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(54) Lifting or hoisting system and method of stabilizing a mobile elevating work platform

(57) A lifting or hoisting system is disclosed, the system comprising:
- a mobile elevating working platform (MEWP) such as a crane or lift, comprising a set of outriggers for stabilizing the MEWP during operation, wherein the MEWP further comprises a storage area for storing a set of outrigger mats;
- a mobile crane comprising a hoisting tool for, during use, unloading the outrigger mats and positioning the outrigger mats; and wherein the MEWP is provided with a crane holder for holding the mobile crane during transport.

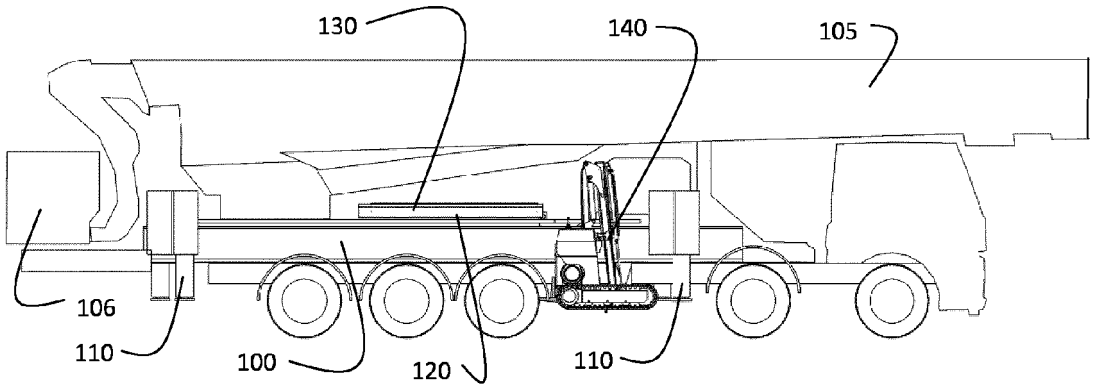

Figure 1

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Description

FIELD OF THE INVENTION

[0001] The invention relates to the field of mobile elevating work platforms (MEWPs) or mobile elevating equipment such as cranes or lifts or the like and more specifically to the placement of outrigger mats (or pads) for such mobile platforms or equipment.

BACKGROUND OF THE INVENTION

[0002] The present invention relates to the field of mobile elevating work platforms (MEWPs) or mobile elevating equipment. Such platforms or equipment e.g. include comparatively large mobile cranes, mobile aerial working platforms or lifts which require, for stability purposes, the use of outriggers and outriggers mats. Such outrigger mats (also referred to as pads) need to be applied in order for the pressure exerted on the ground to remain below a safety value when used.

[0003] Typically, such outrigger mats have a square or round shape, are provided with handles and are positioned manually below the outriggers. Such pads or mats can e.g. be made from plastic, timber or steel.

[0004] However, as the size of such mobile equipment or platforms (e.g. MEWPs such as lifts or cranes) increases, the weight and size of such mats increases as well. As a result, the manual positioning of such pads, e.g. by a single person such as the driver of the MEWP may become difficult. Typically, for large cranes or aerial lifts, the weight of a single outrigger mat can be 200 kg or more.

[0005] In order to position outrigger mats of such weights, these mats are typically brought on site by an additional truck, e.g. provided with a crane for loading/unloading the mats. This solution requires the use of additional personnel to bring the additional truck to the site and reduces the availability of the additional truck for other purposes, thus adding to the operational costs. As an alternative, it has been proposed to use a trailer which can be towed behind the MEWP, whereby the mats are loaded onto the trailer and whereby the trailer is further provided with a crane for loading/unloading the mats. This alternative however poses several shortcomings. The use of a trailer behind an already lengthy MEWP may be objected to by road regulations, this solution may thus not be allowed everywhere. In order to appropriately position the mats, additional maneuvering of the crane or lift may be required, due to the limited range of the crane provided on the trailer. Further, as such MEWPs are often applied in rough terrain, the trailer needs to be adapted to such terrain as well, rendering this solution rather expensive.

SUMMARY OF THE INVENTION

[0006] It would be desirable to provide a solution for positioning of outrigger mats for an MEWP such as a truck, crane, aerial lift or the like that alleviates or mitigates at least one of the drawbacks mentioned.

[0007] To address this, in an aspect of the invention, there is provided a lifting or hoisting system comprising:

- a mobile elevating work platform (MEWP) such as a crane or lift, comprising a set of outriggers for stabilizing the MEWP during operation, wherein the MEWP further comprises a storage area for storing a set of outrigger mats;
- a mobile crane comprising a hoisting tool for, during use, unloading the outrigger mats and positioning the outrigger mats; and wherein the MEWP is provided with a crane holder for holding the mobile crane during transport.

