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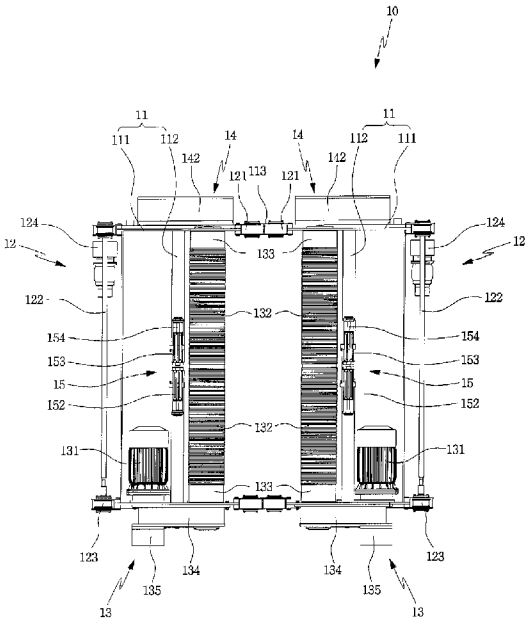
(54) **Title:** TURNING APPRATUS USING HOIST



(57) **Abstract:** Disclosed herein is a turning apparatus using a hoist. The turning apparatus includes a winding-up motor adapted to generate a rotational force through electric power application, a decelerator adapted to reduce a rotating frequency of the winding-up motor, a wire drum adapted to rotate with a reduced rotation frequency from the decelerator, a sheave adapted to rotate by means of connection with the wire drum through a wire rope, a hoist section including a hook section connected with the sheave through a wire rope for lifting a heavy object, and a turning apparatus hung on the hook section and adapted to turn a heavy object.

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Description

TURNING APPRATUS USING HOIST

Technical Field

[1] The present invention relates to a turning apparatus using a hoist, in which a pair of hoists is installed on a girder correspondingly to each other such that the weight of a heavy object hung to the hoists can be divided in halves to thereby avoid overloading, a huge heavy object can be simply turned, and a hung heavy object can be lifted and transported, along with the turning function.

Background Art

[2] In general, a hoist is used for lifting and transporting a heavy object, such as freights or machineries in a factory when they are disassembled or assembled.

[3] As describe above, in the hoist for transporting heavy objects, a hook is connected to a winding-up rope and the heavy objects are fixed to the hook. A winding-up section is provided in such a manner that a rope drum is cooperatively connected with a driver section. The winding-up rope is wound around the rope drum so as to wind up and down the winding-up rope, and the driver section is provided with a reduction gear and a brake. A rail is rested upper side of the winding-up section and a transfer section moving in a transversal direction is provided. Thus, when the winding-up rope is wound up from the rope drum by means of a motor, a heavy object fixed to the hook can be transported to a desired position along the rail, with the object lifted upwardly.

[4] The heavy object such as a bridge or a huge structure is hung under the hoist and transported. On the other hand, a turning apparatus is used for turning the heavy object at a desired angular position for working on other sides of the heavy object. Such a turning apparatus is designed and fabricated to be suitable to the size, shape and weight of the heavy object. The conventional turning apparatus has problems such as a complicated structure and a limited use.

[5] A convention turning apparatus for a hoist is disclosed in Korean Utility Model Application No. 2003-0036791, which has been filed by the present applicant. The conventional turning apparatus is configured to be connected to underside of the hoist to turn a heavy object. Hereafter, the conventional turning apparatus will be explained, referring to FIG. 1.

[6] The turning apparatus is structured to be combined to underside of a hoist to turn a heavy object. In the upper side of the turning apparatus 20 is formed a fixing section 21 for detachably attaching under the hoist. A decelerator 22 and a brake 23 are formed in one side thereof. In the center of the apparatus, a cylindrical friction pulley 24 is cooperatively connected to a motor 25, which is formed in the other side thereof. The

friction pulley 24 is rotated to turn the heavy object connected through a connection means.

[7] As described above, the conventional turning apparatus for a hoist is operated in such a way that a heavy object is turned by rotation of the friction pulley, which is connected with the heavy object through a connection means. The heavy object is turned by a friction force of the friction pulley and the connection means. The friction force between the friction pulley, cooperating through the friction, decreases rapidly with the weight, i.e., a sliding phenomenon, in other words, a slip phenomenon occurs. Thus, the power is overly consumed from a motor, which rotates for a turning job.

[8] In addition, the conventional turning apparatus for a hoist is structured such that the motor and the friction pulley are cooperative with each other. Thus, the motor rotates to rotate the friction pulley, thereby turning a heavy object. Accordingly, the vertical weight of a heavy object is concentrated on the friction pulley connected to the motor and the load is focused on the connection portion when the motor rotates. While it is used for a long period of time, the connection portion may be abraded to result in a failure. Therefore, it must be frequently replaced, which leads to an increase in the operation and maintenance cost.

[9] Furthermore, in the conventional turning apparatus for a hoist, the friction drum is extended according to the size of a heavy object and the rotation of the motor turns the heavy object. As the length of the friction drum increases, the weight of the heavy object is increasingly concentrated and the friction drum supports the whole vertical load. The strength of the friction drum must be increased with the weight of a heavy object, which may leads to an increase in the manufacturing cost.

[10] With the conventional turning apparatus for a hoist, the electric power applied to the motor must be controlled in order to turn a heavy object. While the friction drum rotates, the turning angle of the heavy object must be observed with naked eyes and the turning of the heavy object must be stopped through operation of an operator. Thus, the heavy object may be rapidly turned at a high speed by a mistake of the operator so that the motor is overloaded to shorten the service life and cause a dangerous situation where the heavy object may be escaped from the hoist and free falling.

[11] In addition, the conventional turning apparatus for a hoist is configured to turn a heavy object through rotation of the friction drum, which is rotated by a motor through arbitrary operation of a user. Thus, the rotating speed and angle can not be precisely determined and the precise turning job must be carried out by an operator's control.

[12] With the conventional turning apparatus for a hoist, a heavy object is turned with the turning apparatus hung to a hook of the hoist. When turning a huge heavy object, an overload due to the weight of the heavy object is applied to the hoist and the turning apparatus, thereby shortening the service life and reducing the operating efficiency.

Further, it may not be possible to apply to a heavy object having a high volume.

[13] In addition, the conventional turning apparatus for a hoist must be connected to a hook of the hoist before carrying out a turning job. After completing a turning job, the turning apparatus must be disassembled from the hoist such that the hoist can performs its inherent function of lifting and transporting a heavy object, thereby causing some inconvenience and extended working time.

Disclosure of Invention

Technical Problem

[14] Accordingly, the present invention has been made in order to solve the above problems occurring in the prior art, and it is an object of the invention to provide a turning apparatus using a hoist, in which two hoists not using a friction drum are combined with each other by means of an electrical and mechanical means, the combined hoists are installed in the upper side of a girder, a hook is connected to the respective hoists using a wire rope, and a heavy object is connected to the hook through a sling connected to the heavy object, so that the entire weight of the heavy object can be divided in halves, thereby carrying out a turning job without causing any overload.

[15] Another object of the invention is to provide a turning apparatus using a hoist, in which a sheave frame with an upper sheave rotatably fixed thereto is pivotably connected to the bottom portion of a support bracket using a pin such that the sheave frame can be pivoted to an angle corresponding to the size of a heavy object and the angle can be corrected, and the length of the wire rope can be extendible, thereby performing a turning job without any limitation according to the size of the heavy object.

[16] Still another object of the invention is to provide a turning apparatus using a hoist, in which, when a sling connected to a heavy object is connected to a hook, the sheave frame is pivoted to an angle corresponding to the size of the heavy object, thereby preventing the wire rope from being escaped from the sheave.

[17] Yet another object of the invention is to provide a turning apparatus using a hoist, in which a pair of hoists can performs a turning job without a separate turning apparatus, the pair of hoists, in an individual or combined state, can carry out a craning job of lifting a heavy object without any separate installation and disassembling work.

[18] A further object of the invention is to provide a turning apparatus using a hoist, in which a hoist is used to avoid a sliding phenomenon occurring between a friction drum and a turning means of a conventional turning apparatus, thereby ensuring a safety of work and not causing additional cost for maintenance of the friction drum and the turning means.

Technical Solution

[19] In order to accomplish the above objects, according to one aspect of the present invention, there is provided a turning apparatus using a hoist, the apparatus including a winding-up motor adapted to generate a rotational force through electric power application, a decelerator adapted to reduce a rotating frequency of the winding-up motor, a wire drum adapted to rotate with a reduced rotation frequency from the decelerator, a sheave adapted to rotate by means of connection with the wire drum through a wire rope, a hoist section including a hook section connected with the sheave through a wire rope for lifting a heavy object, and a turning apparatus hung on the hook section and adapted to turn a heavy object, the turning apparatus comprising: a bracket section including a pair of lateral fixing brackets adapted to fix a lateral portion at both sides and a support bracket fixed at both inner sides of the lateral fixing brackets; a transversal-travel driver section fixed at the end portion of the lateral fixing bracket, the transversal-travel driver section having a support-transversal travel wheel fixed at one end thereof and adapted to move along a girder and a transversal motor provided at the other end thereof and adapted to generate a rotational driving force such that one of drive-transversal travel wheels extending to a transversal-travel wheel shaft is gear-connected and moves along the girder; a driver section including a winding-up motor fixed to the rear side of the transversal-travel driver section in such a way that a shaft penetratingly passes from the inner side to the outer side through the lateral fixing bracket at the opposite side of the fixed transversal-travel motor, a wire drum fixed at the rear side of the support bracket in such a way that a shaft penetratingly passes from the inner side to the outer side through the both lateral fixing brackets with a pair of wire ropes spaced apart and wound therearound, a decelerator connected with the wire drum passing through the lateral fixing bracket and the shaft of the winding-up motor and adapted to transfer a rotational force to the wire drum with a reduced rotation frequency of the winding-up motor with the decelerator fixed to the outer side of the lateral fixing bracket, and a brake fixed to the decelerator and adapted to control rotation; a control section connected with a shaft of the wire drum passing through the lateral fixing bracket at the opposite side of the driver section and fixed to the outer side of the lateral fixing bracket, the control section including a control panel adapted to control the operation of the operator section wiredly or wirelessly; an upper sheave section fixed at the bottom center of the support bracket with a fixing plate, the upper sheave section including an upper sheave connected with the wire rope wound around the wire drum and an upper sheave cover where the upper sheave is fixed and rotates; and a pair of hoist sections including a pair of hook sections for lifting or transporting a heavy object, the hook section including a lower

sheave extendably connected with a wire rope connected to the upper sheave section and rotated, and a lower sheave cover to which a hook for hanging the lower sheave and a heavy object is fixed.

