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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) **OUTRIGGER EXTEND-RETRACT SYSTEM CAPABLE OF HORIZONTALLY EXTENDING WITH THREE SEGMENTS**

(57) The present invention relates to an outrigger extend-retract system with compact structure capable of horizontally extending with three segments (11, 12, 13) that enables the outriggers to be extended and shortened used in telescopic boom or knuckle boom cranes. Furthermore, the system comprises two pulleys (70, 120), an organized chain (100), a hydraulic line (80), a piston sleeve (20) and an electric line (90) which moves within the organized chain with the hydraulic line and provides electrical connections of the outrigger.

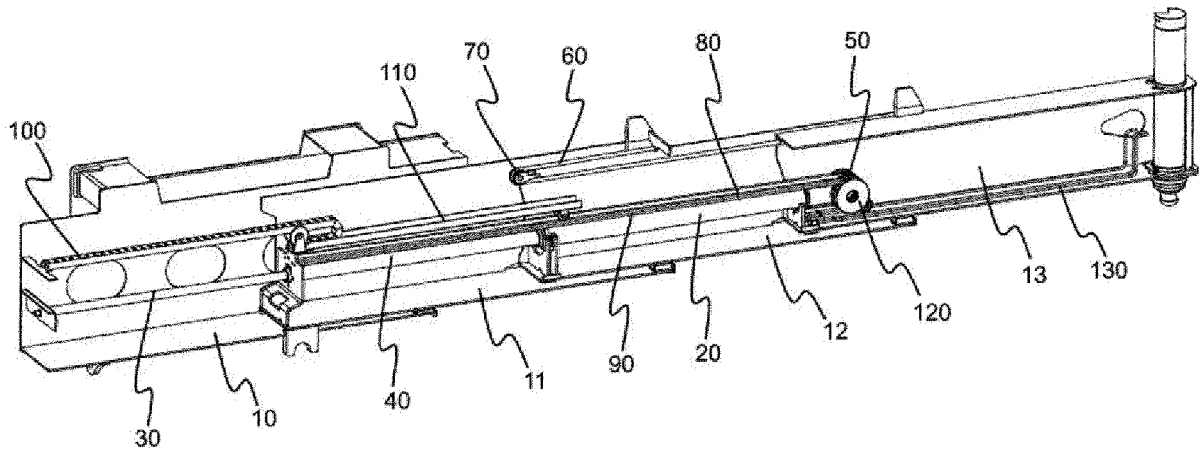

Figure 1a

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Description

Technical Field

[0001] The present invention relates to an outrigger extend-retract system that can extend and shorten in the telescopic boom and knuckle boom cranes.

[0002] The present invention particularly relates to an outrigger extend-retract system with compact structure capable of horizontally extending with three segments that enables the outriggers to be extended and retracted by means of a single piston by opening and closing telescopically in a synchronous manner.

Present State of the Art

[0003] Today, telescopic boom and knuckle boom on board cranes are widely used to transport large tonnage loads such as machinery, equipment etc. During the operation of telescopic boom and knuckle boom cranes onboard, the support point of the crane should be kept at a point as far as possible from the slewing ring against the moment formed in the slewing ring. Therefore, outriggers are used in telescopic boom and knuckle boom cranes and said outriggers are opened and brought to the appropriate position on the ground during the operation of telescopic boom and knuckle boom cranes.

[0004] The outriggers used in the present state of the art are generally opened and closed by extending and retracting the same in three stages on the horizontal axis. This extending and retracting movement is carried out by a mechanism with three hydraulic pistons placed in the outriggers. Moreover, since there is not enough space in outriggers, locating the mechanism that performs the extending and retracting process inside the outrigger during the assembly phase causes loss of time and high costs in production. Furthermore, due to the three-piston mechanism and the hydraulic lines of these pistons, a serious cost increase and extra weight in the crane structure is seen. Meanwhile, the hydraulic line and the cables of the electric line that influence the operation of the system must be connected to the outside of the outrigger since the mechanism occupies a lot of space in the outrigger. Usage of external drums is considered for this. Furthermore, the hoses of the hydraulic line and, the cables of the electric line carried outside the outrigger can be exposed to external factors and break down easily. Therefore, loss of labor might occur during the operation of telescopic boom or knuckle boom cranes due to malfunction, but work accidents may occur in case of a possible explosion due to the transportation of hydraulic lines from outside the outrigger.

