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(54) **LOAD HANDLING ASSEMBLY**

(57) A load handling assembly comprising:
- a crane (10);
- a support legs (22);
- a camera unit (40) for capturing a real time image;
- a camera elevating device (50) which carries the camera unit, wherein the camera unit is moveable in relation to the crane by means of the camera elevating device; and
- a display unit (4) for displaying a real time image captured by the camera unit.

The camera elevating device (50) is automatically moveable under the control of an electronic control device (3) into a predetermined first position, in which the field of vision of the camera unit covers an operating area of said support legs (22). The camera elevating device (50) is also moveable into a second position, in which the field of vision of the camera unit covers an intended working area of the crane.

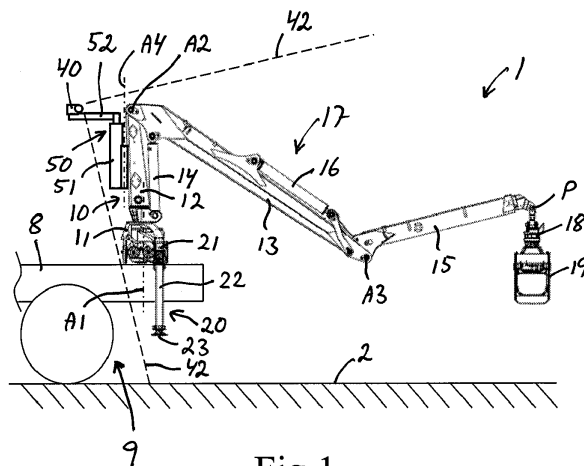


Fig 1

Description

FIELD OF THE INVENTION AND PRIOR ART

[0001] The present invention relates to a load handling assembly according to the preamble of claim 1.

[0002] It is previously known to use a video camera for capturing a real time image of a moveable support leg of a vehicle, wherein the real time image captured by the camera is shown on a display unit in order to enable an operator of the vehicle to view the support leg and an area around the support leg on the display unit during a movement of the support leg between a non-use position, in which the end of the support leg is lifted from the ground, and an operating position, in which the end of the support leg is in supporting contact with the ground. Vehicles having such a camera system are for instance previously known from US 2015/0330146 A1, WO 2015/197708 and EP 2 952 467 A1.

[0003] It is also previously known, for instance from WO 2015/133907 A1, to use a camera mounted to a crane boom of a crane in order to capture a real time image of a working area of the crane and allow an operator of the crane to view a real time image of the working area on a display unit connected to the camera. Also JP H093979 and JP H09214943 disclose devices including a projected camera used to assist an operator at a work site.

OBJECT OF THE INVENTION

[0004] The object of the present invention is to provide a new and favourable manner of implementing camera monitoring of a load handling assembly provided with a crane and support legs.

SUMMARY OF THE INVENTION

[0005] According to a first aspect of the present invention, said object is achieved by means of a load handling assembly having the features defined in claim 1.

[0006] The load handling assembly according to this first aspect of the invention comprises:

- a crane, which comprises a crane base and a crane boom system with one or more liftable and lowerable crane booms;
- a support leg arrangement, which comprises a base structure fixedly connected to the crane base and two support legs moveably mounted to the base structure,
- a camera unit for capturing a real time image and a camera elevating device, wherein the camera unit is mounted to and carried by the camera elevating device and moveable in relation to the crane by means of the camera elevating device to thereby enable an adjustment of the position of the field of vision of the camera unit in relation to the crane and the support

legs;

- a display unit for displaying, to an operator of the load handling assembly, a real time image captured by the camera unit; and
- an electronic control device which is configured to control the movement of the camera elevating device in relation to the crane and thereby the movement of the field of vision of the camera unit.

[0007] The camera elevating device is automatically moveable under the control of the electronic control device into a predetermined first position, in which the field of vision of the camera unit covers an operating area of said support legs to thereby enable the operator to view a real time image of the support legs and an area around the support legs on the display unit during a movement of the support legs in relation to the crane base when the camera elevating device is in this first position. Furthermore, the camera elevating device is moveable under the control of the operator or automatically moveable under the control of the electronic control device into a second position, in which the field of vision of the camera unit covers an intended working area of the crane to thereby enable the operator to view a real time image of the intended working area on the display unit when the camera elevating device is in this second position. Hereby, it will in a simple manner be possible to use one and the same camera unit for observing the operating area of the support legs during remote manoeuvring of the support legs and for observing the working area of the crane during remote manoeuvring of the crane.

[0008] According to an embodiment of the invention, the camera elevating device is configured to position the camera unit on the right side of the crane column or on the left side of the crane column in said second position at the choice of the operator.

[0009] Hereby, it will be possible for the operator to select a position for the camera unit in which the image of the working area of the crane captured by the camera unit is obstructed as little as possible by the crane column and the crane booms, which will offer the operator an advantage as compared for instance with a traditional loader crane without a camera viewing system where the crane operator is seated in a cabin or a top seat which is fixed to the crane on one side of the crane column or behind the crane column and where the crane booms and/or the crane column may obstruct the operator's view in some parts of the working area.

