

GRINDING ROBOT

TECHNICAL FIELD

The present application relates to the technical field of grinding and, in particular, to a grinding robot.

5 BACKGROUND

A floor grinding device is an automatic device used for polishing or grinding the concrete floor and mainly used for removing laitance on the concrete surface (after the concrete is completely dry), so as to perform subsequent floor surface construction work. Different machine tool bits are changed so as to achieve a function of polishing or grinding the floor. The floor grinding
10 device is widely used in the floor construction of underground garages and industrial plants and is an indispensable device in processes of epoxy floor construction, curing floor construction and emery floor construction.

Most of the floor grinding devices currently on the market are semi-automatic floor grinding devices that require manual operation or auxiliary operation. To protect a grinding disc from
15 being damaged by an external force in a non-operation state and to enable a drive motor of the grinding disc to smoothly start and drive the grinding disc to reach a rated power state when the grinding device needs to be started to perform the operation, a flip bracket equipped with a support wheel is generally provided at a front end of the grinding disc to lift the grinding disc off the ground.

20 When the floor grinding device needs to be used for operation, the flip bracket needs to be flipped upwards so as to lift the support wheel so that the grinding disc can be in contact with a floor plane and the floor grinding device can operate normally; when the operation needs to be stopped, the flip bracket needs to be flipped downwards so as to lower the support wheel and lift the grinding disc off the ground so that the floor grinding device is stopped to operate. The

preceding process requires two operators to work together, and the preceding process has the following problems: inconvenient operation, easily-caused safety accidents during the operation, and relatively low efficiency of manual operation.

In addition, a floor grinding robot requires high power and a wide range of actuation, so the length of the cable required is relatively long. However, when the floor grinding robot is turning or turning around, the cable on the side of the power take-off point will be directly pressed against a cable reel shell, resulting in an excessive friction, making it very difficult to pay off the wire, and eventually causing the floor grinding robot to be dragged by the cable and unable to move forward, or causing the cable to be pulled apart.

10 In addition, among current ground construction devices, for example, the floor grinding device, during the operation, the grinding disc, which is an actuator, needs to be in contact with the ground. With the development of technology, functions of the construction devices become more and more abundant, and some auxiliary devices for performing auxiliary functions are also equipped on the robot. When an uneven road is encountered, the problem of wheel suspended
15 and slipping is prone to occur, affecting the normal operation of the floor grinding device.

SUMMARY

A main object of the present application is to provide a grinding robot, which can achieve automatic flipping of a flip bracket.

The present application provides a grinding robot. The grinding robot includes a main rack and
20 a flip bracket pivotally connected to the main rack through a pin shaft. A flip device is further provided between the flip bracket and the main rack and includes a first drive portion and a linkage mechanism. The first drive portion is disposed on the main rack. One end of the linkage mechanism is pivotally connected to the main rack and another end of the linkage mechanism is pivotally connected to the flip bracket. A spacing exists between a pivot point between the flip

bracket and the main rack and a pivot point between the flip bracket and the linkage mechanism. The first drive portion is drivingly connected to the linkage mechanism, driven by the first drive portion, the linkage mechanism is capable of driving the flip bracket to be flipped relative to the main rack, and the flip bracket has a first state in which the flip bracket is folded relative to the main rack and a second state in which the flip bracket is extended relative to the main rack.

Further, the linkage mechanism includes a first link and a second link. One end of the first link is pivotally connected to the main rack through a rotary shaft, and the first link is drivingly connected to the first drive portion. One end of the second link is pivotally connected to another end of the first link through a first connecting shaft, and another end of the second link is pivotally connected to the flip bracket through a third connecting shaft.

Further, the first link includes a first rod segment and a second rod segment, where one end of the first rod segment is pivotally connected to the main rack through the rotary shaft, another end of the first rod segment is connected to one end of the second rod segment, another end of the second rod segment is pivotally connected to the first drive portion, and the first link is pivotally connected to the one end of the second link through the first connecting shaft at a position where the first rod segment and the second rod segment are connected.

Further, the first link includes a first rod segment; the flip device further includes a crank connected to the rotary shaft; and the rotary shaft is fixedly connected to the first rod segment, the crank is connected to the first drive portion, and through the crank and the rotary shaft, the first drive portion drives the first rod segment to rotate, so as to drive, through the second link, the flip bracket to be flipped.

Further, a ratio of a linear distance between the rotary shaft and the first connecting shaft to a linear distance between the first connecting shaft and the third connecting shaft is greater than or equal to 1.9 and less than or equal to 2.2.

Further, the grinding robot further includes a first limiting column and a second limiting column. The first limiting column is disposed on the rack and configured to limit a limit position where the first link of the linkage mechanism swings backward relative to the rack. The second limiting column is disposed on the rack and configured to limit a limit position where the first link of the
5 linkage mechanism swings forward relative to the rack.

Further, the first limiting column and the second limiting column are disposed above the rotary shaft, and the first link is provided with a protruding finger between the first limiting column and the second limiting column.

Further, the grinding robot further includes a grinding mechanism and a second drive portion.
10 The grinding mechanism is provided with a grinding disc and position-adjustably disposed on the main rack. The second drive portion is disposed between the main rack and the grinding mechanism and configured to drive the grinding mechanism to move, so as to adjust a posture of the grinding disc.

Further, the flip bracket is provided with a first support wheel; in the case where the flip bracket
15 is in the first state, projections of the flip bracket and the first support wheel on the grinding disc of the grinding mechanism are within a region where a surface of the grinding disc is located.

Further, the main rack is provided with a grinding mechanism and a plurality of moving wheels; where when the grinding robot is in operation, at least part of the plurality of moving wheels and the grinding mechanism are in contact with the ground, so as to form a working surface; the
20 grinding robot further includes a loading rack including at least one second support wheel; the loading rack is configured to be movably connected to the main rack so that when the loading rack is driven by the main rack, the at least one second support wheel is capable of being non-coplanar with the working surface of the grinding robot.

Further, the grinding robot further includes a first guide portion and a second guide portion

between the main rack and a loading rack, where the first guide portion forms a guide space, and the second guide portion is movably disposed in the guide space; and when the loading rack moves relative to the main rack, the second guide portion slides in the guide space.

5 Further, the guide space is a guide groove and the second guide portion is a guide pin inserted into the guide groove.

Further, the loading rack and the main rack are detachably connected through a movable mechanism.

10 Further, the movable mechanism includes a telescopic structure having an extended state and a retracted state; the main rack includes a first connecting portion, and the loading rack includes a second connecting portion mated with the first connecting portion; and in the case where the telescopic structure is in the extended state, the first connecting portion and the second connecting portion are capable of being movably connected; and in the case where the telescopic structure is in the retracted state, the first connecting portion and the second connecting portion are capable of being separated.

15 Further, the telescopic structure includes a fastener, a movable member, and a drive mechanism, where the fastener is mounted on the main rack or the loading rack; and the movable member is movably disposed on the fastener, and the drive mechanism is configured to drive the movable member to extend or retract relative to the fastener so that the telescopic structure is in the extended state or the retracted state.

20 Further, a first mating surface is provided on the fastener, a second mating surface mated with the first mating surface is provided on the drive mechanism, and the drive mechanism enables the first mating surface to be mated with or be staggered with the second mating surface; where when the first mating surface is mated with the second mating surface, the movable member protrudes from the fastener; and when the first mating surface is staggered with the second

mating surface, the movable member retracts relative to the fastener.

Further, the telescopic structure further includes an elastic reset, where the elastic reset is disposed between the fastener and the movable member and configured to keep the movable member in the extended state; and the first mating surface and the second mating surface each
5 include an inclined surface and a tip abutting surface.

Further, the fastener and the movable member are provided with threads that are mated with each other, the drive mechanism drives the movable member to rotate around an axis of the movable member, and the movable member is capable of extending or retracting relative to the fastener.

10 Further, the fastener and the movable member are connected by a thread and the pin shaft; and the pin shaft is inserted into a screw ring of the thread, the drive mechanism drives the movable member to rotate around an axis of the movable member, and the pin shaft is capable of moving to different screw rings along the thread so that the movable member is capable of extending or retracting relative to the fastener.

15 Further, the loading rack includes at least three second support wheels, and at least one of the at least three second support wheels is a lift support wheel.

Further, the grinding robot further includes a wire guiding mechanism including a mount and a plurality of wire outlet rollers. The mount is disposed on the loading rack. Each of the plurality of wire outlet rollers is rotatably mounted on the mount, and the plurality of wire outlet rollers
20 enclose a wire outlet hole for a cable to pass through; where circumferential walls of the plurality of wire outlet rollers are used for being in contact with a circumferential wall of the cable, where in the case where the cable is in the wire outlet hole, a circumferential wall of at least one of the plurality of wire outlet rollers is in contact with the circumferential wall of the cable; and in the case where the cable moves in the wire outlet hole, when driven by the cable,

the at least one of the plurality of wire outlet rollers in contact with the circumferential wall of the cable is capable of rotating around an axis of the at least one of the plurality of wire outlet rollers.

5 Further, the plurality of wire outlet rollers include a left wire outlet roller and a right wire outlet roller that are located in a left and right direction, and a lower wire outlet roller and an upper wire outlet roller that are located in an up and down direction; where diameters of the left wire outlet roller, the right wire outlet roller and the lower wire outlet roller are all greater than a diameter of the upper wire outlet roller.

10 Further, radii of the left wire outlet roller, the right wire outlet roller and the lower wire outlet roller are all greater than a bending radius of the cable.

Further, the mount includes a first guide shaft and a movable base, where the first guide shaft extends horizontally and is mounted on the loading rack, and the movable base is movably disposed on the first guide shaft; and the plurality of wire outlet rollers are rotatably disposed on the movable base.

15 Further, the mount further includes a second guide shaft mounted on the loading rack, and the movable base is movably disposed on the second guide shaft; and the second guide shaft is disposed above the first guide shaft and parallel to the first guide shaft.

20 Further, the movable base includes a lower connector base and an upper connector base; where the lower connector base is movably disposed on the first guide shaft, and the upper connector base is movably disposed on the second guide shaft; and the upper wire outlet roller is rotatably disposed on the upper connector base, the lower wire outlet roller is rotatably disposed on the lower connector base, two ends of the left wire outlet roller along an axial direction are rotatably connected to the upper connector base and the lower connector base respectively, and two ends of the right wire outlet roller along an axial direction are rotatably connected to the upper

connector base and the lower connector base respectively.

Further, the wire guiding mechanism further includes two wire-passing assemblies arranged at intervals, and the plurality of wire outlet rollers are disposed between the two wire-passing assemblies; and each of the two wire-passing assemblies includes a wire-passing roller arranged
5 vertically, where a circumferential surface of the wire-passing roller is used for being in contact with the circumferential wall of the cable passing through the wire outlet hole.

Further, each of the two wire-passing assemblies includes a plurality of wire-passing rollers arranged at intervals in an arc or arranged at intervals in a circumferential direction.

Further, each of the two wire-passing assemblies further includes a mounting plate and a drive,
10 where the wire-passing roller is rotatably disposed on the mounting plate, and the drive is configured to drive the mounting plate to move up and down.

Further, a limit switch is disposed at a lower end of the wire-passing roller, and the drive responds to the limit switch to drive the mounting plate to move up and down.

Further, the grinding robot further includes a wire arrangement device, where the wire
15 arrangement device includes a linear drive mechanism, and the plurality of wire outlet rollers are connected to an output end of the linear drive mechanism.

Further, the wire arrangement device further includes a motor and a reel, where the motor is configured to drive the reel to take up and pay off a wire, and one end of the cable wound onto the reel passes through the wire outlet hole; and the linear drive mechanism is configured to
20 drive the plurality of wire outlet rollers to move linearly so that the cable is capable of being wound in sequence along an axial direction of the reel or paid off in sequence along the axial direction of the reel.

The technical solution of the present application is applied. The linkage mechanism is pivotally

connected to the main rack, the linkage mechanism is pivotally connected to the flip bracket, the main rack is pivotally connected to the flip bracket, and a spacing exists between the pivot point between the main rack and the flip bracket and the pivot point between the flip bracket and the linkage mechanism. Therefore, driven by the first drive portion, the linkage mechanism can achieve the flip of the flip bracket relative to the main rack so that the flip bracket has the first state in which the flip bracket is folded relative to the main rack and the second state in which the flip bracket is extended relative to the main rack. Through the preceding arrangement, the automatic flip of the flip bracket relative to the main rack can be achieved, thereby replacing the manual flip operation mode and overcoming problems such as low efficiency caused by manual operation.

