US 20080185795A1

(19) **United States**

(12) **Patent Application Publication**

Cheng et al.

(10) **Pub. No.: US 2008/0185795 A1**

(43) **Pub. Date: Aug. 7, 2008**

(54) **BARRIER-OVERPASSING TRANSPORTER**

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(21) Appl. No.: **12/027,576**

(22) Filed: **Feb. 7, 2008**

(30) **Foreign Application Priority Data**

Feb. 5, 2007 (TW) 96115620

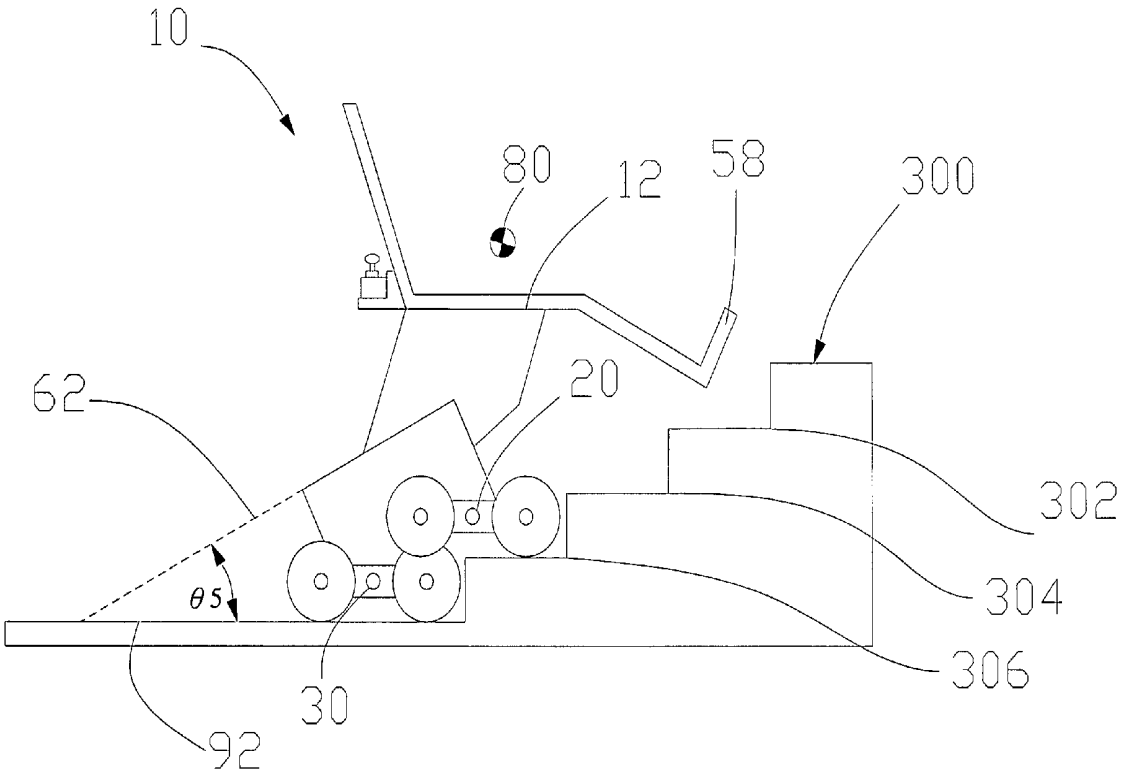
Publication Classification

(51) **Int. Cl.**
A61G 5/06 (2006.01)

(52) **U.S. Cl.** **280/5.28**

(57) **ABSTRACT**

The present invention discloses a barrier-overpassing transporter, which comprises: a support frame carrying a rider or another load; a sensing/adjusting module detecting a tilting state of the support frame and maintaining the support frame in a horizontal state; a ground contact module arranged below the support frame supporting an effective load and lifting the support frame to overpass a surface of a barrier; and a wireless transceiver module collecting and transmitting information to enable adjustments and activities responding to interior states of the transporter. Thereby, the present invention can provide a safe, stable, reliable, comfortable, convenient and low-cost barrier-overpassing transporter.