[0010] According to another embodiment of the invention, the camera unit is a stereoscopic camera unit for capturing a stereoscopic real time image, wherein the display unit is configured to display a stereoscopic real time image captured by the camera unit. The stereoscopic image will give the operator depth perception and improve the ability of the operator to accurately control the movements of the support legs when viewing the operating area of the support legs via the display unit in connection with remote manoeuvring of the support legs and

to accurately control the movements of the crane when viewing the working area of the crane via the display unit in connection with remote manoeuvring of the crane.

[0011] Another embodiment of the invention is characterized in:

- that the load handling assembly comprises a tilt sensor for generating measuring signals related to the tilt angle of the crane base; and
- that the load handling assembly comprises an image processor which is configured to superpose graphic or alphanumeric tilt angle information on the real time image displayed on the display unit when the camera elevating device is in said first position, to thereby enable the operator to monitor, via the display unit during an adjustment of the support legs, the tilt angle of the crane base as established based on measuring signals from the tilt sensor.

Hereby, it will be possible for the operator to control the movements of the support legs in order to position the crane base in an accurate horizontal orientation when viewing the operating area of the support legs via the display unit.

[0012] Further advantages as well as advantageous features of the load handling assembly according to the first aspect of the invention will appear from the following description and the dependent claims.

[0013] According to a second aspect, of the present invention, the above-mentioned object is achieved by means of a load handling assembly having the features as disclosed below.

[0014] The load handling assembly according to this second aspect of the invention comprises:

- a hydraulic loader crane with:
 - a crane base;
 - a crane column which is rotatably mounted to the crane base so as to be rotatable in relation to the crane base about an essentially vertical axis of rotation; and
 - a crane boom system comprising two or more liftable and lowerable crane booms which are articulately connected to each other, including at least a first crane boom which is articulately connected to the column and a second crane boom which is articulately connected to the first crane boom;
- a stereoscopic camera unit for capturing a real time stereoscopic image;
- a camera elevating device, wherein the camera unit is mounted to and carried by the camera elevating device and moveable in relation to the loader crane by means of the camera elevating device; and
- a display unit for displaying, to an operator of the loader crane, a real time stereoscopic image cap-

tured by the camera unit.

The camera elevating device is moveable into a position in which the field of vision of the camera unit covers an intended working area of the loader crane to thereby enable the operator to view a real time stereoscopic image of the intended working area on the display unit when the camera unit is in this position. The stereoscopic image will give the operator depth perception and improve the ability of the operator to accurately control the movements of the loader crane when viewing the working area of the loader crane via the display unit in connection with remote manoeuvring of the crane.

[0015] Further advantages as well as advantageous features of the load handling assembly according to the second aspect will appear from the following description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The invention will in the following be more closely described by means of embodiment examples, with reference to the appended drawings. In the drawings:

Fig 1 is a schematic lateral view of a crane, a support leg arrangement, a camera unit and a camera elevating device included in a load handling assembly according to an embodiment of the present invention, as seen with the camera unit in a first position and the support legs of the support leg arrangement in a non-use position,

Fig 2 is a schematic rear view of the components shown in Fig 1, as seen with the camera unit in the first position and the support legs in a non-use position,

Fig 3 is a schematic planar view from above of the components shown in Fig 1, as seen with the camera unit in the first position and the support legs in a non-use position,

Fig 4 is a schematic lateral view of the components shown in Fig 1, as seen with the camera unit in a second position and the support legs in an operating position,

Fig 5 is a schematic rear view of the components shown in Fig 1, as seen with the camera unit in the second position and the support legs in the operating position,

Fig 6 is a schematic planar view from above of the components shown in Fig 1, as

- seen with the camera unit in the second position and the support legs in the operating position,
- Figs 7a and 7b are schematic illustrations of a camera elevating device according to a first variant, as seen in two different positions, and
- Fig 8 is a schematic illustration of a camera elevating device according to a second variant.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0017] In this description, the expression "liftable and lowerable crane boom" refers to a crane boom which can be pivoted in a vertical plane so as to thereby perform liftings and lowerings of a load carried by the crane.

[0018] Fig 1 shows a part of a load handling assembly 1 according to an embodiment of the present invention. The load handling assembly 1 comprises a crane 10 and a support leg arrangement 20. In the illustrated embodiment, the crane 10 is a hydraulic loader crane and comprises:

- a crane base 11;
- a crane column 12 which is rotatably mounted to the crane base 11 so as to be rotatable in relation to the crane base about an essentially vertical axis of rotation A1;
- a liftable and lowerable first crane boom 13, which is articulately connected to the crane column 12 in such a manner that it is pivotable in relation to the crane column about an essentially horizontal axis of rotation A2;
- a first hydraulic cylinder 14 for lifting and lowering the first crane boom 13 in relation to the crane column 12;
- a liftable and lowerable second crane boom 15, which is articulately connected to the first crane boom 13 in such a manner that it is pivotable in relation to the first crane boom 13 about an essentially horizontal axis of rotation A3; and
- a second hydraulic cylinder 16 for lifting and lowering the second crane boom 15 in relation to the first crane boom 13.