[20] The hoist section is configured such that a pair of support-transversal travel wheels having an identical construction are installed on the girder in such way as to be arranged correspondingly and connected to each other to face each other, and an electromagnet or a connection bracket is selectively provided for interconnecting the support-transversal travel wheels.

[21] The hoist section is configured such that a pair of support-transversal travel wheels having an identical construction are installed on the girder in such way as to be arranged correspondingly and connected to each other to face each other, a latching pin is fixed to the inner side of one end of a pair of lateral plates for interconnection of the support-transversal travel wheels, and the other end thereof is formed of a connection means pivotably connected to one support-transversal travel wheel using a pivot pin.

[22] The upper sheave section is disposed correspondingly and constituted as a pair, such that one pair or more upper sheaves are fixed at the disk center of the upper sheave cover with a rotation shaft so that the upper sheave is protected at one bottom side of a hollow rectangular frame, the end of the wire rope unwound from the wire drum is fixed outwardly, and the upper support cover is inserted between two pairs of fixing plates fixed at the bottom of the support bracket and respectively connected and fixed by means of a pivot pin.

[23] The upper sheave section is configured such that the upper sheave cover is pivoted between the fixing plates by means of the pivot pin, so that the wire rope connected to the upper sheave is prevented from being escaped.

[24] The hoist section is positioned on a girder as one pair and configured such that the weight of a heavy object hung to the hook section can be divided in halves.

Advantageous Effects

[25] As described above, according to a turning apparatus using a hoist of the invention, two hoists not using a friction drum are combined with each other by means of an electrical and mechanical means, the combined hoists are installed in the upper side of a girder, a hook is connected to the respective hoists using a wire rope, and a heavy object is connected to the hook through a sling connected to the heavy object. Thus, the entire weight of the heavy object can be divided in halves, thereby carrying out a turning job without causing any overload.

[26] In addition, a sheave frame with an upper sheave rotatably fixed thereto is pivotably connected to the bottom portion of a support bracket using a pin such that the sheave frame can be pivoted to an angle corresponding to the size of a heavy object and the

angle can be corrected, and the length of the wire rope can be extendible. A turning job can be performed, without any limitation according to the size of the heavy object.

[27] Furthermore, when a sling connected to a heavy object is connected to a hook, the sheave frame is pivoted to an angle corresponding to the size of the heavy object, thereby preventing the wire rope from being escaped from the sheave.

[28] In addition, a pair of hoists can performs a turning job without a separate turning apparatus, the pair of hoists, in an individual or combined state, can carry out a craning job of lifting a heavy object without any separate installation and disassembling work.

[29] Furthermore, a hoist is used to avoid a sliding phenomenon occurring between a friction drum and a turning means of a conventional turning apparatus. Thus, it can ensure a safety of work and does not cause additional cost for maintenance of the friction drum and the turning means.

Brief Description of the Drawings

[30] Further objects and advantages of the invention can be more fully understood from the following detailed description taken in conjunction with the accompanying drawings in which:

[31] FIG. 1 is a perspective view of a conventional turning apparatus for a hoist;

[32] FIG. 2 is a bottom view of a turning apparatus using a hoist according to the present invention;

[33] FIG. 3 is an elevational view of a turning apparatus using a hoist according to the present invention;

[34] FIG. 4 is a plan view of a turning apparatus using a hoist according to the present invention;

[35] FIG. 5 is a side view of a turning apparatus using a hoist according to the present invention;

[36] FIG. 6 is a partial exploded perspective view showing an upper sheave section according to the present invention;

[37] FIG. 7 is a partially enlarged view showing the portion A in FIG. 5;

[38] FIG. 8 is a partially enlarged perspective view showing an alternative connection of a support-transversal travel wheel according to the present invention;

[39] FIG. 9 is a side view of the turning apparatus according to the invention where it is prepared for turning a heavy object;

[40] FIG. 10 is an elevational view of the turning apparatus according to the invention where it is prepared for turning a heavy object;

[41] FIG. 11 is a plan view of the turning apparatus according to the invention where it is prepared for turning a heavy object;

[42] FIG. 12 is an operational view of the turning apparatus according to the invention

where a heavy object is turned by 45 degrees;

[43] FIG. 13 is an operational view of the turning apparatus according to the invention where a heavy object is turned by 90 degrees;

[44] FIG. 14 is an operational view of the turning apparatus according to the invention where a heavy object is turned by 135 degrees; and

[45] FIG. 15 is an operational view of the turning apparatus according to the invention where a heavy object is turned by 180 degrees.

Best Mode for Carrying Out the Invention

[46] The preferred embodiments of the invention will be hereafter described in detail with reference to the accompanying drawings.

[47] FIG. 1 is a perspective view of a conventional turning apparatus for a hoist. FIG. 2 is a bottom view of a turning apparatus using a hoist according to the present invention. FIG. 3 is an elevational view of a turning apparatus using a hoist according to the present invention. FIG. 4 is a plan view of a turning apparatus using a hoist according to the present invention. FIG. 5 is a side view of a turning apparatus using a hoist according to the present invention. FIG. 6 is a partial exploded perspective view showing an upper sheave section according to the present invention. FIG. 7 is a partially enlarged view showing the portion A in FIG. 5. FIG. 8 is a partially enlarged perspective view showing an alternative connection of a support-transversal travel wheel according to the present invention. FIG. 9 is a side view of the turning apparatus according to the invention where it is prepared for turning a heavy object. FIG. 10 is an elevational view of the turning apparatus according to the invention where it is prepared for turning a heavy object. FIG. 11 is a plan view of the turning apparatus according to the invention where it is prepared for turning a heavy object. FIG. 12 is an operational view of the turning apparatus according to the invention where a heavy object is turned by 45 degrees. FIG. 13 is an operational view of the turning apparatus according to the invention where a heavy object is turned by 90 degrees. FIG. 14 is an operational view of the turning apparatus according to the invention where a heavy object is turned by 135 degrees. FIG. 15 is an operational view of the turning apparatus according to the invention where a heavy object is turned by 180 degrees.

[48] As illustrated in the figures, the turning apparatus using a hoist according to the invention is formed of a pair of hoist sections 10. The hoist section 10 is composed of a bracket section 11 for fixing at the upper portion of a girder 100, a transversal-travel driver section 12 for transversally moving fixed at the bracket section 11, a driver section 13 fixed at the bracket section 11 for driving the turning apparatus 200, a control section 14 fixed at the bracket section 11 for controlling the driver section 13, an upper sheave section 15 pivoting fixed at the bottom portion of the bracket section

11 according to the size of a heavy object, and a hook section 16 for lifting the heavy object hung thereto.

[49] The bracket section 11 includes a pair of lateral fixing brackets 111 fixing the lateral portion at both sides and a support bracket 112 fixed to the lateral fixing bracket 111 at both inner sides.

[50] Such lateral fixing bracket 111 is formed of a metal plate having a uniform thickness and constructed facing to each other.

[51] In addition, the support bracket 112 is positioned at the center of the later fixing bracket 111 and fixed in vertical direction by means of a connection method such as a welding method or using a bolt and a nut. At the bottom center thereof, four fixing plates 151 having a rectangular shape are fixed to the support bracket 112 at regular intervals by means of a connection method such as a welding or using a bolt and a nut.

[52] The transversal-travel driver section 12, fixed at the end portion of the lateral fixing bracket 111, includes a support-transversal travel wheel 121, which moves along a girder 100 at one end thereof. That is, the support-transversal travel wheel 121 is configured to be rotated on two columns of girders 100 while supporting them, without any driver means receiving a rotation driving.

[53] In addition, at the other end of the lateral fixing bracket 111 where the support-transversal travel wheel 121 is fixed is provided one of the driver-transversal travel wheel 123, which is extended to a transversal-travel wheel shaft 122 across between the pair of the lateral fixing brackets 111. A transversal-travel motor 124 transfers its rotation driving to the driver-transversal travel wheel 123 through a connection mode such as a gear connection or a belt or chain connection.

[54] That is, the driver-transversal travel wheel 123, which is connected with the transversal-travel motor 124 and receives the rotation driving, rotates on the girder 100 while supporting it, together with another driver-transversal travel wheel 123 connected through the transversal-travel wheel shaft 122, thereby transversally moving the turning apparatus 10.

[55] The support-transversal travel wheel 121 and the driver-transversal travel wheel 123 is fixed to the lateral fixing bracket 111 by means of a bolt and nut connection, where a roller can be rotated on a rotating shaft in a rectangular frame having an open bottom.

[56] The driver section 13 formed in the bracket section 11 includes a winding-up motor 131. The winding-up motor 131 is fixed at the rear side of the transversal-travel driver section 12 in such a manner that a shaft passes, outwardly from the inner side, through the lateral fixing bracket 111 at the opposite side of the fixed transversal-travel motor 124.

[57] In such a winding-up motor 131, the motor body is fixed at the inner side of the

lateral fixing bracket 111 through a bolt and nut connection. Part of the motor shaft (not shown) is protruded through a shaft hole (not shown) formed in the lateral fixing bracket 111.

