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(54) **CONCRETE PUMP TRUCK AND BOOM DEVICE THEREOF**

(57) A boom device for a concrete pump truck include multiple booms (31, 32, 33, 34, 35) hinged with one another, anyone of which is activated to rotate relative to its adjacency by a drive member, and further includes at least one short boom (1) hinged with the end of the endmost boom by a first hinged bearing (2). A first drive member is mounted between the short boom (1) and the endmost boom. Bey the activation of the first drive member, the short boom (1) rotates about the first hinged bearing (2) relative to the endmost boom, so that the short boom (1) is hung downwards at the endmost boom when folded and the angle between the axis of the short boom (1) and the vertical plane is less than or equal to 45°. A concrete pump truck is also provided, which includes the boom device.

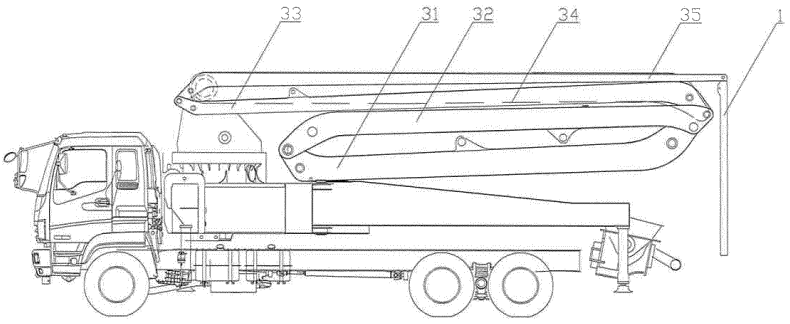

Fig. 3

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Description

[0001] The present application claims the benefit of priority to Chinese patent application No. 201010111843.0 titled "CONCRETE PUMP TRUCK AND BOOM DEVICE THEREOF", filed with the Chinese State Intellectual Property Office on February 05, 2010. The entire disclosure thereof is incorporated herein by reference.

TECHNICAL FIELD OF THE INVENTION

[0002] The present invention relates to the technical field of engineering machinery, in particular to a boom device for a concrete pump truck. The present application also relates to a concrete pump truck including the above boom device.

BACKGROUND OF THE INVENTION

[0003] With the high-speed development of China's economic construction, the market demands for construction engineering machineries, especially for concrete pump trucks, are increased gradually.

[0004] During the operation of the concrete pump truck, a conveying pipe fixed on a boom is used to convey the concrete to a desired location, and with the change of the conveying position, the boom is required to bring the conveying pipe to be unfolded, folded or rotated. Thus, the boom in a concrete pump device generally includes multiple segments and any one of the boom segments is foldable with respect to another.

[0005] Referring to Fig. 1 and Fig. 2, Fig. 1 is a schematic view of a boom device of a typical concrete pump truck when the boom device is unfolded, and Fig. 2 is a schematic view of the typical concrete pump truck when the boom device is folded.

[0006] In a typical concrete pump truck, the boom device includes a first boom 11, a second boom 12, a third boom 13, a fourth boom 14 and a fifth boom 15. Every two adjacent booms are hinged with each other via a hinged shaft. A folding oil cylinder 16 and a connecting rod 17 are mounted between every two adjacent booms to drive one boom to be folded relative to an adjacent boom so as to convey concrete to various positions with different heights; and in the meanwhile, when the concrete pump truck is required to be transported to another place, the booms are folded together to facilitate the transportation.

[0007] During the construction, concrete is conveyed to the desired location by extending the boom. Thus, increasing the total length of the boom becomes a long-term object pursued by the person in the art. At present, the folding methods of the boom generally include R-type, RZ-type or Z-type. Due to the limitation of the length and height of the concrete pump truck required by the transportation laws, when the boom has large number of segments, the boom folded by the above folding methods will have relatively long transportation length and relatively high transportation height, thereby limiting the further increasing of the total length of the boom.

[0008] Therefore, an urgent problem to be solved by the person skilled in the art is to improve the spatial arrangement of the truck body of the concrete pump truck and increase the total length of the boom while length and height of the folded boom meet the transportation requirement.

SUMMARY OF THE INVENTION

[0009] The object of the present application is to provide a boom device for a concrete pump truck, which can effectively increase the total length of the boom while the length and height of the folded boom device can meet the transportation requirements. Another object of the present application is to provide the concrete pump truck including the boom device, in which the spatial arrangement of the truck body is more reasonable.

[0010] For solving the above technical problems, the present application provides the boom device for the concrete pump truck. The boom device includes multiple booms hinged with one another. Any one of the multiple booms is operable to rotate relative to an adjacent boom under the action of a driving member. The boom device further includes at least one short boom, the short boom is hinged with a distal end of an endmost boom of the multiple booms via a first hinged shaft, and a first driving member is mounted between the short boom and the endmost boom. Under the action of the first driving member, the short boom rotates around the first hinged shaft relative to the endmost boom, so that when the short boom is folded, the short boom is located below the endmost and an angle between a axis of the short boom and the vertical plane is less than or equal to 45°.

[0011] Preferably, when the short boom is unfolded, an angle between the axis of the short boom and an axial extended line of the endmost boom is less than or equal to 45°.

[0012] Preferably, when the short boom is folded, the short boom is located in a rear portion of the concrete pump truck in the vertical direction.

