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

(11) **EP 2 017 218 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
21.01.2009 Bulletin 2009/04

(21) Application number: **07075618.4**

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

(51) Int Cl.:
B66F 3/46 *(2006.01)* ***B66F 9/06*** *(2006.01)*
B66F 9/24 *(2006.01)* ***B65G 63/02*** *(2006.01)*

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

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(54) Method and apparatus for moving freight containers

(57) Method for moving a freight container, comprising the steps of bringing at least two vehicles into engagement on at least two sides of the freight container; lifting the freight container from the ground; displacing the freight container by displacing the two vehicles; lowering the freight container onto the ground; and disengaging the two vehicles from the freight container.

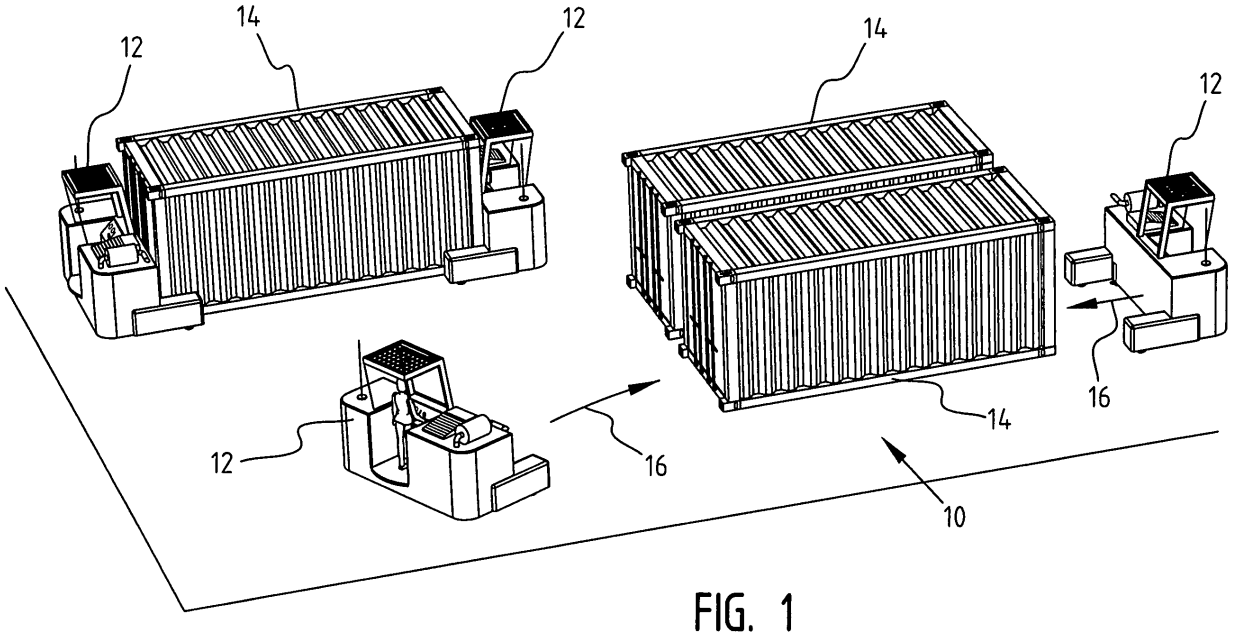

FIG. 1

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Description

[0001] The present invention relates to a method for moving a freight container.

[0002] The invention also relates to an assembly comprising a freight container and at least two vehicles.

[0003] Finally, the invention relates to a vehicle for use in the above method.

[0004] In a container terminal in a port freight containers are transferred between container ships and other means of transport. Using a harbour crane the containers are hoisted from quayside into the container ship or vice versa. In most cases the freight containers are however not immediately placed onto the final transport means from quayside or removedfrom the final transport means and placed on quayside, but are first placed temporarily in a storage area.

[0005] For the transport between the harbour crane and the storage area use is made in modern terminals of automatically guided vehicles (AGVs). The harbour crane places freight containers from the ship onto the AGVs, or lifts the freight containers from the AGVs and places them aboard ship. The AGVs shuttle between the harbour cranes and the storage areas.

[0006] A drawback of the above described system with AGVs is that a crane must wait until an AGV is available to present a container or to receive a container. If congestion occurs in the supply to or discharge from the AGVs, the harbour crane must then wait and this results in delays in loading or unloading of the ship, this being undesirable in view of the speed required.

[0007] It is an object of the present invention to provide a system for transporting freight containers between a harbour crane and a storage area in a container terminal, and more particularly a system wherein the dependency of the harbour crane on the transport between the harbour crane and the storage area is reduced.

[0008] The invention achieves this objective by providing a method for moving a freight container, comprising the following steps of: bringing at least two vehicles into engagement on at least two sides of the freight container; lifting the freight container from the ground; displacing the freight container by displacing the two vehicles; lowering the freight container onto the ground; and disengaging the two vehicles from the freight container. By applying this method a harbour crane can suffice with placing a freight container directly onto the quayside instead of placing it onto a waiting AGV. While the harbour crane is beginning to lift a subsequent freight container from the ship, two vehicles according to the invention arrive and engage on two sides of the freight container. The twist-locks already present on the freight container are preferred for the purpose of engagement. The freight container is then lifted from the ground, after which the two vehicles, which now form together with the freight container a rigid whole, begin to travel and carry the freight container to a destination. Once arrived at the destination, the freight container is once again placed on the ground, after which the vehicles disengage in order to move a following freight container.

[0009] It will be apparent that this method advantageously removes the dependency of the harbour crane on the placing of the freight container on an AGV. This results in a greater loading/unloading speed and flexibility and the harbour crane can continue with unloading even if a vehicle has not arrived to take away the freight container. It is even possible to place a plurality of freight containers adjacently of each other or in the vicinity of each other within reach of the harbour crane. As soon as two vehicles arrive to take away a freight container, these vehicles can take away the freight container without depending on the harbour crane, while this latter continues with unloading of the ship.