BRIEF DESCRIPTION OF DRAWINGS

Drawings constituting part of the present application are intended to provide a further understanding of the present application, and illustrative embodiments of the present application and the description thereof are intended to explain the present application and do not constitute an improper limitation of the present application. In the drawings:

FIG. 1A is a perspective view of a grinding robot according to embodiment one of the present application (a flip bracket is in a second state relative to a rack);

FIG. 1B is a partial enlarged view of the grinding robot in FIG. 1A;

FIG. 1C is a schematic view of a flip bracket of a grinding robot in a second state according to embodiment one of the present application;

FIG. 1D is a schematic view of a flip bracket of a grinding robot in a first state according to embodiment one of the present application;

FIG. 2 is another perspective view of the grinding robot in FIG. 1A (the flip bracket is in a first

state relative to the rack);

FIG. 3 is a perspective view illustrating connection between the flip bracket and a support wheel of the grinding robot in FIG. 1A;

FIG. 4 is a side view of the grinding robot in FIG. 2;

5 FIG. 5 is a top view of the grinding robot in FIG. 4;

FIG. 6 is a perspective view of a grinding robot according to embodiment two of the present application (a flip bracket is in a second state relative to a rack);

FIG. 7 is another perspective view of the grinding robot in FIG. 6 (the flip bracket is in a first state relative to the rack);

10 FIG. 8 is a perspective view illustrating connection between the flip bracket and a support wheel of the grinding robot in FIG. 6;

FIG. 9 is a schematic view of a floor grinding robot from a first viewing angle according to an embodiment of the present application;

FIG. 10 is a schematic view of a floor grinding robot from a second viewing angle according to
15 an embodiment of the present application;

FIG. 11 is a schematic view of a floor grinding robot from a third viewing angle according to an embodiment of the present application;

FIG. 12 is a sectional view of a structure at IV in FIG. 10;

FIG. 13 is an enlarged view at V in FIG. 11;

FIG. 14 is a schematic view illustrating contact between a cable and a lower wire outlet roller;

FIG. 15 is a schematic view illustrating arrangement of wire-passing rollers according to the present application;

FIG. 16 is a schematic view illustrating arrangement of wire-passing rollers according to other
5 embodiments;

FIG. 17 is a schematic view of a floor operation device from a first viewing angle according to an embodiment of the present application;

FIG. 18 is a schematic view of a floor operation device from a second viewing angle according to an embodiment of the present application;

10 FIG. 19 is a schematic view illustrating that two moving wheels are off the ground after a traction device and a loading device of a floor operation device in the existing art are rigidly connected;

FIG. 20 is a schematic view illustrating that two fixed support wheels of a loading rack of a floor operation device are disposed at a convex position according to an embodiment of the
15 present application;

FIG. 21 is an enlarged view at III in FIG. 17;

FIG. 22 is an exploded view of a first rack, a loading rack, and a telescopic structure according to an embodiment of the present application;

FIG. 23 is a schematic view of a telescopic structure in an extended state according to an
20 embodiment of the present application;

FIG. 24 is a schematic view of a telescopic structure in a retracted state according to an embodiment of the present application;

FIG. 25 is a sectional view of a telescopic structure in a retracted state;

FIG. 26 is a schematic view illustrating cooperation between a first mating surface and a second
5 mating surface according to other embodiments;

FIG. 27 is a schematic view illustrating that a first mating surface and a second mating surface are staggered according to other embodiments;

FIG. 28 is a schematic view of a telescopic structure of a first type according to other embodiments;

10 FIG. 29 is a schematic view of a telescopic structure of a second type according to other embodiments;

FIG. 30 is an enlarged view at A in FIG. 29; and

FIG. 31 is an enlarged view at B in FIG. 17.

Reference list

15	10	first drive portion
	20	linkage mechanism
	21	first link
	22	second link
	23	first rod segment
20	24	second rod segment
	25	third connecting shaft

	30	rotary shaft
	40	crank
	50	first connecting shaft
	60	main rack
5	70	flip bracket
	71	bracket body
	72	connecting portion
	73	pin shaft
	81	first limiting column
10	82	second limiting column
	90	grinding mechanism
	91	grinding disc
	92	fourth drive portion
	100	second drive portion
15	110	second bracket
	120	moving mechanism
	121	moving wheel
	122	third drive portion
	130	support wheel
20	1000	grinding robot
	30a	loading rack
	301	second support wheel
	400	cable
	500	wire arrangement device
25	510	mount
	511	first guide shaft
	512	second guide shaft
	513	movable base

	5130	upper connector base
	5131	lower connector base
	5132	lower linear bearing
	5133	lower bearing
5	5134	left sliding plate
	5135	right sliding plate
	5136	upper linear bearing
	5137	fixed base
	5138	left roller shaft
10	5139	right roller shaft
	520	upper wire outlet roller
	530	lower wire outlet roller
	540	left wire outlet roller
	550	right wire outlet roller
15	560	wire outlet hole
	570	wire-passing assembly
	571	wire-passing roller
	572	mounting plate
	573	drive
20	574	slide rail
	575	limit switch
	111	first connecting portion
	112	first guide portion
	21	grinding motor
25	311	second connecting portion
	312	second guide portion
	32	lift support wheel
	33	fixed support wheel

	40a	telescopic structure
	41	fastener
	411	first mating surface
	412	internal thread
5	42	movable member
	421	external thread
	422	pin shaft
	43	drive mechanism
	431	second mating surface
10	432	sleeve portion
	433	handle
	44	elastic reset

DETAILED DESCRIPTION

It is to be noted that if not in collision, the examples and features therein in the present application can be combined with each other. The present application is described below in detail with reference to drawings and in conjunction with examples.

It is to be noted that, unless otherwise specified, all technical and scientific terms used in the present application have meanings the same as those commonly understood by those of ordinary skill in the art to which the present application pertains.

In the present application, the position terms such as "up", "down", "top", and "bottom" used herein are generally for the direction shown in the drawings or the upright, vertical, or gravity direction of a component itself unless otherwise specified to the contrary. Similarly, for ease of understanding and description, "inner and outer" refers to inner and outer parts relative to the contour of each component itself, but the preceding position terms are not used to limit the present application.

A flip device of the present application and embodiments of the present application can be widely used in a device or scenario that requires a simple mechanism and low cost with a limited movement space of the mechanism.

Embodiment one

- 5 As shown in FIGS. 1A and 1B, in the embodiment of the present application, the flip device is disposed on a component to be mounted (for example, a main rack 60) and used for flipping a component to be flipped (for example, a flip bracket 70). The component to be flipped is pivotally connected to the component to be mounted. The flip device includes a first drive portion 10 and a linkage mechanism 20. The first drive portion 10 is disposed on the component
- 10 to be mounted. One end of the linkage mechanism 20 is pivotally connected to the component to be mounted, and the other end of the linkage mechanism 20 is pivotally connected to the component to be flipped. A spacing exists between a pivot point between the component to be flipped and the component to be mounted and a pivot point between the component to be flipped and the linkage mechanism 20. A first drive portion 10 is drivingly connected to the
- 15 linkage mechanism 20. When driven by the first drive portion 10, the linkage mechanism 20 can drive the component to be flipped to flip relative to the component to be mounted. The component to be flipped has a first state (shown in FIG. 2) in which the component to be flipped is folded relative to the component to be mounted and a second state (shown in FIG. 1A) in which the component to be flipped is extended relative to the component to be mounted.
- 20 In the preceding arrangement, the linkage mechanism 20 is pivotally connected to the component to be mounted, the linkage mechanism 20 is pivotally connected to the component to be flipped, the component to be mounted is pivotally connected to the component to be flipped, and a spacing exists between the pivot point between the component to be flipped and the component to be mounted and the pivot point between the component to be flipped and the
- 25 linkage mechanism 20. Therefore, when driven by the first drive portion 10, the linkage mechanism 20 can achieve the flip of the component to be flipped relative to the component to

be mounted so that the linkage mechanism 20 has the first state and the second state, and through a telescopic action of the first drive portion 10, the linkage mechanism 20 can be switched between the first state and the second state. Through the preceding arrangement, the automatic flip of the component to be flipped relative to the component to be mounted can be achieved, thereby replacing the manual flip operation mode and overcoming problems such as low efficiency caused by manual operation.

Further, when the flip device is applied to a grinding robot, the automatic flip of the flip bracket 70 with a first support wheel 130 can be achieved.

The first drive portion 10 may be an electric push rod. Preferably, the first drive portion 10 includes a motor push rod and a control device connected to the motor push rod, where the control device is disposed on the component to be mounted, and one end of the motor push rod farther from the control device is connected to the linkage mechanism 20. Of course, according to actual requirements, the first drive portion 10 may be a structure that can achieve a driving effect, such as a cylinder or a hydraulic cylinder.

As shown in FIGS. 1A, 1B and 2, in the embodiment of the present application, the linkage mechanism 20 includes a first link 21 and a second link 22. One end of the first link 21 is pivotally connected to the main rack 60 through, for example, a rotary shaft 30, and the first link 21 is drivingly connected to the first drive portion 10; one end of the second link 22 is pivotally connected to the other end of the first link 21 through, for example, a first connecting shaft 50, and the other end of the second link 22 is pivotally connected to the flip bracket 70 through, for example, a third connecting shaft 25. The flip bracket 70 is pivotally connected to the main rack 60 through, for example, a pin shaft 73. A spacing exists between the pin shaft 73 and the third connecting shaft 25.

In the preceding arrangement, the first drive portion 10 drives the first link 21 through, for example, shortening or extending the first drive portion, so that the first link 21 and the second

link 22 rotate relative to each other around a pivot point between the first link 21 and the second link 22, and one end of the first link 21 farther from the second link 22 can approach or move away from one end of the second link 22 farther from the first link 21, that is to say, the main rack 60 can approach or move away from the flip bracket 70. Since the main rack 60 is pivotally
5 connected to the flip bracket 70, the main rack 60 and the flip bracket 70 can rotate relative to each other around the pin shaft 73, thereby achieving the automatic flip of the flip bracket 70 relative to the main rack 60.

Preferably, the second link 22 includes two joint bearings and a second connecting shaft. The two joint bearings are connected through the second connecting shaft. Each of two ends of the
10 second connecting shaft is provided with an external thread. One end of each of the two joint bearings is provided with an internal thread that is mated with the external thread. The two joint bearings are threaded to the two ends of the second connecting shaft in a one-to-one correspondence. One end of one of the two joint bearings farther from the second connecting shaft is pivotally connected to the first link 21. One end of the other one of the two joint
15 bearings farther from the second connecting shaft is pivotally connected to the flip bracket 70 through, for example, the third connecting shaft 25.

As shown in FIGS. 1A, 1B and 2, in the embodiment of the present application, the first link 21 includes a first rod segment 23 and a second rod segment 24. One end of the first rod segment 23 is pivotally connected to the main rack 60 through the rotary shaft 30, the other end of the
20 first rod segment 23 is connected to the second rod segment 24, the other end of the second rod segment 24 is pivotally connected to the first drive portion 10, and the first link 21 is pivotally connected to one end of the second link 22 through the first connecting shaft 50 at a position where the first rod segment 23 and the second rod segment 24 are connected.

In the preceding arrangement, the first drive portion 10 drives the second rod segment 24, and
25 driven by the second rod segment 24, the first rod segment 23 and the second link 22 can rotate relative to each other around a pivot point (the first connecting shaft 50) between the first rod

segment 23 and the second link 22 so that one end of the first rod segment 23 farther from the second link 22 approaches or moves away from one end of the second link 22 farther from the first rod segment 23, thereby achieving the rotation of the flip bracket 70 around the pin shaft 73 relative to the main rack 60 and the automatic flip of the flip bracket 70 relative to the main rack 60.

In addition, during the relative rotation of the first rod segment 23 and the second link 22, a case where an included angle between the first rod segment 23 and the second link 22 is 180° exists. In this case, the first rod segment 23 and the second link 22 are in a straight line and at a "dead point" position, and the relative position of the first rod segment 23 and the second link 22 is stable so that the relative position of the main rack 60 and the flip bracket 70 can be stable. In the actual production process, the flip bracket 70 needs to be capable of being flipped relative to the main rack 60, that is, the included angle between the first rod segment 23 and the second link 22 is allowed to change within a certain range and not always 180° . Therefore, a force needs to be applied to the first rod segment 23 or the second link 22 so that the first rod segment 23 and the second link 22 can rotate relative to each other, and the included angle between the first rod segment 23 and the second link 22 changes. To break the "dead point" between the first rod segment 23 and the second link 22, a relatively large force needs to be applied. In the present application, the second rod segment 24 is designed to be similar to a crank structure, and the "dead point" between the first rod segment 23 and the second link 22 can be easily destroyed through the second rod segment 24 so that the relative rotation between the first rod segment 23 and the second link 22 easily occurs, that is to say, the flip bracket 70 can be flipped relatively easily relative to the main rack 60.

Preferably, an included angle exists between an axis of the first rod segment 23 and an axis of the second rod segment 24 so that the second rod segment 24 is bent relative to the first rod segment 23. Preferably, the included angle between the axis of the first rod segment 23 and the axis of the second rod segment 24 is 135° .

Preferably, the first rod segment 23 and the second rod segment 24 are fixedly connected. Preferably, the first rod segment 23 and the second rod segment 24 are integrally formed. Of course, according to actual requirements, the first rod segment 23 and the second rod segment 24 can also be arranged separately, and the first rod segment 23 and the second rod segment 24 are connected through welding or clamping or other manners that can achieve fixed connection.

Preferably, the motor push rod of the first drive portion 10 is pivotally connected to the second rod segment 24 through a hinge pin (not numbered in the figure).

As shown in FIG. 1A, in the embodiment of the present application, the flip device may include two linkage mechanisms 20 arranged symmetrically on the left and right and may further include the preceding rotary shaft 30. The rotary shaft 30 is connected to two first links 21 of the two linkage mechanisms 20. Two ends of the rotary shaft 30 along an axial direction thereof are both pivotally connected to the main rack 60. The two linkage mechanisms 20 are arranged at intervals along the axial direction of the rotary shaft 30.

In the preceding arrangement, both the two linkage mechanisms 20 are pivotally connected to the main rack 60 through one rotary shaft 30. Moreover, since the two linkage mechanisms 20 are both connected to the rotary shaft 30, the two linkage mechanisms 20 can move synchronously (including but not limited to movement in the same direction and amplitude) through the rotary shaft 30 so that the relative rotation between the main rack 60 and the flip bracket 70 is more stable, that is to say, the flip of the flip bracket 70 relative to the main rack 60 is more stable.