[0013] Preferably, the first driving member is a telescopic oil cylinder mounted between the endmost boom and the short boom.

[0014] Preferably, one end of the telescopic oil cylinder is hinged with the endmost boom and the other end thereof is hinged with the short boom.

[0015] Preferably, two ends of the telescopic oil cylinder are hinged with the endmost boom and the short boom respectively via a hinged support.

[0016] Preferably, the first driving member includes the telescopic oil cylinder, a first connecting rod and a second connecting rod, first ends of the first and the second connecting rods are hinged with the endmost boom and the short boom respectively; a second end of the first connecting rod is hinged with a second end of the second

connecting rod, one end of the telescopic oil cylinder is fixed to the endmost boom or the short boom and the other end thereof is fixedly connected with the first connecting rod or the second connecting rod.

[0017] Preferably, the boom device further includes a positioning member, the positioning member is mounted between the endmost boom and the short boom so as to selectively fix the position of the short boom relative to the endmost boom.

[0018] Preferably, the short boom includes a first short boom and a second short boom, one end of the first short boom is hinged with the endmost boom via the first hinged shaft and a second end thereof is hinged with the second short boom via a second hinged shaft parallel to the first hinged shaft; the first driving member is mounted between the first short boom and the endmost boom to drive the first short boom and is operable to rotate downwards around the first hinged shaft relative to the endmost boom, a second driving member is mounted between the first short boom and the second short boom and is operable to drive the second short boom to rotate upwards around the second hinged shaft relative to the first short boom.

[0019] The present application also provides a concrete pump truck including any one of the boom device described above.

[0020] The boom device for the concrete pump truck according to the present application includes multiple booms hinged with one another and at least one short boom. The short boom is hinged with the distal end of the endmost boom via the first hinged shaft, the first driving member is mounted between the short boom and the endmost boom, and under the action of the first driving member the short boom rotates around the first hinged shaft relative to the endmost boom. When the boom device is in a working state, by means of the first driving member between the short boom and the endmost boom, the short boom is activated to rotate around the first hinged shaft in a direction away from the endmost boom. At this moment, an angle less than or equal to 45° is formed between the short boom and the axial extended line of the endmost boom. Therefore, the total length of the prior boom may be increased by an extended length of the short boom. When the boom device is required to be transferred or shifted, the short boom is driven by the first driving member to rotate downwards around the first hinged shaft in a direction approaching to the endmost boom such that the short boom is located below the endmost boom and the angle between the axis of the short boom and the vertical plane is less than or equal to 45°, thereby reducing the height and length of the folded boom device effectively and further realizing the object to effectively increase the total length of the boom while the length and height thereof meet the transportation requirements.

[0021] In a preferred embodiment, one end of the telescopic oil cylinder is hinged with the endmost boom and the other end thereof is hinged with the short boom. When a cylinder rod of the telescopic oil cylinder extends from a cylinder tube, the short boom is driven to be unfolded relative to the endmost boom. Since two ends of the telescopic oil cylinder are hinged with the short boom or the endmost boom, in the unfolding process of the short boom, the telescopic oil cylinder may rotate relative to the short boom and the endmost boom. In this way, when the cylinder rod of the telescopic oil cylinder extends to a certain position, the axis of the short boom forms an angle of 180° with respect to the axis of the endmost boom. At this moment, the short boom is fully unfolded to the largest working length which further increases an effective total length of the boom device. When the cylinder rod of the telescopic oil cylinder retracts back to the cylinder tube, owing to the hinged connection of two ends of the telescopic oil cylinder, i.e. two ends thereof may rotate in a certain angle range, when the telescopic oil cylinder retracts to a certain position, the axis of the short boom substantially lies in the vertical plane so as to reduce the total length of the boom device most efficiently when the short boom is folded.

[0022] In another preferred embodiment, the boom device may further include the positioning member. The positioning member is mounted between the endmost boom and the short boom so as to selectively fix the position between the endmost boom and the short boom. When the short boom is unfolded or folded to a proper angle, the positioning member is used to fix the position between the endmost boom and the short boom, thereby improving the reliability of the unfolding and the folding of the boom device.

BRIEF DESCRIPTION OF DRAWINGS

[0023] Figure 1 is a schematic view of a boom device of a typical concrete pump truck when the boom device is unfolded;

[0024] Figure 2 is a schematic view of the typical concrete pump truck when the boom device is folded;

[0025] Figure 3 is a schematic view of a concrete pump truck according to an embodiment of the present application when a boom device is folded;

[0026] Figure 4 is a partial schematic view of the boom device of the concrete pump truck according to one embodiment of the present application when the boom device is unfolded;

[0027] Figure 5 is an enlarged schematic view of part A in Fig. 4;

[0028] Figure 6 is a partial schematic view of the boom device of the concrete pump truck according to one embodiment of the present application when the boom device is folded; and

[0029] Figure 7 is an enlarged schematic view of part B in Fig. 6.

DETAILED DESCRIPTION OF THE INVENTION

[0030] The spirit of the present application is to provide

a boom device of a concrete pump truck, in which, when the boom device is folded, the total length of the boom device is increased effectively while the length and the height of the boom device meet the transportation requirements. Another spirit of the present application is to provide a concrete pump truck including the boom device, in which the spatial arrangement of the truck body is more reasonable.