[0019] In the illustrated embodiment, the crane boom system 17 of the crane 10 is formed by the first crane boom 13 and the second crane boom 15 and the associated hydraulic cylinders 14, 16. However, the crane boom system 17 of the crane 10 may as an alternative include only one liftable and lowerable crane boom or more than two liftable and lowerable crane booms articulately connected to each other. One or more of the crane booms of the crane boom system 17 may be telescopi-

cally extensible, for instance by means of one or more hydraulic cylinders, in order to enable an adjustment of the extension length thereof.

[0020] In the illustrated embodiment, a rotator 18 is articulately connected to a load suspension point P at the outer end of the second crane boom 15, which rotator in its turn carries a load handling tool 19. In the illustrated example, the load handling tool 19 is a hydraulic gripping tool in the form of a so-called grapple provided with pivotable gripping members 19a, 19b for gripping a load. However, the crane 10 included in a load handling assembly of the present invention may also be provided with another type of load handling tool, such as for instance a lifting hook.

[0021] The support leg arrangement 20 comprises a base structure 21 fixedly connected to the crane base 11 and at least two support legs 22 moveably mounted to the base structure 21. In the illustrated embodiment, the support leg arrangement 20 comprises two support legs 22 mounted to the base structure 21 on opposite sides thereof, wherein each support leg 22 is moveable in a horizontal direction in relation to the crane base 11, for instance by means of a hydraulic cylinder or any other suitable type of linear actuator, between a retracted position (see Figs 2 and 3) and an advanced position (see Figs 5 and 6). In the illustrated embodiment, each support leg 22 is telescopically extensible in a vertical direction, for instance by means of a hydraulic cylinder or any other suitable type of linear actuator. A foot plate 23 is provided at the outer end of each support leg 22, wherein this foot plate 23 is moveable, by an extension of the support leg, from a non-use position (see Figs 1 and 2), in which the foot plate 23 is lifted from the ground 2, to an operating position (see Figs 4 and 5), in which the foot plate 23 is in supporting contact with the ground 2. As an alternative, each support leg 22 could be pivotally mounted to the base structure 21 of the support leg arrangement 20 so as to be pivotable by means of an actuator, for instance in the form of a hydraulic cylinder, between a non-use position and an operating position.

[0022] The load handling assembly 1 comprises a manoeuvring unit 30 (very schematically illustrated in Fig 3) with one or more maneuvering members configured to be manoeuvrable by an operator in order to control the movement of the crane booms 13, 15 and the movement of the support legs 22. The manoeuvring unit 30 may for instance consist of a joystick, but any other suitable type of manoeuvring unit 30 may also be used. Control signals are transmitted via cable or a wireless connection from the manoeuvring unit 30 to an electronic control device 3 (very schematically illustrated in Fig 3), which in its turn controls the hydraulic cylinders and the other actuators of the crane 10 and the support leg arrangement 20 in a conventional manner.

[0023] At least two different operating modes are provided for the manoeuvring unit 30 and the electronic control device 3. In a first operating mode, the manoeuvring unit 30 and the electronic control device 3 are configured

to control the actuators of the support leg arrangement 20 to thereby control the movement of the support legs 22. In a second operating mode, the manoeuvring unit 30 and the electronic control device 3 are configured to control the actuators of the crane 10 to thereby control the movement of the crane booms 13, 15 and the load handling tool 19. The load handling assembly 1 comprises switching means 31 by means of which the operator may switch from the first operating mode to the second operating mode. The switching means may for instance have the form of a maneuvering member 31 on the manoeuvring unit 30 or a menu-guided interface with a function which can be selected by the operator in order to select the desired operating mode.

[0024] The electronic control device 3 may be configured to control the crane boom movements on the basis of the control signals from the manoeuvring unit 30 and a calculation model for boom tip control. The calculation model may for instance be stored as an algorithm in a memory of the electronic control device 3. As an alternative to boom tip control, a first maneuvering member of the manoeuvring unit 30 may be used for controlling the rotation of the crane column 12 in relation to the crane base 11 about the vertical axis of rotation A1, a second maneuvering member of the manoeuvring unit 30 may be used for controlling the first hydraulic cylinder 14 and a third maneuvering member of the manoeuvring unit 30 may be used for controlling the second hydraulic cylinder 16.

