

A system for transferring standard cargo holders, especially ISO containers and swap bodies, between railways and roads.

Description

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The invention concerns an installation for transferring standard cargo holders, especially ISO containers and swap bodies, between road and railway, with handling equipment adjacent to a railway track in a rail transfer zone for loading and unloading standard cargo containers onto or off of rail cars.

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A gantry crane for transferring containers and swap bodies between railways and roads is already known from European patent EP 0 796 813 B1. Corresponding to the design customary for a gantry crane, a crane trolley on a crane girder, which can travel in the girder's longitudinal direction, is provided. Seen in travel direction of the gantry crane, two hydraulic cylinder units
15 are attached in tandem and with spacing between them. Each of the cylinder units is vertically oriented and essentially consists of a lift cylinder and in it a movable push rod. The lift cylinders are rigidly attached to the crane trolley and the push rods, extending downwards from the crane trolley, can be extended in the lowering direction and correspondingly retracted in the lifting direction. At the ends of the push rods opposed to the crane trolley, a suspension frame is
20 attached via slotted hole connections, on which a load take-up device in the shape of a spreader frame is suspended. The connection of the suspension frame with the push rods via slotted hole connections was selected in order to balance differences in the synchronous operation of the cylinder units and corresponding inclinations of the containers. In addition, the suspension frame and the load take-up device arranged in it is offset laterally in regard to the longitudinal axis of
25 both rod-cylinder units by at least 500mm so that containers or swap bodies can also be placed on a rail car, or lifted off it and simultaneously a catenary wire can reach under the laterally offset arrangement of the load take-up device at the push rod.

Additionally known from the European patent EP 1 365 984 B1 is a bridge crane for stacking containers, in particular ISO containers, which moves containers within a container terminal into or out of a storage site. The bridge crane contains a crane girder which spans the width of an essentially rectangular storage site. On the crane girder and along its longitudinal direction, a crane trolley can be moved in the direction of the width of the storage site. The crane girder can be moved via bridge trolleys on tracks in the direction of the crane travel and, thus, laterally to the crane trolley on the crane girder as well as in longitudinal direction of the storage site. In order to be able to handle the container, a mast is positioned on the crane trolley which is guided in vertical direction and can be lifted or lowered. This mast is shaped like a box girder and lifting gears are placed on the crane trolley for the lifting and lowering movement of the mast. On the lower end of the mast pointing in the direction of the containers to be handled is a load take-up device for containers, in particular a so-called spreader, suspended in an articulated fashion. The load take-up device is connected via cables to the lifting gears on the crane trolley. The mast is not directly driven in the lifting or lowering direction, but only indirectly via the cables acting at the load take-up device. The use of a rigid mast between the crane trolley and the load take-up device has the advantage that containers can be handled with little swaying movement in contrast to the also-used load take-up devices which are exclusively suspended on cables.

The present invention is based on the problem of optimizing a system for transferring standard cargo holders, especially ISO containers and swap bodies, between railways and roads.

The problem is solved by an installation for transferring standard cargo holders, especially ISO containers and swap bodies, between rail and road by the characteristics of claim 1.

Advantageous developments of the invention are indicated in claims 2 through 10.

According to the invention, transfer optimization of a system for transferring standard cargo holders, especially ISO containers and swap bodies, between rail and road, with handling equipment for loading and unloading standard cargo holders onto or off of rail cars in a rail transfer zone adjacent to a railway track, is achieved by the fact that a driving zone for
5 driverless transport vehicles, bringing or picking up the standard cargo holders to or from the handling equipment, is adjacent to the handling equipment and that a loading and unloading zone for delivering or collecting the standard cargo holders is adjacent to the driving zone and the handling equipment has a movable crane trolley along a crane girder in a trolley track direction, on which a rigid mast is guided, which is extending in lifting and lowering direction.
10 It is movable in a lifting and lowering direction by means of cables via at least one lifting gear attached on the crane trolley, at the end of which a load take-up device for standard cargo holders is attached. By using the driverless transport vehicles, the road and rail transfer zones are separated, the result of which is that rail cars can be loaded or unloaded faster, as no logistic coordination between the rail car and the allocated truck is required. In one development the
15 mast can be rotated around a vertical pivot axis in relation to the crane trolley.

