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(54) OBSTACLE CROSSING MECHANISM AND CLEANING ROBOT

(57) An obstacle crossing mechanism (100) is mounted on a body of a cleaning robot and includes: a first bracket (10) provided with a rotation center (10a), wherein the first bracket (10) is rotatable relative to the body around the rotation center (10a); a roller assembly (20) mounted on the first bracket (10), wherein the roller assembly (20) includes a first roller (21) and a second roller (22) adjacently arranged, and the first roller (21) and the second roller (22) are located on a same side of the body; and an elastic telescopic assembly (30), wherein a first end (30a) of the elastic telescopic assembly (30) is rotatably connected to the body, and a second end (30b) of the elastic telescopic assembly (30) is rotatably connected to the first bracket (10) at a preset rotation position (40).

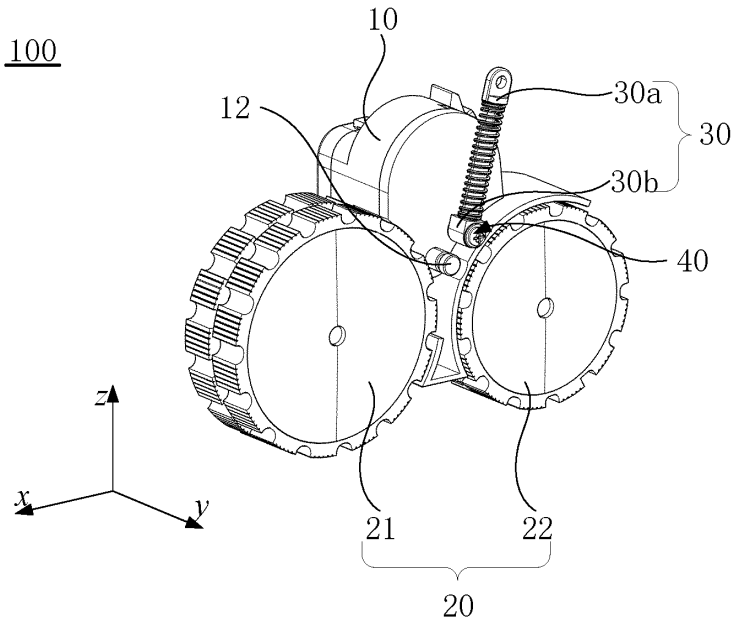

FIG. 1

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Description

TECHNICAL FIELD

[0001] This disclosure relates to the technical field of intelligent electrical appliances, and in particular to an obstacle crossing mechanism and a cleaning robot.

BACKGROUND

[0002] With the development of economy and the progress of society, people have higher and higher requirements for the quality of life, and smart home appliances have emerged. Among them, robots with sweeping and mopping functions, as a kind of smart home appliances, play an increasingly important role in people's daily lives and are gaining increasing popularity among users.

SUMMARY

[0003] In a first aspect of this disclosure, an obstacle crossing mechanism is provided, which is mounted on a body of a cleaning robot and includes:

a first bracket provided with a rotation center, where the first bracket is rotatable relative to the body around the rotation center;

a roller assembly mounted on the first bracket, where the roller assembly includes a first roller and a second roller that are adjacently arranged, and the first roller and the second roller are located on a same side of the body; and

an elastic telescopic assembly, where a first end of the elastic telescopic assembly is rotatably connected to the body, and a second end of the elastic telescopic assembly is rotatably connected to the first bracket at a preset rotation position;

where the preset rotation position does not coincide with the rotation center, and the elastic telescopic assembly applies pressure toward the first bracket through the second end, thereby causing the first bracket to apply pressure to one of the first roller and the second roller.

[0004] In some embodiments, the elastic telescopic assembly includes a mounting rod, a telescopic rod and a reset member, one end of the telescopic rod is inserted into the mounting rod, and the telescopic rod is movable relative to the mounting rod along an axial direction of the mounting rod; where a free end of the telescopic rod serves as the first end, and an end of the mounting rod away from the first end serves as the second end; and

where the reset member is respectively connected to the mounting rod and the telescopic rod, and is configured to provide a reset force after relative movement between the mounting rod and the telescopic rod.

[0005] In some embodiments, the reset member includes a spring, and the spring is sleeved on the mounting rod and/or the telescopic rod.

[0006] In some embodiments, a preset angle is formed between an axis of the mounting rod and a preset reference line, and the preset reference line passes through the rotation center and is parallel to the gravity direction.

[0007] In some embodiments, along a traveling direction of the body, the first roller is located in front of the second roller, and the preset rotation position is provided close to the second roller relative to the rotation center.

[0008] In some embodiments, a diameter of the first roller is greater than a diameter of the second roller.

[0009] In some embodiments, the first bracket includes a roller frame and a power assembly, the first roller and the second roller are rotatably mounted on the roller frame, the power assembly is mounted on the roller frame, and the power assembly is respectively connected to the first roller and the second roller to drive rotation of the first roller and the second roller.

[0010] In some embodiments, the roller frame includes a frame body, the frame body is located between the first roller and the second roller, and the power assembly is mounted on the frame body; and

where the rotation center and the preset rotation position are both provided on the frame body.

[0011] In some embodiments, the roller frame includes a frame body and a turntable connected to the frame body, the frame body is located between the first roller and the second roller, the power assembly is mounted on the frame body, and the rotation center is provided on the frame body; and

where a baffle is arranged on a radial outer side of the turntable for mounting the second roller, and the preset rotation position is provided on the baffle.

[0012] In some embodiments, the obstacle crossing mechanism further includes a second bracket, where the second bracket is rotatably connected to the body, and the second bracket is rotatably connected to the first bracket at the rotation center.

[0013] In some embodiments, a first limiting part is arranged on top of the first bracket, and a second limiting part is arranged on the second bracket; and

when the second roller crosses an obstacle, the first bracket moves toward the second bracket, and the second limiting part abuts against the first limiting part to limit the first bracket.

[0014] A second aspect of this disclosure provides a cleaning robot, which includes a body and the obstacle crossing mechanism according to the first aspect.

[0015] It is to be understood that the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of this disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The accompanying drawings, which are incor-

porated in and constitute a part of this specification, illustrate embodiments consistent with this disclosure and, together with the description, serve to explain the principles of this disclosure.

FIG. 1 is a perspective view showing an obstacle crossing mechanism according to an exemplary embodiment.

FIG. 2 is a front view of an obstacle crossing mechanism according to an exemplary embodiment.

FIG. 3 is a partial exploded view of an obstacle crossing mechanism according to an exemplary embodiment.

FIG. 4 is a partial exploded view of an obstacle crossing mechanism according to an exemplary embodiment.

FIG. 5 is a partial exploded view of an obstacle crossing mechanism according to an exemplary embodiment.

FIG. 6 is a perspective view of an obstacle crossing mechanism according to another exemplary embodiment.

FIG. 7 is a schematic diagram showing an obstacle crossing mechanism without encountering an obstacle according to an exemplary embodiment.