[0005] As a result, in order to solve the abovementioned problems and the insufficiency of the current solutions makes it necessary to make a development in the relevant technical field.

Aim of the Invention

[0006] The present invention is related to an outrigger extend-retract system capable of horizontally extending with three segments which eliminates the abovementioned disadvantages and brings new advantages to the relevant technical field.

[0007] The main aim of the invention is to provide an outrigger extend-retract system with compact structure that enables the outriggers to be extended and shortened by means of a single piston.

[0008] The aim of the invention is to enable the outriggers to be opened and closed telescopically by means of a single piston in a synchronous manner.

[0009] Another aim of the invention is to reduce the total weight of the outrigger by opening and closing the outriggers by means of a single piston.

[0010] Another aim of the invention is to provide that the hydraulic line and the electric line are taken into the telescopic rail and move within the telescopic rail during the opening and closing of extend-retract system.

[0011] Another aim of the invention is to eliminate the use of external drums with the presence of the hydraulic line and the electric line within the telescopic rail.

[0012] Another aim of the invention is to eliminate the failure of the hydraulic line and the power line due to external factors, and in case of a possible breakdown, to prevent the occupational accidents and work losses due to breakdowns.

[0013] Another aim of the invention is to reduce the cost by eliminating the difficulties encountered during the assembly of extend-retract system to the outrigger.

[0014] An extend-retract system that enables the outriggers to be extended and shortened used in telescopic boom or knuckle boom cranes in order to fulfill all aims mentioned above and obtained from the following detailed description and comprises;

- main sleeve rail with a fixed structure,
- 1st rail that opens and closes by moving back and forth within the main sleeve rail,
- 2nd rail that opens and closes by moving back and forth within 1st rail,
- 3rd rail that opens and closes by moving back and forth within 2nd rail,
- piston sleeve with a fixed structure connected into the 2nd rail,
- 1st rod, which is engaged into the main sleeve rail and opens and closes the 1st rail by entering into the piston sleeve,
- 2nd rod, which is engaged into the 1st rail and opens and closes the 2nd rail by entering into the piston sleeve,
- during the opening movement of the 2nd rail, the extending chain or rope that opens the 3rd rail by extending the same on the 2nd pulley engaged to the 3rd rail,
- during the closing movement of the 2nd rail, the re-

tracting chain or rope that opens the 3rd rail by retracting the same on the 1st pulley engaged to the 2nd rail,
- organized chain moving back and forth within the rail connected to the 1st rail,
- hydraulic line that moves within the organized chain and enables the movement of the 1st rod and 2nd rod,
- electric line that moves within the organized chain with the hydraulic line and provides the electrical connections of the outrigger,
- pipe that brings the hydraulic line and the electric line to end of the 3rd rail.

[0015] The structural and characteristic features of the present invention will be understood clearly by the following drawings and the detailed description made with reference to these drawings. Therefore the evaluation shall be made by taking these figures and the detailed description into consideration.

Figures Clarifying the Invention

[0016]

Figure 1a: is a perspective view of the inventive extend-retract system.
Figure 1b: is a perspective view of the inventive extend-retract system from another angle.
Figure 2: is an internal detailed view of the inventive extend-retract system.

Description of the Part References

[0017]

10. Main sleeve rail
11. 1st rail
12. 2nd rail
13. 3rd rail
20. Piston sleeve
30. 1st rod
40. 2nd rod
50. Extending chain or rope
60. Retracting chain or rope
70. 1st pulley
80. Hydraulic line
90. Electric line
100. Organized chain
110. Rail
120. 2nd pulley
130. Pipe

Detailed Description of the Invention

[0018] In this detailed description, the preferred alternatives of the inventive extend-retract system is described only for clarifying the subject manner such that no limiting effect is created.

