



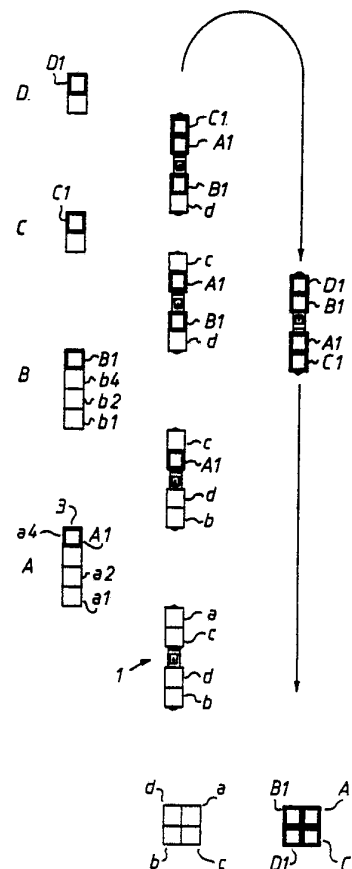
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/SE92/00088 (22) International Filing Date: 14 February 1992 (14.02.92) (30) Priority data: 9100481-2 18 February 1991 (18.02.91) SE (71)(72) Applicant and Inventor: ANDERSSON, Per-Olof [SE/SE]; Hyttevägen 2, S-825 00 Iggesund (SE). (74) Agent: LINDBLOM, Erik, J.; Flotthamn, S-150 23 Enhörna (SE). (81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BF (OAPI patent), BG, BJ (OAPI patent), BR, CA, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CI (OAPI patent), CM (OAPI patent), CS, DE, DE (European patent), DK, DK (European patent), ES, ES (European patent), FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), GN (OAPI patent), GR (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC (European patent), MG, ML (OAPI patent), MN, MR (OAPI patent), MW, NL, NL (European patent), NO, PL, RO, RU, SD, SE, SE (European patent), SN (OAPI patent), TD (OAPI patent), TG (OAPI patent), US.		Published <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>

(54) Title: A MARINE CARGO CONTAINER TRANSPORT SYSTEM, WHERE CONTAINERS ARE ARRANGED ON PLATFORMS ACCORDING TO THEIR DESTINATION

(57) Abstract

The invention comprises a shipping system intended for goods transport, consisting of a number, one or more, for cargo, in the form of containers or similar, adapted vessels (1) and a number, two or more, ports (A, B, C, D). Every cargo vessel (1) belonging to the system is arranged for carrying a number of containers on the vessel's deck and includes necessary ballast tanks adapted to be filled in order to lower the cargo vessel under control and to be emptied in order to raise the cargo vessel. All containers, destined to a first port (A), are oriented on the deck of the vessel in groups on a platform (a), and all containers, destined to another port (B) are oriented on the vessel's deck in groups on another platform (b). At each port (A) the respective cargo vessel (1) leaves respective platform (a) with those to the port destined containers and fetches one platform (A1) loaded with containers destined to another port (E) within the shipping system.



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**A MARINE CARGO CONTAINER TRANSPORT SYSTEM, WHERE CONTAINERS
ARE ARRANGED ON PLATFORMS ACCORDING TO THEIR DESTINATION.**

FIELD OF INVENTION

The present invention refers to a shipping system for the transport of goods and more particularly to such a shipping system for cargo which includes a number of cargo, in the form of containers or similar, to the cargo adapted vessels and a number of ports.

Each vessel, belonging to this system, shall be arranged for carrying on its flush deck or weather deck of the vessel a number of containers and shall contain water ballast tanks, which can be filled in order to under control lower the vessel or its water line and which under control can be emptied, in order to raise the vessel and its waterline.

Each port, related to this system, is adapted for receiving containers, loaded on the vessel's weather deck, when the vessel is lowered, or for leaving containers on the vessel's weather deck, when the vessel is raised.

The invention can be considered especially suitable in a coastal- and close range shipping system but is also applicable in shipping cargo on rivers and canals.

PRIOR ART

A number of, for goods transport intended, shipping systems are earlier known and an ordinary system utilises specially built cargo vessels for transporting stacked containers.

Such a cargo vessel is destined to different ports and in each of these ports, those containers are discharged, normally one by one, which are destined to this particular port and in that port, those containers are loaded, normally one by one, which are destined to ports within the system, which the cargo vessel later will call.

The handling of empty or loaded containers is a heavy work and consequently each

port must be equipped with specially constructed lifting gear, such as trucks and cranes, which can discharge containers from the cargo vessel and/or load containers into the vessel.

These systems demand, that during every port of call, a necessary number of stevedores must be present to perform their work and as the lay-time for these vessels, owing to expensive costs, must be limited, the stevedores are often ordered to work overtime.