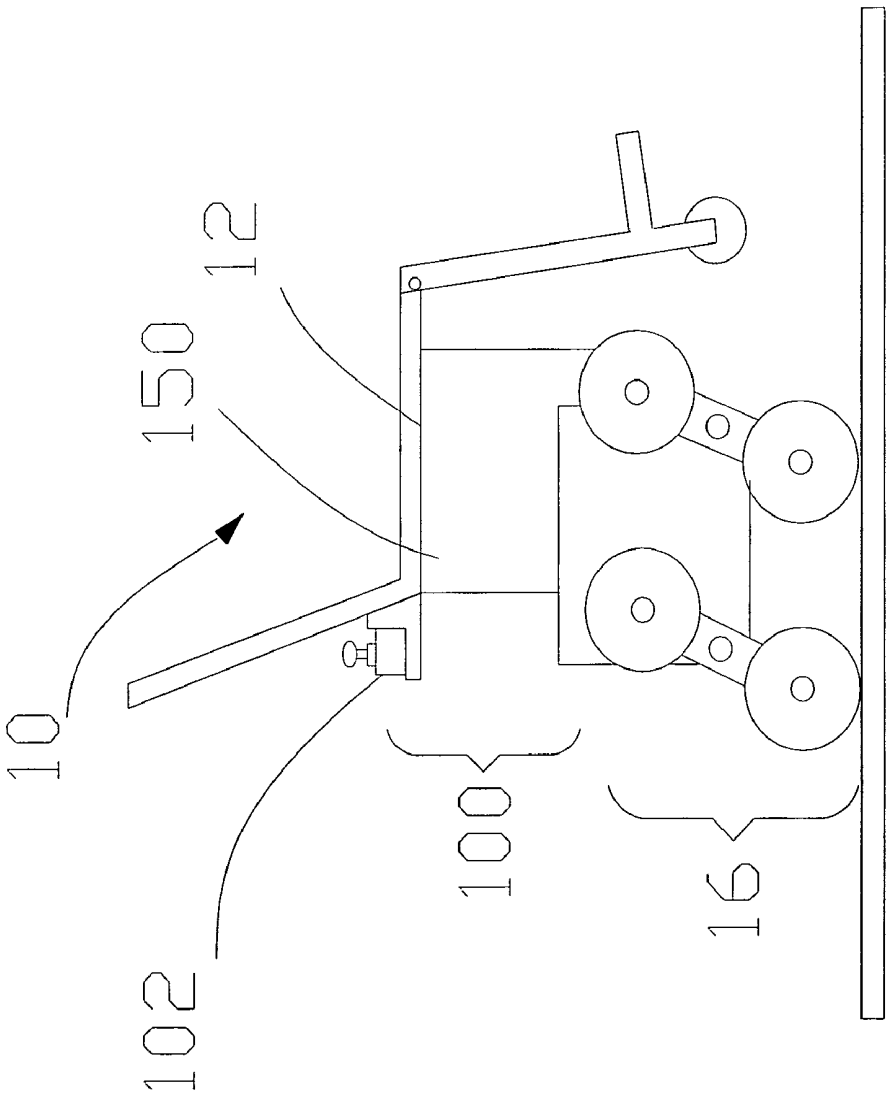


Fig. 1

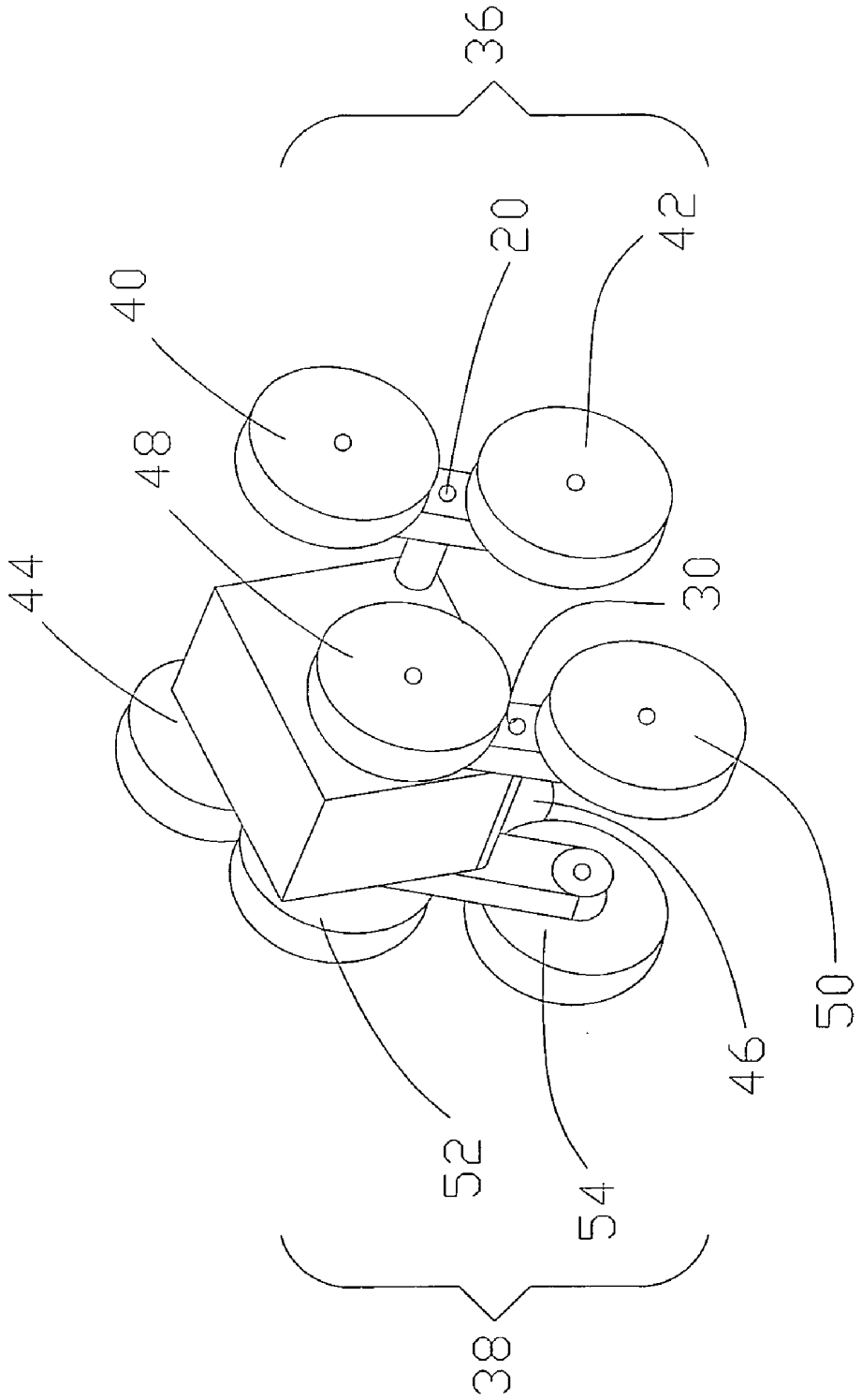


Fig. 2

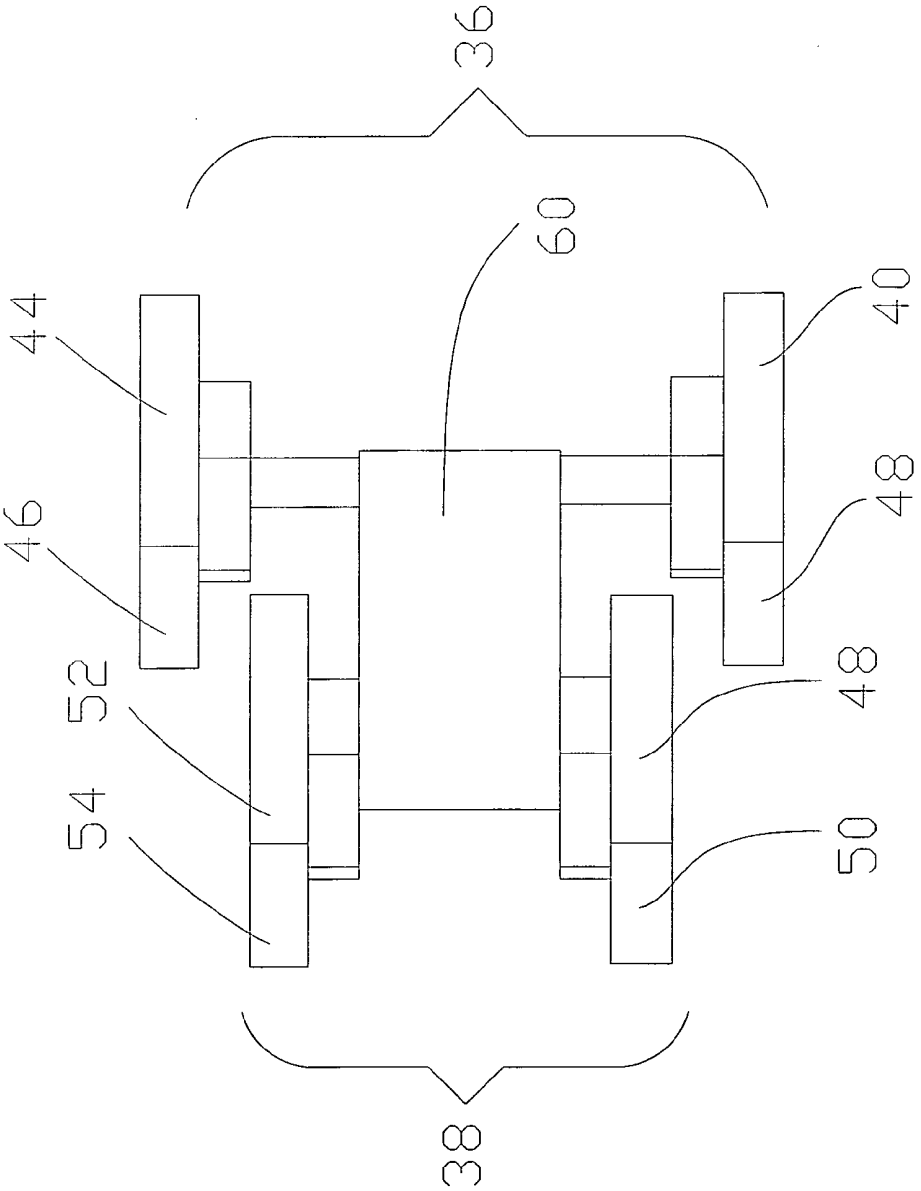


Fig. 3

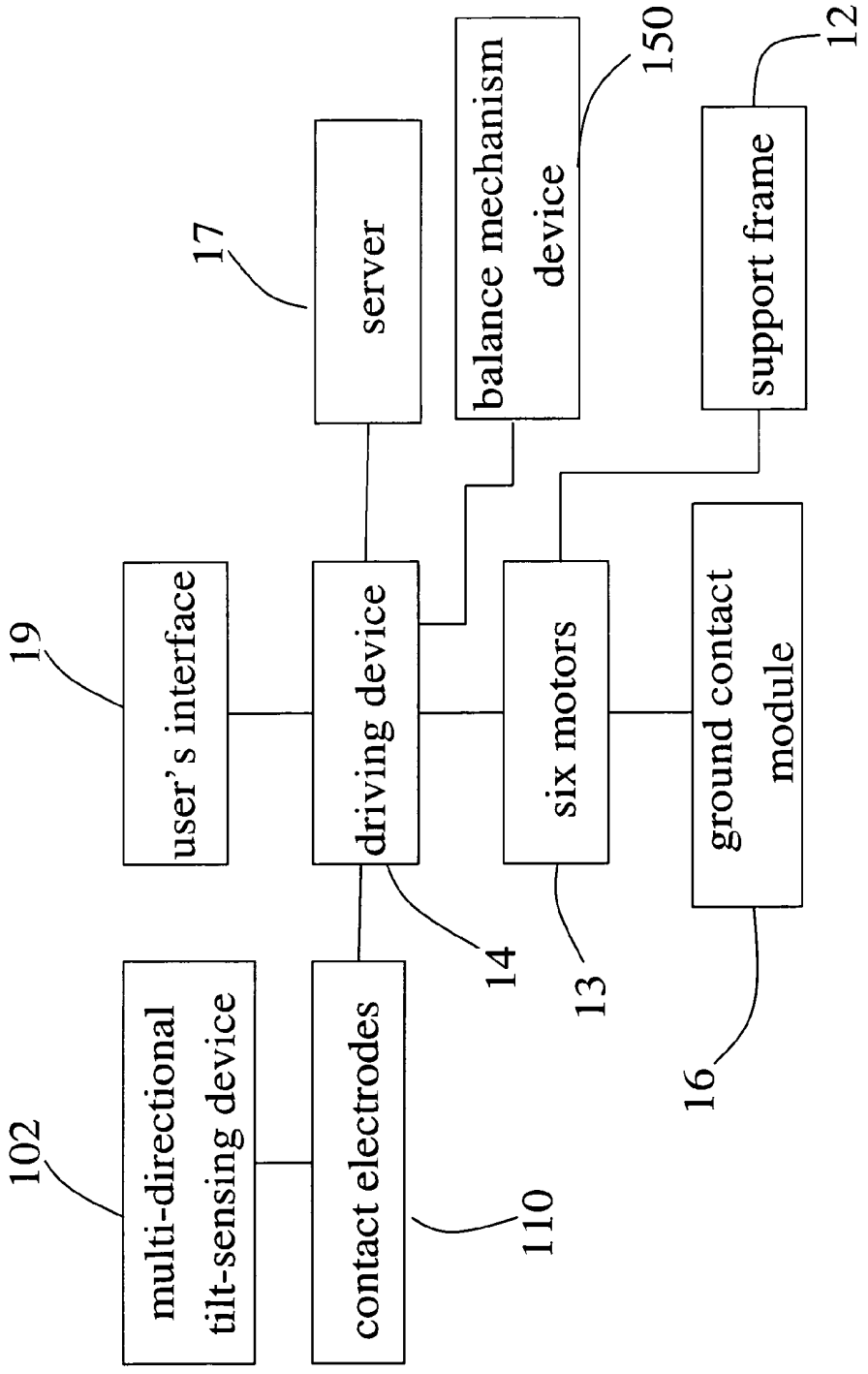

multi-directional tilt-sensing device
102
contact electrodes
110
driving device
14
six motors
13
ground contact module
16
user's interface
19
server
17
balance mechanism device
150
support frame
12

