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(54) **Side lift intended for handling of ISO containers**

(57) The invention concerns a side lift intended for handling of ISO containers. The side lift (10) is provided with grasping members (11), by whose means an ISO container (1) is grasped from either one of the long sides of the container (1) from the fastening points formed on the container, and the side lift (10) has been mounted at the end of the boom (3) or equivalent of a work machine (2). The invention is characterized in that

the side lift (10) has been mounted on a rotation device (14) suspended at the end of a boom (3) or equivalent so that, by means of said rotation device (14), the side lift (10) and the ISO container (1) attached to said side lift can be rotated substantially freely around a substantially vertical axis (R) of rotation.

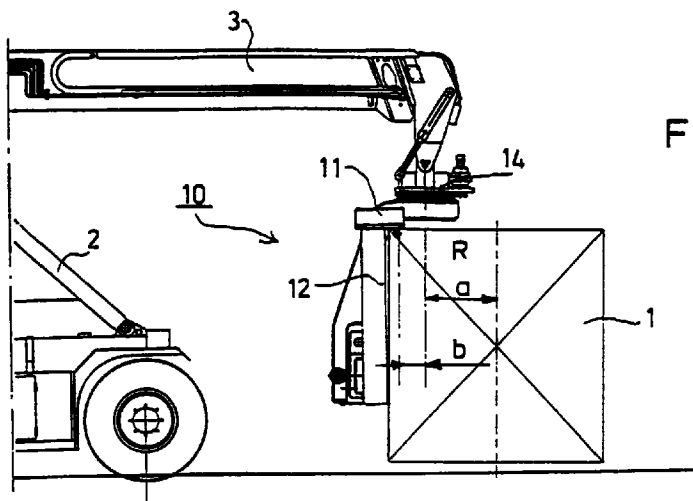


FIG.1A

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Description

The invention concerns a side lift intended for handling of ISO containers, which side lift is provided with grasping members, by whose means an ISO container is grasped from either one of the long sides of the container from the fastening points formed on the container, and which side lift has been mounted at the end of the boom or equivalent of a work machine.

For the transfer of containers, such as stacking, loading onto a vehicle, unloading from a vehicle, and for equivalent operations in container terminals, such as ports and equivalent, container handling devices of different types are employed. One such container handling device is a device of the type of a straddle carrier, which, as is well known, requires free space at both sides of the container. Another device that is used typically for handling of containers is a work machine provided with a boom or equivalent, at which the end of the boom is provided with means for grasping the container. The present invention is related to this latter type of device. The means for grasping a container are mainly of two alternative types. First, it is possible to use a what is called top lift, which is provided with members for grasping the corners of the container from the top. As is well known, ISO containers are provided with means which can be grasped by the grasping members. A top lift grasps a container from the top symmetrically, in which case the support of the container is automatically at the centre of gravity of the load. Since, in such an arrangement, the container is grasped from the top, it is quite simple to provide the container lift with a mechanism of rotation by whose means the container can be rotated around a vertical axis. Thus, the location of the centre of gravity and the possibility of rotation are advantageous features of a top lift.

A second mode of grasping a container is to use a what is called side lift, by whose means the container is grasped from one of its long sides. The advantages of such a side lift can be justified, for example, so that the operator of the work machine can position the side lift more readily in relation to the container, because the work machine operates at the same side of the container from which the side lift grasps it. The side lifts currently in use, however, involve the drawback that the side lift typically produces a high tilting torque, because the centre of gravity of the load to be handled, i.e. of the container, is placed to a considerable extent to the side from the support point. It is a second significant problem of the side lifts currently in use that just very little movements of rotation around a vertical axis are possible. Typically, these movements of rotation are, at the maximum, of an order of 10°.

The object of the present invention is to provide a novel side lift intended for treatment of ISO containers, by means of which side lift the drawbacks related to the side lifts currently in use are avoided and by whose means more versatile possibilities of working are pro-

vided, as compared with the prior art. In view of achieving the objectives of the invention, the invention is mainly characterized in that the side lift has been mounted on a rotation device suspended at the end of a boom or equivalent so that, by means of said rotation device, the side lift and the ISO container attached to said side lift can be rotated substantially freely around a substantially vertical axis of rotation.