FIG. 8 is a schematic diagram showing an obstacle crossing mechanism crossing an obstacle according to an exemplary embodiment.

FIG. 9 is a schematic diagram showing an obstacle crossing mechanism passing over an obstacle according to an exemplary embodiment.

DETAILED DESCRIPTION

[0017] Exemplary embodiments will be described in detail herein, examples of which are shown in the accompanying drawings. When the following description refers to the drawings, the same numbers in different drawings represent the same or similar elements unless otherwise indicated. The embodiments described in the following exemplary embodiments do not represent all embodiments consistent with this disclosure. Instead, they are merely examples of devices and methods consistent with some aspects of this disclosure as detailed in the appended claims.

[0018] In the related art, sweeping robots and mopping robots are able to perform cleaning operations on flat ground, but when encountering uneven roads and other roads with obstacles, the obstacle crossing performance of robots is usually poor, thereby affecting the user experience.

[0019] In order to solve the problems existing in the related art, some embodiments of this disclosure provide an obstacle crossing mechanism and a cleaning robot. The obstacle crossing mechanism includes a first bracket, a roller assembly and an elastic telescopic assembly. The first bracket is provided with a rotation center. The roller assembly includes a first roller and a second roller mounted on the first bracket. The first end of the elastic telescopic assembly is connected to the body of the cleaning robot, and the second end thereof is rotatably connected to the first bracket at a preset rotation position. In this disclosure, the second end of the elastic telescopic assembly is rotatably connected to the first bracket at the preset rotation position, and the preset rotation position does not coincide with the rotation center of the first bracket, so that when the elastic telescopic assembly applies pressure to the first bracket, the pressure transmitted by the first bracket to the first roller and the second roller can be different. When the obstacle crossing mechanism encounters an obstacle, the roller with less pressure makes the first bracket easy to tilt, and the roller with greater pressure can provide stronger grip, thereby improving the obstacle crossing performance of the obstacle crossing mechanism.

[0020] According to an exemplary embodiment of this disclosure, as shown in FIG. 1, an obstacle crossing mechanism 100 is provided. The obstacle crossing mechanism 100 is mounted on the body of a cleaning robot, such as a sweeping robot, a mopping robot, or the like. The obstacle crossing mechanism 100 enables the cleaning robot to easily cross an obstacle 200 (referring to FIG. 8), thereby expanding the application scenarios of the cleaning robot. The obstacle 200 includes bumps, slopes, and items scattered on the floor of a home. It should be noted that at least one obstacle crossing mechanism 100 as shown in FIG. 1 may be provided on the body of the cleaning robot, and two, three, four or more obstacle crossing mechanisms may be provided. For example, if the cleaning robot is provided with four rollers, two rollers are provided on each side, then one obstacle crossing mechanism 100 may be provided on each side to improve the obstacle crossing effect. Alternatively, one obstacle crossing mechanism 100 may be provided on only one side, and only two rollers may be provided on the other side.

[0021] As shown in FIG. 1 and FIG. 2, the obstacle crossing mechanism 100 includes a first bracket 10, the first bracket 10 has a rotation center 10a, and the first bracket 10 can be directly or indirectly connected to the body through the rotation center 10a. In one example, referring to FIG. 1 and FIG. 2, the obstacle crossing mechanism 100 can be directly connected to the body through a preset shaft 12 in the rotation center 10a. In another example, referring to FIG. 6 and FIG. 7, the first bracket 10 can be indirectly connected to the body through a second bracket 60 (described in detail later).

[0022] Referring to FIG. 1 and FIG. 2, the obstacle crossing mechanism 100 further includes a roller assembly 20, which is mounted on the first bracket 10. The roller assembly 20 includes a first roller 21 and a second roller 22 which are arranged adjacent to each other. The first roller 21 and the second roller 22 are located on the same side of the body. When crossing the obstacle 200 (see FIG. 8), a relative height between the first roller 21 and the second roller 22 will change, so that the first bracket 10

rotates relative to the body around the rotation center 10a. By providing the rotation center 10a and the two rollers on the first bracket 10, and when crossing an obstacle, the first bracket 10 can flexibly rotate with the obstacle crossing process, so that the rollers of the cleaning robot can maintain good grip with a horizontal plane 300 and the obstacle 200 during the obstacle crossing process, thereby improving the traveling stability and avoiding slipping due to insufficient grip, which results in the inability to smoothly cross the obstacle 200.

[0023] Referring to FIG. 1 to FIG. 3, the obstacle crossing mechanism 100 further includes an elastic telescopic assembly 30, where the first end 30a of the elastic telescopic assembly 30 is rotatably connected to the body, and the second end 30b of the elastic telescopic assembly 30 is rotatably connected to the first bracket 10 at a preset rotation position 40. When the cleaning robot encounters the obstacle 200, the elastic telescopic assembly 30 can be shortened or elongated to ensure the body balance of the cleaning robot. It should be noted that when the first bracket 10 rotates around the rotation center 10a, the first bracket 10 will drive the second end 30b of the elastic telescopic assembly 30 to change position, so that the arrangement direction of the first end 30a and the second end 30b of the elastic telescopic assembly 30 (i.e., the telescopic direction of the elastic telescopic assembly 30) changes. Therefore, the first end 30a is configured to be rotatably connected to the body, and the second end 30b is configured to be rotatably connected to the first bracket 10, so that the elastic telescopic assembly 30 can be prevented from bending, breaking, or the like, and pressure can be applied to the roller used to grasp the ground more flexibly during the obstacle crossing process, thereby improving the obstacle crossing performance.

[0024] In some embodiments (not shown in the drawings), the first end of the elastic telescopic assembly can be fixedly connected to the body, while the second end thereof is in contact with the first bracket and a limiting structure is provided in the first bracket, and the abutting position is located in the limiting structure to prevent it from slipping out. For example, the elastic telescopic assembly can always provide pressure to the first bracket in a vertically downward direction (the opposite direction of the z direction shown in FIG. 1), and when the cleaning robot passes an obstacle, the first bracket rotates around the rotation center, and the second end of the elastic telescopic assembly can slide in the limiting structure of the first bracket, thereby changing the position of the second end 30b on the first bracket.

[0025] As shown in FIG. 1 and FIG. 2, the preset rotation position 40 does not coincide with the rotation center 10a, which means that the preset rotation position 40 is staggered with the rotation center 10a (also called eccentric setting). When the elastic telescopic assembly 30 applies pressure to the first bracket 10 through the second end 30b, the pressure on the first bracket 10 makes it tend to rotate around the rotation center 10a, so that the first bracket 10 applies pressure to one of the first roller 21 and the second roller 22. For example, according to the different functions of the two rollers during movement of the cleaning robot, the pressure of the first bracket 10 can be configured to act on the first roller 21 or the second roller 22.