[0025] The load handling assembly 1 further comprises a camera unit 40 with one or more video cameras 41a, 41b for capturing a real time image, and a camera elevating device 50, wherein the camera unit 40 is mounted to and carried by the camera elevating device 50 and moveable in relation to the crane 10 by means of the camera elevating device 50 to thereby enable an adjustment of the position of the field of vision of the camera unit 40 in relation to the crane 10 and the support legs 22. The field of vision of the camera unit 40 is illustrated by the broken lines 42 in Figs 1, 3, 4 and 6. The load handling assembly 1 also comprises a display unit 4 (very schematically illustrated in Fig 3) for displaying, to the operator of the load handling assembly, a real time image captured by the camera unit 40. The display unit 4 may be a head mounted display in the form of goggles with one single display screen or with a first display screen 5a for the right eye of the operator and a second display screen 5b for the left eye of the operator. However, any other suitable type of display unit may also be used, such as for instance a display unit with a display screen mounted in the driver's cabin of a vehicle which carries the crane 10 and the support leg arrangement 20.

[0026] The camera unit 40 may be connected to an image processor 6 (very schematically illustrated in Fig 3), wherein this image processor 6 is configured to receive image signals from the video cameras 41a, 41b of the camera unit 40 and to produce, based on these image signals, a real time image for display on the display unit 4.

[0027] The electronic control device 3 is configured to control the movement of the camera elevating device 50 in relation to the crane 10 and thereby the movement and the positioning of the field of vision of the camera unit 40. When so ordered by the operator, the camera elevating device 50 is automatically moveable under the control of the electronic control device 3 into a predetermined first position (see Figs 1-3), in which the field of vision of the camera unit 40 covers an operating area of said support legs 22 to thereby enable the operator to view a real time image of the support legs 22 and an area around the support legs on the display unit 4 during a movement of the support legs in relation to the crane base 11 when the camera elevating device 50 is in this first position. The operator may order a movement of the camera elevating device 50 to said first position by means of a maneuvering member 32 on the manoeuvring unit 30 or by selecting a function on a menu-guided interface. When the camera elevating device 50 is in the first position, the operator may control the movement of the support legs 22 remotely via the manoeuvring unit 30 while simultaneously viewing the support legs 22 and an area around the support legs on the display unit 4.

[0028] From the first position, the camera elevating device 50 is moveable into a second position, in which the field of vision of the camera unit 40 covers an intended working area of the crane 10 to thereby enable the operator to view a real time image of the intended working area on the display unit 4 when the camera elevating device 50 is in this second position. When the camera elevating device 50 is in the second position, the operator may control the movement of the crane booms 13, 15 and the load handling tool 19 remotely via the manoeuvring unit 30 while simultaneously viewing the working area of the crane 10 on the display unit 4.

[0029] The camera elevating device 50 may be moveable into the second position under the control of the operator via the manoeuvring unit 30. In this case, a third operating mode is provided for the manoeuvring unit 30 and the electronic control device 3. In this third operating mode, the manoeuvring unit 30 is configured to control actuators of the camera elevating device 50 via the electronic control unit 3 to thereby control the movement of the camera elevating device 50. The operator may select this third operating mode by means of the above-mentioned switching means 31. As an alternative, the camera elevating device 50 may be automatically moveable into the second position under the control of the electronic control device 3 when so ordered by the operator by means of a maneuvering member on the manoeuvring unit 30 or by selecting a function on a menu-guided interface.

[0030] According to a preferred embodiment, the camera unit 40 is a stereoscopic camera unit for capturing a stereoscopic real time image, wherein the display unit 4 is configured to display a stereoscopic real time image captured by the camera unit 40. The stereoscopic camera unit 40 comprises a first video camera 41a (see Figs

3 and 6-8) for capturing a real time image intended to be displayed to the right eye of the operator and a second video camera 41b for capturing a real time image intended to be displayed to the left eye of the operator. In this case, the display unit 4 is with advantage a head mounted display in the form of goggles with a first display screen 5a for displaying a real time image captured by the first video camera 41a to the right eye of the operator and a second display screen 5b for displaying a real time image captured by the second video camera 41b to for the left eye of the operator.

[0031] The camera elevating device 50 comprises a base part 51, which in the embodiment illustrated in Figs 1-6 is secured to the crane column 12 to thereby allow the camera elevating device 50 to be rotatable together with the crane column 12 in relation to the crane base 11 about the above-mentioned vertical axis of rotation A1. Thus, in this case, the camera elevating device 50 is carried by the crane column 12 and will move together with the crane column when the crane column is rotated in relation to the crane base 11 about the vertical axis of rotation A1. The base part 51 of the camera elevating device 50 may be rotatably connected to the crane column 12 so as also allow the camera elevating device 50 to be rotated by means of an actuator in relation to the crane column 12 about another essentially vertical axis of rotation A4 (see Fig 1).

[0032] The camera elevating device 50 is preferably configured to be capable of positioning the camera unit 40 on the right side of the crane column 12 or on the left side of the crane column 12, at the choice of the operator, in the above-mentioned second position. According to a first alternative, the operator controls the movement of the camera elevating device 50 via the manoeuvring unit 30 in order to position the camera unit 40 on the desired side of the crane column 12 when the camera unit is moved into a position for capturing a real image of the intended working area of the crane. According to a second alternative, the operator may order the electronic control device 3 to automatically move the camera elevating device 50 into a predetermined second position in which the camera unit 40 is positioned on the right side of the crane column 12 or into another predetermined second position in which the camera unit 40 is positioned on the left side of the crane column 12. In the latter case, the operator may select the desired predetermined second position by means of a maneuvering member on the manoeuvring unit 30 or by selecting a function on a menu-guided interface.

