Title: METHOD AND ARRANGEMENT FOR SHIPPING REELS AND TRANSPORT FRAME

Abstract: A method and an arrangement for shipping reels, and a transport frame. The frame (8), which comprises a body (35), a chute (9) for receiving at least one reel (7), and support surfaces (60) for supporting the reel in the lateral direction, is arranged in a ship into a space that is open at least during loading. A reel (7) or reels (7) are loaded into the frame (8). The frame (8) includes a roof (30) placed onto the reels for protecting the reels (7) from environmental conditions.
METHOD AND ARRANGEMENT FOR SHIPPING REELS AND TRANSPORT FRAME

BACKGROUND OF THE INVENTION

[0001] The invention relates to a method of loading reels onto a ship, the method using a frame comprising a body, a chute for receiving at least one reel, and support surfaces for supporting the reel in the lateral direction.

[0002] The invention also relates to an arrangement for loading reels onto a ship, for transporting the reels onboard the ship and for unloading the reels from the ship, the arrangement comprising a lifter for lifting the reels onto a frame comprising a body, a chute for receiving a reel, and support surfaces in the chute for supporting the reel in the lateral direction.

[0003] The invention further relates to a transport frame for use in loading reels onto a ship, for transporting the reels onboard the ship and for unloading the reels from the ship, the frame comprising a body, a chute for receiving a reel, and support surfaces in the chute for supporting the reel in the lateral direction.

[0004] Publication DE 3 246 331 discloses a solution for shipping reels, the solution comprising placing the reels by means of a lifter onto a rectangular frame comprising a bottom structure, a cradle for receiving a reel and support surfaces for supporting the reel in the lateral direction. The problem in this solution is that it does not enable efficient transport of reels.

[0005] Publication EP 1 222 107 discloses a solution for safely transporting reels. Although this known solution enables efficient transport of reels particularly on the tween-deck, in some cases the solution restricts the suitability of the ship for transporting other cargo than reels. The solution cannot either be directly utilized in different ships, since a ship-specific solution is concerned.

BRIEF DESCRIPTION OF THE INVENTION

[0006] The object of the present invention is to provide a new type of method and arrangement for shipping reels, and a transport frame.

[0007] The method of the invention is characterized by placing the frame, without reels, into a space that is open at least during loading, by means of a lifter, loading reels by means of the lifter onto the frame in the space that is open at least during loading, lifting a roof of the frame onto the
reels by means of the lifter, and using the same lifting means in the lifter for lifting the frame and the roof and/or the reels and the roof.

[0008] The arrangement of the invention is further characterized in that the frame includes a closed roof having lifting points for lifting the roof by means of a reel lifter on top of the reels and away from the reels and/or gripping projections for lifting the roof with a container lifter on top of the reels and away from the reels.

[0009] The transport frame of the invention is further characterized in that the frame includes a closed roof having lifting points for lifting the roof by means of a reel lifter on top of the reels and away from the reels and/or gripping projections for lifting the roof with a container lifter on top of the reels and away from the reels.

[0010] The invention is based on the idea that the frame including a body, a chute for receiving at least one reel, and support surfaces for supporting the reel in the lateral direction, is arranged in the ship into a space that is open at least during loading, such as onto the deck of the cargo space or somewhere else on the weather deck or into an open cargo space. A reel or reels are loaded into the frame. The frame further includes a roof, which is placed on top of the reels. This being so, when desired, a space, which is open also during the ship’s transport, can be utilized for transporting reels, or dusty or some other material harmful to the reels may be transported in the same space as the reels, and, thanks to the roof, placed on top of the reels, the reels are safe from the effects of weather and other environmental influences.

[0011] Lifting points, whereto the lifting member of a lifter can be connected are preferably arranged in the roof. The lifting points are preferably arranged such that the roof can be easily lifted with reel lifting tongs. The idea of an embodiment is to arrange the structure of the roof sufficiently solid and attachable to the frame such that during the lifting of the roof, the frame can be lifted simultaneously. The idea of another embodiment is that the middle portion of the roof is shaped such that a lifting means can be arranged to extend to the body of the frame, allowing the frame and, at the same time, the roof on top thereof, to be lifted with the lifting means. Such a solution enables the minimization of liftings to be carried out during shipping, and exchanges of lifting means may also be minimized particularly if the lifting points and/or the shaping of the roof are arranged such that the roof and/or the frame may be lifted with reel lifting tongs.
[0012] The idea of an embodiment is that the chute is a chute in the longitudinal direction of the frame and extends from one end to the other end of the frame (from one end of the frame to the other). This being so, the reels to be transported can be placed in the frame such that the frame may be filled with as many reels as possible, even if the reels were of different sizes. Furthermore, in this case, the frame is very well suitable for transporting bulk goods or bulk material.

[0013] The length of the frame is preferably about 12 metres and the width about 2.4 metres, corresponding to the length and width of a 40-feet container, the lower edges of both long flanks of the frame further comprising four fastening means including the fastening means in the corners of the frame, the corners of the upper plane of the frame comprising fastening means, the upper edges of both long flanks comprising four fastening means including the fastening means in the corners, whereby the bottom structure of the frame comprises eight fastening points, and the upper plane of the frame comprises eight fastening points, the distance between the fastening means at the upper plane further being such that one or more standard 20-feet containers or other transport means according to the container system may be fastened on top of the frame. Furthermore, in connection with the frames are preferably arranged corner poles on top of which standard containers may be fastened. Such a frame allows the ship for instance to transport both reels and containers on the outward voyage.

