

Method and device for transferring containers

Description

The invention concerns a method of transferring containers having upper container corner fittings at their upper corners for coupling with counterpart coupling means of a spreader and lower container corner fittings at their lower corners for connection to the upper corner fittings of a respective lower container or to matching mount fittings of a container mount, as the case may be, between a first location where the respective container is secured at its lower container corner fittings by means of releasable intercoupling units to upper container corner fittings of a lower container or to matching mount fittings of a container mount, as the case may be, and a second location where the container is to be accommodated without the intercoupling units, within the scope of which method the intercoupling units are first released from the lower container or container mount, the container to be transferred is then lifted off from the lower container or mount by means of a spreader, the intercoupling units being taken along, the intercoupling units are then detached from the lower container corner fittings, and the container to be transferred, freed from its intercoupling units, is then conveyed to the said second location.

Such a method is used when, for example, containers are arranged on the deck of a container transport ship at a dock edge and these containers must be brought by a ship's loading crane or

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container loading crane from the deck to a shoreside storage location. There the following must then be considered: The containers are secured to the deck of the container transport ship, on the floor of the deck, by intercoupling units. If the containers are arranged superposed on the deck, the upper container in each instance is likewise secured by intercoupling units to the respective lower container. There the intercoupling units are releasable from the lower container in each instance or from the deck as well as from the respective upper container. Hitherto the procedure has been as follows: The container to be transferred in each instance is released from the respective downward-adjointing container or from the deck of the container ship, in that the intercoupling units, with preservation of their connection to the container to be transferred in each instance, are released from the respective next lower container or the deck of the container ship. This is done by hand. In doing so, the crew on the deck of the ship makes use, if the coupling stations are not readily accessible, of operating bars to get hold of the coupling locations, i.e., the respective setting members of the intercoupling units. Then if a container to be transferred is released, after already having been connected to a spreader before release it is lifted and carried off in the direction of the new shoreside location. Now, the intercoupling units are still present on the underside of the container to be transferred; on the other hand, however, these intercoupling units, when the container to be transferred is put down at a shoreside



storage location, are in the way, are unwanted, and entail expense. Therefore it is necessary to uncouple the intercoupling units from the container to be transferred, i.e., from its underside, while the container is being transferred from its location on the ship to its shoreside location. This disconnection of intercoupling units from each container en route has hitherto been carried out by using service personnel to detach the intercoupling units projecting downward from the particular container and placing them in a collection bin for intercoupling units. This work required of personnel is extremely arduous, since the intercoupling units have a weight in the range of 5 - 15 kg and must be moved by hand. In addition, the setting means must be actuated to effect release and/or coupling of the intercoupling units to the given container.

The same problem naturally exists when containers must be loaded from a shoreside location or from a road transport vehicle or from a railroad train to the deck of a ship. Here it is to be assumed that containers coming from shore, being adapted to a conventional container storage location or to the platform of a truck or to a railroad car, are initially not equipped with intercoupling units, but must of course be equipped with them before being deposited on the ship, so that they can be properly secured, either to the deck of the container ship or to a container lying underneath, already placed there and secured.

The object of the invention is to reduce transfer times, to limit difficult and dangerous human labor, and likewise to reduce



the cost of the transfer operation by a method of transferring containers of the type indicated at the beginning.

To accomplish this object, in a method of the type indicated at the beginning it is proposed "that the container to be transferred, on its way from the first location to the second location, is deposited on intercoupling holder means equipped, according to a pattern of distribution matching the arrangement of upper container corner fittings, with receptacles for the intercoupling units, the intercoupling units entering into engagement with said receptacles, in that the intercoupling units are then uncoupled from the container positioned in relation to the intercoupling holder means, and in that the container to be transferred is then further conveyed towards the second location, leaving the intercoupling units behind at the intercoupling holder means."

As already indicated above, the invention likewise concerns a "method of transferring containers having upper container corner fittings at their upper corners for coupling with counterpart coupling means of a spreader and lower container corner fittings at their lower corners for connection to upper container corner fittings of a respective lower container or to matching mount fittings of a container mount, as the case may be, between a second location and a first location where the lower container corner fittings of the container to be transferred are to be coupled, with intermediacy of intercoupling units, to upper container corner fittings of a lower container or matching mount



fittings of a container mount, the container to be transferred being fitted on its way from the second location, where it had been accommodated without intercoupling units, to the first location, with its intercoupling units and then further conveyed by means of a spreader to the first location and there deposited on the lower container or container mount, as the case may be, and connected to the upper container corner fittings of the lower container or the mount fittings, with intermediacy of the intercoupling units." According to the invention, the object of this method is likewise to reduce transfer times, to limit the amount of arduous and dangerous human labor, and to reduce the cost of transfer operations from the viewpoint of time consumed as well.

To accomplish this object, it is proposed that "the container to be transferred, coming from the second location, is first deposited on intercoupling holder means, which means, according to a distribution pattern corresponding to the arrangement of upper container corner fittings or mount fittings, have receptacles for intercoupling units and are fitted with intercoupling units in said receptacles, in that the container to be transferred, during its positioning in relation to the intercoupling holder means, is connected to the intercoupling units, and in that the container to be transferred is then conveyed from the intercoupling holder means to the first location, taking the intercoupling units along, is there deposited on the respective lower container or container mount,



as the case may be, and secured with intermediacy of the intercoupling units."

In the procedures according to the invention it is in principle possible to work semi-automatically in such manner that, after positioning of a container at the intercoupling holder means, the intercoupling units are released from or attached to the container by hand, by service personnel operating the given setting means at the intercoupling units which produce release from or connection to the respective container. A considerable advantage is already obtained in such a semi-automatic operation, inasmuch as service personnel are spared the work of lifting and mounting the heavy intercoupling units. Service personnel nevertheless must then still enter a dangerous area, where containers are transported suspended, may be improperly deposited, and possibly may even fall off the spreader or the spreader support. It is therefore a special concern of the invention, in transfer operations in both directions, to deliver the intercoupling units from the intercoupling holder means to the container completely automatically and/or to detach the intercoupling units from the containers completely automatically, so that the presence of personnel in the region of the intercoupling holder means is required only occasionally for purposes of service. The use of human labor in the region of danger is then reduced to a minimum. Transfer of intercoupling units to containers and/or intercoupling holder means is effected without the use of personnel. Deposit and securing of containers



on the deck of a container ship may be effected without the use of human labor by bringing the intercoupling units, before deposit on the ship, into preparatory positions in which, upon further lowering, they are automatically fed by guide-in surfaces into the upper corner fittings of containers standing further underneath or into the mount fittings on the deck and, after being fed through these fittings, locked into a locking position by spring pretension. Accordingly, it then remains only to release import containers, i.e., in loading from ship to shore, from the respective container underneath or the mount fittings on the deck.

It is desirable that the intercoupling units be detached from the respective receptacle and supplied to a magazine. At the same time, care should be taken to see "that the transport of the intercoupling units from the respective receptacle to a magazine station is performed with preservation of the orientation of the intercoupling unit in space or with ordered reorientation thereof;" this measure is particularly desirable because it permits the intercoupling units to be removed from the magazine again in their preserved or corrected ordered position by simple handling means.

