

A LIFTING DEVICE AND AN ATTACHMENT DEVICE FOR SAME

FIELD OF THE INVENTION

[0001] The present disclosure relates to a lifting device and an attachment device
5 for the same.

BACKGROUND ART

[0002] The following discussion of the background to the invention is intended to facilitate an understanding of the present invention only. It should be appreciated that the discussion is not an acknowledgement or admission that any of the material
10 referred to was published, known or part of the common general knowledge of the person skilled in the art in any jurisdiction as at the priority date of the invention.

[0003] A lifting device that transports an object using an attachment, such as a hook has been proposed (US 2009/0277857 A1). The hook is arranged to have a curved shape and protrude toward a back portion of the lifting device. In use of the
15 lifting device, the lifting device is controlled so that (i) the hook is required to be adjusted so as to be positioned in a relatively forward position in the traveling direction of the lifting device and (ii) the hook is then moved backward to grasp/hook/engage the object.

[0004] This conventional arrangement requires excessive movement of the lifting
20 device prior to lifting the object due in part to the fact that the hook protrudes toward the back of the lifting device.

[0005] There exists a need to alleviate at least one of the aforementioned problems.

SUMMARY of the Invention

[0006] The present invention seeks to address and/or ameliorate the problem in
25 the prior art by providing a lifting device.

[0007] Throughout this document, unless otherwise indicated to the contrary, the terms “comprising”, “consisting of”, “having” and the like, are to be construed as non-exhaustive, or in other words, as meaning “including, but not limited to”.

[0008] Furthermore, throughout the document, unless the context requires otherwise, the word “include” or variations such as “includes” or “including” will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

[0009] According with an aspect there is an attachment for use with a lifting device, the attachment comprises at least one engagement member, the at least one engagement member includes an engagement interface; a first member arranged to extend from the engagement interface; and a second member arranged to protrude from an end of the first member in one of the following configurations: - a front end and a side end.

[0010] In some embodiments, the first member is pivotably coupled to the engagement interface and moveable between a first position which is substantially parallel to the surface of the engagement interface and a second position which is substantially perpendicular to the surface of the engagement interface.

[0011] In some embodiments, the first member comprises a first part and a second part, the first part and second part disposed at opposite ends of the engagement interface.

[0012] In some embodiments, the second member comprises a first protrusion and a second protrusion, each protrusion protrudes from a side end of the first part and the second part respectively, first protrusion and second protrusion in a substantially similar direction with respect to each other.

[0013] According with another aspect there is a lifting device for transporting a component, comprising: a carriage; a boom arranged to extend from the carriage; and an attachment arranged to be attached to the boom, wherein the attachment comprises an engagement interface, a first member arranged to extend from the engagement interface, and a second member arranged to protrude from an end of the first member in one of the following configurations: - a front end and a side end.

[0014] In some embodiments, the first member is pivotably coupled to the engagement interface and moveable between a first position which is substantially parallel to the surface of the engagement interface and a second position which is substantially perpendicular to the surface of the engagement interface.

5 **[0015]** In some embodiments, the first member comprises a first part and a second part, the first part and second part disposed at opposite ends of the engagement interface.

[0016] In some embodiments, the second member comprises a first protrusion and a second protrusion, each protrusion protrudes from a side end of the first part and the second part respectively, first protrusion and second protrusion in a
10 substantially similar direction with respect to each other.

[0017] In some embodiments, there is a lifting device for transporting a component, comprising: a carriage; a boom extending upward from the carriage in a traveling direction of the carriage.

15 **[0018]** In some embodiments, the lifting device is a lifter, a crane, a lift truck, a reach stacker, or a forklift.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] In the figures, which illustrate, by way of non-limiting examples only,
20 embodiments of the present invention,

[0020] Figure 1 is a side view of a lifting device 100 according to first embodiment of the present disclosure.

[0021] Figure 2a is a perspective view of the attachment 21 according to first embodiment of the present disclosure.

25 **[0022]** Figure 2b is a perspective view of the attachment 21 according to first embodiment of the present disclosure.

[0023] Figure 3 is a schematic view of a lifting device 100 according to first embodiment of the present disclosure.

[0024] Figure 4 is an example of operation of a lifting device 100.

[0025] Figure 5 is a perspective view of a lifting device 200 according to second embodiment of the present disclosure.

[0026] Figure 6 is a perspective view of a lifting device 200 according to second
5 embodiment of the present disclosure.

DETAILED DESCRIPTION

[0027] The present invention may be suited for assembling and/or installing at least one component at a determined site (for example a construction site) to form
10 structures. The invention discloses a novel lifting device (for example a reach stacker) and a novel attachment device for the same.