[0008] In accordance with the present invention, a lifting or hoisting system is provided comprising an MEWP such as a crane or lift which comprises a set of outriggers. The present invention is particularly aiming for the stabilization of mobile elevating platforms or lifting equipment e.g. including truck mounted hydraulic platforms, aerial working platforms, cranes or lifts that require the use of outrigger mats which are too large or heavy to be handled manually. In the present invention, the mobile elevating platform or lifting equipment is in general denoted as an MEWP (mobile elevating working platform). In this respect, reference can also be made to the European standard EN 280 for such platforms. In a system according to the present invention, the application of outrigger mats is facilitated by the use of a mobile crane which is, during transport, mounted to the MEWP. In order to realize this, the MEWP is provided with a crane holder for holding the mobile crane during transport. The MEWP (e.g. a truck mounted hydraulic platform or crane or lift) of the system according to the present invention further comprises a storage area for storing a set of outrigger mats. Preferably, the outrigger mats are stored in a horizontal position.

[0009] During use, the mobile crane can unload, by means of a hoisting tool such as a hoisting hook, the outrigger mats and put the outrigger mats at the appropriate positions. Compared to the use of a trailer provided with a loading crane, the use of a mobile crane which is mounted to the MEWP to be stabilized can provide in the following advantages: The overall length or size of the MEWP is not substantially affected by the use of the mobile crane, thus avoiding objections to bringing the system into traffic.

[0010] The use of a mobile crane provides in a more flexible, faster way to unload and position the outrigger mats: Using the system according to the present invention, the MEWP can be driven into its operating position, the outrigger mats can be subsequently unloaded and positioned and the outriggers can be positioned onto the outriggers mats. When using a trailer loaded with the outrigger mats, the MEWP needs to be positioned, in a

first instance, beyond the operating position such that the trailer is in the appropriate position for unloading and positioning the outrigger mats. When the outrigger mats are in place, the MEWP has to be moved backwards to the operating position. The use of a trailer thus requires additional movements of the MEWP, rendering the stabilization process more complex and time-consuming.

[0011] Therefore, in another aspect of the present invention, there is provided a method of stabilizing a mobile elevating work platform (MEWP) such as a crane or lift provided with a set of outriggers, the method comprising:

- mounting a corresponding set of outrigger mats onto the MEWP;
- mounting a mobile crane onto the MEWP;
- driving the MEWP to an operating site;
- unloading the mobile crane from the MEWP;
- unloading the outrigger mats from the MEWP using the mobile crane;
- positioning the outrigger mats using the mobile crane;
- positioning the outriggers onto the outrigger mats.

[0012] It can further be noted that a mobile crane as applied in the system according to the invention, can be easily adapted for operating in comparatively rough terrain, e.g. by the application of caterpillar tracks or the like.

[0013] In an embodiment of the present invention, the mobile crane of the lifting or hoisting system comprises a pivotable telescopic arm. As an alternative, the mobile crane can comprise a fixed arm or telescopic arm whereto an hoisting tool is mounted for unloading the outrigger mats.

[0014] In a preferred embodiment, a recess is provided along a longitudinal side of the MEWP, the recess being used to receive the mobile crane. By doing so, the mobile crane can be easily transported to the operating site. By mounting the mobile crane into a recess along the longitudinal side of the MEWP, the outer dimensions of the MEWP with or without the mobile crane are substantially the same. In such embodiment, the recess and mobile crane can be adapted to hold the mobile crane in a position wherein an outer longitudinal surface of the mobile crane is substantially flush with the longitudinal side of the MEWP.

[0015] As such, in such embodiment, the mobile crane can be mounted so as not to extend outside an outer circumference of the MEWP when seen in plan view.

[0016] In an embodiment, the crane holder of the MEWP, which is preferably provided in the recess, comprises a support shaft for mounting the mobile crane thereto. Preferably, the support shaft has a substantially vertical orientation.

[0017] In such embodiment, the mounting of the mobile crane to the crane holder of the MEWP can be realized by directing a telescopic arm of the mobile crane downward and lifting the mobile crane upward by extending the telescopic arm, when the support shaft is inserted in a hollow shaft of an end part of the telescopic arm. Note that, as an alternative, the support shaft can be hollow and adapted to receive an end part of the telescopic arm.

[0018] Preferably, the support shaft of the crane holder is rotatable about a vertical axis for, in use, rotating the mobile crane about the vertical axis, thereby positioning the mobile crane inside the outer circumference of the MEWP.

[0019] In an embodiment, the storage area of the MEWP comprises a support structure for supporting the outrigger mats, wherein the support structure is displaceable in a horizontal direction substantially perpendicular to a longitudinal axis of the MEWP. Using such a displaceable support structure may facilitate the unloading of the outrigger mats. In case the storage area of the outrigger mats is e.g. partly underneath a beam of the MEWP, the displaceable support structure enables to bring the outrigger mats from underneath the beam, i.e. bring the outrigger mats to a more outward position, thus facilitating the unloading by the mobile crane.

[0020] In an embodiment, the support structure comprises a bearing enabling the support structure and the outrigger mats to be displaced manually. Alternatively or in addition, the support structure can comprise an hydraulic cylinder for displacing the support structure and the outrigger mats.

[0021] These and other aspects of the invention will be more readily appreciated as the same becomes better understood by reference to the following detailed description and considered in connection with the accompanying drawings in which like reference symbols designate like parts.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

Figure 1 depicts a side view of a lifting or hoisting system according to the present invention.

Figure 2 depicts a plan view of a lifting or hoisting system according to the present invention.