Namely, vice-versa, it is likewise provided "that the intercoupling units are supplied from a magazine to the respective receptacle" when a container is exported, i.e., transferred from a shoreside location to a shipboard location. In both cases, it is desirable that the intercoupling units be moved



between their respective magazine station and the respective receptacle "with preservation of their orientation in space or with ordered reorientation."

Now a problem arises inasmuch as, although the corner fittings of containers, lower ones as well as upper ones, as a rule are standardized, but on the other hand intercoupling units of different structural design and different operational type are in use. In this connection, it may be assumed that one and the same ship uses like intercoupling units. On the other hand, loading and unloading of ships of different shipowners, which frequently use just such different types of intercoupling units, must be expected in a port. In order to practice transfer according to the proposal of the invention while likewise allowing for different types of intercoupling units, it might be possible for the intercoupling holder means to be carried along on the ship each time and brought into position on shore at the beginning of a loading or unloading phase. This possibility should not be ruled out, but alternatively considered a measure essential to the invention. However, it must also be expected that shipowners frequently assume that, as part of loading and unloading operations, mounting and detaching of intercoupling units is a matter for the respective port authority. Then when the port authority must deal with different types of intercoupling units, practice of the method proposed according to the invention is at first difficult.



Now, it has been recognized that the problem of handling intercoupling units of unlike configuration can be dealt with by placing said units, upon their handling, at places which are configured to match standardized corner fittings and hence as a rule present identical combinations of engagement surfaces. Therefore it is further proposed that, "the intercoupling units being fabricated with positioning surfaces intended and configured for engagement in apertures of upper container corner fittings or matching mount fittings and with downward-directed bearing surfaces intended for placement on the top of upper container corner fittings or matching mount fittings, the intercoupling units are positioned at the receptacles of the intercoupling holder means by said positioning surfaces and/or bearing surfaces." In this way, the method according to the invention may be practiced in both directions with relatively minor repositioning or refitting operations at the intercoupling holder means, even if a change must frequently be made from one type of coupling to another type of intercoupling.

A further reduction in arduous and dangerous human labor can be obtained in that the "intercoupling units are transported from the receptacles of the intercoupling holder means by mechanical transport means to the respective magazine station or from the respective magazine station to the respective receptacle station by mechanical transport means."

In many ports the situation is often as follows: Containers are lifted from the ship by a container loading crane traveling



along the edge of the dock and are not brought directly to their final location, but are deposited at a transfer station by the spreader of the ship loading crane and are picked up by a shoreside transport vehicle, as a rule again by means of a spreader. Then the shoreside transport vehicle takes over the rest of the way to a container depot or a shoreside conveyance, perhaps a truck or railroad train. Accordingly, when a transfer is to take place anyway en route from the shipboard location to the final shoreside location or vice-versa, according to a refinement of the invention this is utilized in such a way that the container, en route between the first location and the second, is brought together with the intercoupling holder means at a location for delivery and/or pick-up of the intercoupling units, at which location a transfer between different container transport means takes place.

It has already been stated that the container loading cranes frequently travel along the edge of a dock, in order successively to service various lengthwise sections of a ship lying at the edge of a dock. Now, when the crane trolley running on the bridge girder of such a container loading crane with the container loading crane successively reaches various lengthwise positions along the edge of the dock, according to a further development of the method according to the invention it is advantageous when the "intercoupling holder means are carried along by a container loading crane to various operating stations of said container loading crane." Then, namely, each time the container loading



crane has changed its location along the edge of the dock the intercoupling holding means are already available in the correct position to receive a container suspended on the crane trolley of the bridge girder in the correct position.

According to another aspect, the invention concerns a device for transferring containers between two locations.

The basic components of such a device are "intercoupling holder means having receptacles for intercoupling units, said intercoupling holder means having receptacles for intercoupling units in accordance with a distribution pattern matching the arrangement of lower container corner fittings."

In order to practice coupling and/or release of containers to and/or from the intercoupling holder means without the use of human labor, it is then preferably provided "that with a given receptacle of the intercoupling holder means, mechanical actuating means are associated for releasing or coupling a given intercoupling unit from or to a container."

In order to deal with the problem of different designs of current intercoupling units, it may be provided that the mechanical actuating means for different types of intercoupling units are configured convertible and/or exchangeable. In this way there is at least a chance of being able to use at least the heavy and hard-to-transport parts of the intercoupling holder means for not only one type of intercoupling units but for a plurality of types, possibly all current types.



The conversion of intercoupling holder means to various types of intercoupling units may be facilitated particularly "in that the mechanical actuating means comprise at least one power unit at the holder end in spatial relation to a given receptacle, and in that, in adaptation to different intercoupling units, different purchase means may be coupled to said power unit for purchase of intercoupling units and/or power transmission means." In this way the work of conversion can frequently be reduced to one part of the specific means for individual intercoupling units.

Among the intercoupling units of various types which may be used, in addition to those having a base and an adjustable engagement head above and below the base in each instance, are also found those in which the base is equipped only with a lower engagement head rotatable in relation to the base, and the connection to the lower corner fitting of an upper container in each instance is produced or released by rotation of the whole base, by a base-fixed engagement head mounted thereon, in relation to the respective lower corner fitting. In that case, a rotary unit will be associated with a given receptacle as part of the mechanical actuating means, "said rotary unit being intended and configured to cooperate with lower coupling part units of intercoupling units, namely with those part units which are intended and configured for engagement in upper container corner fittings and/or mount fittings, said rotary unit being capable of releasing or locking the intercoupling unit vis-à-vis a given



lower container corner fitting by rotating the intercoupling unit as a whole within the given receptacle."

In other embodiments of intercoupling units, each with a rotary engagement head above and below a base, it is provided that "the actuating means are configured for engagement with setting means of the intercoupling unit, which setting means effect the release of the given intercoupling unit from, or its locking to, a given lower container corner fitting."

If transport of the intercoupling units between the intercoupling holder means and a magazine is likewise to take place without substantial use of human labor, it is provided "that the receptacles of the intercoupling holder means are connected by one transport path in each instance with a magazine for intercoupling units, said transport path being configured for preservation of orientation or ordered reorientation of the intercoupling units."

In the event that handling of different types of intercoupling units is provided, the magazines may be designed so that in one and the same magazine, perhaps in different compartments or areas, different intercoupling units can be accommodated and dispensed.

A central magazine may be provided for the as-a-rule four receptacles of an intercoupling holding means; however, it is alternatively possible and even preferable "for a special magazine to be provided for each receptacle of the intercoupling holder means." Then the magazines can be detachable from the



intercoupling holder means, so that a full magazine can be replaced by an empty one and vice-versa if necessary.

It is recommended that "the transport path and/or the given magazine station for an intercoupling unit is provided with orientation-maintaining or correcting means gauged to positioning surfaces of intercoupling units, in particular to positioning surfaces of lower part units of intercoupling units adapted to standardized upper container corner fittings." This measure again makes use of the fact that most commercial intercoupling units, because of their adaptation to the corner fittings of containers, have certain surfaces which appear in their position and relationship in all embodiments.

