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(71) Applicants:
- **POSCO**
  Nam-ku
  Pohang, Kyungsangbook-do
  790-300 (KR)
- **RESEARCH INSTITUTE OF INDUSTRIAL SCIENCE & TECHNOLOGY**
  Pohang-si,
  Kyungsangbook-do 790-330 (KR)

(72) Inventors:
- **LIM, Tae-Gyoon**
  Pohang-si
  Kyungsangbook-do 790-751 (KR)
- **BAE, Geun-Sang**
  Gwangyang-si
  Jeollanam-do 545-711 (KR)
- **SONG, Hee-Suk**
  Gwangyang-si
  Jeollanam-do 545-711 (KR)
- **BAE, Hyo-Jeong**
  Pohang-si
  Kyungsangbook-do 790-752 (KR)

(74) Representative: **Potter Clarkson LLP**
The Belgrave Centre
Talbot Street
Nottingham NG1 5GG (GB)

(54) COIL LIFTER

(57) Disclosed is a coil lifter. According to one aspect of the present invention, the coil lifter is one which forwards a coil, in which a core hole is formed, to a central part using a wire, the coil lifter comprising: a lifter frame provided with first and second wire winding units; a pair of lifter arms which extend from the lifter frame towards two side surfaces in the width direction of the coil; and a wire linking unit which is provided on the pair of lifter arms and causes a wire of the first wire winding unit to pass through the coil hole and link to the second wire winding unit, and, in the invention, the work of linking the wire through the core hole of the coil proceeds automatically, thereby making it possible to minimise exposure of the operator to a dangerous environment and so possible to improve work safety, and making it possible to prevent accidents due to, by way of example, defective wire linking occurring in the work process.

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Description

[Technical Field]

[0001] The present disclosure relates to a coil lifter, and more particularly, to a coil lifter configured to tie a belt sling to a coil for lifting and transferring a coil.

[Background Art]

[0002] Generally, in ironworks, a steel sheet having a constant width is continuously produced using a hot rolling mill or a cold rolling mill and is stored or transferred after being coiled.

[0003] FIG. 1 is a view illustrating a coil lifter 1 of the related art. Referring to FIG. 1, the coil lifter 1 of the related art may be connected to a crane for being moved to a coil, lifting the coil, and transferring the coil to a desired location.

[0004] To this end, the coil lifter 1 may include: a main body 10 coupled to a device such as a crane; and lifting arms 20 disposed on both sides of the main body 10 with a gap there between corresponding to a coil width and extending in a direction parallel to both sides of a coil.

[0005] The lifting arms 20 include shoes 22 configured to be inserted into a core hole formed in a center region of a coil to make contact with an inner circumferential surface of the coil and to lift the coil.

[0006] In the related art, however, when the shoes 22 of the lifting arms 20 of the coil lifter 1 are brought into contact with an inner circumferential surface of a core hole of a cold-rolled coil having a thin sheet thickness for lifting the cold-rolled coil, the cold-rolled coil may be easily damaged because of the thin sheet thickness of the cold-rolled coil. Thus, the coil lifter 1 of the related art is limitedly used, for example, for transferring or storing coils having a thick sheet thickness or for indoor use only when handling coils having a thin sheet thickness because of the swing of the lifter due to outdoor wind.

[0007] Therefore, in the related art, slings are used for transferring coils as follows. A worker passes a sling connected to a crane through a core hole of a coil, and another worker receives the sling at the other side of the coil and reconnects the sling to the crane. After the sling is reconnected to the crane, the crane pulls on the sling to lift the coil connected to the sling and transfer the coil. Then, if the coil is transferred to a desired location, workers remove the sling from the coil in inverse order to the connection order.

[0008] In the related art, since a sling is manually connected to a coil as described above, many workers, such as workers to connect a sling to a coil and a signal worker for providing information regarding the connection state of the sling to a crane operator are necessary.

[0009] Therefore, as described above, many workers may be unnecessarily involved in sling connection, and the workers may be exposed to danger while they connect a sling to a coil or while the coil is being transferred. Therefore, it is necessary to develop a technique for automatically connecting a sling to a coil.

[Disclosure]

[Technical Problem]

[0010] An aspect of the present disclosure may provide a coil lifter configured to automatically connect a sling to a coil by passing the sling through the coil for reducing the number of workers involved in a coil lifting process and ensuring the safety of the workers.

[Technical Solution]

[0011] According to an aspect of the present disclosure, a coil lifter for moving a coil having a core hole in a center region thereof by using a sling may include: a lifter frame including a first sling winding unit and a second sling winding unit; a pair of lifting arms extending from the lifter frame toward both widthwise sides of the coil; and a sling connecting unit provided on the pair of lifting arms to connect a sling of the first sling winding unit to the second sling winding unit through the core hole of the coil. The coil lifter may automatically connect the sling through the core hole of the coil, thereby protecting workers from dangerous working environments, improving the safety of working environments, and preventing accidents caused by factors such sling connection errors.

[0012] The sling connecting unit may include: a first variable shoe provided on an end of one of the pair of lifting arms in a rotatable and extendable manner so as to hook the sling of the first sling winding unit and move the sling to a predetermined position in the core hole of the coil; and a second variable shoe provided on an end of the other of the pair of lifting arms in a rotatable and extendable manner so as to hook the sling of the first sling winding unit placed in the core hole by the first variable shoe and connect the sling of the first sling winding unit to a sling of the second sling winding unit.

[0013] The first sling of the first sling winding unit may include a ring-shaped portion on an end thereof, and the sling of the second sling winding unit may include a hooking portion on an end thereof.

[Advantageous Effects]

[0014] According to exemplary embodiments of the present disclosure, a sling may be automatically connected through a core hole of a coil. Therefore, workers may be protected from dangerous working environments, and the safety of working environments may be improved. In addition, accidents caused by factors such sling connection errors may be prevented.

[Description of Drawings]

[0015]

FIG. 1 is a front view illustrating a coil lifter of the related art.