Of course, in an alternative embodiment not shown in the drawings of the present application, the flip device may also be configured to include one or at least three linkage mechanisms 20 according to actual requirements, where the at least three linkage mechanisms 20 are, for example, all connected to the rotary shaft 30, and the at least three linkage mechanisms 20 are arranged at intervals along the axial direction of the rotary shaft 30.

Preferably, one end of the first link 21 of the linkage mechanism 20 is connected with the rotary shaft 30, so as to achieve the connection between the linkage mechanism 20 and the rotary shaft 30. Preferably, one end of the first link 21 is fixedly connected to the rotary shaft 30. Preferably, the first link 21 is provided with a first through hole, the rotary shaft 30 passes through the first through hole, and the rotary shaft 30 is mated with the first through hole on the first link 21 so that the first link 21 is fixed connected to the rotary shaft 30. Preferably, the first through hole may be a round hole with a keyway, a key mated with the keyway is provided on a circumferential sidewall of the rotary shaft 30, and the rotary shaft 30 is snap-fitted with the first through hole so that the rotary shaft 30 is fixedly connected to the first link 21. Of course, the first link 21 and the rotary shaft 30 may also be connected through welding or clamping or other manners that can achieve fixed connection.

Preferably, the main rack 60 is provided with two coaxial mounting holes, and two ends of the rotary shaft 30 pass through the first through hole on the first link 21 and then are mated with the two mounting holes, so as to pivotally connect the rotary shaft 30 to the main rack 60.

Preferably, the two linkage mechanisms 20 are evenly spaced along the axial direction of the rotary shaft 30. This arrangement can ensure the uniformity of a force between the two linkage mechanisms 20 and the rotary shaft 30, thereby ensuring the stability of the flip of the bracket 70 to be flipped relative to the main rack 60.

As shown in FIGS. 1A and 2, in the embodiment of the present application, the flip device further includes the first connecting shaft 50, and the first link 21 is pivotally connected to the second link 22 through the first connecting shaft 50. The pivotal connection between the first link 21 and the second link 22 is achieved through the first connecting shaft 50.

As shown in FIGS. 1A and 2, in the embodiment of the present application, the two first links 21 of the two linkage mechanisms 20 are both connected to the first connecting shaft 50, and two second links 22 of the two linkage mechanisms 20 are both connected to the first

connecting shaft 50. The two linkage mechanisms 20 can move synchronously through the first connecting shaft 50, thereby further improving the synchronism of the linkage mechanisms 20 and making the flip of the flip bracket 70 relative to the main rack 60 more stable.

Preferably, the first link 21 is fixedly connected to the first connecting shaft 50. Preferably, the first link 21 is provided with a second through hole, the first connecting shaft 50 passes through the second through hole, and the first connecting shaft 50 is mated with the second through hole on the first link 21 so that the first connecting shaft 50 is fixedly connected to the first link 21. Preferably, the second through hole may be a flat hole, two ends of the first connecting shaft 50 are both flat shaft segments that are mated with the flat hole, and the flat shaft segments are mated with the flat hole (for example, interference fit or snap connection) so that the first connecting shaft 50 is fixedly connected to the first link 21. Of course, the first link 21 and the first connecting shaft 50 may also be connected through welding or clamping or other manners that can achieve fixed connection.

Preferably, two ends of the first connecting shaft 50 are pivotally connected to the second link 22 after passing through the second through hole on the first link 21.

Preferably, in the embodiment of the present application, a ratio of a length of the first rod segment 23 of the first link 21 along an axial direction thereof to a length of the second link 22 along an axial direction thereof is greater than or equal to 1.9 and less than or equal to 2.2. It is to be understood that a ratio of a linear distance between the rotary shaft 30 and the first connecting shaft 50 to a linear distance between the first connecting shaft 50 and the third connecting shaft 25 is greater than or equal to 1.9 and less than or equal to 2.2.

In the case where the ratio of the length of the first rod segment 23 of the first link 21 along the axial direction thereof (a linear distance between the pivot point between the first link 21 and the main rack 60 and the pivot point between the first link 21 and the second link 22) to the length of the second link 22 along the axial direction thereof (a linear distance between pivot

points at two ends of the second link 22) is less than 1.9, the first link 21 rotates by a certain angle and the first link 21 drives the second link 22 so that the second link 22 rotates at a relatively small angle, and a flip angle of the flip bracket 70 relative to the main rack 60 is relatively small. In the case where the ratio of the length of the first rod segment 23 of the first link 21 along the axial direction thereof to the length of the second link 22 along the axial direction thereof is greater than 2.2, a length difference between the first link 21 and the second link 22 is relatively large so that the operability of the linkage mechanism 20 is reduced and structural dimensions of the main rack 60 and the flip bracket 70 are more strictly required, resulting in the reduction of the adaptability of the linkage mechanism 20. In the case where the ratio of the length of the first rod segment 23 of the first link 21 along the axial direction thereof to the length of the second link 22 along the axial direction thereof is greater than or equal to 1.9 and less than or equal to 2.2, not only can the larger-angle flip of the flip bracket 70 relative to the main rack 60 be achieved in the case where the first link 21 rotates by a certain angle, but also the operability and adaptability of the linkage mechanism 20 can be improved.

Preferably, in the embodiment of the present application, the length of the first rod segment 23 of the first link 21 along the axial direction thereof is 345 mm, and the length of the second link 22 along the axial direction thereof is 165 mm. Preferably, an error of the ratio of the length of the first rod segment 23 of the first link 21 along the axial direction thereof to the length of the second link 22 along the axial direction thereof is within a range of $\pm 5\%$. Preferably, in the embodiment of the present application, a swing angle of the first rod segment 23 of the first link 21 around a rotational center of the rotary shaft 30 is $38^\circ \pm 3^\circ$; and through the swing of the first rod segment 23, the flip bracket 70 can be flipped relative to the main rack 60 by an angle of $154^\circ \pm 3^\circ$. It is to be noted that the swing angle of the first rod segment 23 refers to an angle by which the first rod segment 23 can swing with the first rod segment 23 at the "dead point" position as a starting point; and the flip angle of the flip bracket 70 relative to the main rack 60 refers to an angle by which the flip bracket 70 can be flipped relative to the main rack 60 with a position of the flip bracket 70 relative to the main rack 60 as a starting point when the first rod

segment 23 is at the "dead point" position.

The applicant found that a semi-automatic floor grinding device currently operated manually has a center of gravity of the whole machine at a grinding disc at the front end, so when a grinding bit needs to be replaced, two or more operators are required to cooperate to tip the whole machine to the rear, manually flip the flip bracket 70 (referring to the label of the solution of the present application provided in FIG. 1A), lift the grinding disc 91 through the pressing contact between the first support wheel 130 of the flip bracket 70 and the ground, and expose a part for mounting the grinding bit so that the grinding bit can be replaced. When the grinding device needs to be used for operation, a drive motor of the grinding disc is started first. When the motor drives the grinding disc to make the grinding disc reach an appropriate rotational speed, the flip bracket 70 is manually flipped so as to lift the first support wheel 130 so that the grinding disc 91 can be in contact with a floor plane, and finally the floor grinding device can be operated normally. When the rotation of the grinding disc needs to be stopped, the flip bracket 70 needs to be manually flipped again so as to lower the first support wheel 130 and lift the grinding disc off the ground to stop the drive motor of the grinding disc. Otherwise, it is easy to cause the motor to stall and damage the motor. The preceding process also requires two operators to work together, and the preceding process has the following problems: inconvenient operation, easily-caused safety accidents during the operation, and relatively low efficiency of manual operation.

In view of the preceding problems, the present application and the embodiments of the present application further provide a grinding robot, such as a floor grinding robot.

As shown in FIGS. 1A to 5, in the embodiment of the present application, the grinding robot includes a main rack 60, a flip bracket 70, and a flip device. The flip bracket 70 is pivotally connected to the main rack 60. The flip device is the preceding flip device. The main rack 60 forms the preceding component to be mounted, and the flip bracket 70 forms the component to be flipped.

In the preceding arrangement, the automatic flip of the flip bracket 70 relative to the main rack 60 can be achieved through the flip device, thereby replacing the operation mode of manually flipping the flip bracket and the support wheel, improving the efficiency, and improving the degree of automation and mechanization of the grinding robot.

- 5 In addition, since the grinding robot in the present application has the flip device in the present application, the grinding robot in the present application also has the preceding advantages of the flip device in the present application, and the preceding advantages are not repeated here.

Preferably, two third connecting shafts 25 are provided on the flip bracket 70, a third through hole is provided at one end of the second link 22 of the flip device that is connected to the flip
10 bracket 70, and the third connecting shaft 25 is mated with the third through hole, thereby achieving the pivotal connection between the flip bracket 70 and the second link 22.

Preferably, as shown in FIG. 3, in the embodiment of the present application, the flip bracket 70 includes a bracket body 71 and a connecting portion 72 connected to the bracket body 71, where the bracket body 71 is a frame structure in an inverted triangular shape. The two third
15 connecting shafts are coaxially welded and fixed on an inner side of the connecting portion 72. The connecting portion 72 is provided with two pairs of concentric circular holes. Distances between the two pairs of concentric circular holes and the third connecting shafts are different. A pair of concentric circular holes closer to the third connecting shafts is used for the pivotal connection between the flip bracket 70 and the main rack 60, and the other pair of concentric
20 circular holes is used as spare holes for manually inserting a safety pin. Preferably, the bracket body 71 is a one-piece weldment.

As shown in FIGS. 1A, 2, 4 and 5, in the embodiment of the present application, the grinding robot further includes a grinding mechanism 90 and a second drive portion 100, where the grinding mechanism 90 is pivotally connected to the main rack 60, the second drive portion 100
25 is disposed on the main rack 60, and the second drive portion 100 is drivingly connected to the

grinding mechanism 90 so that the grinding mechanism 90 is rotatably disposed relative to the main rack 60.

5 In the preceding arrangement, the second drive portion 100 drives the grinding mechanism 90 so that the grinding mechanism 90 can rotate relative to the main rack 60, and the grinding mechanism 90 can be lifted off the ground or in contact with the floor plane, thereby facilitating the opening or closing of the grinding mechanism 90.

10 Preferably, the second drive portion 100 may be an electric push rod. Preferably, the second drive portion 100 includes a motor push rod and a control device connected to the motor push rod, where the control device is disposed on the main rack 60, and one end of the motor push rod farther from the control device is connected to the linkage mechanism 90. Of course, according to actual requirements, the second drive portion 100 may be a structure that can achieve a driving effect, such as a cylinder or a hydraulic cylinder.

15 Preferably, the grinding mechanism 90 includes a grinding disc 91 and a fourth drive portion 92 drivingly connected to the grinding disc 91; where when the fourth drive portion 92 drives the grinding disc 91 to rotate, a grinding function of the grinding mechanism 90 can be achieved. Preferably, the fourth drive portion 92 may be a motor.

20 As shown in FIGS. 1A and 2, in the embodiment of the present application, the grinding robot may further include a second bracket 110 (in conjunction with FIG. 7), where one end of the second bracket 110 is pivotally connected to the main rack 60, the other end of the second bracket 110 is connected to the grinding mechanism 90, and the second drive portion 100 is drivingly connected to the second bracket 110 so that the second bracket 110 is rotatably disposed relative to the main rack 60.

In the preceding arrangement, through the second bracket 110, the pivotal connection between the grinding mechanism 90 and the main rack 60 is achieved, and the second drive portion 100

drives the second bracket 110 so that the second bracket 110 can rotate relative to the main rack 60, and driven by the second bracket 110, the grinding mechanism 90 can rotate relative to the main rack 60, so as to make the grinding mechanism 90 lifted off the ground or in contact with the floor plane, thereby facilitating the opening or closing of the grinding mechanism 90.

5 As shown in FIGS. 1A, 2 and 4, in the embodiment of the present application, the grinding robot further includes a moving mechanism 120 disposed at a bottom of the main rack 60, where the moving mechanism 120 includes two moving wheels 121 and a third drive portion 122 drivingly connected to the moving wheels 121.

10 In the preceding arrangement, the moving mechanism 120 can drive the main rack 60 to move, thereby achieving walking and moving functions of the grinding robot. Specifically, the moving wheels 121 are rotatably disposed relative to the main rack 60, and the third drive portion 122 drives the moving wheels 121 to rotate, thereby achieving the walking and moving functions of the moving mechanism 120.

15 Of course, in an alternative embodiment not shown in the drawings of the present application, the moving mechanism 120 may also be configured to include one or at least three moving wheels 121 according to actual requirements.

20 Preferably, third drive portions 122 are arranged in a one-to-one correspondence with the moving wheels 121, and each third drive portion 122 drives a corresponding moving wheel 121 to rotate. Of course, according to actual requirements, at least part of multiple moving wheels 121 are set to be drive wheels, and the third drive portions 122 are drivingly connected to the drive wheels. Preferably, the third drive portion 122 may be a motor.

As shown in FIGS. 1A, 2 and 5, in the embodiment of the present application, the grinding robot further includes a first support wheel 130 connected to the flip bracket 70, where the first support wheel 130 is rotatably disposed relative to the flip bracket 70, and the first support

wheel 130 is disposed at one end of the flip bracket 70 farther from the pivot point between the flip bracket 70 and the main rack 60.