Figure 3 depicts a 3D view of an embodiment of a mobile crane as can be applied in a system according to the invention.

Figure 4 depicts two side views of an embodiment of a mobile crane as can be applied in a system according to the invention.

Figure 5 depicts a crane holder mounted to a MEWP of a system according to the present invention.

Figure 6 depicts a side view of the crane holder as shown in Figure 5.

Figure 7 depicts a storage area for storing outrigger mats including a support structure.

Figure 8 depicts a plan view of a MEWP of a system according to the present invention, wherein part of the outrigger mats are in an outward position.

DETAILED DESCRIPTION OF EMBODIMENTS

[0023] Figure 1 schematically depicts a side view of an example of a MEWP, i.e. a crane 100 of a lifting or hoisting system according to the invention, the crane comprising a beam 105 and a set of outriggers 110. Figure 1 further shows a storage area 120 on the lift for storing outrigger mats 130. Mounted along a longitudinal side of the lift is a mobile crane 140 which is, in the position shown, positioned above ground level and thus can be transported along with the crane 100. In the embodiment as shown, the crane 100 is provided with a platform 106 for carrying on or more operators. Alternatively or in addition, a hoisting tool can be mounted to the end of the beam 105.

[0024] In Figure 2, a plan (top) view of the crane 100 of Figure 1 is schematically shown. Figure 2 further schematically shows the beam 105, the outrigger mats 130 as mounted to the crane and the mobile crane 140 mounted along a longitudinal side 200 of the crane 100. In the arrangement as shown, the mobile crane 140 is provided in a recess of the crane 100, the recess being provided along the longitudinal side 200 of the crane. A more detailed view on the recess is provided below. By positioning the mobile crane 140 in a recess along the longitudinal side 200 of the crane, the mobile crane 140 can be arranged to be positioned inside an outer circumference 210 of the crane. In Figure 2, the outer circumference or contour of the crane (such circumference corresponding to a rectangle having a length and width corresponding to the length and the width of the crane) is indicated by the dotted line 210. As a result, the overall width and length of the crane 100 is substantially not affected by the mounted mobile crane. As such, maneuvering with the MEWP (i.e. the crane 100) on the road or on an operating site is not adversely affected, compared to solutions whereby a trailer (holding the outrigger mats and a loading crane) is provided that is towed by the crane. In Figures 1 and 2, the crane 100 is provided with a crane holder (not shown) for holding the mobile crane 140. An embodiment of such a crane holder is discussed in more detail below.

[0025] In Figure 3, a 3D view of an embodiment of a mobile crane 140 as can be applied in a system according to the invention is shown. In the embodiment as shown, the mobile crane 140 comprises a telescopic arm 300 which can pivot about a horizontal axis at a pivot point 310 and which can rotate about a vertical axis by rotating the shaft 315 that is rotatably mounted to a body 320 of the mobile crane 140 (Note that, as an alternative, the mobile crane can comprises a non-rotatable or non-pivotable arm or telescopic arm). An end part 330 of the telescopic arm 300 is provided with a hoisting tool, e.g. a hoisting hook 340. The mobile crane is further provided with caterpillar tracks 350 and a support platform 360 for supporting an operator.

[0026] Figure 4 shows two side views of the mobile crane 140 of Figure 3. In the side view on the left, the telescopic arm 300, the caterpillar tracks 350 and the support platform 360 are shown. As can be seen, the telescopic arm 300 is shown in a folded position, wherein the telescopic position is directed downward. The telescopic arm 300 is further secured to the body 320 of the crane by a securing mechanism 400. On the right of Figure 4, a front view of the mobile crane 140 is shown. In the embodiment as shown, the mobile crane is constructed asymmetrically with respect to a central axis 420. Doing so facilitates the mounting of the mobile crane 140 in a recess of the crane (100, see e.g. Figure 1) in such manner that the mobile crane is in a position wherein an outer longitudinal surface of the mobile crane (e.g. the outer surface 430 of the caterpillar tracks 350) is substantially flush with the longitudinal side (200, see Figure 2) of the MEWP, i.e. the crane 100.

[0027] In accordance with the present invention, the MEWP of the lifting or hoisting system is provided with a crane holder for holding the mobile crane during transport. As an example of such an holder, a vertically displaceable platform could be applied whereby the mobile crane can be driven onto the platform and subsequently rotate. Alternatively, the platform can be arranged to rotate the mobile crane when the mobile crane is on the platform. The platform may be moved inwardly to ensure that an outer longitudinal surface of the mobile crane (e.g. the outer surface 430 of the caterpillar tracks 350 as shown in Figure 4) is substantially flush with the longitudinal side (200, see Figure 2) of the crane.