FIG. 2 is a front view illustrating a coil lifter according to an exemplary embodiment of the present disclosure.

FIG. 3 is a front view illustrating the coil lifter disposed above a coil according to the exemplary embodiment of the present disclosure.

FIG. 4 is a front view illustrating the coil lifter when a sling of a first sling winding unit is connected to a first variable shoe according to the exemplary embodiment of the present disclosure.

FIG. 5 is a front view illustrating the coil lifter when the sling of the first sling winding unit is placed in a core hole of the coil according to the exemplary embodiment of the present disclosure.

FIG. 6 is a front view illustrating the coil lifter when the sling of the first sling winding unit is connected to a second variable shoe in the core hole of the coil according to the exemplary embodiment of the present disclosure.

FIG. 7 is a front view illustrating the coil lifter when the sling of the first sling winding unit is inserted through the core hole of the coil by the second variable shoe according to the exemplary embodiment of the present disclosure.

FIG. 8 is a front view illustrating the coil lifter when the sling of the first sling winding unit is connected to a second sling winding unit by the second variable shoe according to the exemplary embodiment of the present disclosure.

FIG. 9 is a front view illustrating the coil lifter transferring the coil according to the exemplary embodiment of the present disclosure.

[Best Mode]

[0016] Exemplary embodiments of the present disclosure will now be described in detail with reference to the accompanying drawings. The disclosure may, however, be exemplified in many different forms and should not be construed as being limited to the specific embodiments set forth herein. In the drawings, the shapes and dimensions of elements may be exaggerated for clarity, and the same reference numerals will be used throughout to designate the same or like elements.

[0017] FIG. 2 is a front view illustrating a coil lifter 100 according to an exemplary embodiment of the present disclosure.

[0018] Referring to FIG. 2, the coil lifter 100 of the exemplary embodiment may pass a sling through a core hole 210 of a coil 200 and pull and lift the sling and the coil 200 connected to the sling for moving the coil 200.

[0019] To this end, the coil lifter 100 of the exemplary embodiment may include a lifter frame 110, and the lifter frame 110 may include a first sling winding unit 112 and a second sling winding unit 116.

[0020] The lifter frame 110 may be provided on a path along which the coil 200 is transferred and may be moved in association with an overhead device such as a crane.

[0021] In addition, a pair of lifting arms 120 and 130 may extend from the lifter frame 110 toward both widthwise sides of the coil 200.

[0022] The lifting arms 120 and 130 may be movable in a width direction of the lifter frame 110.

[0023] For example, a movement support 122 may be provided on an upper portion of the lifting arm (left lifting arm) 120 disposed on the left side in FIG. 2. The movement support 122 may be movably attached to a plurality of guides 124 of the lifter frame 110. In addition, one of the guides 124 may include a threaded portion on an outer surface thereof, and the threaded portion may be rotated in association with a driving unit 126 disposed on a side of the threaded portion.

[0024] Therefore, if one of the guides 124 is rotated by rotation of the driving unit 126, the movement support 122 may be moved along the guides 124, and then the lifting arm 120 may be moved together with the movement support 122 along the lifter frame 110.

[0025] In this manner, the lifting arm 120 may be moved in the width direction of the lifter frame 110 so as to adjust the position of the left lifting arm 120 to be close to a lateral side of the coil 200.

[0026] The first sling winding unit 112 may be coupled to the movement support 122 and moved together with the lifting arm 120.

[0027] A sling 114 to be inserted through the core hole 210 of the coil 200 may be wound around the first sling winding unit 112 and unwound from the first sling winding unit 112. To this end, the first sling winding unit 112 may include a bobbin (not shown) around with the sling 114 is wound and a driving unit 113 configured to rotate the bobbin.

[0028] The second sling winding unit 116 may be coupled to a movement support 132 configured to move the lifting arm (right lifting arm) 130 disposed on the right side in FIG. 2. The movement support 132 may be movably attached to a plurality of guides 134 of the lifter frame 110. In addition, one of the guides 134 may include a threaded portion on an outer surface thereof, and the threaded portion may be rotated in association with a driving unit 136 disposed on a side of the threaded portion.

[0029] Therefore, if one of the guides 134 is rotated by rotation of the driving unit 136, the movement support 132 may be moved along the guides 134, and then the lifting arm 130 may be moved together with the movement support 132 along the lifter frame 110.

[0030] The second sling winding unit 116 may include a bobbin (not shown) around which a sling 118 is wound and a driving unit 117 configured to rotate the bobbin. The sling 118 of the second sling winding unit 116 may include a connection portion for connection with the sling 114 of the first sling winding unit 112.

[0031] For example, in the exemplary embodiment, the sling 114 of the first sling winding unit 112 may include

a ring-shaped portion 115 on an end thereof. In addition, the sling 118 of the second sling winding unit 116 may include a hooking portion 119 for coupling with the ring-shaped portion 115 of the sling 114 of the first sling winding unit 112. For example, the hooking portion 119 of the sling 118 of the second sling winding unit 116 may be shaped like a hook and may be coupled to the ring-shaped portion 115 of the sling 114 of the first sling winding unit 112 for making and maintaining a connection between the sling 114 and the sling 118.

[0032] In addition, the coil lifter 100 may include a sling connecting unit 150 configured to connect the sling 114 of the first sling winding unit 112 disposed on an end of the lifting arm 120 to the second sling winding unit 116 through the core hole 210 of the coil 200.

[0033] The sling connecting unit 150 may include a first variable shoe 152 and a second variable shoe 154.

[0034] The first variable shoe 152 may be provided in a rotatable and extendable manner on the left lifting arm 120. The first variable shoe 152 may hook the sling 114 of the first sling winding unit 112 and move the sling 114 to a predetermined position in the core hole 210 of the coil 200.

[0035] The second variable shoe 154 may be provided in a rotatable and extendable manner on the right lifting arm 130. After the sling 114 of the first sling winding unit 112 is placed in the core hole 210 by the first variable shoe 152, the second variable shoe 154 may hook the sling 114 and connect the sling 114 to the sling 118 of the second sling winding unit 116.