In the preceding arrangement, when the flip bracket 70 is put down, the first support wheel 130 is in contact with the floor plane, the first support wheel 130 is mated with the moving wheels 121 so as to support the flip bracket 70, the main rack 60 and other devices on the main rack 60, and the first support wheel 130 is mated with the moving wheels 121 so as to achieve a stable support function. The first support wheel 130 is rotatable relative to the flip bracket 70 and can achieve the walking and moving functions of the grinding robot.

Preferably, the first support wheel 130 is connected to the flip bracket 70 through a retaining member. Preferably, the retaining member may be a bolt or a screw. Preferably, the first support wheel 130 is fastened to a mounting plate disposed at one end of the bracket body 71 of the flip bracket 70 farther from the connecting portion 72 by the screw.

As shown in FIG. 1A, 2, 4 and 5, in the embodiment of the present application, under the action of the flip device, the flip bracket 70 has a first state in which the flip bracket 70 is folded relative to the main rack 60 and a second state in which the flip bracket 70 is extended relative to the main rack 60. In the case where the flip bracket 70 is in the first state, projections of the flip bracket 70 and the first support wheel 130 disposed on the flip bracket 70 on the grinding disc 91 of the grinding mechanism 90 are within a region where a surface of the grinding disc 91 is located.

An action process of the flip bracket 70 of the grinding robot according to embodiment one of the present application is described below in conjunction with FIGS. 1C and 1D.

Referring to FIG. 1C, when the motor push rod of the first drive portion 10 is extended, the flip bracket 70 is put down, and at this time, axes of the first link 21 and the second link 22 are basically coincident (the two are straightened and collinear) and remain stable under the action

of a thrust of the motor push rod of the first drive portion 10, thereby ensuring that the first support wheel 130 is grounded and the grinding robot can move normally.

Referring to FIG. 1D, when the electric push rod of the first drive portion 10 is retracted, under a pulling force of the electric push rod of the first drive portion 10, the straightened and collinear state of the first link 21 and the second link 22 is broken so that the flip bracket 70 is flipped around the pin shaft 73, thereby lifting the flip bracket 70.

In the preceding arrangement, when the flip bracket 70 is in the first state, the flip bracket 70 is flipped relative to the main rack 60 by a relatively large angle, and the projections of the flip bracket 70 and the first support wheel 130 on the grinding disc 91 are within the region where the surface of the grinding disc 91 is located. In this manner, when the grinding disc 91 performs a grinding operation, the problem that an operation range of the grinding disc 91 is limited due to the flip bracket 70 being disposed in front of the grinding disc 91 can be avoided so that the grinding disc 91 can be close to the foot of the wall to perform grinding in regions such as the foot of the wall and the wall corner, thereby improving the grinding coverage of the floor grinding robot and expanding the operation range of the grinding disc 91.

It is to be noted that when the first rod segment 23 and the second link 22 are at the "dead point" position, the flip bracket 70 is in the second state relative to the main rack 60, and the swing angle of the first rod segment 23 and the flip angle of the flip bracket 70 relative to the main rack 60 are both based on the preceding position as a starting point. When the first rod segment 23 is at the maximum swing angle (in the embodiment of the present application, the maximum swing angle is $38^{\circ} \pm 3^{\circ}$) and the flip bracket 70 is at the maximum flip angle relative to the main rack 60 (in the embodiment of the present application, the maximum flip angle is $154^{\circ} \pm 3^{\circ}$), the flip bracket 70 is in the first state. In this case, the flip angle of the flip bracket 70 relative to the main rack 60 is the maximum, and orthographic projections of the flip bracket 70 and the first support wheel 130 in a vertical direction are within an orthographic projection of the grinding disc 91 in the vertical direction (as shown in FIG. 5).

As shown in FIG. 1A, when the first drive portion 10 is fully extended, the first support wheel 130 keeps a grounded posture, and at this time, the floor grinding robot can control the retraction of the second drive portion 100 to lift the grinding disc 91, so as to achieve the automatic moving or remote-controlled moving of the floor grinding robot in a non-grinding operation state. As shown in FIG. 2, when the second drive portion 100 is fully extended so that the grinding disc 91 is lowered to be in contact with the ground, the first support wheel 130 is separated from the ground and suspended in the air. At this time, the retraction of the first drive portion 10 enables the flip bracket 70 to rotate around the pivot point between the flip bracket 70 and the main rack 60 so that the flip bracket 70 can be flipped by a large angle and lifted, thereby achieving the automatic flip of the first support wheel 130. In the case where the first support wheel 130 is flipped and lifted, since two moving wheels 121 and the grinding disc 91 are grounded, forming a three-point grounded state, it can be ensured that the floor grinding robot can smoothly perform the automatic grinding operation.

Preferably, in the embodiment of the present application, the grinding robot further includes a navigation module, where the navigation module is configured to guide the movement of the grinding robot so that the grinding robot can be positioned accurately, the grinding robot can be prevented from colliding with an external device, the wall or other structures, and problems such as structural damage are avoided.

Embodiment two

Differences between embodiment two of the present application and embodiment one of the present application are described below.

1. In embodiment one of the present application, the first link 21 of the flip device includes the first rod segment 23 and the second rod segment 24 that are connected to each other, where one end of the second rod segment 24 farther from the first rod segment 23 is pivotally connected to the first drive portion 10, the first link 21 is pivotally connected to one end of the second link 22

at a position where the first rod segment 23 and the second rod segment 24 are connected, and one end of the first rod segment 23 farther from the second rod segment 24 is connected to the rotary shaft 30 (as shown in FIGS. 1A and 1B).

However, in embodiment two of the present application, the first link 21 of the flip device may include only the first rod segment 23 (the first rod segment 23 in embodiment two may have the same structure as the first rod segment 23 in embodiment one) and does not include the second rod segment 24 of the first link 21 in embodiment one; the flip device may further include a crank 40 connected to the rotary shaft 30, the rotary shaft 30 is fixedly connected to the first rod segment 23, one end of the first rod segment 23 farther from the rotary shaft 30 is pivotally connected to the second link 22, and the first drive portion 10 is drivingly connected to the crank 40 (as shown in FIGS. 6 and 7) so that the crank 40 drives the rotary shaft 30 and the first link 21 to swing relative to the main rack 60; and the first drive portion 10 is pivotally connected to the crank 40. In this manner, when driven by the first drive portion 10, the crank 40 can drive the rotary shaft 30 to rotate, thereby driving the first link 21 to swing.

The flip device in embodiment one of the present application has one first connecting shaft 50, where the first connecting shaft 50 is a long shaft. Two ends of the same first connecting shaft 50 pass through two first links 21 and then are connected to two second links 22 so that the two first links 21 are both fixedly connected to the same first connecting shaft 50, and the two second links 22 are both pivotally connected to the same first connecting shaft 50 (as shown in FIGS. 1A and 2). The flip device in embodiment two of the present application may have two first connecting shafts 50, where the two first connecting shafts 50 are both short shafts. Two first links 21, the two first connecting shafts 50 and two second links 22 are arranged in a one-to-one correspondence, the first link 21 is fixedly connected to the first connecting shaft 50, and the second link 22 is pivotally connected to the first connecting shaft 50; the two relatively short first connecting shafts 50 are provided so as to connect the two first links 21 to the two second links 22 in a one-to-one correspondence, thereby avoiding interference and making the first links 21 and the second links 22 move smoothly relative to the main rack 60.

Remaining structures of the flip device in embodiment two of the present application are basically the same as those in embodiment one of the present application and are not repeated here.

2. In embodiment one of the present application, the flip device of the grinding robot is disposed
5 on an inner side of the main rack 60 (as shown in FIG. 1A). In embodiment two of the present application, the flip device of the grinding robot may be disposed on an outer side of the main rack 60 (as shown in FIG. 6), the rotary shaft 30 is pivotally connected to the main rack 60, and the rotary shaft 30 passes through the main rack 60 and is fixedly connected to the first link 21. Two third connecting shafts on the flip bracket 70 are coaxially welded and fixed on an outside
10 of the connecting portion 72. In embodiment two of the present application, when the first drive portion 10 is retracted, the flip bracket 70 is in the second state relative to the main rack 60 (as shown in FIG. 6); and when the first drive portion 10 is extended, the flip bracket 70 is in the first state relative to the main rack 60 (as shown in FIG. 7). FIG. 8 is a perspective view illustrating connection between the flip bracket 70 and the first support wheel 130 of the
15 grinding robot in FIGS. 6 and 7.

3. In embodiment two of the present application, the grinding robot further includes a first limiting column 81 and a second limiting column 82 (as shown in FIGS. 6 and 7) that are arranged on the main rack 60 at intervals. The first link 21 is provided with a protruding finger 219 between the first limiting column 81 and the second limiting column 82, where the
20 protruding finger 219 is configured to limit limit positions where the first link 21 of the linkage mechanism 20 swings relative to the main rack 60 in a front and rear direction. Through the preceding arrangement, the swing angle of the first link 21 relative to the main rack 60 can be controlled within a certain range, and the following problem can be avoided: since the swing angle of the first link 21 is too large, the first link 21 and the second link 22 are stuck so that the
25 flip bracket 70 cannot be flipped relative to the main rack 60.

Preferably, in the embodiment of the present application, the swing angle of the first link 21 is

controlled within a range of $45^{\circ} \pm 2^{\circ}$ through the first limiting column 81, the second limiting column 82 and the protruding finger, thereby avoiding the problem that the first link 21 and the second link 22 are stuck. Through the preceding arrangement, an included angle between the first link 21 and the second link 22 cannot reach 180° , thereby avoiding the following problem:

5 the first link 21 and the second link 22 are at the "dead point" position, and the first link 21 and the second link 22 are relatively difficult to rotate relative to each other, that is, the flip bracket 70 is relatively difficult to be flipped relative to the main rack 60.

Of course, in an alternative embodiments not shown in the drawings of the present application, according to actual requirements, only the first limiting column 81 may be provided on the main rack 60, so as to limit a limit position where the first link 21 of the linkage mechanism 20 swings backward relative to the main rack 60; or only the second limiting column 82 is provided on the main rack 60, so as to limit a limit position where the first link 21 of the linkage mechanism 20 swings forward relative to the main rack 60.

10

It is to be noted that, as shown in FIG. 6, in the embodiment of the present application, "front" refers to a forward direction of the grinding robot, that is, a side where the flip bracket 70 of the grinding robot is located, and "rear" is opposite to "front", that is, a side of the main rack 60 farther from the flip bracket 70.

15

Remaining structures of the grinding robot in embodiment two of the present application are basically the same as those in embodiment one of the present application and are not repeated here.

20

The grinding robot in the embodiment of the present application has the advantages described below.

1. A deformation mechanism of a four-bar hinge mechanism is flexibly used (in the embodiment of the present application, the main rack 60, the first rod segment 23, the second link 22 and the

flip bracket 70 are connected to form the deformation mechanism of the four-bar hinge mechanism). One first drive portion 10 drives the second rod segment 24 of the first link 21 or the crank 40, that is, achieves the automatic flip of the first support wheel 130 and the flip bracket 70. Through the preceding arrangement, on the one hand, the degree of human intervention in the operation of the floor grinding robot is minimized as much as possible, and the automation, mechanization and operation safety of the floor grinding robot are improved, which is conducive to the development of the floor grinding robot towards full automation and intelligence; on the one hand, the flip device is simple in structure, easy to operate and implement, and has low cost.

2. The first link 21 is configured to be a long link structure, and the second link 22 is configured to be a short link structure. When driven by the first drive portion 10, the first link 21 swings actively so that in the case where swing angles of the first rod segment 23 of the first link 21 and the first drive portion 10 are both relatively small, the flip bracket 70 can be flipped by a large angle of more than 90° , so as to achieve the flip of the first support wheel 130 by a large angle.

3. Since the flip bracket 70 (dimensions in an up and down direction in FIG. 5) has a relatively large span of left and right dimensions and is flipped coaxially, in the present application, one flip device is provided at each of left and right sides of the flip bracket 70, and two flip devices are symmetrically arranged along the axial direction of the rotary shaft 30 and are both fixedly connected to the rotary shaft 30. One first drive portion 10 drives the flip device on one side, so as to achieve synchronous driving of the flip devices at two sides, thereby eliminating uneven forces in the case of unilaterally driven rotation and improving the reliability of the flip devices.

4. In embodiment one of the present application, the mechanism characteristic that the "dead point" exists in the four-bar hinge mechanism is used. When the motor push rod of the first drive portion 10 is fully extended, the first rod segment 23 and the second link 22 of the four-bar hinge mechanism are at a straightened and collinear "dead point" position. At this time,

the first support wheel 130 is in a posture in which the first support wheel 130 is in contact with the ground and can move, and the first rod segment 23 and the second link 22 are at the "dead point" position, thereby ensuring the stability of the state of the first support wheel 130 in this posture and ensuring that the floor grinding robot can move normally.

- 5 5. The flip device can flip the first support wheel 130 and the flip bracket 70 to a maximum outer diameter range of the grinding disc 91, achieve the large-angle flip of the first support wheel 130 and ensure that the grinding disc 91 does not encounter any protrusion of the bracket structure in a moving direction of the floor grinding robot in operation so that the grinding disc 91 can be close to the foot of the wall to perform grinding in regions such as the foot of the wall
10 and the wall corner, thereby improving the grinding coverage of the floor grinding robot.