Fig. 4

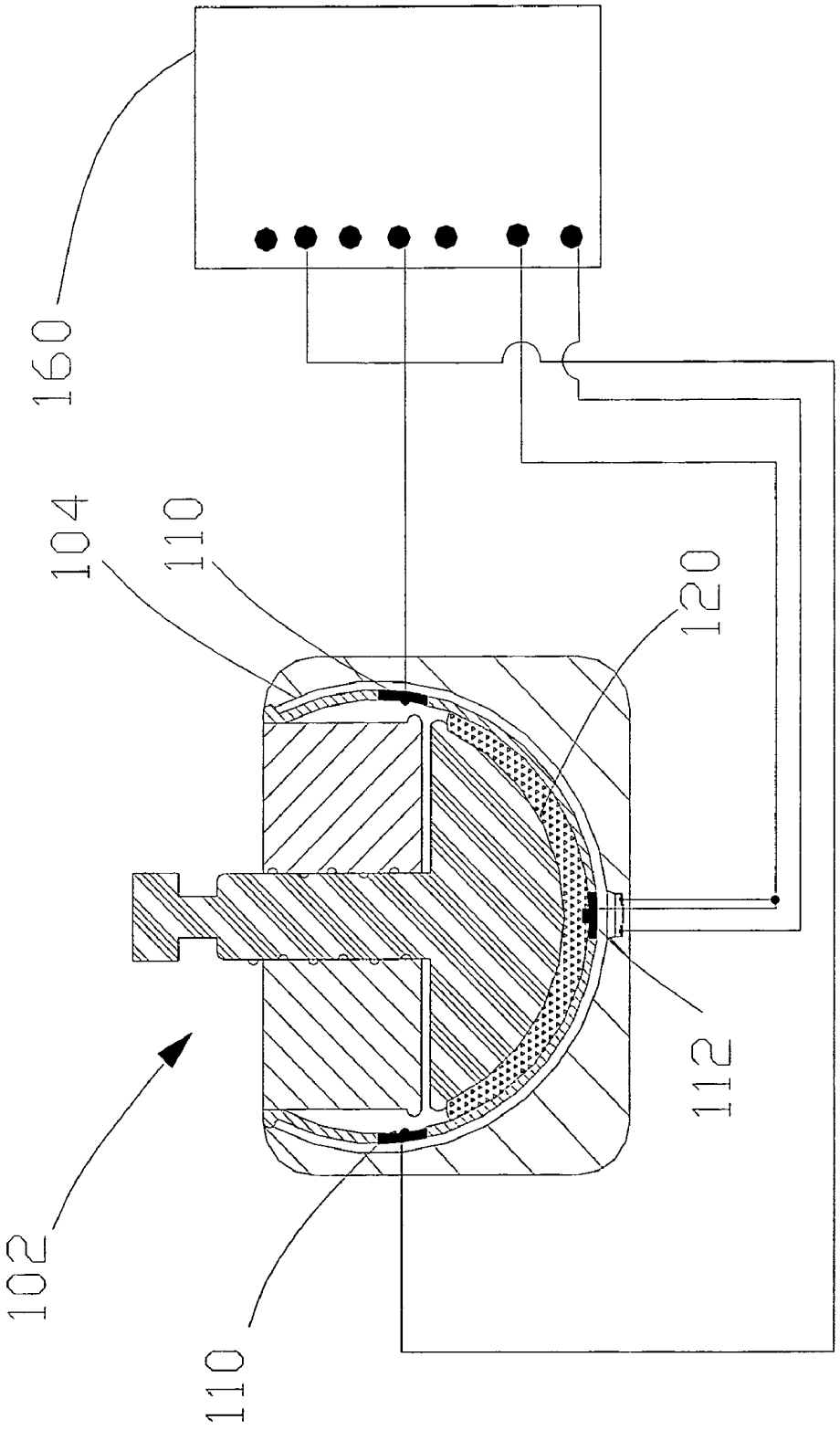


Fig. 5

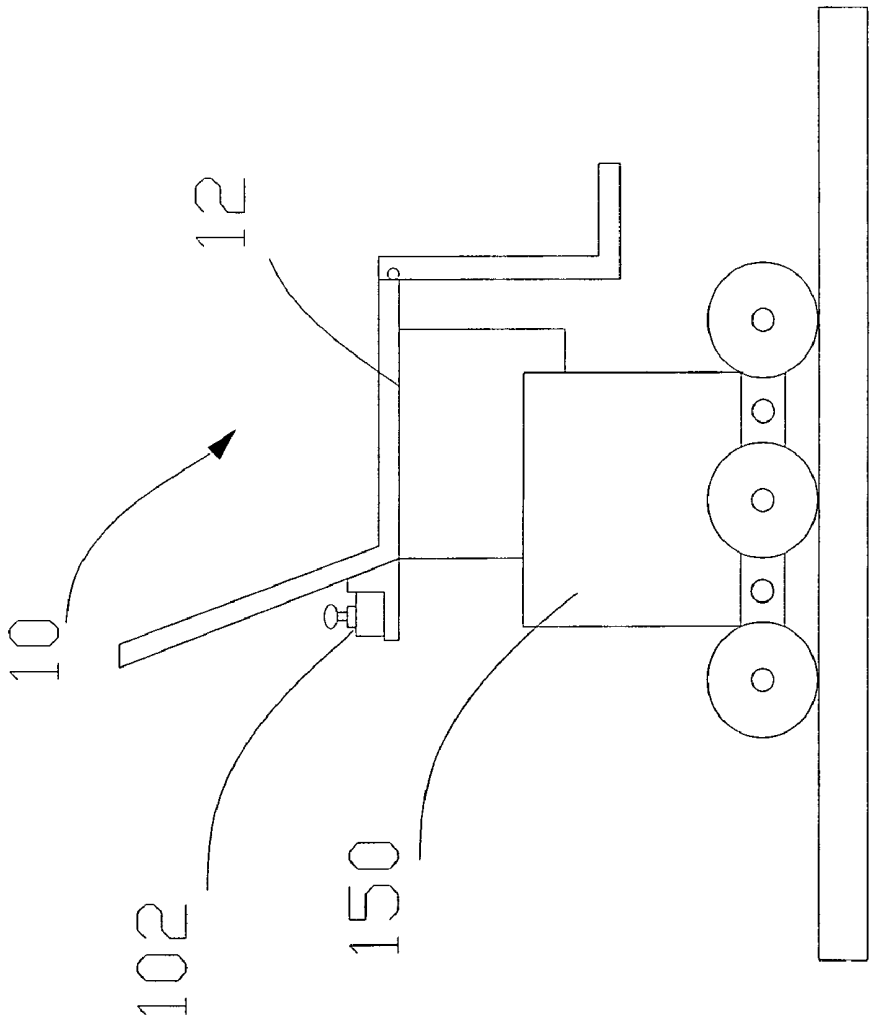


Fig. 6A