[0031] For better understanding of the technical solution of the present application for the person skilled in the art, the present application will be further described in detail in conjunction with drawings and embodiments as follows.

[0032] Referring to Fig.3, Fig. 3 is a schematic view of a concrete pump truck according to an embodiment of the present application when a boom device is folded.

[0033] In one embodiment, the boom device for the concrete pump truck according to the present application includes multiple booms hinged with one another, wherein a first boom is hinged onto a platform of the concrete pump truck and may be erected from the platform of the concrete pump truck under the external force, and any one of the booms may be rotated relative to an adjacent boom under the action of a driving member so as to bring the endmost boom to a corresponding working height. At least one short boom 1 is hinged with a distal end of the endmost boom via a first hinged shaft 2, and a fist driving member is mounted between the short boom 1 and the endmost boom. The short boom 1 may rotate around the first hinged shaft 2 under the action of the first driving member.

[0034] When the short boom 1 is unfolded, it is required that an angle between an axis of the short boom 1 and an axial extended line of the endmost boom is less than or equal to 45°. Preferably, the angle may be 0°, i.e. the axis of the short boom 1 coincides with the axial extended line of the endmost boom, at this moment, the angle between the axis of the short boom and the axis of the endmost boom is 180°. When the short boom 1 is unfolded to the above state, an effective total length of the boom device is maximal, thereby increasing a total working length of the boom device remarkably.

[0035] In some working condition, the short boom 1 may be required to be unfolded in the horizontal direction, at this moment, there will be a specific angle between the short boom 1 and the endmost boom. When the short boom 1 is folded, the short boom 1 is located below the endmost boom and an angle between the axis of the short boom 1 and the vertical plane is less than or equal to 45°. Preferably, the angle may be 0°, i.e. the short boom 1 is located just in the vertical plane. In this way, the space occupied by the folded short boom 1 in the truck body length direction of the concrete pump truck is minimal, thereby effectively reducing the length space occupied by the short boom 1.

[0036] Apparently, the length of the short boom 1 should satisfy the condition that there should be no interference between the folded short boom 1 and the ground or other parts of the concrete pump truck when the short boom 1 is folded.

[0037] The angle between the unfolded short boom 1 and the axial extended line of the endmost boom is less than or equal to 45°, which means that the short boom 1 may be located on either side of two sides of the endmost boom and form an angle which is less than or equal to 45° with respect to the axial extended line of the endmost boom. Accordingly, the angle between the folded short boom 1 and the vertical plane is less than or equal to 45°, which means that the short boom 1 may be located on either side of two sides of the vertical plane and form an angle which is less than or equal to 45° with respect to the vertical plane.

[0038] The connection between the above booms can be a hinged connection via the hinged shaft in the vertical plane or a hinged connection via the hinged shaft in the horizontal plane. Of course, other foldable connection methods can also be used to realize the connection between adjacent booms. A driving member is mounted between adjacent booms so as to drive any one of the booms to rotate relative to the adjacent boom. The driving member may be an oil cylinder or an oil cylinder and connecting rod assembly, and may also adopt other regular driving means in the art.

[0039] The above booms and the short boom 1 may be of hollow steel frame structure. Since the boom device will experience great impact force during operation, the material of the booms and the short boom 1 should have enough rigidity and strength to ensure the working reliability. Apparently, the material of the booms and the short boom 1 is not limited to steel material, can also be other regular metal materials in the art; the booms and the short boom 1 are also not limited to the hollow structure, can also be solid steel parts or trusses, and etc.

[0040] The first hinged shaft 2 will experience a load during the operation of the boom device, thus the first hinged shaft 2 should have enough strength and rigidity to ensure a high reliability of the boom device during operation.

[0041] In detail, a pin shaft may be used to realize the connection between every two adjacent booms and between the endmost boom and the short boom 1.

[0042] Apparently, the booms and the short boom 1 are all installed thereon with a concrete conveying pipe through which mixed concrete is conveyed to a desired working location. The conveying pipe may be a flexible pipe made of abrasion resistant materials. During the operation of the concrete pump truck, concrete is continuously conveyed to the specific location through the conveying pipe, which will seriously abrade the inner wall of the conveying pipe. The conveying pipe made of abrasion resistant material has long service life, thereby saving the maintenance cost of the boom device.

[0043] The abrasion resistant materials may be rubber material, which has low cost and stable working performance. Of course, the abrasion resistant materials are not limited to rubber. Any abrasion resistant materials with

certain degree of flexibility and being capable of bending to some extent can be adopted as the material of the conveying pipe.

[0044] The conveying pipe may be of integral structure, i.e. the conveying pipe installed on the booms is the same conveying pipe with a large length instead of multiple conveying pipes connected by joints, thereby avoiding the problem that the conveying pipes may be disjointed during the operation and further improving the working reliability of the boom device.

[0045] When the boom device is in a working state, by means of the first driving member between the short boom 1 and the endmost boom, the short boom 1 is activated to rotate around the first hinged shaft 2 in a direction away from the endmost boom, at this moment, an angle less than or equal to 45° is formed between the short boom 1 and the axial extended line of the endmost boom. Therefore, the total length of the prior boom device is increased by an extended length of the short boom. When the boom device is required to be transferred or shifted, the short boom is driven by the first driving member to rotate around the first hinged shaft 2 in a direction approaching to the endmost boom, such that the short boom 1 is located below the endmost boom and the angle between the axis of the short boom 1 and the vertical plane is less than or equal to 45°, thereby reducing the height and length of the folded boom device effectively and further realizing the object to effectively increase the total length of the boom while the length and height thereof meet the transportation requirements.

