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Laivojen säiliö- ja logistiikkajärjestelmä
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CONTAINER SYSTEM AND LOGISTICS SYSTEM FOR SHIPS

The invention relates to a container system for transporting and / or storing articles on ships and to a corresponding logistics system for ships in which the container system can be used.

Fitting out ships with articles for the next journey requires not only detailed preplanning for the necessary articles but also brings with it a great time requirement and great handling requirement in the supply. To date also highly varied types of transport containers such as boxes, containers or receptacles with consumables have been necessary which have to be manually reloaded on site into storage areas.

Seen as a whole, an improved efficiency is thus required in fitting out ships going on journeys. This applies especially to multi-purpose ships, research ships or exploration ships but also to passenger ships and working ships of all types with an enormous multitude of the most varied consumables and replacement parts.

The general term "articles" is thus to be understood in the widest sense as all products which are not supplied to the ship via pipes such as for water or fuels. For example, provisions, drinks and necessities for passenger ships or scientific equipment and laboratory equipment for research ships but also mechanical components and replacement parts for the ship's operation.

In the loading processes for these articles used to date the articles have been partially detected manually and partially via reading equipment. These articles have then been brought on board and mostly transferred there to corresponding storage rooms or cold storage rooms and the like and the corresponding receptacles sent back to the pier.

During the ship's operation, mostly at sea, reloading processes could thus result which also led to precise data concerning the number and location of the corresponding articles not being directly available as a permanent storage control was not provided. In particular for research ships and the equipment and equipment articles necessary for a multitude of tasks during a research trip there is a requirement to be informed very precisely of the availability and the location of the corresponding equipment and articles.

There is thus a need to realise the requirements on land and on board for the transport of articles on ships integratively in order to have the best possible information concerning the articles stored and to be stored on board.

Elements for improved efficiency in such loading processes on ships are disclosed in DE 20 2008 007 269 U1. A pallet storage installation for use on ships is described therein, wherein the pallets are suitable for various articles. RFID tags are also mentioned for detection within the scope of the storage.

This pallet storage installation is also described in EP 1 406 051 A1, which is regarded as most relevant state of the art. The pallets and articles stacked thereon, which are disclosed in said reference, do, however, not form an independently movable unit for themselves, but two transport vehicles in longitudinal direction and in transverse direction of the respective store are in fact required to transport the respective loaded pallets to their place of destination in the store.

DE 10 2006 054 083 A1 discloses a system for automated storage wherein reference is also made to stackers or a crane as loading aid.

DE 203 02 969 U1 discloses an integrated transport system in which euro pallets are provided with the provision at defined places in a store. This system is provided as an integrated racking store for a transport ship.

In order to identify articles the use of RFID-like tags for a cargo management system is described corresponding to US 2004/0 233 041 A1 or US 2007/0 213 869 A1, whereby use on ships is not excluded either.

EP 1 246 094 A1 discloses a logistics system in which containers are equipped with a tag as an identifier. The tracking of the transport route is therefore also possible up to the board of a ship.

An independently movable container system which also allows an automatic guiding of units of the container system can, however, not be gathered.

The aforementioned and known systems do indeed reveal individual aspects in the improvement of the transport and the storage of articles, amongst other things also on ships.

An improvement in the direction of an overall concept for the provision, transport and storage of ship articles cannot, however, be seen.

It is thus an object of the invention to overcome the aforementioned disadvantages and to create a container system and logistics system for the transport of articles in fitting out ships which achieves a high level of efficiency and can also be carried out extensively automatically, as well as offering safety and ease of handling at sea and creating in the manner of a management system a high availability and quick provision possibility for the articles.

This object is achieved on the one hand with a container system according to claim 1 and on the other hand in an integrative realisation with a logistics system according to claim 8.

The inventive container system for transporting and storing articles on ships can be used in particular in a ship logistics system and has at least one container module with a base module and at least one build-on module which is arranged or can be arranged thereon and extending in a height direction, wherein the modules are equipped with one or more receiving areas for articles. The base module thereby comprises a transport means, in particular in the manner of a lower transport frame. The transport means is hereby designed for a plurality of different transport types of automatic, semi-automatic or manual mechanical kind. Furthermore at least one fixing means of the container system is present which facilitates the operative fixing of the container system relative to the deck bottom and / or relative to the ceiling and / or relative to the side delimitations.

The further inventive logistics system for ships which comprises a container system which can be used on board and on land, in particular of the previously claimed type, also has an identifier assigned at least to each unit of the container system. Furthermore a recognition system is provided which makes detectable at least the location and / or a predefinable place of destination or storage of each individual unit of the container system and / or the content thereof. A central computer unit is furthermore provided for processing the data obtained by the recognition system with stored data and for controlling the units of the container system, wherein predefinable transport paths are present at least on board for the units of the container system and the container system itself is designed as a transport means and on-board store for the articles remaining on the ship.