By means of the present invention, as compared with the prior art, significant advantages are obtained, ad of these advantages, for example, the following should be stated. First, by means of the present invention, all the advantages related to easy handling are obtained that are typical of the side lifts currently in use. In addition to this, the invention provides the advantages normally related to top lifts, i.e. extensive possibility of rotation of the container around a vertical axis as well as advantageous location of the centre of gravity of the load in relation to the support point. The further advantages and characteristic features of the invention will come out from the following detailed description of the invention.

Next, the invention will be described by way of example with reference to the figures in the accompanying drawing.

The figures in the drawing are side views and top views of a side lift in accordance with the present invention intended for handling of ISO containers and mounted on the boom of a work machine, so that

Figures 1A and 1B illustrate the side lift in a so-called normal grasping position,

Figures 2A and 2B illustrate a corresponding solution with the container rotated through 90°, and

Figures 3A and 3B illustrate the side lift with the container rotated through 180°.

In the figures in the drawing, the side lift is denoted generally with the reference numeral 10. In the exemplifying embodiment shown, the side lift 10 has been attached to the end of the boom 3 of a work machine 2, and in the situation shown in the figures, the container 1 has been grasped by means of the side lift 10. The side lift 10 is, in itself, of conventional construction so that it comprises grasping members 11, by whose means the container 1, in particular the fastening points at the corners of the container 1, are grasped. Further, the side lift 10 includes a side support 12, which is supported against the side wall of the container 1 when the grasping members 11 have been attached to the container 1. Further, the side lift 10 comprises a telescopic construction 13, at whose ends the grasping members have been fitted so that the side lift 10 can handle ISO containers of different measures. It is a novel and essential feature of the invention and of the side lift 10 that the components of the side lift mentioned above, i.e. the

grasping members 11, the side support 12, and the telescopic construction 13 have been mounted on a rotation device 14, by whose means the side lift 10 has been attached to the end of the boom 3 of the work machine 2. Thus, by means of the rotation device 14, the side lift 10 and the container 1 attached to it can be rotated, in the way illustrated in the figures, around the axis R of rotation of the rotation device 14. The figures illustrate a movement of rotation of 180° around the axis R of rotation, but this can be considered to be just an exemplifying embodiment of the invention and, as a matter of fact, almost a minimum requirement for the movement of rotation, because, if necessary, depending on the construction of the rotation device 14, by means of the invention, it is possible to produce a movement of rotation of 360°.

In order that the container 1 could be rotated in the way illustrated in the figures, it is, however, required that the tilting torque of the load can be minimized as well as possible. In the arrangement in accordance with the invention, this has been accomplished so that the grasping members 11, which are supposed to grasp the fastening points provided at the top corners of the container 1, are placed, first, below the rotation device 14 and, second, they have been arranged so that the axis R of rotation of the rotation device 14 has been shifted aside from the line C interconnecting the grasping members 11 to a distance b from said line C towards the vertical plane A placed in the longitudinal direction of the container and passing through the centre of gravity of the container 1. Further, in the exemplifying embodiment shown in the figures, the distance between said vertical plane A and the axis R of rotation is denoted with the reference a. By means of the arrangement shown and by choosing the distances a and b appropriately, the joint centre of gravity of the load produced by the container and of the side lift can be made to be located optimally below the suspension point so that the torque of inclining produced by them is as little as possible. Minimizing of this torque of inclining is of particular importance in a situation in which the container 1 has been turned through 90° in the way illustrated in Figs. 2A and 2B. In such a case, if the centre of gravity is placed far from the point of suspension, the torque of inclining produced by the centre of gravity acts as a considerable torque that attempts to overturn the work machine 2.