[0033] In the embodiments illustrated in Figs 1-8, the base part 51 of the camera elevating device 50 has the form of a vertical column, which is telescopically extensible by means of a hydraulic cylinder (not shown) or any other suitable type of linear actuator so as to allow a movement of the camera unit 40 in a vertical direction. In the illustrated embodiments, the camera elevating device 50 further comprises a carrier arm 52, which is mounted to the base part 51 at an upper end thereof,

wherein the camera unit 40 is mounted to the carrier arm 52 at an outer end thereof. The carrier arm 52 is with advantage telescopically extensible (see Figs 7a, 7b and 8) by means of a hydraulic cylinder (not shown) or any other suitable type of linear actuator so as to allow a movement of the camera unit 40 in a horizontal direction. The carrier arm 52 may be fixed to the base part 51 so as to extend from the base part in a horizontal direction, as illustrated in Figs 7a and 7b. As an alternative, the carrier arm 52 may be articulately connected to the base part 51 in such a manner that it is pivotable in relation to the base part about an essentially horizontal axis of rotation A5, as illustrated in Fig 8. In the latter case, the carrier arm 52 may be pivoted in relation to the base part 51 by means of a hydraulic cylinder 53 or any other suitable type of actuator.

[0034] The camera unit 40 is preferably rotatably connected to the carrier arm 52 so as to allow the camera unit 40 to be rotated in relation to the carrier arm 52 by means of an actuator (not shown) about an essentially vertical axis of rotation A6, as illustrated in Figs 7a, 7b and 8. The camera unit 40 may also be tiltably connected to the carrier arm 52 so as to allow the camera unit 40 to be tilted in relation to the carrier arm 52 by means of an actuator (not shown) about an essentially horizontal tilt axis A7.

[0035] The camera elevating device 50 is with advantage configured to be automatically moveable under the control of the electronic control device 3 into a third position, which represents a resting position to be assumed by the camera elevating device 50 during transport of the load handling assembly 1, when so ordered by the operator by means of a maneuvering member on the manoeuvring unit 30 or by selecting a function on a menu-guided interface. The camera unit 40 may be configured to be moved into a protective housing 54 (very schematically illustrated in Fig 8) when the camera elevating device 50 is moved into this third position.

[0036] The design of the camera elevating device 50 is not limited to the embodiments illustrated in the drawings and described above. On the contrary, the camera elevating device 50 may of course have any other suitable design as long as it is capable of moving the camera unit 40 between the above-mentioned positions.

[0037] The load handling assembly 1 may with advantage comprises a tilt sensor 7 (very schematically illustrated in Fig 3) for generating measuring signals related to the tilt angle of the crane base 11, wherein the image processor 6 is configured to superpose graphic or alphanumeric tilt angle information on the real time image displayed on the display unit 4 when the camera elevating device 50 is in said first position, to thereby enable the operator to monitor, via the display unit 4 during an adjustment of the support legs 22, the tilt angle of the crane base 11 as established based on measuring signals from the tilt sensor 7. The tilt sensor 7 may be mounted to the crane base 11 or to the base structure 21 of the support leg arrangement 20. As a further alternative, if the crane

10 is mounted to the chassis of a vehicle, the tilt sensor 7 may be mounted the vehicle chassis.

[0038] In the embodiment illustrated in Figs 1-6, the crane 10 is a hydraulic loader crane in the form of a forestry crane which is mounted to the chassis 8 of a vehicle 9. The rear end of the vehicle 9 and the rear end of its chassis 8 are very schematically illustrated in Figs 1 and 4. The vehicle 9 and its chassis 8 have been omitted in Figs 2, 3, 5 and 6. A load handling assembly 1 according to the present invention could also comprise a hydraulic loader crane in the form of lorry crane mounted to the chassis of a lorry.

[0039] The electronic control device 3 may be implemented by one single electronic control unit, as illustrated in Fig 3. However, the electronic control device 3 could as an alternative be implemented by two or more mutually co-operating electronic control units.

[0040] The invention is of course not in any way limited to the embodiments described above. On the contrary, several possibilities to modifications thereof should be apparent to a person skilled in the art without thereby deviating from the invention as defined in the appended claims.

