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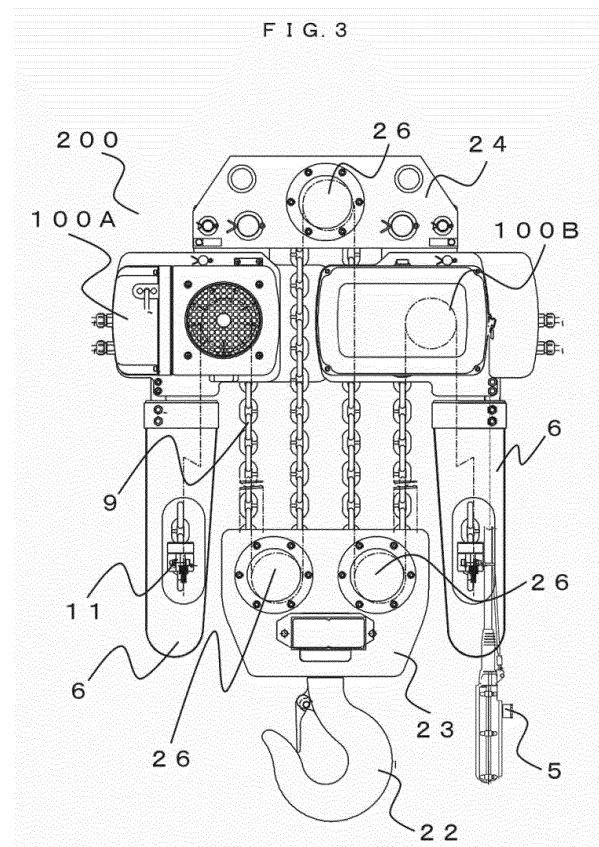
(71) Applicant: **Hitachi Industrial Equipment Systems Co., Ltd.**
Tokyo 101-0022 (JP)

(72) Inventors:
• **YAMANO Kyosuke**
Tokyo 101-0022 (JP)
• **YAMAMOTO Kazuma**
Tokyo 101-0022 (JP)

(74) Representative: **MERH-IP Matias Erny Reichl Hoffmann**
Patentanwälte PartG mbB
Paul-Heyse-Strasse 29
80336 München (DE)

(54) **CHAIN WINDING DEVICE**

(57) In a normal operation of moving a position of a lower suspension tool in an upward and downward direction, first drive means and second drive means are rotated in different directions, and in a chain replacement operation of replacing a chain, the first drive means and the second drive means are rotated in the same direction.



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Description

TECHNICAL FIELD

[0001] The present invention relates to a chain winding device.

BACKGROUND ART

[0002] When the number of running sheaves and the number of loops of a chain are increased, whereas the lift speed becomes the reciprocal of the number of loops, an electric chain block can lift a weight multiplied by the number of loops in a suspension manner.

[0003] Incidentally, as disclosed in Patent Document 1, first and second electric chain blocks are used, and one chain is wound from both sides through a lower suspension tool including a hook and two or more running sheaves and an upper suspension tool including one or more running sheaves, and thus, a suspended load is lifted and lowered by the power of the two electric chain blocks.

CITATION LIST

PATENT DOCUMENT

[0004] Patent Document 1: JP 2017-132561 A

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0005] As the chain which is used in the electric chain block is used, the abrasion, elongation, or the like in a bent portion of the chain occurs. For this reason, maintenance such as regular oil lubrication is performed, and when the chain reaches a usage limit, it is necessary to replace the chain with a new chain.

[0006] Since a large-sized electric chain block disclosed in Patent Document 1 includes a chain longer than usual and a plurality of sheaves for structural reason, the ease of replacement of the chain is very poor.

[0007] An object of the present invention is to easily perform a chain replacement operation on a chain winding device.

SOLUTIONS TO PROBLEMS

[0008] According to one aspect of the present invention, there is provided a chain winding device that winds a chain with first drive means and second drive means through a lower suspension tool and an upper suspension tool, the device including a control unit that controls the first drive means and the second drive means, in which in a normal operation of moving a position of the lower suspension tool in an upward and downward direction, the control unit rotates the first drive means and

the second drive means in different directions, and in a chain replacement operation of replacing the chain, the control unit rotates the first drive means and the second drive means in the same direction.