[0028] As an alternative to the use of such a platform, a more compact mounting solution is schematically shown in Figures 5 and 6. Figure 5 schematically shows a crane holder 500, the crane holder 500 comprising a support shaft 510 which is directed in a substantially vertical direction. In Figure 5, the support shaft is shown in two positions (POS1, POS2), the crane holder 500 comprising a rotation mechanism (not shown) for rotating the support shaft 510 from the first position (POS1) to the second position (POS2) and vice versa. In Figure 6, a side view of the crane holder 500 including the support shaft 510. In Figure 6, the support shaft 510 in shown in the second position POS2. Figure 6 further shows two of the outriggers 110 of the crane. The crane holder 500 as shown in Figures 5 and 6 can be used in the following manner for holding the mobile crane. In order to mount the mobile crane 140 of the lifting or hoisting system according to an embodiment of the invention, the support shaft 510 is positioned in the first position POS1 (see Figure 5). The mobile crane is subsequently positioned relative to the support shaft such that the end part of the telescopic arm 300 (see Figure 4) is above the support shaft 510. The telescopic arm 300 is assumed to be in the downward position as shown in Figure 4. In accordance with the embodiment, the end part of the telescopic arm is provided a hollow shaft dimensioned to receive the support shaft. By extending the telescopic arm over the support shaft, the mobile crane can subsequently be lifted off the ground. Once there is a clearance between the bottom of the mobile crane (e.g. the caterpillar tracks

350) and the ground, the support shaft 510 can be brought into the second position POS2 (as e.g. shown in Figure 6), thereby rotating the mobile crane about a vertical axis and bringing the mobile crane in a position as e.g. shown in Figure 2. The rotation of the mobile crane can either be performed manually or, as an alternative, a rotary actuator can be provided in the crane holder 500 for rotating the support shaft 510 between the first and second position.

[0029] In order to facilitate the unloading of the outrigger mats 130 as e.g. shown in Figures 1 and 2, the storage area of the MEWP (i.e. the mobile platform or lift or crane) of the system according to the present invention can be provided with a displaceable support structure. Figure 7 schematically shows the storage area 120 of a crane 100, the storage area 120 comprising a support structure 700 supporting the outrigger mats 130. In the embodiment shown, the support structure 700 is displaceable in a horizontal direction substantially perpendicular to a longitudinal axis of the MEWP (indicated by the arrow 730). The support structure can e.g. be provided with a bearing enabling a manual displacement of the outriggers mats 130 to an outward position.

[0030] As an alternative, or in addition, the support structure 700 can be provided with an hydraulic cylinder for displacing the outrigger mats.

[0031] In Figure 8, a plan view of the crane 100 as shown in Figure 7 is shown, showing the outrigger mats 130 on the right hand side of the crane 100 in an outward position. By bringing the support structure in a more outward position, the unloading and loading of the outrigger mats is facilitated since the outrigger mats can be moved from being at least partly underneath the beam 105 of the crane. Figure 8 also shows the recess 800 and the crane holder 500 including the support shaft 510 in both the first and second position.

[0032] As required, detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely exemplary of the invention, which can be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present invention in virtually any appropriately detailed structure. Further, the terms and phrases used herein are not intended to be limiting, but rather, to provide an understandable description of the invention.

[0033] The terms "a" or "an", as used herein, are defined as one or more than one. The term plurality, as used herein, is defined as two or more than two. The term another, as used herein, is defined as at least a second or more. The terms including and/or having, as used herein, are defined as comprising (i.e., open language, not excluding other elements or steps). Any reference signs in the claims should not be construed as limiting the scope of the claims or the invention.

[0034] The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

[0035] The term coupled, as used herein, is defined as connected, although not necessarily directly, and not necessarily mechanically.

Claims

1. A lifting or hoisting system comprising:

   - a mobile elevating work platform (MEWP) such as a crane or lift, comprising a set of outriggers for stabilizing the MEWP during operation, wherein the MEWP further comprises a storage area for storing a set of outrigger mats;
   - a mobile crane comprising a hoisting tool for, during use, unloading the outrigger mats and positioning the outrigger mats; and wherein the MEWP is provided with a crane holder for holding the mobile crane during transport.

2. The system according to claim 1, wherein the crane holder is mounted along a longitudinal side of the MEWP.

3. The system according to claim 1 or 2 wherein the mobile crane comprises a telescopic arm.

4. The system according to any preceding claim wherein the mobile crane is provided with caterpillar tracks.

5. The system according the any preceding claim wherein the mobile crane is provided with a support platform for supporting an operator.

6. The system according to any of the preceding claim wherein the mobile crane is mounted so as not to extend outside an outer circumference of the MEWP when seen in plan view.

7. The system according to claim 2 wherein the crane holder is mounted in a recess along the longitudinal side of the MEWP, the recess being adapted to receive the mobile crane.

8. The system according to claim 7 wherein the crane holder, recess and mobile crane are adapted to hold the mobile crane in a position wherein an outer longitudinal surface of the mobile crane is substantially flush with the longitudinal side of the MEWP.

9. The system according to claim 7 or 8 wherein the crane holder comprises a support shaft for mounting the mobile crane.

10. The system according to claim 9 wherein an end part of a telescopic arm of the mobile crane comprises a hollow shaft for receiving the support shaft.

11. The system according to claim 10 wherein the mobile crane is mounted to the MEWP, during transport, by inserting the support shaft into the hollow shaft and extending the end part of the telescopic arm.

12. The system according to any of the claims 9 to 11 wherein the support shaft is rotatable about a vertical axis for, in use, rotating the mobile crane about the vertical axis, thereby positioning the mobile crane inside an outer circumference of the MEWP, when seen in plan view.