In a favorable manner it is provided for that a cargo holder storage site with a stacking device for transporting the standard cargo holders between the loading and unloading zone and the storage site is adjacent to the loading and unloading zone. The cargo holder storage site allows
20 an intermediate storage of the standard cargo holders. The utilization of a cargo holder storage site also increases logistic flexibility and effects a further disentanglement of the arrival times of the rail cars and the associated trucks.

Especially favorable is that a road transfer zone for loading and unloading the standard cargo
25 holders onto or off of trucks adjoins the storage site. Thus, the cargo holder storage site is linked to both, the rail and the road, transfer zones. Thus, the stacking device can be used for storage site tasks as well as for loading and unloading the trucks and the driverless transport vehicles.

To increase the flexibility and the transfer performance, the driverless transport vehicles are each equipped with a lifting platform and supporting frames are positioned in the loading and unloading zone for resting or picking up the standard cargo holders from the lifting platform of the driverless transport vehicles. The driverless transport vehicles can thus be operated independently of the transfer and stacking devices.

From a design point of view it is advantageous that the handling equipment and the stacking device are formed like a bridge or gantry crane.

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The orientation of the standard cargo holders can be adapted to the turnover flow by being able to rotate the standard cargo holder, which is being transported by the handling equipment and/or the stacking device, around a vertical axis.

From a design point of view, it is advantageous that the stacking device has a movable crane trolley along a crane girder in a trolley track direction, on which a rigid mast is guided, which is extending in lifting and lowering direction. It is movable in a lifting and lowering direction by means of cables via at least one lifting gear attached on the crane trolley, at the end of which a load take-up device for standard cargo holders is attached. In one development the mast can be rotated around a vertical pivot axis in relation to the crane trolley.

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If the rail tracks should be equipped with catenary lines, the load take-up device of the handling equipment is placed laterally offset from the mast.

Stable guidance of the standard cargo holders is achieved by the crane girder consisting of a first girder and a second girder on which trolley tracks are located on which the crane trolley can be moved in trolley track direction and in which the first girder and the second girder are

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spaced from each other in the crane traveling direction which runs at a right angle to the trolley track direction.

Several developments of the invention are shown in the drawings and are described below. Shown
5 is:

In figure 1 an overview plan of a transfer system for standard cargo holders, such as ISO containers and swap bodies, between road and rail transfer zones;

figure 2 a sectional enlargement of figure 1 from the area of a rail transfer zone;

figure 3 a side view of figure 2;

figure 4 a view corresponding to figure 2 in an alternative development of the rail transfer zone;

5 figure 5 a view corresponding to figure 2 in another alternative development of the rail transfer zone;

figure 6 a side view of a handling equipment in an alternative development; and

10 figure 7 an overview plan, expanded from figure 1, of a transfer system for standard cargo holders, such as ISO containers and swap bodies, between road and rail transfer zones.

15 Figure 1 shows an overview plan of a transfer system 1 for standard cargo holders 2, such as ISO containers and swap bodies, which are transferred between a rail transfer zone 3 and a road transfer zone 4. The overview plan only shows a section of transfer system 1, but identifies the essential components. Transfer system 1 consists of the rail transfer zone 3 and the road transfer zone 4 which are connected via a cargo holder storage site 5. The cargo holder storage site 5 serves as intermediate storage for the standard cargo holders 2.

20 The rail transfer zone 3 essentially consists of a first rail track 3a, a parallel and spaced second rail track 3b and the allocated handling equipment 6. On the first and the second tracks 3a and 3b, rail cars 7 can be moved for inward and outward transport of the standard cargo holders 2. The handling equipment 6 is developed as a bridge or gantry crane which spans the first and the second tracks 3a and 3b as well as a transfer zone 8. In the transfer zone 8 driverless transport
25 vehicles 9 can be driven in or out.

The driverless transport vehicles 9 are suited for transporting two 20' containers, one 40' container or one 45' container. By means of the handling equipment 6, the standard cargo holders are transferred between the driverless transport vehicles 9, positioned in the transfer zone 8, and the rail cars 7.

5 The handling equipment 6, developed as a bridge or gantry crane, essentially consists of a crane girder 11 which can be moved along the first and second tracks 3a and 3b on the rails 10 in the track direction G. The rails 10 run parallel to the tracks 3a, 3b. On the crane girder 11, transverse to track direction G which coincides with the driving direction of the handling equipment 6, a crane trolley 10 12 can be moved in trolley track direction K. On the crane trolley 12, a mast 13 is suspended, which can be raised and lowered vertically and relative to the crane trolley 12, in order to pick up and release standard cargo holders 2 by means of a load take-up device 14 attached to its lower end 13a.