EFFECTS OF THE INVENTION

[0009] According to one aspect of the present invention, it is possible to easily perform the chain replacement operation on the chain winding device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Fig. 1 is an example of a perspective view illustrating the configuration of an electric chain block.

Fig. 2 is an example of a front view illustrating the configuration of the electric chain block.

Fig. 3 is a front view illustrating the configuration of a large-sized electric chain block.

Fig. 4 is a view describing a normal operation mode of the large-sized electric chain block.

Fig. 5 is a view describing a chain replacement operation mode of the large-sized electric chain block.

MODE FOR CARRYING OUT THE INVENTION

[0011] Hereinbelow, an example will be described with reference to the drawings.

[0012] The entire configuration of an electric chain block will be described with reference to Figs. 1 and 2.

[0013] Firstly, the entire configuration will be described.

[0014] An electric chain block 100 includes an electric motor 1; a speed reduction unit 2; an electromagnetic brake 3; an upper suspension tool 4; a pushbutton switch 5; a chain bucket 6; a sprocket 7; a load block 8; a chain 9; and a control unit 10. The upper suspension tool 4 for installing the electric chain block 100 in a suspension manner is attached to the electric chain block 100.

[0015] The electric motor 1 is attached to the electric chain block 100. The speed reduction unit 2 for reducing the rotation generated by the electric motor 1 is connected to electric motor 1, and the rotation reduced by the speed reduction unit 2 is transmitted to the sprocket 7. The electromagnetic brake 3 for stopping the rotation generated by the electric motor 1 is attached to the electric motor 1. The chain 9 meshes with the sprocket 7. The load block 8 is attached to one end of the chain 9, and a stopper 11 is attached to the other end thereof. The chain bucket 6 is suspended on the electric chain block 100, and the stopper 11 on a lowering side of the chain 9 is accommodated in the chain bucket 6.

[0016] The control unit 10 which controls the operation of the electric motor 1 and the electromagnetic brake 3 is attached to the electric chain block 100.

[0017] Subsequently, the operation of the electric

chain block 100 will be described.

[0018] When an operation button of the pushbutton switch 5 is pushed in, the control unit 10 recognizes an input of the operation, and the electric motor 1 is energized and the electromagnetic brake 3 is also energized at the same time, so that the electromagnetic brake 3 is released and the electric motor 1 starts rotating.

[0019] The rotational power of the electric motor 1 is reduced to a predetermined rotating speed by the speed reduction unit 2, the rotation is transmitted to the chain 9 by the sprocket 7 coupled to a final speed reduction stage, and the load block 8 is lifted and lowered via the chain 9. In this way, a suspended load is lifted and lowered.

[0020] When the chain 9 opposite to the load block 8 is lifted, the chain 9 is accommodated in the chain bucket 6 attached to the electric chain block 100, and when the chain 9 is lowered, the chain 9 is discharged.

[0021] Subsequently, the entire configuration of a large-sized electric chain block which is a chain winding device will be described with reference to Fig. 3.

[0022] A large-sized electric chain block 200 uses the two electric chain blocks 100 illustrated in Fig. 1 as drive means. The chain 9 is wound with a first electric chain block (first drive means) 100A and a second electric chain block (second drive means) 100B from both sides through a lower suspension tool 23 including a hook 22 and two or more running sheaves 26 and an upper suspension tool 24 including one or more running sheaves 26. Therefore, a suspended load with a weight corresponding to the number of loops of the chain 9 is lifted and lowered.

[0023] When the operation button of the pushbutton switch 5 is pushed in, the first electric chain block 100A and the second electric chain block 100B operate to lift and lower the lower suspension tool 23 including the hook 22 and the two or more running sheaves 26. In this way, a suspended load is lifted and lowered.

[0024] The operation of the chain winding device in a normal mode will be described with reference to Fig. 4.