Claims

1. A load handling assembly comprising a hydraulic loader crane (10), wherein the loader crane (10) comprises:

- a crane base (11);
- a crane column (12) which is rotatably mounted to the crane base (11) so as to be rotatable in relation to the crane base about an essentially vertical axis of rotation (A1); and
- a crane boom system (17) comprising two or more liftable and lowerable crane booms (13, 15) which are articulately connected to each other, including at least a first crane boom (13) which is articulately connected to the column (12) and a second crane boom (15) which is articulately connected to the first crane boom (13);

characterized in that:

- the load handling assembly (1) comprises a stereoscopic camera unit (40) for capturing a real time stereoscopic image and a camera elevating device (50), wherein the camera unit (40) is mounted to and carried by the camera elevating device (50) and moveable in relation to the loader crane (10) by means of the camera elevating device (50), and wherein the camera elevating device (50) comprises a base part (51) which is secured to the crane column (12) to thereby allow the camera elevating device to be rotatable together with the crane column (12) in

relation to the crane base (11) about said vertical axis of rotation (A1);

- the load handling assembly (1) comprises a display unit (4) for displaying, to an operator of the loader crane (10), a real time stereoscopic image captured by the camera unit (40); and
- the camera elevating device (50) is moveable into a position in which the field of vision of the camera unit (40) covers an intended working area of the loader crane (10) to thereby enable the operator to view a real time stereoscopic image of the intended working area on the display unit (4) when the camera unit (40) is in this position.

2. A load handling assembly according to claim 1, wherein the load handling assembly (1) comprises a vehicle (9), and wherein the loader crane (10) is mounted to a chassis (8) of the vehicle (9).

3. A load handling assembly according to claim 1 or 2, wherein the base part (51) of the camera elevating device (50) has the form of a vertical column, and is telescopically extensible by means of a hydraulic cylinder, or any other suitable type linear actuator, so as to allow a movement of the camera unit (40) in a vertical direction.

4. A load handling assembly according to any of claims 1-3, wherein the base part (51) of the camera elevating device (50) has the form of a vertical column, and is telescopically extensible under the control of an electronic control device (3) so as to allow a movement of the camera unit (40) in a vertical direction.

5. A load handling assembly according to any of claims 1-4, wherein the base part (51) is secured to the crane column (12) at a vertical side of said crane column.

6. A load handling assembly according to any of claims 1-5, wherein the base part (51) is fixedly connected to the crane column (12), i.e. the base part (51) is not rotatably connected to the crane column (12).

7. A load handling assembly according to any of claims 1-6, wherein the camera elevating device (50) comprises a carrier arm (52), which is mounted to the base part (51) at an upper end thereof, and wherein the camera unit (40) is mounted to the carrier arm (52) at an outer end thereof.

8. A load handling assembly according to claim 7, wherein the camera unit (40) is tiltably connected to the carrier arm (52) so as to allow the camera unit (40) to be tilted in relation to the carrier arm (52).

9. A load handling assembly according to claim 7 or 8, wherein the camera unit (40) is rotatably connected

to the carrier arm (52) so as to allow the camera unit (40) to be rotated in relation to the carrier arm (52).

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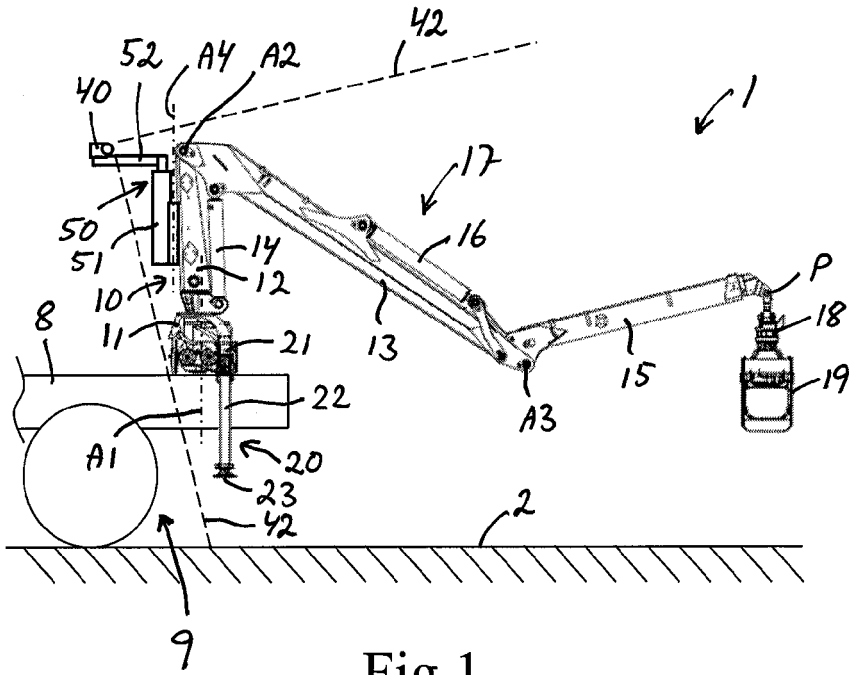