[0014] In accordance with an embodiment, the transport frame comprises a support body and a chute for receiving at least one reel, support surfaces for supporting the reel in the lateral direction, and a detachable roof. The chute of the transport frame is advantageously closed from below and the transport frame comprises ends and sidewalls that are closed and oriented upwards from the chute, and extend substantially up to the height of the frame. At least one of the ends is provided with a door. Reels may be transported with such a frame also for instance on the cargo deck or elsewhere on the weather deck or in an open cargo space. Furthermore, dusty or other material harmful to the reels may be transported in the same place as the reels, however, with the reels being protected from the effects of weather and other environmental influences. In addition, the transport frame is suitable for transporting bulk goods or bulk material, and thus the same transport frame may be used for transporting completely different types of cargoes. This provides extremely
efficient transport and extremely efficient utilization of the transport system.

[0015] Still further, in accordance with an embodiment, the roof is provided with gripping projections for lifting the roof from the frame body and the walls and ends with a container lifter and back on top of the body, the walls and the ends with a container lifter. This being so, the liftings and exchanges of lifting means may be minimized, since the frame, provided with a roof, may be lifted into position with one lifting and then the gripping means may be detached from the container lifter for lifting the container, and lift the roof from the frame with container lifter members gripping the gripping projections of the roof without separate intermediate phases and liftings.

[0016] Furthermore, the length of the frame is about 6 metres and the width about 2.4 metres, corresponding to the length and width of a 20-feet container. This makes the frame easy and simple to handle and in some cases, the frame may be lifted with a container lifter for instance loaded with reels or otherwise ready loaded.

[0017] Overall, the solution presented enables rapid and efficient loading of reels and containers of different sizes and weights onto a ship, efficient and safe transport of reels and containers onboard a ship and rapid unloading of reels and containers. The solution further enables the utilization of the solution for transporting also other cargo than reels with very slight measures or, depending on the type of cargo, even without further measures. In this context, efficient transport means that the cargo capacity of a ship can be utilized efficiently.

BRIEF DESCRIPTION OF THE FIGURES

[0018] Some embodiments of the invention will be described in more detail in the accompanying drawings, in which

Figure 1 schematically shows an example of a ship in which the invention may be utilized,

Figure 2 illustrates the ship of Figure 1 loaded with reels and containers, the containers containing other goods,

Figure 3 shows a schematic side view of a transport frame,

Figure 4 shows a schematic top view of the transport frame of Figure 3,

Figure 5 shows a schematic sectional view of the transport frame of Figure 3 along line C - C of Figure 3,
Figure 6 shows a schematic end view of the transport frame of Figure 3,
Figure 7 shows a schematic sectional view of the transport frame of Figure 3 along line A - A of Figure 3,
Figure 8 shows a schematic sectional view of the transport frame of Figure 3 along line B - B of Figure 3,
Figure 9 schematically shows detail Y of Figure 7,
Figure 10 schematically shows detail X of Figure 7,
Figure 11 schematically shows another transport frame seen obliquely from above,
Figure 12 schematically shows a reel lifting tong for moving frames,
Figures 13 and 14 illustrate the use of a reel lifter in transferring transport frames,
Figure 15 shows a schematic side view of a freight container,
Figure 16 shows a schematic end view of the freight container of Figure 15,
Figure 17 shows a schematic sectional view of the freight container of Figure 15 along line D - D of Figure 15,
Figure 18 shows a schematic top view of the freight container of Figure 15, and
Figure 19 schematically shows the lifting of the cover of a freight container with a container lifter.

[0019] In the figures, some embodiments of the invention are shown in a simplified manner for the sake of clarity. In the figures, like parts are denoted with like reference numerals.

DETAILED DESCRIPTION OF THE INVENTION

[0020] Figure 1 illustrates a ship suitable for transporting reels and containers. In the present context, reels refer particularly to heavy steel reels composed of a wound steel plate. Furthermore, the reels may be any pieces having a cylindrical structure, such as paper reels. The weight of reels is typically 10 to 25 t, but they may be heavier than this.

[0021] In Figure 1, reference numeral 1 denotes a cargo space, reference numeral 2 tween-deck portions, which together constitute a tween-deck 3, shown in Figure 2. Reference numeral 4 denotes cargo space deck portions, which together constitute a cargo space deck 5, shown in Figure 2, which may
be called an upper deck or a weather deck. The weather deck of a ship may comprise also other area than the cargo space deck 5. Reference numeral 6 denotes stowage or storage space for the tween-deck portions 2. The location of the storage space 6 in the ship may differ from that described.

