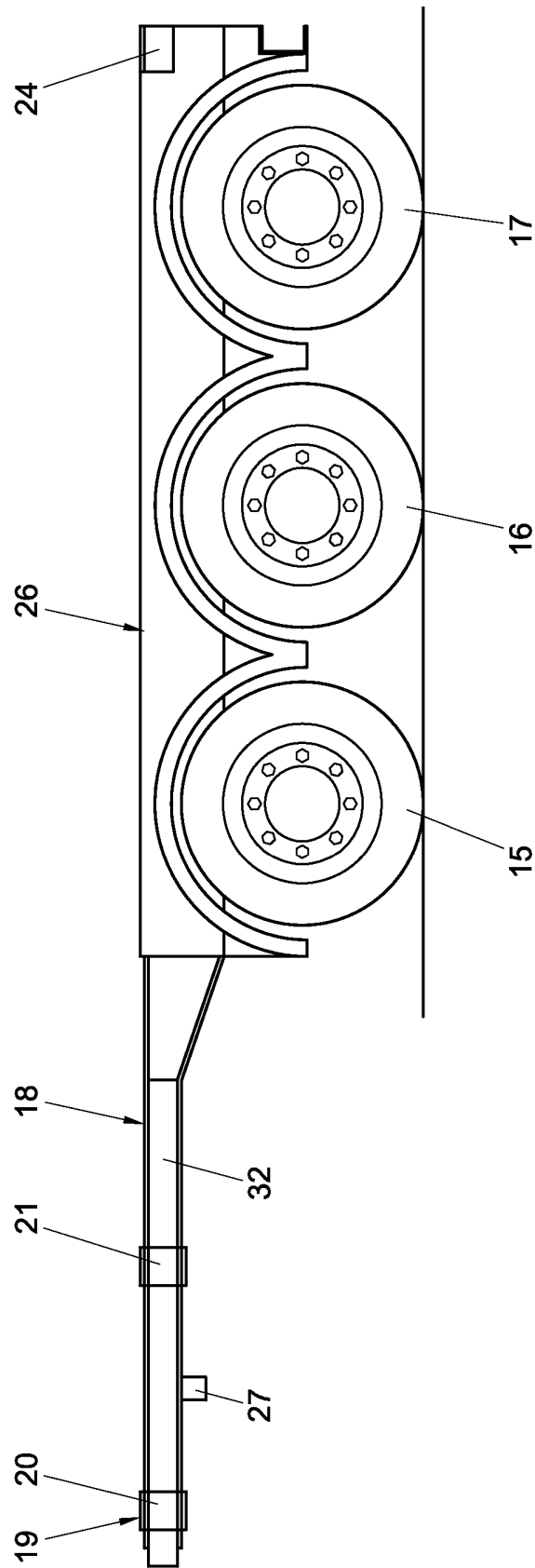


Fig. 3

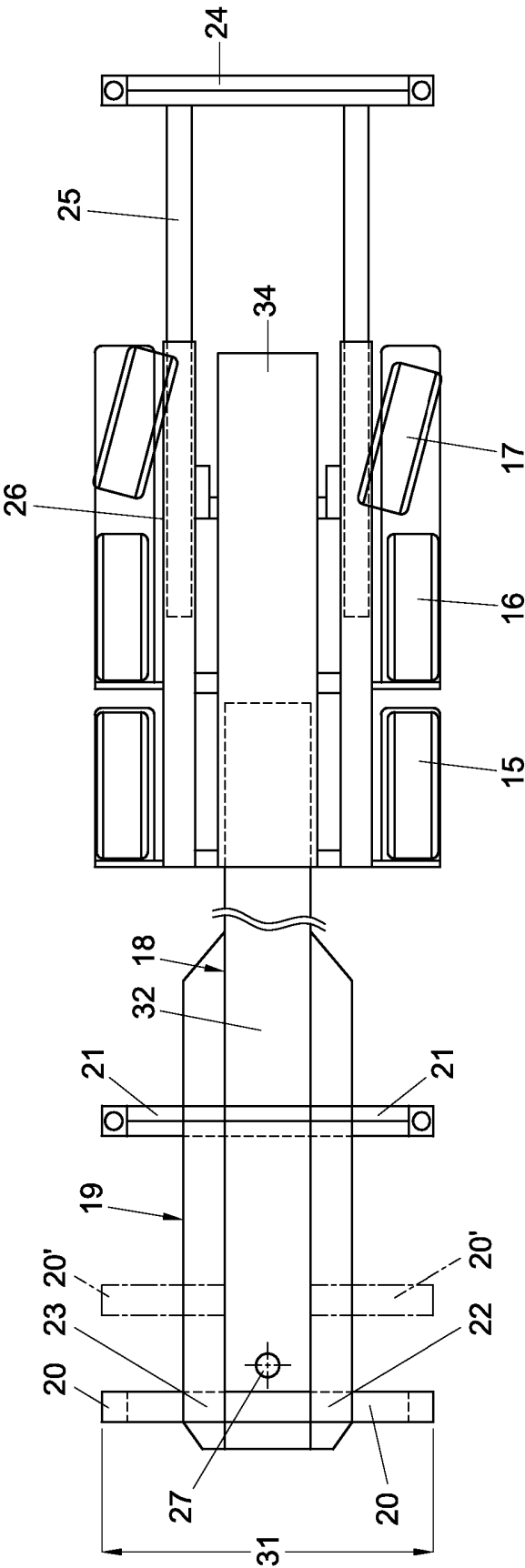


Fig. 4

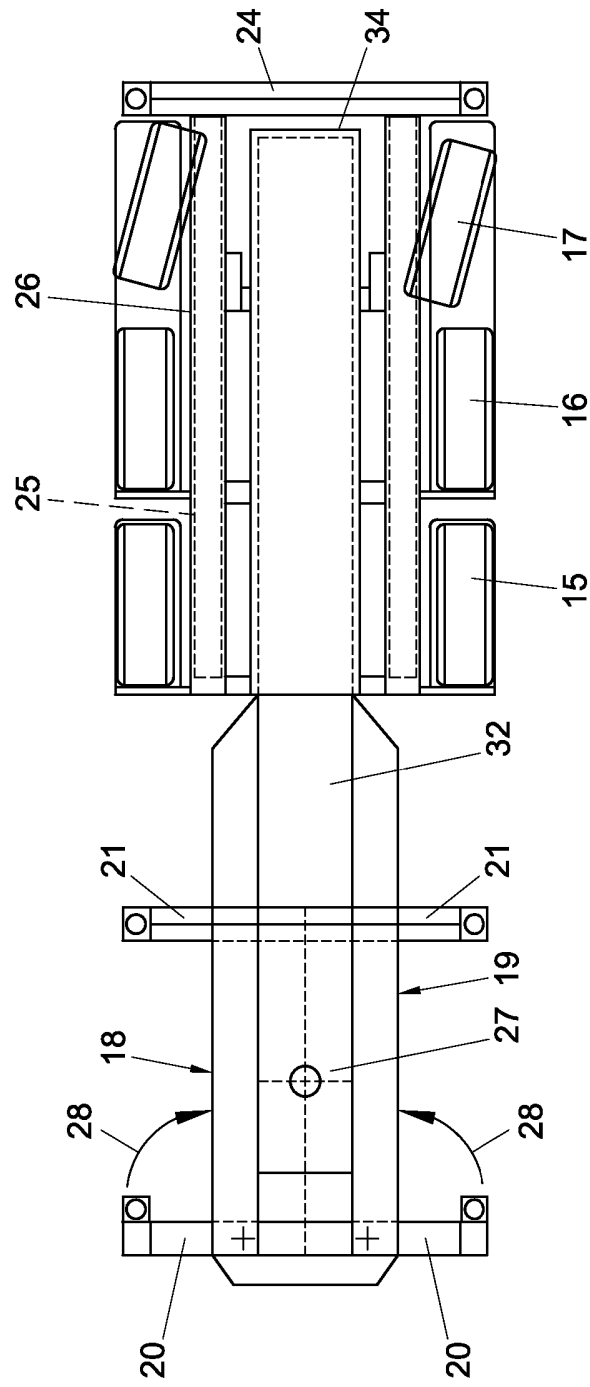