13. The system according to any preceding claim wherein the storage area comprises a support structure for supporting the outrigger mats.

14. The system according to claim 13 wherein the support structure is displaceable in a horizontal direction substantially perpendicular to a longitudinal axis of the MEWP.

15. The system according to claim 13 or 14 wherein the support structure comprises an hydraulic cylinder for displacing the outrigger mats.

16. A method of stabilizing a mobile elevating work platform (MEWP) such as a crane or lift provided with a set of outriggers, the method comprising:

- mounting a corresponding set of outrigger mats onto the MEWP;
- mounting a mobile crane onto the MEWP;
- driving the MEWP to an operating site;
- unloading the mobile crane from the MEWP;
- unloading the outrigger mats from the MEWP using the mobile crane;
- positioning the outrigger mats using the mobile crane;
- positioning the outriggers onto the outrigger mats.

17. The method according to claim 16 wherein the step of unloading the outrigger mats is preceded by the step of

- displacing the outrigger mats at least partly outside an outer circumference of the MEWP, when seen in plan view.

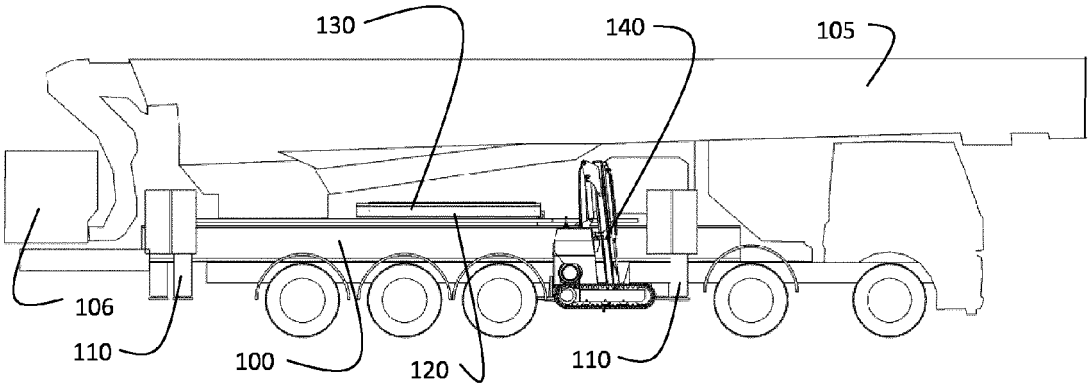