[0022] As is evident from Figure 1, the tween-deck portions 2 are hinged together in pairs in a manner allowing them to be folded against each other. At the front of the cargo space of the ship, two tween-deck portions are folded together vertically, whereby they take up little space. In this position, the tween-deck portions 2 are not in the way when cargo is being loaded onto a bottom 40 of the cargo space. The arrangement for transferring the tween-deck portions 2 from the folded vertical position into a horizontal position is not described in more detail in the present context, since a person skilled in the art is able to achieve such an arrangement and, furthermore, the arrangement is known per se. Typically, the arrangement is hydraulic comprising a plurality of hydraulic cylinders and lever arms. The number of tween-deck portions 2 and the manner they are hinged together may differ from what is described depending on the ship. The tween-deck portions 2 do not necessarily have to be hinged together.

[0023] Figure 1 also shows that the deck portions 4 are hinged together in pairs in a manner allowing them to be folded against each other. In the figure, the deck portions 4 are in a vertical position enabling the loading of the cargo space 1 of the ship. The arrangement for transferring the deck portions 4 from the folded vertical position into a horizontal position is not described in more detail in the present context, since a person skilled in the art is able to achieve such an arrangement and, furthermore, the arrangement is known per se. Typically, the arrangement is hydraulic comprising a plurality of hydraulic cylinders and lever arms. The number of deck portions 4 and the manner they are hinged together may differ from what is described. The deck portions do not necessarily have to be hinged together, but may be composed of separate deck pontoons.

[0024] In Figure 2, a large number of reels 7 are loaded onto the bottom 40 of the cargo space of the ship. The reels 7 are placed on frames 8 comprising chutes (see e.g. Figure 7) for receiving the reels. Containers 150 are loaded on top of the frames 8. The ability to place containers 150 on top of the frame 8 enables efficient utilization of the volume of the cargo space.

[0025] A large number of reels 7 are also loaded onto the tween-
deck 3 of the ship. The reels 7 are placed on frames 8 similar to those on the bottoms 40 of the cargo space. The tween-deck 3 is supported to bear on supports 90 in the walls of the cargo space 1 of the ship.

[0026] Reels 7 placed on frames 8 are also arranged onto the deck 5 of the cargo space. The frames 8 on the deck 5 of the cargo space are further provided with a roof 30.

[0027] The number of frames 8 and containers 150 onboard the ship may vary. The reels in the frames 8 are placed in line in such a manner that their axes are in line with the longitudinal axis of the frame. There are frames 8 on the bottom of the cargo space, some of which are placed longitudinally in line and some are placed in line in the lateral direction.

[0028] The structure of the frames on the deck 5 of the cargo space is evident from Figures 3 to 10 or 11, for example. The structure of the frames on the bottom 40 of the cargo space or on the tween-deck 3 may be similar to that of the frames placed onto the deck 5 of the cargo space, but no roof 30 has to be arranged on top of the frames below the deck 5 of the cargo space. Furthermore, when desired, the structure of the frames 8 on the bottom 40 of the cargo space or on the tween-deck 3 may be different from the structure of the frames 8 placed onto the deck 5 of the cargo space. When the frame 8 is on top of the deck 5 of the cargo space or in another space that is open during transport, such as in other parts of the weather deck or in an open cargo space, i.e. in a space without roof, the roof 30 is sealed to the remainder of the frame. If there is a roof 30 on top of a frame 8 on the bottom 40 of the cargo space or on the tween-deck 3 or in another non-open space, i.e. a weather-protected space onboard the ship, then, however, no seal is required between the roof 30 and the remainder of the frame, unless dusty, erosive material or material otherwise harmful to the reels is transported in such a space.

[0029] Figure 3 shows a side view, Figure 4 a top view and Figure 6 an end view of the frame 8. The length of the frame 8 is 40 feet, i.e. about 12.2 metres, corresponding to the length of a standard container. The width of the frame 8 is 8 feet, i.e. about 2.4 metres, corresponding to the width of a standard container. The height of corner poles 101a, 101b, 110a, 110b, and, consequently the height of the entire frame 8, is about 2.59 metres. The solution presented may naturally be applied also to transport frames of other sizes, such as to 10-, 30-, 45- or 53-feet transport containers or frames.

[0030] Thanks to the corner poles 101a, 101b, 110a, and 110b, a
container can be placed onto the frame 8. There are two pairs of middle poles 107a, 107b and 109a, 109b, i.e. a first pair of middle poles 107a, 107b and a second pair of middle poles 109a, 109b in the middle of the length of the frame 8. Thanks to the middle poles 107a, 107b, 109a, and 109b and the corner poles 101a, 101b, 110a, and 110b, two containers can be placed onto the frame 8, the length of these containers being half of the length of the frame 8.

[0031] When required, the pairs of corner poles 101a, 101b, 110a, and 110b, and, similarly, the pairs of middle poles 107a, 107b, 109a, and 109b may be combined with a horizontal support or a framework construction, for example. If the poles are made rigid enough, such reinforcement structures are not required.

[0032] The free ends of the corner poles 101a, 101b, 110a, and 110b and the middle poles 107a, 107b, 109a, and 109b are provided with fastening members for fastening members at the corners of the containers to be arranged on top thereof. The containers are locked into the fastening members with a standard type of fastening arrangement, and the structure of the fastening arrangement will not be described in any more detail.