[0046] The boom device may specifically include a first boom 31, a second boom 32, a third boom 33, a third boom 34 and a fifth boom 35 which are hinged with each other in this order. An distal end of the fifth boom 35 is hinged with the short boom 1 via the first hinged shaft 2. Here, the above mentioned endmost boom may be the fifth boom 35, and all structural properties of the above mentioned endmost boom are applicable to the fifth boom 35. Since this boom device includes five booms, the total length of the boom is basically in a limit state. In this state, the short boom 1 is hinged with the distal end of the fifth boom 35 via the first hinged shaft 2, thereby further increasing the total extended length of the boom device which has a great practical significance.

[0047] Apparently, the boom device according to the present application is not limited to include five booms. According to the operating requirement during the practical work and the technical level of manufacturing, the number of the boom can be less than five segments. The number of the boom in the boom device should not be limited in this present application.

[0048] Referring to Figs. 4-7, Fig. 4 is the partial schematic view of the boom device of the concrete pump truck according to one embodiment of the present application when the boom device is unfolded. Fig. 5 is the enlarged schematic view of part A in Fig. 4. Fig. 6 is the partial schematic view of the boom device of the concrete pump truck according to one embodiment of the present application when the boom device is folded. Figure 7 is the enlarged schematic view of part B in Fig. 6.

[0049] In another embodiment, taking the boom device with five booms as an example, the first driving member is a telescopic oil cylinder 4 mounted between the fifth boom 35 and the short boom 1. As a regular drive device in the art, the oil cylinder has a stable power output and a low cost.

[0050] One end of the telescopic oil cylinder 4 is hinged with the fifth boom 35 and the other end thereof is hinged with the short boom 1. When a cylinder rod 42 of the telescopic oil cylinder 4 extends from a cylinder tube 41, the short boom 1 is driven to be unfolded relative to the fifth boom 35. Since two ends of the telescopic oil cylinder 4 are hinged with the short boom 1 or the fifth boom 35, in the unfolding process of the short boom 1, the telescopic oil cylinder 4 may rotate relative to the short boom 1 and the fifth boom 35. In this way, when the cylinder rod 42 of the telescopic oil cylinder 4 extends to a certain position, the axis of the short boom 1 may form an angle of 180° with respect to the axis of the fifth boom 35, and at this moment the short boom 1 is fully unfolded to the largest working length which further increases the effective total length of the boom device. When the cylinder rod 42 of the telescopic oil cylinder 4 retracts back to the cylinder tube 41, due to the hinged connection of two ends of the telescopic oil cylinder 4, i.e. two ends thereof may rotate in a certain angle range, when the telescopic oil cylinder 4 retracts to a certain position, the axis of the short boom 1 may substantially lie in the vertical plane so as to reduce the total length of the folded boom device most efficiently when the short boom 1 is folded.

[0051] The telescopic oil cylinder 4 may hinged with the short boom 1 via the cylinder rod 42 and hinged with the fifth boom 35 via the cylinder tube 41; or may hinged with the fifth boom 35 via the cylinder rod 42 and hinged with the short boom 1 via the cylinder tube 41.

[0052] The cylinder rod 42 and the cylinder tube 41 of the telescopic oil cylinder 4 may be hinged with the short boom 1 and the fifth boom 35 respectively via hinged supports 5 mounted on the short boom 1 and the fifth boom 35 so as to improve the assembling reliability and simplify the assembling process.

[0053] The telescopic oil cylinder 4 may hinged with the short boom 1 and the fifth boom 35 via a link mechanism. In detail, the link mechanism may include a first connecting rod and a second connecting rod. One end of the first connecting rod is hinged with the short boom 1, and the other end thereof is hinged with one end of the second connecting rod. The other end of the second connecting rod is hinged with the fifth boom 35.

[0054] The short boom 1 rotates relative to the fifth boom 35 under the combined action of the telescopic oil cylinder 4 and the link mechanism. Owing to the stable power transmission of the link mechanism and the larger power transmitted by the telescopic oil cylinder 4, the working reliability of the boom device is ensured. The driving member may further include a hydraulic motor.

An output shaft of the hydraulic motor is connected with the first hinged shaft 2 via a coupling, and the first hinged shaft 2 is fixed to the short boom 1. When the hydraulic motor is working, the output shaft thereof transmits power to the first hinged shaft 2 via the coupling and then drives the short boom 1 to rotate via the first hinged shaft 2. This structure is more compact and occupies small space.

[0055] The boom device according to the present application may further include a positioning member mounted between the fifth boom 35 and the short boom 1 so as to selectively fix the relative position between the short boom 1 and the fifth boom 35.

[0056] The positioning member is not limited to be mounted between the fifth boom 35 and the short boom 1, theoretically may also be mounted on a proper position on the fifth boom 35 or a proper position on the short boom 1.

[0057] Further improvement may be made to the boom device according to the present application.