[0036] That is, in the exemplary embodiment, the sling 114 of the first sling winding unit 112 may be connected to the first variable shoe 152 and then may be placed in the core hole 210 of the coil 200 by rotation of the first variable shoe 152.

[0037] At this time, the first variable shoe 152 may be extended from an end of the lifting arm 120 to hook the sling 114 of the first sling winding unit 112 and then may be retracted and rotated toward the core hole 210 of the coil 200.

[0038] Thereafter, the left lifting arm 120 may be moved in a width direction of the coil 200, and at the same time, the first variable shoe 152 may be extended so as to move the sling 114 hooked on the first variable shoe 152 to a center position of the core hole 210.

[0039] In association with the movement of the left lifting arm 120 and the first variable shoe 152, the right lifting arm 130 and the second variable shoe 154 may be moved in a width direction of the coil 200.

[0040] At this time, the second variable shoe 154 may be extended within the core hole 210 of the coil 200 so as to hook the sling 114 hooked to the first variable shoe 152. At this time, the sling 114 may be separated from the first variable shoe 152.

[0041] After the sling 114 is connected to the second variable shoe 154 as described above, the second variable shoe 154 is retracted.

[0042] Next, the left and right lifting arms 120 and 130 are moved away from the coil 200, and at the same time, the first and second variable shoes 152 and 154 are rotated.

[0043] Thereafter, the second variable shoe 154 may be extended to hook the sling 114 to the sling 118 of the second sling winding unit 116.

[0044] At this time, the sling 114 transferred by the first variable shoe 152 may be connected to the sling 118 of the second sling winding unit 116 by coupling the ring-shaped portion 115 of the sling 114 to the hooking portion 119 of the sling 118 by using the second variable shoe 154.

[0045] As described above, after the sling 114 of the first sling winding unit 112 is placed in the core hole 210 of the coil 200 by the first variable shoe 152, the second variable shoe 154 may pull the sling 114 out of the coil 200 and connect the sling 114 to the sling 118 of the second sling winding unit 116.

[0046] After the sling 114 is connected through the coil 200, the lifter frame 110 may be lifted in association with a device such as a crane so as to lift the coil 200 while maintaining a proper length of the sling 114 and to move the coil 200 to a desired location.

[0047] According to the exemplary embodiment of the present disclosure, the operation of the coil lifter 100 will now be sequentially described with reference to FIGS. 3 to 9.

[0048] First, as illustrated in FIG. 3, the coil lifter 100 is moved to an upper side of the coil 200 in association with a device such as a crane. Next, the lifting arms 120 of the coil lifter 100 are moved in the width direction of the coil 200 and are lowered to positions close to the coil 200.

[0049] Next, as illustrated in FIG. 4, the first variable shoe 152 of the lifting arm 120 (disposed on the left side in FIG. 4) is extended and connected to the sling 114 of the first sling winding unit 112.

[0050] Next, as illustrated in FIG. 5, the first variable shoe 152 is rotated from the lifting arm 120 toward the core hole 210 of the coil 200 so as to unwind the sling 114 from the first sling winding unit 112 and guide the sling 114 to the core hole 210 of the coil 200.

[0051] Referring to FIG. 6, the first and second variable shoes 152 and 154 are extended, and then the sling 114 hooked on the first variable shoe 152 is hooked to the second variable shoe 154. At this time, the sling 114 is separated from the first variable shoe 152.

[0052] Next, as illustrated in FIG. 7, the first and second variable shoes 152 and 154 are retracted, and thus the sling 114 is fully inserted through the core hole 210 of the core.

[0053] Next, as illustrated in FIG. 8, the sling 114 inserted through the core hole 210 of the core is connected to the sling 118 of the second sling winding unit 116 as the second variable shoe 154 is rotated and extended. At this time, the hooking portion 119, provided on an end of the sling 118, may be coupled to the ring-shaped portion 115 provided on the sling 114 of the first sling winding

unit 112.

[0054] After the sling 114 is connected through the core hole 210 of the core, as illustrated in FIG. 9, the lifter frame 110 is lifted in association with a device such as a crane so as to lift the coil 200 while maintaining a proper length of the sling 114 and to transfer the coil 200 to a desired location.

[0055] In addition, the coil 200 may be tilted by adjusting relative lengths of the slings 114 and 118 so as to safely place the coil 200 down on the floor of a desired location according to the slope of the floor.

[0056] In the exemplary embodiment, the coil lifter 100 is used to transfer coils 200 of steel strips. However, the coil lifter 100 is an example of a device for moving goods in general. That is, the coil lifter 100 may be used to transfer goods other than wound steel strips.

[0057] In addition, the coil lifter 100 may be used to transfer various materials as well as coils 200 of steel strips. That is, the coil lifter 100 of the exemplary embodiment may be used to transfer various materials wound in the form of coils such as paper, fabric, or synthetic resin rolls having core holes in center portions thereof. In addition to moving coil-shaped materials, the coil lifter 100 of the exemplary embodiment may be used to transfer various other materials having penetration holes. For example, the coil lifter 100 of the exemplary embodiment may be used to transfer variously shaped materials having penetration holes through which slings are insertable. Specifically, the coil lifter 100 may be used to transfer hexahedral materials having penetration holes. In addition, the coil lifter 100 of the exemplary embodiment may be used to transfer various materials such as U-shaped materials as long as the materials may be balanced while being transferred using slings.

[0058] Furthermore, the slings used in the exemplary embodiment may include at least one selected from the group consisting of steels, fibers, fabrics, rubbers, and synthetic resins. The slings may be formed by twisting or stacking strands of one or more of the listed materials. In addition to the listed materials, the slings may be formed of other materials that may not damage coils when the coils are lifted using the slings. For example, the slings may be coated with silicone, rubber, or a synthetic resin for preventing slippage and surface damage.

[0059] While exemplary embodiments have been shown and described above, it will be apparent to those skilled in the art that modifications and variations could be made without departing from the scope of the present invention as defined by the appended claims.