[58] In addition, a wire drum 133 is provided at the rear side of the support bracket 112. With a pair of wire ropes 132 wound up spaced apart from each other, the body of the wire drum 133 is fixed by means of a bolt and nut connection in such a way that the shaft (not shown) passes, outwardly from the inner side, through the both lateral fixing brackets 111.

[59] Furthermore, a decelerator 134 is provided connected with the wire drum 133 passing through the lateral fixing bracket 111 and the shaft of the winding-up motor 131. The decelerator 134 is fixed at the outer side of the lateral fixing bracket 111 and transfers the rotating power of the winding-up motor 131 to the wire drum 133 at a reduced rotating ratio.

[60] As described above, a gear, a sprocket, or a belt pulley is selectively adopted and fixed to the protruded end of the wire drum 133 and the winding-up motor 131. The decelerator 134 is configured to transfer the reduced rotating power of the winding-up motor 131 to the wire drum 133 using a selectively adopted gear, chain or belt.

[61] In addition, a brake 135 is provided for controlling rotation of the decelerator 134. The brake 135 is inserted in the outer or inner side of the decelerator 134 body and fixed thereto by means of a bolt and nut connection.

[62] The control section 14 controlling the driver section 13 is fixed to the outside of the later fixing bracket, i.e., connected to the shaft of the wire drum 133, which passes through the lateral fixing bracket 111 at the opposite side of the driver section. The driver section 13 comprises a control panel 142 executing the operation of the operator section 141, which is operated by wire or wirelessly.

[63] Such a control section 14 is configured to control the travel and stop of the turning apparatus, the transversal-travel and stop, the control of winding-up, and a pair of hoist sections 10.

[64] In addition, the operator section 141 is connected with the control panel 142 through wire and can be operated manually by an operator on the floor of a workplace. Alternatively, in case of a large scale turning apparatus 10, it may be controlled from an operating room formed at the bottom side of the girder 100, or a wireless receiver can be formed in the control panel 142 such that it can be operated through a wireless signal using a wireless transmitter.

[65] In addition, an upper sheave section 15 is fixed to the center of the bottom of the support bracket 112 with a fixing plate 151. The upper sheave section 15 is comprised of an upper sheave 152 which is connected with a wire rope 132 wound around the wire drum 133, and an upper sheave cover 153 where the upper sheave 152 is fixed

and rotates.

[66] The above-described fixing plate 151 has a rectangular shape. Four fixing plates 151 are fixed to the bottom floor of the support bracket 112 at regular intervals by means of a welding or a bolt and nut connection.

[67] In addition, the disk of the upper sheave cover 153 is integrally formed such that the upper sheave 152 can be protected at one bottom side of a hollow rectangular frame.

[68] Furthermore, one pair or more upper sheaves 152 are provided so as to be rotated with the disk center of the upper sheave cover 153, fixed with a rotation shaft (not shown).

[69] The end of a wire rope 132 unwound from the wire drum 133 is fixed to the outside of the upper sheave cover 153 where the upper sheave 152 is fixed. Thus, when the upper sheave section 15 is pivoted, the wire rope is pivoted together wound around the upper sheave 152, thereby preventing the release.

[70] In addition, the upper support cover 153 is inserted between a pair of fixing plates 151 and connected with a pivot pin 154.

[71] That is, the upper sheave section 15 is constructed such that the upper sheave cover 153 is pivoted between the fixing plates 151 to prevent the wire rope connected to the upper sheave from being escaped.

[72] A hook section 16 is extended to the wire rope 132, which is connected to the upper sheave section 15. The hook section 16 includes a lower sheave 161 in one pair or more, which is connected to the wire rope 132 and rotates, and is comprised of the lower sheave 161 and a lower sheave cover 163, to which a hook 161 for hanging a heavy object is fixed.

[73] That is, the above construction, in one pair, constitutes a hoist section 10 for lifting and transporting a heavy object.

[74] In addition, the hoist section 10 has an identical construction and is arranged correspondingly to connect a support-transversal travel wheel 121 facing each other to be installed in pairs on a girder 100. For connection of the support-transversal travel wheel 121, either one of an electromagnet or a connection bracket 113 is selectively provided.

[75] Furthermore, the hoist section 10, in one pair, is arranged on the girder 100 in a corresponding arrangement and is configured such that the weight of a heavy object hung on the hook section 16 can be divided in halves.

[76] The connection method using an electromagnet employs electromagnetic field generated by applied electric current.

[77] In addition, the connection bracket 113 has a '□' shape with its bottom portion opened and is constructed so as to be inserted from the upper portion of the support-transversal travel wheel 121 and connected by means of a bolt and nut connection or a

fixing method using a pin.

[78] As an alternative way to connect the support-transversal travel wheel 121 facing each other and arranged correspondingly with an identical construction, the hoist section 10 comprises a connection means 113 including a latching pin 113a' a pair of lateral plates 113c and a pivot pin 113b.

[79] The above connection means 113 is constructed in such a manner that the latching pin 113a is fixed to the inner side of one end of the pair of lateral plates 113c' and the other end thereof is fixed to the upper portion of one support-transversal travel wheel 121 and pivoted using the pivot pin 113b'.

[80] In addition, a vertical groove having the same diameter and length as the latching pin 113a is provided in the upper portion of another support-transversal travel wheel 121 facing the support-transversal travel wheel 121, to which the pivot pin 113b is fixed. Thus, when the connection means 113 is pivoted, the latching pin 113a'can be inserted.

[81] In addition, the hoist section 10 may be constructed in such a manner that a rectangular frame supporting the facing support-transversal travel wheel 121 is integrally constructed. Thus, a pair of hoist sections 10 can be used integrally without having to be disassembled.

[82] The prevent invention having the above-described construction is operated as follows.

[83] As illustrated in FIGS. 9 to 11, first, an integral turning means 300 having a rigidity and a toughness is inserted into the bottom portion of a heavy object and supports the bottom portion thereof. The turning means 300 is made in a flat belt and has a length so as to turn the heavy object. At this time, the turning means is wound around the heavy object in two rows in such a manner that the transversal direction and the vertical direction of the heavy object are in symmetrical relation and balanced.

[84] In addition, the turning means 300 is connected to the both sides of the heavy object for the end portions to be seen, such that the lifting side thereof becomes shorter and the descending side thereof becomes longer. Each end portion is firmly fixed using a sling 400.

[85] Furthermore, the turning means 300 is divided such that two of them can be used as one pair. The end portion thereof is contacted with the upper and lower edge portions at one side of the heavy object, but a circular hook may be used to connect the end portions. This is for the turning means 300 not to be moved and escaped from the initial position due to wobbling when the heavy object is turned.

[86] Thereafter, a pair of hoist sections 10 positioned on the girder 100 is operated. That is, the wire or wireless operator section 141 is controlled from on the ground or the operating room such that the girder 100 with the hoist sections installed thereon moves

along the travelling rail (not shown) and is placed above the center of the heavy object.

[87] Then, after determining a desired orientation for the heavy object to be turned, the operator section 141 is used to rotate each individual winding-up motor 131 constituting a pair of hoist sections 10 such that the hook 162 is connected to the both slings 400 with the hook section 16 placed at the lower side and with the extended length of the wire rope 132 being different.

[88] At this time, in case where the installation width is less than the width of a heavy object, the upper sheave section 15 is pivoted to prevent the wire rope 132 connected with the upper sheave 152 from being escaped.

[89] That is, the winding-up motor 131 is rotated to place the hook section 16 such that the length of the wire rope 132 becomes longer at the hook section 16 of the heavy object lifting side, and becomes shorter at the hook 16 at the opposite side. Then, each sling 400 is connected to complete the preparation for turning a heavy object.

[90] In addition, if the winding-up motor 131 at the hook section 16 of the longer length of wire rope 132 is rotated so as to be pulled and the winding-up motor 131 at the hook section 16 of the shorter length of wire rope 132 is rotated so as to lengthen the wire rope 132, the length of the wire rope 132 is adjusted such that the hook section 16 is placed at the middle between the hoist section 10 and the heavy object.

[91] As illustrated in FIGS. 12 to 15, the winding-up motor 131 of the hoist section 10, in which the winding-up motor 131 has been rotated so as to lengthen the length of the wire rope 132, is rotated for the wire rope 132 to be wound up. At this time, the winding-up motor 131 of the opposite side hoist section 10 is rotated at the same number of rotations such that the length of the wire rope 132 can be lengthened.

[92] That is, one side of the heavy object is lifted up and the other side thereof descends. After that, at the middle of the distance between the hoist section 10 and the heavy object, the length of the wire rope 132 becomes identical and the heavy object becomes upright vertically.

[93] Thereafter, through the above upright state, the heavy object is turned such that the working surface of the heavy object faces upwardly. I.e., the heavy object is turned by 180 degrees so that the working surface to be processed can be seen.

[94] The above-described turning apparatus 10 has no restriction to the size or length of a heavy object, and thus can be applied to various situations. The turning apparatus of the invention is configured such that the entire weight of a heavy object is divided in halves across a pair of hoist sections 10, and thus can be applied to turning a heavy object (above 150 tons) including a light, heavy, large and small ones.

Industrial Applicability

[95] As apparent from the above description, the present invention provides a turning

apparatus using a hoist, in which two hoists not using a friction drum are combined with each other by means of an electrical and mechanical means, the combined hoists are installed in the upper side of a girder, a hook is connected to the respective hoists using a wire rope, and a heavy object is connected to the hook through a sling connected to the heavy object, so that the entire weight of the heavy object can be divided in halves, thereby carrying out a turning job without causing any overload.

[96] In addition, the present invention provides a turning apparatus using a hoist, in which a sheave frame with an upper sheave rotatably fixed thereto is pivotably connected to the bottom portion of a support bracket using a pin such that the sheave frame can be pivoted to an angle corresponding to the size of a heavy object and the angle can be corrected, and the length of the wire rope can be extendible, thereby performing a turning job without any limitation according to the size of the heavy object.