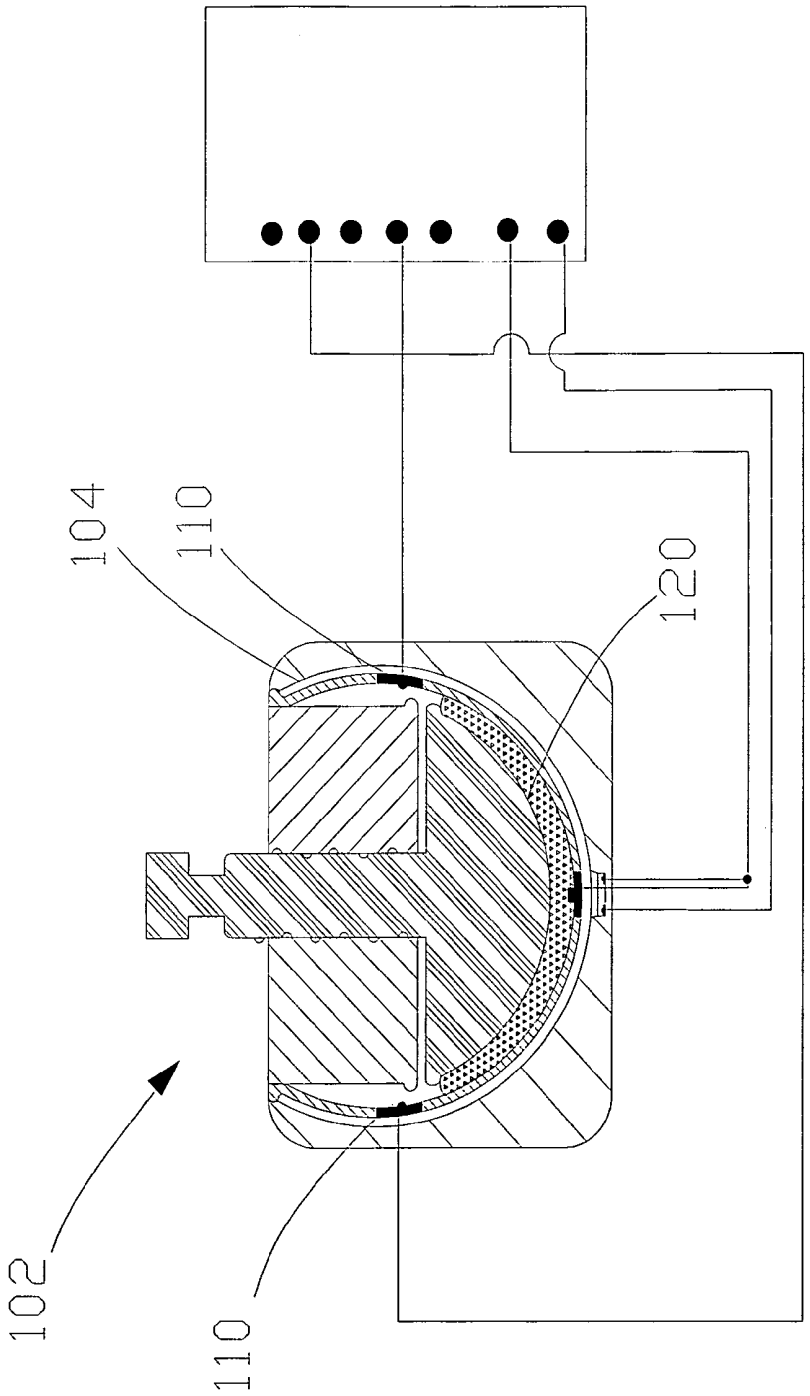


Fig. 6B

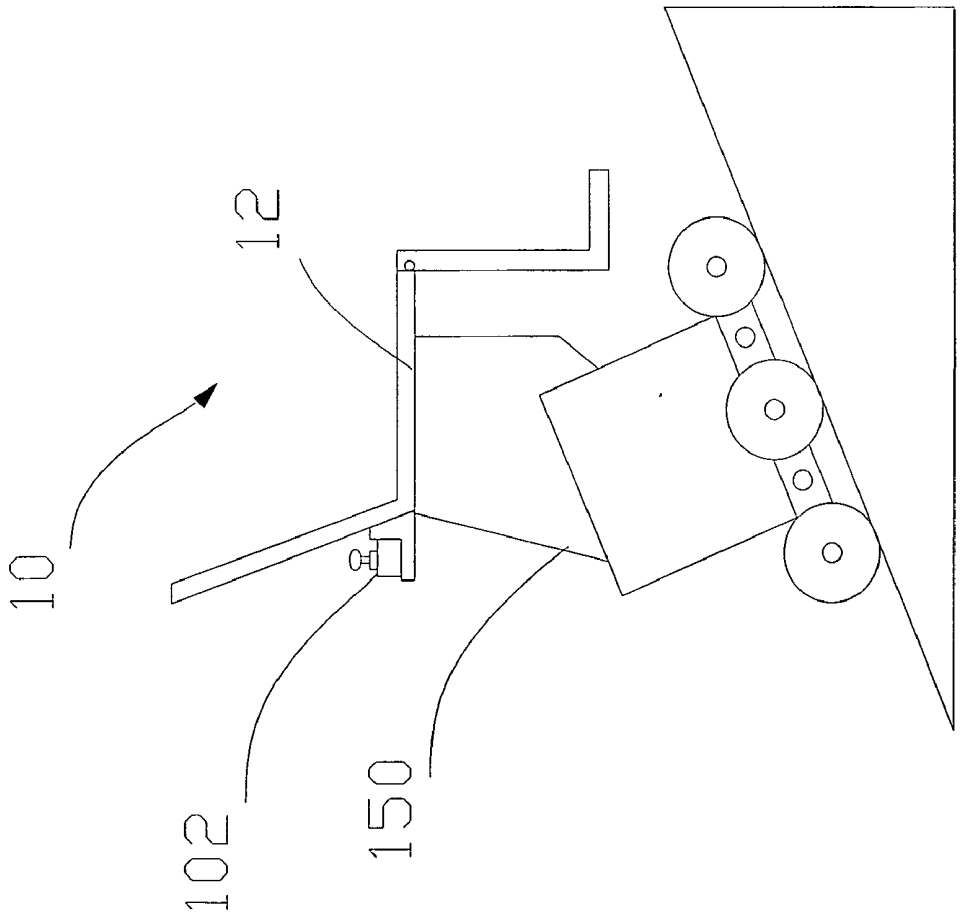


Fig. 7A

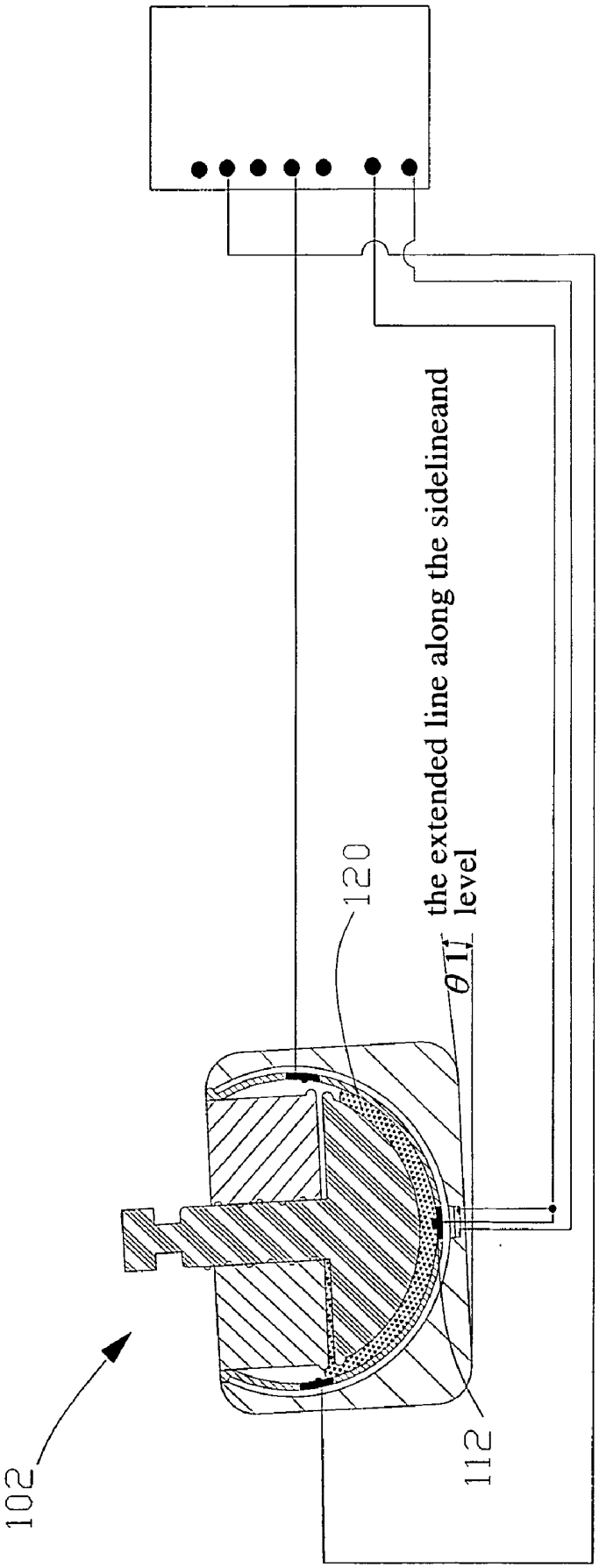

