

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 85201859.7

(51) Int. Cl.⁴: **B 61 D 47/00**
B 61 D 3/04, B 61 B 1/00

(22) Date of filing: 12.11.85

(30) Priority: 15.11.84 NL 8403496

(43) Date of publication of application:
21.05.86 Bulletin 86/21

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

(71) Applicant: **DE ARK B.V.**
Gezellenstraat 21
NL-3861 RD Nijkerk(NL)

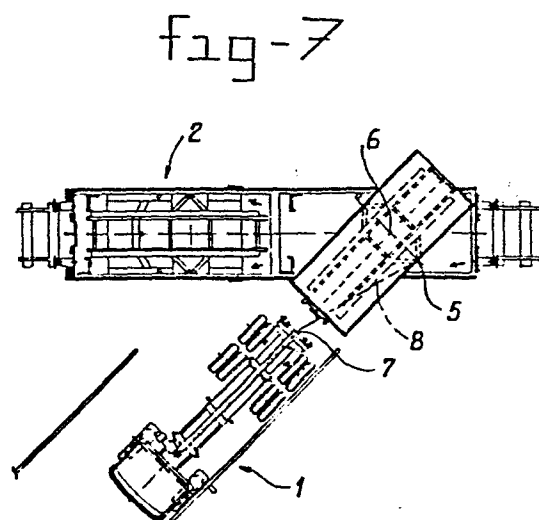
(72) Inventor: **van den Pol, Aart Antonie**
Colthoflaan 10
NL-3861 AG Nijkerk(NL)

(74) Representative: **van der Beek, George Frans et al,**
Nederlandsch Octrooibureau Johan de Wittlaan 15 P.O.
Box 29720
NL-2502 LS 's-Gravenhage(NL)

(54) **Process for the transportation of a container.**

(57) Process for the transportation of a container initially placed on the ground, partly by road using a wheeled vehicle, and partly by rail using a rail vehicle. The rail vehicle is provided with a rotating platform and the wheeled vehicle is provided with an auxiliary frame with guide elements for a container and a conveyor mechanism with which a container can be moved in two directions along the guide elements, it being possible to move the front ends and rear ends of said auxiliary frame independently of each other to a desired height relative to the ground. A container is placed from the ground on the wheeled vehicle or vice versa by means of the said conveyor, during which first of all the front ends of the auxiliary frame are moved upwards, so that the auxiliary frame is taken to a slanting position, following which a container is pulled onto or pushed off the wheeled vehicle by means of the conveyor after which the auxiliary frame is turned back to its initial position. A container is placed from the wheeled vehicle on the rail vehicle or vice versa by means of the said conveyor and, after positioning of the wheeled vehicle in a slanting position alongside the rail vehicle and rotation of the upper frame of the rotating platform until it is in line with the wheeled vehicle first of all the rear ends of the auxiliary frame are moved upwards with means provided on the wheeled vehicle for the purpose, in such a way that the guide elements thereof reach the same height as those of the upper frame of the rotating platform,

and then the front ends of the auxiliary frame are taken to such a height that the guide elements of auxiliary frame and rotating platform are in line with each other, following which the container is pushed onto or pulled off the rail vehicle.



Process for the transportation of a container

The invention relates to the transportation of a container, partly by road by means of a wheeled vehicle, and partly by rail by means of a rail vehicle, from a place of origin to a place of destination.

5 Rail vehicles are frequently used for the transportation of containers, because transport by rail is relatively cheap. However, transport by rail can only take place between two loading/unloading platforms on a railway line. In general, a container will have to be transported by wheeled vehicle from the
10 place of origin to the one loading/unloading platform or from the other loading/unloading platform to the place of destination.

The use of cranes, mobile or otherwise, for transferring a container from a wheeled vehicle to a rail vehicle or vice versa is known. However, not all railways stations are equipped with
15 such cranes, since the cost of these cranes, lifting mechanisms or other transfer facilities is very high. The result is that in most cases the railway station closest to the place of origin or the place of destination cannot be included in the transport route, simply because there are no transfer facilities there.

20 There will also have to be facilities at the place of origin or the place of destination for taking the container off or placing it on the wheeled vehicle. Cranes can also be used for this. However, not every company considering the use of container transport has suitable facilities of this kind on the spot or is

prepared to make the necessary capital outlay for them.

A known method is to place a container on legs which can be jacked up in such a way that the wheeled vehicle can move backwards until it is underneath the container. When the legs are
5 then shortened by means of the jack mechanisms, the container comes to rest on the vehicle and can be transported. When the container is deposited the legs are lengthened by means of the jack mechanisms, so that the container can be lifted from the vehicle and the vehicle can move out from underneath it. In the
10 first place, jack-up legs are necessary here for shifting the container vertically to some extent and, secondly, at the place of origin/place of destination the container stands relatively high above the ground, which does not make loading/unloading of the container any easier. In many cases separate high loading/
15 unloading platforms will have to be constructed, alongside which the container can then be placed.

The transport sector has therefore been searching for many years for suitable means with which the transfer of a container from a rail vehicle to a wheeled vehicle and vice versa can take place
20 at practically any station or goods yard without special facilities such as cranes and the like having to be available at the station/goods yard, and they are also looking for suitable means by which a container, preferably standing on the ground, can be placed on a wheeled vehicle or removed from it, without
25 special facilities such as cranes, special loading/unloading platforms and the like having to be available at the place of

0181676

origin/place of destination.

5 A partial solution to this problem is described in British Patent application 2,108,473. According to the system described therein, the rail vehicle is provided with a rotating platform, and the wheeled vehicle is provided with a conveyor mechanism with which a container can, on the one hand, be moved in a vertical direction over a relatively short distance parallel to itself and, on the other, can be pushed backwards from the wheeled vehicle onto the rotating platform of the rail vehicle or can be
10 pulled in the reverse direction from the rotating platform onto the wheeled vehicle.

However, before the transfer can be made from the one vehicle to the other, steps will have to be undertaken to place the guide elements of the auxiliary frame in line with and at the same
15 level as the guide elements of the rotating platform. For this, the rotating platform, on the one hand, will have to be turned to the correct position and, on the other, the wheeled vehicle will have to be placed in the correct position, and the auxiliary frame must be placed at the correct height and in the correct
20 position.

The turning of the unloaded rotating platform will in many cases still be possible purely by manpower, but turning of a rotating platform loaded with a container or the like is certainly not possible in a simple manner by manpower alone. The above-
25 mentioned British patent application does not indicate the way in which the loaded rotating platform is turned.

0181676

Although this is indicated only very briefly in the above-mentioned British patent application, in the system described in it use is obviously made of a wheeled vehicle with an auxiliary frame which is connected in such a way to the vehicle frame by means of hinged coupling rods that the auxiliary frame can be moved upwards parallel to itself.

In general, the ground on transfer sites will not be ideally flat and absolutely horizontal. Allowance will often have to be made for holes, uneven areas and the like, in particular if the process is to be used at places which are not specially equipped as transfer sites. The result of this is that in many circumstances the wheeled vehicle cannot be placed alongside the rail vehicle in such a way that the auxiliary frame is automatically horizontal (assuming that the rotating platform is horizontal on the rail vehicle). With a height adjustment facility by means of a parallelogram mechanism such as that used in the above-mentioned British patent application, it will therefore not be possible in many cases to take the auxiliary frame into the correct desired position. In particular, it is very undesirable to have a situation in which the front ends of the guide elements of the auxiliary frame are positioned lower than the rear ends, since in this case the container must be pulled, as it were, over a peak in the overall guide track, and an unstable situation can arise.

Allowance must also be made for the fact that both the wheeled vehicle and the rail vehicle are sprung, which means that during

the transfer of a container the position of the guide elements relative to each other on both vehicles can change somewhat as a result of the changing load on the spring systems.

5 The wheeled vehicle which has been described briefly in the above-mentioned British patent application does not offer a solution to these problems.