It is further proposed that "the orientation-preserving or correcting means of the transport path or of the magazine stations be formed by mutually facing edges and/or upward-directed bearing surfaces of slit boundary strips." This measure makes use of the fact that in most intercoupling units fillers for engagement in upper corner fittings of containers are present which are suitable for guidance between the slit boundary strips, as well as surfaces which are suitable for bearing on the upward-directed bearing surfaces.

The magazine or magazines may "be areal or spatial magazines;" accordingly the transport paths to and within the magazine must be multiple in configuration.

It has already been pointed out that there are containers of different dimensions, in particular of different lengthwise



dimensions. For this reason, it is additionally proposed "that the intercoupling holder means consist of boxes movable relative to each other, permitting an adjustment of the receptacles to various distribution patterns corresponding to the arrangement of upper and lower container corner fittings on containers of various dimensions."

In some instances the magazines must accommodate considerable quantities of intercoupling units. This may result in problems of accommodation of the intercoupling units and hence also of the correspondingly large-size magazines. If it is again assumed that the intercoupling holder means are arranged on or just over a runway and that container transport vehicles operating on the runway are used to bring containers into position in relation to the intercoupling holder means, there may be difficulty in accommodating these magazines so that the container transport vehicles operating on the runway can still approach the intercoupling holder means unimpeded. A possible solution to this problem lies in "that the magazine, or individual magazines associated with single receptacles for intercoupling units, are arranged at least in part within a measure of breadth, defined by the receptacles, of the intercoupling holder means." Then the container transport vehicles operating on the runway can approach or move away from the intercoupling holder means, at least along a spur, in two directions, and it nevertheless remains possible to bring the



magazines up to adequate capacity by prolongation in this spur direction.

In order to be able to use the intercoupling holder means in the region of a port at different places, it is proposed "that the intercoupling holder means together with the actuating means associated with the receptacles and/or a magazine or individual magazines of the receptacles are configured as a transportable unit, capable of being picked up and transferable preferably by means of a spreader, likewise after subdivision into part units, if required."

Attention has already been called above to the important aspect of direct take-along of the intercoupling holder means by a container loading crane. To keep the take-along means required for this purpose from becoming a hindrance to movement of the container transport means operating on the runway, it is additionally proposed "that the intercoupling holder means are connected by connecting means to a part of a container loading crane, which means are conveyable by a trackless container transport vehicle being brought up into container transfer position and, if required, contain energy and control lines for the intercoupling holder means." There the connecting means may either slide on the runway or be carried rolling on the runway by very low rollers or balls.

When service and supervisory personnel are no longer regularly present at the transfer station and hence at the location of the intercoupling holder means, the problem of



automatically ruling out mishaps is increased. One possible mishap might be that a spreader which is connected to a container positioned at the intercoupling holding means is lifted under the erroneous assumption that the container, with the intercoupling units coupled to it, has been uncoupled from the receptacles of the intercoupling holder means. Here lifting of the container could result in extensive damage to the intercoupling holder means or at least one of its receptacles. To avoid this, it is in addition provided that "securing means are provided which prevent a receptacle and associated functional parts from being carried along upon lifting of a container relative to the intercoupling holder means if, despite issuance of a release command to release the given intercoupling unit from the container, said release command has failed to be executed or been faultily executed with respect to one or more intercoupling units." At the same time, it may be provided that "the securing means emit a warning or control signal to an operator and/or to a mechanism serving to remove the container from the intercoupling holder means."

In certain types of intercoupling units, namely those in which the upper engagement head is rigidly connected to the base, it may happen that, for release of the intercoupling unit from a lower container corner fitting or for coupling to a lower container corner fitting, the intercoupling unit as a whole must be rotated under the load of the container above it. As already indicated above, this requires a rotary unit at the intercoupling holder means. In order to allow this rotary unit to become



effective at the right time while avoiding the installation of excessively great drive power, the rotary unit may be provided with a prestress means which is prestressed in the direction of release or coupling "in such manner that upon relief of the intercoupling unit from the weight of the container, a rotation in the direction of release or coupling takes place during the relieving phase."

With regard to adaptation to different container dimensions it is provided that "the intercoupling holder means consist of a base frame and at least one moving frame capable of being shifted relative to the base frame, by the shifting whereof the distribution pattern of the receptacles may be adapted to the given container format."

In order to make the positioning routine of a container loading crane independent of container dimensions, on the base frame there may be provided "two moving frames which are shiftable symmetrically in a direction corresponding to the lengthwise direction of the container relative to the base frame and possibly each accommodate one or two magazines."

To transfer the intercoupling holder means in simple fashion within a port area, "on the intercoupling holder means engagement fittings may be provided for coupling means at the spreader end, which fittings are adaptable to spreaders for various container formats."

Simple transfer of the intercoupling holder means may alternatively be obtained when the "intercoupling holder means



are configured as a mobile road unit or are refittable as such and capable of being coupled to a tractor vehicle if required."

Since the presence of service personnel in the region of the receptacles of the intercoupling holder means must be expected on occasion, it is recommended that "at the intercoupling holder means, in the region of the given receptacles, protective roof means are arranged, firstly so that they lie out of superposition with a container approaching or being lifted in proper order, and secondly so as to afford direct protection and prompt escape for service personnel working at the given receptacle." At the same time, additional safety for service personnel may alternatively be obtained in that "with the protective roof means, a barrier is associated, which upon exiting of the service personnel from the protective roof area will bar approach of a container transport road vehicle into the area of occupancy by service personnel."

In order to facilitate the positioning of containers in relation to the intercoupling holder means, in particular when the cables suspended from the spreader are swinging, it is provided "that the intercoupling holder means are provided with guide-in means for a container."

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The accompanying figures explain the invention by means of an example.

Fig. 1 shows a view of a dock area in longitudinal direction of the edge of the dock with a container ship, a container loading crane and a container transfer device under the container loading crane;

Fig. 1a, an upper corner fitting of a container for cooperation with one of the twistlocks of a spreader in top view;

Fig. 2, a side view of an intercoupling holder of Fig.1, in the direction of the arrow II of Fig. 1;

Fig. 2a, a side view of the intercoupling holder of Fig.2 in telescopically extended position;

Fig. 2b, a view of the intercoupling holder of Fig. 2 in another extended position;

Fig. 3, a top view of the intercoupling holder of Fig. 2b;

Fig. 4, an intercoupling unit in engagement with an upper corner fitting of a lower container and at the same time in engagement with a lower corner fitting of an upper container;

Fig. 4a, schematically, the condition of engagement of the intercoupling unit with the lower corner fitting of the upper container, in the direction of the arrows VIa-IVa of Fig. 4;

Fig. 4b, schematically, engagement of the intercoupling unit with the upper corner fitting of the lower container in the direction of the arrows IVb-IVb of Fig. 4;



Fig. 5, the upper container, with the intercoupling unit locked to it, can be lifted from the lower container;

Figs. 5a and 5b, representations according to Figs. 4a and 4b, but according to the condition of Fig. 5;

Fig. 6, the corner fitting of the upper container after transfer of the upper container has been made to an intercoupling holder;