An essential core idea is hereby to create a logistics system for ships for the most varied articles having regard to the transport, provision and availability for a use on ship which logistics system can be realised with high efficiency and extensively automatically.

This logistics system is also to be operable on ships often subject to great movements and in full ship operation. This means on the one hand that the availability of the required articles is given for a task to be managed, for example sinking a research borehole, wherein having regard to the required articles such as boring pipes, connecting sleeves, etc. these can be provided extensively automatically at the place of need. The availability and the storage location of such articles can be ascertained by means of a central computer unit and the corresponding article can be brought between the storage location and the place of need on a predefined transport path to the place of need.

With articles of small volume this usefully takes place by means of corresponding container systems and for example Automatic Guided Vehicles (AGV). In case of larger articles this can take place by means of open containers or carrying devices.

Having regard to an improvement in efficiency in terms of time and costs the container system used in the logistics system can already be commissioned on land. During transport of the container modules of the container system on board of a ship these container modules are preferably moved through a scanner gate so that the identifier of each unit of the container system can be automatically detected. Reading of the corresponding identifier by means of a reading unit held by a person is also possible. The data read are transmitted via cable or wirelessly, in particular via radio, from the reading unit of the recognition system to a central computer unit. Central computer units on board of ships and on land can communicate with each other wirelessly on command or within the scope of automatic processes. The data stored in the central computer unit recognise the predefined place of destination or storage of a certain article and steer the corresponding unit of the container system on a predefined transport path to the place of storage. The container system hereby not only constitutes transport means for the corresponding article but instead at the same time also the onboard store for the article so that reloading of the articles into stationary shelves on board is no longer necessary.

The logistics system which also includes the steps of a logistics process is designed so that each unit of the container system and the articles contained therein can be detected according to the type, number, specification and location and called up via the central computer unit.

Identification means can be in particular machine readable labels which should be waterproof labels and can be detected in case of barcodes by means of a barcode

scanner or reading pen. RFID tags should be used extremely advantageously whereby RFID sticky labels are produced by laminating into a paper layer and simultaneous adhesive coating. These can then be applied easily and already on land or in case of products generated on board on the corresponding individual articles, in units of the container system and the container modules.

This type of identification and detection thus facilitates real-time detection so that at any time it is possible to call up the availability of a certain article and the place of storage thereof on board the ships or also on land.

This logistics and guiding system thus offers the advantage of just-in-time deliveries of the desired articles, further ordering or re-provision of articles with the ship supplier on land. This central logistics system with precise detection of the articles, goods and products also offers considerable advantages in the design of the catering or hospitality arrangements on ships, in particular on passenger ships.

The transport paths of the logistics system are usefully designed for automatic guidance of units of the container system. Particularly suited for this purpose are inductive means provided on the floor, wall or ceiling which can also be installed as guiding lines for the transport vehicles.

The automatic guidance can also take place by means of optical means such as laser beam or scanning beam, controlled or by means of target points in association with laser or IR rays.

AGVs are preferably used as driving units for container module systems which can also serve as under-driving units for driving underneath the container module. The automatic control and guidance on the corresponding transport paths can be achieved through laser scanning of the transport paths, for example of walls, corners, doors, etc., of the transport paths in comparison with the virtual image of the corresponding transport path stored in the central computer unit.

The transport paths are thus usefully designed primarily so that units of the container system can be conveyed on them, whereby a mutual adaptation is present. For example a container module should, where possible, not exceed the dimensions of 120 cm x 80 cm (L x W) and a corresponding safety height.

As the units of the container system which are – together with the articles – transported to a predefined holding area form or can form the storage at the holding area or in the storage room themselves, reloading processes for the correspond-

ing articles on board are superfluous. Furthermore no stationary storage means present in the ship are required in these cases. Fixedly built-in shelves or similar are reduced to the minimum requirements.

The predefined transport paths for articles and container systems are fixed for each corresponding deck of the ship, on which the provision of articles must be guaranteed. The movability from a lower to an upper deck or vice versa is ensured via corresponding lifts. The same applies correspondingly also in case of a combination with a land operation for the supply.

A further improvement is achieved in the logistics system in the use of Automatic Guided Vehicles (AGV) which can move the units of the container system from their storage location to their place of destination with computer control.

These vehicles can be guided with remote control or with laser control or with visualisation.

The inventive container system for transporting and / or storing articles aims to use standardised container modules which are extensively suitable for all types of articles to be transported on the ship. This applies of course also at sea and in case of swell or ships moving for other reasons.