Fig. 5

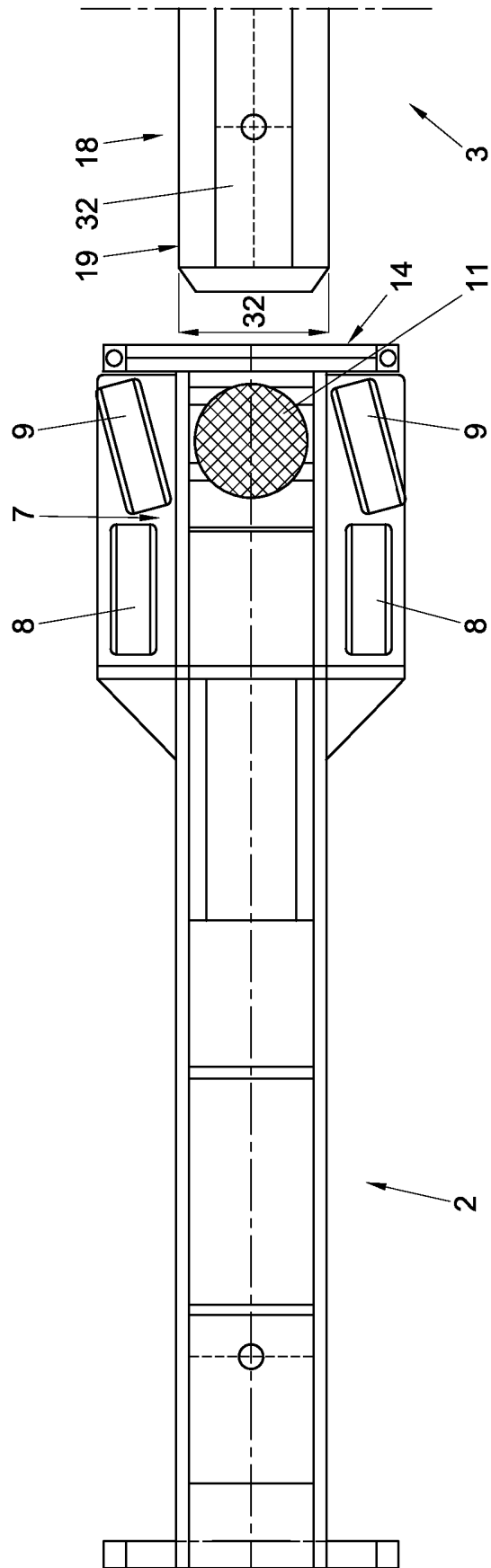


Fig. 6

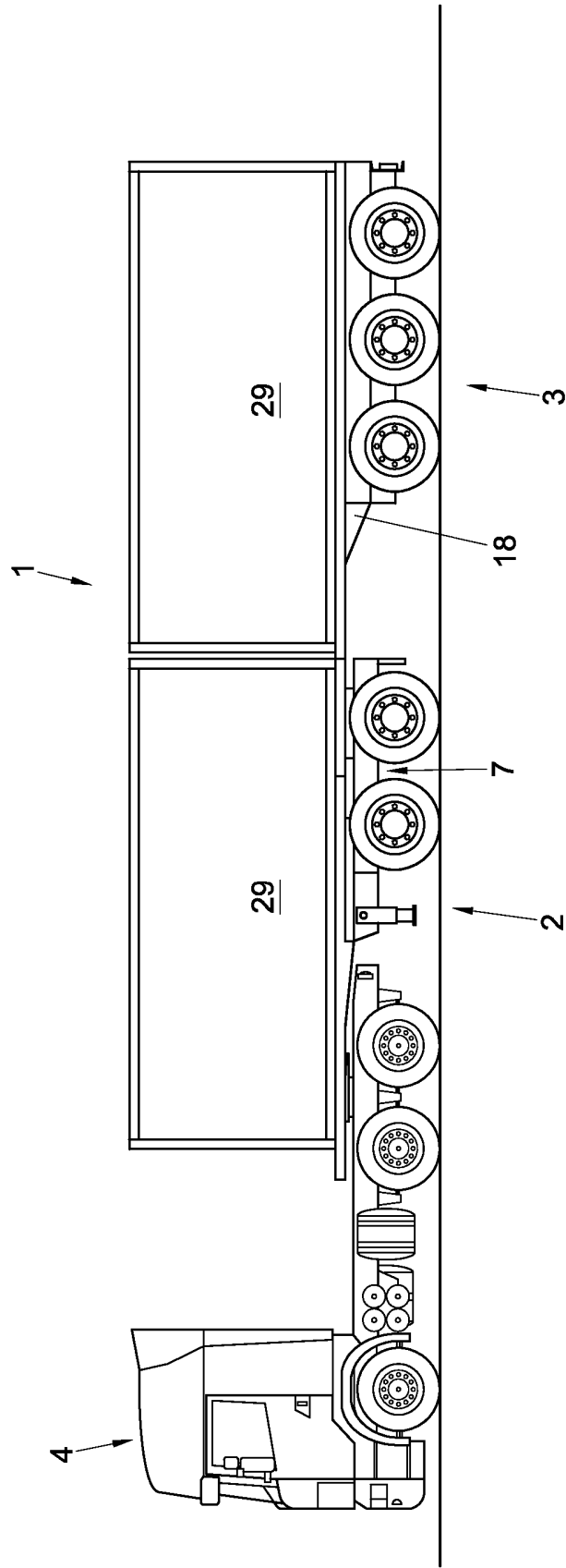


Fig. 7