Considering those with the invention associated basic characteristics, in construction of vessels, it may be mentioned, with reference to cargo vessels belonging to the system, that it is, through the Swedish patent-specification No. 432 229, earlier known, how to construct a catamaran vessel and provide each hull with parallel oriented flush or weather deck, which can carry a solid cargo superstructure.

This superstructure must be self supporting between the flush decks of the catamaran.

In the above mentioned patent-specification, also a loading -and discharging method is discussed, which indicates a possibility of raising or lowering the, two to one unit connected, hulls and the cargo by means of trim tanks.

Included in the prior art are also those ship constructions and directions which are to be found in the following publications:

US-A-4,085,695

US-A-2,371,149

US-A-3,139,197 and

US-A-3,793,974

Here indicated fundamental ideas correspond with and are a starting-point for a development of a shipping system according to the present invention.

CONSIDERATIONS RELATED TO THE PRESENT INVENTION

TECHNICAL PROBLEMS

Considering the prior art, as described above, it appears to be a very complicated technical problem to present a shipping system, especially a coastal and short sea shipping system, that from time- and cost saving points of view can compete with now existing land transport systems.

It must therefore be considered to be a technical problem to be able to present a shipping system that is based on principles which make it possible to significantly minimise the costs for the work with loading and discharging, performed in the ports, and which has lower door to door costs than other systems.

It must also be considered as a technical problem to be able to introduce a round trip shipping system, where in every port, the loading and discharging of one, to the port arrived, cargo vessel is independent of time, which then consequently demands a completely mechanised and automatised cargo handling system.

It must in the above presented shipping system be considered as a qualified technical problem to be aware of the importance of having all containers, destined to the first port in the system, to be oriented in a group on a platform on the vessel's flush deck and to allow all containers, destined to an other port in the system, to be oriented in a group on an other platform on the vessel's flush deck.

There between the different platforms shall be placed on the vessel's flush deck in such a manner that a platform always can be left and at least one such platform can be picked up in one chosen port among several ports to which the vessel arrives during a round trip.

It must also be considered to be a technical problem to be able to realise the necessary co-ordination needed between the number of ports belonging to the system and the construction of the cargo vessel in question.

It may furthermore be considered to be a technical problem to realise that all

containers destined for one particular port shall be co-ordinated in order to rest on one particular platform and that a limited number of platforms, as a suggestion one for each port, is carried on the flush deck of the vessel.

It must also be considered as a technical problem to realise that the rational handling, which is to be taken into account to limit the number of ports within the system, and requires that at each port one cargo vessel can leave a platform and at the same port pick up another platform within the system.

Finally it becomes a technical problem to, considering a shipping system of this category, be able to recognise the advantages connected with the possibility of offering short lay-times and suitable departure times for many vessels with frequent port calls and to provide a cargo transport between many ports per voyage.

Considering the construction of the vessel, in order to be appropriately used in a shipping system for cargo transport, adapted to solving one or more of the above shipping related technical problems, it is a technical problem to be able to realise the importance of constructing the cargo vessel in such a manner that it present two flush deck areas, letting these flush deck areas, both fore and aft of a deck-house, be constructed in order to support and hold one or two, possibly more, platforms, where each of these platforms is loaded with a number of containers, destined for one port within the system.

It must be considered to be a technical problem to be able to foresee the advantages that normally the number of platform areas on the forepart of the flush deck area shall be the same as the number of platform areas aft of the deck-house.

It must be considered to be a technical problem to be able to notice the importance of allowing the width of the vessels hull (inclusive an eventual protection edging) to some extent is below the corresponding width of loaded platforms.

SOLUTION

This invention is intended to present a shipping system for goods transport, including a number of, one or more, for cargo in containers or similar, fitted

or adapted vessels and a number of, two or more, ports.

Every cargo vessel belonging to this system is fitted or adapted for carrying on the deck of the vessel, in the form of flush deck or weather deck, a number of containers and to include necessary ballast tanks, which can be filled in order to, under control, be able to lower the cargo vessel and can be emptied in order to, under control, be able to raise the vessel.

Every port in this system is arranged to receive containers from such a flush deck when the vessel is lowered and to leave containers to such a flush deck in a port when the vessel is raised.

In such a system this invention suggests that all containers, destined for a first port, shall be arranged in groups on the vessels deck and rest on a platform, that all containers, destined for another port, shall be arranged in groups on the vessels deck and rest on another platform. The latter platform shall be placed fore or aft of the platform with containers destined for the first port and so on. At every port each vessel can leave the platform with containers to the port and if needed pick up another platform, with to one within the shipping system belonging port, destined containers resting on this platform.

As suggested forms of realisation, within the range of the idea of the invention, the system points out that the number of ports chosen should be at least two, practically not more than five.

Furthermore it is suggested that all containers destined to one and the same port shall be co-ordinated to rest on one single platform and that a number of such platforms, one for each port, is carried by the vessel and its flush deck.

It is consequently suggested that the vessel shall leave, at every port, a platform and fetch or receive, at every port, a platform, each carrying a number of containers or being fitted with a superstructure for general cargo.