With the facilities on the wheeled vehicle according to the above-mentioned British patent application, it is also not possible to place a container from the vehicle on the ground.
10 Thanks to the vertical displacement facility of the auxiliary frame at the place of origin, this wheeled vehicle can pick up and take away a container which is placed on legs, or can leave a container standing on legs at the place of destination. As already pointed out above, this is not always desirable.

15 A vehicle with which a container can be taken from the ground onto the vehicle or deposited from the vehicle onto the ground is described in Dutch Patent Application 75.02990. This known vehicle is provided with an elongated auxiliary frame, one end of which is hingedly attached to the vehicle frame, near the rear
20 end thereof, while at a distance from the hinge pin there is a jack mechanism between the auxiliary frame and the vehicle frame. By means of that jack mechanism, the auxiliary frame can be placed within a particular range in any desired slanting position. On the auxiliary frame there is also a conveyor
25 mechanism with which a container can be moved in two directions over the auxiliary frame. With the auxiliary frame in a slanting

position, a container can be lifted from the ground onto the auxiliary frame, following which the auxiliary frame is placed horizontal in order to complete the loading of the wheeled vehicle. The unloading of a container takes place in the reverse order.

It is also possible to push a container backwards, for example onto a trailer, or to pull it off the latter, on condition that the surface of the trailer is at least not at a higher level than the guide elements on the conveyor auxiliary frame. With a rotating platform on a rail vehicle, the guide elements thereof will, however, generally be at a higher level, with the result that it is not always possible with this known wheeled vehicle to place a container on the rotating platform of a rail vehicle.

The object of the invention is then to indicate the way in which and the means by which the transfer of containers from a place of origin to a place of destination, partly by road and partly by rail, can be carried out in such a way that no special facilities are necessary at the loading/unloading platforms of the railways, in such a way that no special facilities are necessary at the place of origin or destination, and in such a way that the container can be on the ground at the place of origin or can be placed on the ground at the place of destination.

The invention now produces a process for the transportation of a container initially placed on the ground, partly by road using a wheeled vehicle, and partly by rail using a rail vehicle, from a place of origin to a place of destination, in which the rail

vehicle is provided with a rotating platform comprising a lower frame fixed on the rail vehicle and, rotatable relative to said frame, an upper frame with guide elements for a container, and in which the wheeled vehicle is provided with an auxiliary frame with guide elements for a container and a conveyor mechanism with which a container can be moved in two directions along the guide elements, it being possible to move the front ends and rear ends of said auxiliary frame independently of each other, with the aid of means provided for the purpose, to a desired height relative to the ground, according to which process (a) a container is placed from the ground on the wheeled vehicle or vice versa by means of the said conveyor, during which first of all the front ends of the auxiliary frame are moved upwards, so that the auxiliary frame is taken to a slanting position, following which a container is pulled onto or pushed off the wheeled vehicle by means of the conveyor, after which the auxiliary frame is turned back to its initial position, and (b) a container is placed from the wheeled vehicle on the rail vehicle or vice versa by means of the said conveyor and, after positioning of the wheeled vehicle in a slanting position alongside the rail vehicle and rotation of the upper frame of the rotating platform until it is in line with the wheeled vehicle first of all the rear ends of the auxiliary frame are moved upwards with means provided on the wheeled vehicle for the purpose, in such a way that the guide elements thereof reach the same height as those of the upper frame of the rotating platform, and then the front ends of the auxiliary frame are taken to such a height that the guide elements of auxiliary frame and rotating platform are in line with each other,

following which the container is pushed onto or pulled off the rail vehicle. With this process no special facilities are therefore necessary on the loading/unloading platforms of the railways, and this also applies to the place of origin or place of destination. All requisites for handling the container, apart from the rotating platform on the rail vehicle, are present on the wheeled vehicle.

The invention also provides a wheeled vehicle which is designed in such a way that it can be used in connection with the above process, although the use of of this wheeled vehicle is not limited to this process. The wheeled vehicle must according to the invention be provided with means by which the front ends and rear ends of the auxiliary frame can be raised independently of each other to a desired height above the ground.

According to the invention, it is preferable to start with a wheeled vehicle such as that described in the above-mentioned Dutch Patent Application 75.02990.

According to the invention, a wheeled vehicle of this type is now provided with means by which the rear end of the auxiliary frame can be raised to a predetermined height.

In a practical embodiment of these means one could think of jack legs - known per se - which are attached near the rear of the vehicle frame, and which in the activated state press against the bottom and raise the whole rear part of the vehicle to the desired height. The disadvantage of this solution is that the

0181676

vehicle itself is no longer mobile in this situation. According to the invention, preference is therefore given to a jack mechanism disposed between the vehicle frame and the hinge pin of the auxiliary frame. With this jack mechanism, only the rear part of the auxiliary frame is moved upwards relative to the vehicle frame, while the vehicle as a whole just stays on its wheels and therefore remains mobile.

It will be clear that the combination of the already present jack mechanisms and the jack mechanisms added according to the invention makes it possible to move the auxiliary frame independently of the vehicle frame within certain limits to any desired position. Even if the ground is uneven and the vehicle is standing at an angle, it is possible with them, prior to the transfer, to align the auxiliary frame, and in particular the guide elements thereof, accurately with the guide elements of the rotating platform, thereby producing an efficient and problem-free transfer process.

Such a wheeled vehicle can be advantageously used not only in the process described above for the transfer of a container from one vehicle to another, but also advantageously in other situations. The wheeled vehicle can, for example, be used to place containers on trailers provided with guide elements which do not run at the same height on all trailers. Even if the trailer is standing slightly slanting, the wheeled vehicle according to the invention is capable of positioning a container without problems. With this vehicle it is also possible, provided that the conveyor can be raised high enough, for example, to place two containers on top

of one another. The invention therefore also relates to the wheeled vehicle itself, irrespective of its use.

In addition, as already mentioned in the preamble, not only containers, but also other loading platforms, open tanks, chutes
5 and the like can be handled with the vehicle, and the extra facilities of the wheeled vehicle according to the invention often provide a solution to existing problems.

In wheeled vehicles of the type which are preferably used according to the invention, the rear axle or rear axles are
10 preferably very far back, close to the hindmost part of the vehicle and near the hinge pin of the auxiliary frame. The reason for this is that when a container is moved backwards the centre of gravity of the container remains as long as possible within the axles of the vehicle, in other words the weight of the
15 container is carried by the vehicle for as long as possible. During the transfer of a container from a wheeled vehicle of this type onto the rotating platform of a railway truck the weight of the container will thus not be transferred to the railway truck until the moment when the container is already largely above the
20 rotating platform. The weight is thus not transferred here to the end of the platform, but to a part away from it, more towards the centre of rotation.

The opposite is the case in the system which is described in the above-mentioned British Patent Application 2,108,473. In this
25 known system use is made of a rotating platform which can rotate only through a limited angle. In the position where it is turned

0181676

outwards only one of the guide elements projects slightly beyond the side limit of the rail vehicle. This means that the rear part of the wheeled vehicle has to project relatively far beyond the rear axle(s) of the wheeled vehicle in order to keep the space which has to be bridged by the container between the wheeled vehicle and the rail vehicle as small as possible. In this known system it is therefore inevitable that the weight of the container during the transfer from the wheeled vehicle to the rail vehicle will have to be taken very quickly by the upper frame of the rotating platform, because the centre of gravity of the container has very soon passed the hind axle of the wheeled vehicle. For this reason the supporting element provided between the guide elements of the upper frame of the rotating platform is therefore positioned near the ends of the guide elements of the upper frame. The fact that this supporting element must not pass the side edge of the truck also contributes to the limited turning circle of the rotating platform.

It is now also the object of the invention at least partially to eliminate these limitations.