From the preceding description, it can be seen that the preceding embodiments of the present application achieve the technical effects described below. The first drive portion drives the linkage mechanism. The linkage mechanism is pivotally connected to the main rack 60, the linkage mechanism is pivotally connected to the flip bracket 70, the main frame 60 is pivotally
15 connected to the flip bracket 70, and a spacing exists between the pivot point between the flip bracket 70 and the main rack 60 and the pivot point between the flip bracket 70 and the linkage mechanism. Therefore, driven by the first drive portion, the linkage mechanism can achieve the flip of the flip bracket 70 relative to the main rack 60 so that the linkage mechanism has the first state and the second state and can be switched between the first state and the second state.
20 Through the preceding arrangement, the automatic flip of the flip bracket 70 relative to the main rack 60 can be achieved, thereby replacing the manual flip operation mode and overcoming problems such as low efficiency caused by manual operation.

Embodiment three

The embodiment of the present application provides an electrical device that needs to use a
25 relatively long cable.

Exemplarily, the electrical device is a floor grinding robot 1000. Driven by the moving wheels 121 of the moving mechanism, the grinding robot 1000 polishes or grinds the floor through a machine bit. Since the grinding robot 1000 needs to operate on a large area, the grinding robot 1000 moves to different operation positions so that lengths of a cable 400 required between the grinding robot 1000 and a power supply are different. Therefore, the cable 400 of tens of meters or even hundreds of meters needs to be provided between the grinding robot 1000 and the power supply to satisfy construction requirements. The cable 400 between the grinding robot 1000 and the power supply is bent downward relative to the grinding robot 1000 due to the gravity of the cable 400. The greater a distance between the grinding robot 1000 and the power supply, the higher the position of the cable 400 on the grinding robot 1000, and the greater the bending degree of the cable 400, causing the cable 400 to be easily broken. When the grinding robot 1000 turns around or turns, a circumferential wall of the cable 400 is bent at a corner relative to the grinding robot 1000, resulting in the too large friction and causing the cable 400 to be easily worn.

As shown in FIGS. 9, 10 and 11, the grinding robot 1000 includes a main rack 60, a loading rack 30a, a moving mechanism, a grinding mechanism 90, a cable 400 and a wire arrangement device 500. The grinding mechanism 90 is configured to grind the floor, the wire arrangement device 500 is configured to take up and pay off the cable 400, and the cable 400 may be wound onto a reel 401. The grinding mechanism 90 and the wire arrangement device 500 are both mounted on the loading rack 30a. Driven by the moving wheels 121 of the moving mechanism, the grinding robot 1000 moves to different positions on the floor for grinding. The moving mechanism may include a motor that drives the moving wheels 121 to rotate. The loading rack 30a is provided with a second support wheel 301.

In this embodiment, the wire arrangement device 500 includes a linear drive mechanism (not shown in the figure), a motor (not shown in the figure), a reel (not shown in the figure) and a wire guiding mechanism. The motor is mounted on the loading rack 30a of the grinding robot 1000, the motor is configured to drive the reel 401 to take up and pay off the cable 400, and one

end of the cable 400 wound onto the reel is connected to the power supply under the guidance of the wire guiding mechanism.

As shown in FIGS. 10 and 12, the wire guiding mechanism includes a mount 510, multiple wire outlet rollers, and two wire-passing assemblies 570.

5 As shown in FIG. 12, each wire outlet roller is mounted on the mount 510, and the wire outlet rollers enclose a wire outlet hole 560 for the cable 400 to pass through. One end of the cable 400 wound onto the reel passes through the wire outlet hole 560 and is connected to the power supply. A circumferential wall of each wire outlet roller is used for being in contact with the circumferential wall of the cable 400. In the case where the cable 400 is in the wire outlet hole 10 560, a circumferential wall of at least one wire outlet roller is in contact with the circumferential wall of the cable 400; and in the case where the cable 400 moves in the wire outlet hole 560, when driven by the cable 400, the wire outlet roller in contact with the circumferential wall of the cable 400 can rotate around an axis of the wire outlet roller. In this manner, during a moving process of the grinding robot 1000, the cable 400 moves relative to the circumferential wall of 15 the wire outlet roller, thereby reducing the friction and wear between the cable 400 and the loading rack 30a.

In this embodiment, the wire guiding mechanism includes four wire outlet rollers. Referring to FIG. 12, the four wire outlet rollers are an upper wire outlet roller 520 and a lower wire outlet roller 530 that are located in an up and down direction, and a left wire outlet roller 540 and a 20 right wire outlet roller 550 that are located in a left and right direction. In the case where the cable 400 is in the wire outlet hole 560, in a process of the grinding robot 1000 moves normally in a straight line, the cable 400 is under the action of gravity, and the circumferential wall of the cable 400 is at least in contact with a circumferential wall of the lower wire outlet roller 530. In the case where the grinding robot 1000 turns around or turns, the circumferential wall of the 25 cable 400 can be in contact with the circumferential wall of the left wire outlet roller 540 or the circumferential wall of the right wire outlet roller 550 so that in a process of the grinding robot

1000 turning around or turning, the friction and wear of the cable 400 at a corner are less, and the cable 400 forms a relatively large angle in a tangential direction of the left wire outlet roller 540 or the right wire outlet roller 550 so that the left wire outlet roller 540 and the right wire outlet roller can bend the cable 400 into an arc at the corner, so as to avoid cable breakage caused by direct bending of the cable 400 at the corner to form an included angle of 90° .

If diameters of the left wire outlet roller 540, the right wire outlet roller 550 and the lower wire outlet roller 530 are too small, when the grinding robot 1000 turns or turns around, the cable 400 is equivalent to being strangled on the corresponding wire outlet roller, resulting in greater resistance in a process of taking up and paying off the wire. Therefore, the diameters of the left wire outlet roller 540, the right wire outlet roller 550 and the lower wire outlet roller 530 may be set to be relatively large dimensions. In this embodiment, the diameters of the left wire outlet roller 540, the right wire outlet roller 550 and the lower wire outlet roller 530 are all greater than a diameter of the upper wire outlet roller 520. The upper wire outlet roller 520 has less contact with the cable 400, so the diameter of the upper wire outlet roller 520 may be relatively small; while the lower wire outlet roller 530, the left wire outlet roller 540 and the right wire outlet roller 550 have more contact and friction with the cable 400, so the diameters of the lower wire outlet roller 530, the left wire outlet roller 540 and the right wire outlet roller 550 may be relatively great. In this structure, the diameters of the lower wire outlet roller 530, the left wire outlet roller 540 and the right wire outlet roller 550 are significantly increased (generally, the diameter of the upper wire outlet roller 520 is about 10 mm; in this structure, the diameter of the lower wire outlet roller 530 may be 100 mm, and the diameters of the left wire outlet roller 540 and the right wire outlet roller 550 may be 50 mm). Therefore, when the grinding robot 1000 turns or turns around, a bending radius of the cable 400 can be increased, so as to reduce the friction with the wire outlet roller, thereby paying off the wire more smoothly.

Further, radii of the left wire outlet roller 540, the right wire outlet roller 550 and the lower wire outlet roller 530 are all greater than the bending radius of the cable 400 so that when the cable 400 is bent to the left or to the right or downward, the cable 400 is in contact with the wire

outlet roller, which is conducive to reducing the wear between the cable 400 and the wire outlet roller, thereby paying off the cable 400 at a wire outlet more smoothly. The bending radius is a degree to which the cable 400 needs to be bent due to a U-turn amplitude and a turning amplitude of the electrical device. As shown in FIG. 14, FIG. 14 is a schematic view illustrating contact between the cable 400 and the lower wire outlet roller 530. The radius of the lower wire outlet roller 530 is r_1 , the bending radius of the cable 400 at the lower wire outlet roller 530 is r_2 , and r_1 is greater than r_2 so that the cable 400 is always in contact with the lower wire outlet roller 530, thereby reducing the wear between the cable 400 and the wire outlet roller and paying off the cable 400 at the wire outlet more smoothly.

In this embodiment, referring to FIG. 12, the mount 510 may include a first guide shaft 511, a second guide shaft 512 and a movable base 513. Two ends of the first guide shaft 511 may be connected to the loading rack 30a separately. The first guide shaft 511 extends horizontally in a left and right direction. Two ends of the second guide shaft 512 may be connected to the loading rack 30a. The second guide shaft 512 is disposed above the first guide shaft 511 and parallel to the first guide shaft 511. The movable base 513 is movably disposed between the first guide shaft 511 and the second guide shaft 512. Each wire outlet roller is rotatably disposed on the movable base 513.

The movable base 513 may include a lower connector base 5130 and an upper connector base 5131, where the lower connector base 5130 is movably disposed on the first guide shaft 511, and the upper connector base 5131 is movably disposed on the second guide shaft 512. The upper wire outlet roller 520 is rotatably disposed on the upper connector base 5131, the lower wire outlet roller 530 is rotatably disposed on the lower connector base 5130, two ends of the left wire outlet roller 540 along an axial direction are rotatably connected to the upper connector base 5131 and the lower connector base 5130 respectively, and two ends of the right wire outlet roller 550 along an axial direction are rotatably connected to the upper connector base 5131 and the lower connector base 5130 respectively.

In this embodiment, the lower connector base 5130 includes a lower linear bearing 5132, a lower bearing 5133, a left sliding plate 5134 and a right sliding plate 5135. The lower linear bearing is sleeved on an outside of the first guide shaft 511 and is movable relative to the first guide shaft 511. The lower bearing 5133 is sleeved on an outer ring of the lower linear bearing 5132. The lower wire outlet roller 530 is sleeved on an outer ring of the lower bearing 5133. The left sliding plate 5134 and the right sliding plate 5135 are respectively mounted on two sides of the lower linear bearing 5132 in a left and right direction, and the lower wire outlet roller 530 is disposed between the left sliding plate 5134 and the right sliding plate 5135.

The upper connector base 5131 includes an upper linear bearing 5136 and a fixed base 5137. The upper linear bearing 5136 is sleeved on the second guide shaft 512 and is movable relative to the second guide shaft 512. The fixed base 5137 is fixedly connected to an outer ring of the upper linear bearing 5136. The upper wire outlet roller 520 is rotatably connected to the fixed base 5137.

The left wire outlet roller 540 is mounted on a left roller shaft 5138 through a bearing, and two ends of the left roller shaft 5138 along an axial direction are respectively connected to the left sliding plate 5134 of the mount 510 and the fixed base 5137 of the upper connector base 5130 through screw connection, welding and other manners. The right wire outlet roller 550 is mounted on a right roller shaft 5139 through a bearing, and two ends of the right roller shaft 5139 along an axial direction are respectively connected to the right sliding plate 5135 of the mount 510 and the fixed base 5137 of the upper connector base 5130 through screw connection, welding and other manners.

It is to be noted that an output end of the preceding linear drive mechanism is connected to the lower connector base 5130, for example, connected to the left sliding plate 5134 and the right sliding plate 5135 of the lower connector base 513. A driving direction of the linear drive mechanism is consistent with an extension direction of the first guide shaft 511. The linear drive mechanism can drive the lower connector base 5130 to reciprocate along the extension direction

of the first guide shaft 511, thereby driving the wire outlet roller to move, so as to change a position of the wire outlet hole 560, so that the cable 400 can be wound in sequence along an axial direction of the reel or paid off in sequence along the axial direction of the reel. When the cable 400 reciprocates with a nut through the movable base 513, the action of arranging the
5 cable is completed.

The linear drive mechanism may be a lead screw nut motor, the nut is screwed to the lead screw, a left slider and a right slider of the lower connector base 5130 are connected to the nut, and the motor drives the lead screw to rotate to make the nut move linearly along an axial direction of the lead screw, thereby driving the movable base 513 to move and achieving cable arrangement.

10 Further, as shown in FIGS. 10, 11, and 14, the wire guiding mechanism may further include two wire-passing assemblies 570 arranged at intervals, and multiple wire outlet rollers are disposed between the two wire-passing assemblies 570 and move between the two wire-passing assemblies 570.

Each wire-passing assembly 570 may include a wire-passing roller 571. The wire-passing roller
15 571 is rotatable relative to the mount 510. The wire-passing roller 571 is arranged vertically. A circumferential surface of the wire-passing roller 571 is used for being in contact with the circumferential wall of the cable 400 passing through the wire outlet hole 560. The wire-passing roller 571 is provided so that the friction and wear between the cable 400 and the loading rack 30a when the grinding robot 1000 turns are avoided, the cable 400 can slide smoothly, the
20 resistance received by the grinding robot 1000 turning around or turning is greatly reduced, and the grinding robot 1000 can operate and move normally.

In this embodiment, as shown in FIG. 15, multiple wire-passing rollers 571 may be arranged at intervals in an arc on a mounting plate 572, and circumferential walls of the wire-passing rollers 571 together form an arc surface for being in contact with the cable 400. A large-radius arc
25 surface for being in contact with the cable 400 can be formed by the multiple wire-passing

rollers 571. When the grinding robot 1000 turns around or turns, the cable 400 can be bent in a tangential direction of the arc surface formed by the circumferential walls of the wire-passing rollers 571 together for being in contact with the cable 400 so that the friction and wear between the cable 400 and the loading rack 30a when the grinding robot 1000 turns are avoided, the cable 400 can slide smoothly, the resistance received by the grinding robot 1000 turning around or turning is greatly reduced, and the grinding robot 1000 can operate and move normally.

In other embodiments, as shown in FIG. 16, each wire-passing assembly 570 includes multiple wire-passing rollers 571. The multiple wire-passing rollers 571 are arranged at intervals in a circumferential direction on the mounting plate 572. The circumferential walls of the wire-passing assemblies 571 together form a cylindrical surface for being in contact with the cable 400. When the grinding robot 1000 turns around or turns, the cable 400 can be bent in a tangential direction of the cylindrical surface formed by the circumferential walls of the wire-passing rollers 571 together for being in contact with the cable 400 so that the friction and wear between the cable 400 and the loading rack 30a when the grinding robot 1000 turns are avoided, the cable 400 can slide smoothly, the resistance received by the grinding robot 1000 turning around or turning is greatly reduced, and the grinding robot 1000 can operate and move normally.

