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Other References

Photo of Miss Bardahl on tilt trailer, taken 1959. .
 Photo of Miss Bardhal on tilt trailer, taken 1996. .
 Photos (2) of Hydroplane Tilt-Frame Trailer constructed in 1957, taken Oct. 24, 2002. .
 Photos (2) of Hydroplane Tilt-Frame Trailer constructed in the 1960s or earlier, taken Oct. 24, 2002..

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Parent Case Text

RELATED APPLICATIONS

This application claims priority to U.S. Provisional Patent Application No. 60/378,359, filed May 8, 2002 and to U.S. Provisional Patent Application No. 60/396,951, filed Jul. 18, 2002, each of which is incorporated herein by reference in its entirety.

Claims

14. A cargo rack, comprising: a longitudinal arm for support of cargo, said longitudinal arm being rotatable from a substantially horizontal loading position to an inclined transport position; and one or more bracing arms, said one or more bracing arms extending from the longitudinal arm in a substantially perpendicular direction, at least one of said bracing arms having a length so that when the cargo is loaded on the rack, no more than one bracing arm contacts or supports a corner of the cargo, wherein at least one of the bracing arms includes an extendable assembly, wherein the extendable assembly comprises a sleeve device, a moveable structure, and a grippable member for extending the moveable structure from the sleeve device and retracting the moveable structure into the sleeve device.

15. The cargo rack of claim 14 wherein no bracing arm contacts or supports a corner of the cargo.

16. The cargo rack of claim 14 further comprising a plurality of horizontally spaced supports that support the longitudinal arm when in the substantially horizontal loading position.

Description

FIELD OF THE INVENTION

The present invention relates generally to cargo racks for supporting wide cargo in an inclined position during transport by road, rail, water or other means in order to decrease the apparent width of the cargo. More particularly, the present invention relates to tiltable cargo racks having a rotatably mounted longitudinal arm with a plurality of upwardly extending members for support of the cargo.

BACKGROUND OF THE INVENTION

Prior art tiltable cargo racks for supporting large pre-cast concrete structures had a longitudinal arm rotatable from a horizontal loading position to an inclined transport position. An example of such a rack is described in U.S. Pat. No. 5,947,665 to Baur et al., FIGS. 1-4 and the corresponding text of U.S. Pat. No. 5,947,665 are incorporated herein by reference in their entirety. In such prior cargo racks, a plurality of upwardly extending members of specified length was required for simultaneously contacting and supporting respective corners of the structure. Adequate support was not provided in the event that the pre-cast concrete structure had one or more corners at a height differing from the length of one or more of the corresponding upwardly extending members of the rack. Also, adequate support was not provided to prevent unintentional tilting of the rack during cargo loading.

Accordingly, it is desirable to provide a tiltable cargo rack that provides adequate support for the cargo without requiring a plurality of upwardly extending members of specified length that simultaneously contact and support respective corners of the cargo.

SUMMARY OF THE INVENTION

It is therefore a feature and advantage of the present invention to provide a cargo rack that is securely retained in a horizontal position during cargo loading. The invention prevents unintentional tilting of the rack and does not require upwardly extending members of a specified length for simultaneous contact and support of corresponding corners of the cargo.

It is another feature and advantage of the invention to provide a cargo rack that securely retains the cargo in position during tilting of the rack without requiring a plurality of upwardly extending members of specified length for simultaneously contacting and supporting respective corners of the cargo.

The above and other features and advantages are achieved through the use of a novel cargo rack as herein disclosed. In accordance with one embodiment of the present invention, a cargo rack is provided which

comprises: (1) a longitudinal arm, for support of cargo, said longitudinal arm being rotatable from a substantially horizontal loading position to an inclined transport position; (2) at least one support member to support the arm securely in a substantially horizontal loading position, wherein at least one of the support members is selectively movable from a support position to a retracted position in order to permit rotation of the longitudinal arm to an inclined position for cargo transport; and (3) at least one leg that is attached to and substantially perpendicular to the longitudinal arm, wherein no more than one of the legs contacts and supports a corner of the cargo. Optionally, the invention includes an extendable assembly located within at least one of the legs for further supporting the cargo. The extendable assembly may include, for example, a sleeve and a movable structure located within the sleeve, wherein the movable structure may be extended from the sleeve to contact the cargo.

In accordance with an alternate embodiment of the invention, an apparatus for transporting cargo, includes (1) a longitudinal arm that is rotatable from a substantially horizontal loading position to an inclined transport position; and (2) at least one bracing arm extending upwardly and in a substantially perpendicular direction from the longitudinal arm, wherein at least one of the bracing arms includes an extendable assembly for providing at least partial support of the cargo. The extendable assembly may include, for example, a sleeve and a movable structure located within the sleeve, wherein the movable structure may be extended from the sleeve to contact the cargo. The extendable assembly may also include a grippable member for extending the movable structure from the sleeve and retracting the movable structure into the sleeve, and the movable structure may comprise an inner sleeve. The movable structure may also include a planar structure for contacting the cargo.