Concerning the construction of the cargo vessel, suitably adapted for use in a shipping system for goods transport of above mentioned character, the vessel shall be built with a single hull with flush deck areas, both fore and aft of the deckhouse,

shaped to be able to carry and hold a number of platforms, each loaded with a number of containers.

As further suggested forms of realisation, within the scope of the invention, a number of platforms are suggested which can be carried by a flush deck, which fore shall match the number of platforms, which can be carried by a flush deck, with aft of above mentioned deckhouse.

ADVANTAGES

The advantages which mainly can be considered associated with a shipping system, according to the present invention, are that through this qualifications have been created in order to, with low costs of transport, offer a shipping system lenient to the environment, which economically can compete with available land transport systems, where loading and discharging of the vessel at every port can take place without assistance from stevedores and consequently is completely independent of time.

It is furthermore to be expected that the lay-time for the cargo vessels in every port will be short, which offers possibilities of rationalisation of capital in costs for vessels and cargo handling material.

By letting the cargo vessels call at many ports during one round trip, more frequent trips and higher degree of utilisation can be offered.

What especially can be considered to be characteristic for a shipping system, intended for transporting of goods, is presented in the characterizing of the succeeding patent claim No 1.

BRIEF DESCRIPTION OF THE DRAWINGS

One presently suggested shipping system for goods transport, one cargo vessel belonging to the system and a number of ports belonging to the system, will now be described more exactly in the following drawings where:

- figure 1 shows the principles for a shipping system for goods transport, where one and the same cargo vessel leaves one port and is assumed to be able to call four other ports during a round trip, in order to, at each port, leave one platform and fetch one platform,
- figure 2 shows a perspective view, in a first form of realisation, of a suitable port structure with two port pockets delimited by a quay edge area,
- figure 3 shows a perspective view of another form of realisation of a part of a suitable port structure with a quay edge area and a foundation.
- figure 4 shows a cargo vessels backboard side according to the invention immediately before the loading of a platform with containers located in a port C, according to figure 1 and 2,
- figure 5 shows a cargo vessels starboard side according to figure 4, when it has entered a suitable position for loading of a platform,
- figure 6 shows a section through the port structure and the vessel according to figure 5 and
- figure 7 shows in plan view in a third form of utilisation of a port structure.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to figure 1, one by many possible examples of performance of a shipping system for transporting of goods, will be described as having the features of the invention.

In simplifying purpose it is assumed that a cargo vessel is loaded in one port E with a number of empty containers, loaded side by side and stacked on each other, placed on four platforms a, b, c and d, each intended for and destined to respective port A, B, C, and D.

Each port A, B, C, and D is intended to have a prepared platform A 1, B 1, C 1, and D 1, placed in the port structure and each of these platforms is loaded with containers filled with cargo. Each of these platforms is furthermore intended to be destined to a fifth port E, viz. where the loading of the four platforms with empty containers took place.

For the initiated it is evident that the possibilities of variation in other respects are many, with reference to destining empty or loaded containers from one port to another.

One and the same platform "a" could of course also be loaded with either empty or loaded containers. It is important for the invention that every platform is destined for one port.

For the initiated it is also evident that two or more platforms could be destined for one and the same port and that a vessel could fetch one or more platforms at one port, destined for one or other ports within the system.

Referring to the chosen example of realisation one can state that figure 1 intends to exemplify the basic requirements for this invention in one for goods transport designed shipping system, where one vessel 1 leaves a port E loaded with four platforms a, b, c, and d, each destined for and intended to be discharged at each of a number of ports A, B, C, and D and it is furthermore assumed that those containers which are loaded on the four platforms a, b, c, and d are all empty.

The cargo vessel 1, with the platforms a, c, d, and b, oriented on flush deck areas in a way which is illustrated, now calls at port A and discharges two platforms, c and a, to assigned port areas a 1 and a 2. Thereafter the vessel shifts in order to load a platform A 1, with loaded containers, at the port area a 4. Finally platform c is again picked up, with empty containers, from the area a 1.

This will furthermore be illustrated in the following with reference to the quay structure showed in figure 7.

After departure from port A the vessel 1 is loaded with platforms c, A 1 and d, b. The vessel now calls at port B and discharges there two platforms, d and b, to assigned port areas b 1 and b 2. Thereafter the vessel shifts in order to load a platform B 1, at area b 4, and returns to pick up the earlier discharged platform d, at area b 1.

When the vessel now sails towards the port C, the vessel 1 carries the platforms c, A 1 and B 1, d.

At the port C respectively D one platform at each, c and d, are discharged and there one platform C 1 respectively D 1 are fetched and the vessel now can sail fully loaded towards port E and there discharge all platforms, C 1, A 1 and B 1, D 1.