Figs. 6a and 6b, schematic representations according to Figs. 4a and 4b, Fig. 6a representing the condition of engagement of the intercoupling unit with the transferred upper container and Fig. 6b, schematically, the condition of engagement of the intercoupling unit with the intercoupling holder;

Fig. 7, the arrangement of Fig. 6 after placement of the intercoupling unit into a position in which the upper container, the intercoupling unit having been left behind, can be lifted from the intercoupling holder;

Figs. 7a and 7b, schematic conditions of engagement of the intercoupling unit with the container to be transferred and with the intercoupling holder according to Fig. 7 in viewing directions according to Figs. 4, 4a and 4b;

Fig. 8, the intercoupling holder with an intercoupling unit in the relative position of Fig. 7, but after lifting of the container to be transferred;

Fig. 8a, the position of the upper part of the intercoupling unit of Fig. 8;



Fig. 8b, the condition of engagement between the lower part of the intercoupling unit and the intercoupling holder of Fig. 8;

Fig. 9, the arrangement of Fig. 8 after separation of an actuating tool applied to the intercoupling holder by an actuating lever of the intercoupling unit;

Fig. 9b, the condition of engagement between the lower part of the intercoupling unit and the intercoupling holder of Fig. 9;

Fig. 10a, diagram of transfer of an intercoupling unit from the intercoupling holder to a magazine;

Fig. 10b, an intermediate phase in the transfer of an intercoupling unit from the intercoupling holder to the magazine and

Fig. 11, a front view of the magazine in the direction of the arrow XI of Fig. 10b.

In Fig. 1 a dock edge is labeled 10; it runs perpendicular to the plane of the drawing. On the shoreside the dock edge 10 is adjoined by a runway 12 for rubber-wheeled vehicles. On this dock runway 12 rails 14 for a container loading crane 16 are in addition laid parallel to the dock edge 10. The crane frame 16 consists of a gantry with portal columns 16a and a crane-trolley bridge girder 16b. On the crane-trolley bridge girder 16b there rides a crane trolley 18, which by hoisting cables 20 bears a so-called spreader, i.e., a container pick-up frame 22, which



approximately matches the horizontal cross section of a container and is provided with so-called twistlocks 24 in its four corners, which are designed for coupling to upper corner fittings 26a of a container 26I to be transferred. The two containers 26I and 26II are stacked on the deck of a container loading ship 28. There the lower container 26II is firmly coupled by lower corner fittings 26b, with intermediacy of intercoupling units 30, to mount fittings 32 of the ship 28. On the other hand, the upper container 26I is firmly coupled by its lower corner fittings 26b to upper corner fittings 26a of the lower container 26II, again through intercoupling units 30.

Now let it be assumed that the container 26I is to be brought from its position A, represented in Fig. 1, into a position B, where position B may be located at any desired place on the dock runway 12, for example within a container warehouse.

To do this, the procedure is as follows:

The spreader 22 is lowered to the upper container 26I and connected to it by actuation of the twistlocks 24. The twistlocks 24 must be imagined as a hammerlike structure whose hammer handle is rotatable about a vertical axis. When the spreader 22 is lowered to the upper container 26I, the hammerheads of the twistlocks 24 extend through slots 26a1 of the upper corner fittings 26a (Fig. 1a); if they have passed through the slots 26a1, the hammer handles are rotated about their vertical axes, so that the hammerheads 24a reach under the upper corner fittings



26a. The spreader 22 can then lift the upper container 26I as soon as it is released from the lower container 26II.

To release the upper container 26I from the lower container 26II, the intercoupling units 30 are uncoupled from the lower container 26II, while the said intercoupling units 30 remain connected to the upper container 26I. Now the upper container 26I can be transferred by the spreader 22 along a path a-b-c into a position C on an intercoupling holder 34. Note: On the path a-b-c the intercoupling units 30 are still coupled to the container 26I. But now it is desired finally to bring the container 26I into the position B and deposit it, for example, on the dock runway 12 where, for deposit on the dock runway 12 in the position B, the intercoupling units 30 first have to be uncoupled from the container 26I.

For this purpose it is provided that the container 26I is deposited on the intercoupling holder 34 with the intercoupling units 30, that then, while the container 26I is located on the intercoupling holder 34, the intercoupling units 30 are released from the container 26I and that then the container 26I is again removed from the intercoupling holder 34 and brought into the position B, where the intercoupling units 30 are to remain at the intercoupling holder 34 and from there are to be introduced into a magazine for intercoupling units. After release of the intercoupling units 30 from the container 26I in the region of the intercoupling holder 34, the container 26I is gripped by another spreader 36 by means of twistlocks 24 likewise provided



on the said spreader 36. The spreader 36 is suspended by means of hoisting cables 38 on a portal hoist car 40, which is capable of travel on the dock runway 12 by means of preferably steerable wheels 42 operating on the runway, in order to bring the container 26I from the position C into the position B and there deposit it on the dock runway 12. At the same time, as already mentioned, the intercoupling units 30 which, with the container 26I, from the position A have reached the position C, are left behind at the intercoupling mount 34 and are stored there in a magazine to be described in detail below.

Since the trolley-crane bridge girder 16b [of the] container loading crane 16 is capable of travel parallel to the dock edge 10, i.e., perpendicular to the plane of the drawing of Fig. 1, in order to be able to lift containers successively from different storage locations on the ship which are spaced apart in the longitudinal direction of the ship, it is alternatively provided that the intercoupling holder 34 may be operated with the crane frame 16 in its various positions. For this purpose the intercoupling holder 34 is connected by a take-along connection 44 with the portal column 16a of the crane frame for take-along.

There the take-along 44 rests directly on the dock runway 12, so that the portal hoist car 40, upon approaching the transfer position for transfer of the container 26I from the position C, can be crossed by the wheels 42 of the portal hoist car 40.*

* [Should perhaps read "so that the wheels of the portal hoist car 40, on approaching the transfer point for transfer of the container 26I from the position C, can ride over the take-along."]



Then all supply lines which are necessary for the control and actuation of moving parts in the region of the intercoupling holder 34 can be laid in the take-along 44.

In addition, attention must be called to the fact that the intercoupling holder 34 must be adapted to different container formats, where adaptation as a rule may be limited to the lengthwise direction of containers; viz., the containers in question are standardized in the direction of breadth; however, there are different formats in lengthwise direction, e.g., 40-foot containers, 45-foot containers and 20-foot containers.

In Fig. 1 the intercoupling holder 34 is seen in a position adapted to a 20-foot container. The intercoupling holder 34 consists of two boxes 46, which with intermediacy of intermediate telescopic pieces 48, are carried in a base frame 50. The boxes 46 and the intermediate telescopic pieces 48 are displaceable synchronized in relation to the base frame 50, so that the lengthwise extensions of Figs. 2, 2a and 2b may be electively obtained. Guide-in plates 52 for the containers to be transferred in each instance are provided on the boxes 46.

The take-along structures 44, which connect the base frame 50 with the portal column 16a of the crane frame 16 on the dock runway level 12, are seen again in Fig. 3. A receptacle 54 is in each instance provided on the boxes 46 in a total of four upper corners for the four intercoupling units 30 of a container 26I in each instance.