15 Depending on the development of the handling equipment 6, the orientation of the standard cargo holders 2 is maintained during transfer between the driverless transport vehicles 9 and the rail cars 7 or they are rotated around a vertical axis, if required. In the overview plan at hand according to figure 1, the standard cargo holders 2 on the rail cars 7 are oriented in track direction G and the driverless transport vehicles 9 with their longitudinal axis are rotated by 90 degrees in 20 relation to them. Correspondingly, the handling equipment 6 has a rotating device 26 for this purpose.

25 The transfer zone 8 is positioned along the side of the second track 3b. In the case shown, this transfer zone 8 essentially consists of supporting the frames 8a, on which the standard cargo holders 2, unloaded from the rail cars 7, can be placed for interim storage or can be picked up from them by means of the handling equipment 6, and/or from the neighboring parking sites 8b on which the driverless transport vehicles 9 can wait for delivering the standard cargo holders 2 to or picking them up from the handling equipment 6. The driverless 30 transport vehicles 9 are each equipped with a lifting platform 9a so that the driverless transport vehicles 9 with lowered lifting platform 9a can drive into the supporting frames 8a and thus drive under a standard cargo holder 2 resting on them.

For picking up the standard cargo holder 2, the lifting platform 9a is then raised and the standard cargo holder 2 is lifted from the supporting frame 8a. The driverless transport vehicle 9 then drives with the raised lifting platform 9a and the standard cargo holder 2, resting on it out of the supporting frame 8a, then
 5 lowers the lifting platform 9a and continues its drive. Placing a standard cargo holder 2 on a supporting frame 8a is carried out in reverse order.

The transfer zone 8 is adjoined by a driving zone 15 in which the driverless transport vehicles 9 move in automated operation. Adjacent to this driving zone 15 and preferably opposite to the transfer zone 8, a loading and unloading zone
 10 16 is located which forms the interface to the cargo holder storage site 5.

In this loading and unloading zone 16 supporting frames are again arranged in order to temporarily store the standard cargo holders 2 there for further handling. Sites for the driverless transport vehicles 9 can also be provided there, in order to transfer the standard cargo holders 2 directly with the driverless transport
 15 vehicles 9 without the supporting frames 16a. In the loading and unloading zone 16, the supporting frames 16a are loaded with or unloaded from the standard cargo holders 2 by means of a stacking device 17 which operates in the cargo holder storage site 5 and is in the form of a bridge or gantry crane.

The cargo holder storage site 5 consists of a large number of cargo holder storage zones 5c, which are arranged in parallel side by side and in rows. At their rail-side end 5a each has a loading and unloading zone 16 and at their road-side end 5b is an associated storage and retrieval zone 18. Each cargo holder storage zone 5c is allocated one or several stacking devices 17 which can
 20 be moved along the cargo holder storage zones 5c on rails 19 in crane movement direction. The stacking device 17 transports the standard cargo holders 2 between the cargo holder storage zone 5c and the loading and unloading zone 16 or the storage and retrieval zone 18. Each cargo holder storage zone 5c, in addition to the one or more stacking devices 17, also has a parking zone 5d for the standard cargo holders 2. The parking zone 5d has a
 25 rectangular floor space on which the standard cargo holders 2 are arranged in columns and rows.
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Up to five standard cargo holders 2 are stored stacked on top of each other. The parked standard cargo holders 2 are oriented with their long side essentially parallel to the rails 19 and, thus, in crane travel direction of the stacking devices 17. This orientation of the standard cargo holders 2 can also be found in the loading and unloading zone 18 with the arriving and departing trucks 20, so that the stacking devices 17 do not have to rotate the standard cargo holders 2 during pick-up or deposit in addition to any required alignment corrections. In principle, it is also possible to equip the stacking device 17 with a rotating mechanism for changing the orientation of the standard cargo holders 2 in the horizontal plane. The design of the stacking device 17 essentially corresponds to the design of the handling equipment 6.