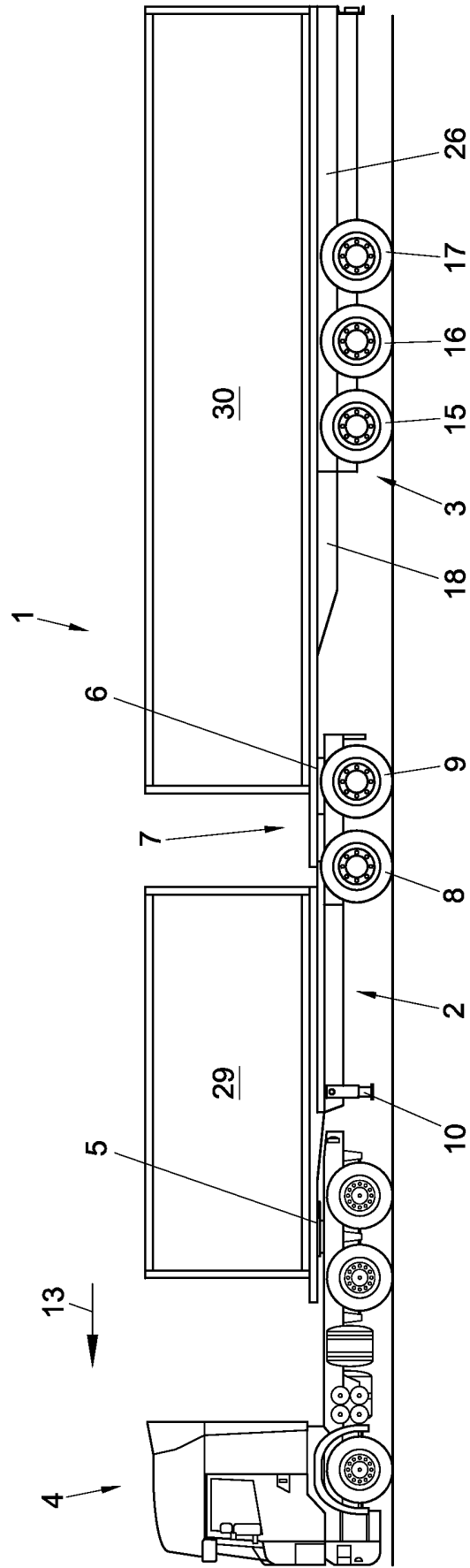


Fig. 8

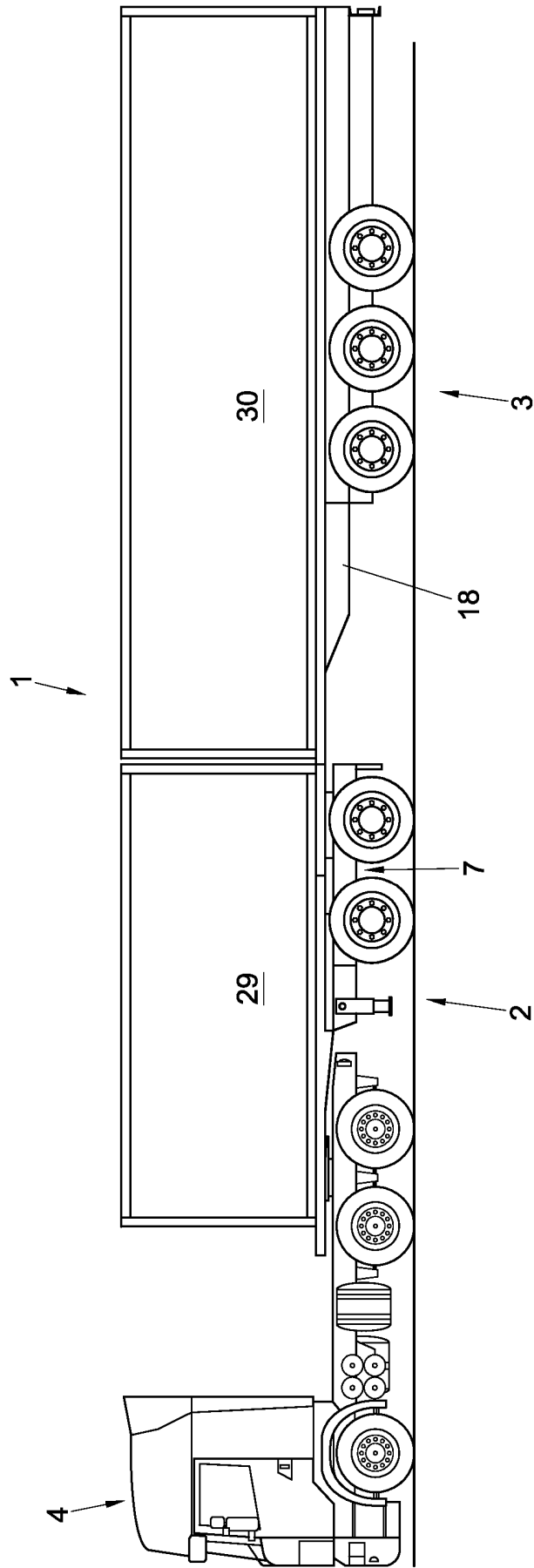


Fig. 9

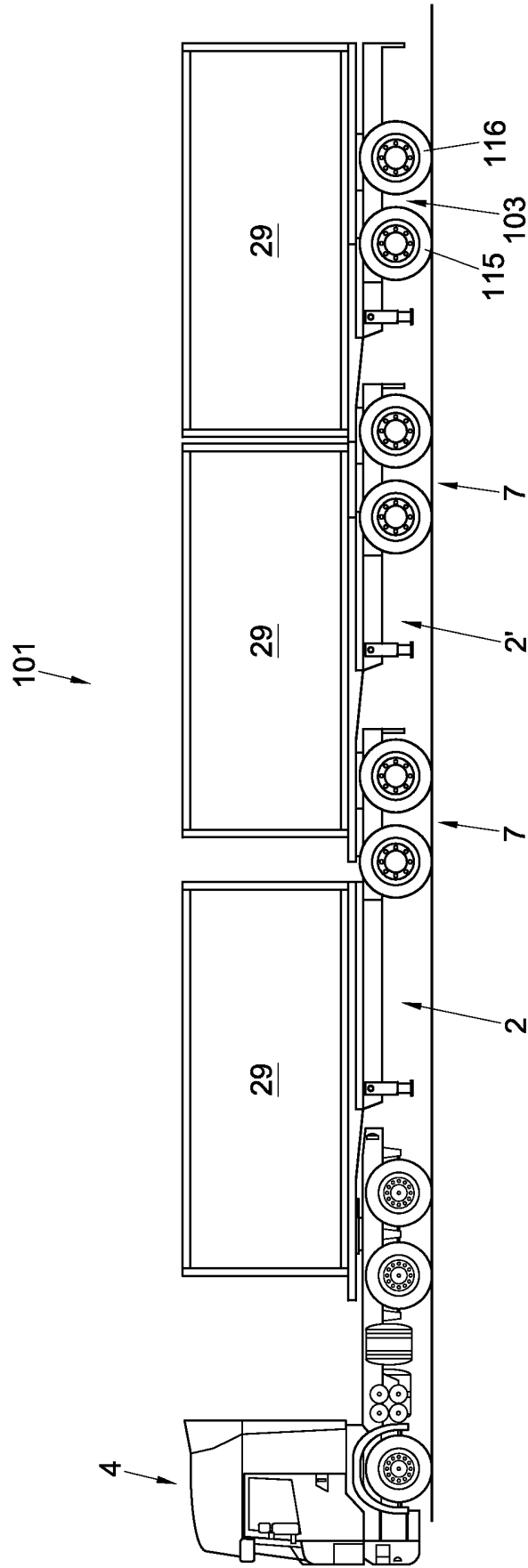