[0010] It will be apparent that the invention is applicable not only to unloading of a ship but also to the loading of a ship. As long as the vehicles place the containers within reach of the harbour crane, they need not wait until the harbour crane has picked up the freight container but they can immediately go and fetch a subsequent freight container.

[0011] The present invention also provides a preferred method, wherein the displacement of the vehicles takes place in both longitudinal direction and width direction of the freight container by rotating the wheels of the vehicle substantially in longitudinal direction or transversely of the longitudinal direction of the freight container. The vehicles hereby acquire a exceptionally good manoeuvrability and they can work their way into narrow spaces between freight containers and also remove a freight container sideways from a row of freight containers. This has a positive effect on the amount of space available for the placing of freight containers in a terminal.

[0012] The present method further provides a preferred method, comprising the step of synchronizing lifting by the two vehicles. In this way the freight container is lifted horizontally from the ground. This prevents, among other things, deformations and/or damage to and/or close to the engaging members due to the freight container being lifted in askew position.

[0013] The present invention also provides a preferred method, comprising the step of synchronizing the movement by the two vehicles. Although it is possible within the scope of the invention for a first vehicle to actively move the freight container during displacement while the second vehicle follows the first vehicle passively (is pulled or travels behind the first vehicle), this method provides the assembly of freight container and the two vehicles with a great manoeuvrability. It enables the assembly to perform manoeuvres such as sideways travel (for instance out of a row of freight containers), to rotate on its axis and to negotiate tight bends.

[0014] The present invention further provides a preferred method wherein the synchronization comprises communication between the vehicles. For the purpose of mobility of the vehicles it is strongly recommended that communication takes place wirelessly, for instance by

means of radio communication. In a specific embodiment one of the two vehicles takes the lead and gives instructions to the other vehicle, whereby the two vehicles act together as a coordinated whole.

[0015] It is possible according to the invention for the second vehicle, which is being led by the first vehicle, not to receive instructions by direct communication, but that the second vehicle senses the movements of the first vehicle using sensors (through the freight container which forms a connection between the two vehicles), after which the second vehicle attempts to follow this movement. It is however much more difficult in this way to give the assembly of freight container and vehicles the manoeuvrability which is obtained by having the vehicles communicate directly with each other.

[0016] The invention provides a preferred method wherein the vehicles are automatically controlled. This method is very advantageous since no operators are needed to control the vehicles. In a more specific embodiment the vehicles receive movement instructions from a central coordinating device via a communication channel. The two vehicles then carry out the movement instructions autonomously.

[0017] The present invention provides an alternative method, wherein the vehicles are controlled manually. This is advantageous for instance if there are problems with the communication between vehicles or with the communication between vehicles and the central coordinating device. In a fully manual embodiment both the first and the second vehicle are each controlled in fully manual manner by an operator.

[0018] The present invention further provides a method wherein a first vehicle is controlled manually and a second vehicle is controlled automatically, and wherein the control of the second vehicle is synchronized with the first vehicle. This is advantageous if there are problems with the central coordinating device. In this case an operator takes up position in a first vehicle and controls this vehicle by hand. In this semi-manual method the operations of the operator in the first vehicle are "copied" or emulated by a second vehicle.

[0019] The invention also provides a preferred method for manual remote control of a vehicle, wherein an operator gives a control instruction which is transmitted to the vehicle via communication means, after which the vehicle carries out the control instruction.

[0020] The invention provides a preferred method wherein the vehicles are brought into engagement on the end surfaces of the freight container. This is preferred to coupling on the long sides, since a relatively small vehicle then suffices, while the container is still carried in stable manner by the vehicles.

[0021] Yet another method provided by the present invention comprises the further step of: mutually coupling two vehicles; travelling to the freight container to be moved, wherein the two vehicles form a coupled unit; and uncoupling the two vehicles from each other once they have arrived at the freight container to be moved. Having the vehicles travel coupled directly to each other when they are not transporting a freight container results in a relatively small, single assembly of two vehicles. This single assembly requires less space at the terminal during travel than two separate vehicles, since only a single safety margin now has to be maintained around the travelling assembly instead of a separate safety margin around each of the two vehicles. At busy terminals this will result in additional space-saving when a large number of vehicles are being driven around. As soon as the vehicles have arrived at a starting location for the purpose of picking up a freight container, they are once again uncoupled from each other in order to each engage on a side of the freight container. In a specific embodiment of the invention the vehicles are also uncoupled from each other in order to travel sideways through a narrow passage.

[0022] The present invention further provides an assembly, comprising: a freight container comprising means for receiving engaging means; and at least two vehicles comprising: engaging means for engaging the freight container; and a lifting device for lifting the freight container, wherein at least one vehicle comprises a drive for displacing the vehicle. The engaging means of the vehicle are adapted to engage the means for receiving engaging means on the freight container. Using the engaging means the vehicle is able to enter into a firm connection with the freight container. In order to move the freight container two vehicles each engage with their engaging means on the means for receiving engaging means of the freight container. A rigid unit (the assembly) is thus created consisting of the freight container and the two vehicles. This assembly now operates during the displacement as if it were a single vehicle. The lifting device makes it possible to raise the freight container from the ground so that the freight container can actually also be moved. This latter is realized by driving at least one of the vehicles. In a preferred embodiment both vehicles are driven. This has the advantage of a great manoeuvrability being obtained. Furthermore, both vehicles can move independently of each other. In an embodiment in which only a single vehicle is driven, the driven vehicle must assist the second vehicle during for instance engaging on and disengaging from the freight container. The second vehicle can moreover not be displaced without the assistance of the first vehicle.

[0023] In a further embodiment an assembly is provided wherein the vehicles comprise a communication means for the purpose of mutual communication. The communication means makes it possible for the vehicles to adjust their operations to each other. In this way the vehicles lift the freight container from the ground simultaneously, both vehicles produce a similar amount of power during travel and the assembly can perform complex manoeuvres, such as for instance rotating on its axis and travelling in transverse direction and so on.