[97] Furthermore, the present invention provides a turning apparatus using a hoist, in which, when a sling connected to a heavy object is connected to a hook, the sheave frame is pivoted to an angle corresponding to the size of the heavy object, thereby preventing the wire rope from being escaped from the sheave.

[98] In addition, the present invention provides a turning apparatus using a hoist, in which a pair of hoists can performs a turning job without a separate turning apparatus, the pair of hoists, in an individual or combined state, can carry out a craning job of lifting a heavy object without any separate installation and disassembling work.

[99] Furthermore, the present invention provides a turning apparatus using a hoist, in which a hoist is used to avoid a sliding phenomenon occurring between a friction drum and a turning means of a conventional turning apparatus, thereby ensuring a safety of work and not causing additional cost for maintenance of the friction drum and the turning means.

[100] While the present invention has been described with reference to the particular illustrative embodiments, it is not to be restricted by the embodiments but only by the appended claims. It is to be appreciated that those skilled in the art can change or modify the embodiments without departing from the scope and spirit of the present invention.

Claims

[1] A turning apparatus using a hoist, the apparatus including a winding-up motor adapted to generate a rotational force through electric power application, a decelerator adapted to reduce a rotating frequency of the winding-up motor, a wire drum adapted to rotate with a reduced rotation frequency from the decelerator, a sheave adapted to rotate by means of connection with the wire drum through a wire rope, a hoist section including a hook section connected with the sheave through a wire rope for lifting a heavy object, and a turning apparatus hung on the hook section and adapted to turn a heavy object, the turning apparatus comprising:

a bracket (11) section including a pair of lateral fixing brackets (111) adapted to fix a lateral portion at both sides and a support bracket (112) fixed at both inner sides of the lateral fixing brackets (111);

a transversal-travel driver section (12) fixed at the end portion of the lateral fixing bracket (111), the transversal-travel driver section having a support-transversal travel wheel (121) fixed at one end thereof and adapted to move along a girder and a transversal-travel motor (124) provided at the other end thereof and adapted to generate a rotational driving force such that one of drive-transversal travel wheels (123) extending to a transversal-travel wheel shaft (122) is gear-connected and moves along the girder (100);

a driver section (13) including a winding-up motor (131) fixed to the rear side of the transversal-travel driver section (12) in such a way that a shaft penetratingly passes from the inner side to the outer side through the lateral fixing bracket (111) at the opposite side of the fixed transversal-travel motor (124), a wire drum (133) fixed at the rear side of the support bracket (112) in such a way that a shaft penetratingly passes from the inner side to the outer side through the both lateral fixing brackets (111) with a pair of wire ropes (132) spaced apart and wound therearound, a decelerator connected with the wire drum (133) passing through the lateral fixing bracket (111) and the shaft of the winding-up motor (131) and adapted to transfer a rotational force to the wire drum with a reduced rotation frequency of the winding-up motor (131) with the decelerator fixed to the outer side of the lateral fixing bracket (111), and a brake (135) fixed to the decelerator (134) and adapted to control rotation;

a control section connected with a shaft of the wire drum (133) passing through the lateral fixing bracket (111) at the opposite side of the driver section (13) and fixed to the outer side of the lateral fixing bracket (111), the control section including a control panel (142) adapted to control the operation of the operator

section (141) wiredly or wirelessly;

an upper sheave section (15) fixed at the bottom center of the support bracket (112) with a fixing plate (151), the upper sheave section including an upper sheave (152) connected with the wire rope (132) wound around the wire drum (133) and an upper sheave cover (153) where the upper sheave (152) is fixed and rotates; and

a pair of hoist sections (10) including a pair of hook sections (16) for lifting or transporting a heavy object, the hook section including a lower sheave (161) extendably connected with a wire rope (132) connected to the upper sheave section (15) and rotated, and a lower sheave cover (163) to which a hook (162) for hanging the lower sheave (161) and a heavy object is fixed.

[2] The turning apparatus according to claim 1, wherein the hoist section (10) is configured such that a pair of support-transversal travel wheels (121) having an identical construction are installed on the girder in such way as to be arranged correspondingly and connected to each other to face each other, and an electromagnet or a connection bracket (113) is selectively provided for interconnecting the support-transversal travel wheels (121).

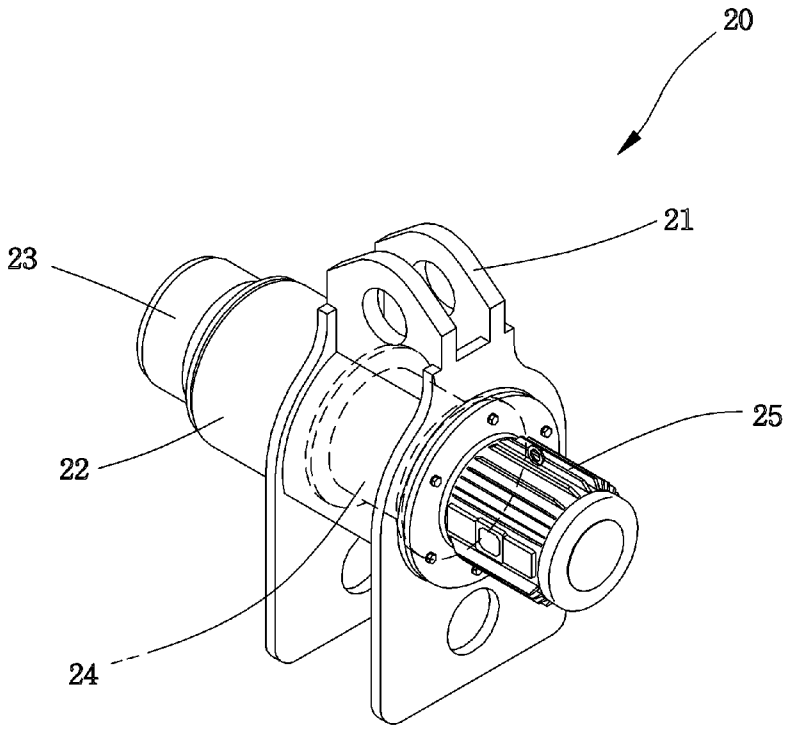
[3] The turning apparatus according to claim 1, wherein the hoist section (10) is configured such that a pair of support-transversal travel wheels (121) having an identical construction are installed on the girder in such way as to be arranged correspondingly and connected to each other to face each other, a latching pin (113a') is fixed to the inner side of one end of a pair of lateral plates (113c') for interconnection of the support-transversal travel wheels (121), and the other end thereof is formed of a connection means (113') pivotably connected to one support-transversal travel wheel (121) using a pivot pin (113b').

[4] The turning apparatus according to claim 1, wherein the upper sheave section (15) is disposed correspondingly and constituted as a pair, such that one pair or more upper sheaves (152) are fixed at the disk center of the upper sheave cover (153) with a rotation shaft so that the upper sheave (152) is protected at one bottom side of a hollow rectangular frame, the end of the wire rope (132) unwound from the wire drum is fixed outwardly, and the upper support cover (153) is inserted between two pairs of fixing plates (151) fixed at the bottom of the support bracket (112) and respectively connected and fixed by means of a pivot pin (154).

[5] The turning apparatus according to claim 4, wherein the upper sheave section (15) is configured such that the upper sheave cover (153) is pivoted between the fixing plates (151) by means of the pivot pin (154), so that the wire rope (132) connected to the upper sheave (152) is prevented from being escaped.

[6] The turning apparatus according to claim 1, wherein the hoist section (10) is positioned on a girder as one pair and configured such that the weight of a heavy object hung to the hook section (16) can be divided in halves.