Further, in the figures in the drawing, it is shown further that the axis R of rotation is placed at a distance a from the longitudinal centre plane A passing through the centre of gravity of the container 1. If necessary, this distance a can be changed, preferably shortened, and according to one alternative, the axis R of rotation can be placed at the plane A. The ISO containers are of uniform width, so that, in the planning, in advance, it is easy to construct the equipment so that the torques of inclining that are produced are as little as possible. In any case, the measures should preferably be arranged

so that, when the container 1 is rotated through 90° from the position shown in Figs. 1A and 1B, i.e. into the position shown in Figs. 2A and 2B, the outermost point of the container 1 and so also the outermost point of the side lift 10 placed at the opposite side of the container are placed within the longitudinal outlines of the work machine 2. In such a case, the side lift 10 and the container 1 do not cause any extra width in the solution, for example, when the container 1 is passed through a door opening or through some other location with limited width.

Above, the invention has been described by way of example with reference to the figures in the accompanying drawing. The invention is, however, not confined to the exemplifying embodiment illustrated in the figures only, but different embodiments of the invention may show variation within the scope of the inventive idea defined in the accompanying patent claims.

Claims

1. A side lift intended for handling of ISO containers, which side lift is provided with grasping members (11), by whose means an ISO container (1) is grasped from either one of the long sides of the container from the fastening points formed on the container, and which side lift (10) has been mounted at the end of the boom (3) or equivalent of a work machine (2), **characterized** in that the side lift (10) has been mounted on a rotation device (14) suspended at the end of a boom (3) or equivalent so that, by means of said rotation device (14), the side lift (10) and the ISO container (1) attached to said side lift can be rotated substantially freely around a substantially vertical axis (R) of rotation.
2. A side lift intended for handling of ISO containers as claimed in claim 1, **characterized** in that the side lift (10) has been mounted on the rotation device (14) so that the grasping members (11) of the side lift, by whose means the container (1) is grasped, are placed, in the vertical direction, substantially below the rotation device (14), and that, while the grasping members (11) are in engagement with the container (1), the rotation device (14) is placed above the container (1).
3. A side lift intended for handling of ISO containers as claimed in claim 1 or 2, **characterized** in that the substantially vertical axis (R) of rotation of the rotation device (14) is placed, in the horizontal direction, as outwards shifted, at a distance (b) from the line (C) that interconnects the grasping members (11), so that, while the grasping members (11) are in engagement with the container (1), the centre of gravity of the container (1) and the axis (R) of rotation of the rotation device (14) are placed, in the lateral direction, at the same side in relation to said

line (C) that interconnects the grasping members (11) in order to reduce the torque that inclines the load.

4. A side lift intended for handling of ISO containers as claimed in any of the preceding claims, **characterized** in that the axis (R) of rotation of the rotation device (14) is placed at a short distance (a) from the vertical plane (A) placed in the longitudinal direction of the container (1) and passing through the centre of gravity of the container (1), or at said vertical plane (A). 5 10
5. A side lift intended for handling of ISO containers as claimed in any of the preceding claims, **characterized** in that the unit that comprises the side lift (10) and the rotation device (14) has been measured so that, when the grasping members (11) are in engagement with the container (1) and when the container has been rotated so that it is parallel to the direction of length of the work machine (2), the longitudinal outlines of the container (1) and of the side lift (10) remain inside the longitudinal outlines of the work machine (2) without causing an extra width in the assembly. 15 20 25

