

LASHING BRIDGE FOR A CARGO SHIP

The object of the present invention is a lashing bridge for a cargo
5 ship for supporting containers during transport, which lashing
bridge is installed on the deck of the cargo ship in the transverse
direction of the cargo ship, and which lashing bridge comprises
fixing points for fixing lashing bars to it, which lashing bars are
fixed at their other end to the containers.

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The object of the present invention is a support framework (a so-
called lashing bridge) to be installed on the deck of a cargo ship
intended for transporting containers. Lashing bars to be used for
supporting the containers are fixed to the structure in question.

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On a cargo ship containers are generally transported below deck
and on deck in a number of rows and lines and also in a number of
layers one on top of the other. Below deck are guide rails, on which
the containers are supported when at sea. On deck are detachable
20 hatch covers, with which the hold below is closed. The containers
above deck are transported on top of the hatch covers. The support
structures on deck, e.g. lashing bridges, for the containers must be
installed at such a distance from each other that the hatch cover
can, in connection with unloading and loading the cargo of the ship,
25 be removed and lowered back with a crane.

After the containers have been loaded onto the ship, at least some
of the containers that are on deck are fixed at their ends to a
lashings bridge with lashing bars and turnbuckles. Each lashing bar
30 is fixed at one of its ends to one corner of a container and at the
other end to a turnbuckle, which in turn is fixed at its other end to
a lashing bridge. The fixing is tightened by rotating the turnbuckle.

When the ship inclines in the swell of the sea, forces that are
35 longitudinal, transverse and also vertical to the ship and that are
exerted by the lashing bars act on the lashing bridges.

Lashing bridges known in the art are of the type that their structure functions as a single entity in such a way that the aforementioned forces in varying directions - more particularly the force longitudinal to and the force vertical to the ship - are conveyed to the hull of the ship via the same structural elements.

Known lashing bridge arrangements are presented e.g. in the following patents: KR20070115383, EP0815004, KR20090121510, WO9630256A1.

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In earlier solutions the geometry of lashing bridges has been designed in such a way that the forces and loads prevailing in the structure are conveyed to the hull of the ship unfavorably. This results in a heavy and expensive structure. In addition, the vibration of the hull caused by the running of the engine might cause strength problems and vibration problems in conventional lashing bridge structures.

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The purpose of the invention is to achieve a lashing bridge, to which the problems appearing in prior art are not attached. The lashing bridge according to the invention is characterized in that at least one tension bar is fixed to the lashing bridge for conveying essentially only the upward forces exerted on the lashing bridge by the lashing bars to the hull of the cargo ship.

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One preferred embodiment of a lashing bridge according to the invention is characterized in that tension bars are installed in an essentially vertical direction.

Another preferred embodiment of a lashing bridge according to the invention is characterized in that the top ends of the tension bars are disposed in line with the fixing points that are situated on the lashing bridge for the lashing bars of the containers.

Yet another preferred embodiment of the lashing bridge according to the invention is characterized in that the top ends of the tension bars are disposed at a distance from the fixing points that are

situated on the lashing bridge for the lashing bars of the containers, in which case the top structures of the lashing bridge transmit forces from the fixing points in question to the tension bars.

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By using the tension bars according to the invention, a lashing bridge can be made to be more lightweight than earlier. At the same time it is possible to reduce the tendency of a lashing bridge to vibrate. The structure is also cheaper to manufacture than before.

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In the following, the invention will be described in more detail by the aid of some preferred embodiments with reference to the attached drawings, wherein

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Fig. 1 presents a conventional lashing bridge and a stack of containers, with two lashing bars connected.

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Fig. 2 presents a conventional lashing bridge and a stack of containers, as viewed from the side.

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Fig. 3 presents a conventional lashing bridge and a stack of containers, with two lashing bars connected.

Fig. 4 presents a lashing bridge according to the invention and a stack of containers, with two lashing bars connected.

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Fig. 5 presents a closer view of a lashing bridge according to the invention and a stack of containers, with two lashing bars connected.

Figs. 1-3 thus present prior art. These figures, which are not described in any more detail in this context, are presented so that the difference between prior art and the invention would be easier to understand. Figs. 1 and 2 illustrate the lashing bars (in this case

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2 units) between the lashing bridge and the container stack. The lack of verticality of the lashing bars seen in Fig. 2 produces a force in the longitudinal direction of the ship on the lashing bridge.

5 Figs. 4 and 5 present the actual invention. A lashing bridge 1 of a cargo ship is typically disposed in the transverse direction of the ship, and the containers/container stacks 2 are disposed between them in such a way that the lashing bars 3 of the containers can be fixed between the containers 2 and the lashing bridge 1. Lashing
10 bridges 1 are of different heights, typically they extend from the level of the weather deck of the ship to a height of two, three or four containers.

The term lashing bar 3 refers in this context to the combination of
15 a lashing bar and a turnbuckle. As described earlier, each lashing bar is fixed at one of its ends to one corner of a container and at its other end to a turnbuckle, which in turn is fixed at its other end to a lashing bridge. The fixing is tightened by rotating the turnbuckle.

20 The top part of the lashing bridge 1 comprises a walkway 4, on top of which a person works when the lashing bars of the containers are detached and attached. Fixing points 5 for the lashing bars 3 of the containers 2 are therefore also disposed on the top part of the lashing bridge.

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When the ship is traveling at sea, especially when the ship inclines, the container stack exerts large forces in the lashing bars 3 fixed to the containers 2 and onwards to the lashing bridge 1.