In other embodiments, only one wire-passing roller 571 may be provided.

Further, referring to FIG. 13, each wire-passing assembly 570 may further include a driver 573 and the mounting plate 572, where the wire-passing roller 571 is rotatably disposed on the mounting plate 572, and the driver 573 is configured to drive the mounting plate 572 to move up and down. The driver 573 is a linear motor, a cylinder, a hydraulic cylinder, and the like.

In this embodiment, the mount 510 is provided with a slide rail 574 extending up and down, and the mounting plate 572 is slidably mated with the slide rail 574. The driver 573 can drive the mounting plate 572 to move up and down along the slide rail 574, and the driver 573 is

provided so that a height position of a lower end of the wire-passing roller 571 relative to the ground can be adjusted, the grinding robot 1000 is not affected by the winding of the cable 400 during construction, and at the same time, an obstacle clearance height of the grinding robot 1000 is guaranteed.

- 5 When the grinding robot 1000 needs to turn or turn around, the cable 400 passes through the wire outlet hole 560, is wound onto the wire-passing roller 571 in a tangential direction, and is connected to the power supply in the tangential direction of the wire-passing roller 571, and the wire-passing roller 571 may rotate relative to the mount 510 around an axis of the wire-passing roller 571, thereby avoiding direct contact and friction between the cable 400 and the loading
- 10 rack 30a, ensuring that the cable 400 always moves along a tangential direction of a contact surface, and greatly reducing the movement resistance. When the grinding robot 1000 needs to transition, the driver 573 drives the wire-passing roller 571 to move upward, so as to ensure that a lowest point of the device satisfies obstacle clearance requirements, thereby completing the transition.
- 15 During normal construction, the wire-passing roller 571 is located at a relatively low position so that the grinding robot 1000 is not affected by the winding of the cable 400 during construction. In some uneven terrains or terrains with obstacles, a lower end of the wire-passing roller 571 is easy to collide. In this embodiment, a limit switch 575 may be disposed at the lower end of the wire-passing roller 571. After the limit switch 575 is triggered, the driver 573 drives the loading
- 20 rack 30a to move up and down. In actual engineering, the obstacle or the ground convex hull is in contact with the limit switch 575. When the limit switch 575 is triggered by the obstacle or the ground convex hull, the limit switch 575 gives a signal to a controller, the controller controls the driver 573 to rise to the highest position, and then the driver 573 is tentatively lowered at intervals. When the limit switch 575 is not triggered when the driver 573 is lowered to the
- 25 lowest position, the action of the driver 573 is completed. When the driver 573 is lowered to the lowest position, if the limit switch 575 is triggered again, the driver 573 drives the wire-passing roller 571 to rise. This cycle is repeated until the convex hull or obstacle is overcome.

In this embodiment, the limit switch 575 may be a safety contact edge, for example, a rubber band-shaped pressure-sensitive switch, which not only has a triggering function, but also has a buffering function through which the impact on the wire-passing roller 571 can be absorbed when the wire-passing roller 571 touches the convex hull or the obstacle. In other embodiments, the limit switch 575 may also have other structural forms.

Embodiment four

As shown in FIGS. 17 to 31, the embodiment of the present application provides a grinding robot 1000, where the grinding robot 1000 includes a main rack 60, a grinding mechanism 90, and a loading rack 30a. The main rack 60 is provided with moving wheels 121, and multiple moving wheels 121 are provided. When the grinding mechanism 90 is in operation, the grinding mechanism 90 and no more than two moving wheels 121 are in contact with the ground at the same time, so as to form a working surface. The loading rack 30a includes at least one support wheel and is configured to be movably connected to the main rack 60 so that when the loading rack 30a is driven by the main rack 60, the support wheel and the working surface move out of coplanar. The main rack 60 can drive the loading rack 30a to move, and the main rack 60 is movably connected to the loading rack 30a. When the grinding mechanism 90 is in operation, the grinding mechanism 90 and no more than two moving wheels 121 are in contact with the ground at the same time so that no more than three contact points between the main rack 60 and the ground exist, thereby effectively avoiding over-positioning. The loading rack 30a is movably connected to the main rack 60 so that the moving wheels 121 of the main rack 60 and the second support wheel (especially a fixed support wheel 33) of the loading rack 30a can move out of coplanar, thereby avoiding the following: due to the rigid connection between the main rack 60 and the loading rack 30a, the moving wheels 121 are off the ground and wheel slipping occurs. Referring to FIG. 17, the second support wheel of the loading rack 30a may include a lift support wheel 32 and the fixed support wheel 33.

In this embodiment, at least one of the moving wheels 121 is a drive wheel, where the drive

wheel can provide power for the movement of the main rack 60. In this embodiment, two moving wheels 121 are provided. When the grinding mechanism 90 is in operation, the two moving wheels 121 and the grinding mechanism 90 are in contact with the ground, so as to form a three-point support, which is conducive to the stable operation and movement of the grinding robot 1000.

In this embodiment, the grinding mechanism 90 includes a grinding motor 21 and a grinding disc 91, where the grinding motor 21 may be mounted on the main rack 60, and the grinding motor 21 is configured to drive the grinding disc 91 to rotate. That is, in this embodiment, the grinding robot 1000 may be a floor grinding device. The main rack 60 moves so as to drive the grinding disc 91 to different positions to perform the grinding operation. In other embodiments, the grinding mechanism 90 may also be a component capable of performing other functions.

The floor grinding device in operation needs to be continuously provided with high-power power supply through a large number of battery devices or cable devices. At present, for most products on the market, the cable of the cable reel is directly dragged to supply power, that is, one operator is required to operate a grinder for each operation, the cable on the cable reel needs to be sorted and wound, resulting in the low efficiency, and the leakage of electricity is prone to occur in a processing of sorting and winding the cable, causing safety accidents. In a grinding process, the grinding waste needs to be cleaned in real time. Therefore, in the operation process of the floor grinding device, more external auxiliary devices are often required, such as the cable reel and a vacuum cleaner. In the present application, the external auxiliary devices of the floor grinding device in the operation process are mounted through the loading rack 30a.

In actual construction, the loading rack 30a may be loaded with only one type of operation mechanism, for example, only the cable reel or only the vacuum cleaner. The loading rack 30a may be loaded with various operation mechanisms, for example, the cable reel and the vacuum cleaner at the same time. In this embodiment, the grinding robot 1000 includes the cable reel and the vacuum cleaner that are both mounted on the loading rack 30a. The cable reel is

convenient for the cable winding and reeling of the grinding robot 1000, so as to avoid over-reeling and accumulation of the cable on the ground. The vacuum cleaner can clean the ground in time after the ground operation is completed.

5 The technical solution of the embodiment of the present application is to solve the problem that the existing floor grinding device is prone to wheel suspended and slipping, and the general idea is described below.

The existing floor grinding device generally uses a rigid chassis. To improve the bearing capacity, multiple support wheels are provided for support. Based on a principle that three points determine a plane, when more than three contact points between the chassis and the ground exist, the problem of over-positioning occurs, easily causing the wheel suspended and slipping and affecting the normal operation of the floor grinding device.

Generally, the main rack 60 is rigidly connected to the loading rack 30a. As shown in FIG. 19, when the floor grinding device is located on the ground with a relatively large degree of unevenness, for example, when the loading rack 30a is in a convex position, positions where the lift support wheel 32 and two fixed support wheels 33 of the loading rack 30a are in contact with the ground are relatively high. Since the main rack 60 is rigidly connected to the loading rack 30a, if the two fixed support wheels 33 of the loading rack 30a are located at relatively high positions, the loading rack 30a lifts a position where the loading rack 30a and the main rack 60 are connected, causing that the two moving wheels 121 of the main rack 60 cannot be in contact with the ground effectively and wheel slipping occurs.

In this embodiment, as shown in FIG. 20, the main rack 60 can drive the loading rack 30a to move, and the main rack 60 is movably connected to the loading rack 30a. After the main rack 60 and the loading rack 30a are connected together, the movable connection manner enables relative movement between the loading rack 30a and the main rack 60 so that the moving wheels 121 of the main rack 60 are always in contact with the ground, thereby avoiding the

main rack 60 from being off the ground and slipping.

As shown in FIG. 21, in this embodiment, the main rack 60 and the loading rack 30a are movably connected in a hinged manner so that the loading rack 30a can rotate relative to the main rack 60, and a rotational axis is located in a plane parallel to a plane where the ground is located and perpendicular to a moving direction of the grinding robot 1000. When the loading rack 30a is connected to the main rack 60 and the grinding robot 1000 moves on the uneven ground, the loading rack 30a can swing up and down relative to the main rack 60 so that the loading rack 30a can adapt to the change of the ground without affecting the two moving wheels 121 of the main rack 60 to be in contact with the ground. In addition, the hinged connection manner is convenient and simple to be implemented.

In addition, to avoid the connection of the loading rack 30a, the main rack 60 and the grinding mechanism 90 as a whole, resulting in the grinding robot 1000 being too bulky and heavy, and causing difficulties in the transportation and transfer of the floor operation device not in operation, the loading rack 30a is detachably connected to the main rack 60 so that the loading rack 30a and the main rack 60 can be separated. When operation is not required, the loading rack 30a is separated from the main rack 60, thereby facilitating disassembly and transportation. When operation is required, the loading rack 30a is connected to a moving device.

In this embodiment, the loading rack 30a and the main rack 60 are detachably connected by a movable mechanism, where the main rack 60 and the loading rack 30a are movably connected (hinged) through the movable mechanism.

Referring to FIG. 22, in this embodiment, the movable mechanism may be a telescopic structure 40a, where the telescopic structure 40a includes an extended state and a retracted state. The main rack 60 may include a first connecting portion 111, and the loading rack 30a may include a second connecting portion 311 mated with the first connecting portion 111. In the case where the telescopic structure 40a is in the extended state, the first connecting portion 111 and the

second connecting portion 311 are capable of being movably connected; and in the case where the telescopic structure 40a is in the retracted state, the first connecting portion 111 and the second connecting portion 311 are capable of being separated.

In other embodiments, the movable mechanism may also be a common rotary shaft, a hinge or another mechanism.

As shown in FIG. 22, the first connecting portion 111 may include a first connecting hole disposed at a rear end of the main rack 60, and the second connecting portion 311 may include a second connecting hole disposed at a front end of the loading rack 30a. The main rack 60 and the loading rack 30a are hinged by the telescopic structure 40a. The first connecting hole and the second connecting hole are coaxially arranged. In the case where the telescopic structure 40a is in the extended state, the telescopic structure 40a can be inserted into the first connecting hole and the second connecting hole so that the loading rack 30a and the main rack 60 are hinged; and in the case where the telescopic structure 40a is in the retracted state, the telescopic structure 40a is retracted from the first connecting hole and the second connecting hole, and the loading rack 30a can be separated from the main rack 60. The connection and separation of the main rack 60 and the loading rack 30a are achieved through the retraction and extension of the telescopic structure 40a, which is simple and convenient.

In this embodiment, two first connecting holes may be provided and coaxially arranged, and two second connecting holes may be provided and coaxially arranged. Correspondingly, two telescopic structures 40a are provided and may be disposed opposite to each other, that is, movable members 42 of the two telescopic structures 40a are extended in opposite directions relative to fasteners 41, and the movable members 42 of the two telescopic structures 40a are retracted in opposite directions relative to the fasteners 41.

As shown in FIGS. 23 to 25, the telescopic structure 40a may include a fastener 41, a movable member 42, and a drive mechanism 43. The fastener 41 may be mounted on the loading rack

30a; the movable member 42 is movably disposed on the fastener 41, and the drive mechanism 43 is configured to drive the movable member 42 to extend or retract relative to the fastener 41 so that the telescopic structure 40a is in the extended state or the retracted state.

In other embodiments, the fastener 41 may also be mounted on the main rack 60.

- 5 Various manners exist for the drive mechanism 43 to drive the movable member 42 to extend or retract relative to the fastener 41. In this embodiment, the drive mechanism 43 is fixedly connected to the movable member 42; and the drive mechanism 43 is driven to rotate around an axis of the movable member 42 so that the movable member 42 can be extended or retracted relative to the fastener 41.
- 10 In other embodiments, the drive mechanism 43 is driven to move along an axial direction of the movable member 42 so that the movable member 42 can be extended or retracted relative to the fastener 41.

- A first mating surface 411 may be provided on the fastener 41, a second mating surface 431 mated with the first mating surface 411 may be provided on the drive mechanism 43, and the
- 15 drive mechanism 43 rotates around the axis of the movable member 42 so that the first mating surface 411 is mated with or is staggered with the second mating surface 431. When the first mating surface 411 is mated with the second mating surface 431, the movable member 42 protrudes from the fastener 41; and when the first mating surface 411 is staggered with the second mating surface 431, the movable member 42 retracts relative to the fastener 41. The first
- 20 mating surface 411 is mated with or is staggered with the second mating surface 431 so that the telescopic structure 40a is in the extended state or the retracted state. The machining technique of the mating surfaces is also relatively simple so that the machining difficulty can be reduced and the structure of the telescopic structure 40a can be simplified, which is conducive to the compactness of the structure formed after the main rack 60 and the loading rack 30a are
- 25 connected.