In this connection the invention provides a rotating platform intended for mounting on a rail vehicle, comprising a lower frame to be fixed on the rail vehicle and an upper frame which can rotate about a vertical axis relative to the lower frame, said upper frame being provided with two parallel container guide elements and a supporting element which can move over a circular track and is located centrally between the guide elements at a

distance from the axis of rotation at the loading/unloading side of the upper frame, characterised in that the position of the supporting element and the position of the axis of rotation are chosen in such a way that the upper frame can rotate through an angle of $\pm 45^\circ$, while in the outturned position the ends of both guide elements at the loading/unloading side of the upper frame project beyond the side limit of the rail vehicle. This makes it possible to drive the wheeled vehicle practically up against the upper frame of the rotating platform, so that the spaces between the guide elements of rotating platform and auxiliary frame are kept to a minimum.

In order to permit the carrying out of the above process, the system in question will also have to be provided with at least one cable, which at least during the turning of the upper frame of the rotating platform of the rail vehicle when the platform is loaded is fastened at one end to a part of the upper frame not lying on its axis of rotation, and at the other end is fastened to one of the above-mentioned coupling elements of the wheeled vehicle, and said cable, depending on the direction of rotation, may or may not run via one or more cable guide elements fixed on the rail vehicle or the lower frame of the rotating platform.

Although during the turning of the rotating platform the cable is fastened at one end to the upper frame and at the other end to a coupling element of the wheeled vehicle conveyor, it will be clear that at one of these two points at least the cable will have to be detached in order to permit the vehicles to be used independently of each other again after the transfer. Detaching

the cable at both ends has the disadvantage that the loose cable always has to be stored somewhere, with the risk that the cable can be mislaid. It would be conceivable to connect the cable permanently at or near the coupling element to the conveyor.

5 Since, however, as already stated above, this conveyor can also be used in other situations, this can be a nuisance in some cases. It is therefore preferable for the fastening of the cable to the upper frame of the rotating platform or to the rail vehicle to be carried out as a permanent attachment and for the
10 other end of the cable to be provided with a connecting element which can be connected to or detached from the particular coupling element.

In some cases the track on which the rail vehicle is sitting can be approached from both sides by the wheeled vehicle, and it is
15 in principle possible to carry out the transfer procedure on both sides. If, however, the rail vehicle is provided with only one cable, this cable may have to be fastened again to the other side of the rotating platform, or at least further cable reels will have to be installed on the rail vehicle to guide the cable.
20 Besides, the cable will often be too short.

In order to avoid these disadvantages, it is preferable to fit two cables on the rail vehicle or on the lower frame of the rotating platform, on opposite parts of the upper frame relative to the longitudinal axis of the rotating platform or on opposite
25 parts of the vehicle relative to the longitudinal axis of the rail vehicle.

According to a preferred embodiment of the invention, the cable guide elements comprise a cable wheel or revolving disc which during use thereof is attached to the rail vehicle or to the lower frame of the rotating platform.

5 The invention will be explained in greater detail below with reference to the attached figures.

Figs. 1 to 7 show various stages during the transfer of a container from the wheeled vehicle to the rail vehicle.

10 Fig. 8 shows the cable which is used for turning the rotating platform into the position for turning in the upper frame of the rotating platform.

Fig. 9 shows the cable for turning the rotating platform into the position for turning out the upper frame of the rotating platform.

15 Figs. 10 and 11 show two stages during the transfer of a container from the rail vehicle to the wheeled vehicle.

Fig. 12 shows a schematic view of the wheeled vehicle according to Dutch Patent Application 75.00990.

20 Figs. 13 and 14 show two modifications of this vehicle according to the invention.

Figs. 15 and 16 show two views of the rotating platform on the rail vehicle.

Figs. 1 to 7 show various stages during the transfer of a

container from a wheeled vehicle to a rail vehicle. In the figures the wheeled vehicle is indicated schematically in a top view by 1, and the rail vehicle by 2. Located on the wheeled vehicle is the container 3, which is placed on the schematically indicated guide tracks 14 and 15. Mounted on the rail vehicle 2 are two rotating platforms 4a and 4b, each provided with a rotating upper frame with guide tracks 16 and 17. Details of the rotating platform will be described with reference to Figs. 15 and 16.

The driver of the wheeled vehicle 1 places his vehicle at an angle α to the longitudinal axis of the rail vehicle in the manner indicated in Fig. 1a. Marker lines, for example, can be provided on the ground to help the driver in manoeuvring the wheeled vehicle. When the wheeled vehicle 1 has been positioned in the correct manner, with the centre line of the wheeled vehicle pointing towards the centre of rotation of the rotating platform (see Fig. 1), the upper frame of the rotating platform, in this case of platform 4a, is turned out through an angle α in such a way that the guide tracks of this upper frame at least in the top view come into line with the guide tracks of the wheeled vehicle 1. This situation is shown in Fig. 2. This turning outwards of the unloaded upper frame of the rotating platform 4a can be carried out simply by hand.

The wheeled vehicle is provided with a conveyor of the type described, for example, in Dutch Patent Application 75.02990. For further details of the wheeled vehicle and in particular of the conveyor mounted on it, you are referred to this older Dutch

0181676

patent application. The wheeled vehicle according to the invention is also provided with a jack mechanism with which the hinge pin of the conveying auxiliary frame can be raised relative to the vehicle frame. The object of this is made clear below with reference to Figs. 3, 4 and 5. The vehicle itself will be described in greater detail with reference to Figs. 12, 13 and 14.

In Fig. 3 the wheeled vehicle 1 with the container 3 on it and the rail vehicle 2 with outturned rotating platform 4a are in the same position as that illustrated in a top view in Fig. 2. It can be seen from Fig. 3 that the container is at a lower level than the guide tracks on the surface of the rotating platform 4a of the rail vehicle 2. The container 3 will therefore first of all have to be taken to the correct height before the transfer to the rail vehicle 2 can be carried out.

To this end the wheeled vehicle 1 can be provided, for example on the rear part, with legs which can be extended downwards by means of, for example, jack mechanisms, in order to jack up the rear part of the wheeled vehicle 1 until the rear part of the container 3 is at the right height. The use of such legs, which are well known per se, does mean, however, that when the legs are extended the wheeled vehicle 1 can no longer be moved. It is therefore preferable to use a jack mechanism between the conveyor auxiliary frame and the actual main frame of the vehicle. With such a jack mechanism only the horizontal position of the rear end of the conveyor auxiliary frame is therefore affected, and

the wheels attached to the main frame of the vehicle remain normally on the ground, so that the vehicle as a whole remains manoeuvrable. The practical achievement of such a jack mechanism is assumed to be known to the expert in this field and is therefore not discussed in detail.

Fig. 4 shows schematically that with such a jack mechanism between the conveyor auxiliary frame and the main frame of the vehicle, the rear part of the container 3 can be taken to the same height as the rotating platform guide elements. In order subsequently to place the container in a horizontal position, ready for transfer to the rail vehicle 2, the jack mechanism belonging to the conveyor is operated so that the front part of the container 3 is also taken to the correct height. This is schematically indicated in Fig. 5 by the arrow 11. The container 3 is now in a horizontal position and is at the same height as the guide tracks of the upper frame of the rotating platform 4a, and it is therefore ready to be transferred in the direction of the arrow 12 from the wheeled vehicle 1 to the rail vehicle 2.

When the situation of Fig. 2 has been reached in this way, the driver puts the conveyor into operation, in such a way that the container is pushed off the wheeled vehicle and gradually transferred to the upper frame of the rotating platform 4a. This transfer phase is schematically indicated in Fig. 6.