[0033] The frames 8 are fastened with the fastening arrangement to the deck below. For example, the fastening arrangement may comprise a fastening means to be fastened to the lower corner of the frame 8, the fastening means being lockable to a base, whereby a locking means is concerned. The mounting base may be the tween-deck 3 of the ship or the bottom 40 of the cargo space 1 of the ship or the deck 5 of the cargo space of the ship. The structure of the fastening arrangement will not be described in the present context, since a known fastening arrangement is used that is customarily used for fastening conventional containers to a deck of a ship. All corners of the frame 8 comprise a fastening means, which is known from containers. The fastening means is part of said fastening arrangement. Corresponding fastening means are arranged in the middle of the frame 8. In the example of Figure 3, altogether eight fastening means are arranged in the bottom of the frame 8. The fastening means may also be used to combine superimposed frames 8 together. A frame 8 can be fastened to an adjacent frame 8 by means of an engagement arrangement 79 shown in Figure 13, for example.

[0034] As is evident from Figure 7, the frame 8 comprises a chute 9 for the reels 7. The chute 9 constitutes a cradle for the reels 7 and constitutes a continuous surface extending along the entire length of the frame 8. Side-
walls 60 of the chute 9 constitute support surfaces providing the reels 7 with lateral support. The sidewalls 60 are shaped to provide optimal support for differently sized reels, which is illustrated by differently sized circles drawn in the figure. The diameter of the largest circle is about 2100 mm and that of the smallest about 900 mm. Initially, the sidewalls are at an angle of about 100° against each other and finally at an angle of about 40° against each other. The amounts of degrees may also differ from these and they may be defined in accordance with the shape and size of the reels. The shape and height of the sidewalls 60 are arranged in such a manner that the reel 7 remains in the cradle also without fastening lines.

[0035] In Figure 7, reference numerals 19 and 22 denote two longitudinal supports below the chutes 9, the supports extending from one end of the frame 8 to the other. From the longitudinal supports, the weights caused by the reels 7 are transferred to the bottom structure of frame 8, denoted by reference numeral 50. There may also be transverse supports below the chute 9. Together, the longitudinal supports, the transverse supports, the bottom structure and other corresponding supporting structures constitutes the body of the frame 8, which is illustrated by reference numeral 35 in the figures.

[0036] Both opposite flanks of the frame 8 are provided with eight fastening means, whereby the bottom structure of the frame includes a total of 8 locking means, and the upper plane includes a total of eight fastening means. The fastening means in both midpoints of the flanks of the frame 8 are at such a distance from each other that they enable the fastening of a 20-feet standard container to the frame 8 in a manner enabling the fastening of two 20-feet standard containers on top of or below the frame 8. This distance is about 0.4 metres. The feasibility of fastening either 20-feet standard containers or a 40-feet standard container to the frame 8 is a highly recommendable feature, since it ensures that no empty frames, i.e. frames without reels, have to be detached and moved to storage because the need is to transport containers and not reels. Accordingly, on the outward voyage, the ship may transport reels and on the return voyage containers without cumbersome additional work stages as the frames 8 remain in position in the ship.

[0037] A roof 30 is arranged on top of the reels 7. The roof 30 is closed, and a sidewall 31 and end walls 32 of the frame 8 are also closed. Thus, the reels 7 are tightly protected from the weather even though the frame 8 is on the deck 5 of the cargo space or in another open space, i.e. in a space
susceptible to the weather onboard the ship.

[0038] As Figure 7 shows, the roof 30 is arched. If desired, the roof 30 may also be made angular. The roof 30 is preferably made such that the roofs 30 can be stacked to overlap on top of each other. In this manner, the roofs 30, stacked on top of each other, do not constitute a very high stack.

[0039] The roof 30 is fastened to the body 35 with separate latching mechanisms, for example. Furthermore, the roof 30 may be fastened by using fastening lines or another fastening arrangement suitable for the purpose.

[0040] The roof 30 is provided with lifting points 16a. Figures 8 and 10 show the lifting points 16a in more detail. The roof 30 may be lifted from the lifting points 16a with a reel lifter 80 intended for lifting reels and shown in Figure 12. The lifting points 16a are provided in the middle of the length of the roof 30 at a distance of about 1.7 metres from each other. The distance between the lifting points 16a can be selected relatively freely, but the recommendable lifting points are within a distance range of 1.4 to 2 from each other. When the roof 30 is lifted with a reel lifter according to Figure 12, the tongs 17 of the reel lifter are placed in the lifting points 16a. Distance L between the tongs 17 is adjustable. Lifting projections 18 at the lower ends of the tongs 17 are placed into a counter piece at the lifting point 16a of the roof 30, the piece settling on top of the lifting projections of the tongs 17, which is illustrated in Figures 8 and 10. The lifting projections 18 are retractable into the tongs 17 so that they do not protrude.

[0041] Listing points 16b are also arranged in the body of the frame 8, as is illustrated in Figures 8 and 10. The lifting points 16b in the body of the frame 8 allow the frame 8 to be lifted with a reel lifter 80 also when it is covered with the roof 30. The mid portion of the roof 30 is, indeed, shaped narrower in a manner allowing the tongs of the reel lifter 80 to be placed either in the lifting points 16a of the roof or in the lifting points 16b of the body of the frame. The narrower portion of the roof 30 is clearly visible in Figure 4. Figure 8 and 10 show the tongs 17 and the lifting projection 18 thereof gripping both the lifting point 16a of the roof and the lifting point 16b of the body of the frame. Naturally, the tongs 17 and the lifting projections thereof are arranged in either lifting point according to whether only the roof 30 is to be lifted or an empty frame 8, on top of which a roof may be arranged.

