(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 095 084 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
**30.11.2022 Bulletin 2022/48**

(21) Application number: **21920565.5**

(22) Date of filing: **02.08.2021**

(51) International Patent Classification (IPC):
***B66C 23/00*** *(2006.01)* ***B66F 11/00*** *(2006.01)*

(86) International application number:
**PCT/CN2021/110097**

(87) International publication number:
**WO 2022/156184 (28.07.2022 Gazette 2022/30)**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
Designated Extension States:
**BA ME**
Designated Validation States:
**KH MA MD TN**

(30) Priority: **29.07.2021 CN 202110862235**

(71) Applicant: **Jiangsu XCMG Construction Machinery Research Institute Ltd.**
**Xuzhou, Jiangsu 221004 (CN)**

(72) Inventors:
- **MA, Hongfeng**
  **Xuzhou, Jiangsu 221004 (CN)**
- **ZHAO, Jian**
  **Xuzhou, Jiangsu 221004 (CN)**
- **LI, Xueling**
  **Xuzhou, Jiangsu 221004 (CN)**

(74) Representative: **Hauck Patentanwaltspartnerschaft mbB**
**Postfach 11 31 53**
**20431 Hamburg (DE)**

# (54) AERIAL WORK PLATFORM

(57) The present disclosure relates to an aerial work vehicle, comprising a vehicle body (10), a first leg (20), a second leg (30) and a drive device (40), the first leg (20) and the second leg (30) being respectively rotatably connected with the vehicle body (10), the drive device (40) being movably mounted on the vehicle body (10), the drive device (40) being connected between the first leg (20) and the second leg (30) and configured to drive the first leg (20) and the second leg (30) to rotate away from a midline of the vehicle body (10) or rotate back towards the midline of the vehicle body (10). The present disclosure can effectively reduce the weight of the legs and improve the adaptability of the legs to different working conditions.

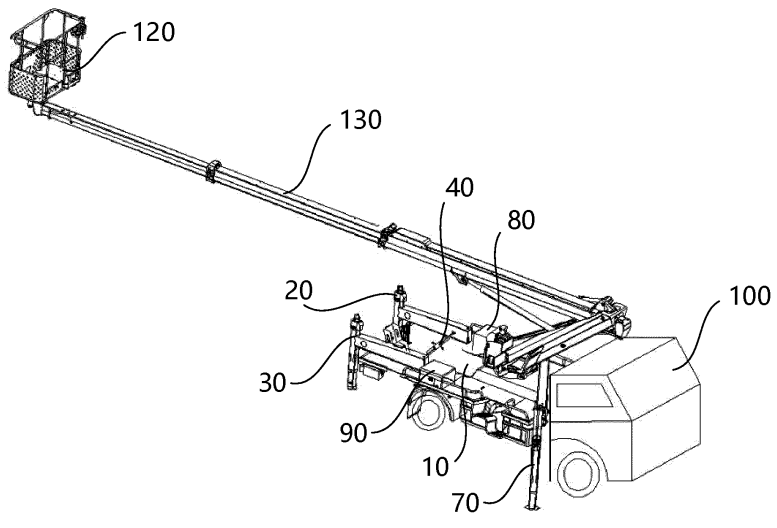


Fig. 1

EP 4 095 084 A1

## Description

**[0001]** The present application is based on and claims priority to Chinese patent application No. 202110862235.1, filed on July 29, 2021, the disclosure of which is hereby incorporated in its entirety.

## Field of the Invention

**[0002]** The present disclosure relates to the technical field of engineering machinery, and particularly to an aerial work vehicle.

## Background of the Invention

**[0003]** An aerial work vehicle (aerial vehicle for short) is a special engineering vehicle for transporting working persons and work equipment to a specified height for operation. Legs of the aerial work vehicle are key components for leveling and ensuring the stability of the whole vehicle.

**[0004]** At present, in the related art, all the four legs of the aerial work vehicle are telescopic legs with a two-section arm, so the overall weight of the legs is large, and the problem of partial crushing and destabilization of the arms is liable to occur; moreover, the legs are fixed legs, and have low adaptability to working conditions.

**[0005]** It is to be noted that the information in the background section of the present disclosure is only intended to enhance understanding of the general background of the present disclosure, and should not be considered as an admission or any form of implication that the information constitutes the prior art well known to those skilled in the art.

## Summary of the Invention

**[0006]** An embodiment of the present disclosure provides an aerial work vehicle that can effectively reduce the weight of legs.

**[0007]** According to an aspect of the present disclosure, an aerial work vehicle is provided, including:

a vehicle body;

a first leg and a second leg respectively rotatably connected with the vehicle body; and

a drive device movably mounted on the vehicle body, the drive device being connected between the first leg and the second leg and configured to drive the first leg and the second leg to rotate away from a midline of the vehicle body or rotate back towards the midline of the vehicle body.

**[0008]** In some embodiments, the aerial work vehicle further includes a supporting rod mounted on the vehicle body, the drive device including a drive body which is provided with a mounting hole, the drive body being slidably mounted on the supporting rod through the mounting hole.

**[0009]** In some embodiments, the aerial work vehicle further includes a bearing, which is provided between the mounting hole of the drive body and the supporting rod.

**[0010]** In some embodiments, the drive device includes a cylinder, and a first piston rod and a second piston rod provided in the cylinder and projecting from two ends of the cylinder, respectively, the first piston rod being rotatably connected with the first leg, and the second piston rod being rotatably connected with the second leg.

**[0011]** In some embodiments, the aerial work vehicle further includes a first connecting shaft, a first lug plate and a second lug plate provided on a side of the first leg, the first lug plate being provided with a first connecting hole, the second lug plate being provided with a second connecting hole, and the first piston rod being provided with a third connecting hole, the first connecting shaft passing through the first connecting hole, the third connecting hole and the second connecting hole to connect the first piston rod and the first leg.

**[0012]** In some embodiments, the aerial work vehicle further includes a second connecting shaft, and a third lug plate and a fourth lug plate provided on a side of the second leg, the third lug plate provided being with a third connecting hole, the fourth lug plate being provided with a fourth connecting hole, and the second piston rod being provided with a fifth connecting hole, the second connecting shaft passing through the third connecting hole, the fifth connecting hole and the fourth connecting hole to connect the second piston rod and the second leg.