Claims

1. A coil lifter for moving a coil having a core hole in a center region thereof by using a sling, the coil lifter comprising:

   a lifter frame comprising a first sling winding unit and a second sling winding unit;

   a pair of lifting arms extending from the lifter frame toward both widthwise sides of the coil; and

   a sling connecting unit provided on the pair of lifting arms to connect a sling of the first sling winding unit to the second sling winding unit through the core hole of the coil.

2. The coil lifter of claim 1, wherein the sling connecting unit comprises:

   a first variable shoe provided on an end of one of the pair of lifting arms in a rotatable and extendable manner so as to hook the sling of the first sling winding unit and move the sling to a predetermined position in the core hole of the coil; and

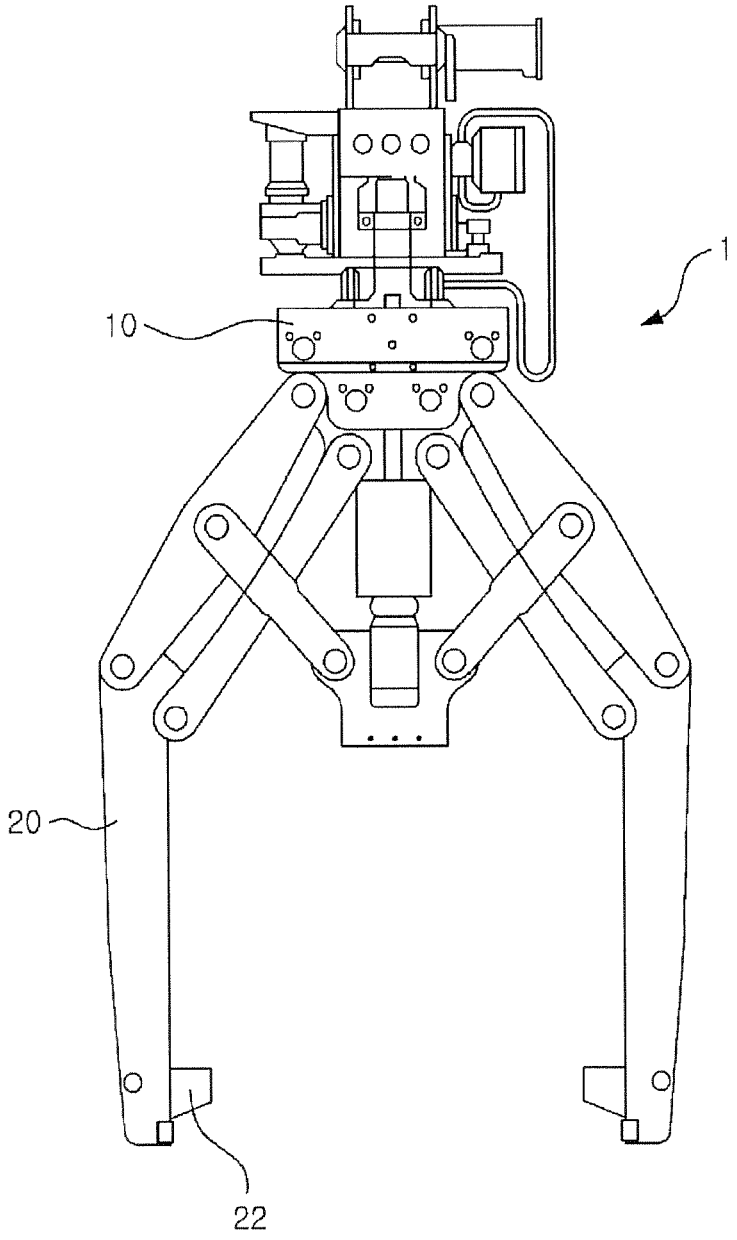
   a second variable shoe provided on an end of the other of the pair of lifting arms in a rotatable and extendable manner so as to hook the sling of the first sling winding unit placed in the core hole by the first variable shoe and connect the sling of the first sling winding unit to a sling of the second sling winding unit.

3. The coil lifter of claim 2, wherein the first sling of the first sling winding unit comprises a ring-shaped portion on an end thereof, and

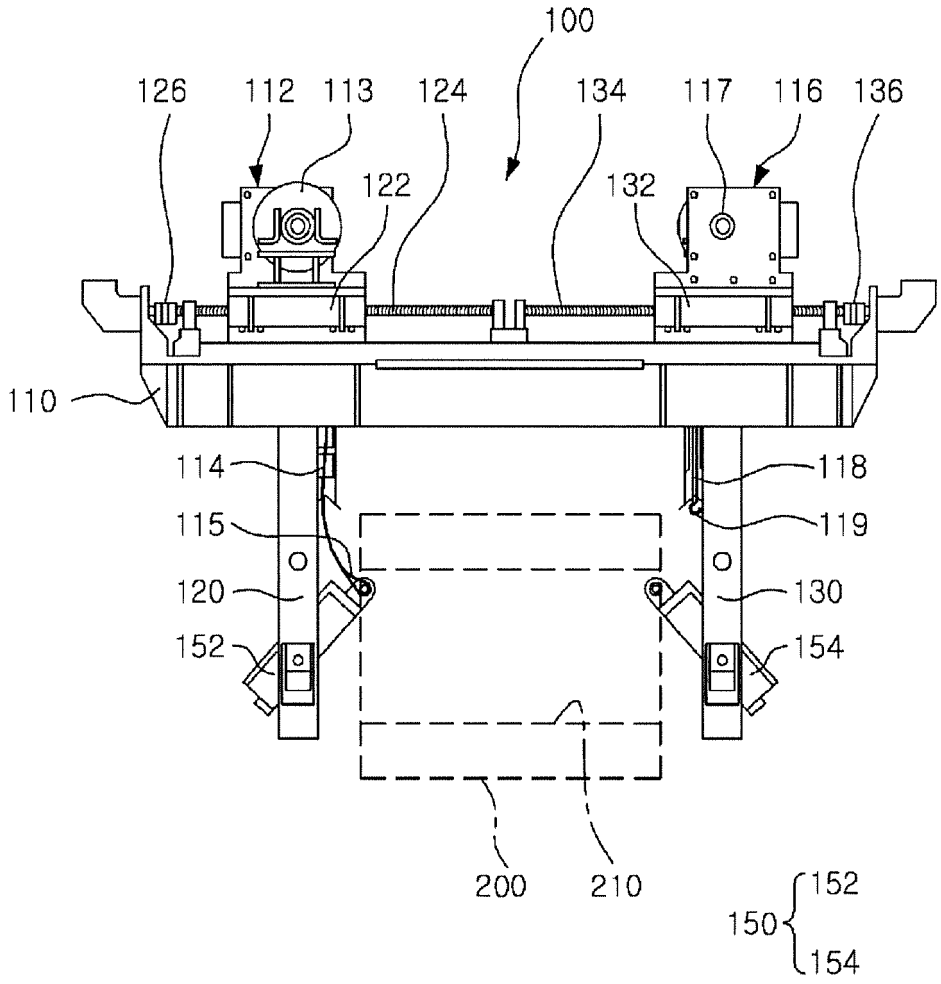
   the sling of the second sling winding unit comprises a hooking portion on an end thereof.