[0042] Figure 9 shows how the roof 30 is sealed to a structure below. A groove at the lower edge of the roof is provided with a seal 33, which
may of rubber, for example. The seal 33 is pressed against a steel plate 34, for example. Figure 5 shows the seal 33 with a thick line, which thus illustrates the point where the roof 3 is sealed to a lower structure.

[0043] Since the roof 30 is tight and the sidewalls 31 and the end walls 32 are tight, the reels 7 are therefore in a tight casing. A water removal arrangement may be adapted to the bottom of the frame 8 for instance by providing the bottom with a non-return valve, which thus lets any water accumulated inside the frame out, but does not let water to the inside of the frame.

[0044] In the solution presented in Figures 3 to 10, the roof 30 may be quite lightly structured, since it does not at any stage have to bear a load placed on top thereof, but a container or containers to be placed on top thereof settle to rest on the end poles and the middle poles.

[0045] In the embodiment shown in Figure 11, the end poles 101a, 101b, 110a and 110b and the middle poles 107a, 107b, 109a and 109b do not extend higher than the edges of the chute 9. The height of the poles and, thus, the lower part of the frame 8 may be half of the height of a standard sized container, for example. The roof 30 to be placed on top of the reels 7, again, is correspondingly also half of the height of a standard sized container, whereby the entire frame 8, provided with the roof 30, is of the height of a standard sized container. In the embodiment of Figure 11, the roof 30 is provided with middle poles 111a, 111b, 120a and 120b, and middle poles 117a, 117b, 119a and 119b. In addition, the structures of the roof 30 are reinforced also in other manners. Accordingly, a 40-feet container or two 20-feet containers can be placed also on top of the frame according to Figure 11. The roof 30 is preferably locked with the lower part of the frame 8 by using so-called twist locks, for example.

[0046] The roof 30 is provided with lifting points 16a, from which the roof 30 can be lifted with a reel lifter 80. When the roof 30 is locked to the lower frame and the frame is empty, both the roof 30 and the remainder of the frame 8 may be lifted simultaneously with the reel lifter 80. Both lifting points 16a are provided with a channel 36, which leads to an opening 37 at the flank of the roof 30. The channel 36 is used to lead water out of an opening 37, whereby no such connection thus exists from the openings of the lifting points 16a in the upper portion of the roof to the inside of the frame 8 in such a manner that the reels 7 would be allowed to wet while the frames 8 are on top of the deck 5 of the cargo space.
[0047] An advantage of the solution of Figure 11 is that no such narrower portion exists in the middle portion of the frame 8 in which a reel as large as in other portions of the frame would not fit. Furthermore, no bend exists in the middle portion of the frame in the sealing line between the roof and the remainder of the frame part in a way similar to that of the solution of Figure 5.

[0048] Figure 12 shows a known reel lifter 80 for lifting reels (loose reels). As was mentioned above, the roof 30 and/or the frame 8 and/or the frame 8 provided with a roof 30 can be lifted with the lifting device of Figure 12. Naturally, no reels 7 are disposed in the frame 8 when the frame 8 is being lifted.

[0049] Figure 13 illustrates how two adjacent frames 8, connected to each other with coupling arrangements, are lifted. The tongs 17 of the lifting device 80 are arranged in the lifting points in the frame 8, the lifting points including counter pieces for the lifting projections 18 of the tongs 17, after which the frames may be lifted.

[0050] Figure 14 illustrates how two frames 8 arranged on top of each other are lifted. The tongs 17 of the lifting device, illustrated with a broken line, are first arranged through holes in the lifting points of the uppermost frame, and then through the openings in the lifting points of the lower frame in such a manner that the tongs settle in the position shown with a dashed line. Both frames 8 can then be lifted simultaneously with the lifting device.

[0051] Figures 15 to 18 show a container-like transport frame having a length of 20 feet, i.e. about 6.1 metres, corresponding to the length of a standard container. The width of the frame 8 is 8 feet, i.e. about 2.4 metres, corresponding to the width of a standard container. The height of corner poles 101a, 101b, 110a, 110b, and, consequently the height of the entire frame 8, is about 2.59 metres. The solution presented may naturally be applied also to transport frames of other sizes, such as to 10-, 30-, 45- or 53-feet transport containers or frames.

[0052] Thanks to the corner poles 101a, 101b, 110a, 110b, a second container can be placed onto the frame 8. The upper ends of the corner pole pairs at both ends are connected with horizontal supports 70. One end of the transport frame 8 comprises a door 71. At the end on the side of the door 71, the horizontal support 70 is removable from between the corner poles. The removal of the horizontal support 70 facilitates the loading and discharge of the transport frame 8 when a reel lifter, for example, is used. Instead of or in addi-
tion to a horizontal support, a framework or another suitable reinforcement structure may be used for supporting the pair of corner poles at the end of the transport frame 8 opposite to the door 71.