Even though figure 1 illustrates the system by means of only one vessel it is evident that one for goods transport designed shipping system, in accordance with the present invention, can include a number for cargo, in the form of containers or similar, fitted vessels and with a number of ports diverging from the number which are shown in figure 1.

The system can even include the possibility of letting the platform A1 be destined to another port than the one showed E, say port C.

In figure 2 the port A is exemplified with one, for loading on a vessel prepared, platform A1, fully loaded with containers 3. where all are destined to port E.

Figure 2 illustrates furthermore that a platform "a", with containers 5 from the port E, recently has been discharged from vessel 1 and with assistance from truck 6 all containers are discharged from platform "a" as container 5'.

From figure 2 it appears further that the platform A1, and even the platform "a", has a dimension which enables the platforms to reach across a port pocket 20, 20'. The platform A1 rests with its opposite edge areas A1a, A1b against either quay edge 7a and 7b, and where the distance between the quay edges 7a and 7b somewhat exceeds the total width of the used vessel 1, enabling the vessel to enter the port pocket 20.

The construction of platform A1 consists of one for the purpose suitably dimensioned framed structure.

The opposite edge areas A1a and A1b of platform A1 should rest on each its own quay edge with a distance of 0,5 and 1,0 meter.

With reference to figure 3 an alternative form of realisation of a port is shown, with a discharged platform "c" at the port C, and this platform rests against a quay edge 7a' and an edge of a fundament 7b', in about the same way as illustrated in figure 2.

The complete port according to figure 3 should even include a not shown port pocket for another platform.

One can imagine that the truck 6' earlier has discharged all containers from the port E from the platform "c" and one can imagine that the truck 6' now is loading the platform with new containers 5' and makes the platform ready to be loaded on a calling cargo vessel 1.

With reference to figure 4 a cargo vessel is shown in perspective view immediately before the vessel shall be loaded with platform C1.

The platform C1 rests with its edge areas against the quay edge 7a and against a fundament 7b.

It is of importance for the invention that the cargo vessel now uses its ballast tanks (they are indicated in figure 5 and 6 but have not been given any reference notation)

in such a manner that these are filled with water, thus making the cargo vessel 1 to sink to such an extent that the fore part of the cargo vessels empty flush deck area will be situated somewhat under platform C1, enabling the vessel to enter under platform C1 and in this position, which is shown in figure 5, chosen ballast tanks can be emptied and the vessel raises, which means that the platform C1 will rest on the flush deck area of the vessel and thereafter is lifted from quay edge and fundament and then the cargo vessel 1 can back astern and the platform C1, with loaded containers 5, are loaded on vessel 1.

With reference to figure 5 a side view shows the situation when the cargo vessel 1 is located under the platform C1 with filled chosen ballast tanks. The vessel 1 with its momentary water-line 1a is now lying deep in the water.

By emptying chosen ballast tanks the vessel 1 is raised to a wanted co-ordination between the platform C1 and the fore part of the vessels flush deck.

The invention assumes that the port C is designed in order to form one against the width of the vessel corresponding port pocket 20" or similar. From figure 4 it is shown that the platform C1 is designed to reach across one against the width of the vessel corresponding port pocket 20" or similar in the port structure and rests loosely against formed quay edges 7a and 7b of the port pocket and oriented on a beforehand decided height. The vessel 1 has for loading and before entering the port pocket filled the ballast tanks to such an extent that the fore part can pass under the platform C1 and between quay edges 7a, 7b, in order to, in that position empty the ballast tanks and raise the vessel in such a manner that the platform C1 with containers rests against the vessel 1.

For discharging one platform and before entering the port pocket the ballast tanks are emptied to such an extent the vessel can pass with the platform over and between the quay edges 7a, 7b, in order to in a discharging position fill chosen ballast tanks and lower the vessel and its water-line 1a so that the platform C1 with containers 5 will rest against the quay edges and furthermore a short distance in order to make it possible for the vessel to leave the corner pocket.

It is to be expected that a vessel 1 belonging to this category must be equipped with a number of ballast tanks and that necessary pumping systems must be exploited

to accomplish a raising or lowering of the whole vessel.

Specially from figure 1 it is evident that all containers on one platform, destined to a first port A, shall be oriented in groups on mentioned platform "a". All containers on another platform "b" is destined to another port B, and these containers shall be oriented in groups on that platform.

At each port the cargo vessel 1 now shall leave all containers destined to the port coordinated on one or more platforms and fetch all containers destined to one or more ports within the system on another platform respective platforms.

The invention presents a special cargo vessel, having a deck, which both fore and aft of a deck-house, designed to hold, with holding gears, a number of platforms to platform areas, where each of these platforms are loaded with a number of containers.

The number of platform areas are, in this concept four, two in the fore part are equally adapted to the number of platform areas in the aft part of mentioned deck-house.

A number of ballast tanks (see figure 5) are as a suggestion oriented below each platform area in such a manner that these tanks can be adapted to trim the vessel owing to actual weight and weight allotment within respective platform area.