[0028] Throughout the description, the term 'component' or 'pre-assembled components' may refer to the assembly of a plurality of pre-fabricated components into a larger component.

15 **[0029]** Throughout the description, the term 'substantially perpendicular' may cover deviations of up to 10 degrees, i.e. 80 degrees to 100 degrees.

[0030] Throughout the description, the term 'substantially parallel' may cover deviations of up to 5 degrees, i.e. -5 to +5 degrees.

20 **[0031]** Unless defined otherwise, all other technical and scientific terms used herein have the same meaning as is commonly understood by a skilled person to which the subject matter herein belongs.

[0032] In one aspect there is an attachment for use with a lifting device, the attachment comprises at least one engagement member, the at least one engagement member includes a frame; a first member arranged to extend from the
25 frame; and a second member arranged to protrude from an end of the first member in one of the following configurations: - a front end and a side end.

[0033] In another aspect there is a lifting device for transporting a component, comprising: a carriage; a boom arranged to extend from the carriage; and an attachment arranged to be attached to the boom, wherein the attachment comprises a frame, a first member arranged to extend from the frame, and a second member arranged to protrude from an end of the first member in one of the following configurations:- a front end and a side end.

Lifting device 100

[0034] Figure 1 is a side view of a lifting device 100 according to first embodiment of the present disclosure. The lifting device 100 comprises a carriage 1 and a boom 11. The lifting device 100 may further comprise an attachment 21. The lifting device 100 is, for example, a reach stacker.

[0035] Carriage 1 comprises a controller (not shown) and four wheels 1a. The controller controls, for example, the wheels 1a and the boom 11, as per an instruction from an operator. The wheels 1a can be controlled when the carriage 1 is required to approach to a component (e.g. component 500) to be transported. The boom 11 can be rotated clockwise and counter-clockwise in the side view of the boom 11, extended, and retracted.

[0036] The boom 11 extends upward from the carriage 1 in a traveling direction of the carriage 1 and attaches the attachment 21 thereto. Details of the attachment 21 will be described with reference to figure. 2a and figure 2b.

[0037] Figure. 2a is perspective view of the attachment 21. Figure. 2b is perspective view of the attachment 21. As shown in figure 2a, the attachment 21 comprises an engagement member 24 and is, for example, arranged to be attached to a front end of the boom 11. The attachment 21 may further comprise an engagement interface and a connecting member 23. The engagement interface may be in the form of a frame 22.

[0038] The frame 22 is attached to a front end of the boom 11 and is arranged to have a rectangular shape in a plan view of the attachment 21. The frame 22 comprises four parts 22a, 22b, 22c, and 22d. Parts 22a, 22b face each other and

extend in a forward direction of the lifting device 100 where the attachment 21 is attached to the boom 11. Parts 22c, 22d face each other and extend in a width direction of the lifting device 100 where the attachment 21 is attached to the boom 11. The part 22c can be connected to the part 22d via a connecting member 23.

5 **[0039]** The connecting member 23 extends in a forward direction of the lifting device 100 where the attachment 21 is attached to the boom 11. An extending direction of the connecting member 23 may be same as an extending direction of the parts 22a, 22b. The connecting member 23 has a shaft 23a so that the engagement member 24 is pivotable.

10 **[0040]** The engagement member 24 comprises a first member 24a and a second member 24b, and is, for example, arranged to have an L-shaped structure in a side view of the lifting device 100 where the attachment 21 is attached to the boom 11. The first member 24a is, for example, arranged to extend a determined direction (e.g. toward direction of gravity) from either the front end of the boom 11 or the connecting
15 member 23. The first member 24a is pivotably coupled to the frame 22 and moveable between a first position which is substantially parallel to the surface of the frame 22 and a second position which is substantially perpendicular to the surface of the frame 22. The second member 24b is arranged to protrude from an end of the first member 24a in one of the following configurations: - a front end and a side end.

20 **[0041]** The second member 24b is arranged to protrude, in the forward direction of the lifting device 100. The first member 24a is, for example, provided separately from the second member 24b.

25 **[0042]** The engagement member 24, for example, extends in a direction of gravity during use of the lifting device 100 as shown in figure 2a (the second direction) while the engagement member 24, for example, laterally extends during storage of the attachment 21 as shown in figure 2b (the first position). The engagement member 24 is, for example, pivotable in the range of -90 to 90 degree in the width direction in relation to the direction of gravity.

30 **[0043]** For instance, an operator, upon detaching the attachment 21 from the boom 11, can rotate the engagement member 24 so that the engagement member 24 is moved from a position shown in fig.2a to the lower surface of either the part 22a

or the part 22b shown in fig. 2b, thus enabling to store the attachment 21 with less space.