**[0013]** In some embodiments, the drive device is configured to drive the first leg and the second leg to rotate away from the midline of the vehicle body to a position be angled by a preset angle relative to the midline of the vehicle body, the preset angle being 0° to 90°.

**[0014]** In some embodiments, the drive device is configured to drive the first leg and the second leg to rotate back to positions parallel to the midline of the vehicle body.

**[0015]** In some embodiments, the first leg includes a first end close to the vehicle body and a second end away from the vehicle body, the first end having a larger cross-sectional area than the second end.

**[0016]** In some embodiments, the first leg has a cross-sectional area that gradually decreases from the first end to the second end.

**[0017]** In some embodiments, the aerial work vehicle further includes a third leg and a fourth leg, the first leg and the second leg being both provided at a rear portion of the vehicle body, the third leg and the fourth leg being both provided at a front portion of the vehicle body, the third leg and the fourth leg each including a retractable leg structure.

**[0018]** In some embodiments, the aerial work vehicle further includes a tool box, an under body control box and a cab, the tool box being provided between the first leg and the cab, the under body control box being pro-

vided between the second leg and the cab.

**[0019]** Based on the above technical solution, in the embodiment of the present disclosure, the first leg and the second leg are swung relative to the vehicle body by the drive device to achieve the purpose of the first leg and the second leg rotating away from the midline of the vehicle body or rotating back towards the midline. With this swing-type structure, there is no need to provide a retractable two-section arm, so the weight of the legs can be greatly reduced, and the problem of the legs being crushed and destabilized is reduced; moreover, the sizes of the stretching angles of the swing-type legs can be adjusted according to needs of the working conditions, so as to better adapt to the needs of the working conditions, improve the adaptability of the legs and achieve higher safety.

## Brief Description of the Drawings

**[0020]** To describe technical solutions more clearly in the embodiments of the present disclosure or in the prior art, a brief introduction to the drawings for use in description of the embodiments or the prior art will be given below. Obviously, the drawings in the following description only illustrate the embodiments of the present disclosure, and other drawings may also be obtained by those of ordinary skill in the art based on the drawings provided herein without creative work.

Fig. 1 is a schematic structural diagram of an embodiment of an aerial work vehicle of the present disclosure.

Fig. 2 is a top view of an embodiment of the aerial work vehicle of the present disclosure in which a first leg and a second leg are in a drawn-back state.

Fig. 3 is a top view of an embodiment of the aerial work vehicle of the present invention in which the first leg and the second leg are in a splayed state.

Fig. 4 shows a front view of the first leg in an embodiment of the aerial work vehicle of the present invention.

Fig. 5 shows a top view of the first leg in an embodiment of the aerial work vehicle of the present invention.

Fig. 6 is a top view of the drive device in an embodiment of the aerial work vehicle of the present invention.

Fig. 7 is a side view of the drive device in an embodiment of the aerial work vehicle of the present invention.

Fig. 8 is a schematic structural diagram of a third leg in an embodiment of the aerial work vehicle of the present invention.

Reference numerals:

**[0021]** 10. Vehicle body; 20. First leg; 21. First leg portion; 22. Second leg portion; 23. First lug plate; 24. Second lug plate; 30. Second leg; 40. Drive device; 41. Cylinder; 42. First piston rod; 43. Second piston rod; 44. First rod cavity; 45. Second rod cavity; 46. Rodless cavity; 50. Supporting rod; 51. First supporting seat 52. Second supporting seat; 60. Third leg; 61. Fifth leg portion; 611. Movable leg; 612. Fixed leg; 62. Sixth leg portion; 70. Fourth leg; 80. Tool box; 90.Under body control box; 100. Cab; 110. Slewing table; 120. Operation platform; 130. Telescopic arm.

## Detailed Description of the Embodiments

**[0022]** The technical solutions in the embodiments will be described clearly and completely below in conjunction with the accompanying drawings in the embodiments of the present disclosure. Obviously, the described embodiments are only a part of the embodiments of the present disclosure, and not all the embodiments. Based on the embodiments of the present disclosure, all other embodiments obtained by those of ordinary skill in the art without creative work shall fall within the protection scope of the present disclosure.

**[0023]** In description of the present disclosure, it should be understood that orientation or position relations denoted by the terms "center", "transverse", "longitudinal", "front", "rear", "left", "right", "upper", "lower", "vertical", "horizontal", "top", "bottom", "inner", "outer" and the like are orientation or position relations illustrated based on the drawings, are merely for the convenience of describing the present disclosure and simplifying description, instead of indicating or implying the denoted devices or elements must have specific orientations or be constructed and operated in specific orientations, and thus the terms cannot be understood as limiting the protection scope of the present disclosure.

**[0024]** As shown in Figs. 1-3, in some embodiments of an aerial work vehicle provided in the present disclosure, the aerial work vehicle includes a vehicle body 10, a first leg 20, a second leg 30 and a drive device 40, the first leg 20 and the second leg 30 being respectively rotatably connected with the vehicle body 10, the drive device 40 being movably mounted on the vehicle body 10, the drive device 40 being connected between the first leg 20 and the second leg 30 and configured to drive the first leg 20 and the second leg 30 to rotate away from a midline of the vehicle body 10 or rotate back toward the midline of the vehicle body 10.

**[0025]** In the above embodiment, the first leg 20 and the second leg 30 are swung relative to the vehicle body 10 by the drive device 40 to achieve the purpose of the first leg 20 and the second leg 30 rotating away from a midline of the vehicle body 10 or rotating back toward the midline. With this swing-type structure, there is no need to provide a retractable two-section arm, so the weight of the legs can be greatly reduced, and the problem of the legs being crushed and destabilized is reduced; moreover, the sizes of the stretching angles of the swinging legs can be adjusted according to needs of

the working conditions, so as to better adapt to the needs of the working conditions, improve the adaptability of the legs and achieve higher safety.

**[0026]** In addition, in the embodiment of the present disclosure, the drive device simultaneously drives the first leg 20 and the second leg 30 to move, i.e., the first leg 20 and the second leg 30 are driven by the same drive device instead of being driven respectively by independent drive devices, so the number of drive device can be reduced to save costs, while being beneficial to reducing the overall weight of the operation vehicle.