The hull of the vessel shall, which is shown in figure 6, have a width that is somewhat smaller than corresponding measurement for loaded platforms.

It should also be noted that the cargo vessel in question can emanate from the design instructions valid for tankers, with necessary reinforcements in order to resist the load from the platforms.

The flush deck 1b of vessel 1 shall be equipped with locking gear, not closer described, which in known manner makes a locking union between a loaded platform C1 and a platform area (see figure 6).

With reference to figure 7 a third concept of a port is shown.

If it is supposed that the port shown in figure 7 represents the port A, the platform "a" can be discharged to the port area a2 by the quay 71 and rest between the quay edge 71a and the fundamentals 72 and 73.

The platform "c" can be placed to a port area a1, for re-loading, and this area is defined by fundamentals 74, 74' and 75, 75'.

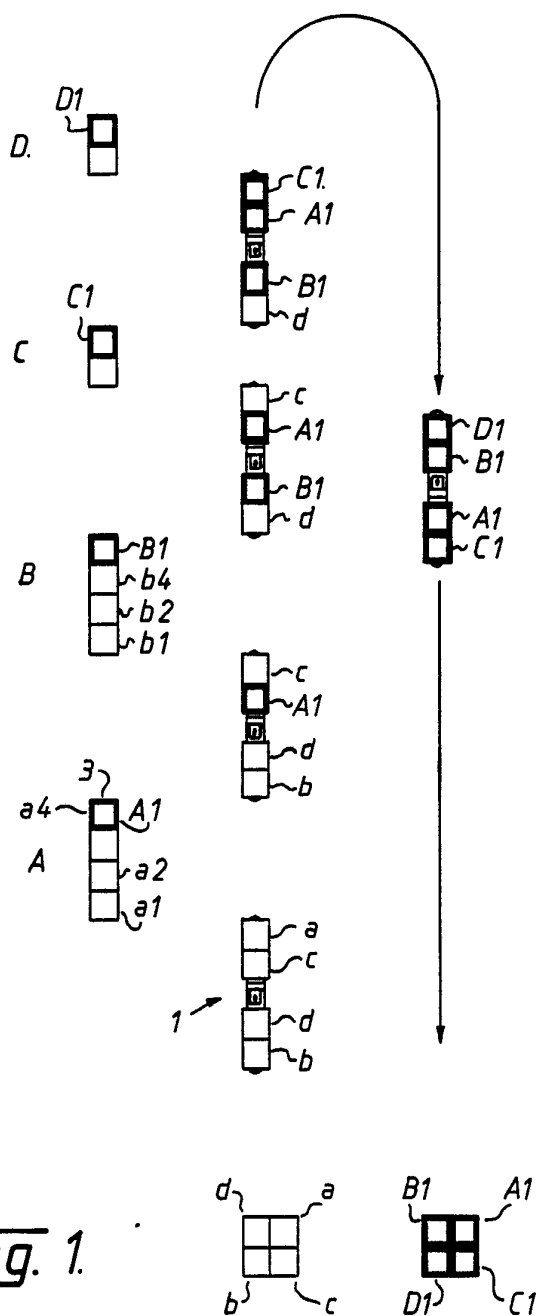
A loaded platform A1 has been fetched from the port area a4, formed by the quay edge 71 b and fundament 74, 74' and the vessel 1 now takes a position where it is prepared to load the platform "c" once again.

In the description only containers and similar are mentioned as a simplification and it is evident that within this concept even other similar cargo handling equipment should be included. For loose cargo one can imagine that a used platform is equipped with a superstructure.

The invention is of course not limited to the realisation presented above, but can tolerate modifications within the frame of the thought of the invention illustrated in the following claims.

CLAIMS

1. A shipping system intended for goods transport, consisting of a number, one or more, for cargo, in form of containers or similar adapted, vessels and a number, two or more, ports, every cargo vessel belonging to the system is arranged to carry a number of containers on the vessels deck and present necessary ballast tanks, adapted to be filled in order to lower the cargo vessel under control and adapted to be emptied in order to raise the cargo vessel and every port belonging to the system is designed for receiving containers resting on such a vessel's deck by lowering the cargo vessel or to be able to leave to such a vessel's deck containers placed in the port by raising the cargo vessel, characterized by the fact, that all containers, destined to a first port, are oriented in a group on a platform and all containers destined to another port are oriented in a group on the vessel's deck on another platform, that at each port the respective cargo vessel leaves the respective platform with those to the port destined containers and fetches one platform loaded with containers destined to another port within the system, when cargo vessels belonging to the system have flush decks both for and aft of a deck-house.
2. A system according to the claim, characterized by the fact, that the number of ports are chosen to at least two, usually five.
3. A system according to claim 1 or 2, characterized by the fact, that all containers, destined to one and the same port are co-ordinated to rest against one single platform and a number of such platforms, one for each port, are carried by a flush deck or a weather deck allotted by the vessel.
4. A system according to claim 1, 2, or 3, characterized by the fact, that the cargo vessel leaves, at each port, one platform and fetches, at each port, one platform.
5. A system according to claim 1, characterized by the fact, that flush deck or weather deck, both fore and aft of a deck-house, are designed to hold a number of platforms, each capable of being loaded with a number of containers or similar.
6. A system according to claim 5, characterized by the fact, that the number of platforms, carried by flush deck, in the fore part are the same as the number of platforms, carried by flush deck, in the aft part of the deck-house.