102
112
120
θ1
the extended line along the sidelineand level

Fig. 7B

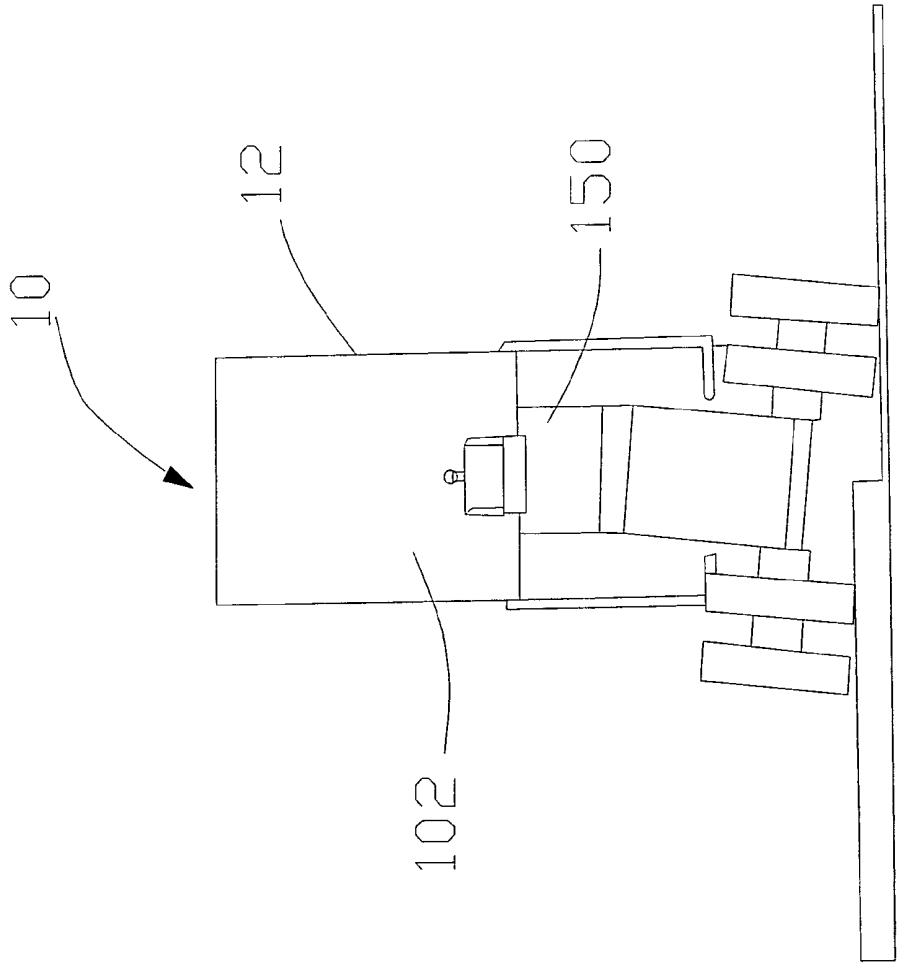