At the rail-side end 5a of the cargo holder storage site 5, the standard cargo holders 2 are placed in the storage and retrieval zone 16 by the stacking device 17 onto the supporting frames 16a, or are retrieved from there. The storage and retrieval zone 16 serves as an interface to the rail transfer zone 3 and has several supporting frames 16a for the standard cargo holders 2, arranged side by side, into which the driverless transport vehicles 9 with their lifting platforms 9a can drive, in order to pick up the temporarily stored standard cargo holders 2 or park them there. It is also possible that the containers 2 are directly picked up by means of the stacking crane 17 from its platform, or placed there. Then, no supporting frames 16a exist and the driverless transport vehicles 9 have no lifting tables.

Figure 2 shows a sectional enlargement of figure 1 from the area of a rail transfer zone 3. In this sectional enlargement, no parking sites 8b for the driverless transport vehicles 9 are shown between the supporting frames 8a. The handling equipment 6, in the form of a semi-gantry crane can be traversed along the rails 10 in track direction G. Corresponding to the semi-gantry crane construction, one of the two rails 10, namely the one rail 10 adjoining the first track 3a, is located on approximately the same height level as the tracks 3a, 3b. The opposing rail 10 is elevated so that the driverless transport vehicles 9 can drive unintersected into resp. out of the supporting frames 8a and/or parking sites 8b.

The crane trolley 12 essentially consists of a rectangular base frame 12a, on the four corners of which the trolley travelling gears 21 are positioned which travel on the trolley tracks on the crane girder 12. The base frame 9a of the crane trolley 9 has an opening in the center area through which a rotation tube 26 is passed through. The rotating tube 26 is supported on its top end via a revolving joint 26a on the base frame 12a of the crane trolley 12 and can be rotated via the revolving joint 26a around a vertical rotating axis. Mast 13 runs inside the rotating tube 22 and is guided there.

Figure 2 also shows that the crane girder 11 is designed with a first girder 11a and a second girder 11b which, seen in rail direction G, are arranged in tandem at one height level and with spacing between them.

Figure 3 is a side view of figure 2. One can see that the first girder 11a and the second girder 11b each have a triangular cross-section. This triangular cross-section has the shape of an isosceles triangle with the angle in the top area of 11c being about 30°. The trolley rail 22 is mounted on each of the top areas 11c of the first girder 11a and the second girder 11b. The crane trolley 12 can be traversed on these rails in the trolley track direction K. In the front area, corresponding to the semi-gantry design, the rail 10 is elevated via the supports 23 and the *[one or more words missing in the German; according to figure 3, it may be "bases" or "base plates"]* of the first girder 11a and the second girder 11b are connected by a base girder 25a and are directly supported via the crane travelling mechanism 24 on the rail 10. Also corresponding to the semi-gantry design, in the rear area, the ends of the first girder 11a and the second girder 11b are supported via two vertical girders 25b on the crane traversing mechanism 24. The lower ends of the two vertical girders 25b are connected in a U-shape via another base girder 25a.

Figure 3 also shows the revolving joint 26a and the rotating tube 26. As a drive for the rotating tube 16, a ring gear running around its outside is provided which engages an electric motor rotary actuator. In order to move the mast 13 in the lifting and lowering direction H, a rectangular lifting frame 27 (see figure 6) is rigidly mounted on the lower end of the rotating tube 26. A lifting gear 28 for the mast 13 is located on the lifting frame 27 of the crane trolley 12.

The lifting gear 28 has a first cable drum 28a and a second cable drum (not shown) which are co-axially bearing mounted on a common transmission which is driven by a drive motor 28c. A first cable 29a and a second cable 29b (not shown in figure 3) reel off the first cable drum 28a. A third cable 29c and a fourth cable 29d (also not shown in figure 3) reel off the second cable drum. Correspondingly, there are four cables 29 which either directly reel off vertically downwards from the first or the second cable drum 28a, or are guided horizontally to the opposite side of mast 13 and from there, via a corner pulley with a horizontal rotating axis, are diverted by 90° vertically downwards. The ends of the cables 29 are connected with the load take-up device 14.