In accordance with another embodiment of the invention, a cargo rack, includes: (1) a longitudinal arm, said longitudinal arm being rotatable from a substantially horizontal position to an inclined transport position; and (2) at least one bracing arm extending from the longitudinal arm. At least one of the bracing arms preferably includes an extendable assembly, and the extendable assembly preferably comprises a sleeve and a movable structure.

In accordance with another embodiment of the invention, a cargo rack includes a longitudinal arm for support of cargo, where the longitudinal arm is rotatable from a substantially horizontal loading position to an inclined transport position. This embodiment also includes one or more bracing arms that extend from the longitudinal arm in a substantially perpendicular direction. In this embodiment, at least one of the bracing arms has a length so that when the cargo is loaded on the rack, no more than one bracing arm contacts or supports a corner of the cargo.

It is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth herein or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting. As such, those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be used as a basis for designing other structures, methods and systems for carrying out the several purposes of the invention. Thus, the invention is not limited to the exact construction and operation illustrated and described, and accordingly all appropriate modifications and equivalents may fall within the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 provides a side elevation view illustrating several elements of a preferred embodiment of the present invention.

FIG. 2 provides a side elevation view illustrating the embodiment of FIG. 1 in a tilted position.

FIG. 3 illustrates an alternate embodiment of the present invention.

FIG. 4 is a close-up view of a preferred extendable assembly (in this illustration a bolt and sleeve apparatus) that may be used as an element of the invention.

FIG. 5 illustrates an additional, optional, support element in a preferred embodiment of the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

A preferred embodiment of the present invention provides a tiltable cargo rack having a rotatably mounted longitudinal arm with a plurality of members extending generally perpendicularly upwardly from said arm. A plurality of horizontally spaced supports is provided beneath the arm to support the arm securely in a substantially horizontal loading position. A support near or adjacent to one end of the longitudinal arm is selectively movable from a vertical support position to a retracted position in order to permit rotation of the longitudinal arm to an inclined position for cargo transport. Preferably, the movable support is pivotable to a retracted position that is substantially parallel to the longitudinal arm. More preferably, the movable support is a post that is pivotably mounted at one end to the longitudinal arm near or adjacent to one end of the longitudinal arm. Most preferably, a selectively releasable and engageable lock is provided for alternately securing the movable support in the substantially vertical support position and permitting its movement to a retracted position.

A preferred embodiment of the present inventive apparatus is illustrated in FIG. 1. Referring to FIG. 1, cargo rack 10 has a base which, for example, may include spaced steel angle irons 12 and 14 and a plurality of spaced cross plates, one of which is shown at 16. A fixed, preferably substantially vertical, upright support which may, for example, comprise a pair of spaced plates, one of which is shown at 18, are welded, bolted or otherwise secured to corresponding spaced cross plates. Optional triangular braces 20 and 22 provide additional support for the fixed vertical upright support. Longitudinal arm 24 is rotatably mounted, preferably at about its mid-length point, to an upper part of the fixed vertical upright support by pipe pin 26. A vertical support post 28 is provided for support of the longitudinal arm near or adjacent to one end of the arm. Support post 28 preferably is attached at its upper end to the lower surface of arm 24, and its bottom end is not attached to the base. It is to be understood, however, that the bottom end of the support post may be attached to the base with the other end not being attached to the arm, resulting in a retracted position wherein support post 24 is preferably substantially parallel to the base.

Another support post 30 is provided adjacent an opposite end of longitudinal arm 24 from that in which post 28 is located and preferably comprises a pair of spaced plates pivotably attached at their upper ends to arm 24 by pipe pin 32. Post 30 optionally and preferably includes lower foot member 33 pivotably mounted to the pair of spaced plates of the post by pipe 34. A cable 36 is attached at one end to an eye loop 38 on foot member 33. Cable 36 is preferably threaded over pulley 40 through eyelet 42 and has a handle 44 at its opposite end. Coil spring 46 is attached at one end to cable 36 and to foot member 33 at the other end. Pin 48 is selectively actuatable by a lever arm (not shown) for engagement in pipe 34 and retractable from pipe 34. Preferably, the lever arm may be locked in position when pin 48 is engaged in pipe 34 so that the pin will not be accidentally disengaged from pipe 34.

A plurality of members 50 and 52 extend generally perpendicularly upwardly from longitudinal arm 24 and are secured to the arm by welding, bolting or other means. Optional angular brace 54 is secured at one end to longitudinal arm 24 and to member 50 at its other end to support member 50. Member 52 preferably has pipe 56 located so as to be engageable by pin 48 when longitudinal arm 24 is rotated clockwise to the inclined transport position which is to the right in FIG. 1. Member 50 may have a shape at its upper end for abutting a corresponding corner of cargo 58. Sleeve 51 mounted transversely in member 50 receives bolt assembly 53 which can be turned to adjust its position, for example to a retracted position (to the right in FIG. 1) out of contact with a downwardly extending leg of cargo 58. Alternately, bolt 53 may be turned and adjusted to an extended position (to the left in FIG. 1) for contact and support of the leg of cargo 58. A pressure plate may be attached or secured to the end of bolt 53 for contact with the leg of cargo 58 in order to spread the force for support of the leg over a greater area. Alternatively, as shown in FIG. 4 and as described below bolt assembly 53 may be included in a sleeve device that extends to contact and support a leg of the cargo. In addition, members 50 and 52 preferably have rubber or plastic pads, for example, as shown at 60, 62 and 64 for abutting cargo 58. Such pads may also be located between the longitudinal member and the stems of the cargo.

appropriate. The bolt assemblies are optional and may be included with one of the perpendicular members, more than one of the perpendicular members, or none of the perpendicular members.