[0024] The invention further provides an embodiment comprising an assembly wherein the vehicles further

comprise communication means in order to synchronize the displacement with another vehicle.

[0025] In a further embodiment of the invention an assembly is provided wherein the vehicles are identical to each other. This has the advantage that vehicles are mutually interchangeable. In one embodiment two vehicles are paired to each other in fully dynamic manner for each separate task. In another embodiment the vehicles form pairs which carry out multiple movement instructions in pairs.

[0026] In a further embodiment the present invention provides an assembly wherein the vehicles further comprise control means for automatic control of the vehicle. The control means perform a series of movement instructions. In an advantageous embodiment the movement instructions are obtained from a central coordinating device via a communication channel, such as for instance a radio connection.

[0027] An advantageous embodiment comprises an assembly wherein a vehicle further comprises a steering device adapted to steer the wheels through at least ± 90'. This enables the vehicle to place its wheels transversely of the lengthwise direction of the freight container. The vehicle is hereby able to travel in the transverse direction in the narrow space between two freight containers oriented in lengthwise direction, to then couple to the freight container and drive the freight container transversely out of a row of freight containers. It is hereby possible to place the freight containers relatively close to each other without preventing the vehicles from lifting a freight container out of a row.

[0028] In a preferred embodiment of the invention an assembly is provided wherein the engaging means are adapted to engage means for receiving engaging means arranged close to the bottom side of the freight container. In another embodiment of the invention an assembly is provided wherein the engaging means are adapted to engage means for receiving engaging means arranged close to the top side of the freight container. Standard ISO containers are provided with so-called twist-locks on both the top and bottom sides. The invention provides an embodiment for coupling to the twist-locks on the top side as well as an embodiment for coupling to the twist-locks on the bottom side.

[0029] In a further embodiment the invention provides an assembly wherein the vehicles further comprise coupling means for coupling the vehicle to a second vehicle. As described above, this makes it possible to drive the vehicles in compact manner to a freight container to be moved.

[0030] The present invention also provides an embodiment comprising an assembly wherein at least one of the vehicles further comprises position-determining means for determining the position and the orientation of the vehicle. Owing to the position-determining means the vehicle is able to determine its position at the terminal and to determine the direction in which the destination location is to be found. The vehicle finds its way to the destination location on the basis of predetermined or dynamic routes.

[0031] In a further embodiment an assembly is provided wherein the drive is a diesel-hydraulic drive.

[0032] In another embodiment of the invention an assembly is provided wherein the drive is a diesel-electrical drive.

[0033] In another alternative embodiment an assembly is provided wherein the drive is an electrical drive.

[0034] The present invention further provides a vehicle, comprising: a drive for displacing the vehicle; engaging means for engaging the freight container; and a lifting device for lifting the freight container. As already described, a freight container is moved by two vehicles which each engage on one side of the freight container and lift the freight container from the ground. The two vehicles together then move the freight container to its destination location, where the vehicles lower the freight container onto the ground again, after which the vehicles disengage again from the freight container.

[0035] In a further preferred embodiment a vehicle is provided which further comprises communication means for the purpose of synchronizing lifting with another vehicle. Owing to the communication means the vehicles are able to lift the freight container simultaneously and at almost the same speed from the ground and to also set the container down on the ground again simultaneously and at almost the same speed.

[0036] A further preferred embodiment comprises a vehicle which further comprises communication means for the purpose of synchronizing displacement with another vehicle. The communication means enable two vehicles to coordinate their movements, whereby the vehicles can for instance together drive a freight container in transverse direction out of a row of disposed freight containers.

[0037] In a further embodiment the vehicle comprises control means for automatic control of the vehicle.

[0038] The invention also provides an embodiment comprising a vehicle which further comprises a steering device adapted to steer the wheels through at least ± 90'. This steering device enables the vehicle to place its wheels transversely of the lengthwise direction of a freight container. This in turn enables the vehicle to drive transversely in the narrow space between a row of freight containers oriented in the lengthwise direction and, after coupling to the freight container, to drive this container in transverse direction out of the row of freight containers.

[0039] In one embodiment the invention further provides a vehicle wherein the engaging means are adapted to engage means for receiving engaging means arranged close to the bottom side of the freight container.

[0040] In another embodiment the invention further provides a vehicle wherein the engaging means are adapted to engage the means for receiving engaging means arranged close to the top side of the freight container.

[0041] In yet another embodiment a vehicle is provided

which further comprises coupling means for coupling the vehicle to a second vehicle.

[0042] In yet another embodiment a vehicle is provided which further comprises position-determining means for determining the position and orientation of the vehicle.

[0043] In an embodiment of the invention a vehicle is provided wherein the drive is a diesel-hydraulic drive.

[0044] In another embodiment a vehicle is provided wherein the drive is a diesel-electrical drive.

[0045] In another alternative embodiment a vehicle is provided wherein the drive is an electrical drive.

[0046] In one embodiment the invention provides a system comprising at least two vehicles and further comprising a coordinating device for coordinating the vehicles in the system. In a specific embodiment the coordinating device comprises a central computer which communicates with the vehicles. The central computer evaluates the need for movements of freight containers and prepares instructions for a movement. The central computer then sends the instruction to a vehicle or a pair of vehicles with a starting location and a destination location. In another more specific embodiment the central computer also sends a route to be followed together with the instruction. The movement instruction is performed by two vehicles, after which these report completion of the movement to the central computer and await a subsequent instruction.

[0047] In an alternative embodiment the central computer sends an instruction to a first vehicle. The first vehicle performs the instruction while communicating with a second vehicle, which in turn receives instructions from the first vehicle.