[0026] For example, according to the traveling direction of the cleaning robot body (the x direction shown in FIG. 1), the first roller 21 is the front wheel and the second roller 22 is the rear wheel. By adaptively setting the relative positions of the preset rotation position 40 and the rotation center 10a, when pressure is applied to the first bracket 10, the pressure applied to the second roller 22 can be greater than the pressure applied to the first roller 21. Therefore, when the cleaning robot encounters an obstacle 200, the first roller 21 that first contacts the obstacle 200 is more likely to tilt up due to the smaller pressure applied, and the second roller 22 has a stronger grip due to the greater pressure applied, thereby enhancing the performance of climbing over the obstacle 200.

[0027] In some embodiments of this disclosure, the second end of the elastic telescopic assembly is rotatably connected to the first bracket at the preset rotation position, and the preset rotation position does not coincide with the rotation center of the first bracket. Therefore, when the elastic telescopic assembly applies pressure to the first bracket, the pressure transmitted by the first bracket to the first roller and the second roller can be different. When the obstacle crossing mechanism encounters an obstacle, the roller with less pressure makes the first bracket easy to tilt, and the roller with greater pressure can provide stronger grip, thereby improving the obstacle crossing performance of the obstacle crossing mechanism.

[0028] In an exemplary embodiment, as shown in FIG. 1 and FIG.2, the obstacle crossing mechanism 100 includes the first bracket 10, the roller assembly 20 and the elastic telescopic assembly 30. The first bracket 10 is provided with a rotation center 10a. The roller assembly 20 includes a first roller 21 and a second roller 22 mounted on the first bracket 10. The first end 30a of the elastic telescopic assembly 30 is connected to the body of the cleaning robot, and the second end 30b is rotatably connected to the first bracket 10 at a preset rotation position 40.

[0029] As shown in FIG. 3, the elastic telescopic assembly 30 includes a mounting rod 32 and a telescopic rod 31, where one end of the telescopic rod 31 is inserted into the mounting rod 32, and the telescopic rod 31 is movable relative to the mounting rod 32 along the axial direction of the mounting rod 32. The free end of the telescopic rod 31 constitutes the first end 30a of the elastic telescopic assembly 30, and the end of the mounting rod away from the first end 30a of the elastic telescopic assembly 30 constitutes the second end 30b. Referring to FIG. 3, the elastic telescopic assembly 30 further includes a reset member 33, which is connected to the mounting rod 32 and the telescopic rod 31 respec-

tively. The reset member 33 is configured to provide a reset force after relative movement between the mounting rod and the telescopic rod 31. For example, when the mounting rod 32 moves relative to the telescopic rod 31 to shorten the length of the elastic telescopic assembly 30, the reset member 33 can provide a force that makes the mounting rod 32 and the telescopic rod 31 move away from each other (reset). In addition, the reset member 33 also enables the obstacle crossing mechanism 100 to have a vibration reduction function, thereby improving the running stability of the cleaning robot.

[0030] In one example, referring to FIG. 3, the reset member 33 includes a spring, which is sleeved on the mounting rod 32 and the telescopic rod 31, where one end of the spring is connected to the first end 30a of the elastic telescopic assembly 30, and the other end of the spring is connected to the second end 30b of the elastic telescopic assembly 30. When the length of the elastic telescopic assembly 30 is reduced, the first end 30a and the second end 30b of the elastic telescopic assembly 30 approach each other and compress the spring, so the compressed spring can provide a reset force to move the first end 30a and the second end 30b away from each other.

[0031] In another example (not shown in the drawings), the reset member includes a spring, which is sleeved on the telescopic rod, where a partial structure of the spring is located in a slide groove 321 of the mounting rod (see FIG. 3), one end of the spring is connected to the first end of the elastic telescopic assembly, and the other end of the spring is connected to the bottom surface of the slide groove 321 of the mounting rod.

[0032] In another example (not shown in the drawings), the reset member includes two magnets, which are respectively arranged on the mounting rod and the telescopic rod, and the same poles of the two magnets face each other. In other words, the repulsive force generated by the same poles of the magnets facing each other is used as the reset force.

[0033] The reset element 33 may be any one of the three examples mentioned above, or a combination of any two examples to obtain a stronger reset force, or a combination of three examples to obtain a further stronger reset force.

[0034] As shown in FIG. 2 and FIG. 3, there is a preset angle between the axis of the mounting rod 32 and a preset reference line, where the preset reference line is a vertical line passing through the rotation center 10a, and the vertical line is always parallel to the gravity direction (z direction shown in FIG. 1). The smaller the preset angle, the greater the component force of the elastic telescopic assembly 30 in the gravity direction. The preset angle may be any value between 0° and 60°, such as 1°, 15°, 30° or 50°.

[0035] During the travel of the cleaning robot, the size of the preset angle will change based on whether an obstacle 200 is encountered, thereby adjusting the direction in which the elastic telescopic assembly 30 applies pressure to the first bracket 10, and further adjusting the pressure of the first bracket 10 on the first roller 21 and the second roller 22. For example, referring to FIG. 7 and FIG. 8, it can be seen that the angle when crossing the obstacle shown in FIG. 8 is smaller than the angle when locating on the flat road surface shown in FIG. 7, so that the elastic telescopic assembly 30 shown in FIG. 8 applies greater pressure to the second roller 22, thereby improving the grip of the second roller 22, and thus enhancing the obstacle crossing performance. In this embodiment, by setting the mounting rod 32 to form a preset angle relative to the gravity direction, the reset force provided by the reset member 33 in the elastic telescopic assembly 30 can apply an inclined force to the first bracket 10, so that the first bracket 10 can apply a variable pressure to one of the first roller 21 and the second roller 22, thereby achieving the effect of easily crossing the obstacle 200.

[0036] In an exemplary embodiment, as shown in FIG. 1 and FIG. 2, the obstacle crossing mechanism 100 includes the first bracket 10, the roller assembly 20 and the elastic telescopic assembly 30. The first bracket 10 is provided with a rotation center 10a. The roller assembly 20 includes a first roller 21 and a second roller 22 mounted on the first bracket 10. The first end 30a of the elastic telescopic assembly 30 is connected to the body of the cleaning robot, and the second end 30b is rotatably connected to the first bracket 10 at a preset rotation position 40.

[0037] The obstacle crossing mechanism 100 provided in this embodiment may include any structure of the obstacle crossing mechanism 100 provided in the aforementioned embodiments.

[0038] As shown in FIG. 1, along the traveling direction of the body (the x direction shown in FIG. 1), the first roller 21 is located in front of the second roller 22, that is, the first roller 21 is a front wheel, the second roller 22 is a rear wheel. The preset rotation position 40 is arranged closer to the second roller 22 than the rotation center 10a. In order to facilitate the explanation of the technical solution of this disclosure, the position where the first end 30a is rotatably connected to the body is defined as the first mounting position 31a, the line between the first mounting position 31a and the center of the first roller 21 is defined as the first line *m,* and the line between the first mounting position 31a and the center of the second roller 22 is defined as the second line *n.*

[0039] In one example, referring to FIG. 8, it is shown that the first roller 21 of the cleaning robot encounters an obstacle 200 and tilts up, so that the first bracket 10 rotates clockwise around the rotation center 10a, and the first bracket 10 drives the preset rotation position 40 to move backward (in the opposite direction of the x direction shown in FIG. 1). Since the height h1 (see FIG. 7) of the first mounting position 31a remains unchanged, the angle between the telescopic direction of the elastic telescopic assembly 30 and the first connecting line *m* becomes larger, and the angle between the telescopic

direction of the elastic telescopic assembly 30 and the second connecting line n becomes smaller, thereby greatly increasing the pressure of the elastic telescopic assembly 30 on the second roller 22 and reducing the pressure of the elastic telescopic assembly 30 on the first roller 21, and thus enhancing the grip of the second roller 22 and reducing the pressure of the first roller 21 on the obstacle 200, so that the obstacle crossing mechanism 100 is easier to tilt up to climb over the obstacle 200, and the difficulty of crossing the obstacle can be reduced.