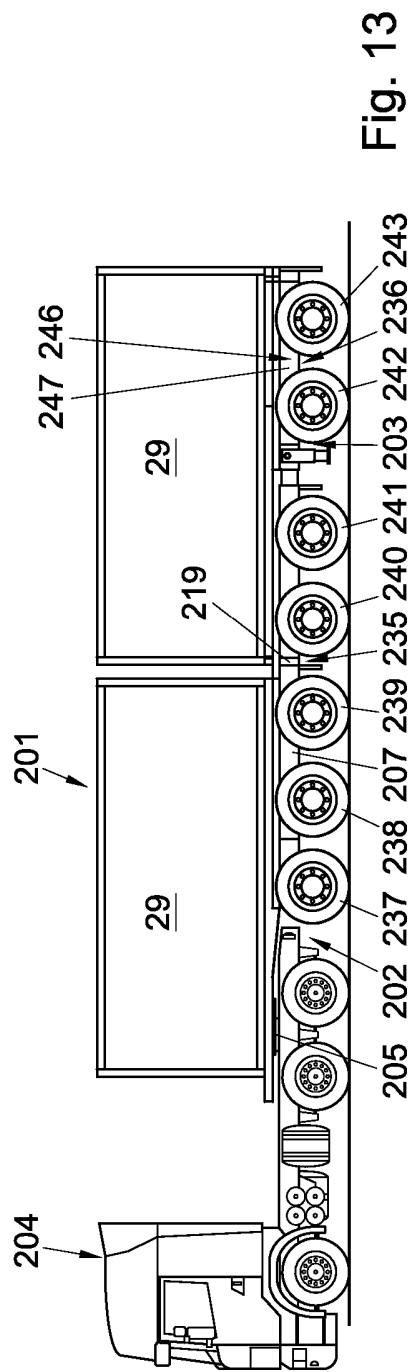
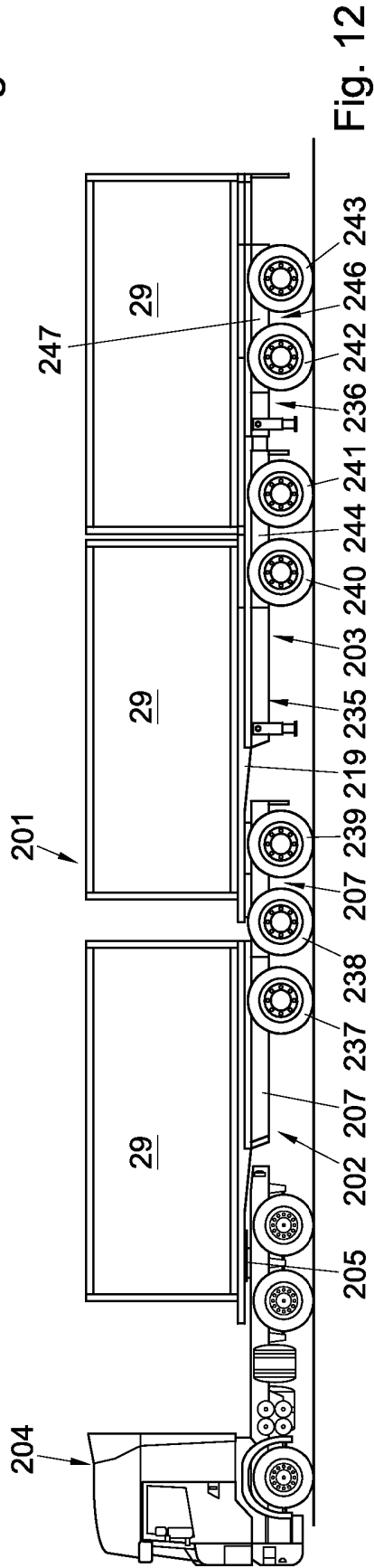
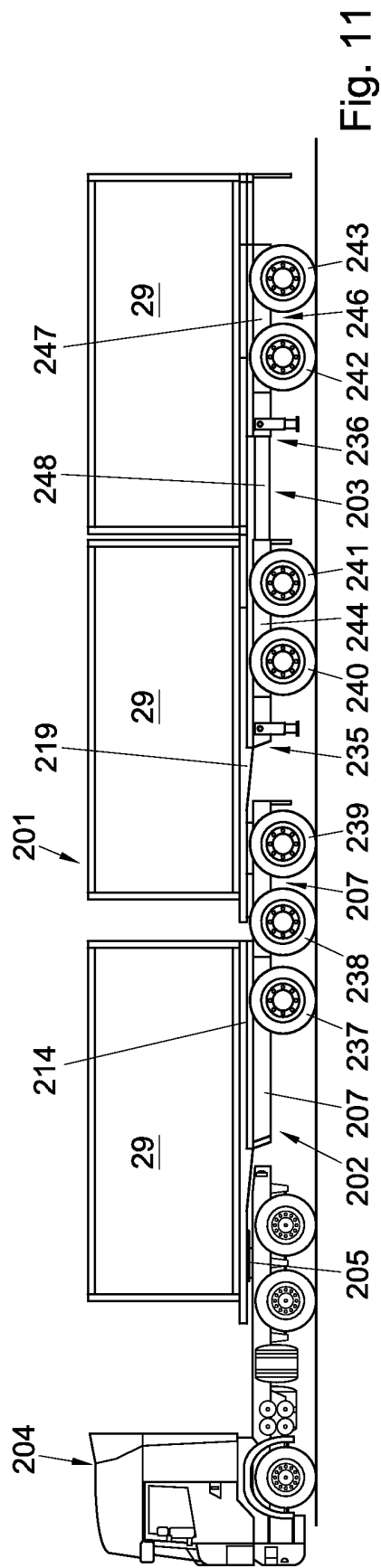