**[0027]** Moreover, the first leg 20 and the second leg 30 splay or draw back under the drive of the drive device, and thus do not need to stretch out or retract along a horizontal direction, so there is no need to provide a horizontal cylinder, and no need to provide a fixed leg box and movable legs capable of stretching out relative to the fixed leg box, thus allowing a great reduction of the total weight of the legs, thereby reducing the overall weight of the aerial work vehicle. Without the fixed leg box, some space may also be freed for the vehicle body 10 to optimize the arrangement of components on the vehicle body 10.

**[0028]** As shown in Fig. 2, in a non-working state, the first leg 20 and the second leg 30 are in a drawn-back state, and the first leg 20 and the second leg 30 rotate back to directions parallel to the midline of the vehicle body 10, and also parallel to a driving direction of the vehicle body 10, such that when the vehicle body 10 is traveling, the first leg 20 and the second leg 30 do not interfere with other items to avoid collision.

**[0029]** As shown in Fig. 3, under the action of the drive device 40, the first leg 20 and the second leg 30 rotate in directions away from each other so that the first leg 20 and the second leg 30 rotate away from the midline of the vehicle body 10; and the first leg 20 and the second leg 30 splay to a preset angle according to the size of an operation site for the aerial work vehicle, and the first leg 20 and the second leg 30 enter a splayed state (also a working state), so that the first leg 20 and the second leg 30 can stably support the vehicle body 10. At that point, an upper body of the aerial work vehicle can start working, and after the working of the upper body is completed, under the action of the drive device 40, the first leg 20 and the second leg 30 can rotate in directions of getting closer to each other so that the first leg 20 and the second leg 30 rotate back towards the midline of the vehicle body 10 until rotating back to positions where the first leg 20 and the second leg 30 are parallel to the midline of the vehicle body 10, i.e. returning to an initial state.

**[0030]** In some embodiments, the drive device 40 is configured to drive the first leg 20 and the second leg 30 to rotate away from the midline of the vehicle body 10 to a position be angled by a preset angle relative to the midline of the vehicle body 10, the preset angle being 0° to 90°.

**[0031]** In the related art, the legs adopt a fixed leg structure and the leg splaying angle is also fixed and cannot be adapted according to the actual working conditions. In the embodiment of the present disclosure, by controlling the drive device 40, the first leg 20 and the second leg 30 can be kept at a preset splaying angle to adapt to the needs of different working conditions. For example, in a relatively narrow site or an uneven site, the first leg 20 and the second leg 30 may be splayed to a suitable angle according to specific needs, wherein the value of the splaying angle ranges from 0° to 90°, such as being 10°, 20°, 30°, 40°, 50°, 60°, 70 °, 80° or the like.

**[0032]** In some embodiments, the drive device 40 is configured to drive the first leg 20 and the second leg 30 to rotate back to positions parallel to the midline of the vehicle body 10. The positions can effectively ensure that the first leg 20 and the second leg 30 do not interfere or collide with other items during movement of the vehicle body 10, to improve the traveling safety of the vehicle body.

**[0033]** In some embodiments, the first leg 20 includes a first end close to the vehicle body 10 and a second end away from the vehicle body 10, the first end having a larger cross-sectional area than the second end. That is, the first end is thicker and the second end is thinner. Such configuration can increase the structural strength of the first end close to the vehicle body 10, increase the cross sectional moment of inertia of the first end of the first leg 20, and greatly improve the load-bearing capacity of the first leg 20, and can reduce the total weight of the first leg 20 as much as possible while meeting the structural strength requirement.

**[0034]** In some embodiments, the first leg 20 has a cross-sectional area that gradually decreases from the first end to the second end.

**[0035]** As shown in Fig. 4, the first leg 20 includes a first leg portion 21 and a second leg portion 22, the first leg portion 21 being rotatably connected with the vehicle body 10, the second leg portion 22 being connected with the first leg portion 21, and the second leg portion 22 being configured to be supported on the ground. The first leg portion 21 has a cross-sectional area that gradually decreases from the first end to the second end.

**[0036]** The second leg portion 22 adopts a telescopic leg structure, such that after the first leg 20 splays to a preset angle, an inner leg of the second leg portion 22 stretches out relative to an outer leg thereof, and a support foot at an end of the inner leg is supported on the ground to achieve stable support.

**[0037]** The structure of the second leg 30 may be the same as or different from the structure of the first leg 20.

**[0038]** For example, the second leg 30 includes a third leg portion and a fourth leg portion, the third leg portion being rotatably connected with the vehicle body 10, and the fourth leg portion being connected with the third leg portion and configured to be supported on the ground. The third leg portion has a cross-sectional area that gradually decreases from a first end towards a second end.

**[0039]** The fourth leg portion adopts a telescopic leg structure, such that after the second leg 30 splays to a

preset angle, an inner leg of the fourth leg portion stretches out relative to an outer leg thereof, and a support foot at an end of the inner leg is supported on the ground to achieve stable support.

**[0040]** In some embodiments, the aerial work vehicle further includes a supporting rod 50 mounted on the vehicle body 10, the drive device 40 including a drive body, which is provided with a mounting hole, the drive body being slidably mounted on the supporting rod 50 through the mounting hole.

**[0041]** By providing the supporting rod 50, the drive device 40 can be supported and the drive device 40 can slide along an extending direction of the supporting rod 50 to avoid the deflection of the drive device 40 in the process of driving the first leg 20 and the second leg 30 to swing.

**[0042]** The extending direction of the supporting rod 50 is parallel to the direction of the midline of the vehicle body 10, so that the drive device 40 can move in a direction parallel to the midline of the vehicle body 10 in the process of driving the first leg 20 and the second leg 30 to swing, so as to adapt to the displacement of the first leg 20 and the second leg 30 in a direction parallel to the midline of the vehicle body 10 during swinging thereof, and prevent the problem of breakage by tension at positions of the drive device 40 connected with the first leg 20 and the second leg 30, etc.

**[0043]** In addition, providing the supporting rod 50 can also prevent displacement of the drive device 40 in a direction perpendicular to the supporting rod 50, thereby avoiding deflection of the drive device 40, facilitating synchronization of the swinging of the first leg 20 and the second leg 30 and improving the control accuracy of the splaying angle.

**[0044]** In some embodiments, the aerial work vehicle further includes a bearing, which is provided between the mounting hole of the drive body and the supporting rod 50. By providing the bearing between the mounting hole of the drive body and the supporting rod 50, the relative movement between the drive device 40 and the supporting rod 50 can be smoother, to avoid relatively serious abrasion between the drive device 40 and the supporting rod 50 and effectively improve the service life of the drive device 40 and the supporting rod 50.