FIG. 4 provides a close-up view of the extendable bolt assembly (51/53 in FIGS. 1 and 2 and 74 and 76 in FIG. 3), which may be included in a sleeve device that extends to contact and support a leg of the cargo. Referring to FIG. 4, support arm 90 is equipped with an outer sleeve 91 and an inner sleeve 92, each of which may be a metal pipe or other cylinder or other-shaped sleeve. Outer sleeve 91 has an inner diameter that is at least slightly larger than the outer diameter of inner sleeve 92. For example, in a preferred embodiment the inner diameter of outer sleeve 91 may be approximately 2.9 inches, and the outer diameter of inner sleeve 92 may be appropriately 2.875 inches. Outer sleeve 91 is attached to support arm 90, such as by welding, or it may be integral with support arm 90. The inner sleeve 92 is not attached to outer sleeve 91, and it also has a length that is less than that of outer sleeve 91 so that inner sleeve 92 may move within and be retracted into outer sleeve 91.

A bolt 93, which may alternatively be a threaded rod or other appropriate item, extends into the outer and inner sleeves and has a length that is longer than that of both sleeves. A first nut 94 or other gripping means is attached to bolt 93 at or near a first end of bolt 93, such as by welding, to provide a secure gripping point for turning the bolt 93. Alternatively, if bolt 93 has an integral head or other grippable element, first nut 94 may not be necessary. Preferably, a second nut 95 and optional washer 96 are fixedly attached to the outer sleeve 91 or support arm 90, such as by welding, to provide further stability outside of outer sleeve 91. One or more washers 97 and 98 are also secured, such as by welding, to inner sleeve 92 and/or to each other to receive bolt 93 and provide further stability. A plate 99 or washer is secured to the other end of bolt 93 to provide a surface that contacts and preferably presses against the downwardly extending leg of cargo 58 when the bolt is turned so that the plate 99 extends outside of the inner and outer sleeves.

When the cargo is loaded onto the cargo rack in a horizontal position, bolt 93 is in a retracted position. After the cargo is placed onto the assembly, bolt 93 is turned so that plate 99 protrudes from or exits the outer and inner sleeves and touches the vertical support member of the cargo rack. Thus, plate 99 and its related elements in the bolt assembly will provide additional support and bracing of the cargo when the cargo is turned into a tilted transport position. If one bolt assembly is used, or if two or more bolt assemblies are used, preferably each bolt assembly is so engaged to contact a support arm before the cargo is turned to a tilted transport position.

FIG. 5 illustrates an optional, additional support element in a preferred embodiment of the cargo rack. A chain 100 or high-strength wire is connected to the cargo rack at a clip 102, eyelet, hole, or other assembly that can receive and secure an end of chain 100. Preferably the location of clip 102 is closer to the support arm that will be in a lower position after tilting of the cargo rack than it is to the upper support arm. The clip 102 is preferably welded or otherwise attached to the longitudinal arm of the cargo rack, although it may optionally be integral with the arm, or it may be located on or integral with the lower support arm or another location. The other end of chain 100 is secured to the cargo 104 itself, preferably through a hole 106 that is drilled or otherwise formed in a stem of the cargo 104. The chain is tightened after the cargo is loaded onto the rack in a substantially horizontal position, thus providing additional support when the cargo and rack are moved to a tilted transport position.

Returning to FIGS. 1 and 2, to unload the cargo, a crane is lowered and cables or chains are attached to eyelets (not shown) in cargo 58. The cables or chains through eyelet 66 in member 52 are loosened and removed from eyelet 66. The lever attached to pin 48 is unlocked and moved so as to disengage pin 48 from pipe 56 of member 52. The crane is then moved slowly so as to rotate cargo 58 and longitudinal arm 24 counter clockwise to a substantially horizontal position. Foot member 33 is pushed into a vertical attitude so that pin 48 may be re-engaged in pipe 34. Bolt 53 is then turned so as to move to a retracted position out of contact with downwardly extending leg of cargo 58. Chain 100, if present, is removed. The crane is then raised so as to remove cargo 58 from longitudinal arm 24. The cargo rack is then in position for receiving another load of cargo. Thus, the invention provides a tiltable cargo rack that is securely supported in the horizontal position and which may be safely rotated to the inclined transport position when desired.

There have thus been outlined the more important features of the invention in order that the detailed description that follows may be better understood, and in order that the present contribution to the art may be better

appreciated. There are, of course, additional features of the invention that will be described below and which will form the subject matter of the claims appended hereto.

In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein, as well as the abstract, are for the purpose of description and should not be regarded as limiting.

As such, those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be used as a basis for designing other structures, methods, and systems for carrying out the several purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

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