[0025] As illustrated in Fig. 4, in the normal mode, the first electric chain block 100A and the second electric chain block 100B rotate in different directions as seen from front. For this reason, the lower suspension tool 23 including the hook 22 and the two or more running sheaves 26 move in an upward direction or a downward direction (the position of the hook 22 is lowered or raised). In this way, it is possible to lift and lower a suspended load.

[0026] Subsequently, the operation of the chain winding device in a chain replacement operation mode will be described with reference to Fig. 5.

[0027] In regard to the chain replacement operation mode, when the control unit 10 receives an input from outside, for example, a button input or a special operation which is a combination of a plurality of button inputs from the pushbutton switch 5, the control unit 10 determines that the chain replacement operation mode is activated.

[0028] When the control unit 10 determines that the chain replacement operation mode is activated, as illustrated on the left side of Fig. 5, the first electric chain block 100A and the second electric chain block 100B rotate in the same direction as seen from front.

[0029] Then, after the chain bucket 6 which is suspended on the first electric chain block 100A and the second electric chain block 100B is removed, and the stopper 11 which is attached to a final trailing end of the chain 9 on a first electric chain block 100A side is removed, a tip of a new chain 27 is coupled to the final trailing end of the chain 9 using a C link 12.

[0030] For example, when a downward button of the pushbutton switch 5 is operated from this state, the chain 9 is wound to flow from the first electric chain block 100A to the second electric chain block 100B through the lower suspension tool 23 and the upper suspension tool 24. The new chain 27 is wound together with the chain 9 via the C link 12.

[0031] Then, as illustrated on the right side of Fig. 5, when the C link 12 is discharged from a second electric chain block 100B side, the button operation of the pushbutton switch 5 is stopped. Therefore, the chain 9 of the large-sized electric chain block 200 is replaced with the new chain 27.

[0032] In the example, the foregoing operation facilitates the chain replacement operation of the large-sized electric chain block 200.

[0033] In the related art, when the chain of the large-sized electric chain block is replaced, as illustrated on the right side of Fig. 5, firstly, the chain bucket 6 of the first electric chain block 100A and the second electric chain block 100B is removed.

[0034] Subsequently, after the stopper 11 provided at the final trailing end of the chain 9 is removed, the chain 9 and the new chain 27 are coupled to each other with the C link 12, and the first electric chain block 100A and the second electric chain block 100B are operated one by one by means such as electric power supply shutoff. In this case, the chain replacement operation is performed while slacks of the chain 9 and the new chain 27, the slacks occurring in the running sheaves 26, are eliminated with the human hands.

[0035] As described above, since the chain replacement operation of the large-sized electric chain block 200 in the related art is performed while the slacks of the chain 9 and the new chain 27 are eliminated with the human hands, the ease of replacement of the chain is very poor.

[0036] According to the example, when the control unit 10 receives an input from outside, for example, a button input of the pushbutton switch 5, the control unit 10 determines that the chain replacement operation mode is activated. When the control unit 10 determines that the chain replacement operation mode is activated, the first electric chain block (first drive means) 100A and the second electric chain block (second drive means) 100B rotate in the same direction as seen from front. Therefore,

in a state where the position of the hook 22 is not changed, the chain 9 is wound to flow from the first electric chain block 100A to the second electric chain block 100B.

[0037] As described above, according to the example, the chain replacement operation is facilitated; and thereby, it is possible to improve the operation efficiency.

REFERENCE SIGNS LIST

[0038]

100	Electric chain block
200	Large-sized electric chain block
1	Electric motor
2	Speed reduction unit
3	Electromagnetic brake
4	Upper suspension tool
5	Pushbutton switch
6	Chain bucket
7	Sprocket
8	Load block
9	Chain
10	Control unit
11	Stopper
12	C link
22	Hook
23	Lower suspension tool
24	Upper suspension tool
26	Running sheave
27	New chain

Claims

1. A chain winding device that winds a chain (9) with first drive means and second drive means through a lower suspension tool (23) and an upper suspension tool (24), the device comprising:
 - a control unit (10) that controls the first drive means and the second drive means, wherein in a normal operation of moving a position of the lower suspension tool (23) in an upward and downward direction, the control unit (10) rotates the first drive means and the second drive means in different directions, and in a chain replacement operation of replacing the chain (9), the control unit (10) rotates the first drive means and the second drive means in the same direction.
2. The chain winding device according to claim 1, wherein the lower suspension tool (23) includes two or more running sheaves (26), the upper suspension tool (24) includes one or more running sheaves (26), and the chain (9) moves via the running sheaves (26).