In addition on ships, in particular research ships, for relatively heavy articles, for example 20'-containers, there can also be further transport means or towing means in order to make such heavy articles available at the place of need. The same applies for example also to drilling cores or other samples and elements drawn from the ocean bed.

The standardised container system is advantageously structured so that a corresponding container module comprises a base module, on which build-on modules can be arranged in stacks. In dependence upon the products and articles to be transported the modules have different height dimensions whereby a maximum height may not be exceeded having regard to the transport paths and the total height of the storage areas.

Having regard to the standardisation each base module comprises a transport means in the manner of a lower transport frame. This transport frame which is integrated or connected to the base module is designed so that different transport means, in particular of the automatic, semi-automatic or mechanical manual type, can be used, whereby the transport flexibility is considerably improved.

Under-driving units for example of the "compact" type can be used as automatic transport means. These flat carrier vehicles are usually provided with a lifting means. The carrier vehicles can drive under the reverse U-shape of the transport frame and due to their lifting means can slightly raise the whole container module including the articles stored therein. The control of such carrier vehicles can then take place via the central computer unit from the storage location to the place of need via predefined transport paths.

For the purpose of control on the transport path the carrier vehicle (AGV) can be implemented by means of a laser beam scanning process in comparison with the virtually input transport path which is stored in the central computer unit.

Other transport means such as forklift trucks or electric forklift trucks are also possible. Corresponding openings are provided for this purpose in the transport frame for the standardised forks. These openings are purposefully provided in the limbs of the U-shape of the transport frame, thus approximately transversely to the orientation of the U-shaped opening.

The container module comprises on the lower side of the transport frame purposefully at least four guide rollers. On the one hand also a manual displacement of a container module is hereby facilitated. On the other hand these guide rollers can be brought in particular at the place of storage and the storage room into engagement with bottom guide rails so that coupling with other container modules is possible and in this way a modular store is formed with a plurality of container modules. The individual container module itself can usefully be held stationary under locking brakes. In the general case a ceiling fixing should also be provided in case of a plurality of container modules in order to guarantee the stationary safety of the container modules even with greater ship movements or swell. Such a ceiling fixing can take place with the aid of a rail system on the ceiling in engagement with the upper side of the container module. A lock by means of short rods or wire cables in relation to the ceiling is also possible.

The container modules should have standardised dimensions in the base area, for example 120 cm x 80 cm (L x W), but whereby the height dimension of the individual modules can be different, for example 10 cm to 100 cm.

The container modules equipped in this way with guide rollers can also be described as roll racks and are purposefully fitted with a friction-locking or shape-locking detent possibility in relation to the deck floor.

The container modules and build-on modules can be designed in the manner of drawers or as containers with flaps. In dependence upon the articles simple wire mesh modules can also be provided, the strength of which is guaranteed in particular by square columns or rods.

It is also possible to equip the build-on modules for example with form inlets in order to be able to receive small transport articles such as electronic parts, tools or screws.

Having regard to an integrated logistics system for all articles the container racks and the individual modules can be equipped with an identifier. RFID tags with transponders are advantageously used for this purpose. This type of identification also allows a bulk detection. This means that each individual article must no longer be detected separately but instead the content of articles of a build-on module can be incorporated in a scanning process.

A further advantage lies in the bi-directional communication so that for example the transponders of a build-on module can be reprogrammed upon incorporating other articles, for example by means of a handheld input terminal, which should appropriately be WLAN compatible.

Code strips, as a bar code, can also be used in various fields. However, the great advantages of RFID tags which are watertight and can also be read in case of soil deposits on them speak clearly in favour of this type of transponder.

As the transport possibility of the container modules must also apply in case of ship movements, e.g. in case of swell, the transport paths are preferably equipped in the lower wall region with guide means, for example guide rails, which can be brought into engagement with complementary holding means on the transport vehicle or also on the container module, in particular in the lower transport frame and in this way guarantee secure movement of the container modules even in case of swell.

The container modules or container racks can also be fixed to each other via complementary connection means to form larger units, for example three or ten units. In this way on the one hand a plurality of container modules can be transported and moved together. On the other hand this guarantees in particular in the storage area a high safety and strength of the container store built up modularly.

Depending upon the application and place of destination on board of ships the container modules can be made of plastic or metal, in particular aluminium.

Pallet racks, wire mesh crates, Zarges boxes are also possible as transport units. All in all, however, a standardised container system should be used so that the automation of the transport of such articles can be ensured.

The invention will be explained in greater detail below by way of example by reference to schematic drawings, in which:

Fig. 1 shows a perspective view of a container module with an under-driving unit;

Fig. 2 a simplified illustration of a storage shelf on a ship deck formed by means of a plurality of container modules; and

Fig. 3 a schematic illustration of an inventive logistics system with the essential units and method steps for the transport of articles from land to the ship and subsequently in the ship to a defined place of destination.