[0048] Further details and preferred embodiments are given in the following description and elucidated with reference to the figures, in which:

Figure 1 shows an axonometric view of preferred embodiments of the present invention,

Figure 2 shows an axonometric view of a preferred embodiment according to the present invention,

Figure 3 is a top view of a preferred embodiment according to the present invention,

Figure 4 is a top view of an alternative embodiment of the device of figure 3,

Figure 5 is a top view of yet another alternative embodiment of the device of figure 3, and

Figure 6 is a top view of a preferred embodiment according to the present invention which is performing a step of the method according to the invention.

[0049] Freight containers 14 are situated in a container terminal (figure 1). Freight containers 14 are picked up and moved by two vehicles 12. For this purpose two vehicles 12 each approach freight container 14 at an end surface as according to arrows 16. Vehicles 12 can then couple to freight container 14 and lift it from the ground. Once clear of the ground, freight container 14 can be moved by the two vehicles 12 which, together with freight container 14, form a rigid entity during the movement. So that they actually also move as one entity, the two vehicles 12 act in a synchronized manner by for instance communicating with each other. The control is preferably located here in the first vehicle 12, wherein the other vehicle 12 performs instructions from first vehicle 12. First vehicle 12 is herein controlled manually by an operator. It is however also possible to envisage a central coordinating computer sending instructions to a central coordinating computer sending instructions to a control device in vehicles 12 for the purpose of moving a container from a starting location to a destination location, wherein a route to be followed is possibly even assigned, whereby an operator is not needed to control vehicle 12. In one embodiment vehicles 12 herein make their way autonomously to the starting location, although in another embodiment two vehicles 12 which are not moving a freight container 14 couple to each other and move in this way as a single entity to the starting location. Once arrived, vehicles 12 uncouple from each other. Once arrived at the starting location, both vehicles 12 each make their way to an end surface of freight container 14 and there couple to freight container 14. In a preferred embodiment of the invention this coupling is done using the twist-locks already available on freight container 14. Vehicles 12 now form together with freight container 14 a rigid entity which can displace as such. For this purpose vehicles 12 lift freight container 14 from the ground. Vehicles 12 then move to the destination location, thereby co-displacing freight container 14. Having arrived at the destination location, vehicles 12 once again lower freight container 14 onto the ground and disengage from freight container 14 by uncoupling the twist-locks. They then move away from freight container 14 and make their way, optionally coupled to each other, to a subsequent starting location for the purpose of moving a following freight container 14.

[0050] In a preferred embodiment a vehicle 12 comprises two arms 22 (figure 2) which can enclose the end surface of a freight container 14. A swivel wheel 24 is arranged in the vicinity of each of the arms 22. Vehicle 12 further comprises two drivable and steerable wheels 26. Wheels 26 are provided with a steering drive 25 to enable steering of wheels 26. Wheels 26 are preferably rotatable through a large angle, for directions, both forwards and backwards as well as sideways. Vehicle 12 is hereby also able to still manoeuvre in small limited spaces between freight containers 14. Wheels 26 are driven by a drive (not shown).

[0051] In one embodiment the drive is a diesel-hydraulic drive. In another embodiment the drive is a diesel-electrical drive, and in yet another embodiment the drive is an electrical drive. The embodiment shown in figure 2 comprises an exhaust 27 for the diesel drive.

[0052] Vehicle 12 is further provided with communication means. The shown embodiment comprises an antenna 23 for radio communication. The communication means enable vehicle 12 to communicate with another vehicle 12 for joint lifting and moving of a freight container

14. In a further embodiment the communication means also make it possible to communicate with a central coordinating computer for the purpose of receiving instructions for moving freight containers 14.

[0053] The embodiment of vehicle 12 shown in figure 2 also makes it possible however to allow the vehicle to be operated directly by an operator located in cab 21. Second vehicle 12 is then controlled by first vehicle 12 by means of the communication means. In an extreme case it is also possible to revert to fully manual operation. At that moment each vehicle 12 is controlled individually by an operator.

[0054] Using the coupling/lifting members 28 the vehicle 12 connects to the twist-locks of freight container 14. Once the coupling has been effected, freight container 14 is raised from the ground using coupling/lifting members 28. After freight container 14 has been moved, coupling/lifting members 28 are lowered once again, whereby freight container 14 once again comes to rest on the ground. Coupling/lifting members 28 then disengage again from freight container 14.

[0055] Figure 3 shows a top view of a vehicle 12 in which are visible the arms 22 which enclose freight container 14. Swivel wheels 24 are arranged on the outer ends of arms 22. Vehicle 12 is further supported by the steerable and drivable wheels 26. Coupling/lifting members 28 can also be seen. Vehicle 12 is also provided with two measuring means 32 for detecting magnets in the surface over which the vehicle is driven. The position of vehicle 12 is determined on the basis of the location of the magnets detected by measuring means 32.

[0056] In an advantageous preferred embodiment the arms 22 take a retractable form (figure 4). Arms 22 can be retracted as according to arrow 42 so that vehicle 12 can enter very narrow spaces in order to pick up or drop a freight container 14. As soon as a freight container 14 is picked up, arms 22 are extended for more stability. Arms 22 are also extensible so that travel at higher speed in larger spaces takes place in stable manner.

[0057] In an alternative embodiment the arms 22 are rotatable (figure 5). Arms 22 rotate about a vertical shaft 52 as according to arrow 54. Because its arms 22 are rotatable, this embodiment can also be reduced in length, whereby this embodiment of vehicle 12 can enter a very narrow space between two freight containers 14 in order to pick up one of the two freight containers 14.

[0058] Figure 6 shows a vehicle 12 which has just disengaged from a freight container 14. The broken line periphery 62 of vehicle 12 shows vehicle 12 at the moment it was still coupled to the end surface of freight container 14. After disengaging from freight container 14, vehicle 12 is then driven backward, after which it can manoeuvre itself sideways out of the space between freight containers 14 as according to arrow 64. In this figure it was not essential for vehicle 12 to retract its arms 22 because there is still sufficient space available between the two freight containers 14. If however freight containers 14 had been closer to each other, vehicle 12 could then only have driven out between freight containers 14 as according to arrow 64 by retracting arms 22.