3. The chain winding device according to claim 1, wherein in the chain replacement operation, the control unit (10) rotates the first drive means and the second drive means in the same direction without changing the position of the lower suspension tool (23).
4. The chain winding device according to claim 1, wherein the control unit (10) determines whether the normal operation or the chain replacement operation is performed, and when the control unit (10) determines that the chain replacement operation is performed, the control unit (10) rotates the first drive means and the second drive means in the same direction.
5. The chain winding device according to claim 4, further comprising:
 - an input device for inputting predetermined information, wherein the control unit (10) determines that the chain replacement operation is performed, in response to the information input from the input device.
6. The chain winding device according to claim 5, wherein the input device is formed of a pushbutton switch (5), and the control unit (10) determines that the chain replacement operation is performed, in response to button input information from the pushbutton switch (5).

FIG. 1

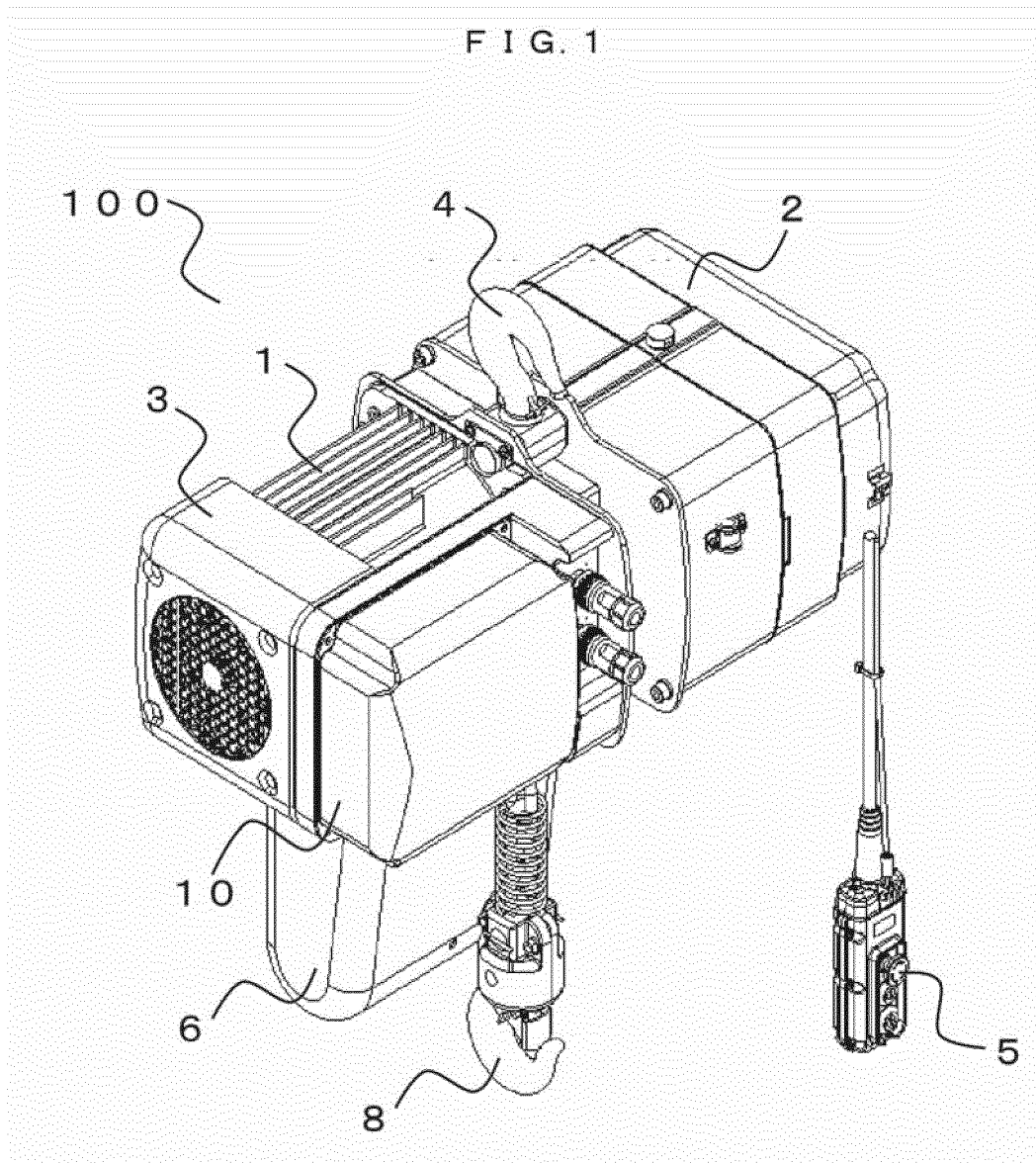


FIG. 2

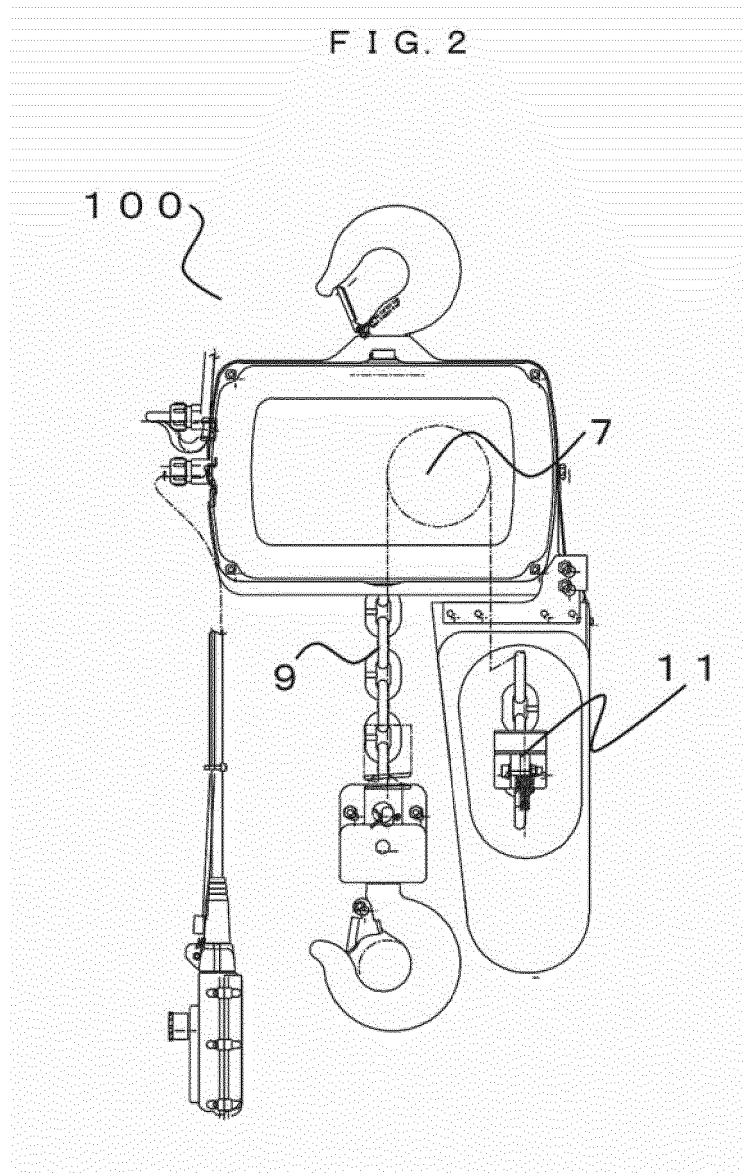


FIG. 3

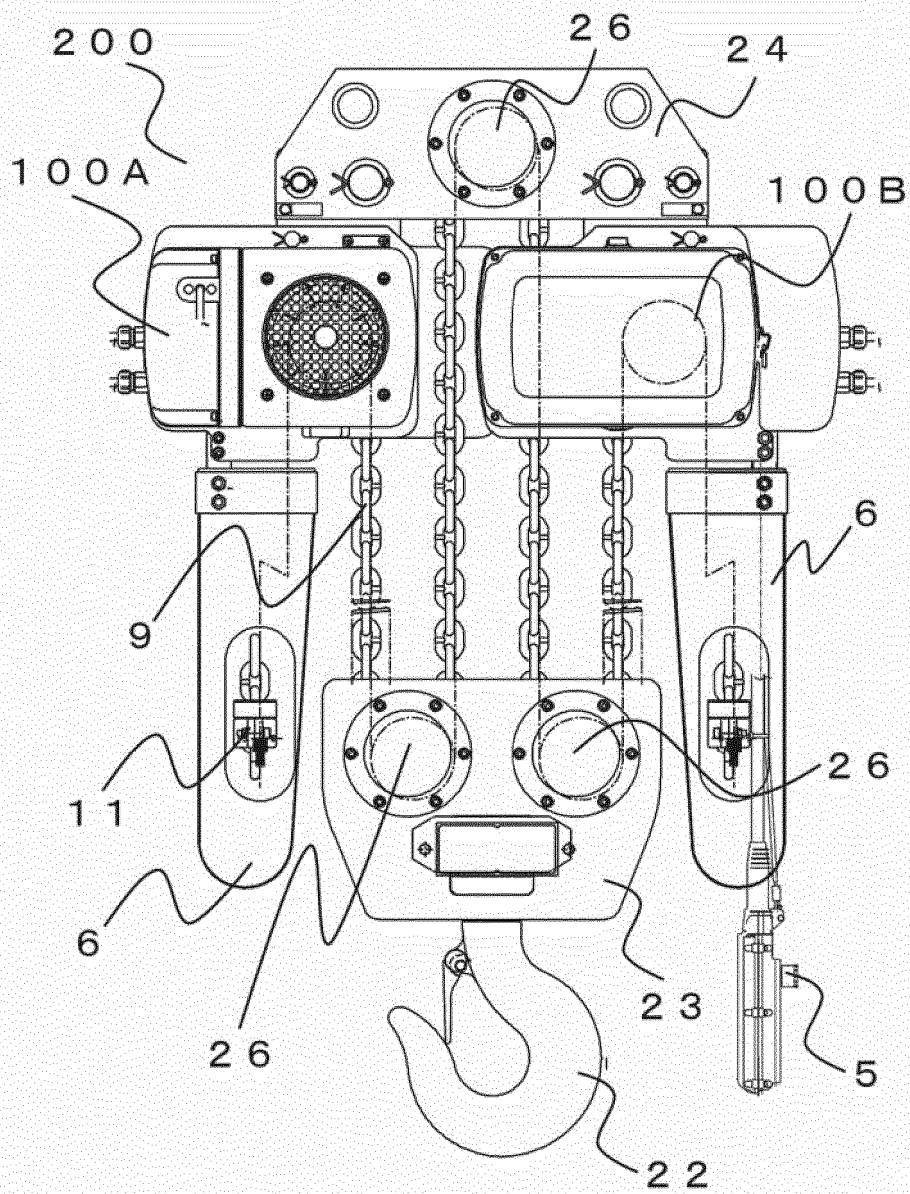


FIG. 4

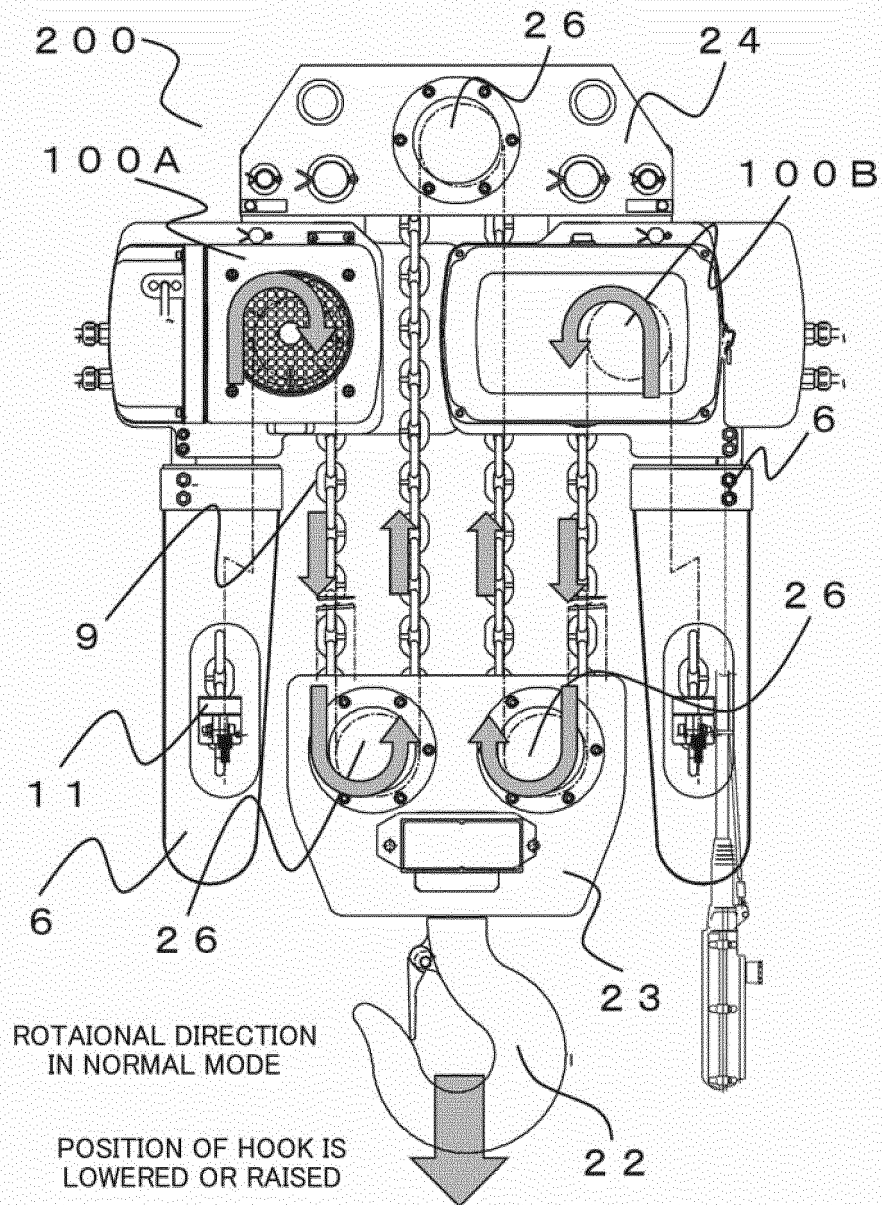
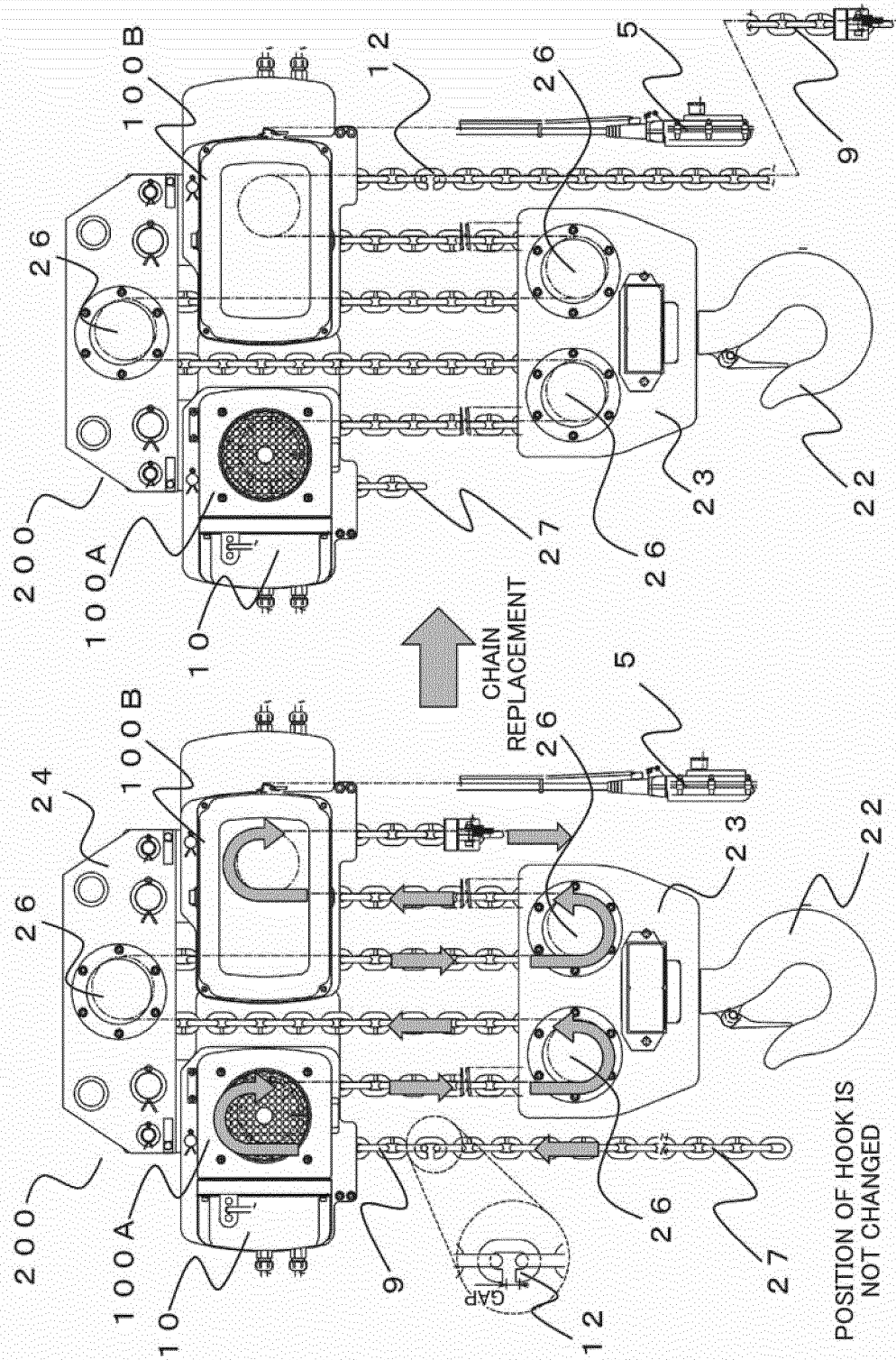


FIG. 5



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2018/028628

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. B66D3/20 (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)

Int.Cl. B66D1/00-5/34

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

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2018

Registered utility model specifications of Japan 1996-2018

Published registered utility model applications of Japan 1994-2018

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 53-10686 Y2 (KITO CORPORATION) 22 March 1978 (Family: none)	1-6
A	JP 9-86886 A (KITO CORPORATION) 31 March 1997 (Family: none)	1-6
A	JP 7-59473 B2 (ELEPHANT CHAIN BLOCK CO., LTD.) 28 June 1995 (Family: none)	1-6
A	JP 3-272998 A (KAWADEN CO., LTD.) 04 December 1991 (Family: none)	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

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"P" document published prior to the international filing date but later than the priority date claimed

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Date of the actual completion of the international search
29.08.2018Date of mailing of the international search report
11.09.2018Name and mailing address of the ISA/
Japan Patent Office
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Tokyo 100-8915, Japan

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Patent documents cited in the description

- JP 2017132561 A [0004]