[0040] In another example, referring to FIG. 9, it shows that the second roller 22 of the cleaning robot is about to pass over the obstacle 200. At this time, the first bracket 10 rotates counterclockwise around the rotation center 10a, and the first bracket 10 drives the second end 30b of the elastic telescopic assembly 30 to move forward (in the x direction shown in FIG. 1). Since the height h1 of the first mounting position 31a remains unchanged, the angle between the telescopic direction of the elastic telescopic assembly 30 and the first connecting line *m* becomes smaller, and the angle between the telescopic direction of the elastic telescopic assembly 30 and the second connecting line n becomes larger, thereby increasing the pressure of the elastic telescopic assembly 30 on the first roller 21 and reducing the pressure of the elastic telescopic assembly 30 on the second roller 22, and thus enhancing the grip of the first roller 21 and reducing the pressure of the second roller 22 on the obstacle 200, so that the obstacle crossing mechanism 100 has a stronger grip and a smaller pressure on the obstacle 200, and the difficulty of crossing the obstacle can be reduced.

[0041] Referring to FIG. 2 and FIG. 7, the diameter of the first roller 21 is greater than the diameter of the second roller 22. It is understandable that for an obstacle 200 of the same height, when the position where the roller contacts the obstacle 200 is flush with the circular center of the roller, it will be difficult for the roller to pass over the obstacle 200 or even completely impossible to cross. By increasing the diameter of the first roller 21 (i.e., the front wheel), the circular center of the first roller 21 is higher than the initial contact point between the first roller 21 and the obstacle 200, thereby facilitating the first roller 21 to pass over the obstacle 200. In this embodiment, by setting the first roller 21 located at the front side of the traveling direction to have a larger diameter, the ability of the obstacle crossing mechanism 100 to cross the obstacle 200 is improved.

[0042] Referring to FIG. 4 and FIG. 5, the first bracket 10 includes a roller frame 11 and a power assembly 50, the first roller 21 and the second roller 22 are rotatably mounted on the roller frame 11, the power assembly 50 is mounted on the roller frame 11, and the power assembly 50 may be in transmission connection with at least one of the first roller 21 and the second roller 22 to drive the roller(s) to rotate.

[0043] In one example, as shown in FIG. 4 and FIG. 5, the power assembly 50 is connected to the first roller 21 and the second roller 22, respectively, so that the first roller 21 and the second roller 22 both have driving force. Referring to FIG. 4 and FIG. 5, the power assembly 50 includes a driving motor 51, a first gear 52, a plurality of second gears 53 and a plurality of third gears 54. The output shaft of the driving motor 51 is connected to the first gear 52. Two third gears 54 are provided and coaxially arranged with the first roller 21 and the second roller 22, respectively. The plurality of second gears 53 are arranged between the first gear 52 and the third gear 54, so as to transfer the torque of the first gear 52 to the third gears 54, thereby driving the first roller 21 and the second roller 22 to rotate. In some optional embodiments (not shown in the drawings), the power assembly 50 can be composed of a driving motor 51 and a transmission belt, which will not be described in detail.

[0044] In another example (not shown in the drawings), the power assembly is connected to the first roller only.

[0045] In yet another example (not shown in the drawings), the power assembly is connected to the second roller only.

[0046] Referring to FIG. 3 to FIG. 5, the first bracket 10 further includes a first side cover 15 and a second side cover 16, which are disposed on both sides of the roller frame 11. The first side cover 15 and the roller frame 11 define a motor installation space, and the second side cover 16 and the roller frame 11 define a gear installation space. The roller frame 11 has a shaft hole, which communicates the motor installation space with the gear installation space. The output shaft of the driving motor 51 passes through the shaft hole to be connected with the first gear 52. Referring to FIG. 3, a boss 151 is disposed on a side of the first side cover 15 away from the roller frame 11, and the boss 151 coincides with the preset rotation position 40. The second end 30b of the elastic telescopic assembly 30 has a through hole, which is sleeved on the boss 151. A screw 152 is disposed in the boss 151, and the screw 152 is configured to limit the second end 30b from coming out.

[0047] Referring to FIG. 4 and FIG. 5, it can be determined that the driving motor 51, the first roller 21 and the second roller 22 are located on the same side of the roller frame 11, and the multiple gears are located on the other side of the roller frame 11, thereby improving the utilization rate of the space on both sides of the roller frame 11, helping to reduce the volume of the obstacle crossing mechanism 100, reducing the space occupied within the body of the cleaning robot, facilitating the installation of larger capacity batteries, larger dust boxes, and the like in the body, and thus improving the user experience.

[0048] In some embodiments, as shown in FIG. 4 and FIG. 5, the roller frame 11 includes a frame body 111, and the frame body 111 is located between the first roller 21 and the second roller 22. The power assembly 50 is mounted on the frame body 111, and the rotation center 10a and the preset rotation position 40 are both set on the frame body 111. In this embodiment, there are no repeated limitations on the rotation center 10a and the preset rotation position 40.

[0049] In other embodiments, as shown in FIG. 4 and FIG. 5, the roller frame 11 includes a frame body 111, and the frame body 111 is located between the first roller 21 and the second roller 22. The power assembly 50 is mounted on the frame body 111, and the rotation center 10a is set on the frame body 111. Referring to FIG. 4, the roller frame 11 further includes a turntable 112 connected to the frame body 111, and the number of turntables 112 is two (including a first turntable 1121 and a second turntable 1122), where the first turntable 1121 is used to install the first roller 21, and the second turntable 1122 is used to install the second roller 22. The radial outer side of the second turntable 1122 is provided with a baffle 13, and the preset rotation position 40 is set on the baffle 13 (not shown in this example figure).

[0050] In an exemplary embodiment, as shown in FIG. 1 and FIG. 2, the obstacle crossing mechanism 100 includes the first bracket 10, the roller assembly 20 and the elastic telescopic assembly 30, where the first bracket 10 is provided with a rotation center 10a, the roller assembly 20 includes a first roller 21 and a second roller 22 mounted on the first bracket 10, the first end 30a of the elastic telescopic assembly 30 is connected to the body of the cleaning robot, and the second end 30b is rotatably connected to the first bracket 10 at a preset rotation position 40. Along the traveling direction of the body (the x direction shown in FIG. 1), the first roller 21 is located in front of the second roller 22, and the preset rotation position 40 is arranged closer to the second roller 22 than the rotation center 10a.