**[0045]** The bearing may be a linear sliding bearing to enable the drive device 40 to slide smoothly relative to the supporting rod 50.

**[0046]** As shown in Fig. 6, a first end of the supporting rod 50 is mounted on the vehicle body 10 by means of a first supporting seat 51, and a second end of the supporting rod 50 is mounted on the vehicle body 10 by means of a second supporting seat 52. The supporting rod 50 is fixed with respect to the vehicle body 10.

**[0047]** As shown in Fig. 7, a mounting block is provided at the underside of the drive body of the drive device 40, and the mounting block is provided with a mounting hole in which a bearing is mounted, and the supporting rod 50 is inserted into an inner hole of the bearing.

**[0048]** The drive device 40 may adopt an oil cylinder, air cylinder, electric motor or other structure.

**[0049]** In some embodiments, the drive device 40 includes a cylinder 41 (i.e., drive body), and a first piston rod 42 and a second piston rod 43 provided in the cylinder 41 and projecting from two ends of the cylinder 41, respectively, the first piston rod 42 being rotatably connected with the first leg 20, and the second piston rod 43 being rotatably connected with the second leg 30.

**[0050]** The internal space of the cylinder 41 is divided by the first piston rod 42 and the first piston rod 42 into a first rod cavity 44, a second rod cavity 45 and a rodless cavity 46, the rodless cavity 46 being located between the first rod cavity 44 and the second rod cavity 45. When the first rod cavity 44 and the second rod cavity 45 are connected with a high pressure end and the rodless cavity 46 is connected with a low pressure end, the first piston rod 42 and the first piston rod 42 retract and cause the first leg 20 and the second leg 30 to return to retracted positions; and when the first rod cavity 44 and the second rod cavity 45 are connected with the low pressure end and the rodless cavity 46 is connected with the high pressure end, the first piston rod 42 and the first piston rod 42 stretch out and cause the first leg 20 and the second leg 30 to splay.

**[0051]** In some embodiments, the aerial work vehicle further includes a first connecting shaft, a first lug plate 23 and a second lug plate 24 provided on a side of the first leg 20, the first lug plate being 23 being provided with a first connecting hole, the second lug plate 24 being provided with a second connecting hole, and the first piston rod 42 being provided with a third connecting hole, the first connecting shaft passing through the first connecting hole, the third connecting hole and the second connecting hole to connect the first piston rod 42 and the first leg 20.

**[0052]** As shown in Figs. 4 and 5, providing the first lug plate 23 and the second lug plate 24 can improve the reliability of the connection between the first piston rod 42 and the first leg 20.

**[0053]** In some embodiments, the aerial work vehicle further includes a second connecting shaft, and a third lug plate and a fourth lug plate provided on a side of the second leg 30, the third lug plate provided being with a third connecting hole, the fourth lug plate being provided with a fourth connecting hole, and the second piston rod 43 being provided with a fifth connecting hole, the second connecting shaft passing through the third connecting hole, the fifth connecting hole and the fourth connecting hole to connect the second piston rod 43 and the second leg 30.

**[0054]** Providing the third lug plate and the fourth lug plate can improve the reliability of the connection between the second piston rod 43 and the second leg 30.

**[0055]** In some embodiments, the aerial work vehicle further includes a third leg 60 and a fourth leg 70, the first leg 20 and the second leg 30 being both provided at a rear portion of the vehicle body 10, the third leg 60 and

the fourth leg 70 being both provided at a front portion of the vehicle body 10, the third leg 60 and the fourth leg 70 each including a retractable leg structure.

**[0056]** In the embodiment shown in Figs. 2 and 3, the third leg 60 and the fourth leg 70 are respectively located at the front left and right portions of the vehicle body 10, and the first leg 20 and the second leg 30 are located at the rear left and right portions of the vehicle body 10, respectively, and the four legs extend along left front, right front, left rear and right rear directions of the vehicle body 10, respectively, to achieve relatively stable support of the vehicle body 10.

**[0057]** The third leg 60 and the fourth leg 70 both adopt a telescopic leg structure.

**[0058]** As shown in Fig. 8, the third leg 60 includes a fifth leg portion 61 and a sixth leg portion 62, the fifth leg portion 61 being connected with the vehicle body 10, and the sixth leg portion 62 being connected with the fifth leg portion 61 and supported on the ground. The fifth leg portion 61 includes a movable leg 611 and a fixed leg 612, wherein the fixed leg 612 is fixedly connected with the vehicle body 10, the fixed leg 612 having a box-type structure, and the fixed leg 612 having an internal cavity; and the movable leg 611 is inserted in the internal cavity of the fixed leg 612, and the movable leg 611 is capable of stretching out or retracting with respect to the fixed leg 612. When the movable leg 611 stretches out, the fifth leg portion 61 is in a splayed state; and when the movable leg 611 retracts, the fifth leg portion 61 is in a drawn-back state.

**[0059]** The sixth leg portion 62 also adopts a telescopic leg structure, such that after the fifth leg portion 61 splays, an inner leg of the sixth leg portion 62 stretches out relative to an outer leg thereof, and a support foot at an end of the inner leg is supported on the ground to achieve stable support.

**[0060]** In the embodiment as shown in Figs. 2 and 3, the structure of the fourth leg 70 is the same as that of the third leg 60. That is, the first leg 20 and the second leg 30 both adopt a swing-type leg structure, and the third leg 60 and the fourth leg 70 both adopt a telescopic leg structure, which can reduce structural transformation of the front end of the existing aerial work vehicle and improve the adaptability of the operation vehicle to the working conditions by structural transformation of the rear portion, while reducing the total weight of the vehicle to meet the requirement of the work vehicle on the road.

**[0061]** In some embodiments, the aerial work vehicle further includes a tool box 80, an under body control box 90 and a cab 100, the tool box 80 being provided between the first leg 20 and the cab 100, the under body control box 90 being provided between the second leg 30 and the cab 100.

**[0062]** Providing the tool box 80 and the under body control box 90 in front of the first leg 20 and the second leg 30 can prevent the first leg 20 and the second leg 30 from interfering with the tool box 80 and the under body control box 90 during the splaying process.