Fig. 8A

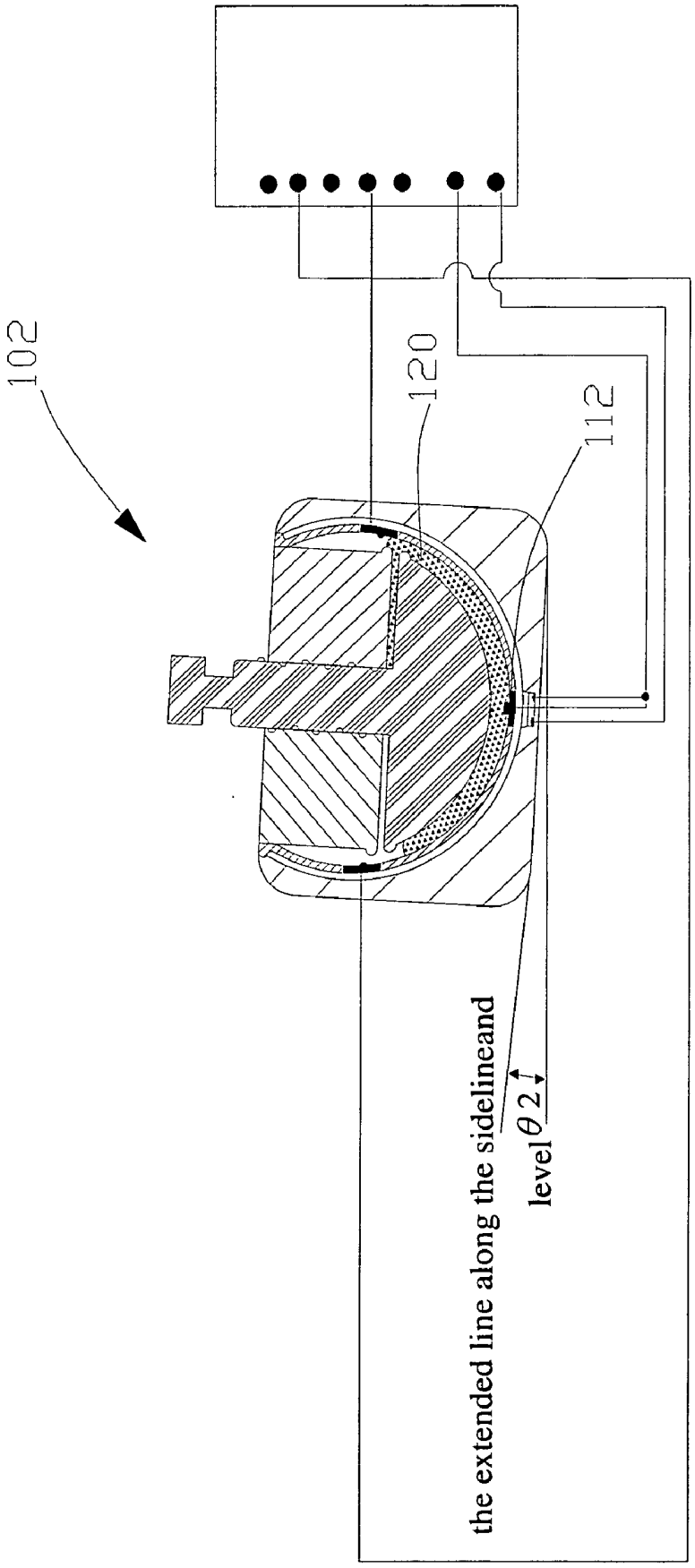

102
120
112
the extended line along the sidelineand