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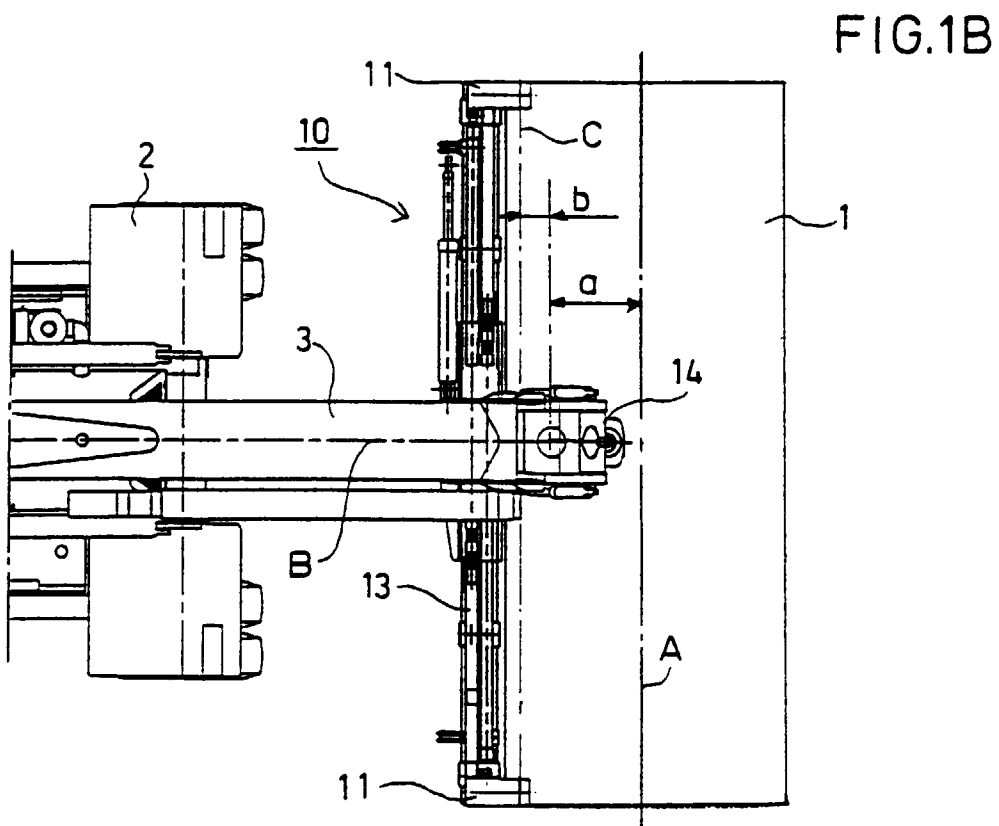
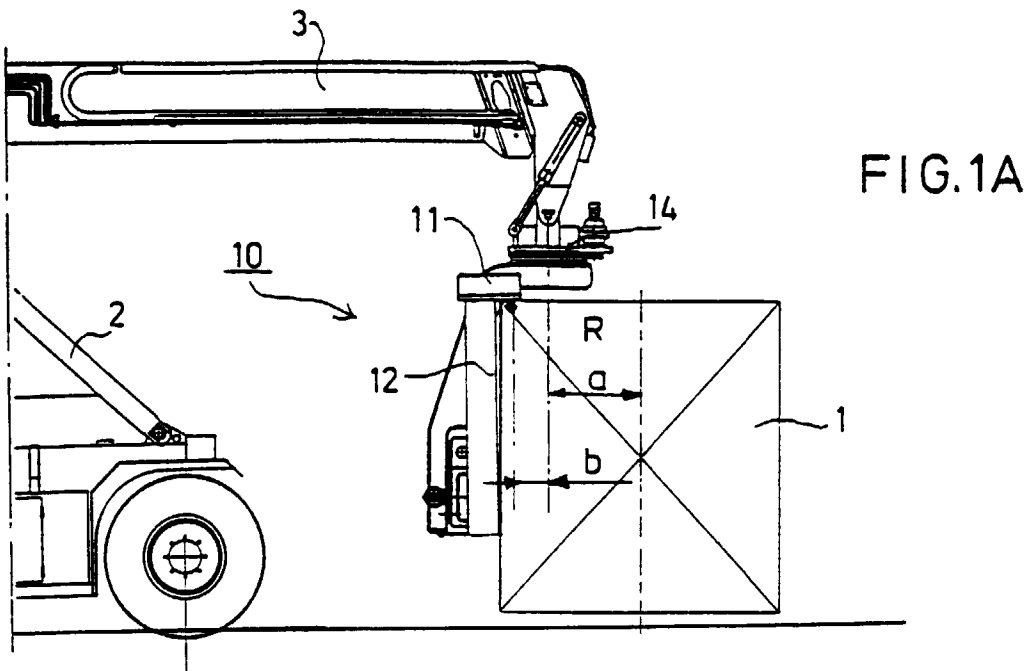