Fig. 10



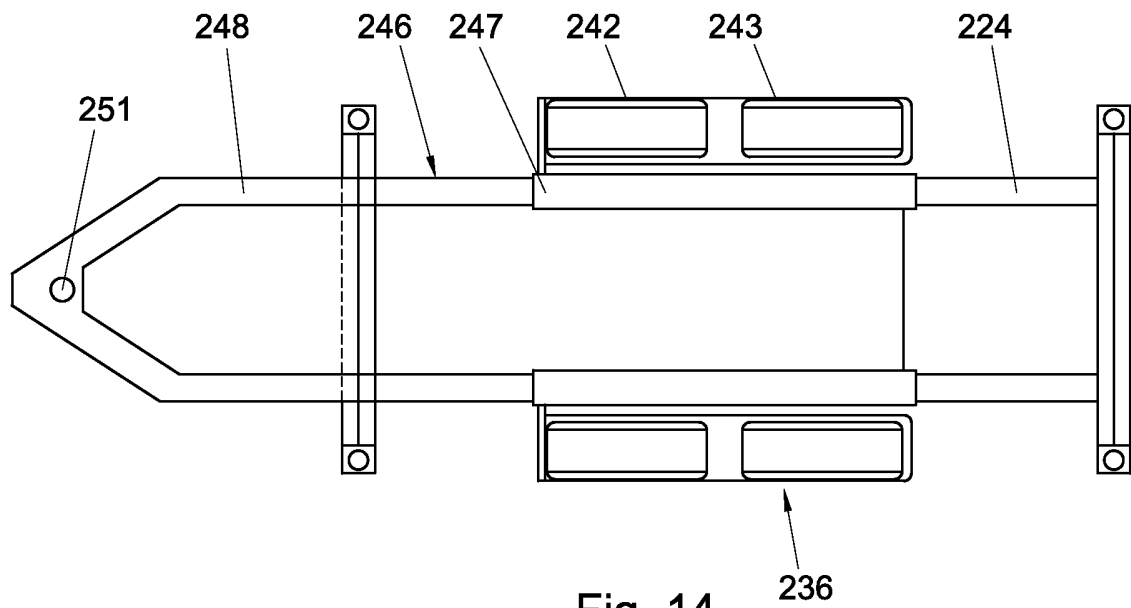


Fig. 14

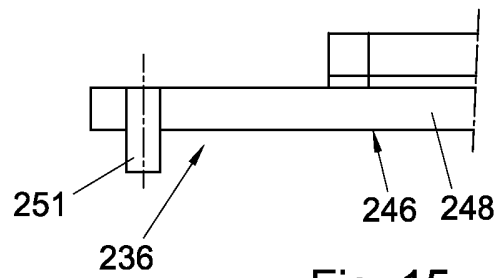


Fig. 15

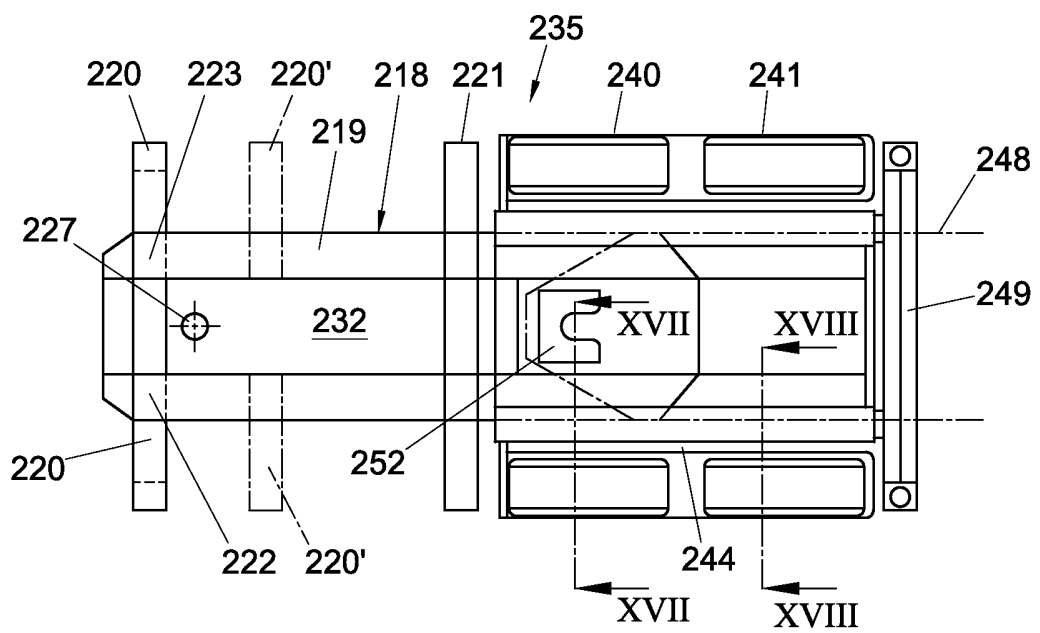


Fig. 16

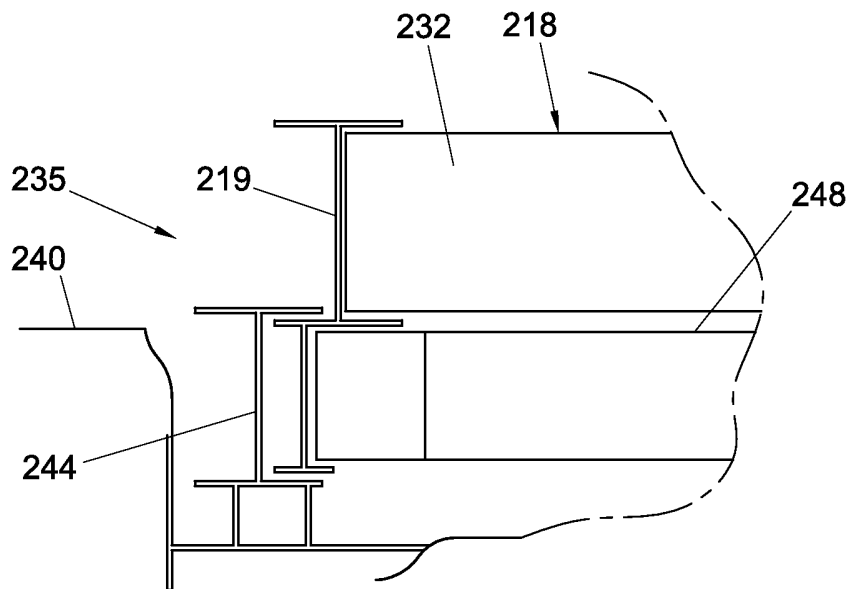


Fig. 17

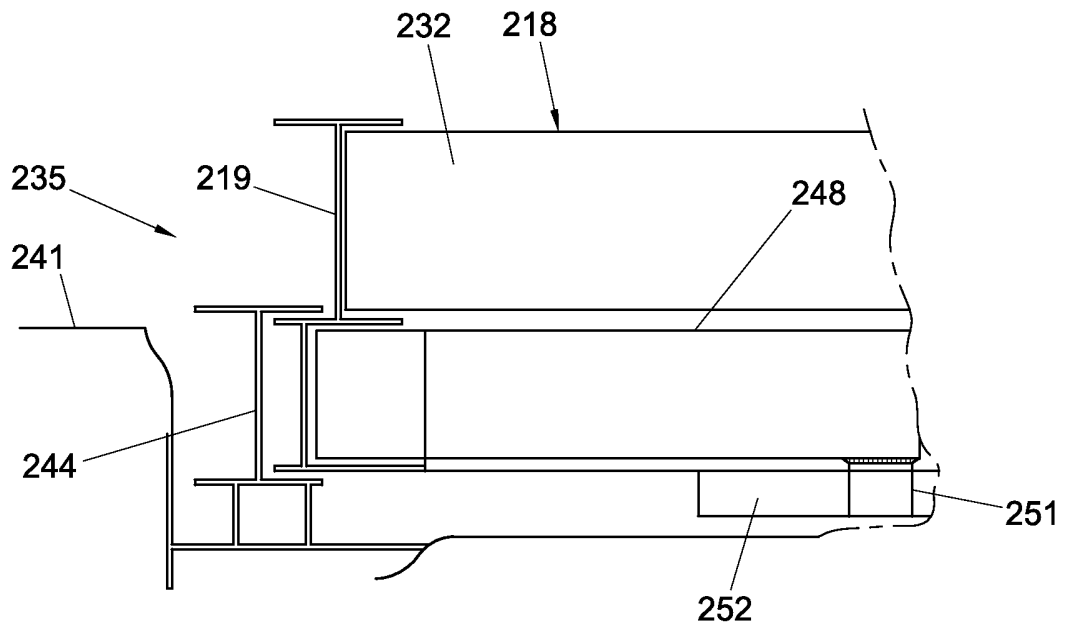


Fig. 18

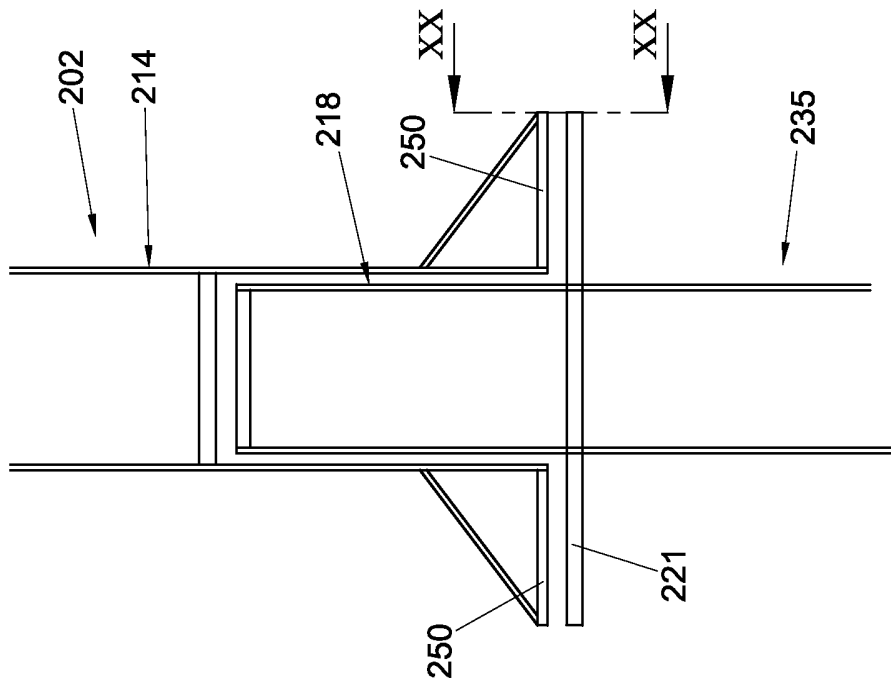


Fig. 19

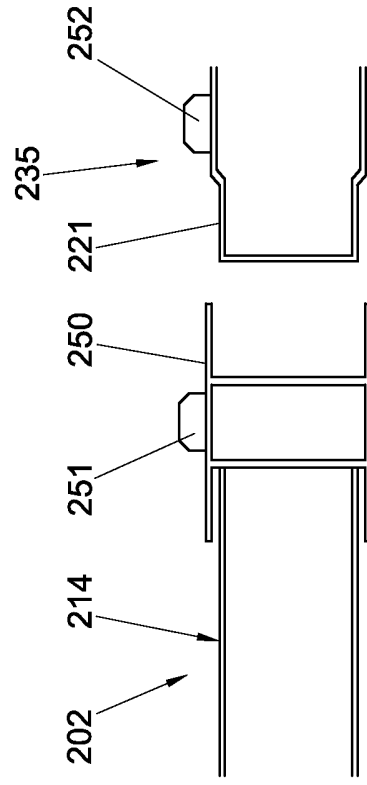


Fig. 20

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE P89659NL10
Nederlands aanvraag nr. 2005201	Indieningsdatum 06-08-2010
	Ingeroepen voorrangsdatum
Aanvrager (Naam) DD B.V.	
Datum van het verzoek voor een onderzoek van internationaal type 25-09-2010	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. SN54899
I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)	
Volgens de internationale classificatie (IPC) B62D53/04 B62D53/06 B62D53/08	
II. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK	
Onderzochte minimumdocumentatie	
Classificatiesysteem	Classificatiesymbolen
IPC 8	B62D
Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen	
III.	☐ GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES (opmerkingen op aanvullingsblad)
IV.	☐ GEBREK AAN EENHEID VAN UITVINDING (opmerkingen op aanvullingsblad)

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Nummer van het verzoek om een onderzoek naar
de stand van de techniek
NL 2005201

A. CLASSIFICATIE VAN HET ONDERWERP

INV. B62D53/04 B62D53/06 B62D53/08
ADD.

Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.

B. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimum documentatie (classificatie gevolgd door classificatiesymbolen)
B62D

Onderzochte andere documentatie dan de minimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden)