[0053] Door locking latches 72 or other suitable means, known per se, are arranged in connection with the door 71 for locking the door 71. The door 71 may also be arranged such that only its lower part, for example, is openable. The opening of only the lower part of the door 71 may be utilized for instance in connection with discharging bulk goods or bulk material, allowing the transport frame 8 to be discharged by tilting.

[0054] The free ends of the corner poles are provided with fastening members for fastening members at the corners of the containers to be arranged on top thereof. The containers are locked into the fastening members with standard types of fastening arrangements, and therefore the structure of the fastening arrangement will not be described in any more detail.

[0055] The frame 8 is fastened with the fastening arrangement to the deck below. For example, the fastening arrangement may comprise a fastening means to be fastened to the lower corner of the transport frame 8, the fastening means being lockable to a base, whereby a locking means is concerned. The mounting base may be the tween-deck of the ship or the bottom of the cargo space of the ship or the deck of the cargo space of the ship. The structure of the fastening arrangement will not be described in the present context, since a known fastening arrangement is used that is customarily used for fastening conventional containers to a deck of a ship. All corners of the frame 8 comprise a fastening means, which is known from containers. The fastening means is part of said fastening arrangement. The fastening means may also be used to combine superimposed freight containers 1 together.

[0056] As is evident from Figure 17, the transport frame 8 comprises a chute 9 for the reels 7. The transport frame 8 for transporting reels is made container-like, and can thus also be called a transport container. In the present context, reels refer particularly to heavy steel reels composed of a wound steel plate. Furthermore, the reels may be any pieces having a cylindrical structure, such as paper reels. The weight of reels is typically 10 to 25 kg. but they may be heavier than this.

[0057] The chute 9 constitutes a cradle for the reels 7 and constitutes a continuous surface extending along the entire length of the transport container 1. Sidewalls 60 of the chute 9 constitute support surfaces providing
the reels 7 with lateral support. The sidewalls 60 of the chute are shaped to provide optimal support for differently sized reels, which is illustrated by differently sized circles drawn in the figure. The diameter of the largest circle is about 2100 mm and that of the smallest about 900 mm. Initially, the sidewalls are at an angle of about 100° against each other and finally at an angle of about 40° against each other. The amounts of degrees may also differ from these and they may be defined in accordance with the shape and size of the reel. The shape and height of the sidewalls 60 are arranged in such a manner that the reel 7 remains in the cradle also without fastening lines.

[0058] In Figure 17, reference numerals 19 and 22 denote two longitudinal supports below the chutes 9. The longitudinal supports 19, 22 extend from one end of the transport container 1 to the other. From the longitudinal supports 19, 22, the weight caused by the reels 7 is transferred to the bottom structure of frame 8. There may also be transverse supports below the chute 9.

[0059] The transport frame 8 further comprises sidewalls 31 extending upwards from the sidewalls 60 of the chute substantially up to the height of the entire transport container 1. In the present context, the definition that the sidewalls 31 extend substantially up to the height of the transport container means that the height of the upper edge of the sidewalls 31 is at least 80% of the height of the entire transport container.

[0060] At the bottom, the chute 9 is closed, the sidewalls 31 also being closed, and the ends of the transport frame 8, i.e. the door 71 and the end opposite the door are also closed. In the present context, the definition that the chute 9 is closed at the bottom means that the sidewalls 60 of the chute are continuous, i.e. without holes. Correspondingly, the fact that the ends and the sidewalls 31 are closed means that they are continuous, i.e. without holes. Accordingly, the transport frame 8 may be utilized for transporting bulk goods and bulk material, such as steel refuse, sand, mineral coal, kaolin or some other bulk and/or powdery material, in addition to reels 7. If the chutes, ends and/or sidewalls are not closed, the transport container may be used for transporting large bulk material or bulk goods, e.g. materials or goods packed in boxes or cases.

[0061] The transport frame 8 is further provided with a closed and continuous roof 30. Accordingly, the roof 30 is tight. Thanks to the roof 30 and thanks to the chute, the sidewalls and the ends being closed, the transport frame 8 is closed as a whole, i.e. tight, in a manner allowing the transport
frame 8 to be used in transport also in spaces that are susceptible to the effects of weather or other environmental effects. Consequently, the transport frame 8 may be used in transport for instance on top of the deck of the cargo space or elsewhere on the weather deck or in an open cargo space. Naturally, the transport frame 8 may also be utilized in a cargo space provided with a deck and protected from the weather, or on the tween-deck or in another protected location. In this case, the transport frame 8 does not necessarily require a roof 30.

[0062] The roof 30 is detachable. Accordingly, by detaching the roof 30 and the horizontal support 70 on the side of the door 71, the transport frame 8 may be loaded and discharged easily and simply. The roof 30 is fastened into position with fastening latches 73 or by using some other fastening arrangement suitable for the purpose. Preferably, the fastening latches 73 are operable from below in accordance with Figure 15, i.e. standing at the plane of the lower edge of the transport frame 8.

[0063] In the manner illustrated in Figure 18, the roof 30 is provided with hatches 74. For instance, bulk material may be fed into the transport frame 8 through the hatches 74 by using a belt conveyor. The diameter of the hatch 74 may vary between 300 and 800 mm, for example.