In this embodiment, the first mating surface 411 and the second mating surface 431 each include an inclined surface.

In other embodiments, as shown in FIGS. 26 and 27, the first mating surface 411 and the second mating surface 431 may also be in other forms. For example, the first mating surface 411 includes a convex surface on an axial end surface of the fastener 41, and the second mating surface 431 includes a concave surface on an axial end surface of the drive mechanism 43. When the drive mechanism 43 rotates to a position where the convex surface is mated with the concave surface, the movable member 42 extends. When the drive mechanism 43 rotates to a position where the convex surface is staggered with the concave surface, for example, the convex surface on the axial end surface of the fastener 41 abuts against a flat surface on the axial end surface of the drive mechanism 43, the movable member 42 retracts. Of course, the convex surface may also be provided on the axial end surface of the drive mechanism 43, and the concave surface may be provided on the axial end surface of the fastener 41.

In this embodiment, the fastener 41 may be a sleeve structure, and the movable member 42 is inserted into the fastener 41. The drive mechanism 43 may include a sleeve portion 432 and a handle 433, where the movable member 42 may be inserted into the sleeve portion 432, and the handle 433 is inserted into the sleeve portion 432 along a radial direction of the sleeve portion 432 and fixedly connected to the movable member 42. The fastener 41 and the sleeve portion 432 are coaxially arranged, and the second mating surface 431 is provided on a side of the sleeve portion 432 closer to the fastener 41. The fastener 41 in the form of a sleeve can provide a space for the movable member 42 to move and can also guide the movement of the movable member 42. The handle 433 is used for applying a force to the drive mechanism 43 so as to drive the movable member 42 to move.

In this embodiment, the telescopic structure 40a further includes an elastic reset 44, where the elastic reset 44 is disposed between the fastener 41 and the movable member 42, and the movable member 42 can retract relative to the fastener 41 against an elastic force of the elastic

reset 44. In this embodiment, the elastic reset 44 may be a spring, where one end of the elastic reset 44 is connected to an outer wall of the movable member 42, and the other end of the elastic reset 44 is connected to an inner wall of the fastener 41. The elastic reset 44 is provided, thereby facilitating the automatic extension of the movable member 42.

5 When the first mating surface 411 is mated with the second mating surface 431, a force is applied to the handle 433 so that the handle 433 rotates around an axis of the sleeve portion 432 and moves along an axial direction of the sleeve portion 432, thereby driving the sleeve portion 432 to rotate around the axis of the sleeve portion 432 and move along the axial direction of the sleeve portion 432, so that the first mating surface 411 is staggered with the second mating
10 surface 431 (referring to FIG. 25). In a process of staggering the first mating surface 411 with the second mating surface 431, the movable member 42 can retract relative to the fastener 41, and the elastic reset 44 is compressed to generate torque. Referring to FIGS. 24 and 25, respective tip abutting surfaces (not numbered in the figure) of the first mating surface 411 and the second mating surface 431 keep abutting against each other, and in this case, the main rack
15 60 and the loading rack 30a can be separated and the movable member 42 retracts. When the main rack 60 and the loading rack 30a need to be connected, the sleeve portion 432 is rotated by the handle 433 so that the respective tip abutting surfaces of the first mating surface 411 and the second mating surface 431 no longer abut against each other, then the force acting on the handle 433 is removed, the movable member 42 is under the action of the elastic force and torque of
20 the elastic reset 44, and the handle 433 rotates around the axis of the sleeve portion 432, thereby driving the sleeve portion 432 to rotate around the axis of the sleeve portion 432, so that inclined surfaces of the first mating surface 411 and the second mating surface 431 are mated with each other. When the first mating surface 411 is mated with the second mating surface 431, the movable member 42 extends relative to the fastener 41. The elastic reset 44 is provided,
25 which is conducive to the following: after a force for driving the drive mechanism 43 is removed, the elastic force of the elastic reset 44 enables the movable member 42 to automatically extend.

In other embodiments, the movable member 42 may also extend or retract relative to the fastener 41 in other manners. For example, the fastener 41 and the movable member 42 are provided with threads that are mated with each other, the drive mechanism 43 drives the movable member 42 to rotate around the axis of the movable member 42, and the movable member 42 is capable of extending or retracting relative to the fastener 41. As shown in FIG. 28, an internal thread 412 is provided on the inner wall of the fastener 41, and an external thread 421 that is mated with the internal thread 412 is provided on the outer wall of the movable member 42. The drive mechanism 43 drives the movable member 42 to rotate around the axis of the movable member 42. The movable member 42 can extend or retract relative to the fastener 41 through the screw fit of the movable member 42 and the fastener 41. In this structure, the drive mechanism 43 driving the movable member 42 to extend or retract has opposite rotational directions. The movable member 42 can extend or retract relative to the fastener 41 through screw fit, which is simple and labor-saving, and the internal thread 412 is mated with the external thread 421 so that a better axial limiting effect is ensured, thereby avoiding the axial movement of the movable member 42 relative to the fastener 41 without the driving of the drive mechanism 43.

In other embodiments, the fastener 41 may be provided with a thread, the movable member 42 may be provided with a pin shaft, the pin shaft is inserted into a screw ring of the thread, the drive mechanism 43 drives the movable member 42 to rotate around the axis of the movable member 42, and the pin shaft is capable of moving to different screw rings along the thread so that the movable member is capable of extending or retracting relative to the fastener. As shown in FIGS. 29 and 30, the internal thread 412 is provided on the inner wall of the fastener 41, a pin shaft 422 is provided on the outer wall of the movable member 42, the pin shaft 422 is inserted into a screw ring of the internal thread 412, the drive mechanism 43 drives the movable member 42 to rotate around the axis of the movable member 42, and the pin shaft 422 can be inserted into different screw rings of the internal thread 412 so that the number of screw rings on upper and lower sides of the pin shaft 422 changes, and the movable member 42 can extend or retract

relative to the fastener 41. When the number of screw rings below the pin shaft 422 is gradually reduced, the movable member 42 can extend relative to the fastener 41; and when the number of screw rings below the pin shaft 422 is gradually increased, the movable member 42 can retract relative to the fastener 41. In this structure, the drive mechanism 43 driving the movable member 42 to extend or retract has opposite rotational directions. The internal thread 412 is mated with the pin shaft 422 so that a better axial limiting effect is ensured, thereby avoiding the axial movement of the movable member 42 relative to the fastener 41 without the driving of the drive mechanism 43. Of course, the thread may also be provided on an outer circumferential wall of the movable member 42, and the pin shaft 422 is provided on the inner wall of the fastener 41.

To enable stable relative movement between the main rack 60 and the loading rack 30a, the grinding robot 1000 further includes a first guide portion 112 and a second guide portion 312 between the main rack 60 and the loading rack 30a.

The main rack 60 may include the first guide portion 112, and the loading rack 30a includes the second guide portion 312; the first guide portion 112 forms a guide space, and the second guide portion 312 is movably disposed in the guide space. When the loading rack 30a moves relative to the main rack 60, the second guide portion 312 moves in the guide space.

As shown in FIG. 31, in this embodiment, the first guide portion 112 forms the guide space. The guide space is an arc guide groove, and the second guide portion 312 is a guide pin inserted into the arc guide groove. The guide space is provided at the rear end of the main rack 60, and the guide pin is provided at the front end of the loading rack 30a. When the main rack 60 is connected to the loading rack 30a, the guide pin is inserted into the arc guide groove; and when the loading rack 30a rotates relative to the main rack 60, the guide pin slides in the arc guide groove. The guide pin and the arc guide groove are provided, which is conducive to the relative rotation of the main rack 60 and the loading rack 30a in one direction, so as to avoid the following: the grinding robot 1000 shakes in multiple directions due to the uneven ground,

affecting the stable operation of the grinding robot 1000.

In other embodiments, it is also feasible that the second guide portion 312 forms the guide space, and the first guide portion 112 is movably disposed in the guide space.

5 In the embodiment of the present application, the main rack 60 and the loading rack 30a are movably connected to each other so that the moving wheels of the main rack 60 and the grinding mechanism are always kept in contact with the ground, avoiding the problem of over-positioning and causing the wheel suspended and slipping of the moving wheels 121. The main rack 60 includes the first connecting portion 111, and the loading rack 30a includes the second connecting portion 311, where the first connecting portion 111 is mated with the second
10 connecting portion 311.

With continued reference to FIGS. 17 and 18, in this embodiment, the grinding mechanism 90 is disposed on the main rack 60 in a liftable manner so that the grinding mechanism 90 has a ground-off state and a ground-contact state. Therefore, the main rack 60 may further include a first drive mechanism (not shown in the figure), where the first drive mechanism is configured
15 to drive the grinding mechanism 90 off the ground or in contact with the ground. When the grinding mechanism 90 is in contact with the ground, the grinding disc 91 can polish the ground. The grinding mechanism 90 is lifted off the ground by the first drive mechanism, so as to avoid the following: the grinding mechanism 90 collides with the ground due to the uneven ground during the transfer of the grinding robot 1000, hindering the movement of the grinding robot
20 1000.

The grinding mechanism 90 is movably connected to the main rack 60, and the first drive mechanism is configured to drive the grinding mechanism 90 to move relative to the main rack 60 so that the grinding mechanism 90 is off or in contact with the ground. The grinding mechanism 90 is movably connected to the main rack 60, thereby reducing the burden of the
25 first drive mechanism.

Various manners exist for the grinding mechanism 90 to be movably connected to the main rack 60. For example, the grinding mechanism 90 is disposed on the main rack 60 to move linearly (for example, in a vertical direction), and the first drive mechanism is configured to drive the grinding mechanism 90 to move linearly relative to the main rack 60. Alternatively, the grinding mechanism 90 is rotatably connected to the main rack 60, and the first drive mechanism is configured to drive the grinding mechanism 90 to rotate relative to the main rack 60. In this embodiment, the first drive mechanism may be a linear motor, a linear cylinder, a hydraulic cylinder or the like and may also be a rotary motor or the like.

In other embodiments, the grinding mechanism 90 may also be directly connected to an output end of the first drive mechanism.

The main rack 60 may further include the first support wheel 130, where the first support wheel 130 is disposed on the main rack 60 in a liftable manner. The first support wheel 130 is controlled to ascend and descend so that the first support wheel 130 is off or in contact with the ground. When the grinding mechanism 90 is in contact with the ground, the first support wheel 130 is lifted off the ground, so as to avoid the following: since the first support wheel 130 is in contact with the ground, the main rack 60 is over-positioned. When the grinding mechanism 90 is lifted off the ground, the first support wheel 130 is in contact with the ground, so as to ensure that a three-point support is formed between the main rack 60 and the ground and ensure the stable movement of the main rack 60. In this embodiment, a mechanism driving the first support wheel 130 to ascend and descend may be a linear motor, a linear cylinder, a hydraulic cylinder or the like and may also be a rotary motor or the like.

In some other embodiments, the main rack 60 may include the flip bracket 70 connected to the first support wheel 130. In conjunction with the description of embodiment one, the first support wheel 130 is rotatably connected to the flip bracket 70, the flip bracket 70 is, for example, rotatably connected to the main rack 60, and the first drive portion is configured to drive the flip bracket 70 to rotate relative to the main rack 60 so that the first support wheel 130 is off or in

contact with the ground.

The loading rack 30a may include at least three second support wheels, and at least one of the at least three second support wheels is the lift support wheel 32. In this embodiment, the loading rack 30a includes three second support wheels, where the other two second support wheels are
5 fixed support wheels 33, and the two fixed support wheels 33 are coaxially arranged. The lift support wheel 32 and the two fixed support wheels 33 are arranged in a triangle shape, and the lift support wheel 32 is disposed between the main rack 60 and the two fixed support wheels 33. In other embodiments, the loading rack 30a may include more than three support wheels.

When the loading rack 30a is movably connected to the main rack 60, the lift support wheel 32
10 is off the ground, and the two fixed support wheels 33 are in contact with the ground; and when the loading rack 30a is separated from the main rack 60, the lift support wheel 32 and the two fixed support wheels 33 are all in contact with the ground, so as to form a three-point support. The lift support wheel 32 is off the ground, which is conducive to the movement of the loading rack 30a driven by the main rack 60, thereby avoiding the problem of over-positioning caused
15 by the lift support wheel 32 during the moving process. When the loading rack 30a is separated from the main rack 60, the lift support wheel 32 and the two fixed support wheels 33 form a three-point support, which is conducive to the stable placement of the loading rack 30a. In other embodiments, three or more than three fixed support wheels 33 may be provided.

Since the loading rack 30a and the main rack 60 can be movably connected, after the main rack
20 60 is connected to the loading rack 30a, the two moving wheels 121 and the two fixed support wheels 33 are always in contact with the ground, thereby effectively avoiding the two moving wheels 121 of the main rack 60 from off the ground and slipping.

To facilitate ascending and descending of the lift support wheel 32, the loading rack 30a may further include a lift mechanism, where the lift mechanism is configured to drive the lift support
25 wheel 32 to ascend and descend. When the main rack 60 is connected to the loading rack 30a,

the lift mechanism drives the lift support wheel 32 to be lifted off the ground. When the main rack 60 is separated from the loading rack 30a, to maintain the stability of the loading rack 30a, the lift mechanism drives the lift support wheel 32 to descend and be in contact with the ground so that the lift support wheel 32 and the two fixed support wheels 33 form a three-point support
5 on the ground.

In this embodiment, the lift mechanism may be an electric cylinder, and in other embodiments, the lift mechanism may also be a linear motor, a cylinder or the like.