[Fig. 1]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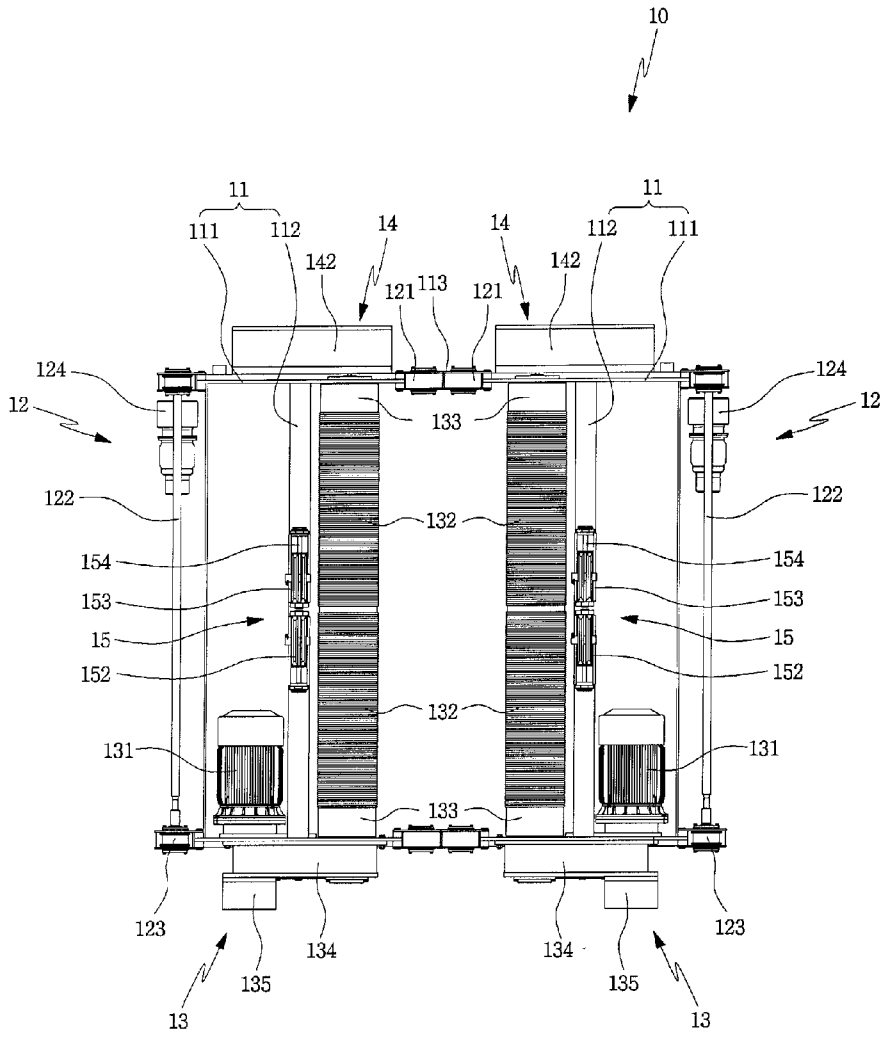
[Fig. 2]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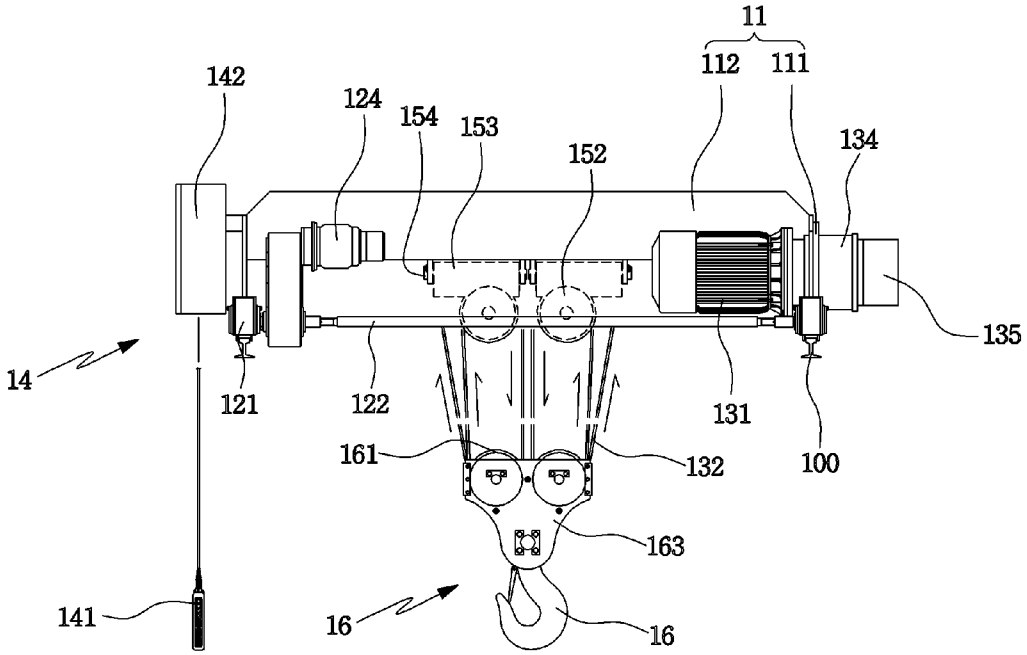
[Fig. 3]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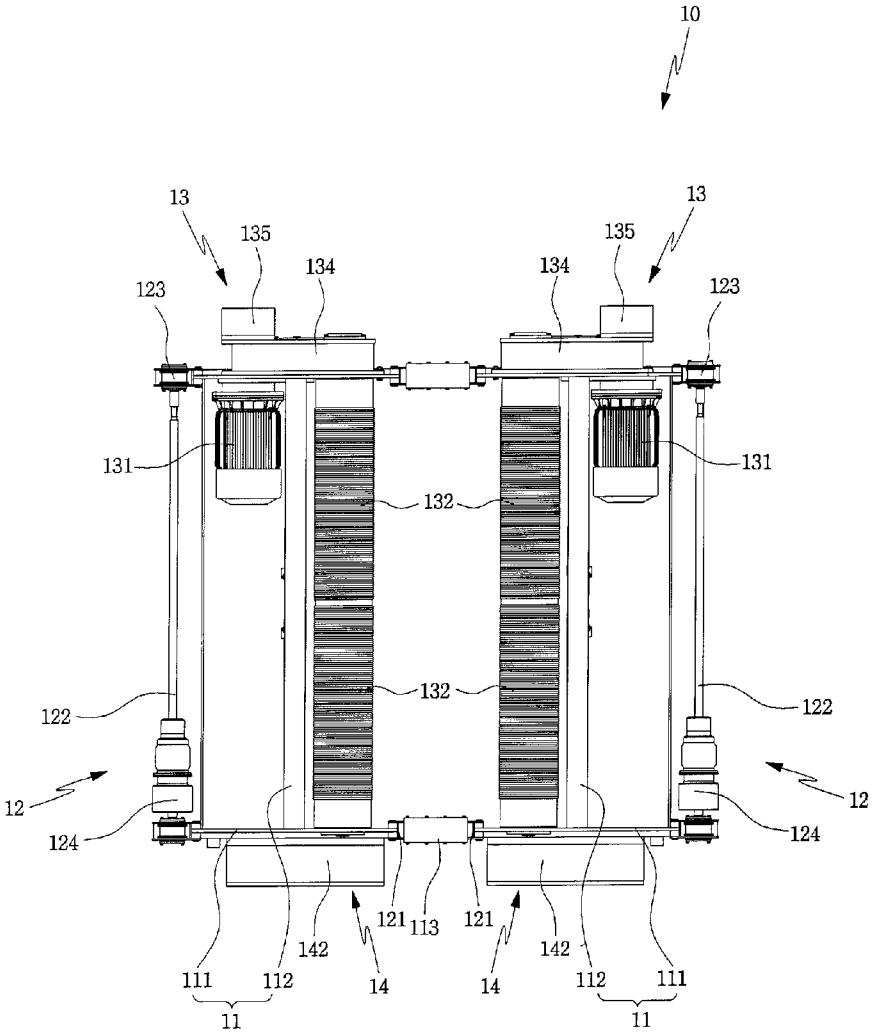
[Fig. 4]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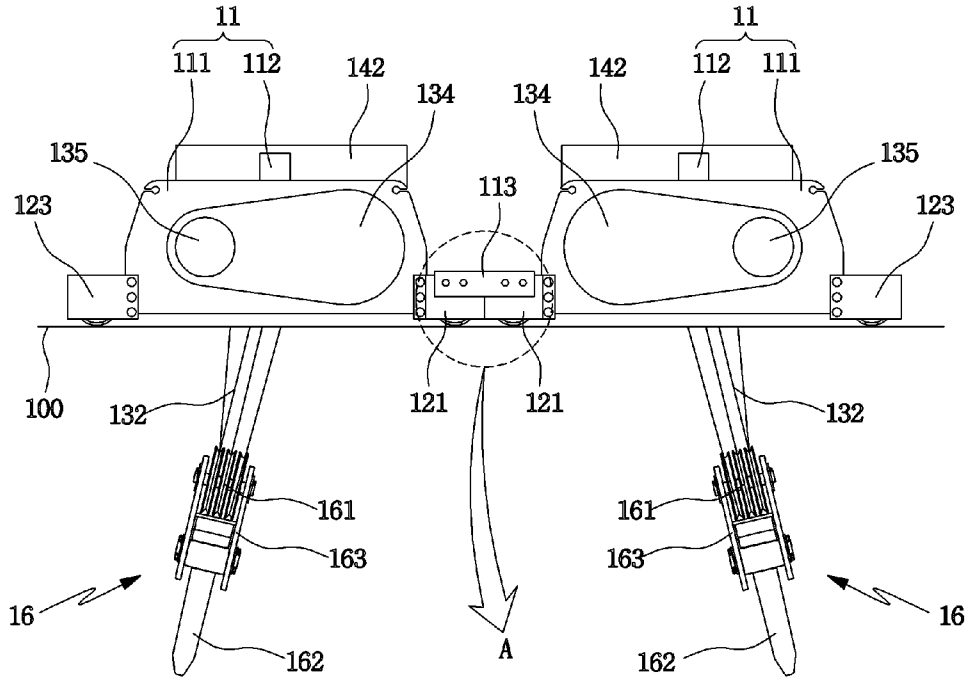
[Fig. 5]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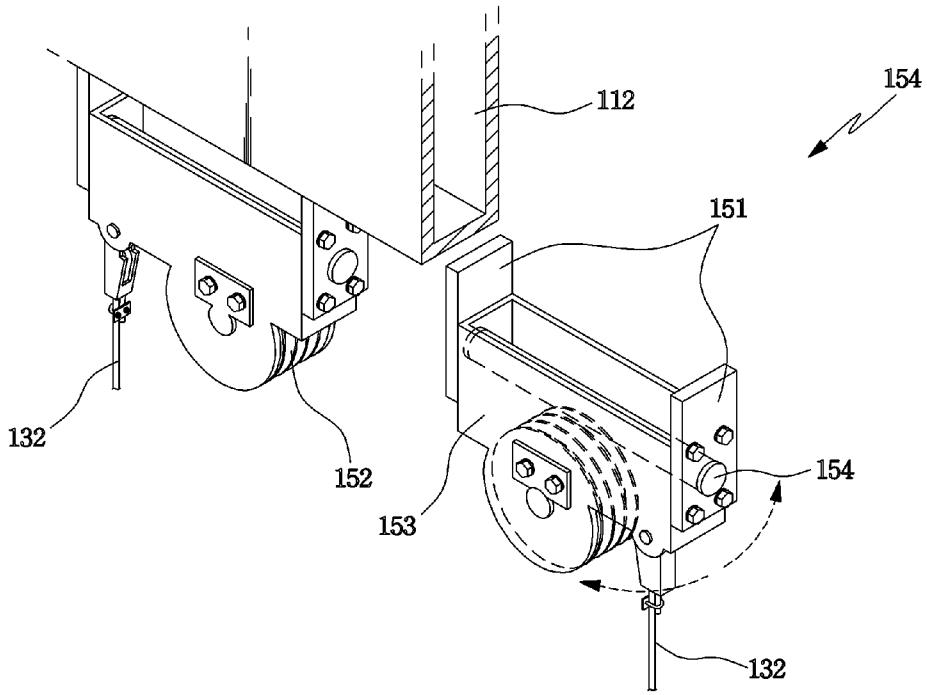
[Fig. 6]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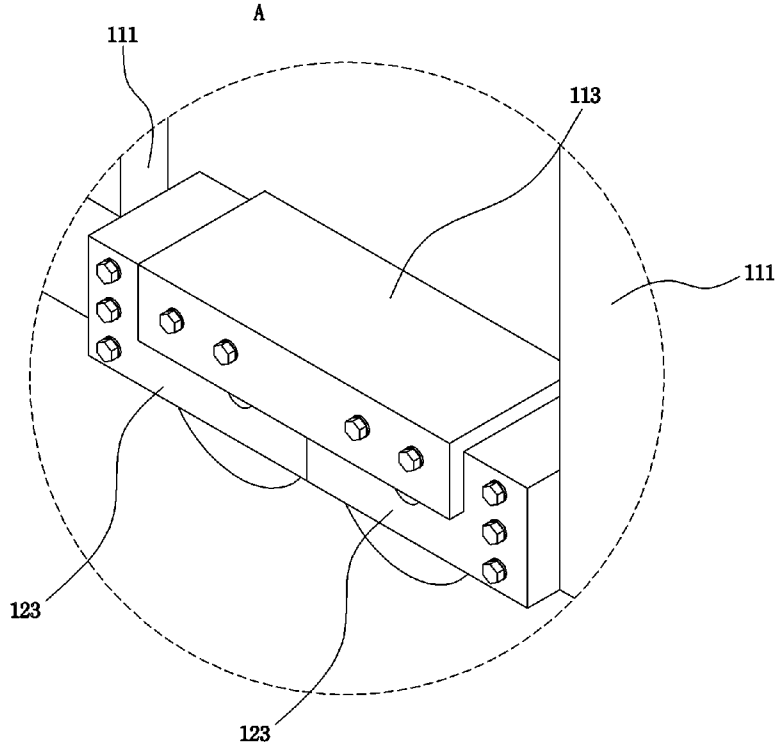
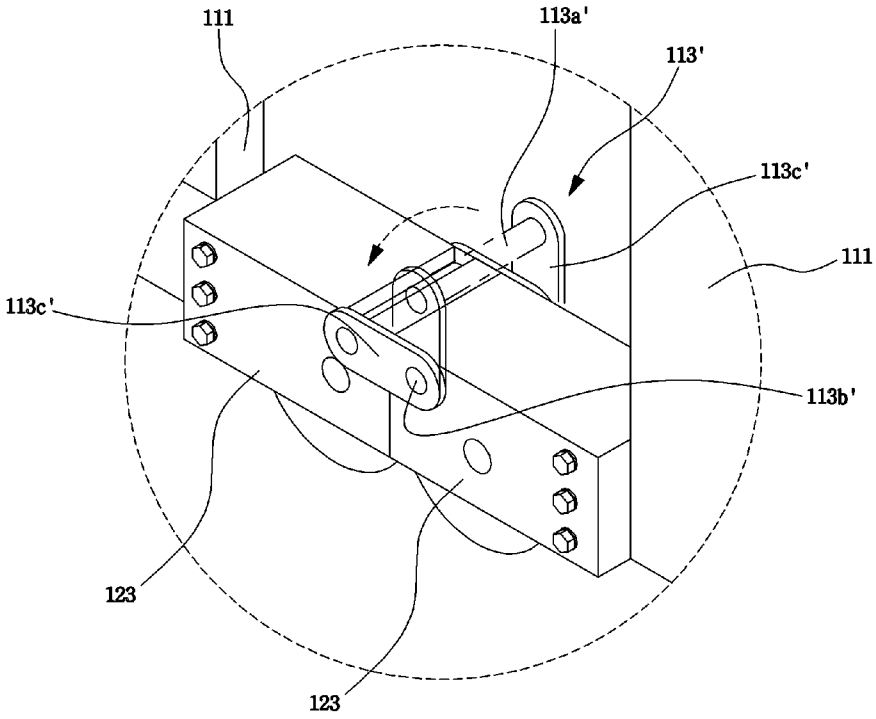
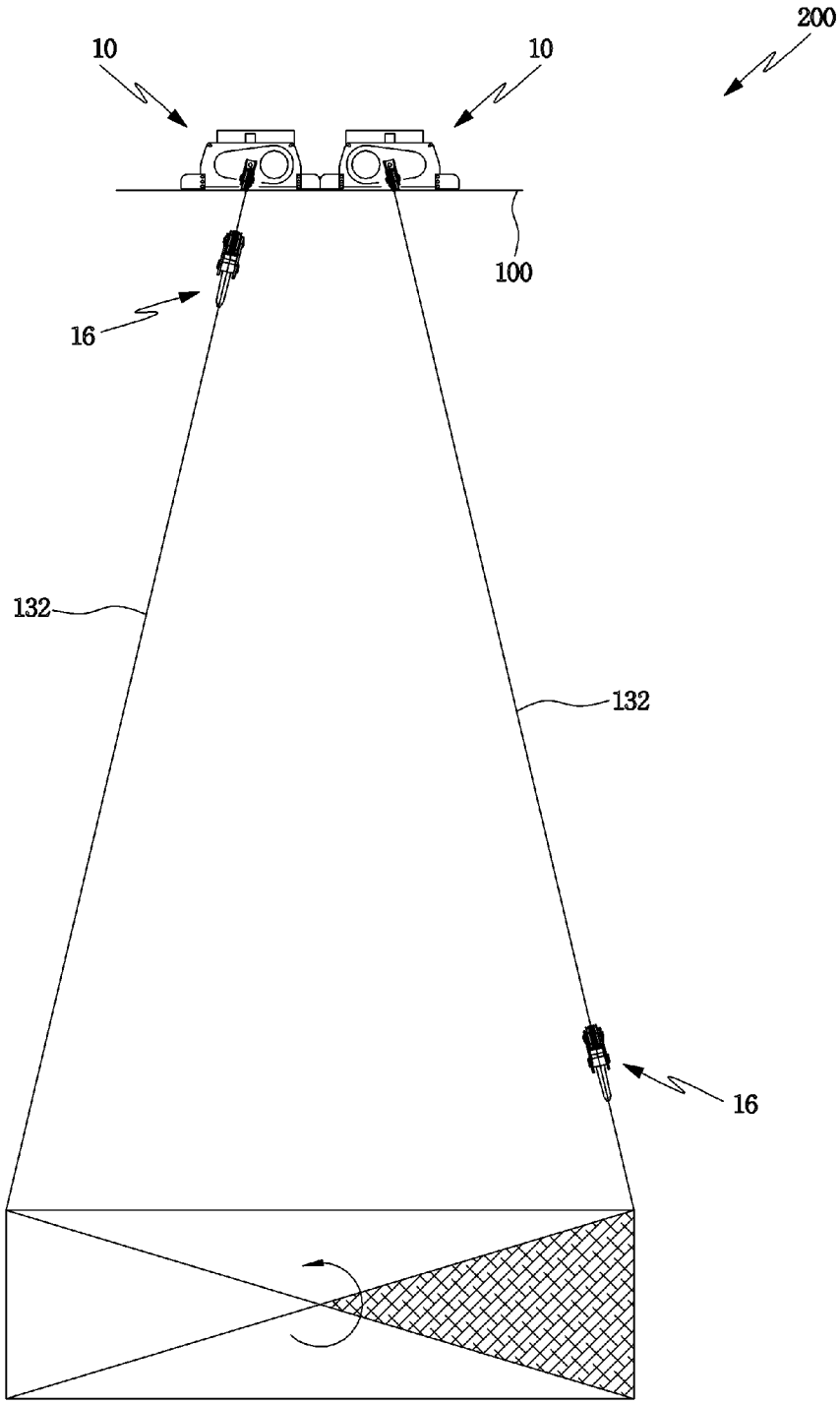
[Fig. 7]