The schematic illustration according to Fig. 1 shows in a perspective view an individual container module 1 or a roll rack. The base module 2 comprises downwardly a transport frame 5 which essentially forms a reverse U.

A plurality of build-on modules 3 are stacked on the base module 2 which are formed in the example in the manner of drawers. A grip region is provided on the front side.

The reverse U-shape of the transport frame 5 forms an under-driving opening 8, into which an under-driving unit 9 (AVG), in particular automatically controlled, can be driven. The lifting system integrated with the under-driving unit 9 can subsequently slightly lift the whole container module including articles stored therein so that the whole unit of the container module can be moved.

Such an under-driving unit 9 can be conveyed, centrally controlled by the computer unit, from its holding area to the destination container module 1 so that the whole container module can be transported or moved over predefined transport paths to the place of destination or need.

The under-driving unit can verify in particular by means of optical scanning of the transport path on the one hand the correct transport path and on the other hand

also observe any obstacles present in the transport path, or stop the whole container module.

Having regard to alternative transport means the lower transport frame 5 comprises approximately transversely to the U-shaped opening engagement openings 11 for the fork of lifting carriages or electric forklift trucks so that a semi-automatic transport or person-guided transport is also possible.

The container module 1 and in particular the lower region of the transport frame 5 is advantageously equipped with guide rollers 13 (Fig. 2). This also facilitates a manual displacement of a corresponding container module. In the transport frame, preferably in the region of the guide rollers, locking brakes are suitably provided so that the container module 1 can also be placed at any point of the ship deck in a stationary manner.

The modules of the container module 1 have a standard dimension in cross-section wherein different height dimensions of the stackable build-on modules 3 are possible. The total height is determined by the height of the transport paths and the height of the corresponding place of storage or storage room.

Fig. 2 shows schematically a type of high bay racking arrangement with individual container modules 1, for example in a ship deck. The storage room 20 comprises on the deck bottom 21 fixedly installed fixing facilities, e.g. bottom rails 15 and ceiling fixing possibilities, e.g. ceiling rails 16. The individual container modules 1 can be moved into this rail system so that an overall storage shelf is produced.

The ceiling rails 16 hung on the upper ceiling structure 23 or projecting downwards also facilitate the upper fixing and locking of the corresponding container modules so that a secure container and shelf system is created precisely having regard to ship movements and swell.

The arrangement also allows individual container modules present in a row of shelves to be transported by means of a corresponding under-driving unit 9 directly from this place to a place of destination.

Fig. 3 shows schematically a logistics system with the essential units and method steps for fitting out a ship with articles provided in a container system and the subsequent use of this container system for the transport of articles within the ship to a defined place of destination.

On land or on the pier the container modules 1 of the container system are commissioned completely with the corresponding articles. The modules 3 of a container module 1 receive, in the same way as these, an identifier, preferably as an RFID tag. The mode of functioning of RFID tags having regard to reading the stored information and the possibility of reprogramming of the tags is known.

The identifier is read for example by means of a reading unit 34 which is shown as a hand unit and transmitted by radio already to the central computer unit 36 on the ship 30.

Gate scanners can also possibly be used, through which the corresponding container modules 1 with articles are guided. It is also possible to detect in the manner of a bulk detection the articles commissioned in the container module 1 according to type, quantity, destination, etc.

As soon as the container modules 1 are loaded or transported on board of the ship 30, which can be realised by means of a crane or a direct driving, for example by means of rails, into the ship, the internal ship transport can be set in operation in the sense of a part of the logistics system. The automatic process for transporting a container module into a certain storage area is not shown in Fig. 3.

For simplification purposes, however, the further process in the ship is shown insofar as certain articles are to be brought from a storage room 20 of the ship 30 to a place of destination.

The corresponding data and instructions are generated by the central computer unit 36 via an electromagnetic control signal which can be emitted only in the storage room 20 and until then is line-bound.

The emitted control signal is received for example by an under-driving unit 9 (AVG) so that this is conveyed in the storage room 20 to the container module 1 (also x) loaded with the desired articles. The corresponding container module 1 is slightly raised by the under-driving unit 9 and automatically or semi-automatically moved to the corresponding place of destination so that the required articles are provided there.

The corresponding under-driving unit 9 can then be moved back with or without load to its provision location.

The inventive container system for transporting and storing articles is in this sense an essential constituent part of the previously described ship logistics system, wherein the latter has an independent inventive character. The integration of the claimed container system into a ship logistics system produces a synergetic effect which facilitates a real-time status detection of the articles available and an extensive automatic provision of the articles at the place of need via a computer-controlled guiding system.