To prepare for transfer of the container 26I from the position A to the position C, the intercoupling units 30 are released from the container 26II by hand. The same applies when at a later point in time the container 26II is to be released from the mount fittings 32 on the deck of the ship 28.

In Fig. 4 there is represented an upper corner fitting 26a of the lower container 26II and a lower corner fitting 26b of the upper container 26I and, between these two, an intercoupling unit 30. The intercoupling unit 30 comprises a base 30a, consisting of an intermediate plate 30a1, a lower filler 30a2 and an upper filler 30a3. The lower filler 30a2 substantially completely fills in the slot 26a1 of the upper corner fitting 26a. The upper filler 30a3 substantially completely fills in a matching slot 26b1 of the lower corner fitting 26b of container 26I. There the longitudinal axis LX of the slots 26a1 and 26b1 in Fig. 4 extends perpendicular to the plane of the drawing. The intermediate plate 30a1, which has approximately a rectangular outline and whose sides lie parallel to the rectangular sides of the slots 26a1 and 26b1, has a downward-directed bearing surface 30a12 and an upward-directed supporting surface 30a13. The downward-directed bearing surface 30a12 rests on the upper side 26a2 of the upper corner fitting 26a of the container 26II, while the underside 26b2 of the lower corner fitting 26b of container 26I rests on the upward-directed supporting surface 30a13 of the intermediate plate 30a1. A shaft 30b is supported rotatable in the center of



the base 30a. At its upper end the said shaft 30b bears an upper hammerhead 30c and at its lower end a lower hammerhead 30d.

It can be seen in Figs. 4a and 4b that in the condition of Fig. 4 the shaft 30b assumes an angular position in relation to the base 30a, in which the hammerhead 30d extends under the upper corner fitting 26a and the hammerhead 30c extends over the lower corner fitting 26b, so that the two corner fittings 26a and 26b of the two containers 26II and 26I are locked together and secured against vertical lifting from one another. At the base 30a there is provided a setting lever 30e, which permits rotation of the shaft 30b and fixes different angular settings of the shaft 30b in different positions.

In Figs. 5, 5a and 5b, the intercoupling unit 30 is released from the upper corner fitting 26a of the container 26I, as appears particularly in Fig. 5b, viz., from the parallel position of the hammerhead 30d and the slot 26a1. On the other hand, the intercoupling unit 30 is still interlocked with the lower corner fitting 26b of the upper container 26I, as appears in Fig. 5a, where the upper hammerhead 30c lies transverse to the slot 26b1.

In this connection, note the new position of the setting lever 30e. In the condition of Fig. 5 the container 26I can be lifted by the spreader 22 and brought into the position C of Fig. 1, to be deposited there on the intercoupling holder 34.

In Fig. 6 the lower corner fitting 26b of the container 26I is shown as having been brought into alignment with an intercoupling receptacle 54 of the intercoupling holder 34. In



Fig. 6 there is no change in the angular position of the shaft 30b in relation to the angular position in Fig. 5, so that the upper hammerhead 30c is still suspended on the lower corner fitting 26b and the lower hammerhead 30b is able to enter an elongated slot 54a of the receptacle 54 unhindered. The filler 30a2 matches in width the width of the slot 54a. The upper hammerhead 30c still extends over the lower corner fitting 26b.

In Fig. 7 it can be seen that an actuating device for the setting lever 30e is mounted on the intercoupling holder 34, in the region of the intercoupling receptacle 54. This actuating device is labelled 56. It comprises an actuating fork 56a on an actuating shaft 56b which diametrically penetrates a rocking shaft 56c, displaceable in its longitudinal direction within the actuating shaft 56c in the direction of the arrow 56d, and is rotatable in the direction of the arrow 56e by the actuating shaft 56c. The setting lever 30e can be brought into the position of Fig. 7 by the said actuating device 56. In this position the upper hammerhead 30c assumes a position parallel to the slot 26b1 of the lower corner fitting 26b of container 26I, so that the container 26I can be lifted from the intercoupling holder 34 while leaving behind the intercoupling unit 30 in the receptacle 54 of the intercoupling holder 34. Leaving the intercoupling unit 30 behind on the intercoupling holder 34 is ensured by the adjustment of the lower hammerhead 30d, which, as appears



particularly in Fig. 7b, extends under the intercoupling receptacle 54.

Then when the container 26I is detached from the intercoupling holder 34 by means of the spreader 36 of the portal lift car 40, the condition of Figs. 8, 8a and 8b is produced.

Figs. 9 and 9b differ from Figs. 8 and 8b only in that the actuating device 56 has been withdrawn from the setting lever 30e.

Fig. 9, like Figs. 6, 7 and 8, shows a transport slide 58, which is displaceable along a linear guide rail 58a. The transport slide 58 is designed fork-shaped and its two fork arms 58b, 58c rest on the front and rear limiting surfaces of the intermediate plate 30a1 parallel to the plane of the drawing in Fig. 9. By means of this transport slide 58, the intercoupling unit 30 of Fig. 9b can be slipped out of the elongated slot 54a in the direction of the arrow 60. At the same time, the two side surfaces 30a21 of the filler 30a2 slide along the slot-delimiting surfaces 54a1 of the elongated slot 54a. In this way the orientation of the intercoupling unit 30 about its vertical axis is maintained.

Fig. 10a shows the position of the intercoupling unit 30 of Fig. 9 in a section along line Xa-Xa of Fig. 9. The filler 30a2 is still located inside the elongated slot 54a between its two slot-delimiting surfaces 54a1, while the intermediate plate 30a1 rests on the upper side 54b of the receptacle 54. In Fig. 10a it



can be seen that a transport table 62 lies in a position in relation to the intercoupling receptacle 54, specifically, so that the upper sides 62a of the transport table 62 lie even with the upper side 54b of the receptacle 54 and that a slot 62b with slot-delimiting edges 62b1 of the transport table 62 lie in alignment with the elongated slot 54a of the receptacle 54. In this arrangement the transport slide 58 can now shift the intercoupling unit 30 out of the position of Fig. 10a into the position of Fig. 10b.

As soon as the intercoupling unit 30 has reached its position of Fig. 10b on the transport table 62, the transport slide 58 can be withdrawn in a manner not represented, so that by means of the transport table 62 the intercoupling unit 30 can be shifted in two directions orthogonal to each other according to the directional symbols 64 and 66 parallel to the front wall 68a of a magazine 68 in vertical and horizontal direction. By means of the transport table 62 the intercoupling unit 30 can then be brought into alignment with one of the magazine compartments 68II1 - 68II4 and/or 68III1 - 68III4 arranged in columns 68I and 68II. Once alignment to such a magazine compartment is produced, the intercoupling unit 30 can be transported by the transport table 62 into the respective magazine compartment. In the case of the example of Fig. 11, the magazine compartment 68III1 is loaded. Transfer from the transport table 62 into the magazine compartment 68III1 can then be assumed by a sawlike transport bar 70. In operating position the said transport bar 70 can be