[0058] In another embodiment, the short boom 1 according to the present application may further include a first short boom and a second short boom. One end of the first short boom is hinged with the fifth boom 35 via the first hinged shaft 2 and a second end thereof is hinged with the second short boom via a second hinged shaft substantially paralleled to the first hinged shaft 2. The first driving member is mounted between the first short boom and the endmost boom to drive the first short boom to rotate downwards around the first hinged shaft 2. A second driving member is mounted between the first short boom and the second short boom to drive the second short boom to rotate upwards around the second hinged shaft relative to the first short boom.

[0059] Apparently, when the first short boom and the second short boom are folded, the first short boom and the second short boom are both located below the endmost boom.

[0060] The short boom is designed as two parts which are rotatably hinged with each other, thereby further increasing the effective total length of the boom device while it is ensured that the folded height thereof meets the requirements.

[0061] Theoretically, provided that the height and length of the folded boom device meet the requirements, the short boom 1 may also include multiple segments hinged with each other.

[0062] The second driving member may be an oil cylinder with two ends hinged with the first short boom and the second short boom respectively. Apparently, the second driving member is not limited to be the oil cylinder, the concrete form of the second driving member should not be limited in the present description as long as it can enable the second short boom to rotate relative to the first short boom.

[0063] Besides the above boom device, the present application further provides a concrete pump truck including the above boom device. Regarding structure of other parts of the concrete pump truck, please refer to the prior art, which will not be described herein.

[0064] The concrete pump truck and the boom device thereof according to the present application are described in detail hereinbefore. In the present description, specific examples are used to describe the principle and the embodiments of the present application. The above description of the embodiments is only used for better understanding of the method and the spirit of the present application, it should be noted that, for the person skilled in the art, any modifications and improvements may be made to the present application without departing from the principle of the present application, and these modifications and improvements should be deemed to fall into the protection scope of the present application.

Claims

1. A boom device for a concrete pump truck, comprising multiple booms hinged with one another, any one of the multiple booms being operable to rotate relative to an adjacent boom under the action of a driving member, **characterized in that**,
the boom device further comprises at least one short boom (1), the short boom (1) is hinged with a distal end of an endmost boom of the multiple booms via a first hinged shaft (2), and a first driving member is mounted between the short boom (1) and the endmost boom; the short boom (1) is operable to rotate around the first hinged shaft (2) relative to the endmost boom under the action of the first driving member, so that when the short boom (1) is folded, the short boom (1) is located below the endmost boom and an angle between an axis of the short boom (1) and the vertical plane is less than or equal to 45°.

2. The boom device for the concrete pump truck according to claim 1, wherein when the short boom is unfolded, an angle between the axis of the short boom and an axial extended line of the endmost boom is less than or equal to 45°.

3. The boom device for the concrete pump truck according to claim 2, wherein, when the short boom (1) is folded, the short boom (1) is located in a rear portion of the concrete pump truck in a vertical direction.

4. The boom device for the concrete pump truck according to any one of claims 1-3, wherein, the first driving member is a telescopic oil cylinder (4) mounted between the endmost boom and the short boom (1).

5. The boom device for the concrete pump truck according to claim 4, wherein, one end of the telescopic oil cylinder (4) is hinged with the endmost boom and the other end thereof is hinged with the short boom

(1).

6. The boom device for the concrete pump truck according to claim 5, wherein, two ends of the telescopic oil cylinder (4) are hinged with the endmost boom and the short boom (1) respectively via a hinged support (5).

7. The boom device for the concrete pump truck according to any one of claims 1-3, wherein, the first driving member comprises a telescopic oil cylinder (4), a first connecting rod and a second connecting rod, first ends of the first and the second connecting rods are hinged with the endmost boom and the short boom (1) respectively; a second end of the first connecting rod is hinged with a second end of the second connecting rod, one end of the telescopic oil cylinder (4) is fixed to the endmost boom or the short boom (1) and the other end thereof is fixedly connected with the first connecting rod or the second connecting rod.

8. The boom device for the concrete pump truck according to any one of claims 1-3, wherein, the boom device further comprises a positioning member, the positioning member is mounted between the endmost boom and the short boom (1) so as to selectively fix the position of the short boom (1) relative to the endmost boom.

9. The boom device for the concrete pump truck according to any one of claims 1-3, wherein, the short boom (1) comprises a first short boom and a second short boom, one end of the first short boom is hinged with the endmost boom via the first hinged shaft (2) and a second end thereof is hinged with the second short boom via a second hinged shaft parallel to the first hinged shaft (2); the first driving member is mounted between the first short boom and the endmost boom and is operable to drive the first short boom to rotate downwards around the first hinged shaft (2) relative to the endmost boom, a second driving member is mounted between the first short boom and the second short boom and is operable to drive the second short boom to rotate upwards around the second hinged shaft relative to the first short boom.