4. The coil lifter of any one of claims 1 to 3, wherein the sling or slings comprise at least one selected from the group consisting of irons, fibers, fabrics, rubbers, and synthetic resins.

【Figure 1】



【Figure 2】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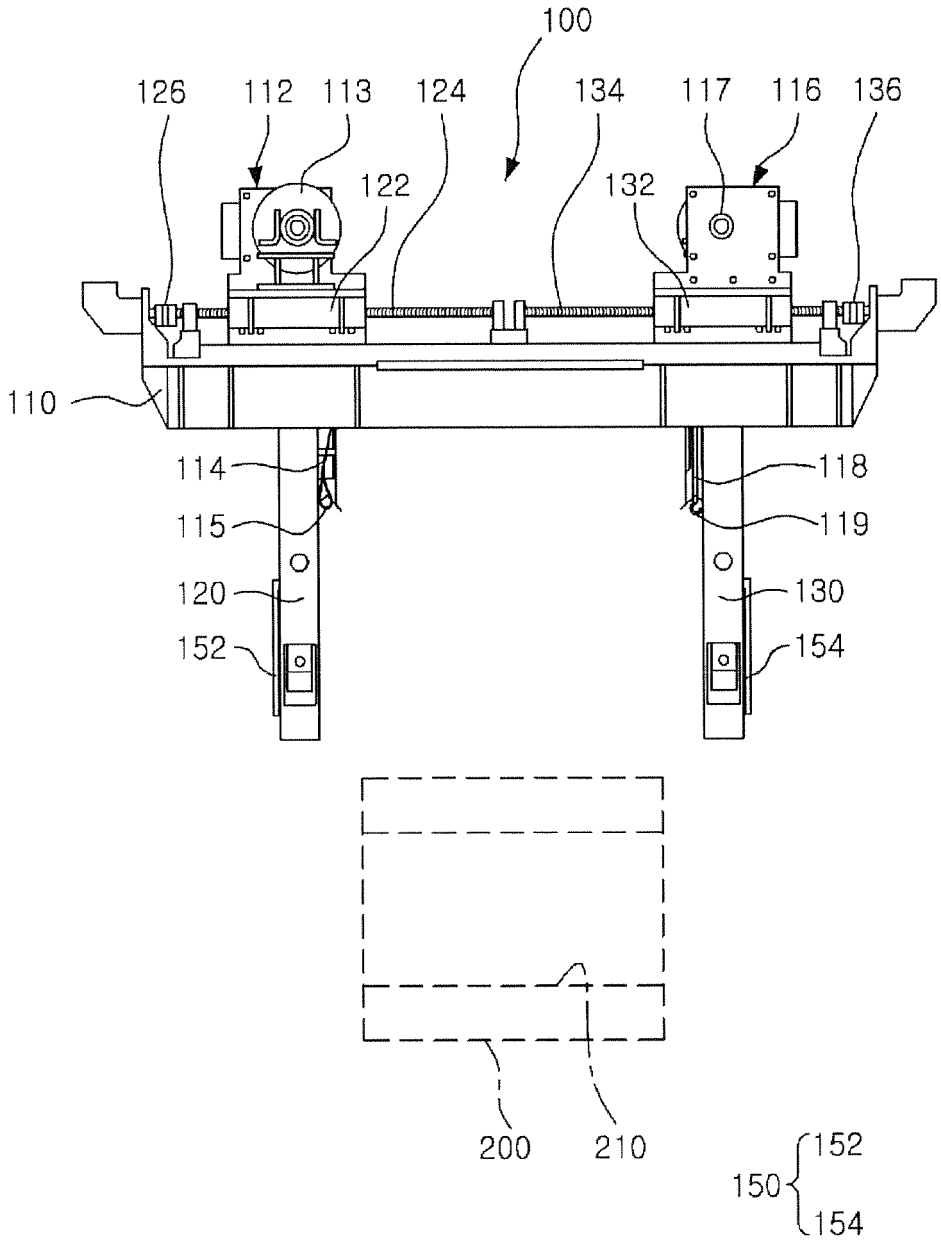
【Figure 3】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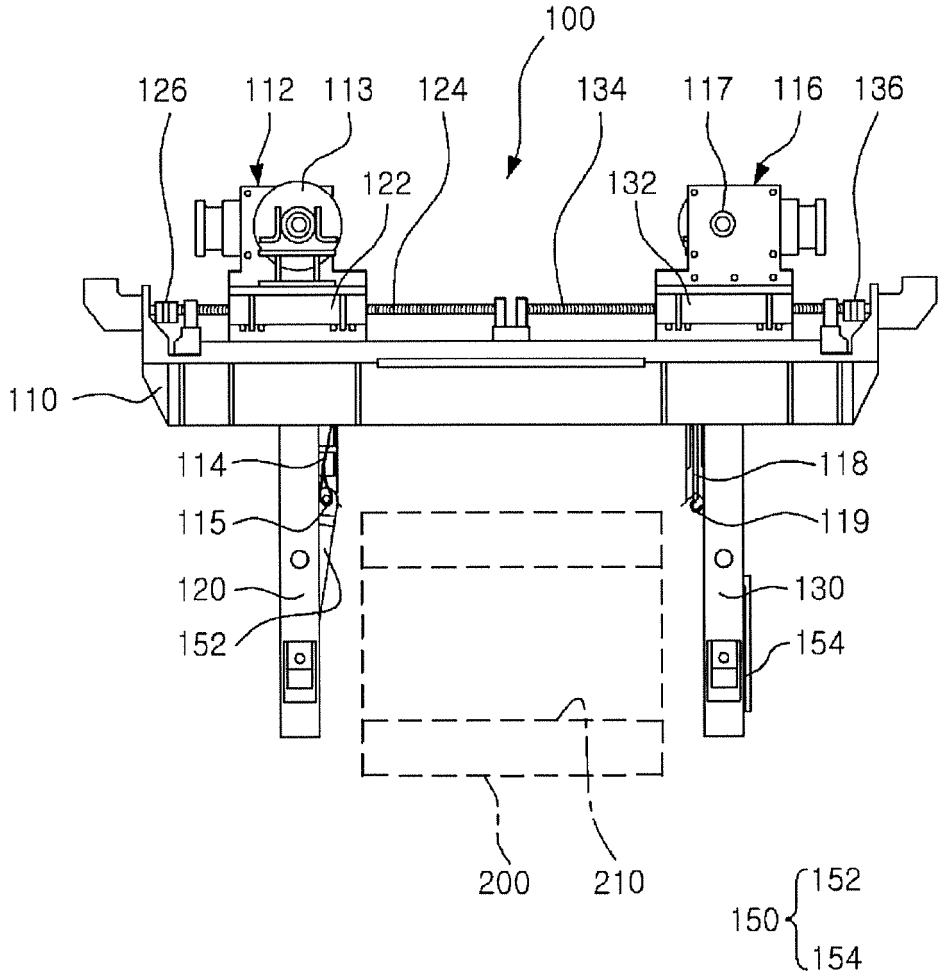
【Figure 4】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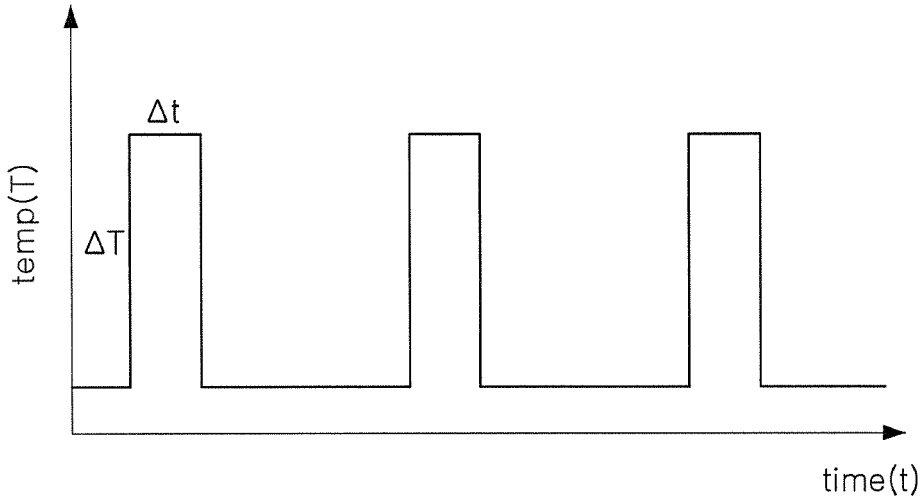
【Figure 5】