[0059] The embodiments according to the invention described and shown in the description and the figures are only exemplary embodiments. The skilled person will appreciate that many changes and modifications are possible which fall within the present invention. The protection sought is therefore defined by the following claims.

Claims

1. Method for moving a freight container (14), comprising the steps of:

   bringing at least two vehicles (12) into engagement on at least two sides of the freight container (14);
   lifting the freight container (14) from the ground;
   displacing the freight container (14) by displacing the two vehicles (12);
   lowering the freight container (14) onto the ground; and
   disengaging the two vehicles (12) from the freight container (14).

2. Method as claimed in claim 1, wherein the displacement of the vehicles (12) takes place in both longitudinal direction and width direction of the freight container (14) by rotating the wheels (26) of the vehicle (12) substantially in longitudinal direction or transversely of the longitudinal direction of the freight container (14).

3. Method as claimed in claim 1 or 2, comprising the step of synchronizing lifting by the two vehicles (12).

4. Method as claimed in claim 1, 2 or 3, comprising the step of synchronizing the movement by the two vehicles (12).

5. Method as claimed in claim 3 or 4, wherein the synchronization comprises communication between the vehicles (12).

6. Method as claimed in any of the claims 1-5, wherein the vehicles (12) are automatically controlled.

7. Method as claimed in any of the claims 1-5, wherein the vehicles (12) are controlled manually.

8. Method as claimed in any of the claims 1-5, wherein a first vehicle (12) is controlled manually and a second vehicle (12) is controlled automatically, and wherein the control of the second vehicle (12) is synchronized with the first vehicle (12).

9. Method as claimed in any of the claims 1-8, wherein

the vehicles (12) are brought into engagement on the end surfaces of the freight container (14).

10. Method as claimed in any of the claims 1-9, further comprising the step of:

mutually coupling two vehicles (12);
travelling to the freight container (14) to be moved,

wherein the two vehicles (12) form a coupled unit; and

uncoupling the two vehicles (12) from each other once they have arrived at the freight container (14) to be moved.

11. Assembly, comprising:

a freight container (14) comprising means for receiving engaging means; and
at least two vehicles (12) comprising:

- engaging means (28) for engaging the freight container (14); and
- a lifting device (28) for lifting the freight container (14),

wherein at least one vehicle (12) comprises a drive for displacing the vehicle (12).

12. Assembly as claimed in claim 11, wherein the vehicles (12) comprise a communication means for the purpose of mutual communication.

13. Assembly as claimed in claim 11 or 12, the vehicles (12) further comprising communication means in order to synchronize the displacement with another vehicle (12).

14. Assembly as claimed in claim 11, 12 or 13, wherein the vehicles (12) are identical to each other.

15. Assembly as claimed in any of the claims 11-14, the vehicles (12) further comprising control means for automatic control of the vehicle (12).

16. Assembly as claimed in any of the claims 11-15, wherein a vehicle (12) further comprises a steering device (25) adapted to steer the wheels (26) through at least $\pm$ 90°.

17. Assembly as claimed in any of the claims 11-16, wherein the engaging means (28) are adapted to engage means for receiving engaging means arranged close to the bottom side of the freight container (14).

18. Assembly as claimed in any of the claims 11-16, wherein the engaging means (28) are adapted to engage means for receiving engaging means arranged close to the top side of the freight container (14).

19. Assembly as claimed in any of the claims 11-18, the vehicles (12) further comprising coupling means for coupling the vehicle (12) to a second vehicle (12).

20. Assembly as claimed in any of the claims 11-19, wherein at least one of the vehicles (12) further comprises position-determining means for determining the position and the orientation of the vehicle (12).

21. Assembly as claimed in any of the claims 11-20, wherein the drive is a diesel-hydraulic drive.

22. Assembly as claimed in any of the claims 11-20, wherein the drive is a diesel-electrical drive.

23. Assembly as claimed in any of the claims 11-20, wherein the drive is an electrical drive.

24. Vehicle (12) for use in a method as claimed in any of the claims 1-10, comprising:

a drive for displacing the vehicle (12);
engaging means (28) for engaging the freight container (14); and
a lifting device (28) for lifting the freight container (14).

25. Vehicle (12) as claimed in claim 24, further comprising communication means for the purpose of synchronizing lifting with another vehicle (12).

26. Vehicle (12) as claimed in claim 24 or 25, further comprising communication means for the purpose of synchronizing displacement with another vehicle (12).

27. Vehicle (12) as claimed in claim 24, 25 or 26, further comprising control means for automatic control of the vehicle (12).

28. Vehicle (12) as claimed in any of the claims 24-27, further comprising a steering device (25) adapted to steer the wheels (26) through at least $\pm$ 90°.

29. Vehicle (12) as claimed in any of the claims 24-28, wherein the engaging means (28) are adapted to engage means for receiving engaging means arranged close to the bottom side of the freight container (14).

30. Vehicle (12) as claimed in any of the claims 24-28, wherein the engaging means (28) are adapted to

engage means for receiving engaging means arranged close to the top side of the freight container (14).

31. Vehicle (12) as claimed in any of the claims 24-30, further comprising coupling means for coupling the vehicle (12) to a second vehicle (12).

32. Vehicle (12) as claimed in any of the claims 24-31, further comprising position-determining means for determining the position and orientation of the vehicle (12).

33. Vehicle (12) as claimed in any of the claims 24-32, wherein the drive is a diesel-hydraulic drive.

34. Vehicle (12) as claimed in any of the claims 24-32, wherein the drive is a diesel-electrical drive.

35. Vehicle (12) as claimed in any of the claims 24-32, wherein the drive is an electrical drive.

36. Vehicle (12) as claimed in any of the claims 24-35, further comprising two arms (22) for the purpose of stabilizing the vehicle (12), each provided with a wheel (24), wherein the arms (22) are suitable for at least partially enclosing the end surface of a freight container (14).