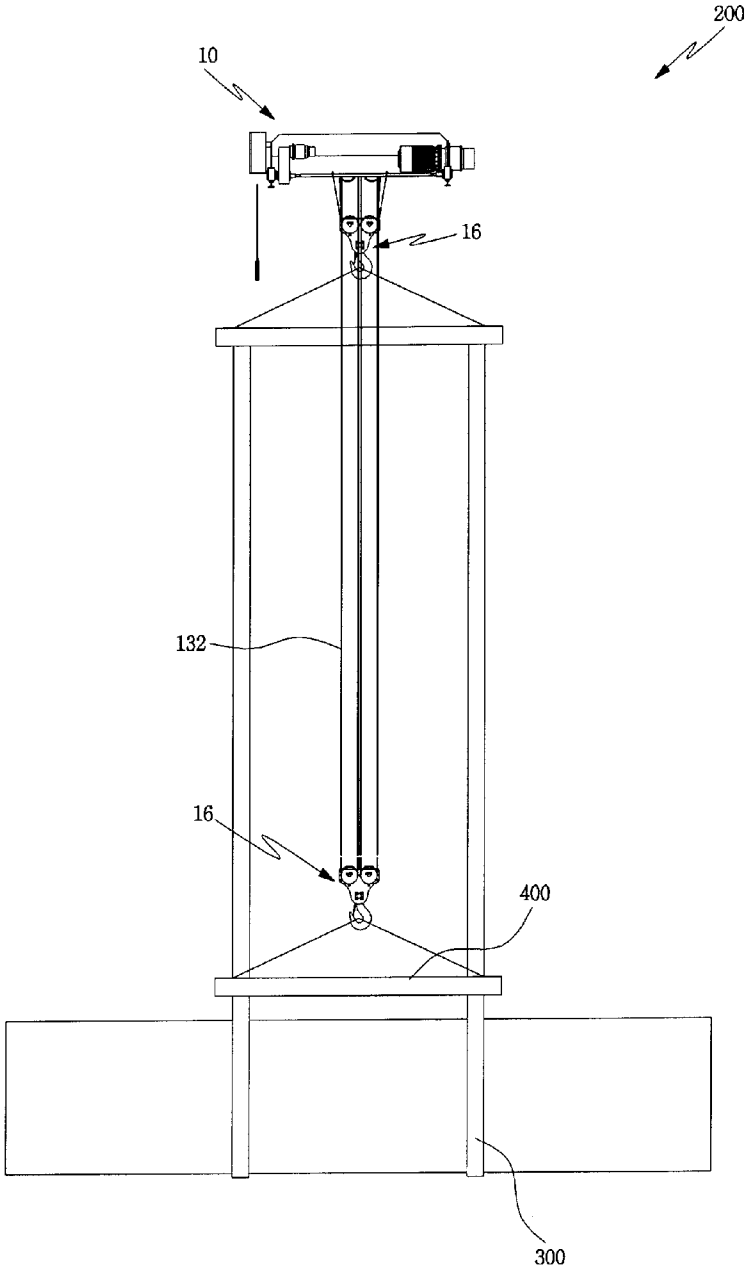
[Fig. 8]