30 The forces acting on the lashing bridge in the longitudinal direction of the ship from the lashing bars 3 of the containers 2 are transmitted to the hull of the ship first via the walkway 4 and then via the butt ends 6 of the lashing bridge or via the guide pillars 7 of the loading hatch or via corresponding structures. The forces in the
35 transverse direction of the ship, for their part, are transmitted to the hull of the ship first via the walkway 4 and then via the

diagonal support beams 8 or via plate structures (not presented in the figure) that are in a vertical direction.

The vertical upward forces acting on the lashing bridge 1 from the lashing bars 3 of the containers are transmitted to the hull of the ship with the tension bars 9 according to the invention, of which there are one or more units. In the vertical attitude according to Figs. 4 and 5 the tension bars 9 do not essentially transmit horizontal forces or downward forces. There are no separate tension bars at the point of the butt ends 6 and of the guide pillars 7 of the lashing bridge, but instead the butt ends 6 and the guide pillars 7 also transmit vertical upward forces. The butt ends 6 and guide pillars 7 also support the walkway 4 and the other upper structures of the lashing bridge 1.

In the lashing bridge 1 according to the invention the vertical, typically upward, forces exerted by the lashing bars 3 of the containers 2 are therefore conveyed to the hull of the ship (more precisely: to the transverse coamings between cargo holds, which are a part of the hull structure of the ship) with the tension bars 9 or with corresponding structural elements, which do not significantly support the structure of the lashing bridge 1 in the transverse direction or in the longitudinal direction or in the vertical downward direction.

The top ends of the tension bars 9 are preferably disposed in line with the fixing points 5 that are situated on the lashing bridge 1 for the lashing bars 3 of the containers 2. The top ends of the tension bars 9 can also be disposed at a distance from the fixing points 5 that are situated on the lashing bridge for the lashing bars 3 of the containers 2, in which case the top structures of the lashing bridge 1 are able to transmit forces from the fixing points 5 in question to the tension bars 9.

The tension bars 9 can also be inclined e.g. in the transverse direction of the ship, in which case also transverse forces, but not forces longitudinal to the ship, are transmitted via them.

Each tension bar 9 can be arranged to extend from their bottom ends from the hull of the cargo ship, more particularly from the transverse coamings between the cargo holds, upwards to near the
5 fixing points 5 disposed on the lashing bridge 1 for the lashing bars 3. Alternatively, a tension bar 9 can function higher up, supported at its bottom end by the structures of the lashing bridge 1 (being disposed e.g. between two horizontal levels of lashing bridge that are one above the other). The fixings of a tension bar 9 can take
10 place by welding or with some other method suited to the purpose.

The shape of the cross-section of a tension bar 9 can vary at different points of the tension bar 9, and also cross-sectional shapes that are complex in their geometry are possible.

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A tension bar 9 can also be a cable, rope or corresponding, instead of a rigid profile. Further, a tension bar 9 can be of solid material or tube profile, and in its cross-sectional shape a tension bar can be round, rectangular or corresponding. Typically the dimensions of a
20 tension bar are less than 100x100x8 mm or a corresponding amount of steel as a cross-section.

It is obvious to the person skilled in the art that the invention is not limited to the embodiments described above, but that it can be
25 varied within the scope of the claims presented below.

The characteristic features possibly presented in the description in conjunction with other characteristic features can if necessary be used separately to each other.

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CLAIMS

- 5 1. Lashing bridge (1) for a cargo ship for supporting containers (2) during transport, which lashing bridge (1) is installed on the deck of the cargo ship in the transverse direction of the cargo ship, and which lashing bridge (1) comprises fixing points (5) for fixing lashing bars (3) to it, which lashing bars (3) are fixed at one of their ends to the containers (2), **characterized** in that at least one tension bar (9) is fixed to the lashing bridge (1) for conveying essentially only the upward forces exerted on the lashing bridge (1) by the lashing bars (3) to the hull of the cargo ship.
- 10 2. Lashing bridge according to claim 1, **characterized** in that the tension bars (9) are installed in an essentially vertical direction.
- 15 3. Lashing bridge according to claim 1 or 2, **characterized** in that the top ends of the tension bars (9) are disposed in line with the fixing points that are situated on the lashing bridge for the lashing bars of the containers (2).
- 20 4. Lashing bridge according to claim 1 or 2, **characterized** in that the top ends of the tension bars (9) are disposed at a distance from the fixing points (5) that are situated on the lashing bridge for the lashing bars of the containers, in which case the top structures of the lashing bridge (1) transmit forces from the fixing points (5) in question to the tension bars (9).
- 25 30 5. Lashing bridge according to any of claims 1-4, **characterized** in that the tension bars (9) are arranged to extend from their bottom ends from the hull of the cargo ship, more particularly from the transverse coamings between the cargo holds, upwards to near the
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fixing points (5) disposed on the lashing bridge (1) for the lashing bars (3).

- 5 6. Lashing bridge according to any of claims 1-4, **characterized** in that the tension bars (9) are fixed at their bottom ends to structures of the lashing bridge (1) above the hull of the cargo ship and at their top ends to near the fixing points disposed on the lashing bridge (1) (5) for the lashing bars (3).
- 10 7. Lashing bridge according to any of claims 1-6, **characterized** in that the tension bar (9) is of solid material or of pipe profile.
- 15 8. Lashing bridge according to any of claims 1-7, **characterized** in that the cross-section of the tension bar (9) is round or rectangular.