FIG. 2A

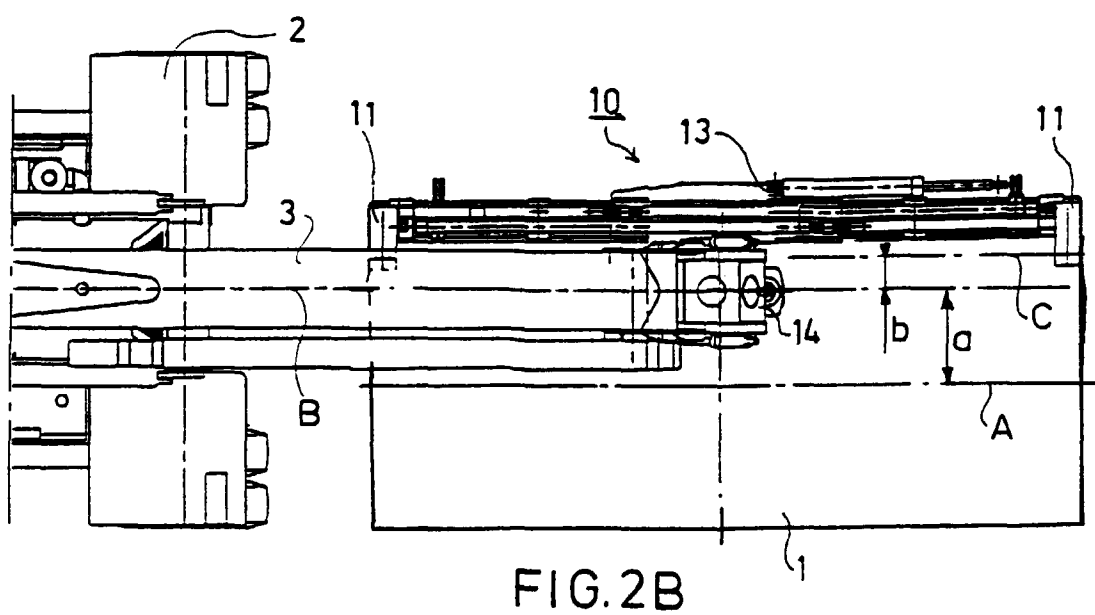
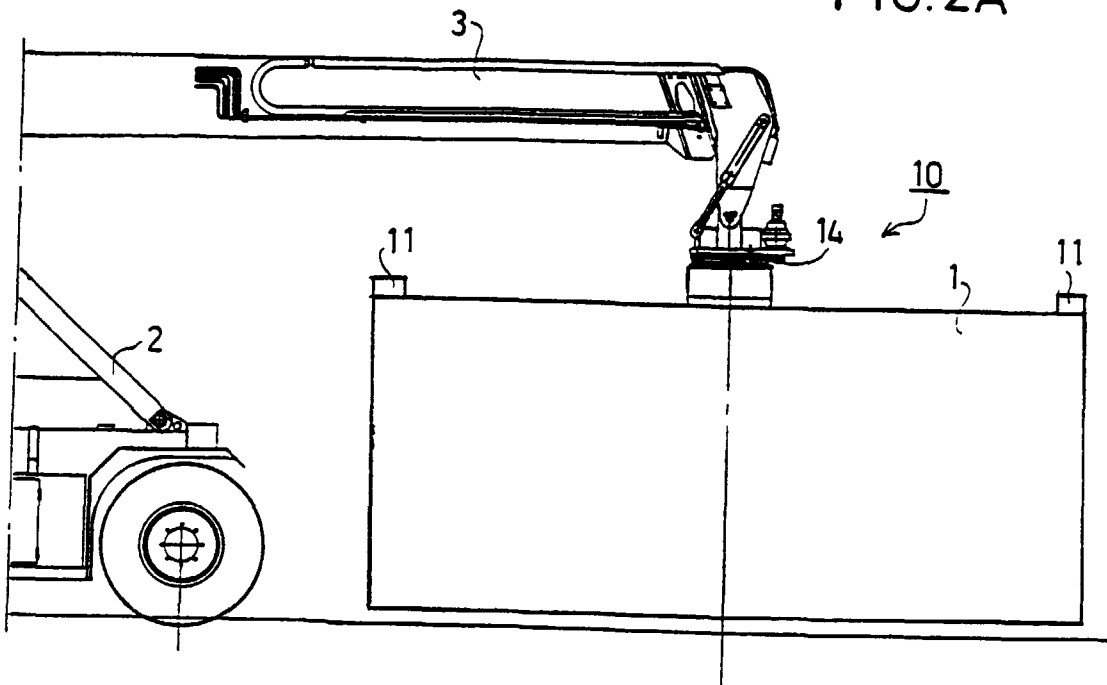