[0019] The general view of the inventive extend-retract system that enables the outriggers to be extended and shortened used in telescopic boom or knuckle boom cranes is given in figure 1a and 1b. Accordingly extract-retract system mainly comprises the following; main sleeve rail (10) with a fixed structure, 1st rail (11) that opens and closes by moving back and forth within the main sleeve rail (10), 2nd rail (12) that opens and closes by moving back and forth within 1st rail (11), 3rd rail (13) that opens and closed by moving forward backward in the 2nd rail (12), piston sleeve (20) with a fixed structure connected into the 2nd rail (12), 1st rod (30), which is engaged into the main sleeve rail (10) and opens and closes the 1st rail (11) by entering into the piston sleeve (20), 2nd rod (40), which is engaged into the 1st rail (11) and opens and closes the 2nd rail (12) by entering into the piston sleeve (20), during the opening movement of the 2nd rail (12), the extending chain or rope (50) that opens the 3rd rail (13) by extending the same on the 2nd pulley (120) engaged to the 3rd rail (13), during the closing movement of the 2nd rail (12), the retracting chain or rope (60) that opens the 3rd rail (13) by retracting the same on the 1st pulley (70) engaged to the 2nd rail (12), hydraulic line (80) that moves within the organized chain (100) moving back and forth within the rail (110) connected to the 1st rail (11), and enables the movement of the 1st rod (30) and 2nd rod (40), electric line (90) that moves within the organized chain (100) with the hydraulic line (80) and provides the electrical connections of the outrigger, pipe (130) that conveys the hydraulic line (80) and electric line (90) to the end of the 3rd rail (13).

[0020] The main sleeve rail (10), 1st rail (11), 2nd rail (12) and 3rd rail (13), which constitute the main structure of the inventive extend-retract system, have a structure that gradually opens and closes in a telescopic manner in the horizontal axis. Main sleeve rail (10) is fixed. A fixed piston sleeve (20) is connected inside the 2nd rail (12) to enable the opening and closing of the 1st rail (11) and 2nd rail (12).

[0021] 1st rod (30) that opens and closes the 1st rail (11) by opening and closing into the piston sleeve (20) is engaged into the main sleeve rail (10) and 2nd rod (40) that opens and closes the 2nd rod (12) by opening and closing into the piston sleeve (20) in engaged into the 1st rail (11).

[0022] The opening and closing movement of the 3rd rail (13) is provided by the extending chain or rope (50) that opens the 3rd rail (13) by extending the same on the 2nd pulley (120) connected to the 3rd rail (13) during the opening movement of the 2nd rail (12) and by a retracting chain or rope (60) which closes the 3rd rail (13) on the 1st pulley (70) connected to the 2nd rail (12), during the closing movement of the 2nd rail (12).

[0023] There is an organized chain (100) that moves back and forth in the rail (110) engaged to the 1st rail (11). The hydraulic line (80) that enables the movement of the 1st rod (30) and the 2nd rod (40) and the electric line (90) that provides the electrical connections of the

outrigger, move within the organized chain (100). At the same time, said hydraulic line (80) and the electric line (90) are connected to the pipe (130) that is engaged the 3rd rail (13) passing through the right and left sides of the 2nd pulley (120). Thus, the hydraulic line (80) and the electric line (90) have been brought to the end of the 3rd rail (13).

The operating principle of the inventive extend-retract system is as follows:

[0024] The 1st rod (30) is opened by means of the hydraulic line (80) inside the piston sleeve (20) to open extend-retract system, and it opens the 1st row (11) by extending the same from the main sleeve rail (10). Then the 2nd rod (40) opens and opens the 2nd row (12) by pushing the same through the 1st rail (11). During the opening of the 2nd rail (12), the extending chain or rope (50) on the 2nd pulley (120) engaged to the 3rd rail (13) opens the 3rd rail (13) by extending the same. Thus, the extension of the outrigger (not shown in the figures) is ensured.

[0025] During the closing of extend-retract system, the 1st rod (30) closes and closes the 1st row (11) by retracting the same to the main sleeve rail (10). Then the 2nd rod (40) closes and the 2nd row (12) by retracting the same inside the 1st rail (11). During the closing movement of the 2nd rail (12), the retracting chain or rope (60) that is on the 1st pulley (70) engaged to the 2nd rail (12) closes the 3rd rail (13) by retracting the same into the 2nd rail (12).