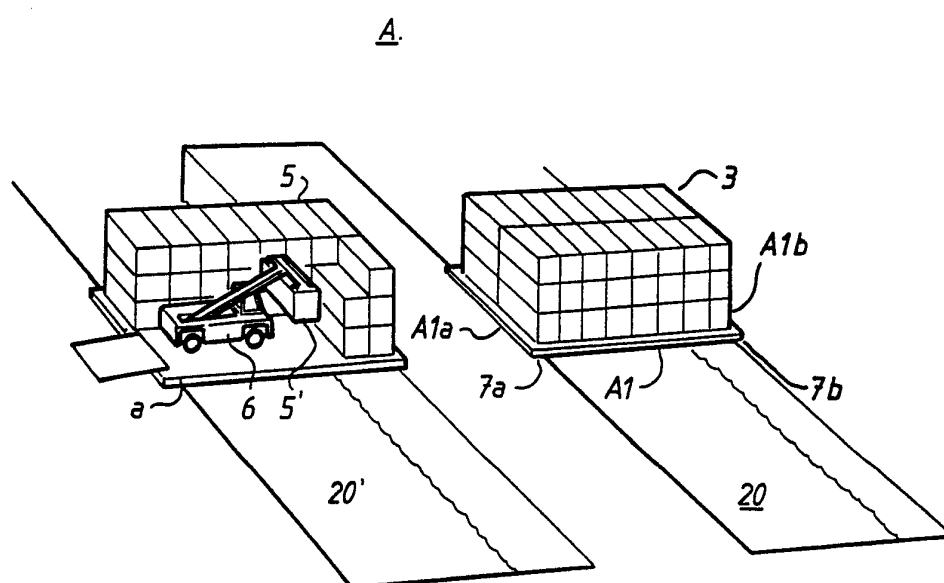
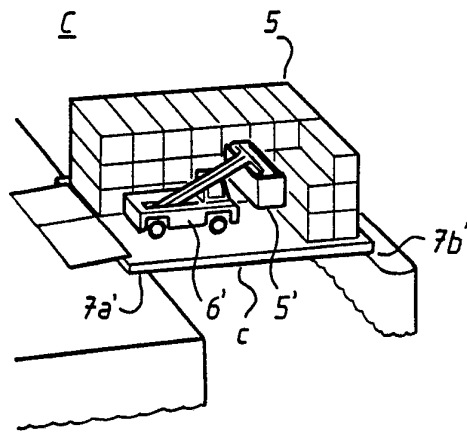


Fig 2.

Fig. 3.

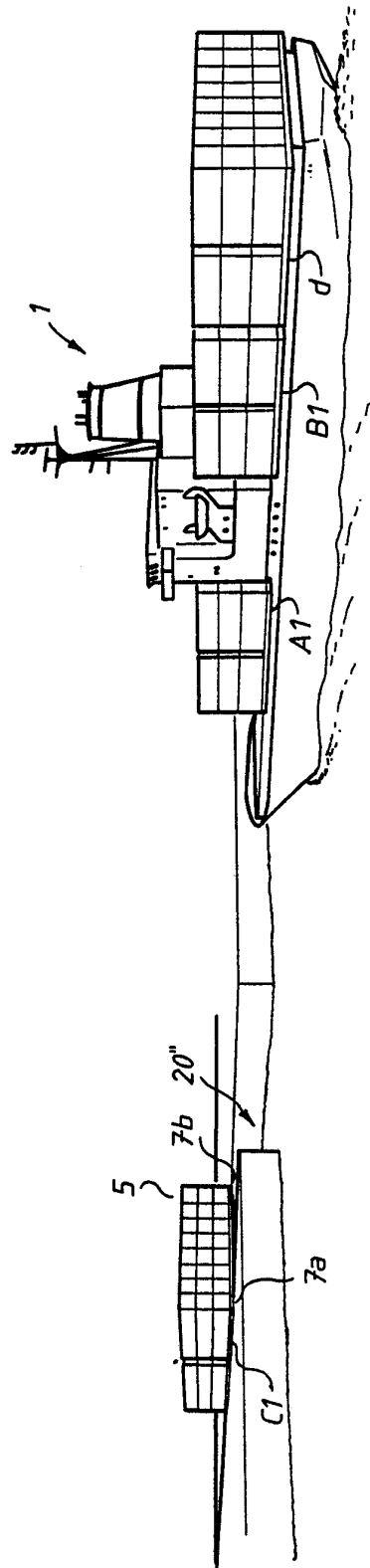


Fig. 4.