[0064] Four gripping plates 75 are arranged in the edges of the roof 30. The gripping plates 75 constitute gripping projections for lifting the roof from and/or onto the body of the transport frame 8 with a container lifter 76.

[0065] Figure 19 illustrates the lifting of the roof 30 with a container lifter 76. When the transport frame 8 is lifted with the container lifter 76, the gripping means 77 of the container lifter 76 are used to grip the lifting points at the upper ends of the corner poles. In this instance, the container lifter 76 is parked on top of the transport frame 8. The container lifter 76 is preferably provided with actuator-operated gripping paws 78, which may be controlled with the actuator to grip from the underside of the gripping plate 75 serving as the gripping projection. The procedure may be for instance such that the container lifter 76 is used to lift the transport frame 8 into position. The fastening latches 73 are then opened. Once the gripping paws 78 of the container lifter 76 are controlled to grip the gripping plate 75 from the underside and the gripping means 77 of the container lifter 76 are detached from the upper ends of the corner poles, the container lifter 76 is used to lift the roof 30 away from the top of the transport frame 8. Accordingly, after the transport frame 8 is lifted in po-
position, the lifter does not have to be repositioned, nor does its gripping means have to be replaced before the roof 30 is lifted from its position.

[0066] The procedure may naturally also be reverse, i.e. when the transport frame 8 has no roof, the container lifter 76 is used to lift the roof 3 into position. In this case, the container lifter 76 will be positioned at the right position, and the gripping means 77 for lifting the transport frame 8 may be coupled to the upper ends of the corner poles of the transport frame 8, and the transport frame 8, provided with a roof, lifted. Accordingly, also in this case, there are few lifting events and replacements of lifting means.

[0067] When the roof includes at least four gripping projections, the roof 30 remains well in balance when lifted with the container lifter 76. In this embodiment, too, in addition to or instead of said gripping projections, the roof 30 may be provided with lifting points 16a for lifting the roof 30 with a reel lifter, whereby the same lifting means is thus used for lifting the roof 30 and the reels 7, the number of lifting events and replacements of lifting means remaining also reasonably low.

[0068] In some cases, the features presented in the present application may be used as such, irrespective of other features. On the other hand, if need be, the features disclosed in the present application may be combined to provide different combinations.

[0069] The drawings and the related description are only intended to illustrate the idea of the invention. The details of the invention may vary within the scope of the claims.

[0070] The structure of the frame 8 may be rigid or, instead, a bottom structure 50 of the frame 8 may comprise a flexible support surface for supporting the frame against the deck of the ship, the rigidness of the frame being dimensioned such that the bottom structure of the frame is adapted to yield elastically to a degree making the bottom structure of the frame bend against the deck, and the flexible support surface constitutes a pressure-equalization surface against the deck when the frame is loaded with reels.

[0071] Furthermore, the corner poles and the middle poles may be rotatable by means of hinges or a joint arrangement into a horizontal position, for example.

[0072] Preferably, the sides, i.e. flanks of the frames are provided with detachable side supports. The side supports may be arranged at the mid-points of one flank and the corners of the frame, for example. The purpose of
the side supports is to support the frame 8 and to conduct horizontal forces into an adjacent frame and also to provide support against the wall of the cargo space or against a fitting piece in the wall in case the frame would yield and/or be displaced in the lateral direction. The wall of the cargo space may include a reinforcement for preventing any application of surface pressure caused by the lateral support to the wall. The side support may be composed of an arched piece, for example, which comprises a slanting side surface oriented upwards and to the sides, which surface, when hitting an obstacle (for instance the side support of another frame or a fitting piece in the wall of the cargo space), is able to control the frame 8 when it is being lowered down into position with the lifter. The fastening of the side support to the flank of the frame 8 may be implemented with a bolted joint (or other detachable fastening means), which is preferably fastened to the fastening means. Alternatively, the side support may be welded to the flank of the frame 8. Naturally and preferably, the other flank of the frame 8 also comprises side supports. The number and shape of side support may vary.

[0073] Lifting points may be arranged in the roof 30 for instance in the corners thereof for lifting the roof 30 for instance with a container lifter or another suitable lifting means. Most preferably, however, the roof 30 is lifted with the same lifting means as the reels.

[0074] The roof 30 of the frame 8 may also be composed of a second frame 8, having a body 35, a chute 9 and support surfaces 60. In this case, different lower parts and roofs are thus not required for the frame 8, which diversifies the uses of the frames 8 and facilitates logistics. In this case, preferably, the height of the frame 8, comprising a body 35, a chute 9 and support surfaces 60, is half of the height of a standard container. When a second frame 8 is placed, turned upside down, as the roof 30 on top of the reels 7, the total height of the roofed structure constituted by two frames is the same as the height of a standard container.
CLAIMS

1. A method of loading reels onto a ship, the method using a frame (8) comprising a body (35), a chute (9) for receiving at least one reel (7), and support surfaces (60) for supporting the reel (7) in the lateral direction, characterized by placing the frame (8), without reels, into a space that is open at least during loading, by means of a lifter, loading reels (7) by means of the lifter onto the frame (8) in the space that is open at least during loading, lifting a roof (30) of the frame (8) onto the reels by means of the lifter, and using the same lifting means in the lifter for lifting the frame (8) and the roof (30) and/or the reels (7) and the roof (30).