Patenttivaatimukset

1. Säiliöjärjestelmä tavaroiden kuljettamiseksi ja varastoimiseksi laivoissa, joissa on ainakin yksi laivan kansi varustettuna kannen pohjalla ja katolla, erityisesti laivojen logistiikkajärjestelmää varten järjestelmän sisältäessä

- ainakin yhden säiliömoduulin (1), joka sisältää perusmoduulin (2) ja siihen järjestetyn tai siihen järjestettävissä olevan korkeussuunnassa suuntautuvan rakennemoduulin (3),
- jolloin moduulit (2, 3) on varustettu yhdellä tai usealla tavaroiden vastaanottoalueella,

tunnettu siitä, että

- perusmoduuli (2) sisältää alemman kuljetusrungon (5) tyyppisen kuljetuslaitteen (5),
- kuljetusrunko (5) on tehty rullarungoksi,
- kuljetuslaite (5) on tehty useita erilaisia automaattisia, puoliautomaattisia tai mekaanis-manuaalisia kuljetusvälineitä varten,
- kukin säiliömoduuli (1) sisältää ainakin yhden kiinnityslaitteen kannen pohjaan (21) ja/tai kattoon (22) nähden,
- kuljetusrunko (5) sisältää perusmoduulin (2) yhdessä suunnassa suunnilleen käänteisen U-muodon (8) aliajolaitteen (9) avulla suoritettavan aliajon tai kuljetuksen toteuttamiseksi,
- poikittain U-muotoon (8) nähden sen sakaroihin (7) on sijoitettu kytkentäaukkoja (11) muita kuljetusvälineitä, erityisesti haarukkatrukkien haarukoita tai nostovaunuja varten, ja
- säiliöjärjestelmä itse on tehty kuljetusvälineeksi ja laivalla sijaitsevaksi varastoksi.

2. Patenttivaatimuksen 1 mukainen säiliöjärjestelmä, **tunnettu** siitä, että kuljetusrunko (5) on varustettu ohjausrullilla (13) ja että kiinnityslaite on suunniteltu ohjausrullien (13) lukitusjarruksi, kitkasulkuiseksi tai muotosulkuiseksi lukitukseksi, joka voidaan laskea joko kannen pohjaa (21) vasten tai sen sisään.

3. Jonkin patenttivaatimuksen 1 tai 2 mukainen säiliöjärjestelmä, **tunnettu** siitä, että säiliömoduuli (1) on tehty euromittoihin yhteensopivaksi ja että se sisältää erityisesti säädettävän korkeusristikon eripituisten standardisäiliöiden sisämittaa ja/tai lastipaikkaa tai vastaavasti lastitilaa varten.

4. Jonkin patenttivaatimuksen 1–3 mukainen säiliöjärjestelmä, **tunnettu** siitä, että säiliömoduuli (1) on tehty säiliötelineeksi, ja että lastattavista tavaroista riippuen moduulit (1, 2) on muotoiltu erikorkuisiksi työntö- tai läppäsäiliöiksi, verkkosäiliöksi tai kulma- tai vastaavasti välipalkeilla, mahdollisesti muotoaukoilla varustetuksi säiliöksi.

5. Jonkin patenttivaatimuksen 1–4 mukainen säiliöjärjestelmä, **tunnettu** siitä, että kukin säiliöteline (1) ja/tai kukin moduuli (2, 3) on varustettu identifiointitunnisteella (33), erityisesti viivakoodilla, transponderilla tai RFID-tunnisteella.

6. Jonkin patenttivaatimuksen 1–5 mukainen säiliöjärjestelmä, **tunnettu** siitä, että säiliötelineet (1) sisältävät täydentäviä liitosvälineitä niiden kiinnittämiseksi kiinteästi toisiinsa ja/tai aliajolaitteeseen (9), ja että säiliötelineet (1) sisältävät kiinnitys- tai vastaavasti ohjausvälineet turvallisen liikkuvuuden varmistamiseksi laivassa/laivalla.

7. Jonkin patenttivaatimuksen 1–6 mukainen säiliöjärjestelmä, **tunnettu** siitä, että säiliötelineet (1) on suunniteltu lastitilakohtaista järjestelyä varten ja että ne muodostavat vastaavan lastitilan (20) varastojärjestelmän, erityisesti varastohyllykön.