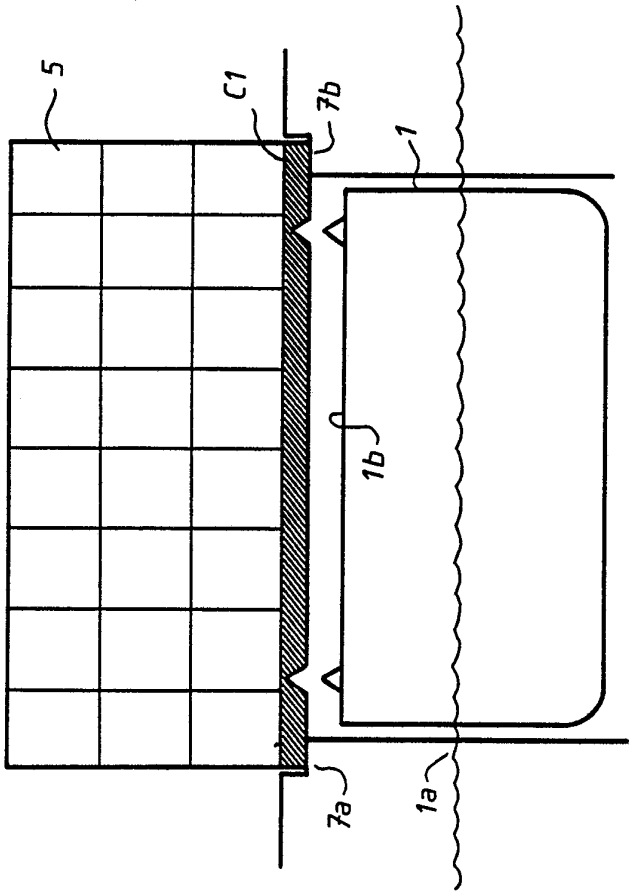
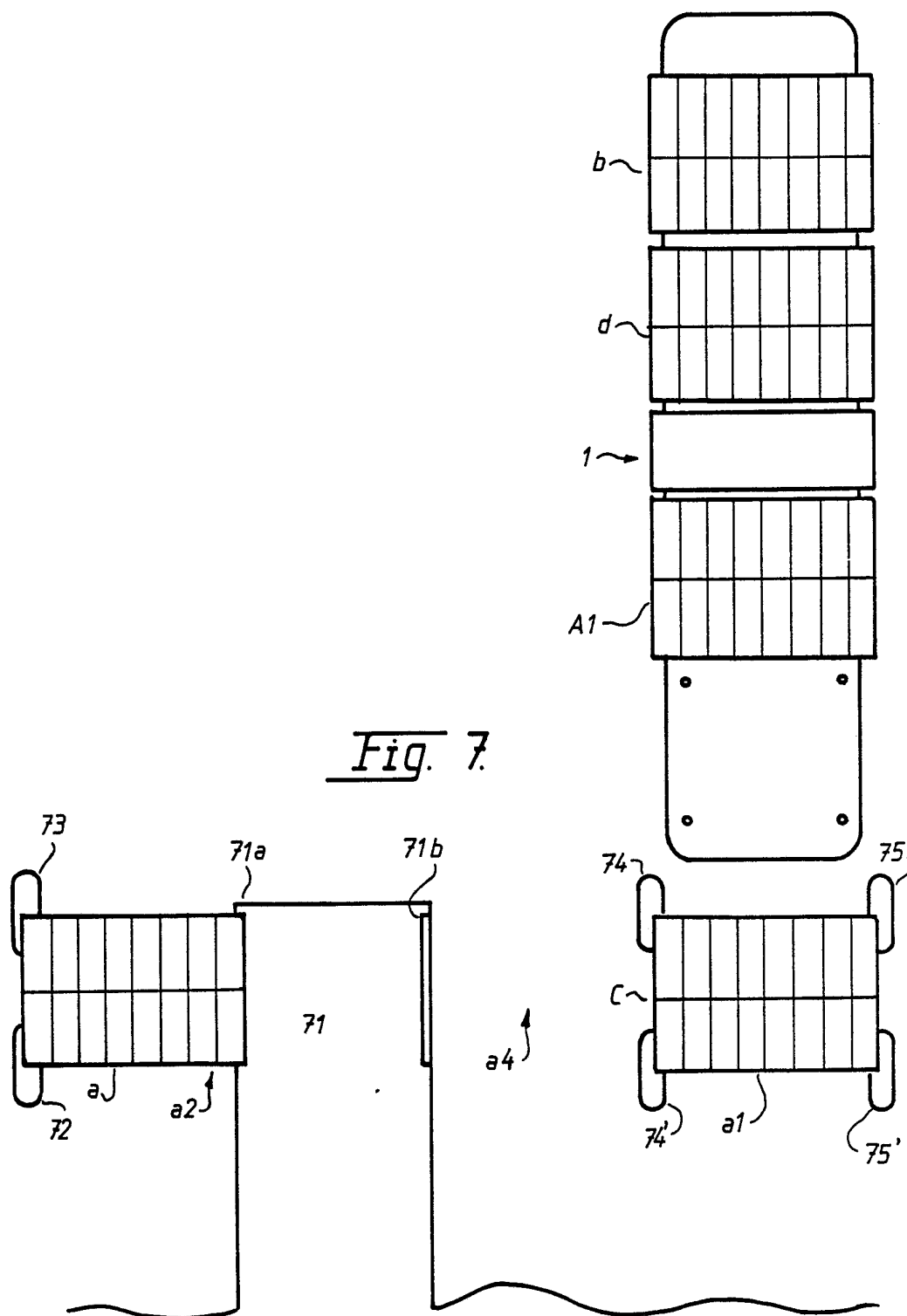