brought opposite to each of the magazine compartments and in each instance is located underneath the magazine compartment to be loaded; in Fig. 11, the compartment 68II1 is loaded. After that the sawlike transport bar 70 is located in the magazine compartment 68II2 underneath. At the same time transfer of the intercoupling unit 30 from the transport table 62 of Fig. 10b into the magazine compartment 68II1 is effected by sawteeth 70a of the transport bar 70. In each instance the distance between two associated pairs of sawteeth 70a is adjusted to the length of the filler 30a2, which in Fig. 10a is labelled 1. The transport bar 70 is movable according to the directional symbols 72 and 74 and executes, viewed in viewing direction V of Fig. 10b, a periodic motion along a rectangular path in the vertical plane. According to Fig. 10b, two sawteeth 70a are located in register position to the filler 30a2, but in Fig. 11 underneath and out of engagement with the intercoupling unit 30. Now when the transport bar 70 rises in the direction 74 from the position of Fig. 11, the two sawteeth 70a, located in register position with the filler 30a2, straddle the filler 30a2. Then when the transport bar 70 moves in the direction of the arrow 72 (upward in Fig. 10b), the intercoupling unit 30 is slid the length of the stroke h of the transport bar 70, in the direction of the arrow 72, into the magazine compartment 68II1. The intercoupling unit 30, due to seating of the longitudinal edges 30a21 of the filler 30a2 on longitudinal edges of bearing strips 68b of the magazine compartment 68II1, then is prevented from turning about its



vertical axis. At the same time, the intermediate plate 30a1 lies on the strips 68b. As soon as the transport bar 70 has ended its stroke h in the direction of the arrow 72, it again moves downward along its rectangular path in the direction of the arrow 74, so that the teeth 70a, which until then had straddled the filler 30a2, again go out of engagement with the filler 30a2. Then the transport bar 70 can execute a backward stroke in the direction of the arrow 72 and, after executing this backward stroke, again rise along the arrow 74 of Fig. 11, in order to receive another intercoupling unit 30 presented by the transport table 62 and move it into the magazine compartment 68II1. The intercoupling units 30 already contained in the magazine compartment 68II1 are then brought by the next following pair of teeth, each time by a stroke length h, to additional storage locations in the magazine compartment 68II1. In this way it is ensured that the intercoupling units 30 in the magazine compartment 68II1 assume specific positions in the longitudinal direction of the said magazine compartment, so that they can again be grasped by the transport bar 70 for the purpose of retransport to the transport table 62. When one magazine compartment is filled, the transport table 62 is adjusted in alignment to another magazine compartment, etc. The transport bar 70 simultaneously is brought into a position in relation to the magazine compartment to be freshly loaded, i.e., is introduced into the magazine compartment located under the compartment to be freshly loaded.



A special magazine may be provided for each of the four intercoupling receptacles 54 of the intercoupling holder 34 of Figs. 2, 2a, 2b and 3. In particular, it is advisable to provide, in each of the boxes 46, two magazines each for the two receptacles associated with the respective boxes 46. The magazines 68 of Figs. 10a, 10b and 11 may be placed loose in the boxes 46, so that they can be removed from them and replaced with, for example, a fork lift.

It can readily be seen that the container 26I may alternatively be brought from the position B through the position C into the position A on the deck of the ship 28. The container 26I, coming into the position C from the position B without intercoupling units 30, can then be equipped with intercoupling units 30 on the intercoupling holder 34, the said units being locked to it. The spreader 22 can then pick up the container 26I again and bring it into the position A on the path c-b-a against the direction of the arrow, where it can again be deposited on the lower container 26II. After deposit the intercoupling units 30 are again locked with the upper corner fittings 26a of the lower container 26II.

It is then provided there that locking of the lower hammerheads 30d into the upper corner fittings 26a of the lower container 26II or into the fittings 32 on the deck of the ship 28 takes place automatically. For this purpose the hammerheads 30d are brought into an intermediate position, out of which they can be rotated upon entry into the respective slot 26a1 by guide-in



slopes of the hammerhead in position parallel to the respective slot 26a1, to extend, after passage through the respective slot 26a1, under the respective upper corner fitting 26a, with spring action.

Transfer of the respective hammerhead 30d to a position of readiness, from which, upon entry into a slot 26a1, it automatically opposes the spring action parallel to the slot 26a1, is already effected before or during travel of the hammerhead 30d out of the elongated slot 54a of the receptacle 54. The condition of readiness can be brought about again by action on the setting lever 30e.

Let it be noted here that there are different types of intercoupling units 30. An alternative embodiment provides that the upper hammerhead 30c of an intercoupling unit 30 is incapable of rotation in relation to the base 30a. In this case the receptacle 54 must be designed so that the entire intercoupling unit 30 can rotate in it. Then a rotary drive is associated with the receptacle 54, which causes rotation of the intercoupling unit 30. The said rotary drive can then act upon the lower filler 30a2 of the base 30a. In this connection, the following problem then appears: As long as an upper container 26I rests on the intercoupling unit 30 or, stated more precisely, rests on the intercoupling plate 30a1, which in turn rests on the upper side 54b of a receptacle 54, rotation of the base 30a for the purpose of unlocking from, or locking to, the lower corner fitting 26b of the container 26I is possible only against great frictional



resistance. In order to avoid this frictional resistance, it is provided that a rotary prestress device acts upon the base 30a which stores the actuating force for rotation of the base 30a and produces rotation as soon as the intermediate plate is relieved.

The design according to the invention described thus far permits more rapid transfer of containers. In contrast to the previous mode of operation, it is no longer necessary, after lifting a container from a container lying underneath it, to uncouple the intercoupling units 30 at first taken along by the lifted container and to store them by hand. This saves very arduous, dangerous and expensive manual labor. The same savings is also obtained when a container, before deposit on a container ship, must be equipped with intercoupling units by which it is then to be attached to a container lying underneath it or to the deck. Such attachment of the intercoupling units 30 to the container to be loaded on the ship has hitherto also been performed by hand and is now replaced by mechanical means in the region of the intercoupling holder. However, manual labor is still required on the deck of the ship when a container is to be uncoupled from a container lying underneath it or from fittings on the deck.

It has been assumed until now that containers are delivered shoreside by a container transport vehicle, perhaps a portal lift car of the type represented at 40 in the drawings, to the intercoupling holder 34. It is alternatively possible that a container may be driven, perhaps on a platform car, up to the



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intercoupling holder and be deposited there in a position in relation to the respective receptacles for the intercoupling units. In this case, a fixed auxiliary crane, which lifts the After making photocopies, please indicate below the number of copies taken and hand over to the secretarial staff. Please do not make entries in the record book at the photocopy machine.

Regardless of how the container 26I is further conveyed from Thank you.
the position C in import operation, the following advantage is obtained:

As soon as the container 26I is deposited on the Corporate Department, the spreader 22 can already be lifted from the container again and, by means of the trolley crane 18, run back to the ship for pickup of another container, without having to wait until the intercoupling units 30 are detached from the container 26I.

Thus the crane cycle is not affected, and in particular is Name of Client

Name of Auditors :

Let it likewise be mentioned that the intercoupling holder

Name of Person conducting a container loading crane with two statutory review

or more trolleys, a spreader of one trolley is transferred to a spreader of another trolley.