Apparently, the described embodiments are part, not all, of embodiments of the present application. Based on embodiments in the present application, all other embodiments obtained
10 by those of ordinary skill in the art without creative work are within the protection scope of the present application.

It is to be noted that terms used herein are for the purpose of describing specific embodiments only and not intended to limit the exemplary embodiments according to the present application. As used herein, unless the context clearly dictates otherwise, the singular is intended to include
15 the plural as well; furthermore, it is to be understood that when the terms "comprising" and/or "including" are used in this specification, the terms indicate that the existing features, steps, operations, devices, components, and/or combinations thereof.

It is to be noted that the terms "first", "second" and the like in the description, claims and drawings of the present application are used to distinguish between similar objects and are not
20 necessarily used to describe a particular order or sequence. It should be understood that data used in this way is interchangeable when appropriate so that the embodiments of the present application described herein can be implemented in a sequence not illustrated or described herein.

The above are only preferred embodiments of the present application and are not intended to

limit the present application. For those skilled in the art, the present application may have various modifications and variations. Any modifications, equivalent substitutions, improvements and the like made within the spirit and principle of the present application should fall within the scope of the present application.

What is claimed is:

1. A grinding robot, comprising a main rack (60) and a flip bracket (70) pivotally connected to the main rack (60) through a pin shaft (73), wherein a flip device is further provided between the flip bracket (70) and the main rack (60) and comprises:

5 a first drive portion (10) disposed on the main rack (60); and

a linkage mechanism (20), wherein one end of the linkage mechanism (20) is pivotally connected to the main rack (60), another end of the linkage mechanism (20) is pivotally connected to the flip bracket (70), and a spacing exists between a pivot point between the flip bracket (70) and the main rack (60) and a pivot point between the flip bracket (70) and the linkage mechanism (20),

wherein the first drive portion (10) is drivingly connected to the linkage mechanism (20), when driven by the first drive portion (10), the linkage mechanism (20) is capable of driving the flip bracket (70) to be flipped relative to the main rack (60), and the flip bracket (70) has a first state in which the flip bracket (70) is folded relative to the main rack (60) and a second state in which the flip bracket (70) is extended relative to the main rack (60).

2. The grinding robot of claim 1, wherein the linkage mechanism (20) further comprises:

a first link (21), wherein one end of the first link (21) is pivotally connected to the main rack (60) through a rotary shaft (30), and the first link (21) is drivingly connected to the first drive portion (10); and

20 a second link (22), wherein one end of the second link (22) is pivotally connected to another end of the first link (21) through a first connecting shaft (50), and another end of the second link (22) is pivotally connected to the flip bracket (70) through a third connecting shaft (25).

3. The grinding robot of claim 2, wherein the first link (21) comprises a first rod segment (23) and a second rod segment (24), wherein one end of the first rod segment (23) is pivotally connected to the main rack (60) through the rotary shaft (30), another end of the first rod segment (23) is connected to one end of the second rod segment (24), another end of the second rod segment (24) is pivotally connected to the first drive portion (10), and the first link (21) is pivotally connected to the one end of the second link (22) through the first connecting shaft (50) at a position where the first rod segment (23) and the second rod segment (24) are connected.

4. The grinding robot of claim 2, wherein:

the first link (21) comprises a first rod segment (23);

the flip device further comprises a crank (40) connected to the rotary shaft (30); and

the rotary shaft (30) is fixedly connected to the first rod segment (23), the crank (40) is connected to the first drive portion (10), and through the crank (40) and the rotary shaft (30), the first drive portion (10) drives the first rod segment (23) to rotate, so as to drive, through the second link (22), the flip bracket (70) to be flipped.

5. The grinding robot of claim 2, wherein a ratio of a linear distance between the rotary shaft (30) and the first connecting shaft (50) to a linear distance between the first connecting shaft (50) and the third connecting shaft (25) is greater than or equal to 1.9 and less than or equal to 2.2.

6. The grinding robot of claim 4, further comprising:

a first limiting column (81) disposed on the rack (60) and configured to limit a limit position where the first link (21) of the linkage mechanism (20) swings backward relative to the rack (60); and

a second limiting column (82) disposed on the rack (60) and configured to limit a limit position where the first link (21) of the linkage mechanism (20) swings forward relative to the rack (60).

7. The grinding robot of claim 6, wherein the first limiting column (81) and the second limiting column (82) are disposed above the rotary shaft (30), and the first link (21) is provided with a protruding finger (219) between the first limiting column and the second limiting column.

8. The grinding robot of claim 1, further comprising:

a grinding mechanism (90) provided with a grinding disc (91) and position-adjustably disposed on the main rack (60); and

a second drive portion (100) disposed between the main rack (60) and the grinding mechanism (90) and configured to drive the grinding mechanism (90) to move, so as to adjust a posture of the grinding disc (91).

9. The grinding robot of claim 8, wherein:

the flip bracket (70) is provided with a first support wheel (130); and

in a case where the flip bracket (70) is in the first state, projections of the flip bracket (70) and the first support wheel (130) on the grinding disc (91) of the grinding mechanism (90) are within a region where a surface of the grinding disc (91) is located.

5 10. The grinding robot of claim 1, wherein:

the main rack (60) is provided with a grinding mechanism (90) and a plurality of moving wheels (121); wherein when the grinding robot is in operation, at least part of the plurality of moving wheels (121) and the grinding mechanism (90) are in contact with the ground, so as to form a working surface;

10 the grinding robot further comprises a loading rack (30a) comprising at least one second support wheel; and

the loading rack (30a) is configured to be movably connected to the main rack (60) so that when the loading rack (30a) is driven by the main rack (60), the at least one second support wheel is capable of being non-coplanar with the working surface of the grinding robot.

15 11. The grinding robot of claim 1, further comprising a first guide portion (112) and a second guide portion (312) between the main rack (60) and a loading rack (30a), wherein the first guide portion (112) forms a guide space, and the second guide portion (312) is movably disposed in the guide space; and

20 when the loading rack (30a) moves relative to the main rack (60), the second guide portion (312) slides in the guide space.

12. The grinding robot of claim 11, wherein the guide space is a guide groove and the second guide portion (312) is a guide pin inserted into the guide groove.

13. The grinding robot of claim 11, wherein the loading rack (30a) and the main rack (60) are detachably connected through a movable mechanism.

25 14. The grinding robot of claim 13, wherein the movable mechanism comprises a telescopic structure (40a) having an extended state and a retracted state;

the main rack (60) comprises a first connecting portion (111), and the loading rack (30a)

comprises a second connecting portion (311) mated with the first connecting portion (111); and

in a case where the telescopic structure (40a) is in the extended state, the first connecting portion (111) and the second connecting portion (311) are capable of being movably connected; and in a case where the telescopic structure (40a) is in the retracted state, the first connecting
5 portion (111) and the second connecting portion (311) are capable of being separated.

15. The grinding robot of claim 14, wherein the telescopic structure (40a) comprises a fastener (41), a movable member (42), and a drive mechanism (43), wherein the fastener (41) is mounted on the main rack (60) or the loading rack (30a); and

the movable member (42) is movably disposed on the fastener (41), and the drive mechanism
10 (43) is configured to drive the movable member (42) to extend or retract relative to the fastener (41) so that the telescopic structure is in the extended state or the retracted state.

16. The grinding robot of claim 15, wherein a first mating surface (411) is provided on the fastener (41), a second mating surface (431) mated with the first mating surface (411) is provided on the drive mechanism (43), and the drive mechanism (43) enables the first mating
15 surface (411) to be mated with or to be staggered with the second mating surface (431);

wherein when the first mating surface (411) is mated with the second mating surface (431), the movable member (42) protrudes from the fastener (41); and when the first mating surface (411) is staggered with the second mating surface (431), the movable member (42) retracts relative to the fastener (41).

20 17. The grinding robot of claim 16, wherein:

the telescopic structure (40a) further comprises an elastic reset (44), wherein the elastic reset (44) is disposed between the fastener (41) and the movable member (42) and configured to keep the movable member (42) in the extended state; and

the first mating surface (411) and the second mating surface (431) each comprise an inclined
25 surface and a tip abutting surface.

18. The grinding robot of claim 16, wherein the fastener (41) and the movable member (42) are provided with threads that are mated with each other, the drive mechanism (43) drives the movable member (42) to rotate around an axis of the movable member (42), and the movable member (42) is capable of extending or retracting relative to the fastener (41).

19. The grinding robot of claim 16, wherein:

the fastener (41) and the movable member (42) are connected to each other by a thread and a pin shaft; and

5 the pin shaft is inserted into a screw ring of the thread, the drive mechanism (43) drives the movable member (42) to rotate around an axis of the movable member (42), and the pin shaft is capable of moving to different screw rings along the thread so that the movable member (42) is capable of extending or retracting relative to the fastener (41).

10 20. The grinding robot of claim 10, wherein the loading rack (30a) comprises at least three second support wheels, and at least one of the at least three second support wheels is a lift support wheel (32).

21. The grinding robot of claim 10, further comprising a wire guiding mechanism comprising:

a mount (510) disposed on the loading rack (30a); and

15 a plurality of wire outlet rollers, wherein each of the plurality of wire outlet rollers is rotatably mounted on the mount (510), and the plurality of wire outlet rollers enclose a wire outlet hole (560) for a cable (400) to pass through,

20 wherein circumferential walls of the plurality of wire outlet rollers are used for being in contact with a circumferential wall of the cable (400), wherein in a case where the cable (400) is in the wire outlet hole (560), a circumferential wall of at least one of the plurality of wire outlet rollers is in contact with the circumferential wall of the cable (400); and in a case where the cable (400) moves in the wire outlet hole (560), when driven by the cable (400), the at least one of the plurality of wire outlet rollers in contact with the circumferential wall of the cable (400) is capable of rotating around an axis of the at least one of the plurality of wire outlet rollers.

25 22. The grinding robot of claim 21, wherein the plurality of wire outlet rollers comprise a left wire outlet roller (540) and a right wire outlet roller (550) that are located in a left and right direction, and a lower wire outlet roller (530) and an upper wire outlet roller (520) that are located in an up and down direction; wherein diameters of the left wire outlet roller (540), the right wire outlet roller (550) and the lower wire outlet roller (530) are all greater than a diameter of the upper wire outlet roller (520).

23. The grinding robot of claim 22, wherein radii of the left wire outlet roller (540), the right

wire outlet roller (550) and the lower wire outlet roller (530) are all greater than a bending radius of the cable.

24. The grinding robot of claim 22, wherein the mount (510) comprises a first guide shaft (511) and a movable base (513), wherein the first guide shaft (511) extends horizontally and is mounted on the loading rack (30a), and the movable base (513) is movably disposed on the first guide shaft (511); and

the plurality of wire outlet rollers are rotatably disposed on the movable base (513).

25. The grinding robot of claim 24, wherein the mount (510) further comprises a second guide shaft (512) mounted on the loading rack (30a), and the movable base (513) is movably disposed on the second guide shaft (512); and

the second guide shaft (512) is disposed above the first guide shaft (511) and parallel to the first guide shaft (511).

26. The grinding robot of claim 25, wherein the movable base (513) comprises a lower connector base (5130) and an upper connector base (5131);

wherein the lower connector base (5130) is movably disposed on the first guide shaft (511), and the upper connector base (5131) is movably disposed on the second guide shaft (512); and

the upper wire outlet roller (520) is rotatably disposed on the upper connector base (5131), the lower wire outlet roller (530) is rotatably disposed on the lower connector base (5130), two ends of the left wire outlet roller (540) along an axial direction are rotatably connected to the upper connector base (5131) and the lower connector base (5130) respectively, and two ends of the right wire outlet roller (550) along an axial direction are rotatably connected to the upper connector base (5131) and the lower connector base (5130) respectively.

27. The grinding robot of claim 21, wherein the wire guiding mechanism further comprises two wire-passing assemblies (570) arranged at intervals, and the plurality of wire outlet rollers are disposed between the two wire-passing assemblies (570); and

each of the two wire-passing assemblies (570) comprises a wire-passing roller (571) arranged vertically, wherein a circumferential surface of the wire-passing roller (571) is configured to be in contact with the circumferential wall of the cable (400) passing through the wire outlet hole (560).

28. The grinding robot of claim 27, wherein each of the two wire-passing assemblies (570) comprises a plurality of wire-passing rollers (571) arranged at intervals in an arc or arranged at intervals in a circumferential direction.

29. The grinding robot of claim 28, wherein each of the two wire-passing assemblies (570) further comprises a mounting plate (572) and a drive (573), wherein the wire-passing roller (571) is rotatably disposed on the mounting plate (572), and the drive (573) is configured to drive the mounting plate (572) to move up and down.

30. The grinding robot of claim 29, wherein a limit switch (575) is disposed at a lower end of the wire-passing roller (571), and the drive (573) responds to the limit switch (575) to drive the mounting plate (572) to move up and down.

31. The grinding robot of claim 21, further comprising a wire arrangement device (500), wherein the wire arrangement device (500) comprises a linear drive mechanism, and the plurality of wire outlet rollers are connected to an output end of the linear drive mechanism.

32. The grinding robot of claim 31, wherein the wire arrangement device (500) further comprises a motor and a reel, wherein the motor is configured to drive the reel to take up and pay off a wire, and one end of the cable (400) wound onto the reel passes through the wire outlet hole (560); and

the linear drive mechanism is configured to drive the plurality of wire outlet rollers to move linearly so that the cable (400) is capable of being wound in sequence along an axial direction of the reel or paid off in sequence along the axial direction of the reel.