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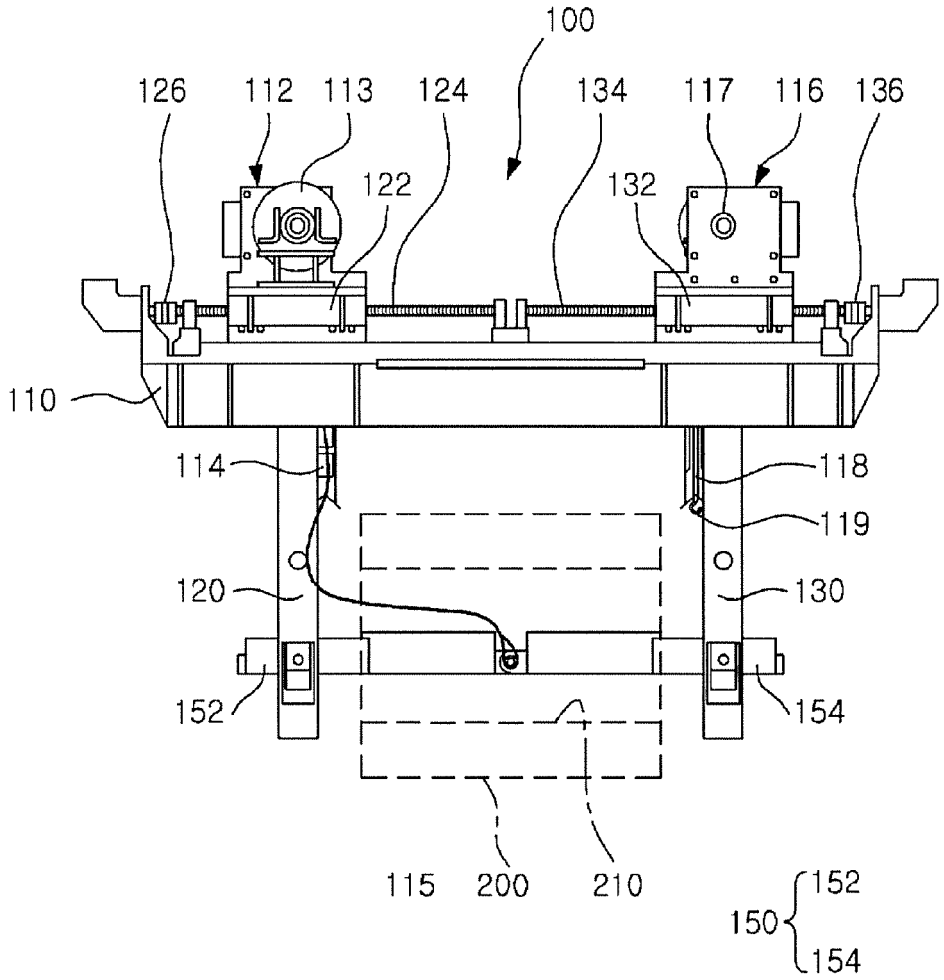
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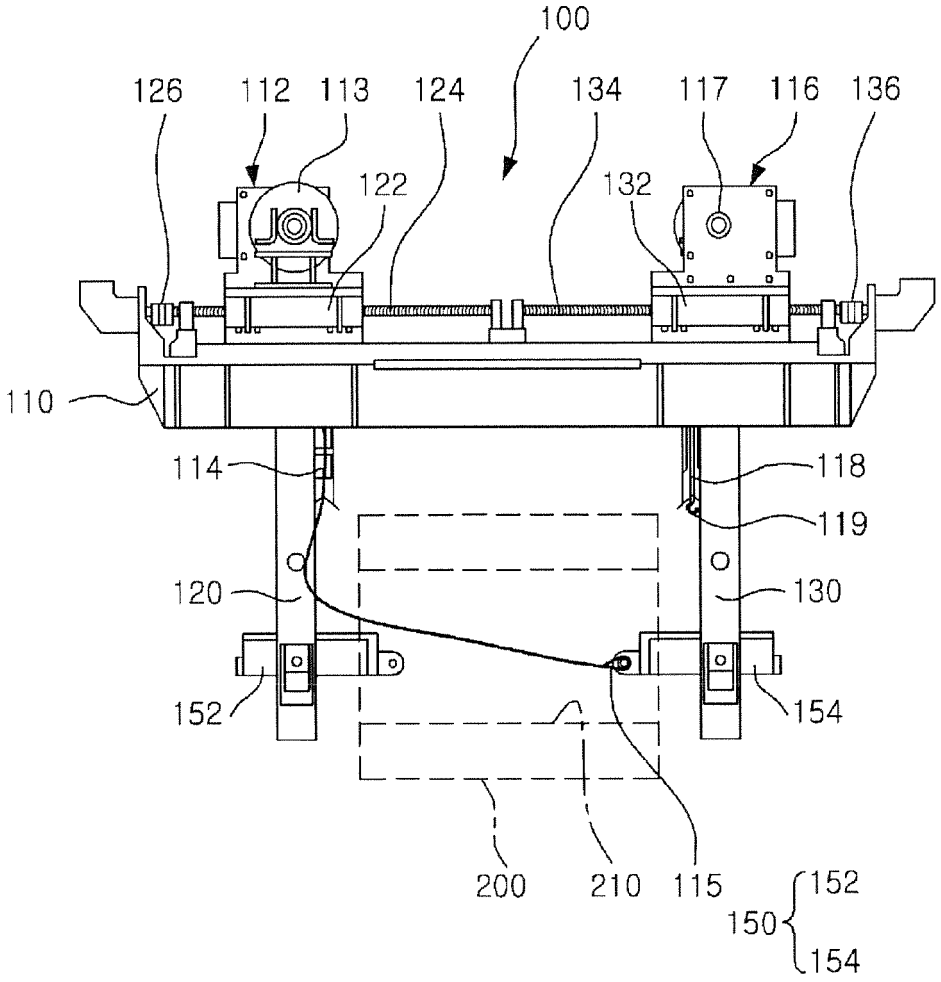
【Figure 7】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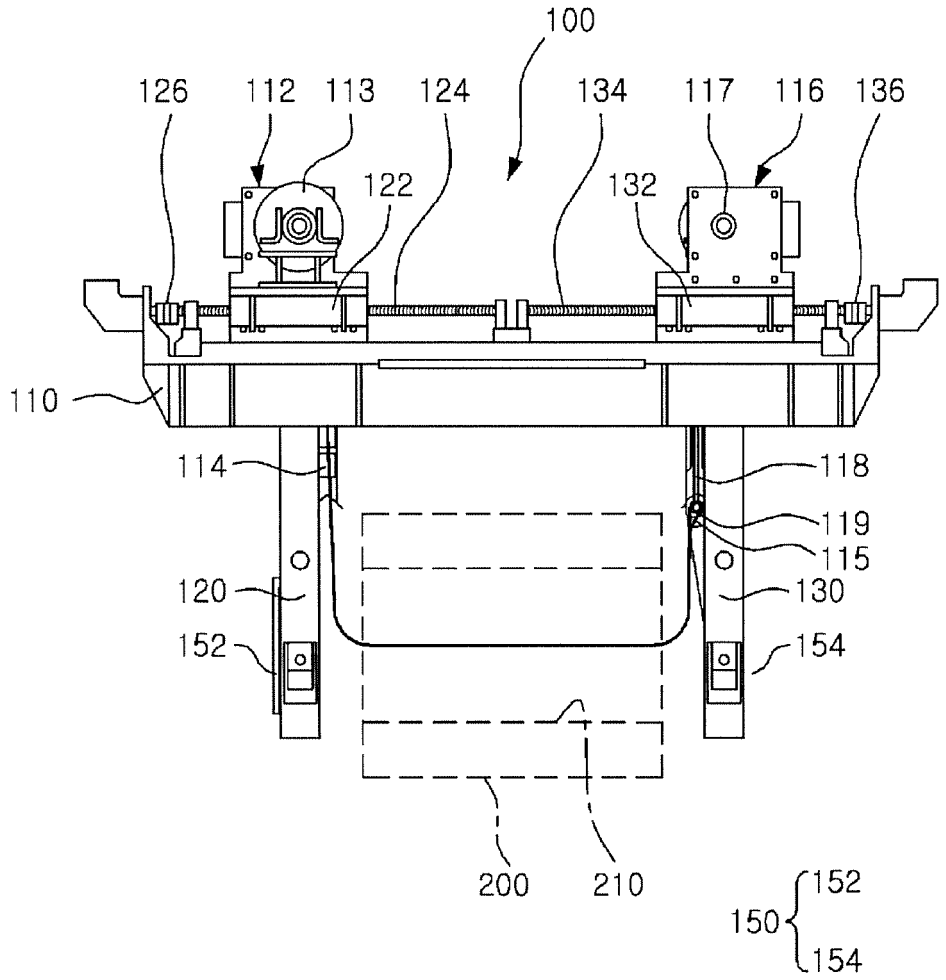