Fig 1

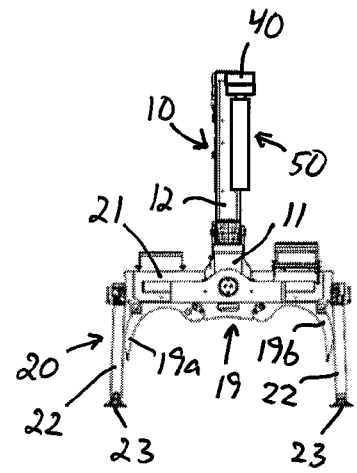


Fig 2

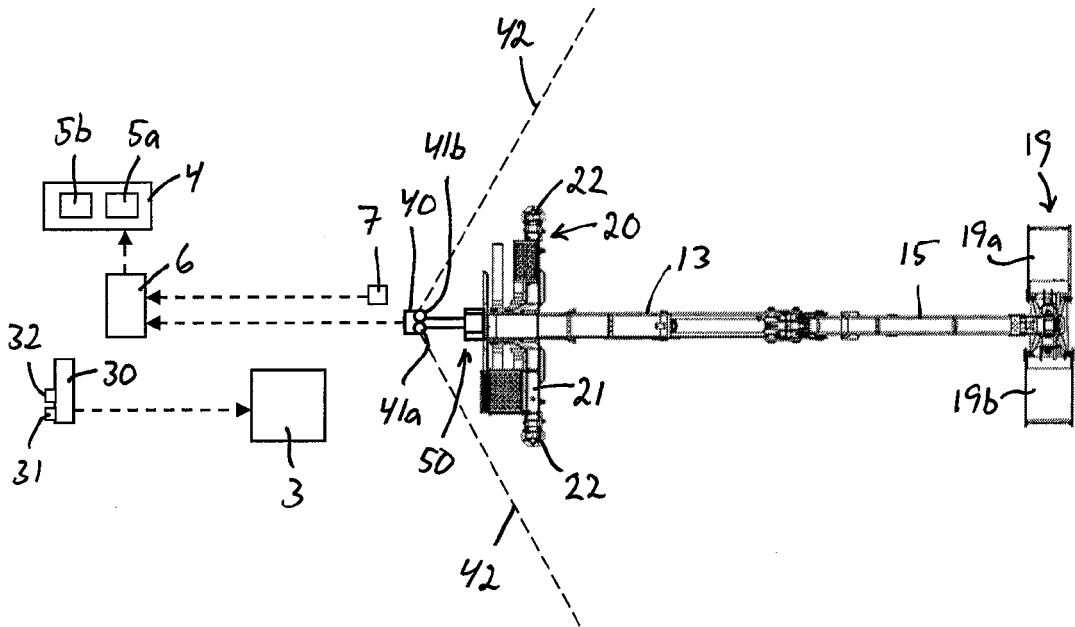


Fig 3

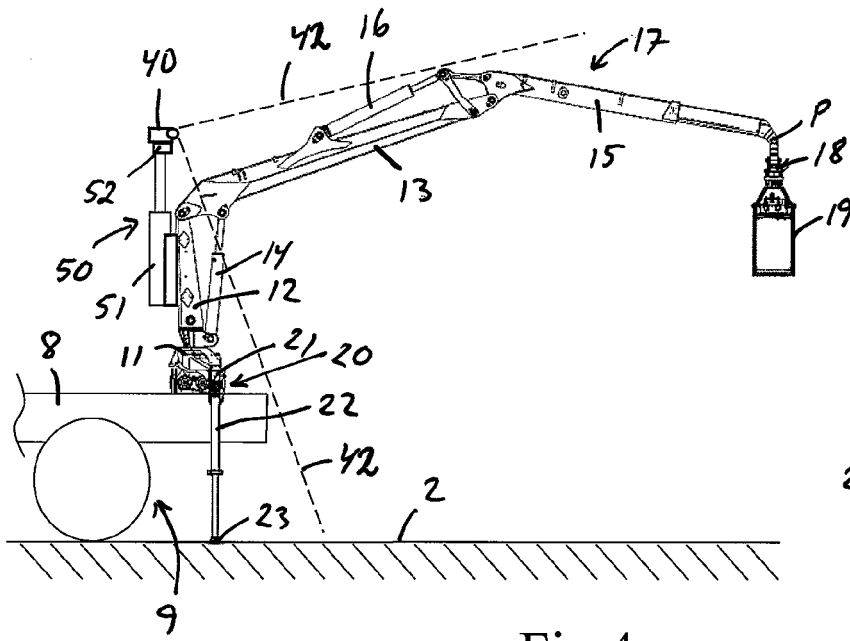


Fig 4

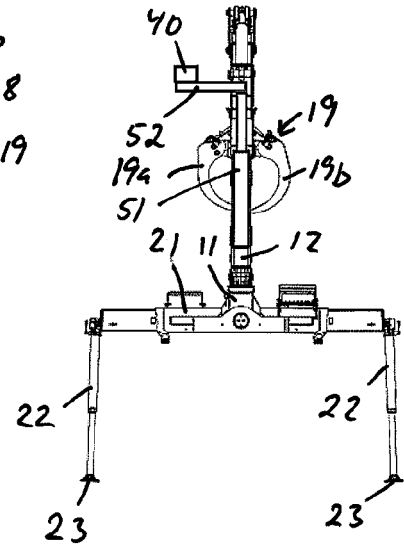


Fig 5

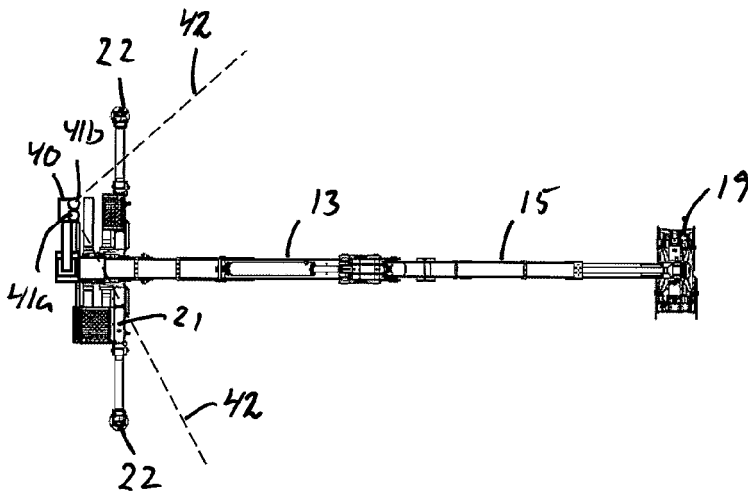


Fig 6

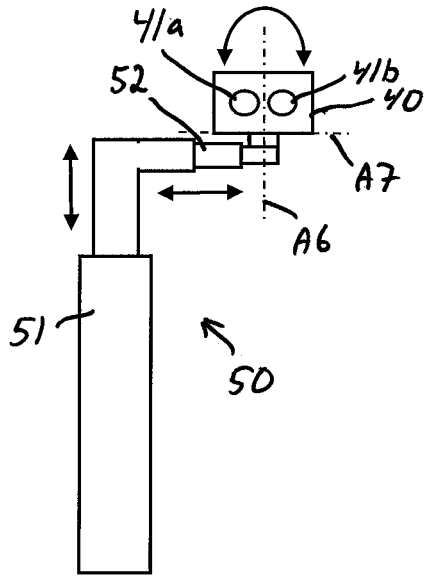


Fig 7a

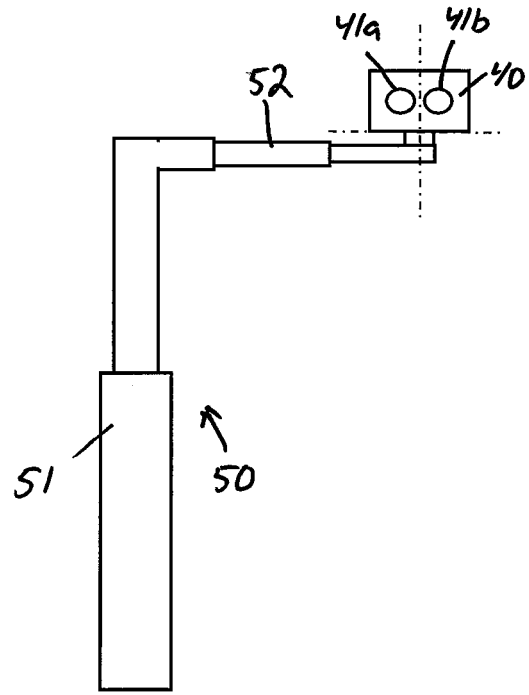


Fig 7b