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Claims

1. Method of transferring containers (26I, 26II) having upper container corner fittings (26a) at their upper corners for coupling with counterpart coupling means (24) of a spreader (22) and lower container corner fittings (26b) at their lower corners for connection to the upper corner fittings (26a) of a respective lower container (26II) or to matching mount fittings (32) of a container mount (28), as the case may be, between a first location (A) where the respective container (26I) is secured at its lower container corner fittings (26b) by means of releasable intercoupling units (30) to upper container corner fittings (26a) of a lower container (26II) or to matching mount fittings (32) of a container mount (28), as the case may be, and a second location

(B) where the container (26I) is to be accommodated without the intercoupling units (30), within the scope of which method the

intercoupling units (30) are first released from the lower container (26I) or container mount (28), the container (26I) to be transferred, freed from its intercoupling units (30), is then conveyed to the said second location (B),

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or mount (28) by means of a spreader (22), the intercoupling units (30) being taken along, the intercoupling units (30) are then detached from the lower container corner fittings (26b), and the container (26I) to be transferred, freed from its intercoupling units (30), is then conveyed to the said second

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in that the container (26I) to be transferred, on its way from the first location (A) to the second location (B), is deposited on intercoupling holder means (34) equipped, according to a pattern of distribution matching the arrangement of upper container corner fittings (26a), with receptacles (54) for the intercoupling units (30), the intercoupling units (30) entering into engagement with said receptacles (54), in that the intercoupling units (30) are then uncoupled from the container (26I) positioned in relation to the intercoupling holder means (34), and in that the container (26I) to be transferred is then further conveyed towards the second location (B), leaving the intercoupling units (30) behind at the intercoupling holder means (34).

2. Method of transferring containers (26I, II) having upper container corner fittings (26a) at their upper corners for coupling with counterpart coupling means (24) of a spreader (22) and lower container corner fittings (26b) at their lower corners for connection to upper container corner fittings (26a) of a respective lower container (26II) or to matching mount fittings (32) of a container mount (28), as the case may be, between a second location (B) and a first location (A) where the lower container corner fittings (26b) of the container (26I) to be transferred are to be coupled, with intermediacy of intercoupling units (30), to upper container corner fittings (26a) of a lower container (26II) or matching mount fittings (32) of a container mount (28), the container (26I) to be transferred being fitted on

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8 SUMMARY OF SHARE CAPITAL AND SHARES

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Form AR Continuation Sheet 2





its way from the second location (B), where it had been accommodated without intercoupling units (30), to the first location (A), with its intercoupling units (30) and then further conveyed by means of a spreader (22) to the first location (A) and there deposited on the lower container (26II) or container mount (28), as the case may be, and connected to the upper container corner fittings (26a) of the lower container (26II) or the mount fittings (32), with intermediacy of the intercoupling units (30),

characterized

in that the container (26I) to be transferred, coming from the second location (B), is first deposited on intercoupling holder means (34), which means, according to a distribution pattern corresponding to the arrangement of upper container corner fittings (26a) or mount fittings (32), has receptacles (54) for intercoupling units (30) and is fitted with intercoupling units (30) in said receptacles (54), in that the container (26I) to be transferred, during its positioning in relation to the intercoupling holder means (34), is connected to the intercoupling units (30), and in that the container (26I) to be transferred is then conveyed from the intercoupling holder means (34) to the first location (A), taking the intercoupling units (30) along, and there deposited on the respective lower container (26II) or container mount (28), as the case may be, and secured with intermediacy of the intercoupling units (30).

3. Method according to claim 1,

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8 SUMMARY OF SHARE CAPITAL AND SHARES

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A

FOR

Form AR Continuation Sheet I





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Checked By:

Tel No: 5350733
Fax: 5354864

A/c No:

in that the intercoupling units (30) taken from the

Receipt No:

respective receptacle (54) and a magazine (68).

Address:

Name:

Businesses by

Lodged in the office of the Registrar of Companies and

Method according to

For Official Use

characterized

in that the transport of the intercoupling units (30) from the respective receptacle (54) to a magazine station (68I1, 68II1...) is performed with preservation of the orientation of the intercoupling unit (30) in space or with ordered reorientation thereof.

5. Method according to claim 2,

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in that the intercoupling units (30) are supplied from a magazine (48) to the respective receptacle (54).

(Please use Continuation Sheets if space provided is insufficient)

6. Method according to claim 5

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characterized

registered with the Registrar of Companies and Businesses:

6 Total amount of indebtedness of the company in respect of all charges which are required to be in that the intercoupling units (30) are supplied from their

respective magazine station (68I1, 68II1 ...) to the respective receptacle (54) with preservation of their orientation in space or with ordered reorientation.

7. Method according to claims 1 to 6,

20 Raffles Place

characterized

4 Address of registered office:

31 December 1994

in that the intercoupling units (30) being fabricated with

3 Date accounts made up to:

2 Date of Annual General Meeting: 24 January 1996

positioning surfaces (30a1, 30a2) intended and configured for

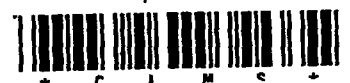
engagement in apertures (26a) of upper corner fittings

Company No:

directed-downward and with downward fittings (32) and matching mount fittings (26a) or

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(CHAPTER 50).
Eighth Schedule

bearing surfaces (30a12) intended for placement on the top of upper container corner fittings (26a) or matching mount fittings (32), the intercoupling units (30) are positioned at the receptacles (54) of the intercoupling holder means (34) by said positioning surfaces (30a21, 30a22) and/or bearing surfaces (30a12).

8. Method according to any one of claims 3 to 7, characterized in that the intercoupling units (30) are transported from the receptacles (54) of the intercoupling holder means (34) by mechanical transport means (62, 70) to the respective magazine station (68I1, 68-II1 ...) or from the respective magazine station (68I1, 68II ...) to the respective receptacle station (54) by mechanical transport means (62, 70).

9. Method according to any one of claims 1 to 8, characterized in that the container (26I), en route between the first location (A) and the second (B), is brought together at a station (C) with the intercoupling holder means (34) for delivery and/or pick-up of the intercoupling units (30), at which station a transfer between different container transport means (18, 22, 40, 36) takes place.

10. Method according to any one of claims 1 to 9, characterized

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in that the intercoupling holder means (34) are carried along by a container loading crane (14, 18) to various operating stations of said container loading crane (16, 18).

11. Device for practicing a method according to any one of claims 1 to 10, characterized by intercoupling holder means (34) having receptacles (54) for intercoupling units (30), said intercoupling holder means (34) having receptacles (54) for intercoupling units (30) in accordance with a distribution pattern matching the arrangement of lower container corner fittings (26a).

12. Device according to claim 11, characterized in that with a given receptacle (54) of the intercoupling holder means (34), mechanical actuating means (56) are associated for releasing or coupling a given intercoupling unit (30) from or to a container (26I).

13. Device according to claim 12, characterized in that the mechanical actuating means (56) are configured to be convertible and/or interchangeable for different types of intercoupling units (30).