**[0063]** In some embodiments of the present disclosure, the tool box 80 may be provided in front of the first leg 20 and the under body control box 90 may be provided in front of the second leg 30. Of course, in other embodiments, the tool box 80 may be provided in front of the second leg 30, and the under body control box 90 may be provided in front of the first leg 20.

**[0064]** Inside the tool box 80 may be placed some common tools, such as wrenches, pliers, screws, etc. Inside the under body control box 90 may be provided electrical control elements.

**[0065]** On the vehicle body 10 of the aerial work vehicle, based on the original telescopic leg structure of the four legs, the two legs located on the rear portion are transformed into swing-type legs, which can improve the adaptability to the working conditions and reduce the weight of the legs without causing great changes of the vehicle body 10; and the tool box 80 and the under body control box 90 are moved forward, which can optimize the structural arrangement, and also avoid interference with the legs.

**[0066]** Moreover, the inventor has found after research that on the aerial work vehicle, the vehicle body 10 is provided with a slewing table 110, and a telescopic arm 130 of the upper body is mounted on the slewing table 110, so that there is a preset distance between the telescopic arm 130 and the upper surface of the vehicle body 10, thereby allowing the arrangement of the drive device 40 between the first leg 20 and the second leg 30, and the arrangement of the drive device 40 does not affect the arrangement of other components on the vehicle body 10, so two drive devices that drive two legs respectively are replaced by the one drive device, which fully utilizes the advantages of the structural arrangement on the aerial work vehicle, not only can ensure the synchronization of the swinging of the two legs, but also can save costs and reduce the overall weight of the operation vehicle.

**[0067]** The telescopic arm 130 includes a plurality of sections of arms, and the telescopic arm 130 can be lengthened or shortened to transport an operation platform 120 connected with a head of the telescopic arm 130 to a preset height for operation.

**[0068]** The embodiment of the present disclosure adopts the swing-type leg structure with only a single section of arm by structural transformation of the two rear legs, and uses one drive device to simultaneously drive the two legs to swing, and the legs also adopt a variable cross-section design. All these improvement measures are conducive to reducing the overall weight of the operation vehicle, realizing a lightweight design and achieving the purpose of energy conservation and emission reduction; and are also conducive to meeting the weight requirement on the operation vehicle traveling on an urban road; in addition, under the premise of an equal overall weight, the weight of the vehicle body is reduced, which allows to appropriately increase the weight of the upper body, increase the total length of the upper body

during operation and improve the reachable height of the upper body.

**[0069]** Finally, it should be noted that the above embodiments are only used for describing rather than limiting the technical solutions of the present disclosure. Although the present disclosure is described in detail with reference to the preferred embodiments, those of ordinary skill in the art should understand that they still can make modifications to the specific implementations in the present disclosure or make equivalent substitutions to part of technical features thereof without departing from the principle of the present disclosure; and such modifications and equivalent substitutions should be encompassed within the technical solutions sought for protection in the present disclosure.

## Claims

**1.** An aerial work vehicle, comprising:

a vehicle body (10);
a first leg (20) and a second leg (30) respectively rotatably connected with the vehicle body (10); and
a drive device (40) movably mounted on the vehicle body (10), the drive device (40) being connected between the first leg (20) and the second leg (30) and configured to drive the first leg (20) and the second leg (30) to rotate away from a midline of the vehicle body (10) or rotate back towards the midline of the vehicle body (10).

**2.** The aerial work vehicle according to claim 1, further comprising a supporting rod (50) mounted on the vehicle body (10), the drive device (40) comprising a drive body which is provided with a mounting hole, the drive body being slidably mounted on the supporting rod (50) through the mounting hole.

**3.** The aerial work vehicle according to claim 2, further comprising a bearing which is provided between the mounting hole of the drive body and the supporting rod (50).

**4.** The aerial work vehicle according to any one of claims 1 to 3, wherein the drive device (40) comprises a cylinder (41), and a first piston rod (42) and a second piston rod (43) provided in the cylinder (41) and projecting from two ends of the cylinder (41), respectively, the first piston rod (42) being rotatably connected with the first leg (20), and the second piston rod (43) being rotatably connected with the second leg (30).

**5.** The aerial work vehicle according to claim 4, further comprising a first connecting shaft, a first lug plate (23) and a second lug plate (24) provided on a side of the first leg (20), the first lug plate being (23) being provided with a first connecting hole, the second lug plate (24) being provided with a second connecting hole, and the first piston rod (42) being provided with a third connecting hole, the first connecting shaft passing through the first connecting hole, the third connecting hole and the second connecting hole to connect the first piston rod (42) and the first leg (20).

**6.** The aerial work vehicle according to claim 4 or 5, further comprising a second connecting shaft, and a third lug plate and a fourth lug plate provided on a side of the second leg (30), the third lug plate provided being with a third connecting hole, the fourth lug plate being provided with a fourth connecting hole, and the second piston rod (43) being provided with a fifth connecting hole, the second connecting shaft passing through the third connecting hole, the fifth connecting hole and the fourth connecting hole to connect the second piston rod (43) and the second leg (30).

**7.** The aerial work vehicle according to any one of claims 1 to 6, wherein the drive device (40) is configured to drive the first leg (20) and the second leg (30) to rotate away from the midline of the vehicle body (10) to a position be angled by a preset angle relative to the midline of the vehicle body (10), the preset angle being 0° to 90°.

**8.** The aerial work vehicle according to any one of claims 1 to 7, wherein the drive device (40) is configured to drive the first leg (20) and the second leg (30) to rotate back to positions parallel to the midline of the vehicle body (10).

**9.** The aerial work vehicle according to any one of claims 1 to 8, wherein the first leg (20) comprises a first end close to the vehicle body (10) and a second end away from the vehicle body (10), the first end having a larger cross-sectional area than the second end.

**10.** The aerial work vehicle according to claim 9, wherein the first leg (20) has a cross-sectional area that gradually decreases from the first end to the second end.

**11.** The aerial work vehicle according to any one of claims 1 to 10, further comprising a third leg (60) and a fourth leg (70), the first leg (20) and the second leg (30) being both provided at a rear portion of the vehicle body (10), the third leg (60) and the fourth leg (70) being both provided at a front portion of the vehicle body (10), the third leg (60) and the fourth leg (70) each comprising a retractable leg structure.