Claims

1. An extend-retract system that enables the outriggers to be extended and shortened used in telescopic boom or knuckle boom cranes, ***characterized in comprising***;

    - main sleeve rail (10) with a fixed structure,
    - 1st rail (11) that opens and closes by moving back and forth within the main sleeve rail (10),
    - 2nd rail (12) that opens and closes by moving back and forth within 1st rail (11),
    - 3rd rail (13) that opens and closes by moving back and forth within 2nd rail (12),
    - piston sleeve (20) with a fixed structure connected into the 2nd rail (12),
    - 1st rod (30), which is engaged into the main sleeve rail (10) and opens and closes the 1st rail (11) by entering into the piston sleeve (20),
    - 2nd rod (40), which is engaged into the 1st rail (11) and opens and closes the 2nd rail (12) by entering into the piston sleeve (20),
    - during the opening movement of the 2nd rail (12), the extending chain or rope (50) that opens the 3rd rail (13) by extending the same on the 2nd pulley (120) engaged to the 3rd rail (13),
    - during the closing movement of the 2nd rail (12), the retracting chain or rope (60) that opens the 3rd rail (13) by retracting the same on the 1st pulley(70) engaged to the 2nd rail (12),
    - organized chain (100) moving back and forth within the rail (110) connected to the 1st rail (11),
    - hydraulic line (80) that moves within the organized chain (100) and enables the movement of the 1st rod (30) and 2nd rod (40),
    - electric line (90) that moves within the organized chain (100) with the hydraulic line (80) and provides the electrical connections of the outrigger,
    - pipe (130) that conveys the hydraulic line (80) and electric line (90) to the end of the 3rd rail (13).

Amended claims in accordance with Rule 137(2) EPC.

1. An extend-retract system that enables the compact structure capable of horizontally extending with three segments that enables the outriggers to be extended and retracted by means of a single piston by opening and closing telescopically in a synchronous manner in telescopic boom or knuckle boom cranes, ***characterized by comprising***;

    - a main sleeve rail (10) with a fixed structure,
    - a 1st rail (11) that is configured to open and close by moving back and forth within the main sleeve rail (10),
    - a 2nd rail (12) that is configured to open and close by moving back and forth within the 1st rail (11),
    - a 3rd rail (13) that is configured to open and close by moving back and forth within the 2nd rail (12),
    - a piston sleeve (20) with a fixed structure connected into the 2nd rail (12),
    - a 1st rod (30), which is engaged into the main sleeve rail (10) and which is configured to open and close the 1_{st} rail (11) by entering into the piston sleeve (20),
    - a 2nd rod (40), which is engaged into the 1st rail (11) and which is configured to enter into the piston sleeve (20) to open and close the 2nd rail (12)
    - a 2nd pulley (120
    - an extending chain or rope (50) that is configured to open the 3rd rail (13) by extending the same on the 2nd pulley (120) engaged to the 3rd rail (13),
    - a 1st pulley(70),
    - a retracting chain or rope (60) that opens the 3rd rail (13) by retracting the same on the 1st pulley(70) engaged to the 2nd rail (12),

- a rail (110),
- an organized chain (100) which is configured to moveed back and forth within the rail (110) connected to the 1st rail (11),
- a hydraulic line (80) that is configured to move within the organized chain (100) and enable the movement of the 1st rod (30) and 2nd rod (40),
- an electric line (90) that is configured to move within the organized chain (100) with the hydraulic line (80) and that is configured to provide the electrical connections of the outrigger,
- a pipe (130) that conveys the hydraulic line (80) and electric line (90) to the end of the 3rd rail (13).