2. A method as claimed in claim 1, characterized by using the same lifting means in the lifter for lifting the frame (8), the reels (7) and the roof (30).

3. A method as claimed in claim 1 or 2, characterized in that the transport frame is container-like comprising opposite ends, at least one of which comprises a door (71), and opposite side walls (31) extending upwards from the chute (9), and that in addition to reels (7), bulk goods or bulk material is transported on the frame (8) when the frame (8) is not used for transporting reels (7).

4. An arrangement for loading reels onto a ship, for transporting the reels onboard the ship and for unloading the reels from the ship, the arrangement comprising a lifter for lifting the reels onto a frame (8) comprising a body (35), a chute (9) for receiving a reel (7), and support surfaces (60) in the chute for supporting the reel (7) in the lateral direction, characterized in that the frame (8) includes a closed roof (30) having lifting points (16a) for lifting the roof (30) by means of a reel lifter on top of the reels (7) and away from the reels (7) and/or gripping projections for lifting the roof (30) with a container lifter (76) on top of the reels (7) and away from the reels (7).

5. An arrangement as claimed in claim 4, characterized in that lifting points (16b) are arranged in the middle portion of the body (35) of the frame (8) for lifting the frame (8) with a reel lifter.

6. An arrangement as claimed in claim 5, characterized in that a narrower portion is arranged in the middle portion of the roof (30) for allowing the reel lifter to grip the lifting points (16b) of the frame when the roof (30) is on top of the body (35).
7. An arrangement as claimed in claim 4, characterized in that the roof (30) is attachable to the body (35) of the frame (8) and has such a rigid structure that the frame (8) can be lifted together with the roof (30) from the lifting points (16a) of the roof (30).

8. An arrangement as claimed in any one of claims 4 to 7, characterized in that the length and width of the frame (8) correspond to the measurements of a standard container.

9. An arrangement as claimed in any one of claims 4 to 8, characterized in that the chute (9) of the frame (8) is composed of a chute in the longitudinal direction of the frame (8), the chute extending from one end of the frame (8) to the other.

10. An arrangement as claimed in any one of claims 4 to 9, characterized in that the roof (30) is constituted by a second frame (8) comprising a body (35), a chute (9) and support surfaces (6).

11. An arrangement as claimed in any one of claims 4 to 10, characterized in that the frame (8) is container-like comprising opposite ends, at least one of which comprises a door (71), and opposite side walls (31) extending upwards from the chute (9), and that in addition to reels (7), bulk goods or bulk material is transported on the frame (8) when the frame (8) is not used for transporting reels (7).

12. A transport frame for use in loading reels onto a ship, for transporting the reels onboard the ship and for unloading the reels from the ship, the frame (8) comprising a body (35), a chute (9) for receiving a reel, and support surfaces (60) in the chute (9) for supporting the reel (7) in the lateral direction, characterized in that the frame (8) includes a closed roof (30) having lifting points (16a) for lifting the roof (30) by means of a reel lifter on top of the reels (7) and away from the reels (7) and/or gripping projections for lifting the roof (30) with a container lifter (76) on top of the reels (7) and away from the reels (7).

13. A frame as claimed in claim 12, characterized in that lifting points (16b) are arranged in the middle portion of the body (35) of the frame (8) for lifting the frame (8) with a reel lifter.

14. A frame as claimed in claim 13, characterized in that the middle portion of the roof (30) is narrower for allowing the reel lifter to grip the lifting points (16b) of the frame when the roof (30) is on top of the body (35).

15. A frame as claimed in claim 12, characterized in that the
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roof (30) is attachable to the body (35) of the frame (8) and has such a rigid structure that the frame (8) can be lifted together with the roof (30) from the lifting points (16a) of the roof (30).

16. A frame as claimed in any one of claims 12 to 15, characterized in that the length and width of the frame (8) correspond to the measurements of a standard container.

17. A frame as claimed in any one of claims 12 to 16, characterized in that the chute (9) of the frame (8) is composed of a chute in the longitudinal direction of the frame (8), the chute extending from one end of the frame (8) to the other.

18. A frame as claimed in any one of claims 12 to 17, characterized in that the frame (8) is container-like comprising opposite ends, at least one of which comprises a door (71), and opposite side walls (31) extending upwards from the chute (9), and that in addition to reels (7), bulk goods or bulk material is transported on the frame (8) when the frame (8) is not used for transporting reels (7).
FIG. 11
INTERNATIONAL SEARCH REPORT

International application No
PCT/FI2009/050236

A CLASSIFICATION OF SUBJECT MATTER
See extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: B63B, B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
FI, SE, NO, DK

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-INTERNAL, WPI, COMPDX, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>JP 05270546 A (KAWASAKI STEEL CORP.) 19 October 1993 (19.10.1993), figures, machine translation into English</td>
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Further documents are listed in the continuation of Box C. See patent family annex

* Special categories of cited documents:
  'A' document defining the general state of the art which is not considered to be of particular relevance
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# International Search Report

## Information on Patent Family Members

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