Component 500

- 5 **[0044]** The component 500 is, for example, a part of components used for at a determined site (e.g. construction site) and is, for example, one of plurality of components (e.g. pre-fabricated or pre-assembled components) to be transported. Figure 3 is a schematic view of a lifting device 100 according to first embodiment of the present disclosure.
- 10 **[0045]** As shown in figure. 3, the component 500 is, for example, grid shape and has a plurality of openings 500a, each opening 500a arranged to have a shape to receive the second member 24b.

Example of operation in use of the lifting device 100

- 15 **[0046]** The wheels 1a and the boom 11 may be controlled so that the second member 24b is opposed to one of the openings 500a and is spaced a determined distance apart from the component 500. Thereafter, the wheels 1a are controlled so that the second member 24b inserts the one of the openings 500a, thus enabling to reduce time required to transport the component 500.

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Advantageous Effect

- [0047]** With the second member 24b protruding in the forward direction of the lifting device 100, as compared to the second member 24b protruding toward the back of the lifting device 100, an operator can reduce the amount of time required to
- 25 transport the component 500.

[0048] Further, the connecting member 23 having the shaft 23a enables to store the attachment 21 with less space because the engagement member 24 is pivotable around shaft 23a and is thus positioned as shown in figure. 2b in storage of the attachment 21.

Possible variants

[0049] It should be noted that the lifting device 100 is not limited to a reach stacker, and may including a general lifter, a crane, a lift truck, or a forklift.

5 **[0050]** It should be noted that the frame 22 and the connecting member 23 may not optional components in some embodiments and thus may be omitted. For example, frame 22 may be replaced by other engagement interface suitable for engaging different types of lifting device 100.

10 **[0051]** It should be noted that although the first member 24a is provided separately from the second member 24b in first embodiment, it is not limited to this configuration. In some embodiments, the first member 24a may be integrated with the second member 24b, thus facilitating the engagement member 24 with high durability.

15 **[0052]** It should be noted that shaft 23a may have a structure (e.g. a lock) to prevent the engagement member 24 from turning, thus preventing the component 500 from falling from the lifting device 100 in transportation of the component 500. An operator, upon detaching the attachment 21 from the boom 11, may have the engagement member 24 turnable to store the component 500 with less space.

20 **[0053]** It should be noted that the shape of the frame 22 is not limited to rectangular and may be determined to the shape of the boom 11.

[0054] It should be noted that the number of the engagement members is not limited to one, and may be two or more especially for lifting component 500 shown in figure 4.

25 **[0055]** Figure 4 is an example of operation of a lifting device 100. Assuming that the component 500 is placed on the ground so that one of the lateral surfaces of the component 500 is opposed to the ground, the operator may fail to lift the component 500 as shown in figure 4. In view of the above, to ensure that the lifting device 100 can transport a component (e.g. oblong component), the attachment 21 may

comprise two or more engagement members. Example of such arrangement will be described with reference to figure 5, 6.

Lifting device 200

5 **[0056]** Figure 5 is a perspective view of a lifting device 200 according to second embodiment of the present disclosure. Figure 6 is a perspective view of a lifting device 200 according to second embodiment of the present disclosure. In a second embodiment, unlike the first embodiment, the lifting device 200 comprises a carriage 101 having wheels 101a, a boom 111, and an attachment 121 having a plurality of
10 engagement members.

As shown in the figure 5, attachments 121 comprises engagement members 124, 224. The attachment 121 may further comprise a frame 122. The frame 122 comprises four parts 122a, 122b, 122c, and 122d. Parts 122a, 22b face each other and extend in a forward direction of the lifting device 200 where the attachment 121
15 is attached to the boom 111. Parts 122c, 122d face each other and extend in a width direction of the lifting device 200 where the attachment 121 is attached to the boom 111. The part 122c can be connected to the part 22d via a connecting member 123. The engagement member 124 is spaced a determined distance apart from the engagement member 224 in the width direction of the lifting device 200.

20 **[0057]** The engagement member 124 has a first member 124a, a second member 124b (first protrusion), and a hook 124c (second protrusion). The first member 124a extends from the lower surface of the part 122a. The engagement member 224 has a first member 224a, a second member 224b (first protrusion), and a hook 224c (second protrusion). The first member 224a extends from the lower surface of the
25 part 122b.

[0058] The second member 124b and the hook 124c protrude from a side end of the first member 124, the second member 124b and the hook 124c in a substantially similar direction with respect to each other. The second member 224b and the hook 224c protrude from a side end of the second member 224b, the second member
30 224b and the hook 224c in a substantially similar direction with respect to each other.