37. Vehicle (12) as claimed in claim 36, wherein the arms (22) are retractable in order to reduce the length of the vehicle (12) for entry into a narrow space between two freight containers (14).

38. Vehicle (12) as claimed in claim 36, wherein the arms (22) can be rotated aside in order to reduce the length of the vehicle (12) for entry into a narrow space between two freight containers (14).

39. System comprising at least two vehicles (12) as claimed in any of the claims 24-38, further comprising a coordinating device for coordinating the vehicles (12) in the system.

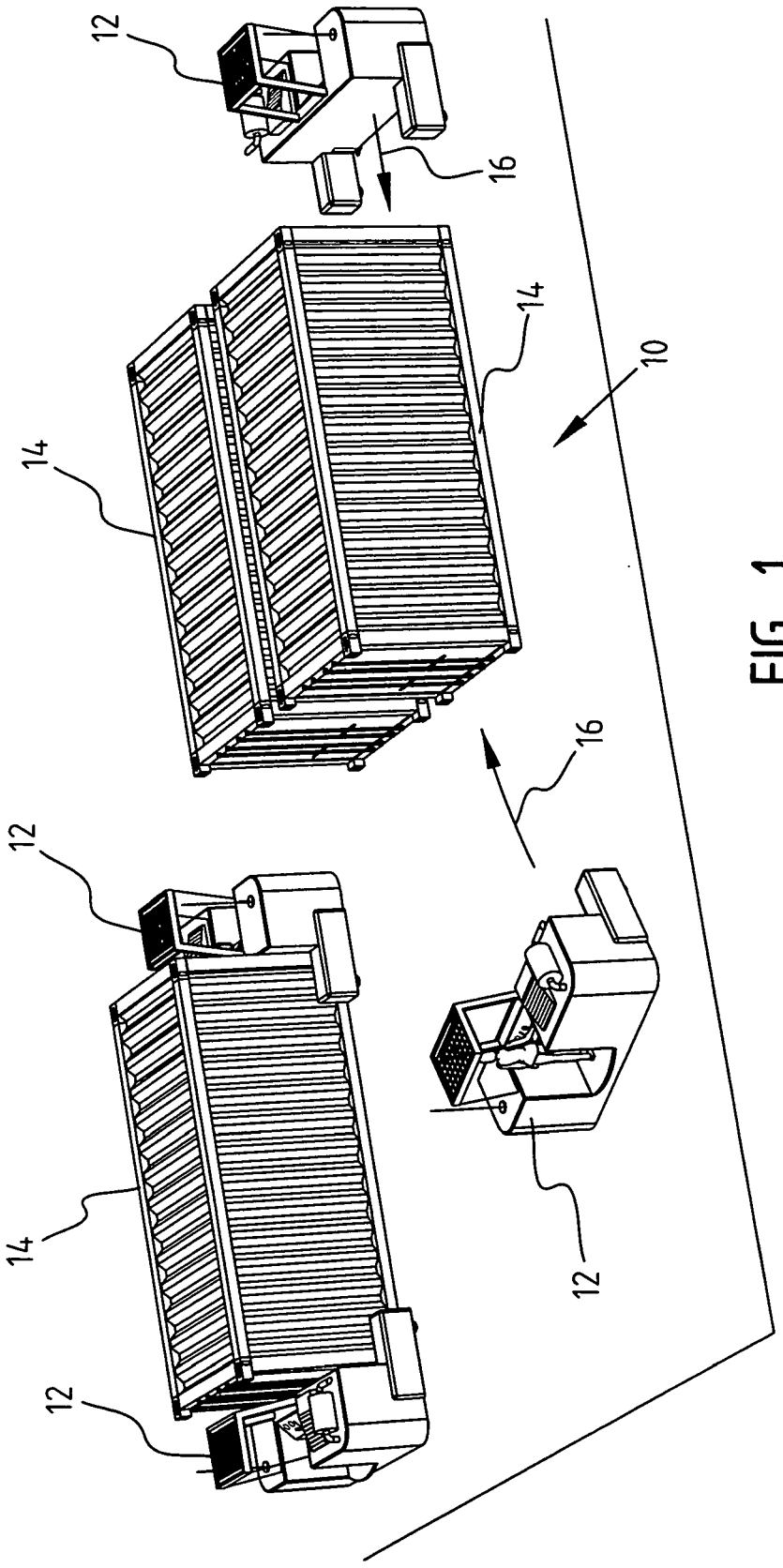

FIG. 1

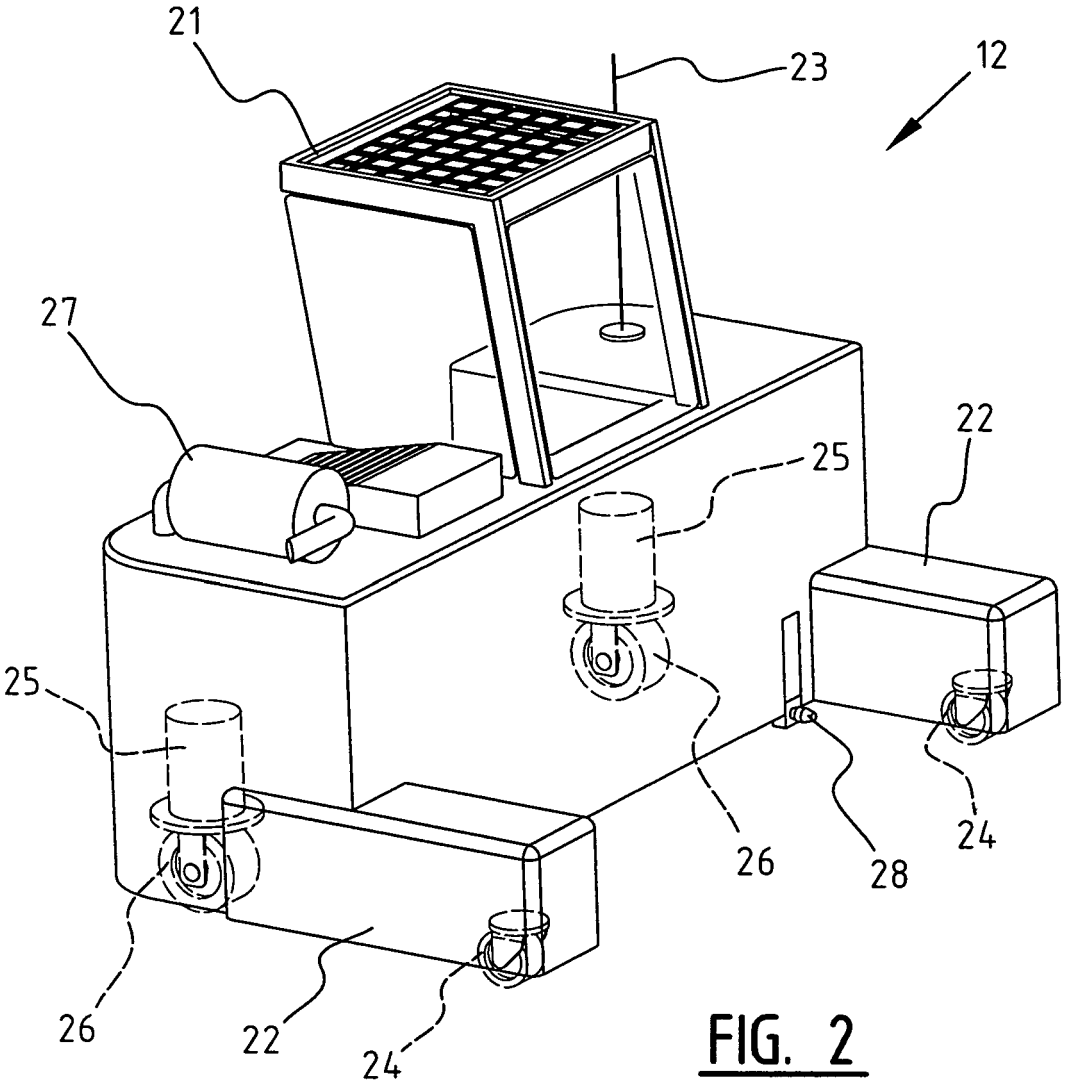

FIG. 2

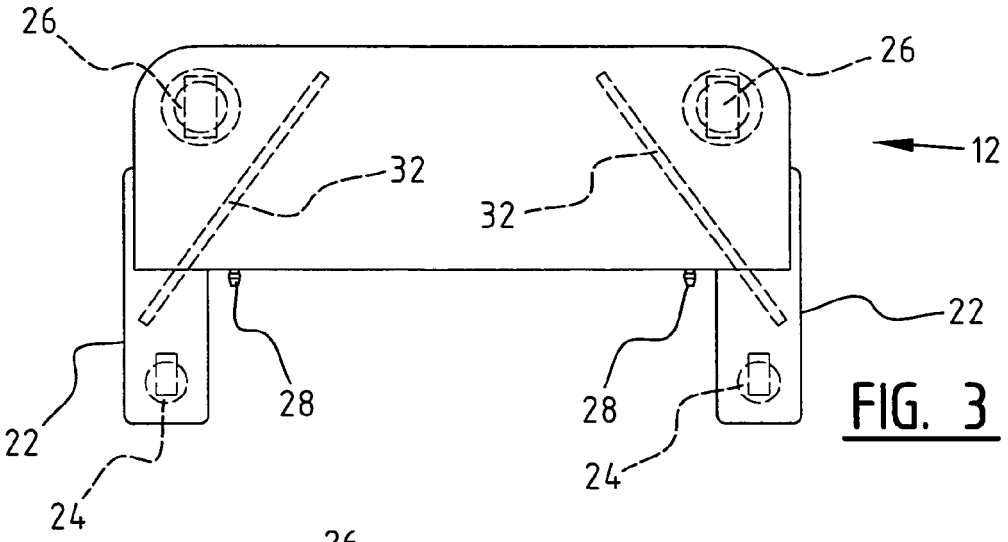