[0051] As shown in FIG. 6 and FIG. 7, the obstacle crossing mechanism 100 further includes a second bracket 60, which is rotatably connected to the body at a second mounting position 62, and is rotatably connected to the first bracket 10 at a rotation center 10a. The second bracket 60 can provide a pulling force to the first bracket 10, so as to prevent the first bracket 10 from moving relative to the body in the traveling direction, thereby improving the overall strength.

[0052] In addition, it can be understood that, referring to FIG. 2, when the obstacle crossing mechanism 100 is not provided with the second bracket 60, the obstacle crossing mechanism 100 is to directly form a rotation connection with the body through the rotation center 10a of the first bracket 10. When the cleaning robot encounters the obstacle 200, the rotation center 10a of the first bracket 10 increases in height, causing the body to tilt. Referring to FIG. 7 and FIG. 8, in the obstacle crossing mechanism 100 provided in this embodiment, by providing the second bracket 60, when the cleaning robot encounters the obstacle 200, the rotation center 10a of the first bracket 10 increases in height, but the height h2 of the second mounting position 62 remains substantially unchanged. Compared with the obstacle crossing mechanism 100 without the second bracket 60, the body is more stable when crossing the obstacle 200.

[0053] As shown in FIG. 4 and FIG. 9, a first limiting part 14 is provided on the top of the first bracket 10, and a second limiting part 61 is provided on the second bracket 60. When the obstacle crossing mechanism 100 is about to cross the obstacle 200 (that is, when the second roller 22 is about to cross the obstacle 200), the first bracket 10 moves toward the second bracket 60, and the second limiting part 61 approaches and abuts against the first limiting part 14 to limit the first bracket 10. By limiting the first bracket 10, for example, it is possible to avoid the reset member 33 of the elastic telescopic assembly 30 and the baffle 13 of the first bracket 10 from being squeezed and damaged.

[0054] In an example, the first limiting part 14 may be a protruding structure on the top of the first bracket 10, and the second limiting part 61 may be an elastic block (such as a silicone block or a rubber block) disposed on the second bracket 60.

[0055] Referring to FIG. 4, the preset shaft 12 can be fixedly connected to the second bracket 60, such as by bonding, gluing or integrally forming. The preset shaft 12 passes through the first side cover 15 and extends into the roller frame 11.

[0056] According to an exemplary embodiment of this disclosure, some embodiments of this disclosure further provide a cleaning robot, which includes a body and the obstacle crossing mechanism 100 according to any of the foregoing embodiments of this disclosure.

[0057] The cleaning robot provided by the disclosed embodiment has all the technical effects of the obstacle crossing mechanism. The second end of the elastic telescopic assembly is rotatably connected to the first bracket at the preset rotation position, and the preset rotation position does not coincide with the rotation center of the first bracket, so that when the elastic telescopic assembly applies pressure to the first bracket, the pressure transmitted by the first bracket to the first roller and the second roller can be different. When the obstacle crossing mechanism encounters an obstacle, the roller with less pressure makes the first bracket easy to tilt, and the roller with greater pressure can provide stronger grip, thereby improving the obstacle crossing performance of the obstacle crossing mechanism.

[0058] Those skilled in the art will readily appreciate other embodiments of this disclosure after considering the specification and practicing the embodiments disclosed herein. This disclosure is intended to cover any variations, uses, or adaptations of this disclosure that follow the general principles of this disclosure and include common knowledge or customary techniques in the art that are not disclosed in this disclosure. The description and examples are to be considered exemplary only, and the true scope and spirit of this disclosure are indicated by the following claims.

[0059] It should be understood that this disclosure is not limited to the exact structures that have been described above and shown in the drawings, and that various modifications and changes may be made without departing from the scope thereof. The scope of this disclosure is limited only by the appended claims.

Claims

1. An obstacle crossing mechanism (100), being mounted on a body of a cleaning robot and comprising:

   a first bracket (10) provided with a rotation center (10a), wherein the first bracket (10) is rotatable relative to the body around the rotation center (10a);
   a roller assembly (20) mounted on the first bracket (10), wherein the roller assembly (20) comprises a first roller (21) and a second roller (22) adjacently arranged, and the first roller (21) and the second roller (22) are located on a same side of the body; and
   an elastic telescopic assembly (30), wherein a first end (30a) of the elastic telescopic assembly (30) is rotatably connected to the body, and a second end (30b) of the elastic telescopic assembly (30) is rotatably connected to the first bracket (10) at a preset rotation position (40);
   wherein the preset rotation position (40) does not coincide with the rotation center (10a), and the elastic telescopic assembly (30) applies pressure toward the first bracket (10) through the second end (30b), thereby causing the first bracket (10) to apply pressure to at least one of the first roller (21) and the second roller (22).

2. The obstacle crossing mechanism according to claim 1, wherein the elastic telescopic assembly (30) comprises a mounting rod (32), a telescopic rod (31) and a reset member (33), one end of the telescopic rod (31) is inserted into the mounting rod (32), and the telescopic rod (31) is movable relative to the mounting rod (32) along an axial direction of the mounting rod (32); wherein another end of the telescopic rod (31) serves as the first end (30a) of the elastic telescopic assembly (30), and an end of the mounting rod (32) away from the first end (30a) serves as the second end (30b) of the elastic telescopic assembly (30).

3. The obstacle crossing mechanism according to claim 2, wherein the reset member (33) is respectively connected to the mounting rod (32) and the telescopic rod (31), and is configured to provide a reset force resisting relative movement between the mounting rod (32) and the telescopic rod (31).

4. The obstacle crossing mechanism according to claim 2 or 3, wherein the reset member (33) comprises a spring, and the spring is sleeved on at least one of the mounting rod (32) or the telescopic rod (31).

5. The obstacle crossing mechanism according to claim 2 or 3, wherein a preset angle is formed between an axis of the mounting rod (32) and gravity direction.

6. The obstacle crossing mechanism according to any one of claims 1 to 5, wherein, along a traveling direction of the body, the first roller (21) is located in front of the second roller (22), and the preset rotation position (40) is provided close to the second roller (22) relative to the rotation center (10a).

7. The obstacle crossing mechanism according to claim 6, wherein a diameter of the first roller (21) is greater than a diameter of the second roller (22).

8. The obstacle crossing mechanism according to claim 6 or 7, wherein the first bracket (10) comprises a roller frame (11) and a power assembly (50), the first roller (21) and the second roller (22) are rotatably mounted on the roller frame (11), the power assembly (50) is mounted on the roller frame (11), and the power assembly (50) is respectively connected to the first roller (21) and the second roller (22) to drive rotation of the first roller (21) and the second roller (22).

9. The obstacle crossing mechanism according to claim 8, wherein the roller frame (11) comprises a frame body (111), the frame body (111) is located between the first roller (21) and the second roller (22), and the power assembly (50) is mounted on the frame body (111).

10. The obstacle crossing mechanism according to claim 9, wherein the rotation center (10a) and the preset rotation position (40) are both provided on the frame body (111).