When the container has been fully transferred to the upper frame of the rotating platform 4a, this rotating platform has to be turned back to the initial position in such a way that the

container is positioned in its final position on the rail vehicle. Since the rotating platform is now loaded, it will be impossible to carry out this turning of the platform in a simple manner by hand. According to the invention, use is now made of a cable whose one end is connected to a point of the upper frame of the rotating platform 4a which does not coincide with the axis of rotation. This attachment point is shown by 5 in Fig. 7, while the axis of rotation is indicated by 6. The other end of the cable is connected to the coupling element of the conveyor on the wheeled vehicle 1. Since this coupling element is used in the previous phase of the procedure to push the container from the wheeled vehicle onto the rail vehicle, this coupling element is at that moment located near the rear part of the vehicle, for example at 7 in Fig. 7. The cable 8 is also sufficiently long to permit fastening between the points 5 and 7 without moving the wheeled vehicle 1. The conveyor of the wheeled vehicle 1 is then put into operation again, in such a way that the coupling element moves to the front part of the wheeled vehicle. After in the initial phase of this movement the cable 8 has been pulled taut, with further forward movement of the coupling element the upper frame of the platform 4a will be rotated about the axis of rotation 6 to the end position within the limits of the rail vehicle 2.

Fig. 8 shows in greater detail the cable 8, whose one end is attached at 5 to a projecting part 9 of the upper frame of the rotating platform 4a, and whose other end is provided with a hook element 12 which can be connected to the coupling element 13.

This coupling element 13 forms part of the conveyor on the wheeled vehicle 1. Fig. 8 shows the hook element 12 and the coupling element 13 in the connected state. Fig. 9 shows the two parts separately. In Fig. 8 one can also see a pulley 10, but it does not play any part in the transfer procedure just described. The fastening of the cable 8 at 5 to the part 9 of the upper frame of the rotating platform is preferably permanent, which means that the cable is always present on the rail vehicle and cannot be mislaid.

10 Figs. 10 and 11 illustrate some situations which occur during the transfer of a container from the rail vehicle 2 to the wheeled vehicle 1.

Positioned on the rail vehicle 2 in Fig. 10 are two containers 3a and 3b, each placed on its own rotating platform, not visible in the figure. The wheeled vehicle 1 is again manoeuvred into the correct position by the driver. Before the actual transfer can be started, the rotating platform on which the particular container is resting must be turned outwards. The cable 8 is again used for this. The driver of the wheeled vehicle ensures that the coupling element of the conveyor of the wheeled vehicle is near the rear part of the wheeled vehicle. The one end of the cable 8 with the hook element 12 is connected at 7 to the coupling element 13 of the conveyor. The other end of the cable is fastened to the projecting part 9 of the upper frame of the rotating platform. Provided on the lower frame of the rotating platform or on the frame of the rail vehicle is a fastening element 11. The pulley 10 is now connected with this fastening element 11 in the way

shown schematically in Fig. 3. Thus the situation schematically illustrated in Fig. 10 is reached.

25 The driver of the wheeled vehicle 1 now puts the conveyor into operation, causing the coupling element 7 to be moved to the front part of the wheeled vehicle 1. When the cable has been pulled taut, as can be seen clearly from Fig. 10, a force will be exerted clockwise via the cable on the fastening point 9, so that the rotating platform with the container 3a on it will turn counterclockwise. The conveyor of the wheeled vehicle 1 is kept
10 in operation until the guide tracks of the rotating platform with the container 3a at least in the top view are in line with the guide tracks on the conveyor of the wheeled vehicle 1. This situation is illustrated in Fig. 11.

The conveyor is then moved back, so that the cable 8 hangs slack
15 and the hook element 12 can be detached from the coupling element 13. The coupling element 13 is then moved back further in order to permit the connection between the coupling element and a coupling member provided near the bottom edge of the container.

The conveyor auxiliary frame must, however, first be taken to the
20 correct height. In the same way as indicated in Figs. 3, 4 and 5, this is carried out by first raising the hinge point of the auxiliary frame by means of the jack mechanisms provided for the purpose (arrow 10 in Fig. 4), following which the front end of the auxiliary frame is raised to at least the same height by
25 means of the other jack mechanisms (arrow 11 in Fig. 5).

The drive direction of the conveyor is then reversed and, after connection to the conveyor, the container is pulled from the platform onto the wheeled vehicle 1. In the final position the situation is then in fact the same as that illustrated in Fig. 2.

5 As the final stage in the whole procedure, only the rotating platform 4a now has to be turned back on the rail vehicle. Since this rotating platform is no longer loaded, it can be turned back simply by hand.

Fig. 12 shows a wheeled vehicle of the type described in Dutch Patent Application 75.02990. The wheeled vehicle 20 is provided with a vehicle frame 21 placed on wheels and a conveyor auxiliary frame 22 which is connected with a hinge pin 24 to the vehicle frame 21. At a distance from the hinge pin 24 one or more jack mechanisms 23 are provided between the vehicle frame 21 and the conveyor auxiliary frame 22, by means of which the conveyor auxiliary frame can be placed in the slanting position shown in Fig. 12. For further details of the auxiliary frame with the conveyor and the use thereof, you are referred to the older Dutch patent application.

20 Fig. 13 shows a modification of this wheeled vehicle carried out according to the invention. The swivel pin 24 of the auxiliary frame is not directly attached to the rear end of the vehicle frame 21. Disposed between the swivel pin 24 and the rear end of the vehicle frame 21 is a jack mechanism 25. This jack mechanism is attached to the rear end of the vehicle frame in such a way that the rear swivel pin 24 can be moved only vertically up and

down by means of this jack mechanism over a predetermined distance set by the jack mechanism.

With the aid of the jack mechanism 25, the rear part of the auxiliary frame 22 can now first of all be raised to a predetermined height, following which by means of the jack mechanism 23 the auxiliary frame is then taken again to the horizontal or, if desired, to a slanting position.

Fig. 14 shows another modification of the known wheeled vehicle carried out according to the invention. According to this modification, two jack legs 26 are provided near the rear part of the vehicle frame and near each side edge of the vehicle frame. By means of these jack legs 26, the whole rear part of the vehicle frame 21 is raised to a desired height. Thereafter, by operating the jack mechanisms 23, the auxiliary frame 22 can be placed horizontal again or in a slanting position, if desired.

Figs. 15 and 16 illustrate a rotating platform preferably used according to the invention, in two end positions.

The upper frame of the rotating platform is provided with two elongated container guide elements 31 and 32, which are connected to each other by means of a number of crossbars 33, 34, 35, 36, 37 and together form the upper frame. A supporting element 38 is attached in the centre of the crossbar 37. This supporting element 38 can, for example, consist of a slide block or a wheel or roller.

The lower frame of the rotating platform comprises in general two

elongated members 39 and 40, which are connected to each other by means of a cross plate 41. Mounted on this cross plate 41 is the rotating mechanism with which the upper frame can rotate relative to the lower frame. Details of this rotating mechanism are not, however, shown because such rotating mechanisms are known to an expert.

In the turned-in position the ends of the guide elements 31, 32 are blocked by means of stop elements 42, 43. These stop elements can be rotated about a horizontal axis by means of a handle. Fig. 15 shows the stop element 42 in the blocking position and the stop element 43 in the non-blocking position. With the stop element 43 in this position, the rotating platform can therefore be rotated from the position of Fig. 15 to the position shown in fig. 16.

During the turning, the supporting element 38 will move over the bottom of the railway truck on which the rotating platform is placed and in the end position will hit the stop element 44 which is attached to the longitudinal member 40. A similar stop element 45 is mounted on the other longitudinal member 39 and functions on turning of the platform in the other direction.

Between the longitudinal members 39 and 40 there is an approximately bow-shaped cross member 46 which is formed in such a way that its central part is higher up than the two attachment points on the longitudinal members. The result of this is that when the upper frame is turned inwards from the position shown in Fig. 16 to the position shown in Fig. 15 the guide elements run

up against the centre part of this cross member 46, which thus forms a run-on face, in such a way that this run-on face takes the weight of the loaded upper frame. After locking of the front ends of the guide elements 31 and 32 by means of the stop elements 42 and 43, a very stable situation is achieved.

Both Fig. 15 and Fig. 16 show the cable 8, one end of which is fastened at 5 to the draw bar 9 which projects from the actual upper frame, and which is already illustrated in Figs. 8 and 9. In Fig. 15 the cable runs over the pulley 10 which is attached to the supporting point 11 provided on a second cross member between the longitudinal members 39 and 40. A symmetrical supporting point is provided on the other side of the truck.