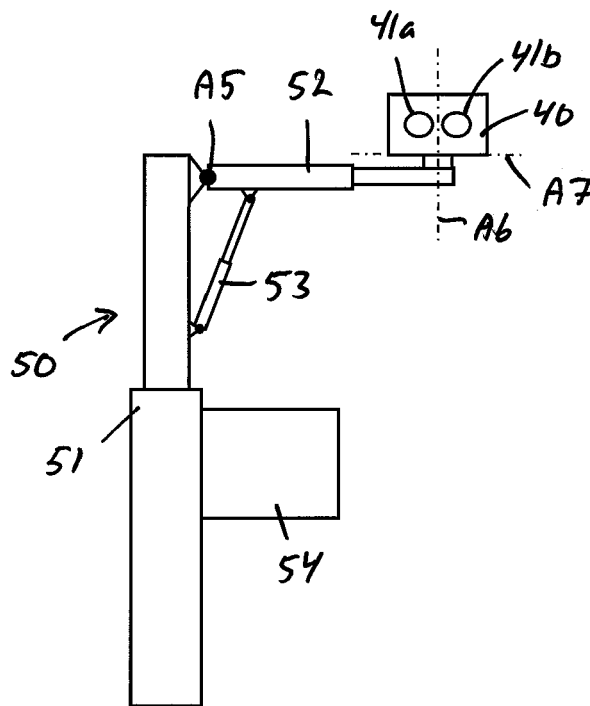


Fig 8



EUROPEAN SEARCH REPORT

Application Number

EP 23 15 5940

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Place of search		Date of completion of the search	Examiner
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CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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