**12.** The aerial work vehicle according to any one of claims 1 to 11, further comprising a tool box (80), an

under body control box (90) and a cab (100), the tool box (80) being provided between the first leg (20) and the cab (100), the under body control box (90) being provided between the second leg (30) and the cab (100).

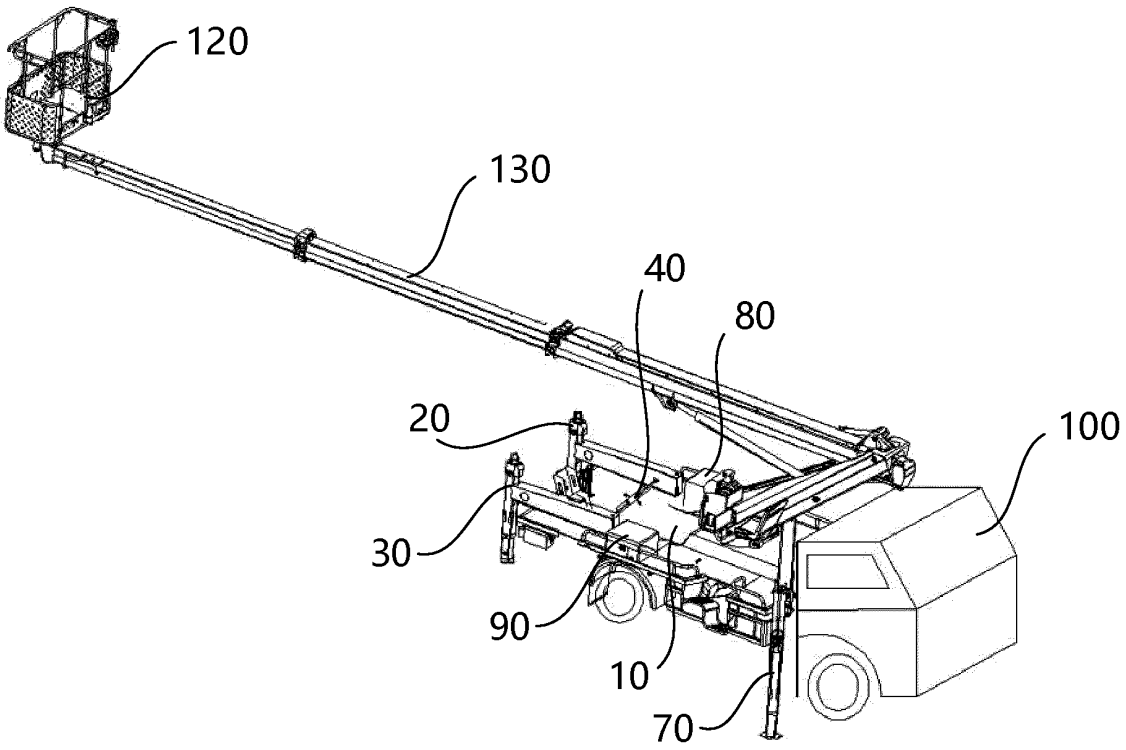


Fig. 1

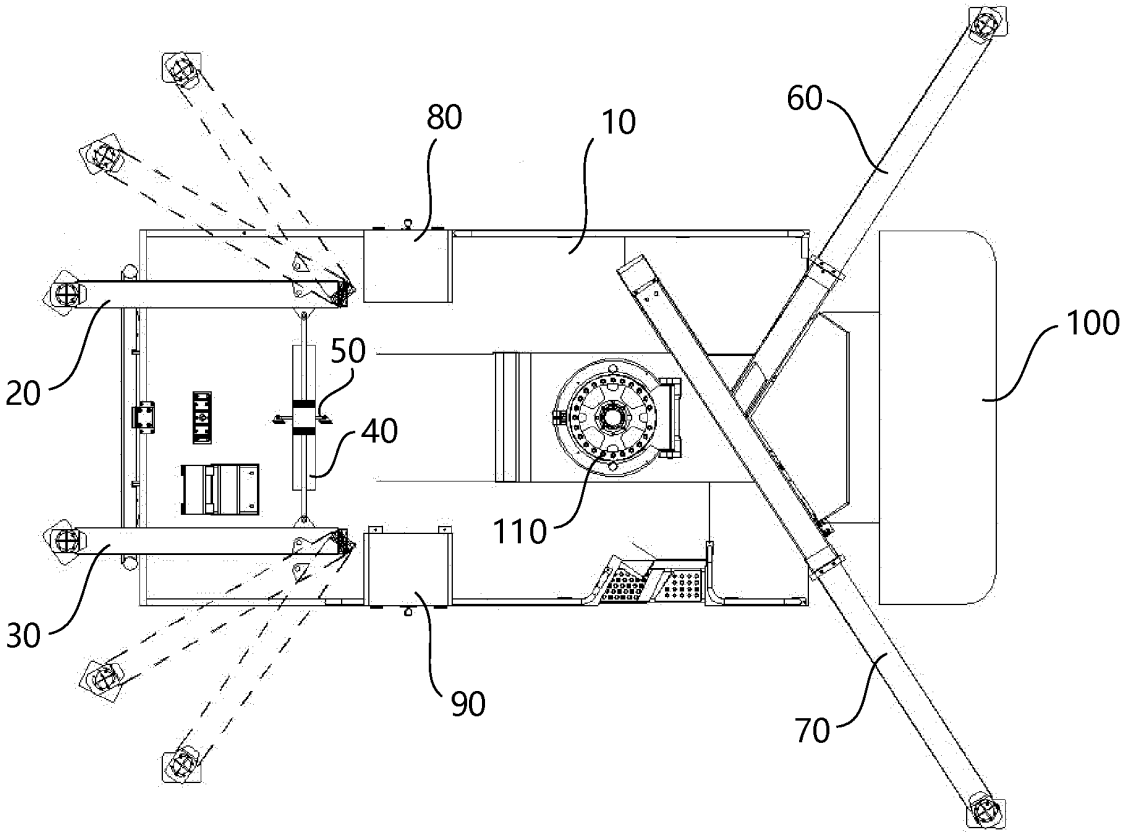


Fig. 2

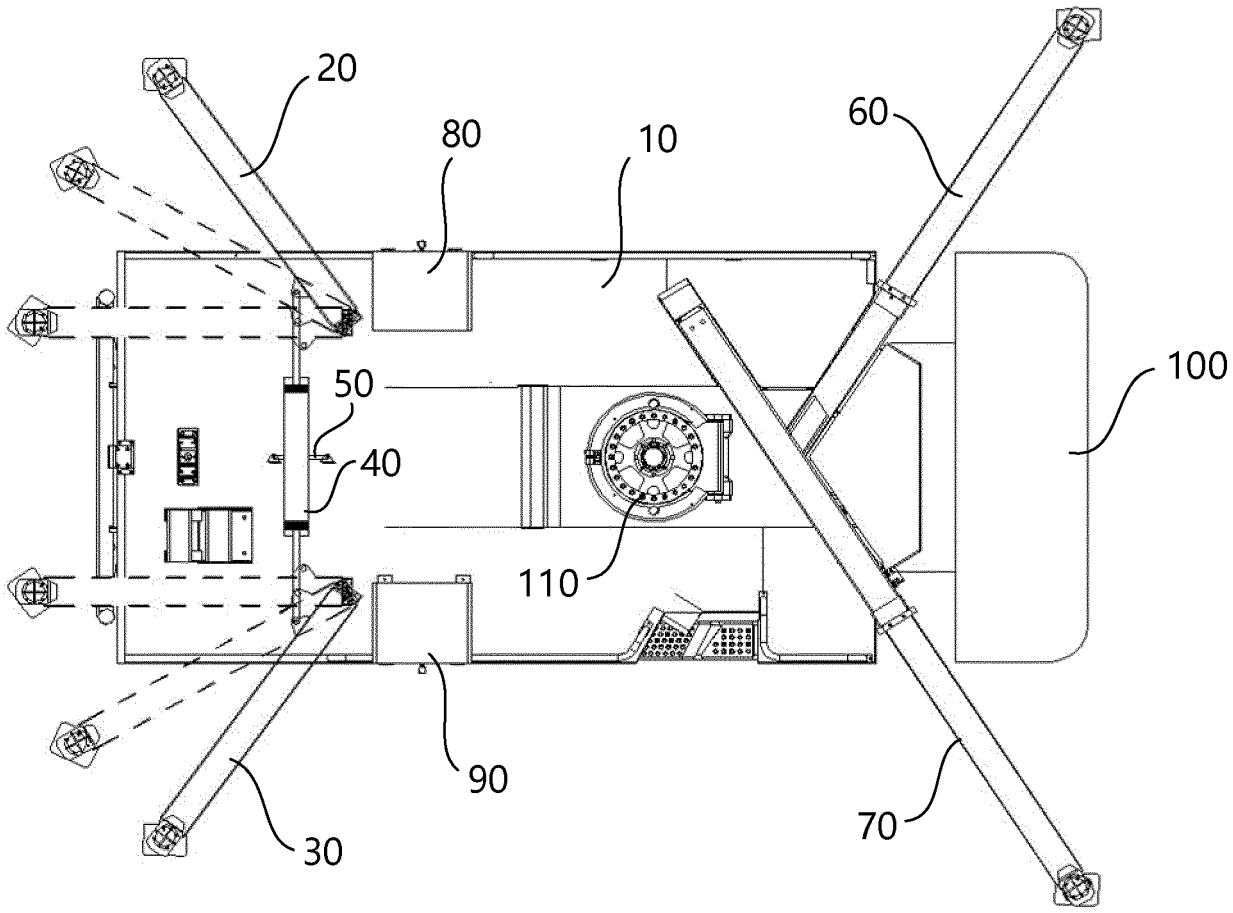


Fig. 3

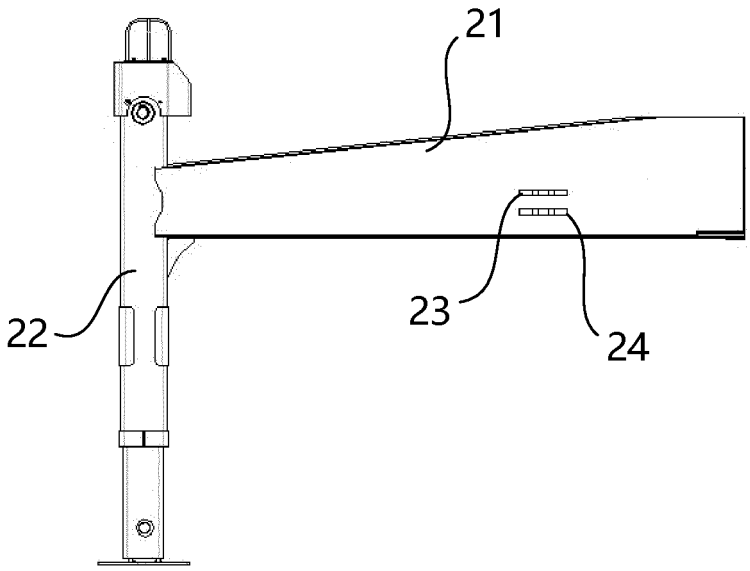


Fig. 4

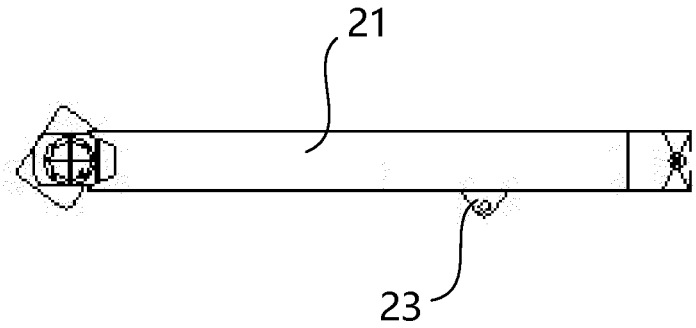


Fig. 5

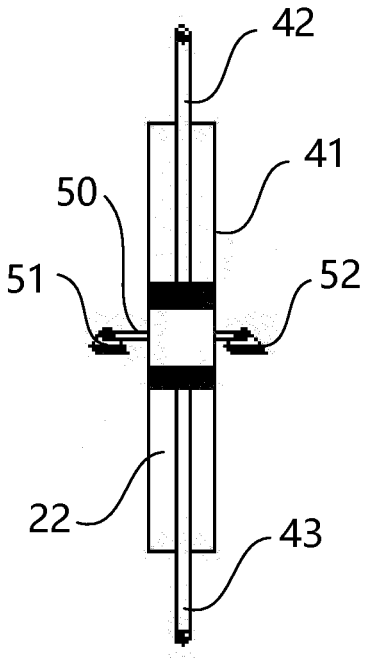


Fig. 6

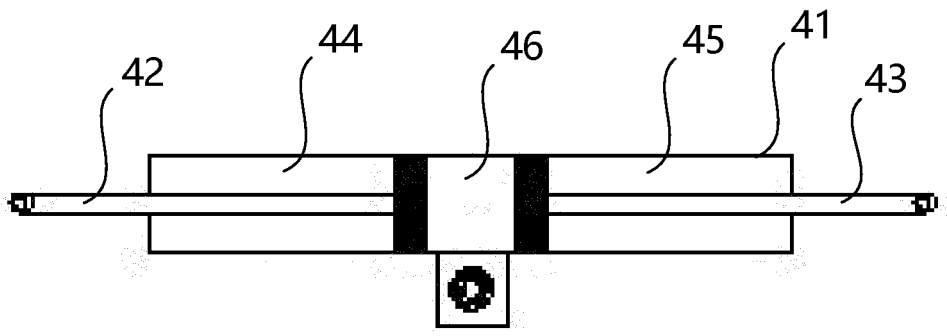


Fig. 7

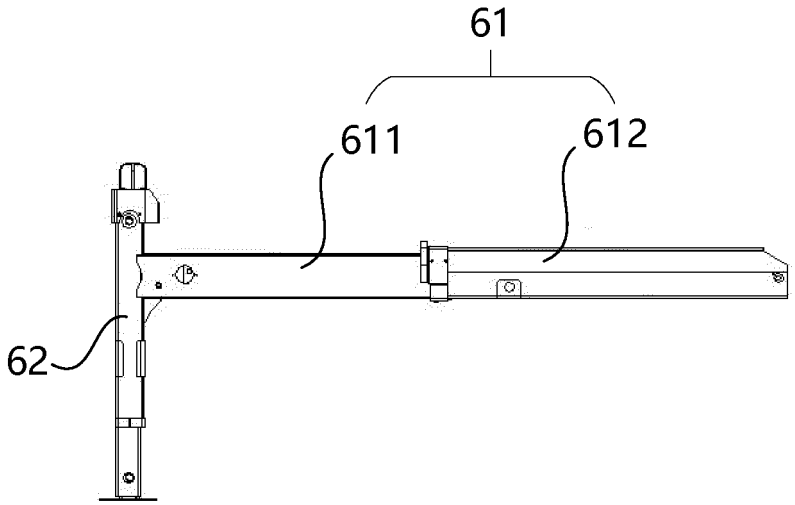


Fig. 8

## INTERNATIONAL SEARCH REPORT

International application No.
**PCT/CN2021/110097**

**A. CLASSIFICATION OF SUBJECT MATTER**

B66C 23/00(2006.01)i; B66F 11/00(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 B66F

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, EPODOC, WPI, CNKI: 江苏徐工工程机械研究院有限公司, 高空, 作业车, 支腿, 驱动, 活塞, 杆, 预设, 角度, 横截面, 面积, 工具箱, altitude, work, vehicle, leg, drive, piston, rod, preset, angle, cross, section, area, toolbox

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | CN 203819214 U (SANY AUTOMOBILE MANUFACTURING CO., LTD.) 10 September 2014 (2014-09-10)<br>description, page 2 paragraph 30, page 3 paragraphs 31-36, figures 1-4 | 1 |