FIG. 2B

FIG.3A

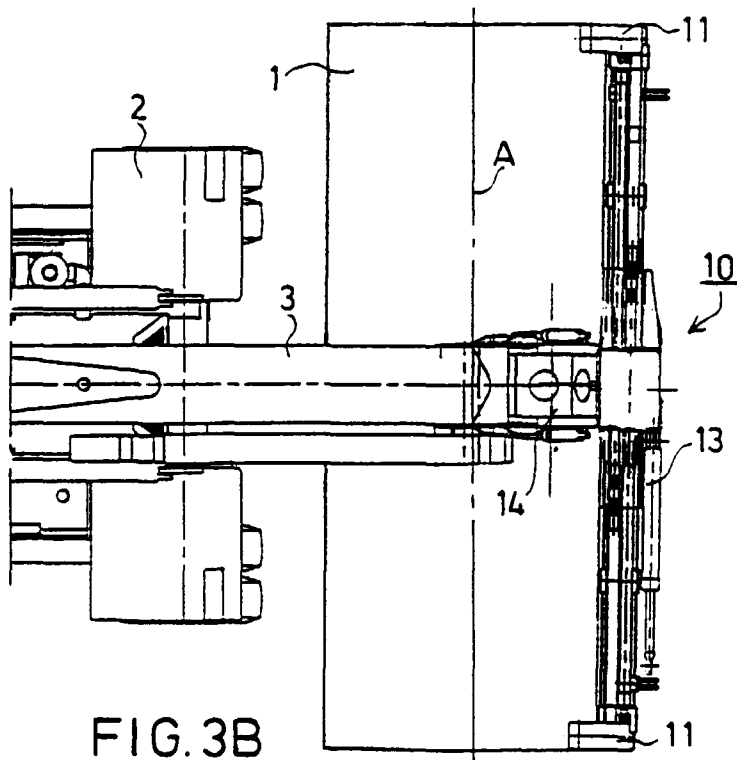
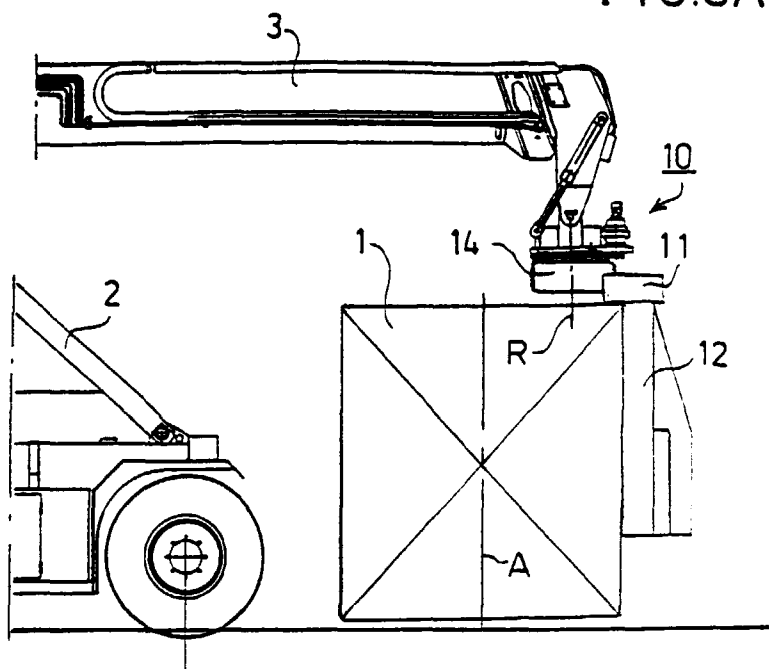


FIG.3B