【Figure 8】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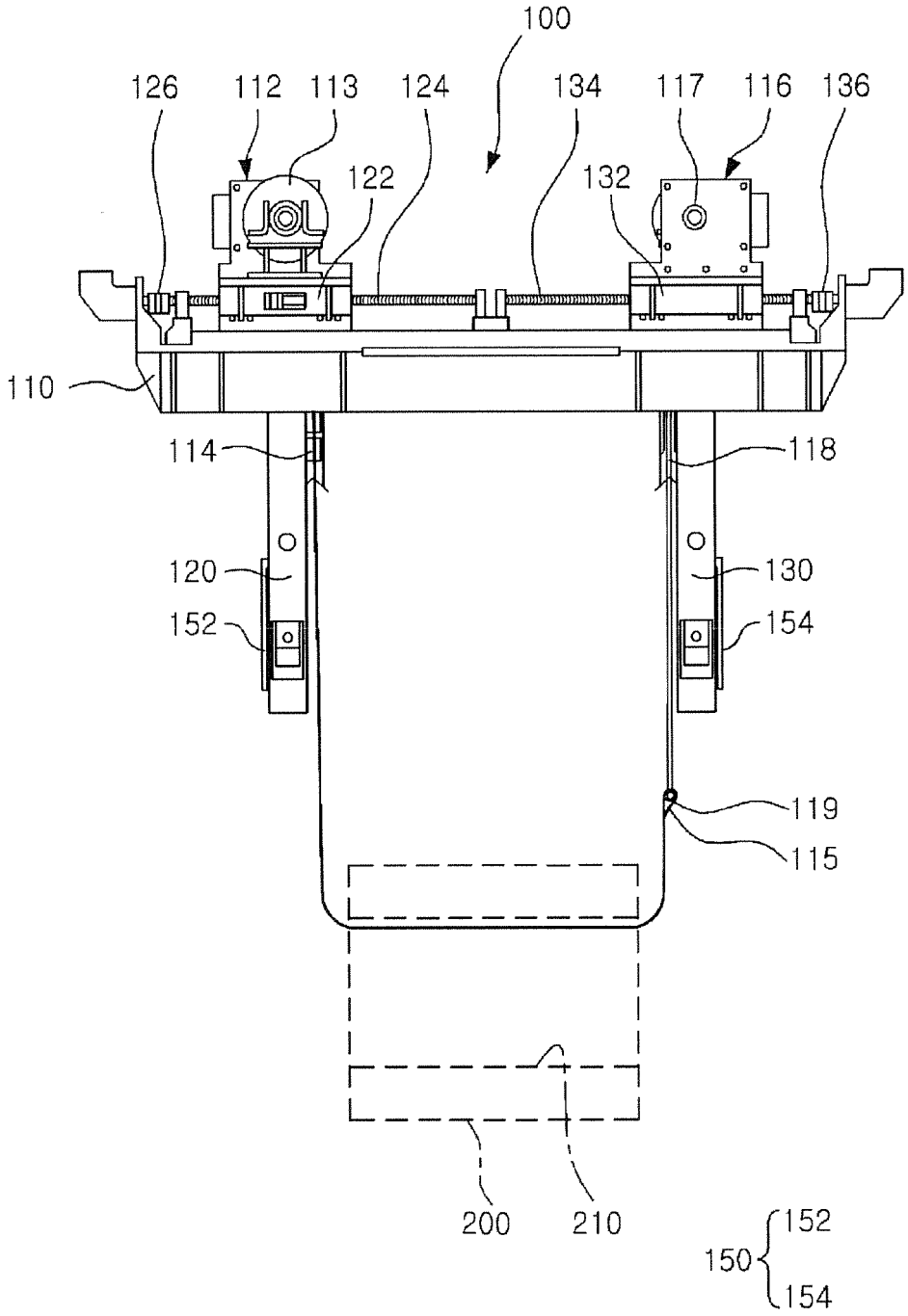
【Figure 9】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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2013/011943