10. A concrete pump truck **characterized by** comprising the boom device according to any one of claims 1-9.

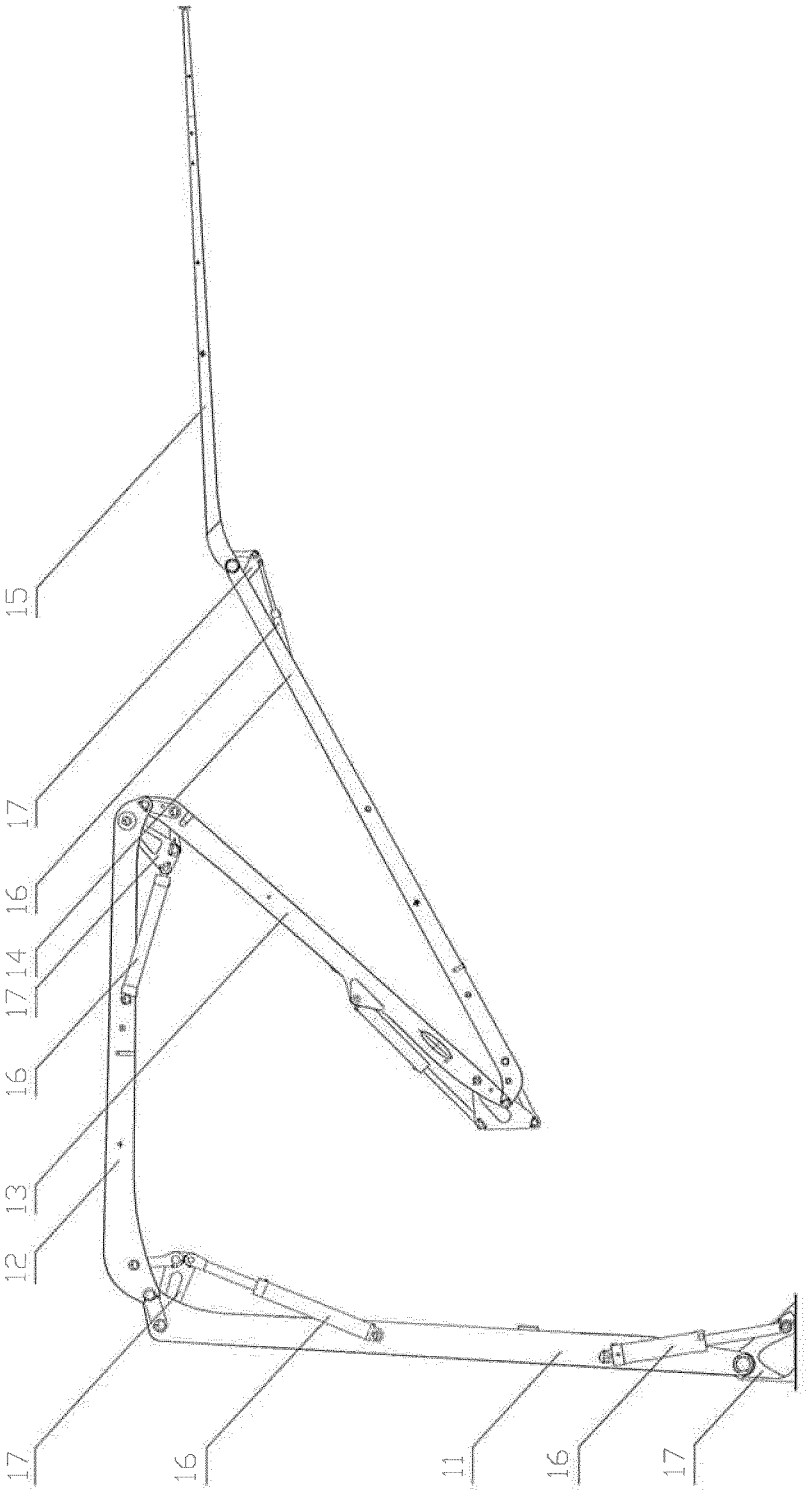

Fig. 1

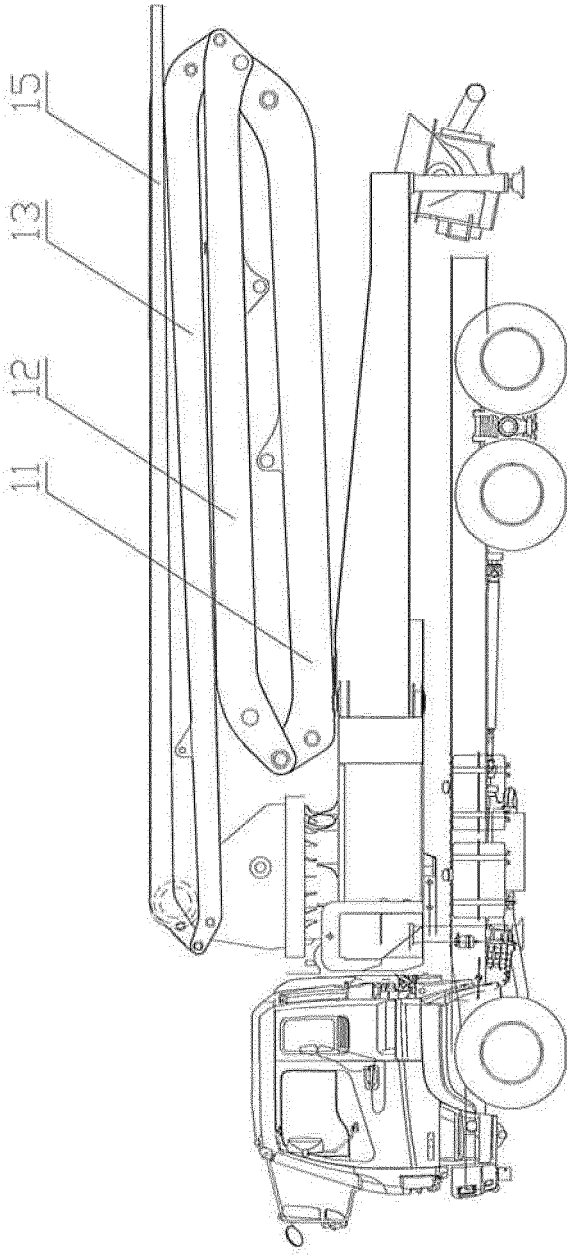

Fig. 2

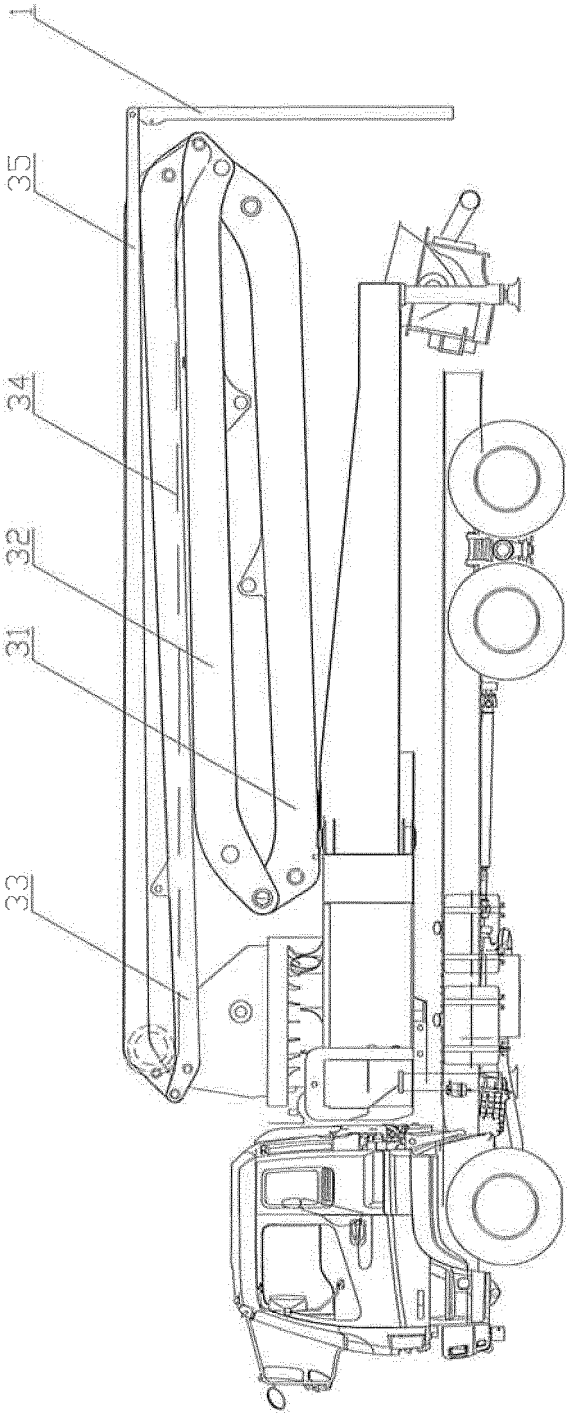

Fig. 3

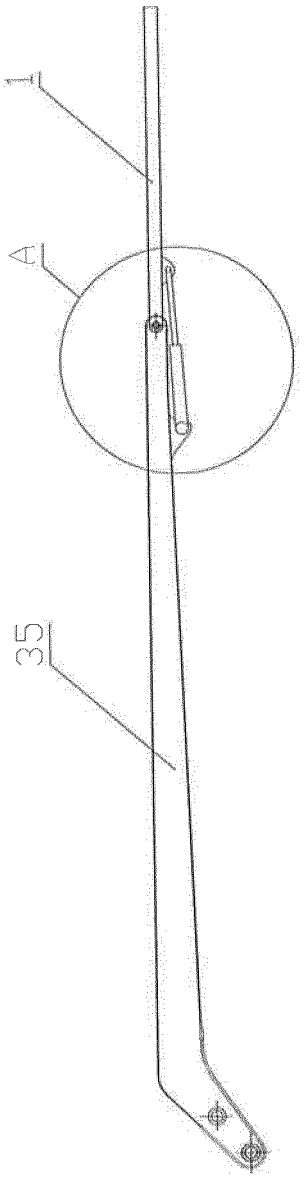

Fig. 4

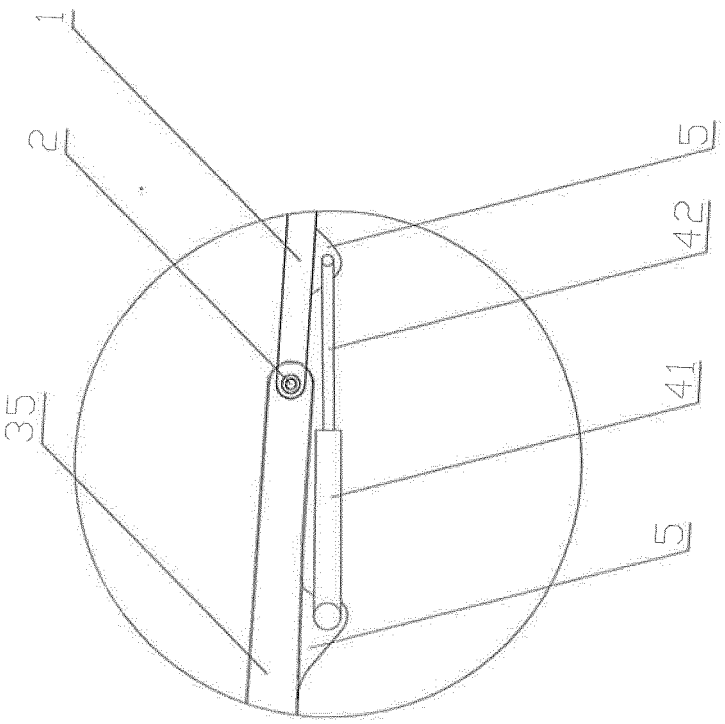

Fig. 5

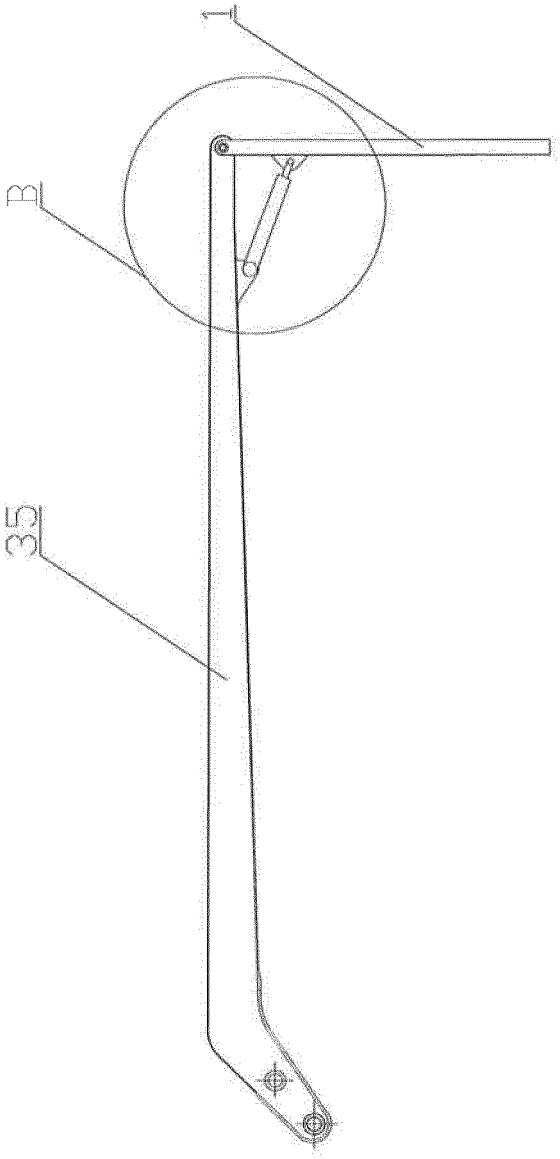

Fig. 6

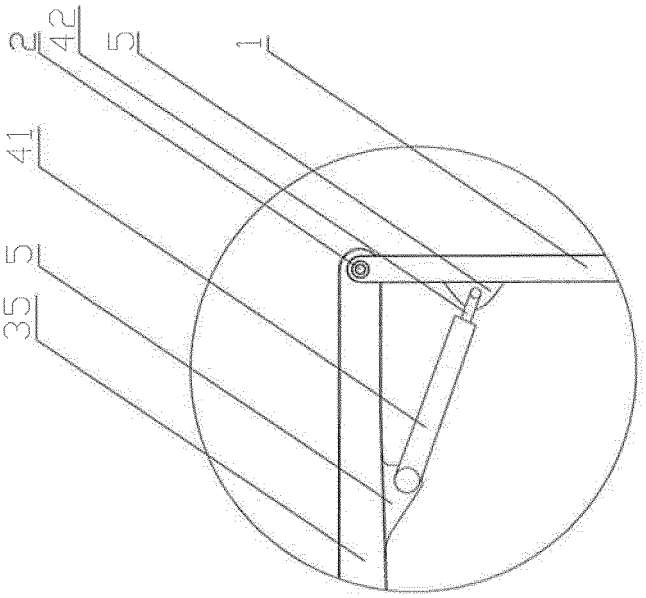

Fig. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2010/073749

A. CLASSIFICATION OF SUBJECT MATTER

E04G21/02 (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)

IPC: E04G

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

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

CNPAT, CNKI, EPODOC, WPI: concrete, hydraulic, boom, pump, angle

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN2898190Y (LIANG Yi), 09 May 2007 (09.05.2007), fig. 1	1-10
A	CN101292072A (PUTZMEISTER CONCRETE PUMPS), 22 Oct. 2008 (22.10.2008), see page 6, lines 9-27 and figs. 1, 2a-2d and 6a-6c	1-10
A	US3976092A (FRIEDRICH WILHELM SCHWING GMBH), 24 Aug. 1976 (24.08.1976), the whole document	1-10
A	US6786233B1 (SCHWING AMERICA, INC.), 07 Sep. 2004 (07.09.2004), the whole document	1-10

☐ 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

"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

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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
06 Sep. 2010(06.09.2010)	**18 Nov. 2010 (18.11.2010)**
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer GUO Weijuan Telephone No. (86-10)62084877

Form PCT/ISA /210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2010/073749

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
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		US2006257604A	2006-11-16

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REFERENCES CITED IN THE DESCRIPTION

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