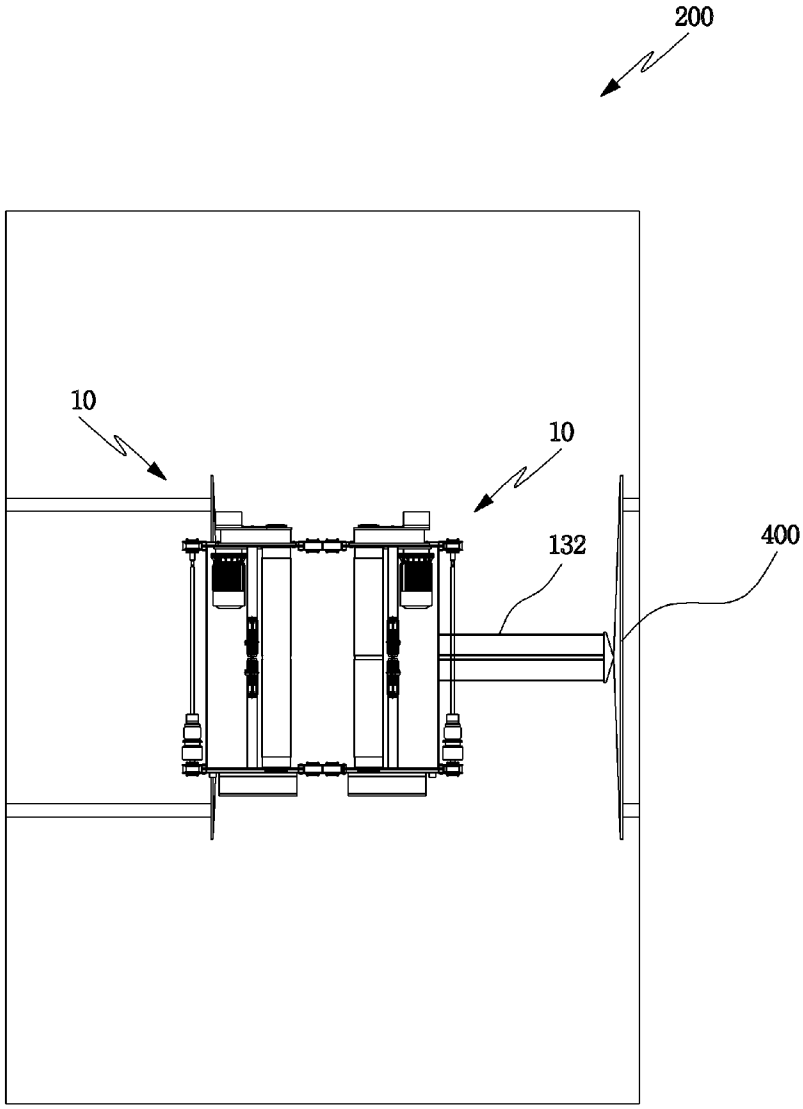
[Fig. 9]



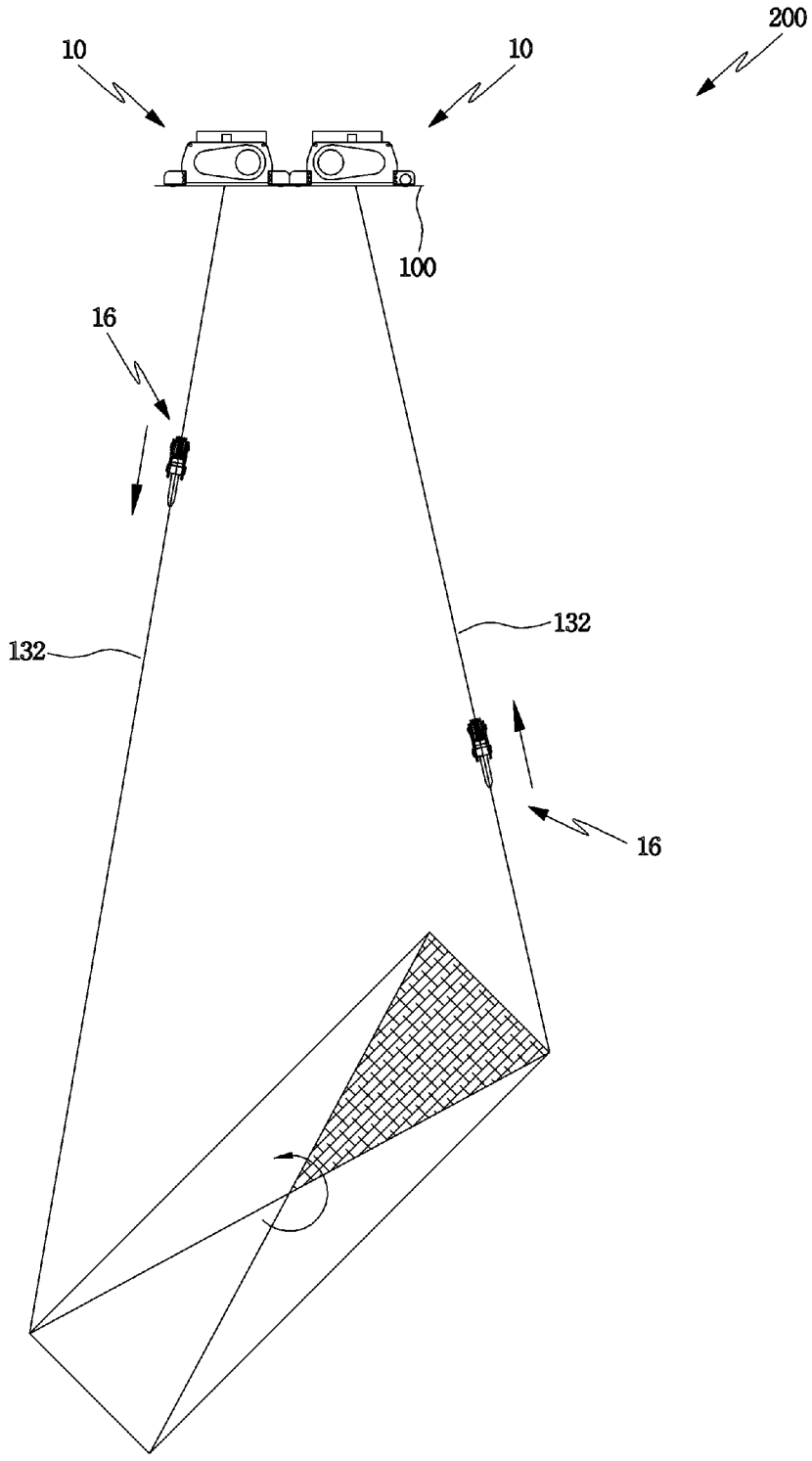
[Fig. 10]



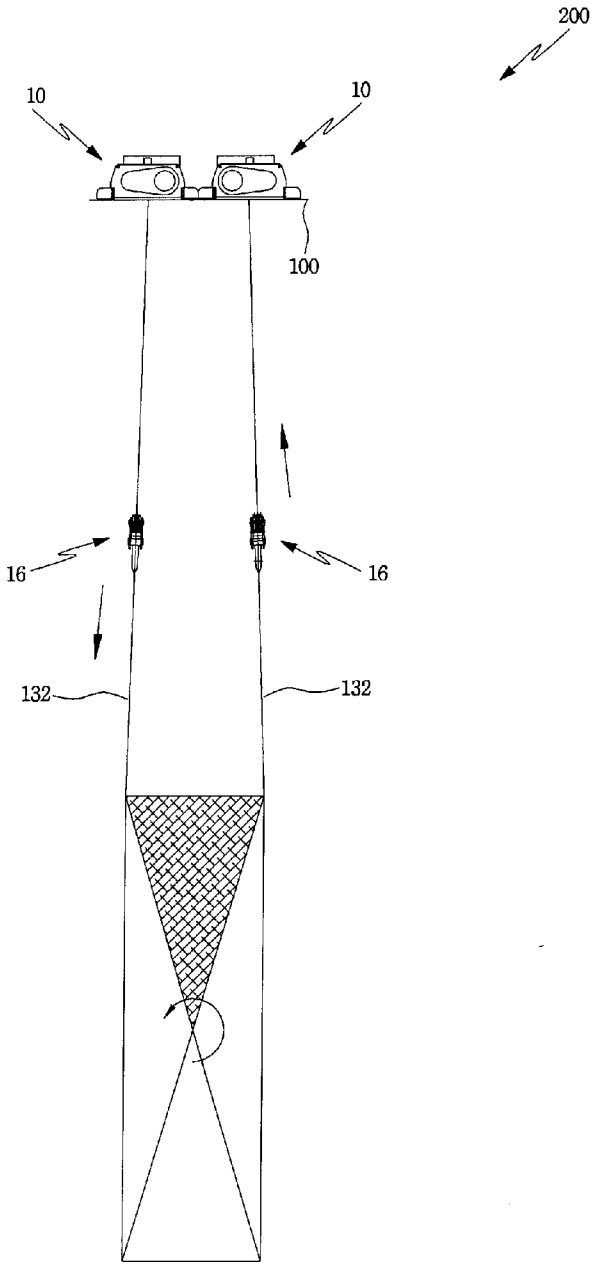
[Fig. 11]