Figure 4 shows a view of a rail transfer zone 3 in an alternative development which essentially corresponds to the one shown in figure 2. Here also the two first and second rail tracks 3a, 3b, running in parallel, can be seen with the rail cars 7, which can be moved on them, as well as the rails 10 for the handling equipment 6, running parallel to the direction of the tracks. Here, the handling equipment 6 is designed as a gantry crane, as the driverless transport vehicles 9 do not have to cross the rails 11 in order to drive in or out of the driving zone 15 between the tracks 3a, 3b and the rails 11. As explained before, the handling equipment 6 can be equipped with a rotating tube 26 and a revolving joint 26a and can, thus, rotate around a vertical axis in a horizontal plane the standard cargo holders lifted by the load take-up device 14. This is required in order to be able to place the standard cargo holders 2, lifted from the rail cars 7, on the supporting frames 8a within the transfer zone 8, or retrieve them from these. The supporting frames 8a are approximately oriented with their long dimension in an angle of 30° to the track direction. Thus, the driverless transport vehicles 9 can drive into the supporting frames 8a from one side, then pick up the standard cargo holders 2, or put them down, and drive out on the opposite side, in order to then leave the driving zone 15 at the end of the handling equipment 6 and thus its rails 10.

Figure 5 shows another alternative development of the rail transfer zone 3. The basic design is similar to the development described earlier in figure 4.

The driverless transport vehicles 9 move here also in a driving zone located between the rails 11 and the tracks 3a, 3b. However, the configuration with a rotating tube 26 and a revolving joint 26a on the handling equipment 6 is not needed, as the supporting frames 8a for the interim storage and the standard cargo holders 2 are oriented centrally in the driving zone and parallel to the tracks 3a, 3b.

Figure 6 further shows a side view of handling equipment 6 in the gantry crane design. For a detailed description please refer to the earlier explanation provided for figures 2 and 3. As a significant difference, one can see here that the first girders 11a and the second girders 11b are supported via vertical supports on the crane traversing mechanisms 24. The lower ends of the vertical supports 25b are stabilized via a horizontal base girder 25a, which connects them.

Figure 6 further shows that the load take-up device 14 is divided into in a suspension frame 14a, which is rigidly mounted to the lower end 13a of the mast 13, and into a spreader frame 14b, which is suspended on the suspension frame 14 via chains 14c. Figure 6 also shows that a container-like receptacle 31 is attached to the outside of the second girder 11b, in which the control and power electrics, or electronics for the handling equipment 6 are arranged.

Between the first and the second tracks 3a and 3b, which are running straight within the transfer zone 3, a variety of catenary supports can usually be located, which carry a catenary wire each above the first and second tracks 3a, 3b. The handling equipment 6 will then have a laterally cantilevered load take-up device 14.

Figure 7 shows an overview plan, expanded from figure 1, of a transfer system. The overview plan thus shows all essential elements of the overview plan according to figure 1, such as the rail transfer zone 3, the first and second tracks 3a, 3b, the cargo holder storage site 5, the handling equipment 6, the transfer zone 8, the supporting frames 8a, the driverless transport vehicles 9, the loading and unloading zones 16, and the stacking devices 17.

A variety of cargo holder storage sites 5, arranged side by side in parallel, is also shown.

5 Compared to figure 1, the road transfer zone 4 is shown in more detail. At the road-side end 5b of the cargo holder storage site 5, the standard cargo holders 2 are placed in the storage and retrieval zone 18 by the stacking device 17 onto the trucks 20, parked on the parking sites 18a located there, or are retrieved from there. The storage and retrieval zone 18 is the interface to the road transfer zone 4 and has several parking sites 18a for trucks 20, arranged side by side.

10 In addition, a distribution site 32 is located adjacent to the many cargo holder storage sites 5, which has loading and unloading zones 16 for the driverless transport vehicles 9 pointing to the rail transfer zone 3. As for the cargo holder storage sites 5, the loading and unloading zones 16 are equipped with supporting frames 16a for interim storage of the cargo holders 2. Additionally, the distribution site 32 is
15 equipped with storage and retrieval sites 18, which are pointing to the road transfer site 4 with the street 4a for inward and outward transport of the cargo holders 2 via trucks 20. The storage and retrieval zones 18 have parking sites 18a, arranged side by side in parallel, for the trucks 20 backing up into these parking sites 18a.