11. The obstacle crossing mechanism according to claim 8, wherein the roller frame (11) comprises a frame body (111) and a turntable (112) connected to the frame body (111), the turntable (112) is used for mounting the second roller (22), the frame body (111) is located between the first roller (21) and the second roller (22), the power assembly (50) is mounted on the frame body (111), and the rotation center (10a) is provided on the frame body (111) .

12. The obstacle crossing mechanism according to claim 11, wherein a baffle (13) is arranged on a radial outer side of the turntable (112), and the preset rotation position (40) is provided on the baffle (13).

13. The obstacle crossing mechanism according to any one of claims 6 to 12, further comprising a second bracket (60), wherein the second bracket (60) is rotatably connected to the body, and is rotatably connected to the first bracket (10) at the rotation

center (10a).

14. The obstacle crossing mechanism according to claim 13, wherein a first limiting part (14) is arranged on top of the first bracket (10), and a second limiting part (61) is arranged on the second bracket (60); and wherein, when the second roller (22) crosses an obstacle (200), the first bracket (10) moves toward the second bracket (60), and the second limiting part (61) abuts against the first limiting part (14) to limit the first bracket (10).

15. A cleaning robot, comprising a body and the obstacle crossing mechanism (100) according to any one of claims 1 to 14.

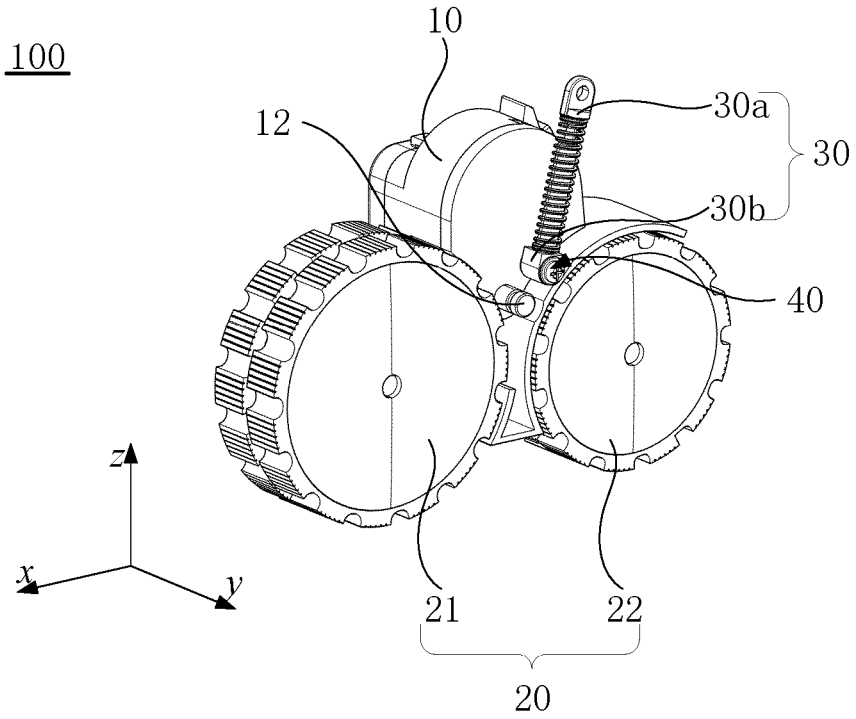

100
10
12
30a
30
30b
40
z
x
y
21
22
20

FIG. 1

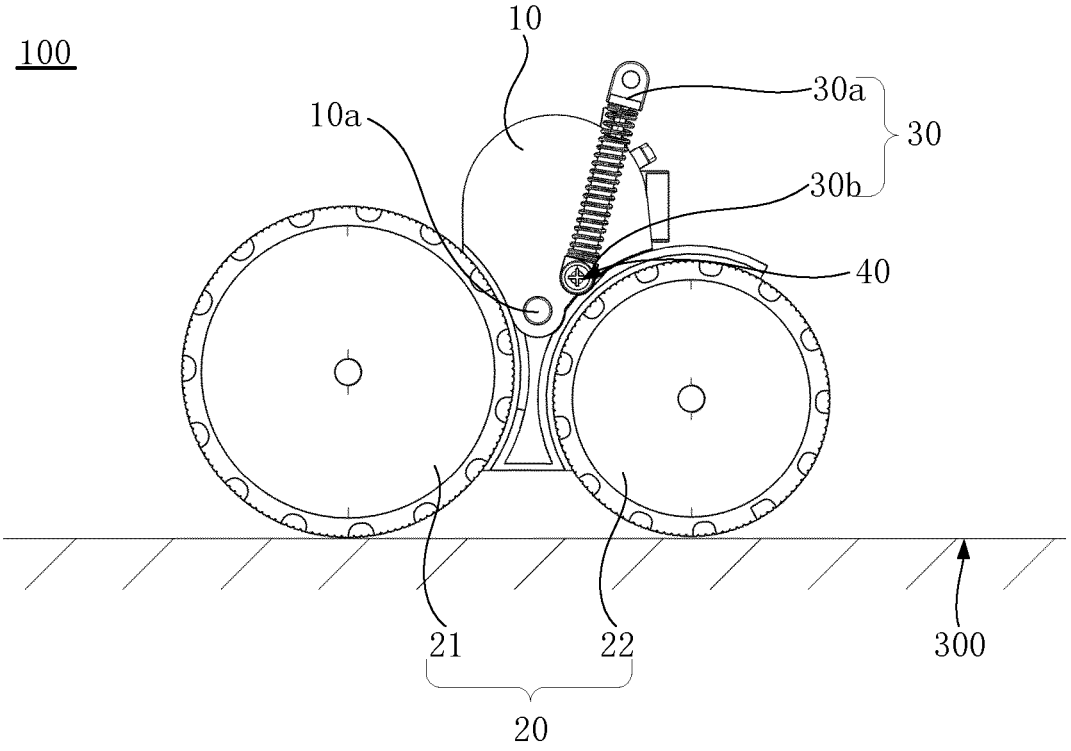

100
10
10a
30a
30
30b
40
21
22
300
20

FIG. 2

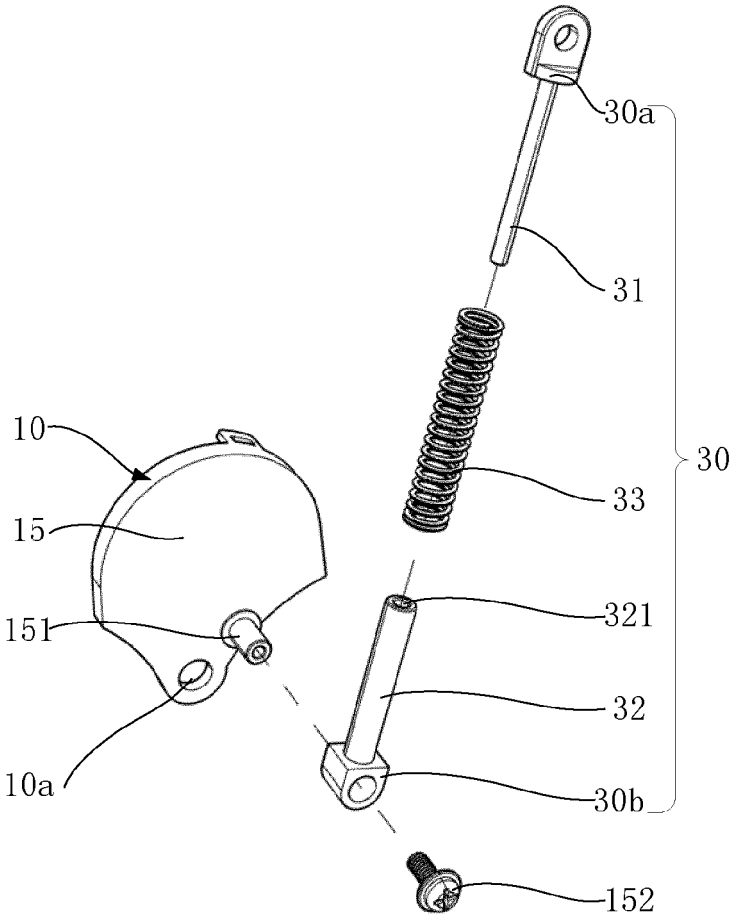

30a
31
30
33
10
15
321
151
32
10a
30b
152

FIG. 3

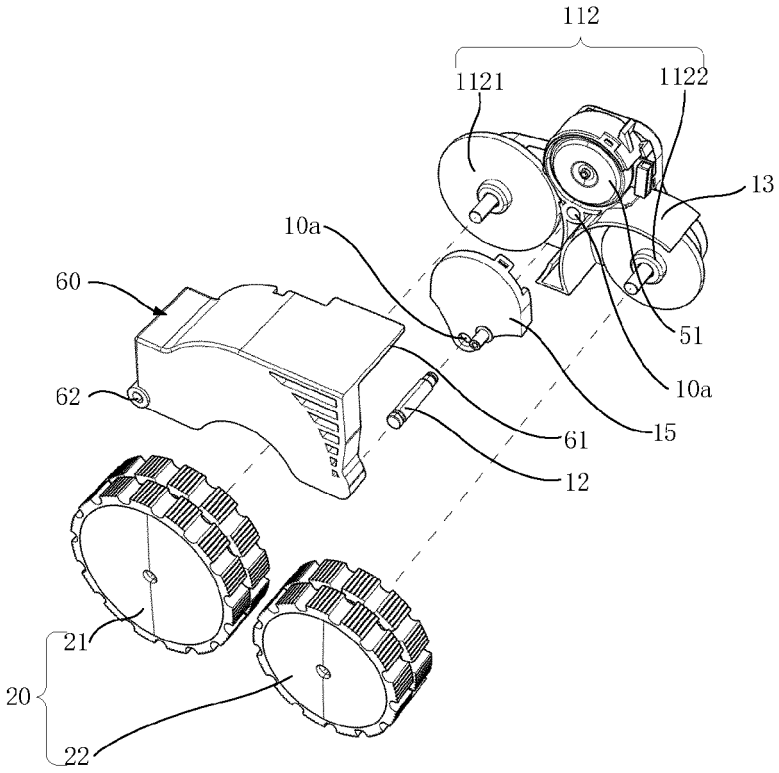

112
1121
1122
13
10a
60
51
10a
62
61
15
12
21
20
22