EPO-Internal

C. VAN BELANG GEACHTE DOCUMENTEN

Categorie *	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	US 3 163 306 A (WALTER BENNETT ET AL) 29 december 1964 (1964-12-29)	1-3,6, 8-17
Y	* figuren 1,2,11-13,16,20a,21 *	4,5,7,19
A	* kolom 3, regels 24-63 * * kolom 4, regel 64 - kolom 5, regel 64 * * kolom 11, regel 73 - kolom 12, regel 8 * * kolom 1, regels 30-35 *	18
Y	EP 1 177 971 A1 (RENDERS SA [LU]) 6 februari 2002 (2002-02-06)	4,5,7,19
A	* alineaas [0027] - [0031], [0035], [0036]; figuren 3,4,8,9 *	1-3,6, 8-18
A	US 4 740 007 A (LUTZ DAVID E [US] ET AL) 26 april 1988 (1988-04-26) * kolom 2, regel 61 - kolom 3, regel 32; figuren 1,2,7,8 * * kolom 5, regels 46-61 *	1-19
	----- -/--	



Verdere documenten worden vermeld in het vervolg van vak C.



Leden van dezelfde octrooifamilie zijn vermeld in een bijlage

* Speciale categorieën van aangehaalde documenten

A niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft

D in de octrooiaanvraag vermeld

E eerdere octrooi(aanvraag), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven

L om andere redenen vermelde literatuur

O niet-schriftelijke stand van de techniek

P tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur

T na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvraag, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding

X de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur

Y de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht

Z lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid

25 oktober 2010

Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type

Naam en adres van de instantie

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