In the above only one example of an embodiment of a process and means for handling and transporting a container is described, and it will be clear to the expert that various changes and modifications are possible within the scope of the invention.

C L A I M S

1. Process for the transportation of a container initially placed on the ground, partly by road using a wheeled vehicle, and partly by rail using a rail vehicle, from a place of origin to a place of destination, in which the rail vehicle is provided with a
5 rotating platform comprising a lower frame fixed on the rail vehicle and, rotatable relative to said frame, an upper frame with guide elements for a container, and in which the wheeled vehicle is provided with an auxiliary frame with guide elements for a container and a conveyor mechanism with which a container
10 can be moved in two directions along the guide elements, it being possible to move the front ends and rear ends of said auxiliary frame independently of each other, with the aid of means provided for the purpose, to a desired height relative to the ground, according to which process (a) a container is placed from the
15 ground on the wheeled vehicle or vice versa by means of the said conveyor, during which first of all the front ends of the auxiliary frame are moved upwards, so that the auxiliary frame is taken to a slanting position, following which a container is pulled onto or pushed off the wheeled vehicle by means of the
20 conveyor, after which the auxiliary frame is turned back to its initial position, and (b) a container is placed from the wheeled vehicle on the rail vehicle or vice versa by means of the said conveyor and, after positioning of the wheeled vehicle in a slanting position alongside the rail vehicle and rotation of the
25 upper frame of the rotating platform until it is in line with the wheeled vehicle first of all the rear ends of the auxiliary frame

are moved upwards with means provided on the wheeled vehicle for the purpose, in such a way that the guide elements thereof reach the same height as those of the upper frame of the rotating platform, and then the front ends of the auxiliary frame are taken to such a height that the guide elements of auxiliary frame and rotating platform are in line with each other, following which the container is pushed onto or pulled off the rail vehicle.

2. Process according to Claim 1, characterised in that the upper frame of the rotating platform in the loaded state is turned relative to the lower frame by means of the conveyor of the wheeled vehicle placed at an angle alongside the rail vehicle through the fact that one end of a cable is connected to the conveyor and the other end of the cable is connected to a part thereof not lying on the axis of rotation of the upper frame, and said cable, depending on the direction of rotation, may or may not run via one or more cable guide elements fixed on the rail vehicle or the lower frame of the rotating platform, following which by putting the conveyor into operation sufficient pulling force is exerted on the cable for the turning of the upper frame relative to the lower frame of the rotating platform.

3. Process for the transfer of a container from a wheeled vehicle onto a rail vehicle or vice versa, the rail vehicle being provided with a rotating platform comprising a lower frame fixed on the rail vehicle and, rotatable relative thereto, an upper frame with guide elements for the container, said wheeled vehicle being provided with an auxiliary frame which has guide elements

for the container and which is linked to the vehicle frame in such a way that this auxiliary frame can be moved relative to the vehicle frame, and the auxiliary frame is provided with a conveyor mechanism for the purpose of pulling the container from the rail vehicle onto the wheeled vehicle or pushing it from the wheeled vehicle onto the rail vehicle after the wheeled vehicle has been positioned at an angle to the rail vehicle, and after the upper frame of the rotating platform is turned relative to the lower frame, in such a way that the guide elements of the upper frame of the rotating platform are at least approximately in line with the guide elements of the auxiliary frame of the wheeled vehicle, characterised in that prior to the transfer of the container from the wheeled vehicle to the rail vehicle or vice versa, the guide elements of the auxiliary frame of the wheeled vehicle are positioned, with the aid of the means provided for the purpose on the wheeled vehicle, in such a way that the rear ends of the guide elements of the auxiliary frame are taken to the same height as the guide elements of the rotating platform and the front ends of the guide elements of the auxiliary frame are taken to at least the same height as the guide elements of the rotating platform.

4. Process according to Claim 3, characterised in that the upper frame of the rotating platform of the rail vehicle, at least when the platform is loaded, is turned relative to the lower frame after the wheeled vehicle is placed at an angle alongside the rail vehicle, doing so by means of a cable which is fastened at the one end to a part of the upper frame not lying on its axis of

rotation and at the other end to one of the above-mentioned coupling elements of the conveyor mechanism, and said cable, depending on the direction of rotation, may or may not run via one or more cable guide elements fixed on the rail vehicle or the lower frame of the rotating platform, so that by putting into operation the conveyor mechanism via the coupling element sufficient pulling force is exerted on the cable to turn the upper frame relative to the lower frame of the rotating platform.

5. Wheeled vehicle provided with an elongated auxiliary frame with guide elements for guiding the container, and with a conveyor mechanism with coupling elements for moving over the auxiliary frame the gripped edge of a container, while the auxiliary frame can swivel relative to the vehicle frame about a hinge pin near the rear end of the auxiliary frame while being driven by one or more jack mechanisms disposed at a distance from the hinge pin between the vehicle frame and the auxiliary frame, characterised in that jack legs are provided near the rear part of the vehicle on the vehicle frame, by means of which the rear part of the vehicle frame can be pushed upwards from the ground.

6. Wheeled vehicle provided with an elongated auxiliary frame with guide elements for guiding the container, and with a conveyor mechanism with coupling elements for moving over the auxiliary frame the gripped edge of a container, while the auxiliary frame can swivel relative to the vehicle frame about a hinge pin near the rear end of the auxiliary frame while being driven by one or more jack mechanisms disposed at a distance from

the hinge pin between the vehicle frame and the auxiliary frame, characterised in that at least one further jack mechanism is provided between the hinge pin and the vehicle frame, by means of which the hinge pin can be moved upwards.

5 7. Rotating platform intended for mounting on a rail vehicle, comprising a lower frame to be fixed to the rail vehicle and an upper frame which can rotate about a vertical axis relative to the lower frame, said upper frame being provided with two parallel container guide elements and a supporting element which
10 can move over a circular bow-shaped track located centrally between the guide elements at a distance from the axis of rotation at the loading/unloading side of the upper frame, characterised in that the place of the supporting element and the place of the axis of rotation are chosen in such a way that the
15 upper frame can rotate through an angle of $\pm 45^\circ$, while in the outturned position the ends of both guide elements at the loading/unloading side of the upper frame project beyond the side limit of the rail vehicle.

20 8. Rotating platform according to Claim 7, characterised in that the dimensions of the upper frame are chosen in such a way that in the outturned position the other ends do not project further than a predetermined distance beyond the side limit of the rail vehicle.

25 9. Rotating platform according to one of the preceding Claims 7 to 8, characterised in that the lower frame is provided with run-on faces at a distance from the axis of rotation, against which

0181676

the part of the upper frame facing the loading/unloading side runs during inward turning, in such a way that the weight of the upper frame - which may or may not be loaded - in the turned-in position is at least partially borne by these run-on faces.

5 10. Rotating platform according to one of Claims 7 to 9, characterised in that near both side edges of the vehicle in the movement path of the support element stop elements are provided, against which the support element stops in its relevant end position.

10 11. Rotating platform according to one of Claims 7 to 10, characterised in that the lower frame has movable stop elements which enclose the ends of the guide elements on the loading/unloading side in the turned-in position and which can be moved from the enclosing position, in order to permit turning of
15 the upper frame to the side where the stop element in question is positioned.

12. Rail vehicle provided with a rotating platform as described in one of Claims 7 to 11.

13. Process according to one of Claims 1 to 4, characterised by
20 the use of a wheeled vehicle according to one of claims 5 or 6 and/or a rail vehicle according to Claim 12.

14. System for carrying out the process according to Claim 13, characterised in that the attachment of the cable to the upper frame of the rotating platform or to the rail vehicle is carried
25 out as a permanent fastening, and the other end of the cable is

provided with a connecting element which can be coupled to or detached from the relevant coupling element.