| Y | CN 203819214 U (SANY AUTOMOBILE MANUFACTURING CO., LTD.) 10 September 2014 (2014-09-10)<br>description, page 2, paragraph 30, page 3, paragraphs 31-36, figures 1-4 | 2-12 |
| Y | CN 211751975 U (ANHUI YUQIU FIRE TECHNOLOGY CO., LTD.) 27 October 2020 (2020-10-27)<br>description, paragraphs 25-27, and figures 1-3 | 2-12 |
| A | US 2018057320 A1 (ZHEJIANG DINGLI MACHINERY CO., LTD.) 01 March 2018 (2018-03-01)<br>entire document | 1-12 |
| A | CN 207061700 U (JIAHE DADI HORTICULTURE CO., LTD.) 02 March 2018 (2018-03-02)<br>entire document | 1-12 |
| A | CN 102942129 A (SUZHOU BLUE KING MACHINE TOOL TECHNOLOGY CO., LTD.) 27 February 2013 (2013-02-27)<br>entire document | 1-12 |

☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

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

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| **19 April 2022** | **28 April 2022** |
| Name and mailing address of the ISA/CN<br>**China National Intellectual Property Administration (ISA/CN)**<br>**No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China**<br>Facsimile No. **(86-10)62019451** | Authorized officer<br><br>Telephone No. |

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2021/110097