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Fax: (+31-70) 340-3016

De bevoegde ambtenaar

Rinchard, Laurent

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Nummer van het verzoek om een onderzoek naar
de stand van de techniek
NL 2005201

C.(Vervolg). VAN BELANG GEACHTE DOCUMENTEN		
Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
A	US 4 856 804 A (NASH BOYD B [US]) 15 augustus 1989 (1989-08-15) * bladzijde 2, regel 33 - bladzijde 3, regel 17; figuren 1-7 * -----	1-19
A	US 3 374 010 A (CROCKETT JOSEPH G ET AL) 19 maart 1968 (1968-03-19) * kolom 4, regels 5-34; figuren 1-3,6 * -----	1-19

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar
de stand van de techniek

NL 2005201

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
US 3163306	A	29-12-1964	GEEN
EP 1177971	A1	06-02-2002	AT 277801 T 15-10-2004 BE 1013635 A3 07-05-2002 DE 10137080 A1 07-03-2002 DE 20112589 U1 31-10-2001 DE 50103842 D1 04-11-2004 DK 1177971 T3 24-01-2005 ES 2231385 T3 16-05-2005 ES 2208019 A1 01-06-2004 FR 2812610 A1 08-02-2002 IT MI20011699 A1 04-02-2002 NL 1018651 C2 05-02-2002 PT 1177971 E 31-01-2005 SE 0102625 A 05-02-2002
US 4740007	A	26-04-1988	CA 1300657 C 12-05-1992
US 4856804	A	15-08-1989	CA 1328476 C 12-04-1994
US 3374010	A	19-03-1968	BE 698014 A 16-10-1967 DE 1630282 A1 01-04-1971 ES 340173 A1 01-06-1968 GB 1131372 A 23-10-1968 NL 6706342 A 07-11-1967 SE 342190 B 31-01-1972



OCTROOICENTRUM NEDERLAND

WRITTEN OPINION

File No. SN54899	Filing date (<i>day/month/year</i>) 06.08.2010	Priority date (<i>day/month/year</i>)	Application No. NL2005201
International Patent Classification (IPC) INV. B62D53/04 B62D53/06 B62D53/08			
Applicant DD B.V.			