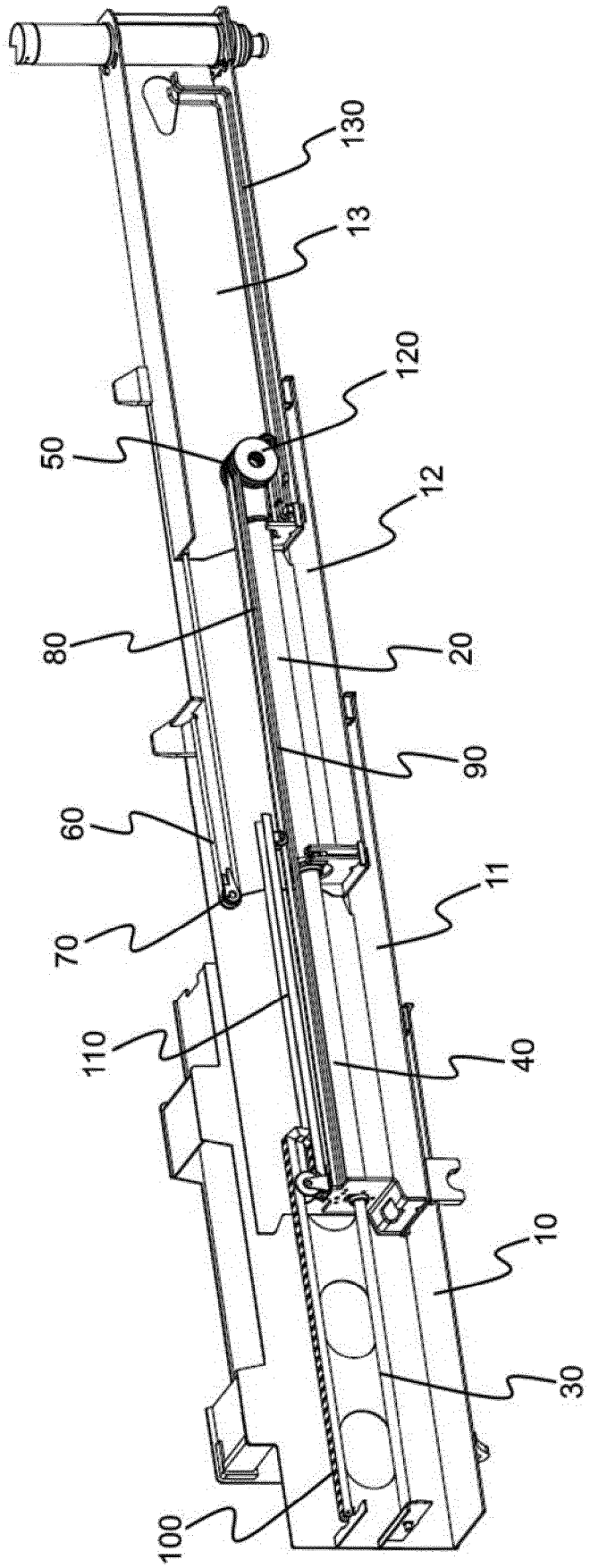

Figure 1a

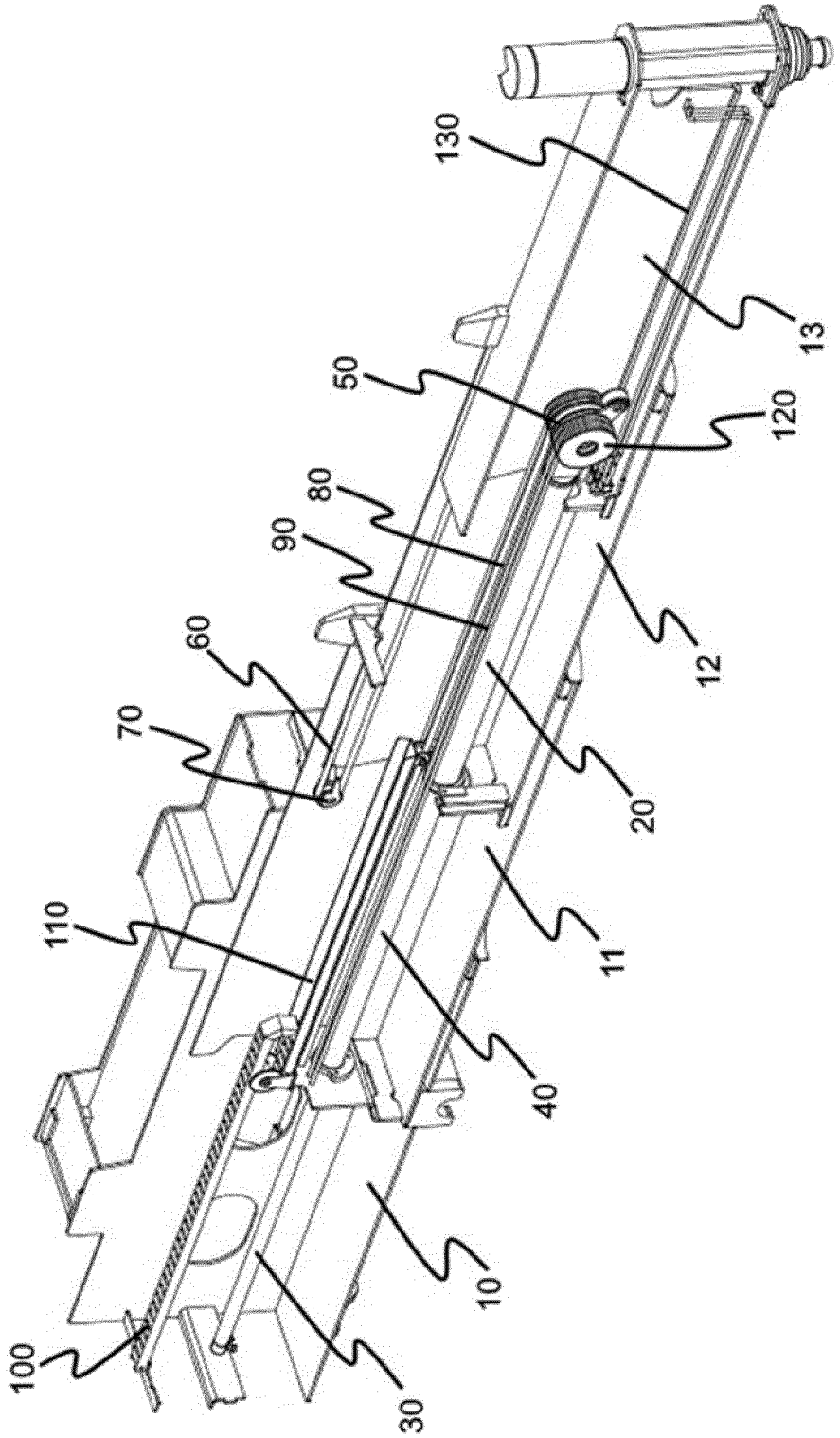

Figure 1b

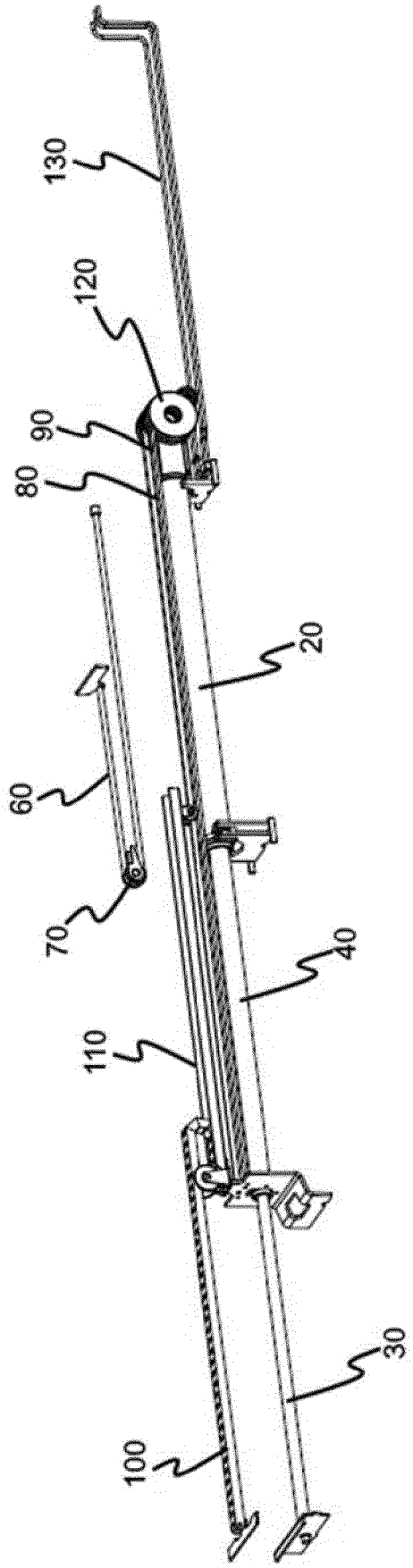

Figure 2

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EUROPEAN SEARCH REPORT

Application Number
EP 21 15 6523

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2008/142464 A1 (FUGEL DIETMAR [DE]) 19 June 2008 (2008-06-19) * abstract; figures 1-5 *	1	INV. B66C23/80
A	US 8 757 663 B1 (GLAZER JAMES M [US] ET AL) 24 June 2014 (2014-06-24) * abstract; figures 1-5 *	1	
A	CN 201 991 872 U (CHANGSHA ZOOMLION HEAVY IND) 28 September 2011 (2011-09-28) * abstract; figures 1-9 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

B66C
E02F
E04G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 July 2021	Rupcic, Zoran

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 21 15 6523

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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20-07-2021

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