FIG. 3

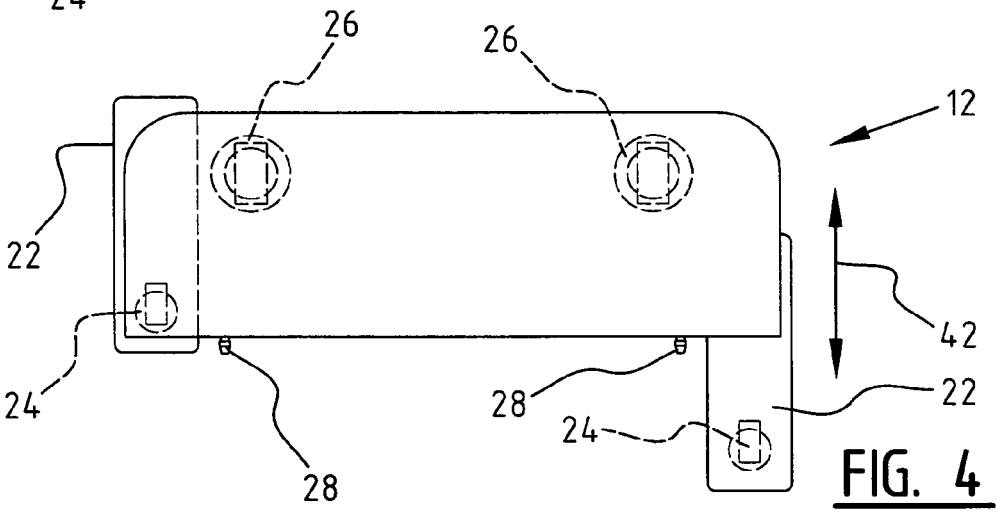

FIG. 4

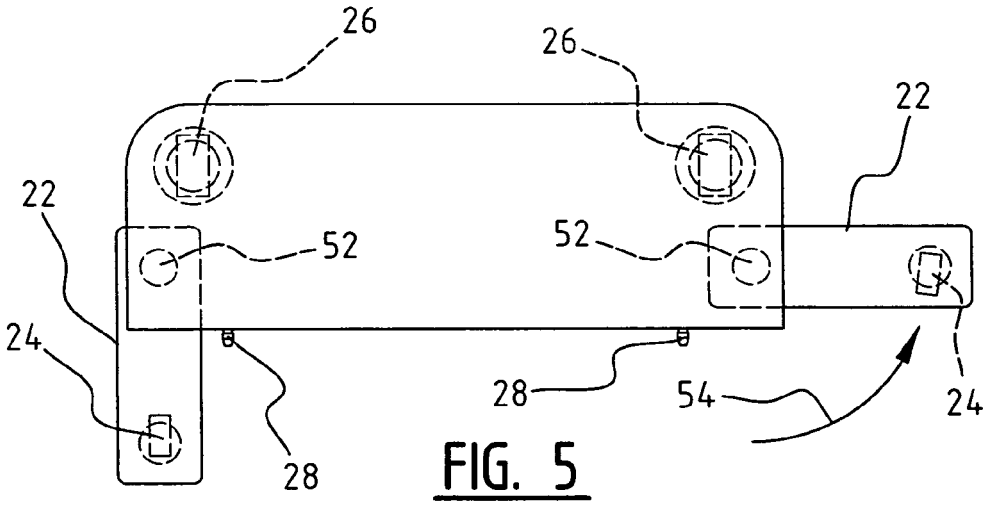

FIG. 5

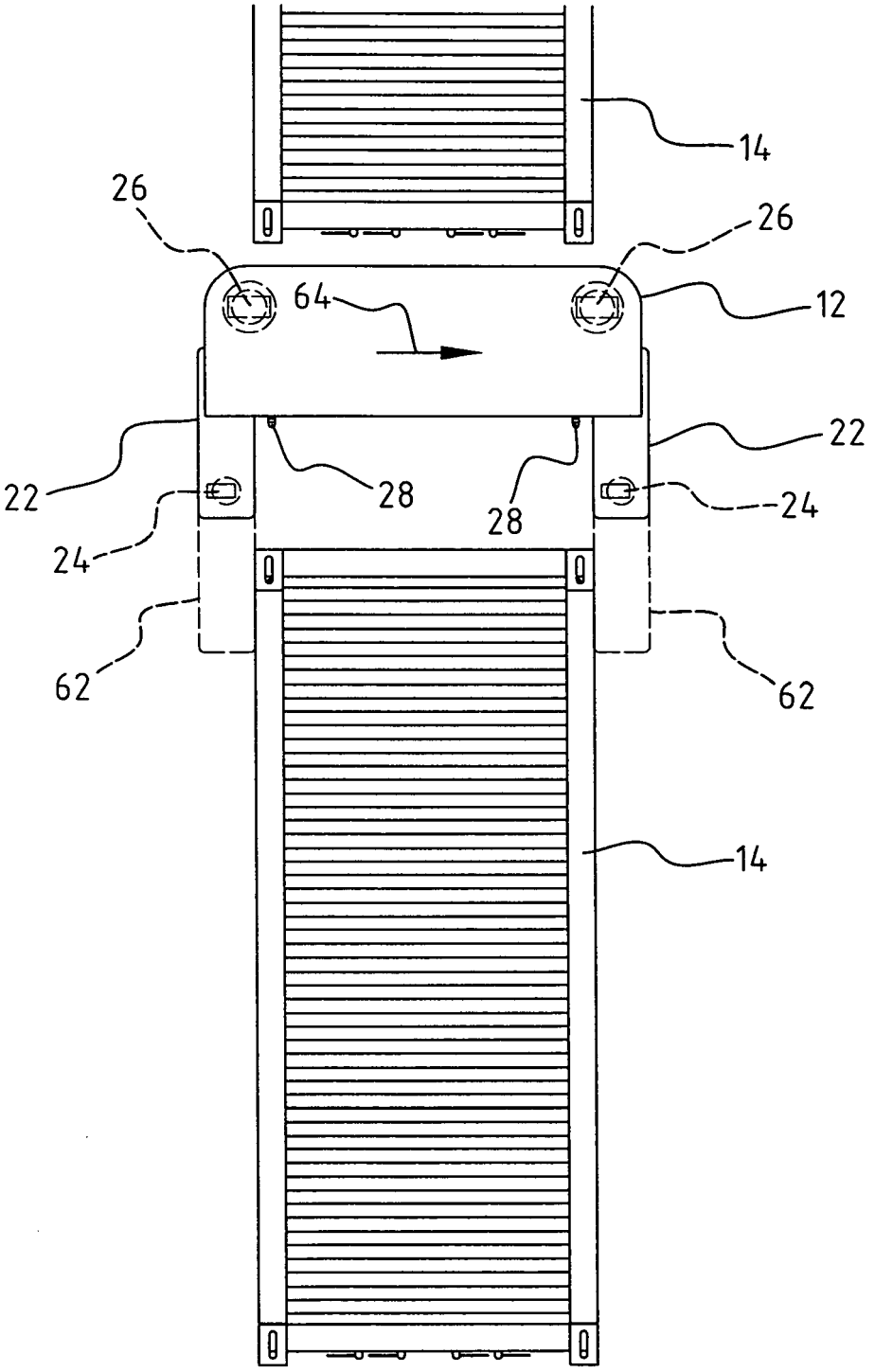

FIG. 6

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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 December 2007	Ferrien, Yann

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