Fig. 6.



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 92/00088

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: B 65 G 67/60, B 63 B 27/00																	
II. FIELDS SEARCHED Minimum Documentation Searched⁷ <table style="width: 100%; border: none;"> <tr> <td style="width: 20%; border: none;">Classification System</td> <td style="border: none;">Classification Symbols</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">IPC5</td> <td style="border: 1px solid black; padding: 5px;">B 63 B; B 65 G</td> </tr> </table> Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched⁸			Classification System	Classification Symbols	IPC5	B 63 B; B 65 G											
Classification System	Classification Symbols																
IPC5	B 63 B; B 65 G																
SE,DK,FI,NO classes as above																	
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Category *</th> <th style="width: 60%;">Citation of Document,¹¹ with indication, where appropriate, of the relevant passages¹²</th> <th style="width: 30%;">Relevant to Claim No.¹³</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;">X A</td> <td style="vertical-align: top;">US, A, 4085695 (BYLO) 25 April 1978, see the whole document -- </td> <td style="vertical-align: top;">1,6, 10 2-5,7-9</td> </tr> <tr> <td style="vertical-align: top;">X A</td> <td style="vertical-align: top;">US, A, 3793974 (BYLO) 26 February 1974, see the whole document -- </td> <td style="vertical-align: top;">1,6, 10 2-5,7-9</td> </tr> <tr> <td style="vertical-align: top;">X A</td> <td style="vertical-align: top;">US, A, 3139197 (J.J. BYLO) 30 June 1964, see the whole document -- </td> <td style="vertical-align: top;">1,6, 10 2-5,7-9</td> </tr> <tr> <td style="vertical-align: top;">X A</td> <td style="vertical-align: top;">US, A, 2371149 (J.J. BYLO) 13 March 1945, see the whole document -- ----- </td> <td style="vertical-align: top;">1,6, 10 2-5,7-9</td> </tr> </tbody> </table>			Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	X A	US, A, 4085695 (BYLO) 25 April 1978, see the whole document --	1,6, 10 2-5,7-9	X A	US, A, 3793974 (BYLO) 26 February 1974, see the whole document --	1,6, 10 2-5,7-9	X A	US, A, 3139197 (J.J. BYLO) 30 June 1964, see the whole document --	1,6, 10 2-5,7-9	X A	US, A, 2371149 (J.J. BYLO) 13 March 1945, see the whole document -- -----	1,6, 10 2-5,7-9
Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³															
X A	US, A, 4085695 (BYLO) 25 April 1978, see the whole document --	1,6, 10 2-5,7-9															
X A	US, A, 3793974 (BYLO) 26 February 1974, see the whole document --	1,6, 10 2-5,7-9															
X A	US, A, 3139197 (J.J. BYLO) 30 June 1964, see the whole document --	1,6, 10 2-5,7-9															
X A	US, A, 2371149 (J.J. BYLO) 13 March 1945, see the whole document -- -----	1,6, 10 2-5,7-9															
* Special categories of cited documents:¹⁰ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family																	
IV. CERTIFICATION <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">Date of the Actual Completion of the International Search</td> <td style="width: 50%; border: none;">Date of Mailing of this International Search Report</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">25th May 1992</td> <td style="border: 1px solid black; padding: 5px;">1992 -05- 2 6</td> </tr> <tr> <td style="border: none;">International Searching Authority</td> <td style="border: none;">Signature of Authorized Officer</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">SWEDISH PATENT OFFICE</td> <td style="border: 1px solid black; padding: 5px;"> Petter Sörsdahl </td> </tr> </table>			Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	25th May 1992	1992 -05- 2 6	International Searching Authority	Signature of Authorized Officer	SWEDISH PATENT OFFICE	 Petter Sörsdahl							
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SWEDISH PATENT OFFICE	 Petter Sörsdahl																

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.PCT/SE 92/00088**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the Swedish Patent Office EDP file on **28/03/92**
The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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