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | CN 101284636 A (HANGZHOU AICHI ENGINEERING VEHICLES CO., LTD.) 15 October 2008 (2008-10-15)<br>entire document | 1-12 |

Form PCT/ISA/210 (second sheet) (January 2015)

**INTERNATIONAL SEARCH REPORT**
**Information on patent family members**

International application No.
**PCT/CN2021/110097**

| Patent document cited in search report | Publication date (day/month/year) | Patent family member(s) | Publication date (day/month/year) |
|---|---|---|---|
| CN 203819214 U | 10 September 2014 | None | |
| CN 211751975 U | 27 October 2020 | None | |
| US 2018057320 A1 | 01 March 2018 | AU 2017216521 A1 | 15 March 2018 |
| | | KR 20180022552 A | 06 March 2018 |
| | | NZ 733251 A | 26 July 2019 |
| | | CA 2976509 A1 | 24 February 2018 |
| | | EP 3287413 A1 | 28 February 2018 |
| | | CN 106430015 A | 22 February 2017 |
| | | JP 2018030715 A | 01 March 2018 |
| | | SG 10201706925 T A | 28 March 2018 |
| CN 207061700 U | 02 March 2018 | None | |
| CN 102942129 A | 27 February 2013 | None | |
| CN 101284636 A | 15 October 2008 | None | |

Form PCT/ISA/210 (patent family annex) (January 2015)

## REFERENCES CITED IN THE DESCRIPTION

*This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.*

### Patent documents cited in the description


- CN 202110862235 **[0001]**