8. Laivojen logistiikkajärjestelmä, jossa on

- laivalla ja maissa käytettävä, jonkin patenttivaatimuksen 1–7 mukainen säiliöjärjestelmä
- ainakin yksi kuhunkin säiliöjärjestelmän yksikköön (1) järjestetty identifiointitunniste (33),
- ainakin säiliöjärjestelmän kunkin yksittäisen yksikön sijaintipaikan ja/tai ennalta määritetyn määrä- tai lastipaikan (20) ja/tai sisällön havaitseva tunnistusjärjestelmä (33, 34),
- keskustietokoneyksikkö (36) tunnistusjärjestelmästä (33, 34) saatujen tietojen käsittelemiseksi tallennetuilla tiedoilla ja säiliöjärjestelmän yksiköiden (1) ohjaamiseksi erityisesti yhdessä maihin sijoitetun tietokoneyksikön kanssa,

tunnettu siitä, että

- ainakin laivalle on järjestetty ennalta määritetyt ajo-/kuljetusreitit säiliöjärjestelmän yksikköä (1) varten,

- kuljetusreitit on suunniteltu myös säiliöjärjestelmän yksiköiden (1) automaattista ohjausta varten, ja
- itse säiliöjärjestelmä on tehty kuljetusvälineeksi ja laivalla sijaitsevaksi varastoksi laivalle (30) jääviä tavaroita varten.

9. Patenttivaatimuksen 8 mukainen logistiikkajärjestelmä, **tunnettu** siitä, että säiliöjärjestelmän yksiköt (1) ovat varustettavissa tavaroilla maissa; että säiliöjärjestelmän varustetut yksiköt (1) ovat kuljetettavissa laivaan; että säiliöjärjestelmän kukin yksikkö (1) on havaittavissa identifiointitunnisteen (33) avulla käyttämällä tunnistusjärjestelmää (34) ja kuljetettavissa määräpaikkaansa (20) ennalta määritettyä kuljetusreittiä pitkin automaattisesti tai henkilökäyttöisen keskustietokoneyksikön avulla (36).

10. Jonkin patenttivaatimuksen 8–9 mukainen logistiikkajärjestelmä, **tunnettu** siitä, että kukin säiliöjärjestelmän yksikkö (1) on havaittavissa ja haettavissa tavaroineen tyypin, lukumäärän, erittelyn ja paikkakunnan mukaan tunnistusjärjestelmän (33, 34) avulla.

11. Jonkin patenttivaatimuksen 8–10 mukainen logistiikkajärjestelmä, **tunnettu** siitä, että identifiointitunniste (33) on toteutettu RFID-tunnisteiden, koodietikettien tai vastaavien avulla.

12. Jonkin patenttivaatimuksen 8–11 mukainen logistiikkajärjestelmä, **tunnettu** siitä, että kuljetusreitit on suunniteltu sisältämään pohjaan, seinään tai kattoon sijoitetut induktiiviset välineet esimerkiksi ohjauslinjoina, tai ne on suunniteltu optisten, kuten lasersädeohjattujen tai skannaussädeohjattujen välineiden avulla, esimerkiksi laser- tai IR-säteisiin liittyvien tähtäyspisteiden avulla.

13. Jonkin patenttivaatimuksen 8–12 mukainen logistiikkajärjestelmä, **tunnettu** siitä, että säiliöjärjestelmän ennalta määritettyyn säilytyspaikkaan kuljetetut yksiköt (1) muodostavat itse varaston säilytyspaikalla.

14. Jonkin patenttivaatimuksen 8–13 mukainen logistiikkajärjestelmä, **tunnettu** siitä, että säiliöjärjestelmän yksiköt (1) ovat kuljetettavissa säilytyspaikastaan ennalta määritettyjä kuljetusreittejä pitkin määräpaikkaansa käyttämällä kuljetusyksiköitä (9), erityisesti automaattisia siirtovaunuja (Automatic Guided Vehicles, AGV).

15. Patenttivaatimuksen 14 mukainen logistiikkajärjestelmä, **tunnettu** siitä, että kuljetusyksiköt (9) ohjataan ennalta määritettyjä kuljetusreittejä pitkin kauko- tai sädeohjatusti, erityisesti lasersädeohjatusti ja/tai visualisointia hyödyntämällä.

16. Jonkin patenttivaatimuksen 8–15 mukainen logistiikkajärjestelmä, **tunnettu** siitä, että kuljetusreitit ja säiliöjärjestelmä on sovitettu toisiinsa ja että se on varustettu pääkuljetusreitillä erityisesti kutakin laivankantta (21) kohti olevia lastipaikkoja varten.