A. CLASSIFICATION OF SUBJECT MATTER

B66C 1/42(2006.01)i, B66C 1/62(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)

B66C 1/42; B66C 1/12; B66C 23/00; B66C 13/22; B21C 47/24; B66C 1/28; B66C 9/02; B66C 13/08; B66C 1/62

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Utility models and applications for Utility models: IPC as above
Japanese Utility models and applications for Utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & Keywords: coil, lifter, winding, wire and connection

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 10-0711431 B1 (POSCO) 24 April 2007 See paragraphs 24-34 and figures 2-4.	1-4
Y	JP 2008-056369 A (EAGLE KURANPU K.K.) 13 March 2008 See paragraphs 21-22 and figures 5, 8.	1-4
A	US 3963130 A (MAYNARD, James J.) 15 June 1976 See column 1, lines 33-64 and figure 1.	1-4
A	US 4360112 A (BREWER et al.) 23 November 1982 See column 1, line 48 - column 2, line 47 and figure 1.	1-4
A	JP 10-087269 A (MITSUI ENG & SHIPBUILD CO., LTD.) 07 April 1998 See paragraphs 9-12 and figure 5.	1-4

☐ 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
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 MARCH 2014 (21.03.2014)	**21 MARCH 2014 (21.03.2014)**
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