[0059] The first member 124a, 224a are arranged to extend a direction (e.g. toward gravity direction) from either the front end of the boom 111 or frame 122. The second member 124b, 224b protrude in the width direction (e.g. right direction in figure. 5). Hooks 124c, 224c respectively protrude upwardly from the upper surface of the second members 124b, 224b.

Component 600

[0060] The component 600 is placed on the ground so that one of the lateral surfaces of the component 600 is opposed to the ground. The component 600 forms bent parts 600a, 600b protruding upward in figure 5, each having an opening. The bent part 600a is used to receive the second members 124b and hook 124c. The bent part 600b is used to receive the second members 224b and hook 224c. The bent part 600a is spaced a determined distance, in the width direction of the component 600, apart from the bent part 600b.

Example of operation in use of the lifting device 200

[0061] The wheels 101a and the boom 111 are controlled so that second member 124b, 224b are respectively positioned at left side of bent parts 600a, 600b in figure. 5. Thereafter, the wheels 1a are controlled so that the second member 124b, 224b respectively insert the bent parts 600a, 600b, and then boom 11 is controlled so that the component 600 is lifted upward as shown in figure. 6, thus enabling to lift the component 600 with stability.

Advantageous Effect

[0062] With the attachment 121 having engagement members 124, 224, a user can transport various components (e.g. oblong structure) with stability.

[0063] With attachment 121 having the hook 124c and hook 224c, the component 600 is prevented from falling from the lifting device 200 in transportation of the component 600.

Notes

[0064] It should be noted that a distance between the engagement members 124, 224 is not limited to a particular length, and may be determined according to the component 600 (e.g. distance between the bent parts 600a, 600b).

[0065] It should be noted that the protruding direction of the second member is not limited to the right direction in figure 5, and may be either the left direction in figure 5 or the left and right direction in figure 5.

[0066] It should be noted that the number of the engagement members is not limited to two. For instance, to ensure that the lifting device 100 can transport the thicker component compared with the component 600, the attachment may comprise one or more engagement members extending from the lower surface of at least one of the part 122c and the part 122d, aside from the part 122a and part 122b.

[0067] It should be noted that attachment 121 may have shafts (not shown). The shafts are respectively provided bottom surface of parts 122a, 122b and performs so that the engagement member 124, 224 are pivotable in the range of -90 to 90 degree in the width direction in relation to the direction of gravity, thus enabling to store the attachment 121 with less space.

[0068] It should be further appreciated by the person skilled in the art that variations and combinations of features described above, not being alternatives or substitutes, may be combined to form yet further embodiments falling within the intended scope of the invention.

[0069] As would be understood by a person skilled in the art, each embodiment, may be used in combination with other embodiment or several embodiments.

CLAIMS

1. An attachment for use with a lifting device, the attachment comprises at least one engagement member, the at least one engagement member includes

an engagement interface;

5 a first member arranged to extend from the engagement interface; and

a second member arranged to protrude from an end of the first member in one of the following configurations: - a front end and a side end.

2. The attachment of claim 1, wherein the first member is pivotably coupled to the engagement interface and moveable between a first position which is substantially parallel to the surface of the engagement interface and a second position which is
10 substantially perpendicular to the surface of the engagement interface.

3. The attachment of claim 1, wherein the first member comprises a first part and a second part, the first part and second part disposed at opposite ends of the engagement interface.

15 4. The attachment of claim 3, wherein the second member comprises a first protrusion and a second protrusion, each protrusion protrudes from a side end of the first part and the second part respectively, first protrusion and second protrusion in a substantially similar direction with respect to each other.

5. A lifting device for transporting a component, comprising:

20 a carriage;

a boom arranged to extend from the carriage; and

an attachment arranged to be attached to the boom, wherein the attachment comprises an engagement interface, a first member arranged to extend from the engagement interface, and a second member arranged to protrude from an end of
25 the first member in one of the following configurations: - a front end and a side end.

6. The lifting device of claim 5, wherein the first member is pivotably coupled to the engagement interface and moveable between a first position which is substantially parallel to the surface of the engagement interface and a second position which is substantially perpendicular to the surface of the engagement interface.

7. The lifting device of claim 5, wherein the first member comprises a first part and a second part, the first part and second part disposed at opposite ends of the engagement interface.

8. The lifting device of claim 7, wherein the second member comprises a first protrusion and a second protrusion, each protrusion protrudes from a side end of the first part and the second part respectively, first protrusion and second protrusion in a substantially similar direction with respect to each other.