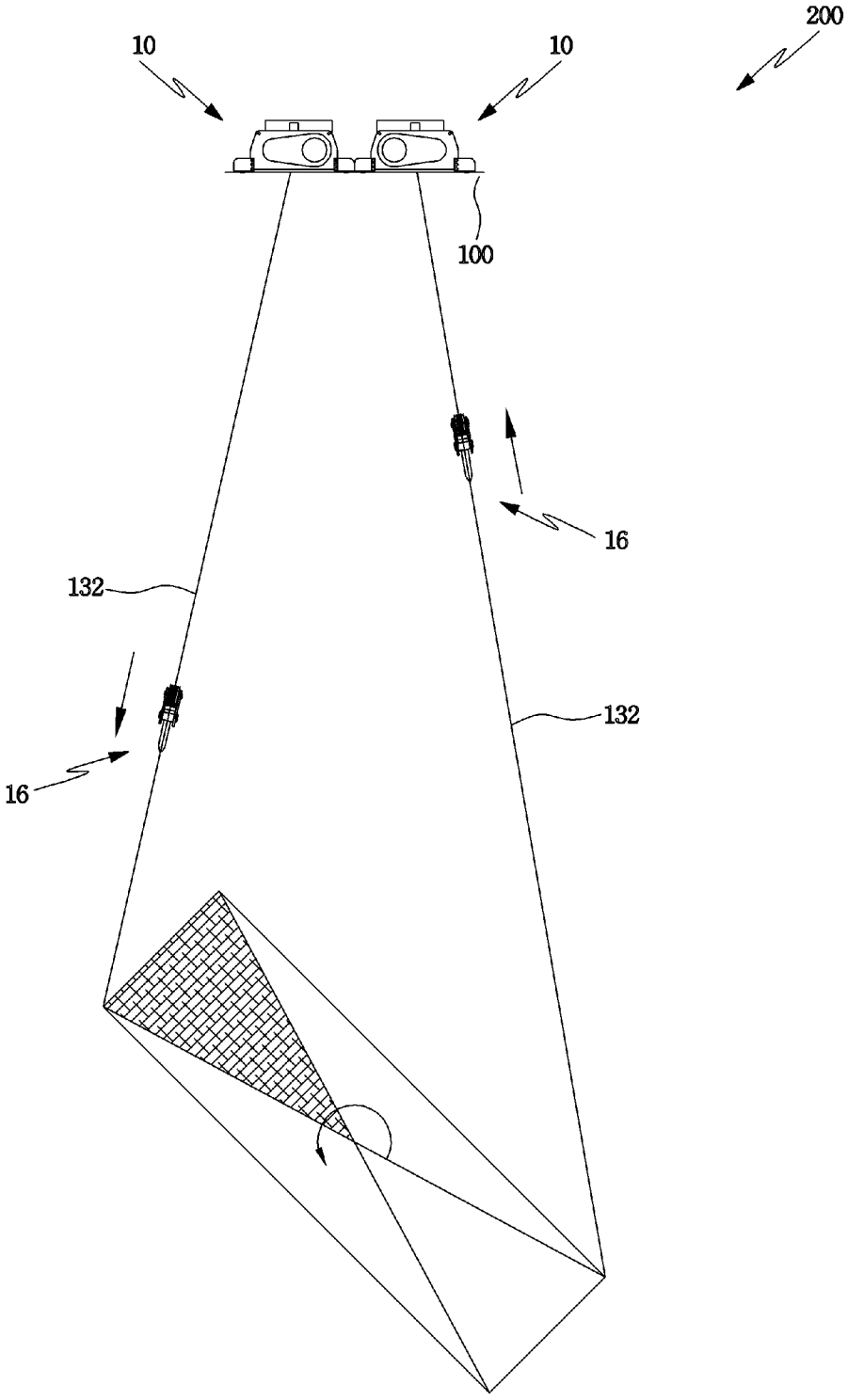
[Fig. 12]



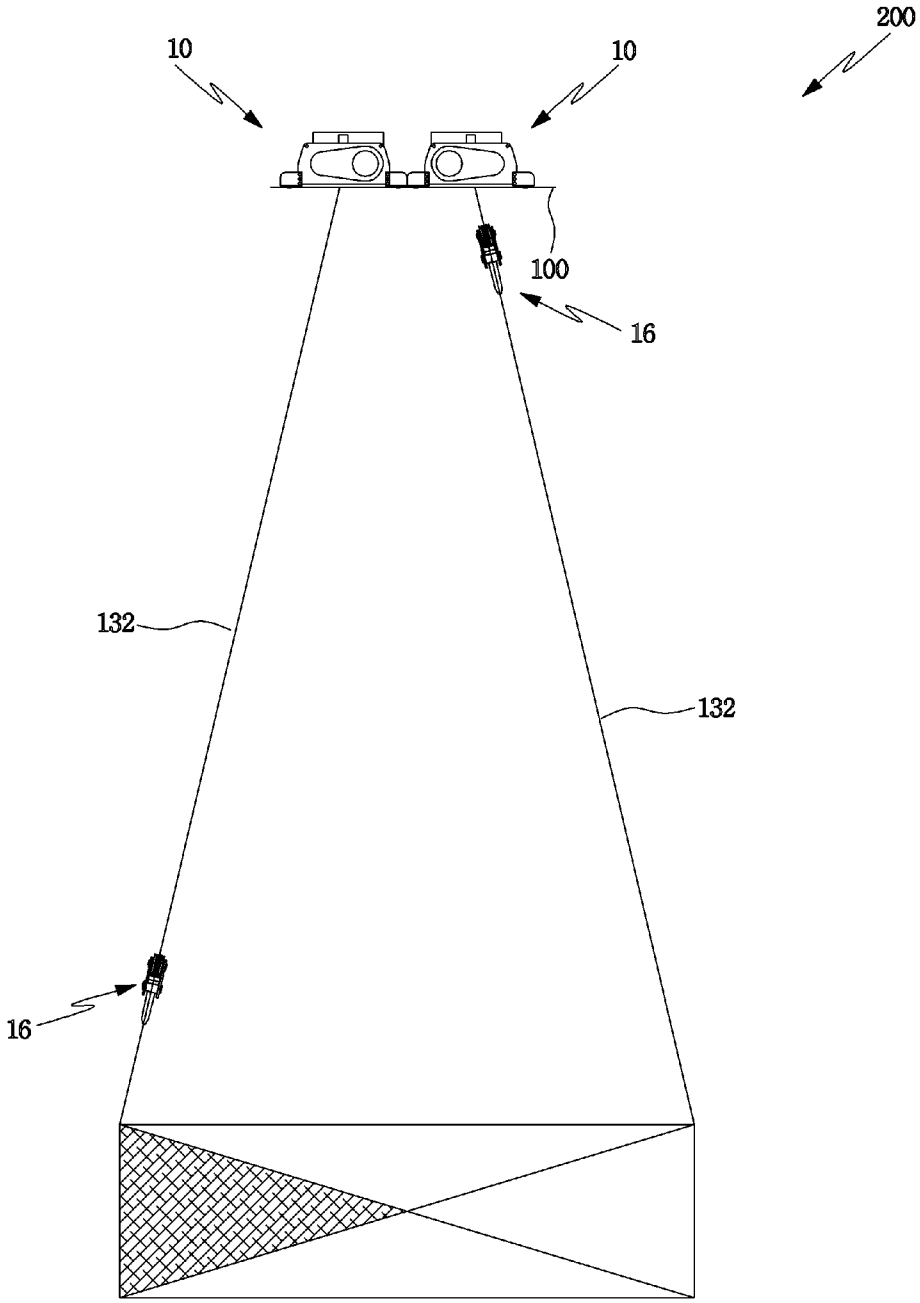
[Fig. 13]



[Fig. 14]



[Fig. 15]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2006/001569

A. CLASSIFICATION OF SUBJECT MATTER

B66C 13/08(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC8 B66C, B66D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the intertnational search (name of data base and, where practicable, search terms used)
e-KIPASS (KIPO internal) & keywords : "hoist", "turn"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 04-371491 A (IDE KEISUKE)24 December 1992 See abstract, column8, line 1 - column 15, line10 and Figures1-8.	1 - 6
A	US 6,956,339 B1 (KURECK, AARON S. et al.) 18 October 2005 See abstract and Figures 3-5.	1 - 6
A	US 5,593,138 A (JAMES ZAGUROLI, JR. et al.) 14 January 1997 See abstract and Figures 1-3.	1 - 6

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 SEPTEMBER 2006 (20.09.2006)	**21 SEPTEMBER 2006 (21.09.2006)**

Name and mailing address of the ISA/KR
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Facsimile No. 82-42-472-7140

Authorized officer
BAHNG, Seung Hoon
Telephone No. 5422

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR2006/001569

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 04371491 A	24.12.1992	None	
US 6956339 B1	18.10.2005	US 2005043258 A1	24.02.2005
		WO 2004087873 A2	14.10.2004
US 5593138 A	14.01.1997	None	