5 15. System according to Claim 14, characterised in that on the rail vehicle or on the lower frame of the rotating platform two cables are provided on opposite parts of the upper frame relative to the longitudinal axis of the rotating platform or on opposite parts of the vehicle relative to the longitudinal axis of the rail vehicle.

10 16. System according to one of the preceding Claims 14 or 15, characterised in that the cable guide means comprise a cable wheel or revolving disc which during use thereof is fastened to the rail vehicle or to the lower frame of the rotating platform.

15 17. System according to Claim 16, characterised in that the cable wheel or revolving disc is designed as a pulley provided with a generally U-shaped brace with a pivot point for the roller or disc near the ends of the legs of this brace, while the brace is further provided with coupling means with which the pulley can be connected to a supporting element or elements fixed to the rail vehicle or the lower frame.

20 18. System according to Claim 17, characterised in that the connecting element at the other end of the cable has such dimensions that the pulley cannot pass this connecting element.

25 19. System according to one of the preceding Claims 14 to 18, characterised in that the rail vehicle is provided with means for fixing or storing the cable when the latter is not in use.

0181676

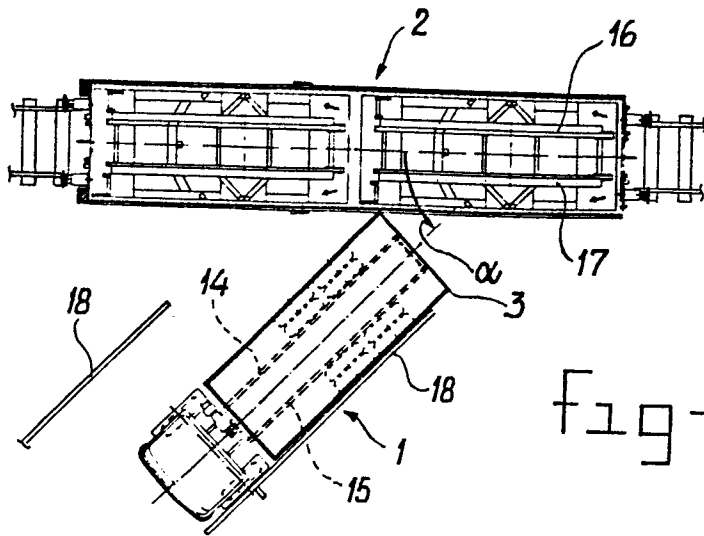


fig-1

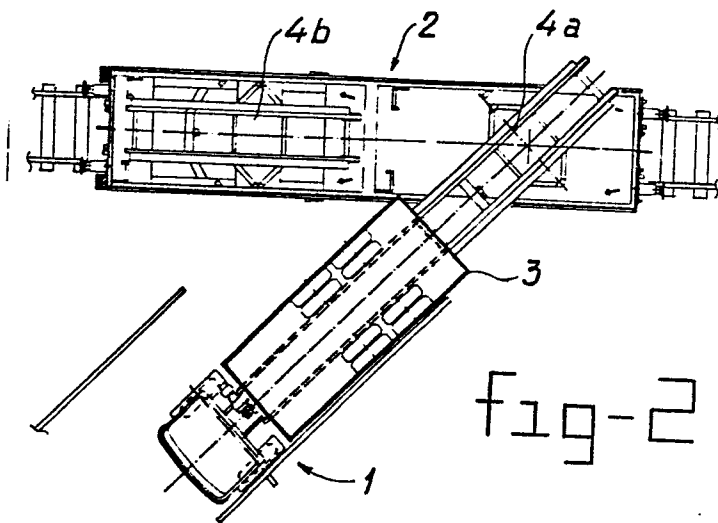


fig-2

fig-3

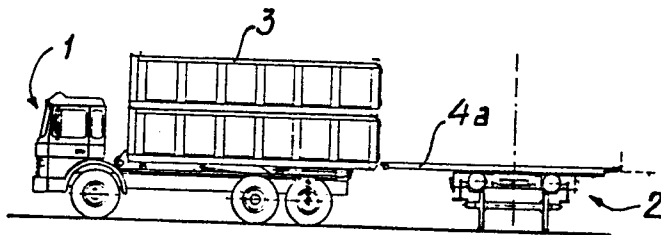
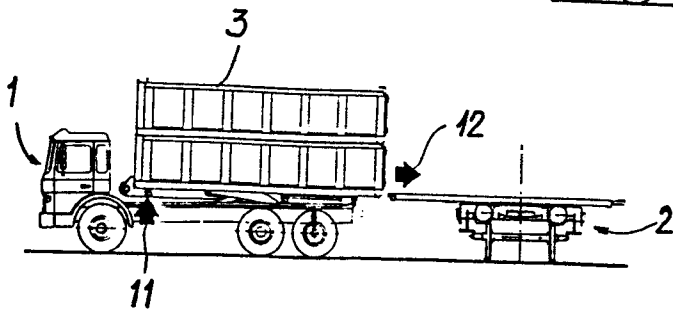
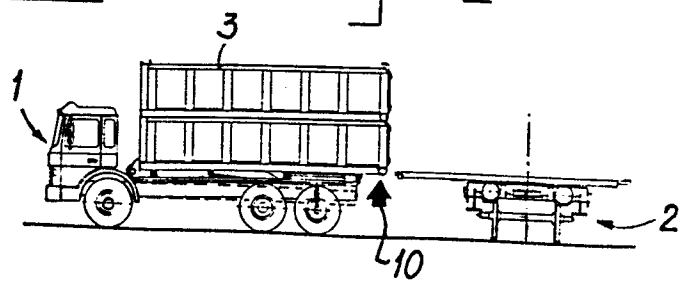