14. Device according to claim 13, characterized in that the mechanical actuating means (56) comprise at least one power unit at the holder end in spatial relation to a given receptacle (54), and in that, in adaptation to different





intercoupling units (30), different purchase means (56a) may be coupled to said power unit for purchase of intercoupling units (30) and/or power transmission means (56b).

15. Device according to any one of claims 12 to 14, characterized in that the mechanical actuating means (56) of a given receptacle (54) comprise a rotary unit, said rotary unit being intended and configured to cooperate with lower coupling part units (30a2, 30d) of intercoupling units (30), namely with those part units (30a1, 30d) which are intended and configured for engagement in upper container corner fittings (26d) and/or mount fittings (32), said rotary unit being capable of releasing or locking the intercoupling unit (30) vis-à-vis a given lower container corner fitting (26b) by rotating the intercoupling unit (30) as a whole within the given receptacle.

16. Device according to any one of claims 12 to 15, characterized in that the actuating means (56) are configured for engagement with setting means (30e) of the intercoupling unit (30), which setting means effect the release of the given intercoupling unit (30) from, or its locking to, a given lower container corner fitting (26b).

17. Device according to any one of claims 11 to 16, characterized in that the receptacles (54) of the intercoupling holder means (34) are connected by one transport path in each instance with a





magazine (68) for intercoupling units (30), said transport path being configured for preservation of orientation or ordered reorientation of the intercoupling units (30).

18. Device according to claim 17, characterized in that for each receptacle (54) of the intercoupling holder means (34), a special magazine (68) for intercoupling units (30) is provided.

19. Device according to claim 17 or 18, characterized in that the intercoupling magazine (68) is configured to accommodate various electively employable types of intercoupling units (30).

20. Device according to any one of claims 17 to 19, characterized in that the transport path and/or the given magazine station for an intercoupling unit (30) is provided with orientation-maintaining or correcting means (54a1, 62b1, 68b) gauged to positioning surfaces (30a21, 30a22) of intercoupling units (30), in particular to positioning surfaces (30a21, 30a22) of lower part units (30a2, 30d) of intercoupling units (30) adapted to standardized upper container corner fittings (26a).

21. Device according to claim 20, characterized in that the orientation-preserving or correcting means (54a1, 62b1, 68b) of the transport path or of the magazine stations





(68I1, 68II1 ...) are formed by mutually facing edges (62b1, 68b) and/or upward- directed bearing surfaces (62a, 68b) of slit boundary strips.

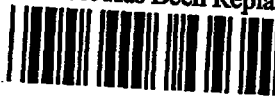
22. Device according to any one of claims 17 to 21, characterized in that the magazine (68) is an areal or spatial magazine, and accordingly comprises transport paths in at least two or at least three mutually perpendicular directions of transport respectively.

23. Device according to any one of claims 11 to 22, characterized in that the intercoupling holder means (34) consist of boxes (46) movable relative to each other, permitting an adjustment of the receptacles (54) to various distribution patterns corresponding to the arrangement of upper and lower container corner fittings (26a, 26b) on containers (26I) of various dimensions.

24. Device according to any one of claims 17 to 23, characterized in that the magazine (68), or individual magazines (68) associated with single receptacles (54) for intercoupling units (30), are arranged at least in part within a measure of breadth, defined by the receptacles (54), of the intercoupling holder means (34).

25. Device according to any one of claims 11 to 24, characterized





in that the intercoupling holder means (34) together with the actuating means (56) associated with the receptacles (54) and/or a magazine or individual magazines (68) of the receptacles (54) are configured as a transportable unit (34), capable of being picked up and transferable preferably by means of a spreader (22, 36), likewise after subdivision into part units, if required.

26. Device according to any one of claims 11 to 25, characterized in that the intercoupling holding means (34) are so arranged in the neighborhood of a runway (12) for trackless container transport vehicles (40) that they afford them (40) the possibility of bringing up and depositing or taking off and carrying away containers (26I) respectively to and from the intercoupling holder means (34).

27. Device according to claim 26, characterized in that the intercoupling holder means (34) are connected by connecting means (44) to a part (16a) of a container loading crane (16), which means are conveyable by a trackless container transport vehicle (40) being brought up into container transfer position (C) and, if required, contain energy and control lines for the intercoupling holder means (34).

28. Device according to any one of claims 11 to 27, characterized in that securing means are provided which prevent a receptacle (54) and associated functional parts (56) from being carried



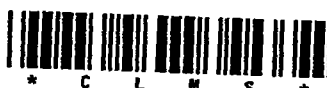


along upon lifting of a container (26I) relative to the intercoupling holder means (34) if, despite issuance of a release command to release the given intercoupling unit (30) from the container (26I), said release command has failed to be executed or been faultily executed with respect to one or more intercoupling units (30) or if no release command was issued.

29. Device according to claim 28, characterized in that the securing means emit a warning or control signal to an operator and/or to a mechanism (38) serving to remove the container (26I) from the intercoupling holder means (34).

30. Device according to any of claims 11 to 29, characterized in that, in the case of an intercoupling unit (30) required to be rotated as a whole under the load of the container (26I) for release from a lower container corner fitting (26b) or for coupling to a lower container corner fitting (26b), a rotary unit intended for the purpose is prestressed at the intercoupling holder means (34) in the direction of release or coupling, as the case may be, by a prestress means, in such manner that upon relief of the intercoupling unit (30) from the weight of the container (26I), a rotation in the direction of release or coupling takes place during the relieving phase.

31. Device according to any one of claims 17 to 30, characterized in that the magazine or magazines (68) are exchangeable.





32. Device according to any one of claims 11 to 31, characterized in that the intercoupling holder means (34) consist of a base frame (50) and at least one moving frame (46, 48) capable of being shifted relative to the base frame (50), by the shifting whereof the distribution pattern of the receptacles (54) may be adapted to the given container format.

33. Device according to claim 32, characterized in that, on the base frame (50), two moving frames (46) are present, which are shiftable symmetrically in a direction corresponding to the lengthwise direction of the container relative to the base frame (50) and possibly each accommodate one or two magazines (68).

34. Device according to any one of claims 32 and 33, characterized in that, on the intercoupling holder means (34), engagement fittings are provided for coupling means at the spreader end, which fittings are adaptable to spreaders for various container formats.

35. Device according to any one of claims 11 to 34, characterized in that the intercoupling holder means (34) are configured as a mobile road unit or are refittable as such and capable of being coupled to a tractor vehicle if required.

36. Device according to any one of claims 11 to 35, characterized



in that, at the intercoupling holder means (34), in the region of the given receptacles (54), protective roof means are arranged, firstly so that they lie out of superposition with a container (26I) approaching or being lifted in proper order, and secondly so as to afford direct protection and prompt escape for service personnel working at the given receptacle (54).

37. Device according to claim 36,
characterized

in that, with the protective roof means, a barrier is associated, which upon exiting of the service personnel from the protective roof area will bar approach of a container transport road vehicle (40) into the area of occupancy by service personnel.

38. Device according to any one of claims 11 to 37,
characterized

in that the intercoupling holder means are provided with guide-in means (52) for a container (26I).

39. Device according to any one of claims 11 to 37,
characterized

in that a stationary handling crane is associated with the intercoupling holder means.

This Sheet Has Been Replaced