This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the application
- ☐ Box No. VIII . Certain observations on the application

	Examiner Rinchard, Laurent
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WRITTEN OPINION

Application number
NL2005201

Box No. I Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing:
 - ☐ contained in the application as filed.
 - ☐ filed together with the application in electronic form.
 - ☐ furnished subsequently for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes: Claims	4, 5, 7, 8, 10, 18, 19
	No: Claims	1-3, 6, 9, 11-17
Inventive step	Yes: Claims	18
	No: Claims	1-17, 19
Industrial applicability	Yes: Claims	1-19
	No: Claims	

2. Citations and explanations

see separate sheet

WRITTEN OPINION

Application number
NL2005201

Box No. VII Certain defects in the application

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

- D1 US 3 163 306 A (WALTER BENNETT ET AL) 29 december 1964
 (1964-12-29)
- D2 EP 1 177 971 A1 (RENDERS SA [LU]) 6 februari 2002 (2002-02-06)

The present application does not meet the criteria of patentability, because the subject-matter of claims 1-3,6, 9, 11-17 is not new.

The document D1 discloses (the references in parentheses applying to this document):

"een verrijdbare opleggercombinatie, omvattende:

een voorste oplegger (14) met een voorframedeel (20) en, aan een achterzijde, een koppelonderstel (24,50 and back part of 20) voorzien van een koppeldeel (24, 50); en een achterste oplegger (16) met een wielstel (63), een zich ten opzichte van het wielstel (63) in rijrichting naar voren uitstrekkend voorframedeel (60, 65) met een koppeldeel (75, 76) complementair met het koppeldeel (24, 50) van het koppelonderstel (20 back), en zijwaarts uitstekende container-steunarmen (22, 62) welke demonteerbaar, intrekbaar of inzwenkbaar zijn (170 in fig. 25); waarbij de voorste en achterste opleggers (14) koppelbaar zijn in een lange, onderling zwenkbare configuratie (24, 76) en in een korte, onderling starre configuratie (25, 75 in fig. 16); waarbij in de lange configuratie het koppeldeel (76) van het voorframedeel (60, 65) van de achterste oplegger (16) zwenkbaar is gekoppeld met het koppeldeel (24) van het koppelonderstel (20 back) van de voorste oplegger (14); en waarbij in de korte configuratie het voorframedeel (65) van de achterste oplegger (16) star is gekoppeld (50, 75 in fig. 16) met het voorframedeel van de voorste oplegger (14), genoemde container-steunarmen (62) zijn gedemonteerd, ingetrokken of ingezwenkt (they are positioned on the rear part of 16 like in fig. 12 in order to avoid overlapping of the containers when in the short configuration), en het voorframedeel (60, 65, 75) van de achterste oplegger (16) in het voorframedeel (50) van de voorste oplegger (14) uitsteekt (fig. 16)."

The document D1 discloses also(the references in parentheses applying to this document):

"een werkwijze voor het herconfigureren van een opleggersamenstel, omvattende (fig. 1-4):

het verschaffen van een verrijdbare opleggercombinatie (fig. 1) volgens een der voorgaande conclusies; voor het configureren van een korte configuratie (fig. 2), uitgaande van de lange configuratie (fig. 1); het verplaatsen van het koppelonderstel (77; 76) naar de ingeschoven positie (76a near 61 in fig. 12 and 13); het demonteren, intrekken of inzwenken van genoemde containersteunarmen (22 and 62 are displaced and so detached - disassembled - from the frame to slide them in the right positions); en het koppelen van de achterste oplegger (16) aan de voorste oplegger (14), waarbij het voorframedeel (60, 65) van de achterste oplegger (16) ten minste gedeeltelijk voorwaarts in het voorframedeel (20 back part) van de voorste oplegger (14) wordt gestoken (with 60a and 75 in resp. 20 and 50) ; of voor het configureren van een lange configuratie (fig. 1), uitgaande van de korte configuratie (fig. 2); het verplaatsen van het koppelonderstel (from 76a to 76) naar de uitgeschoven positie; het monteren, uittrekken of uitzwenken van genoemde container-steunarmen (22 and 62 are rearranged) voor het ondersteunen van een container; en het koppelen van de koppeling (76) van achterste oplegger (16) aan de koppeling (24) van voorste oplegger (14) op het koppelonderstel (20)."

The subject-matter of claims 2, 3, 6, 9 and 11 to 16 is not new as it is disclosed by the document D1 (see ref. in search report).

The present application does not meet the criteria of patentability, because the subject-matter of claims 1 to 16, 17 and 19 does not involve an inventive step;

- as the subject-matter of claims 1-3,6, 9, 11-17 is not new,
- as starting from the trailer coupling arrangement of D1 it is obvious for the skilled person to reach the subject-matter of claims 8, 10 in trying to solve the problem concerning an optimal and adaptable mounting of the support arms,
- as the subject-matter of claims 4, 5, 7 and 19 results from an obvious combination of the features to be found in the document D2 in the arrangement disclosed in D1 in order to tackle common problems of load distribution (axles) and container size adaptability.

The combination of the features of dependent claim 18 is neither known from, nor rendered obvious by, the available prior art.

Re Item VII

Certain defects in the application

The relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor are these documents identified therein.

Independent claims 1 and 16 are not in the two-part form, which in the present case would be appropriate, with those features known in combination from the prior art (most probably document D1) being placed in the preamble and with the remaining features being included in the characterising part.