fig-4

fig-5



0181676

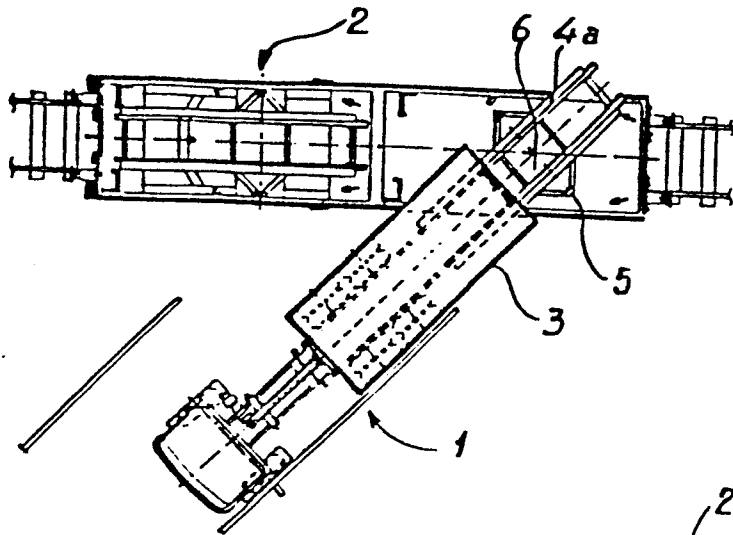


fig-6

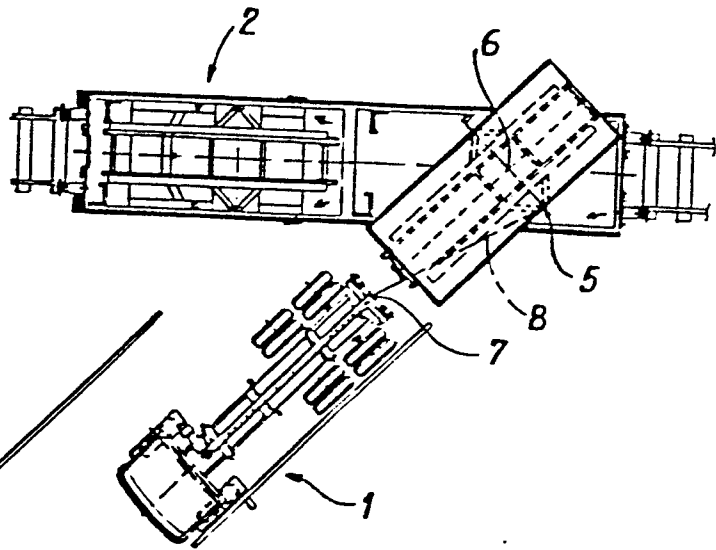


fig-7

fig-8

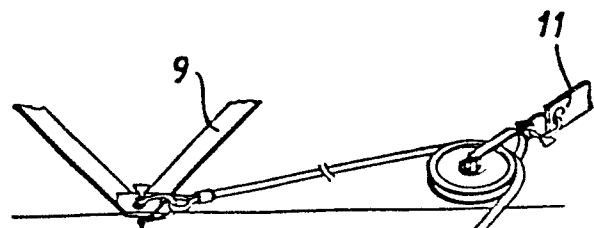
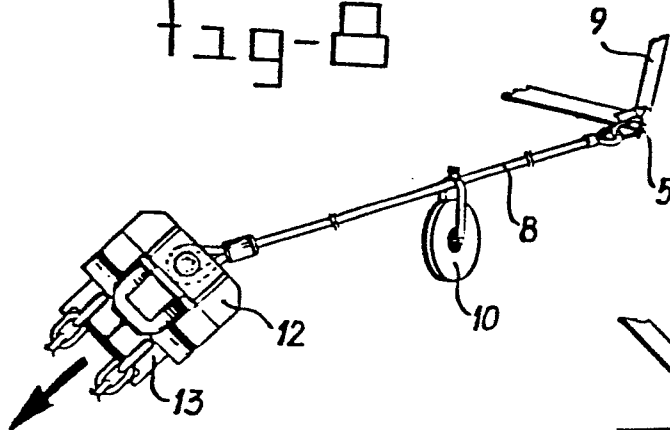


fig-9

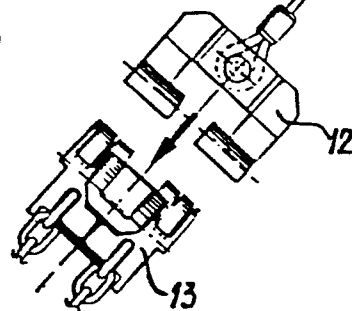


fig-10

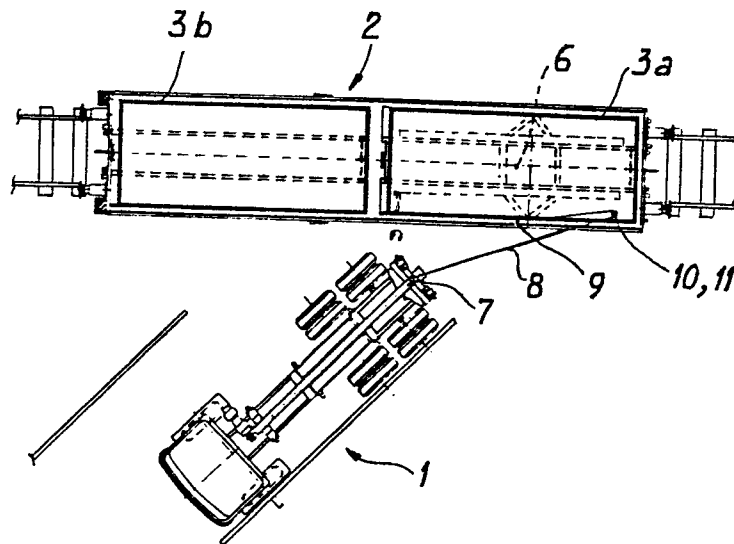
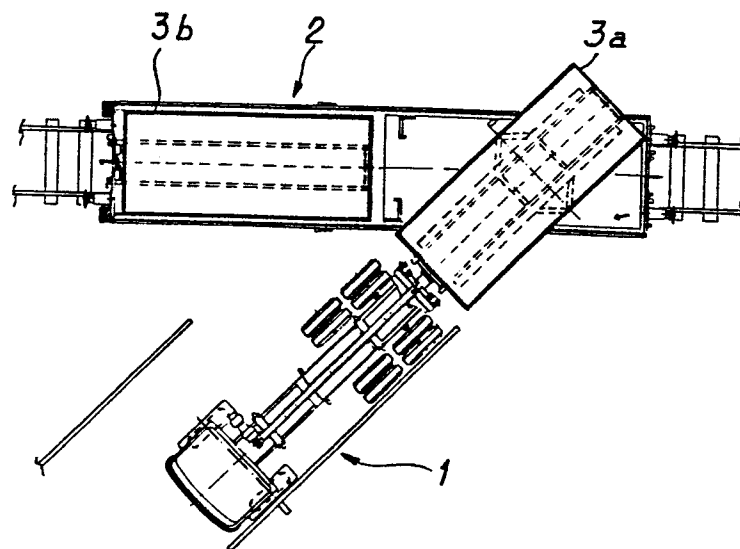