FIG. 1

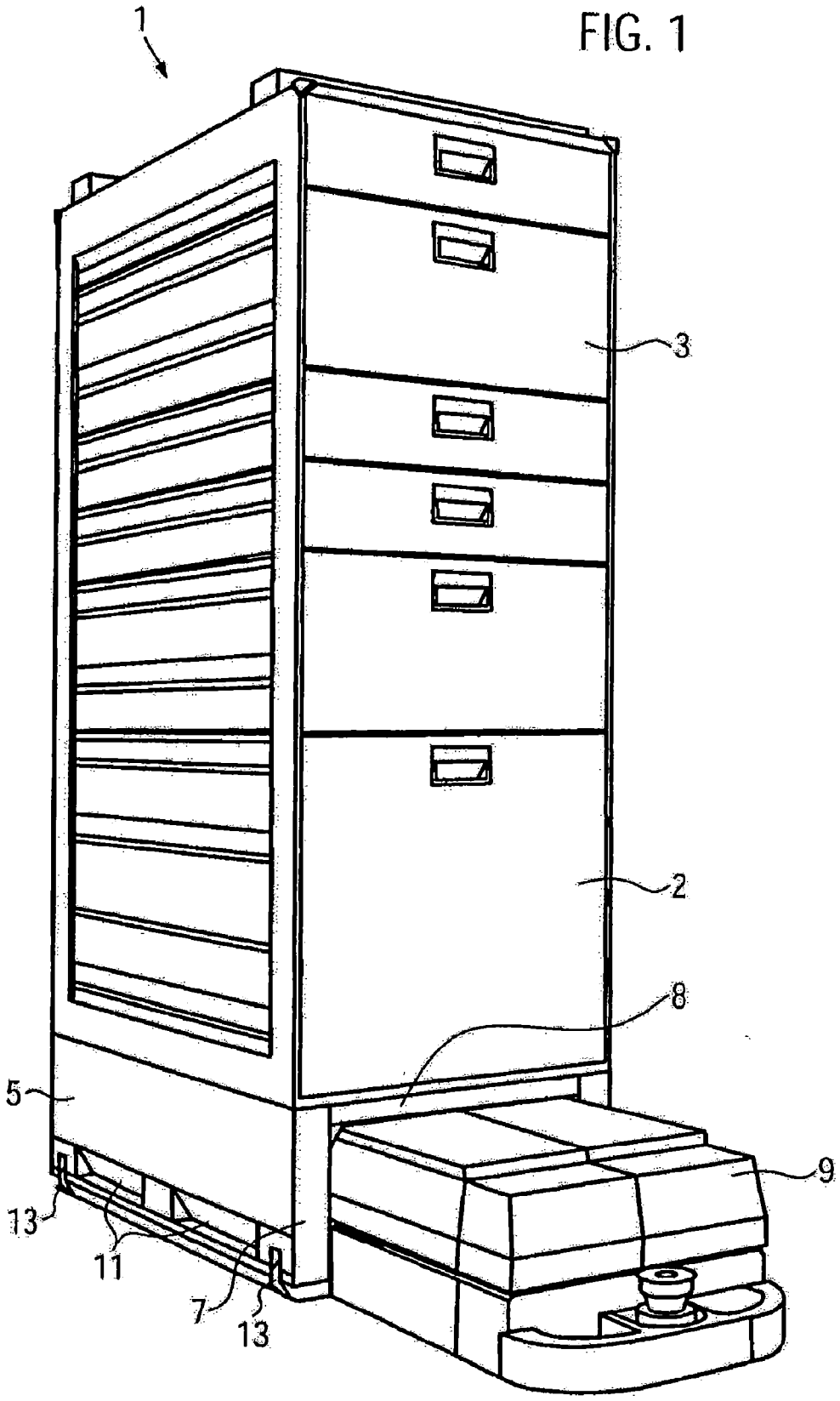


FIG. 2

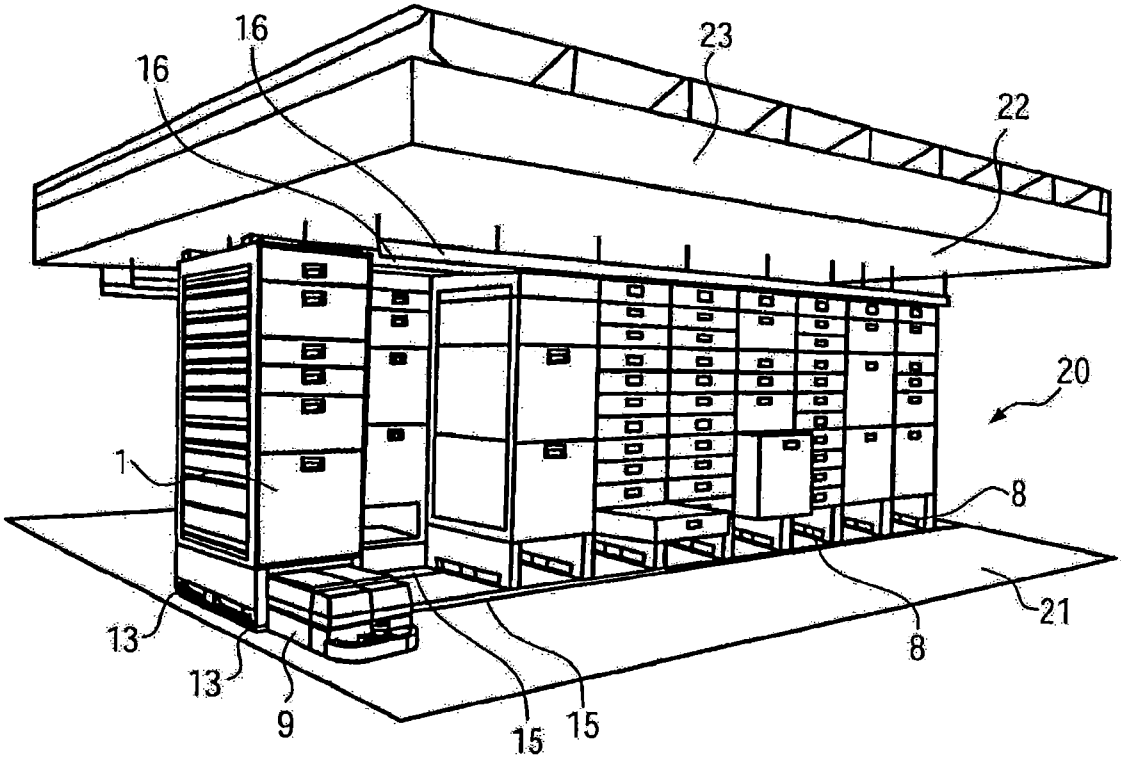
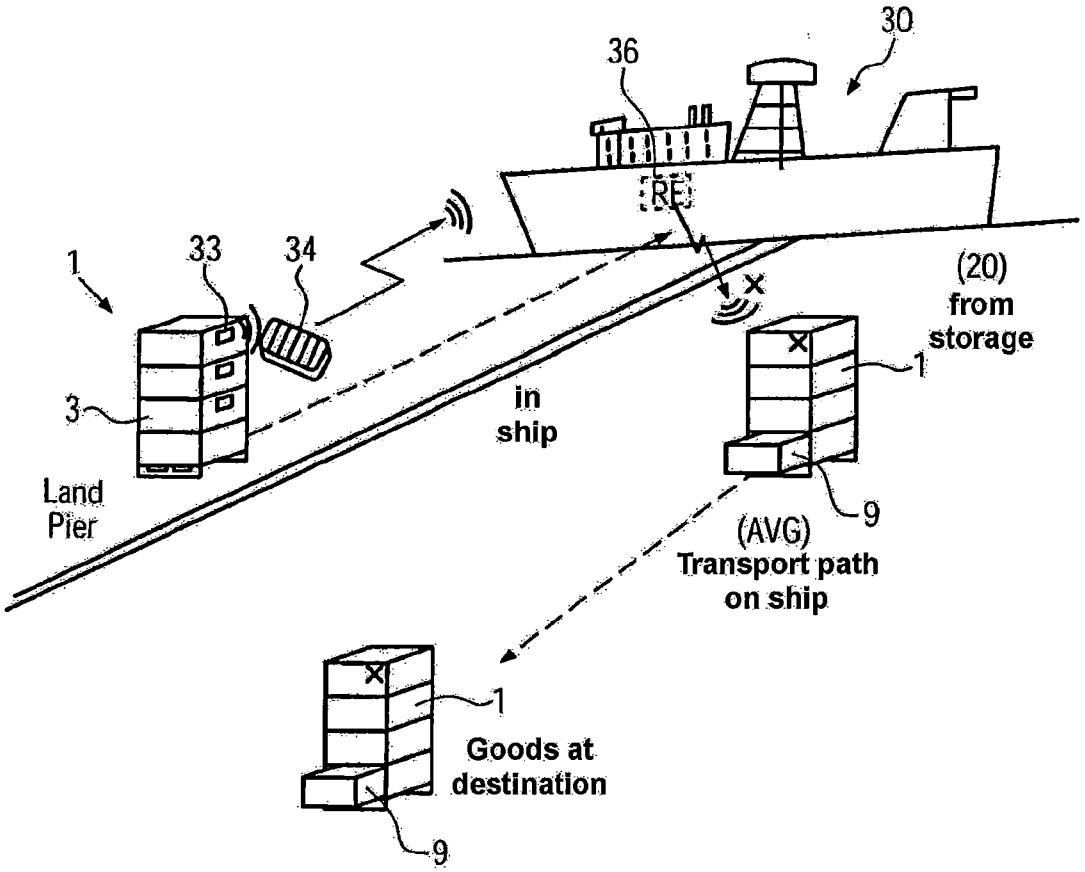


FIG. 3


30
36
RE
1
33
34
3
Land
Pier
in
ship
(20)
from
storage
1
9
(AVG)
Transport path
on ship
1
Goods at
destination
9