Figure 1

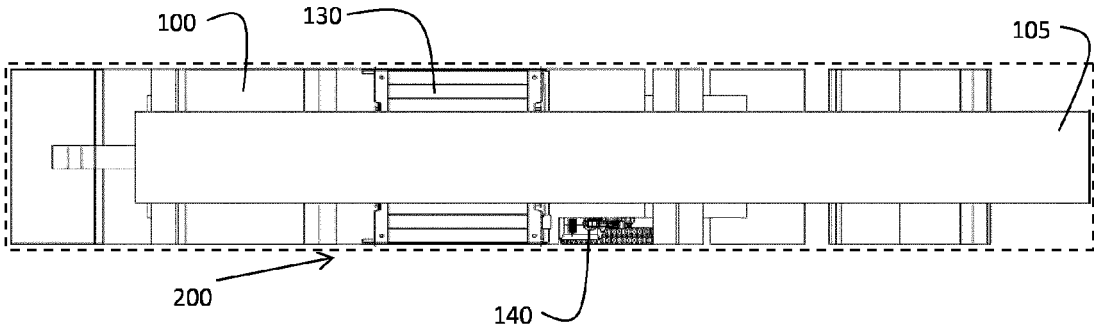

Figure 2

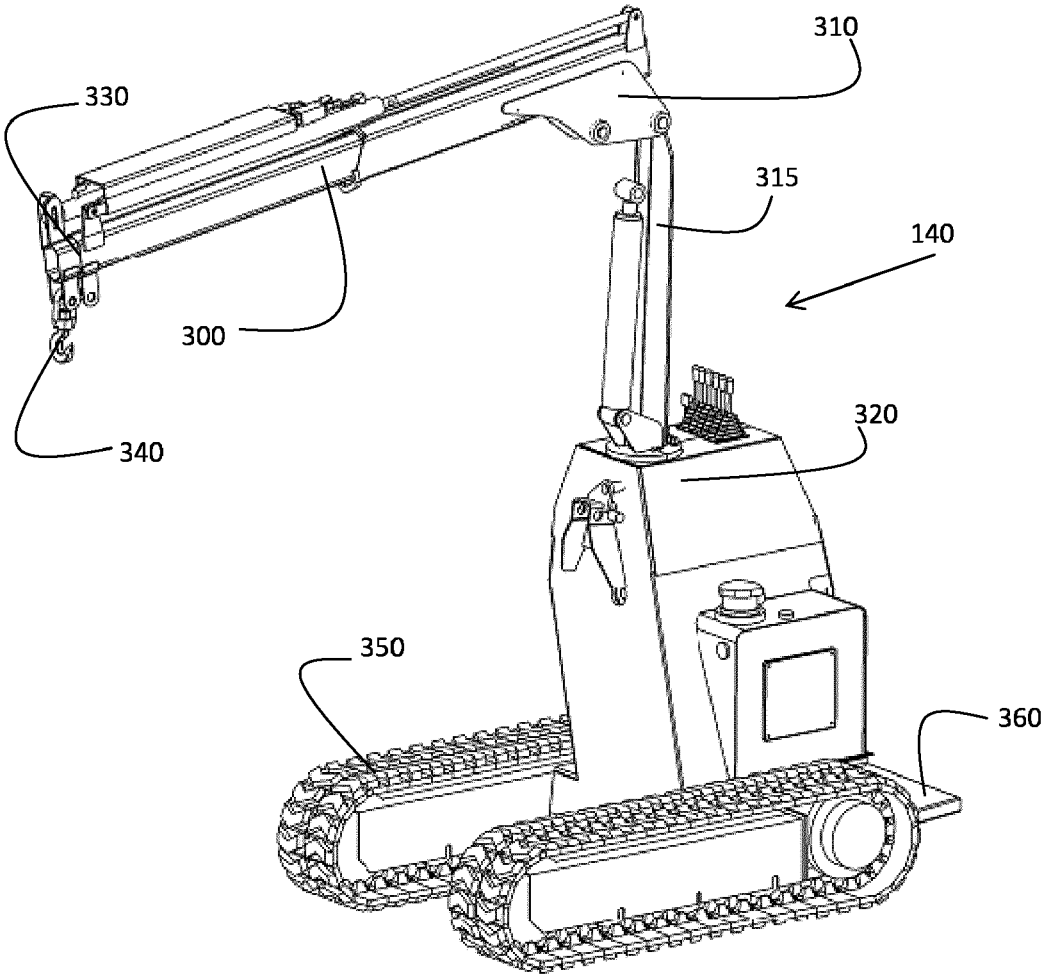

Figure 3

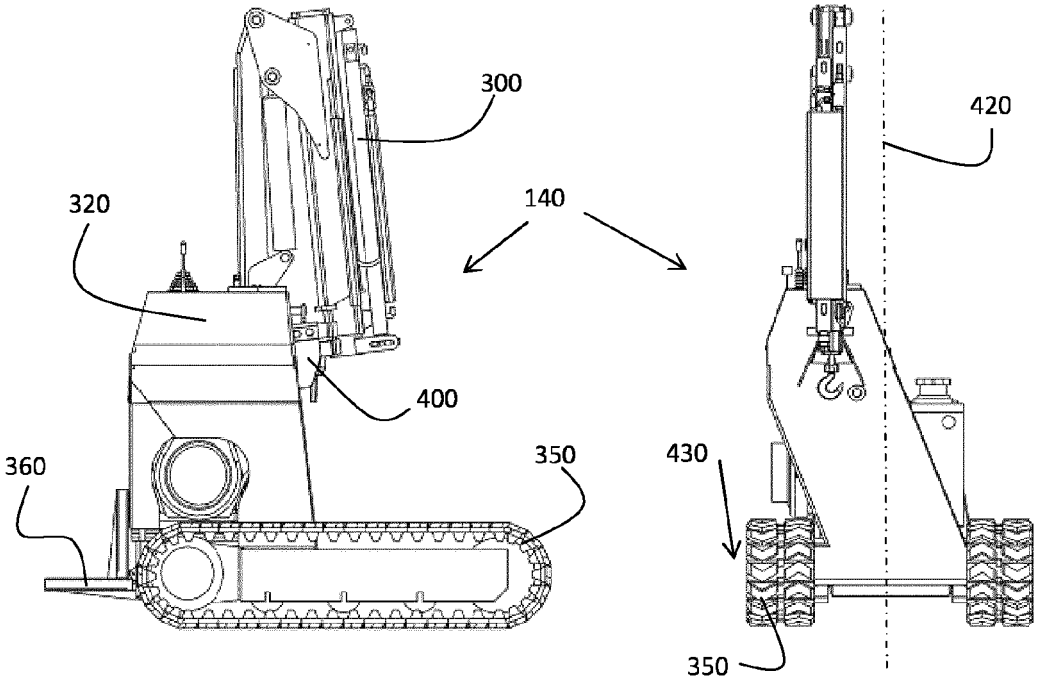

Figure 4

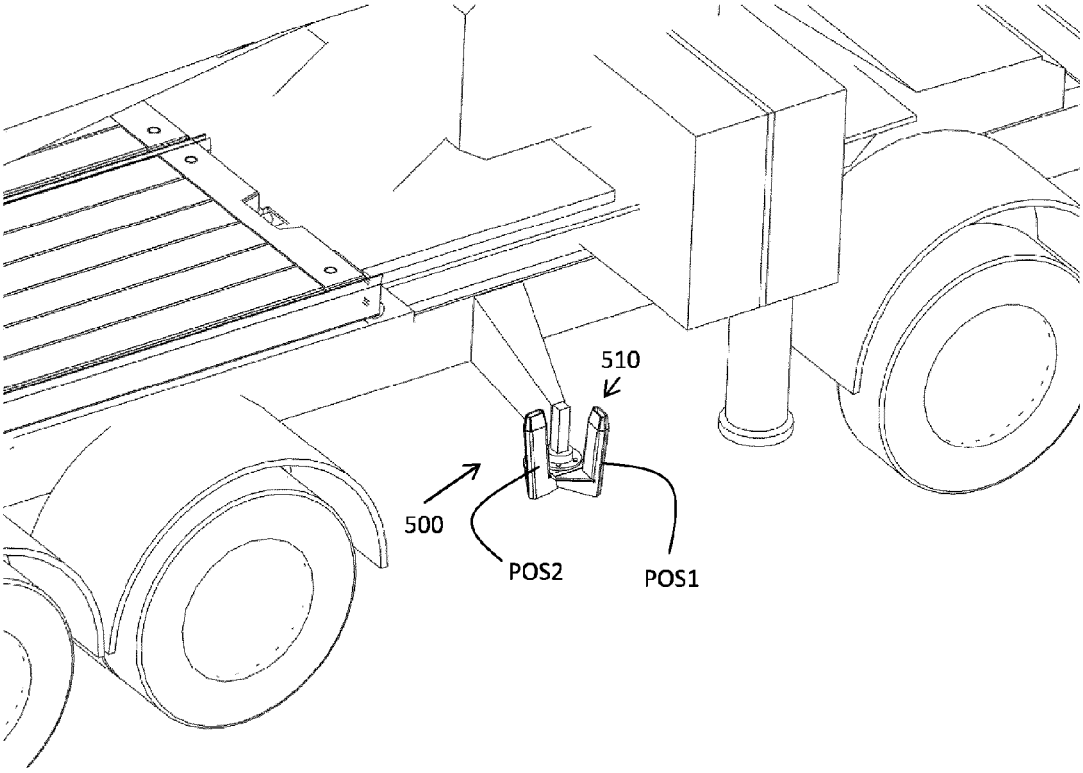

Figure 5

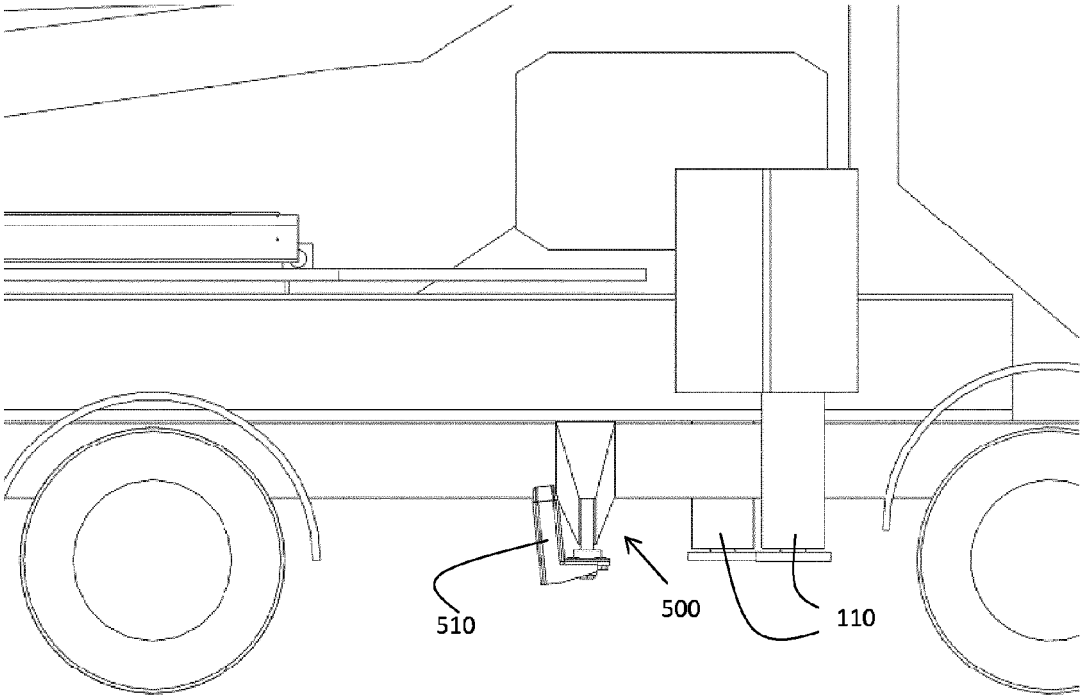

Figure 6

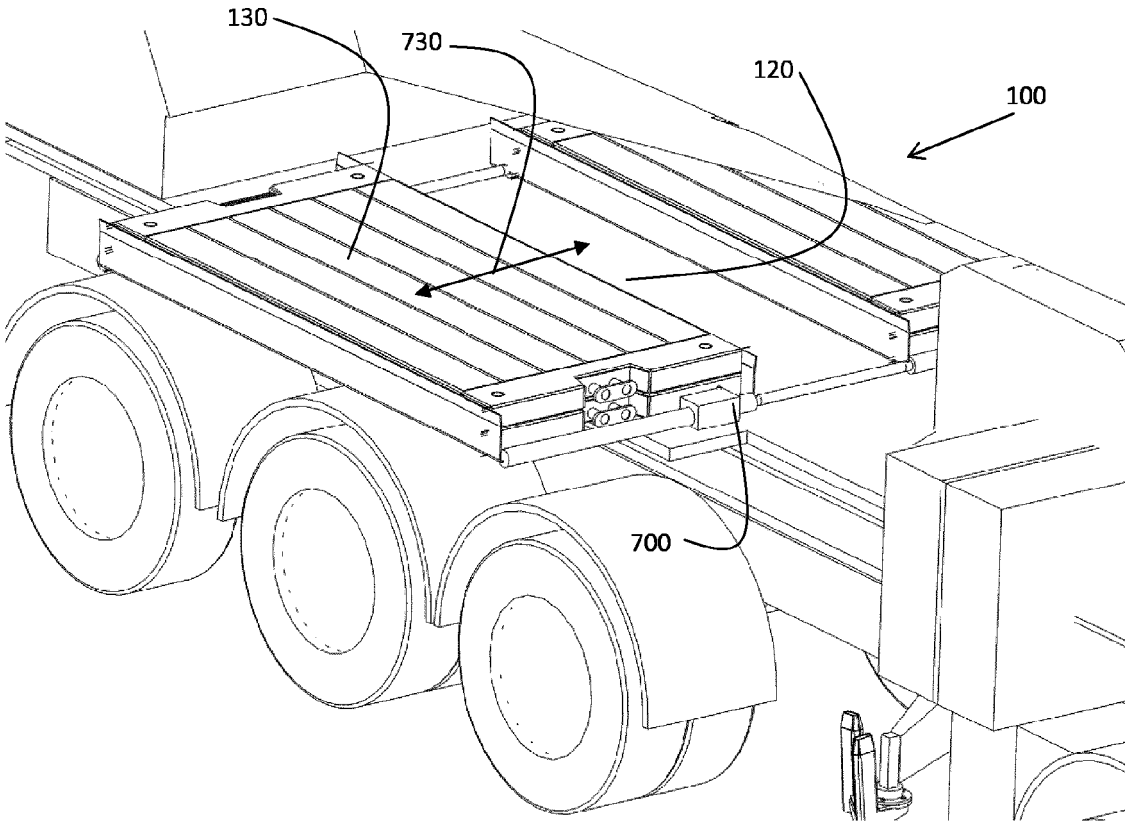

Figure 7

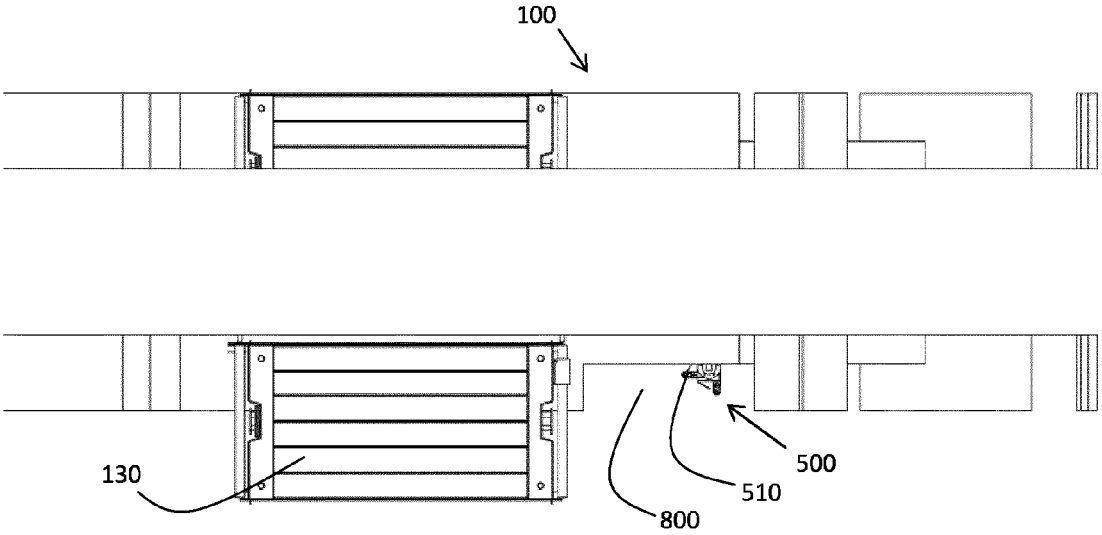

Figure 8

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EUROPEAN SEARCH REPORT

Application Number
EP 13 18 3114

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2006/267326 A1 (RICHARD RONNIE J [US]) 30 November 2006 (2006-11-30) * abstract; figures 1-14 *	1,16	INV. B66C23/78 B66F11/04
A	CN 201 800 687 U (XUZHOU HEAVY MACHINERY CO LTD) 20 April 2011 (2011-04-20) * abstract; figures 1-14 *	1,16	
A	CN 201 901 526 U (XUZHOU HEAVY MACHINERY CO LTD) 20 July 2011 (2011-07-20) * abstract; figures 1-7 *	1,16	

TECHNICAL FIELDS SEARCHED (IPC)
B66C
B66F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	6 January 2014	Rupcic, Zoran

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 13 18 3114

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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06-01-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82