fig-11



0181676
fig-12

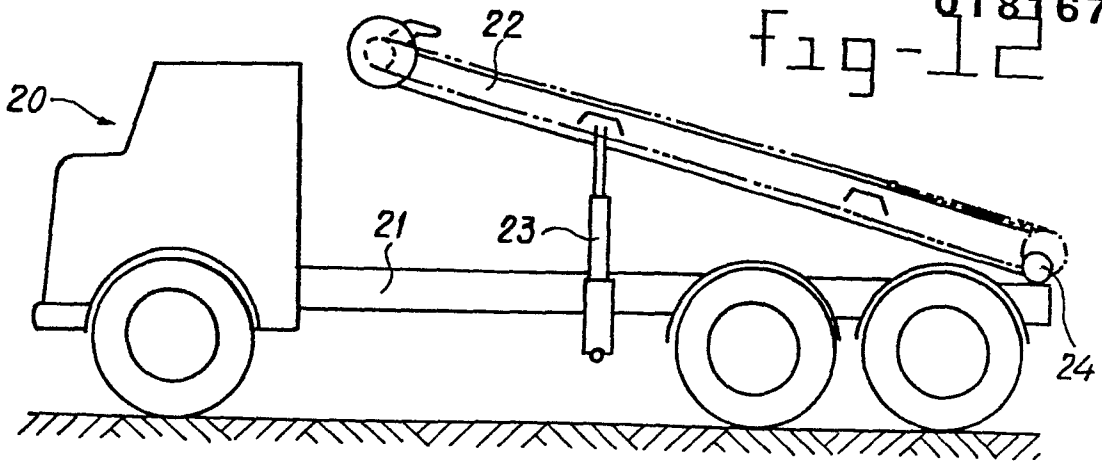


fig-13

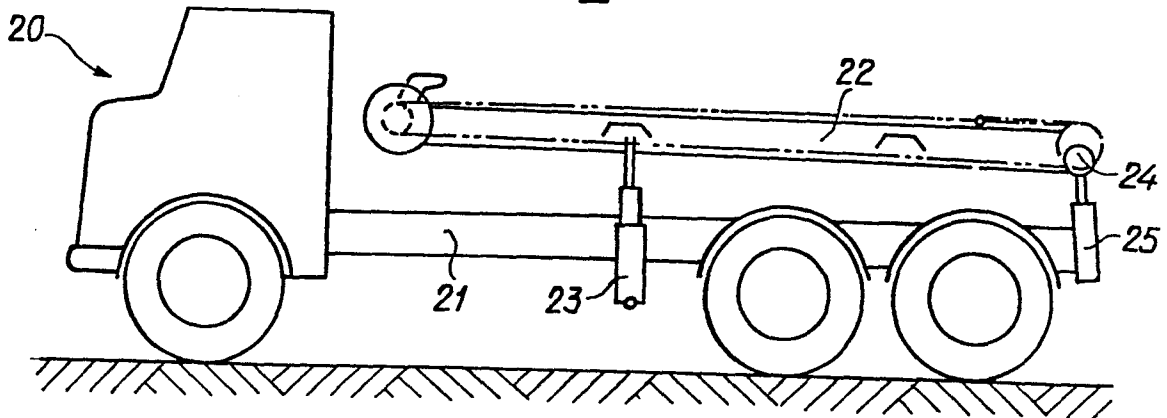
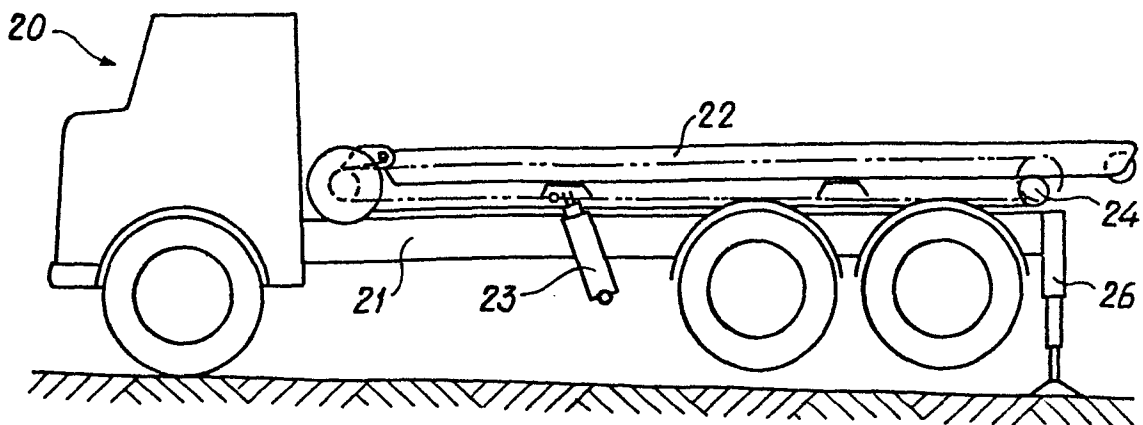
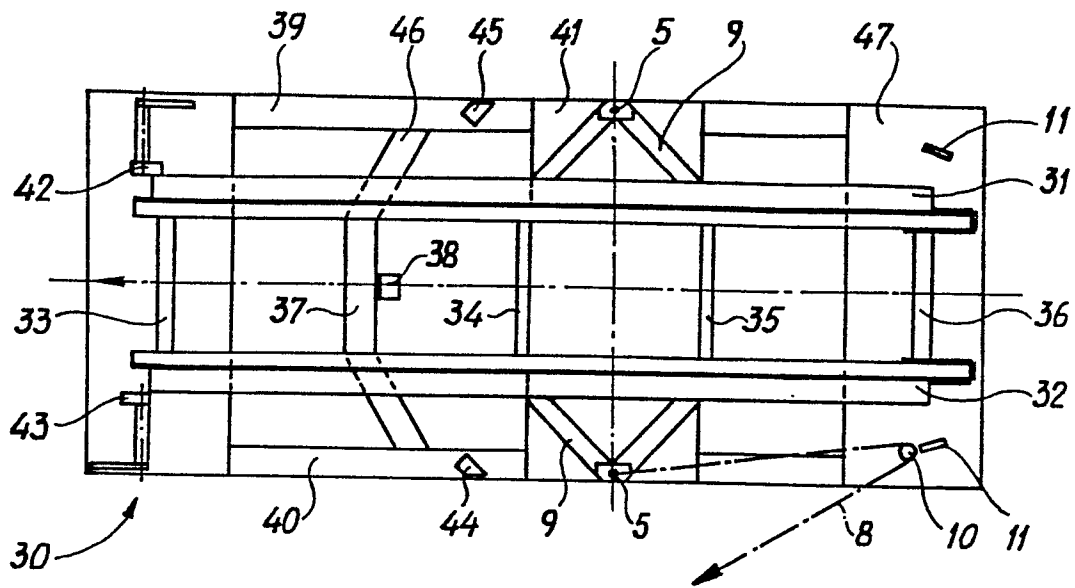


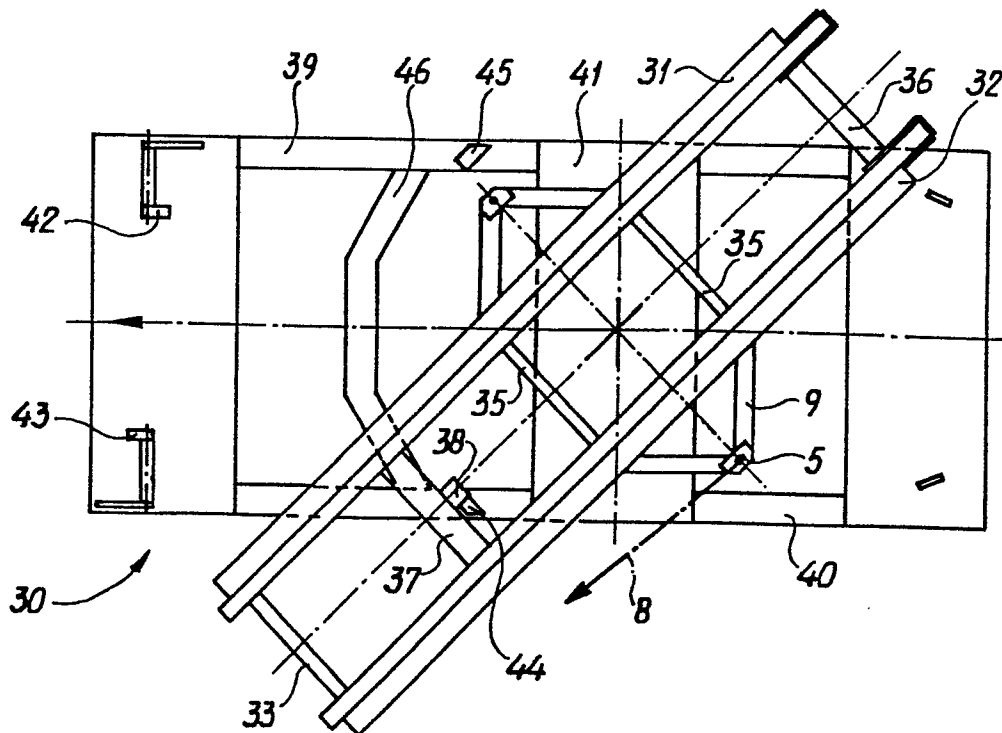
fig-14



f1g-15



f1g-16





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
A	GB-A-2 108 473 (M. HEMMINKI) * Whole document *	1, 3, 5- 7	B 61 D 47/00 B 61 D 3/04 B 61 B 1/00
A	US-A-3 143 979 (R. ECKERSALL) * Whole document *	1, 3, 5- 7	
A	FR-A-1 512 592 (SOFRAMIXTE) * Whole document *	1, 3, 5- 7	
A	GB-A-1 213 324 (TALBOT) * Whole document *	1, 3, 5- 7	
A	US-A-2 959 303 (H. WHETTLE) * Whole document *	1, 3, 5- 7	TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
A	GB-A- 856 951 (FLEXI-VAN) * Whole document *	1, 3, 5- 7	B 61 D B 60 P B 61 B
A	GB-A- 848 728 (FLEXI-VAN) * Whole document *	1, 3, 5- 7	
A	US-A-3 310 185 (HIGHWAY TRAILER) --- -/-		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 07-01-1986	Examiner LINTZ C.H.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	



DOCUMENTS CONSIDERED TO BE RELEVANT			Page 2
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
A	US-A-3 190 477 (E. EWERS)		
A	--- US-A-3 158 106 (GENERAL AMERICAN TRANS.)		
A	--- US-A-3 151 751 (L. MARINI) -----		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
Place of search THE HAGUE		Date of completion of the search 07-01-1986	Examiner LINTZ C.H.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			