List of Reference Numbers

	1	Transfer system
	2	standard cargo holder
	3	Rail transfer zone
5	3a	first track
	3b	second track
	4	Road transfer zone
	4a	Road
	5	Cargo holder storage site
10	5a	Rail-side end
	5b	Road-side end
	5c	cargo holder storage zone
	6	Handling equipment
	7	Rail car
15	8	Transfer zone
	8a	Supporting frame
	8b	Parking space
	9	Driverless transport vehicles
	9a	Lifting platform
20	10	Rails
	11	Crane girder
	11a	first girder
	11b	second girder
	11c	top
25	12	Crane trolley
	12a	Base frame
	13	Mast
	13a	lower end of mast
	14	Load take-up device
30	14a	Suspension frame
	14b	Spreader frame
	14c	Chain
	15	Driving zone
	16	Loading and unloading zone

	16a	Supporting frame
	17	Stacking device
	18	Storage and retrieval zone
	18a	Parking space
5	19	Rails
	20	Trucks
	21	Trolley traveling gear
	22	Trolley rail
	23	Support
10	24	Crane traveling mechanism
	25a	Base girder
	25b	Vertical support
	26	Rotation tube
	26a	Revolving joint
15	27	Lifting frame
	28	Lifting gear
	28a	First cable drum
	28b	Transmission
	28c	Drive motor
20	29	Cables
	30	Corner pulley
	31	Container
	32	Distribution site
	G	Track direction
25	H	Lifting and lowering direction
	K	Trolley track direction

Patent claims

- 5 1. A system for transferring standard cargo holders, especially ISO containers and swap bodies, between
rail and road, with handling equipment for loading and unloading standard cargo holders onto or off of rail
cars in a rail transfer zone adjacent to a railway track, characterized by the fact that a driving zone (15) for
driverless transport vehicles (9) bringing or picking up the standard cargo holders to or from the handling
10 equipment, is adjacent to the handling equipment (6) and that a loading and unloading zone (16) for
inward or outward transport of standard cargo holders (2) is adjacent to the driving zone (15), and the
handling equipment (6) having a crane trolley (12), movable along a crane girder (11) in a trolley track
direction (K), on which a rigid mast (13) is guided, which extends in lifting and lowering direction (H) and is
movable in lifting and lowering direction (H) by means of cables (29) via at least one lifting gear (28)
15 attached to the crane trolley (12), at the lower end of which a load take-up device (14) for the standard
cargo holders (2) is attached.
2. System according to claim 1, characterized by the cargo holder storage site (5) with a stacking device
(17) for transporting the standard cargo holders (2) between the loading and unloading zone (16) and a
cargo holder storage site (5c) being adjacent to the loading and unloading zone (16).
- 20 3. System according to claim 2, characterized by a road transfer zone (4) for loading and unloading the
standard cargo holders (2) onto or off trucks (20) adjoins the storage site (5).
4. System according to one of the claims 1 to 3, characterized by the driverless transport vehicles (9) each
being equipped with a lifting platform (9a) and supporting frames (16a) which are positioned in the
loading and unloading zone (16) for placing onto or picking up the standard cargo holders (2) from the
25 lifting platform (9a) of the driverless transport vehicles (9).
5. System according to one of the claims 1 to 4, characterized by the fact that the handling equipment (6)
and the stacking device (17) are a bridge or gantry crane.
6. System according to one of the claims 1 to 5, characterized by the transported standard
cargo holders (2) being rotated around a vertical axis by means of the handling equipment (6)
30 and/or the stacking device (17).
7. System according to [one of the] claims 2 to 6, characterized by the stacking device (17) having a crane
trolley (12), movable along a crane girder (11) in a trolley track direction (K), on which a rigid mast (13) is
guided, which extends in lifting and lowering direction (H). It is movable in a lifting and lowering direction
35 (H) by means of cables via at least one lifting gear (28) attached to the crane trolley (12), at the lower end
of which a load take-up device (14) for the standard cargo holders (2) is attached.
8. System according to one of claims 1 to 7, characterized by the load take-up device (14) of
the handling equipment (6) being laterally offset from the mast (13).
9. System according to one of claims 1 to 8, characterized by the crane girder (11)
40 consisting of a first girder (11a) and a second girder (11b) on which trolley tracks (22) are

located on which the crane trolley (12) can be moved in trolley track direction (K) and in which the first girder (11a) and the second girder (11b) are spaced from each other in the crane traveling direction which runs at a right angle to the trolley track direction (K).

- 5 10. System according to one of the claims 1 to 9, characterized by the mast (13) being rotatable around a vertical rotation axis in relation to the crane trolley (12).

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