FIG. 4

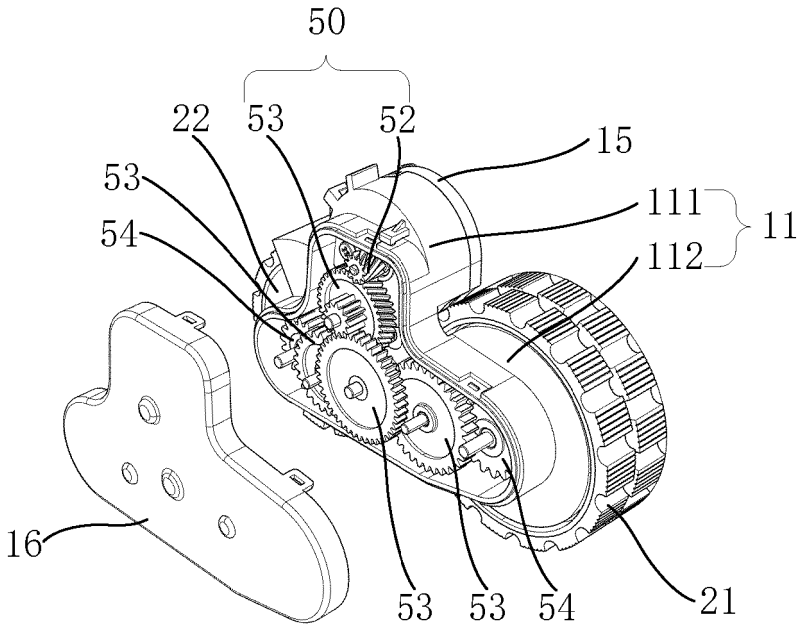

50
22
53
52
15
53
111
11
54
112
16
53
53
54
21

FIG. 5

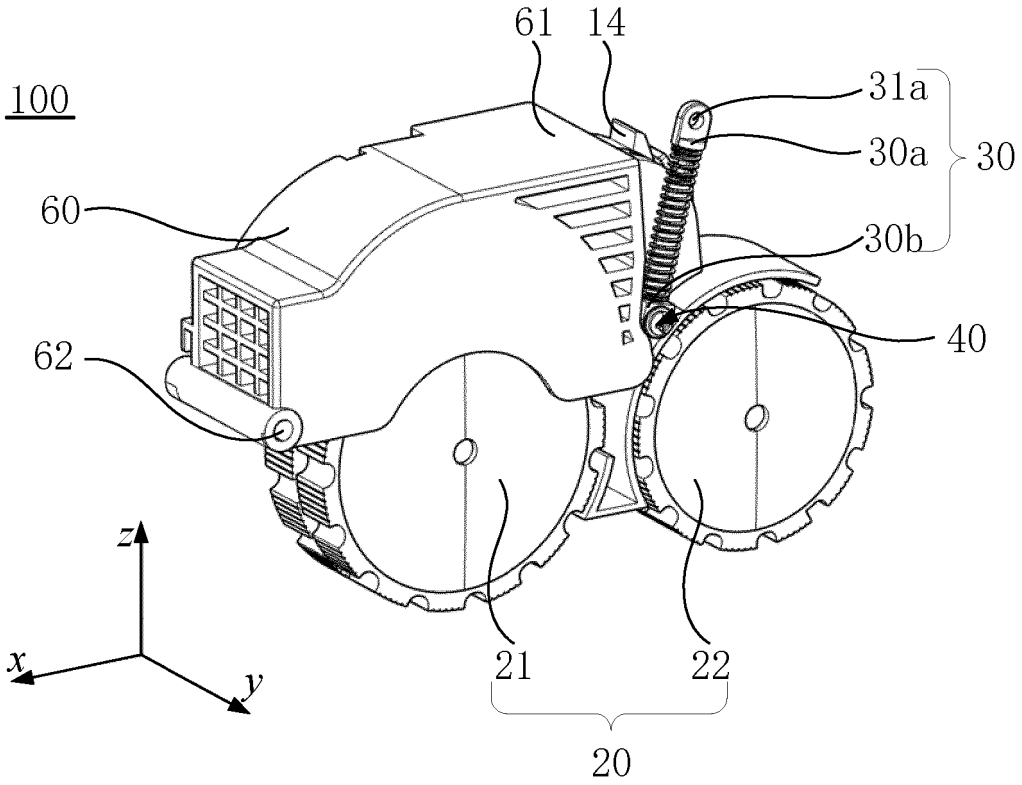

61
14
100
31a
30a
30
60
30b
40
62
z
x
y
21
22
20

FIG. 6

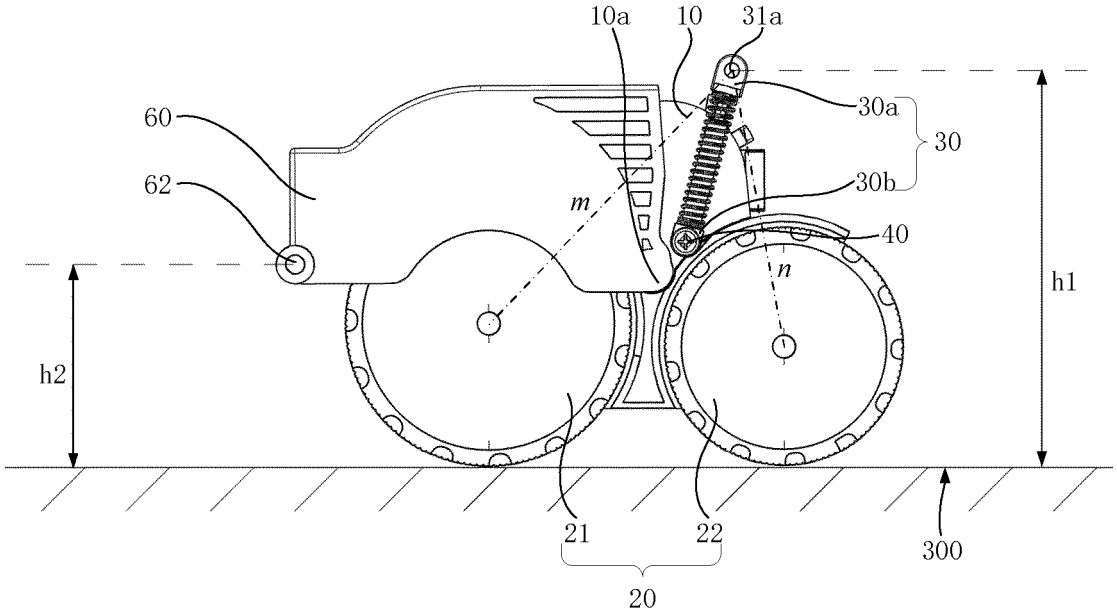
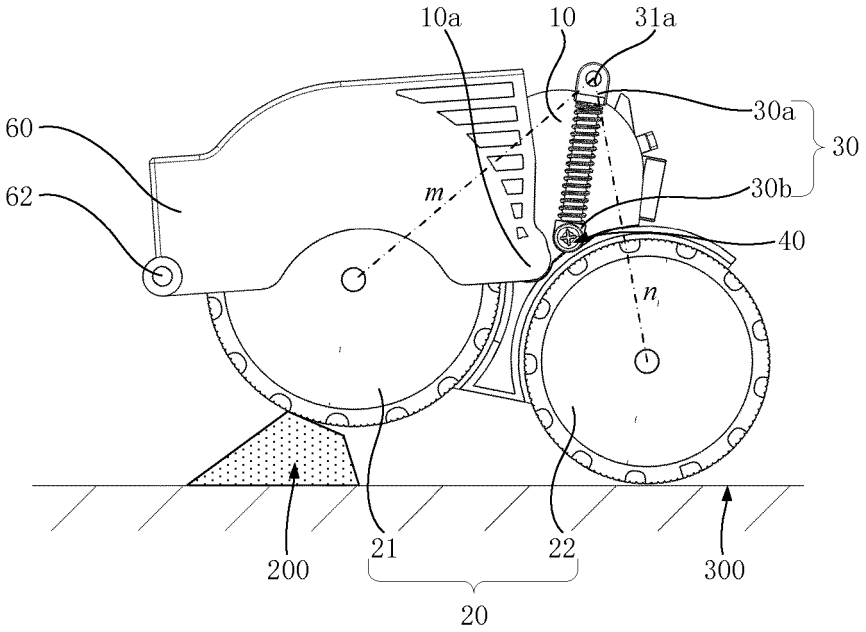

10a
10
31a
30a
30
60
62
30b
m
40
n
h1
h2
21
22
300
20

FIG. 7


10a
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31a
30a
30
60
62
30b
m
40
n
200
21
22
300
20

FIG. 8

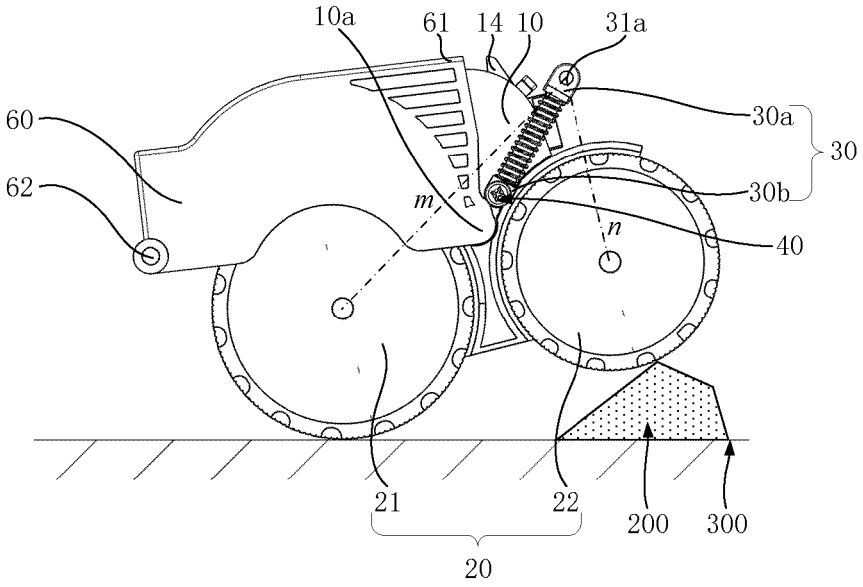

FIG. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 25 18 3533

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A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 November 2025	Hubrich, Klaus

CATEGORY OF CITED DOCUMENTS

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28-11-2025

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		WO 2015084078 A1	11-06-2015

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