level θ2

Fig. 8B

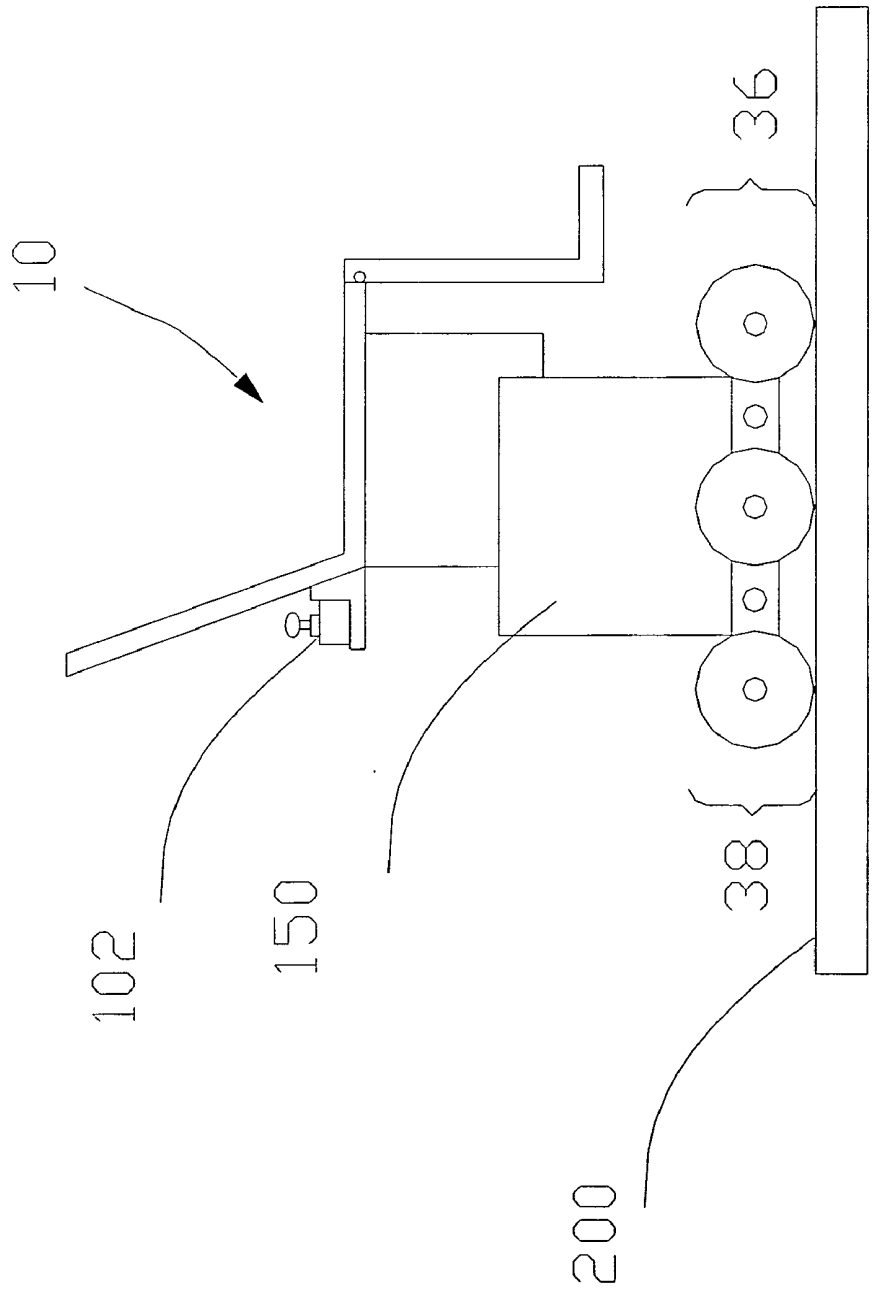


Fig. 9

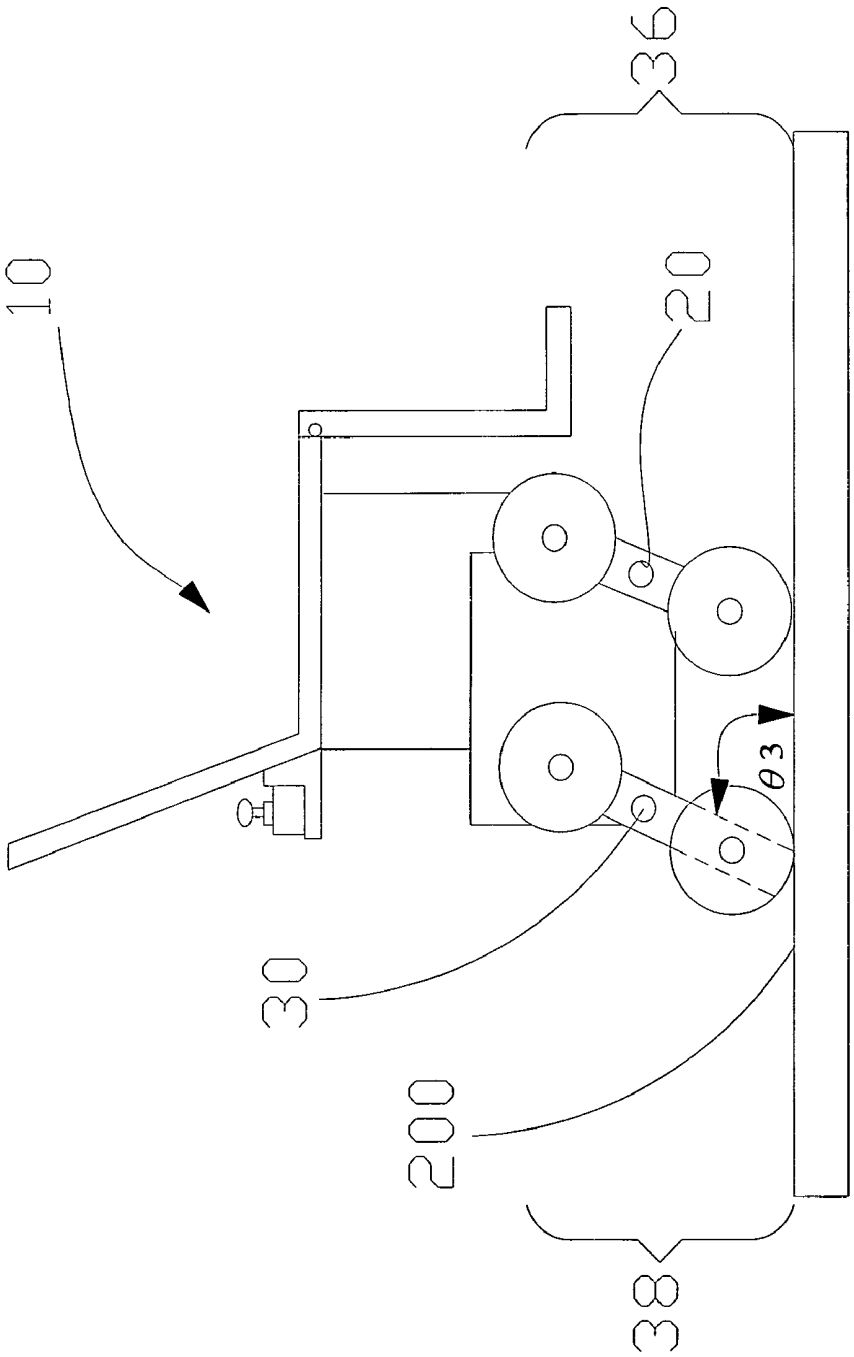


Fig. 10

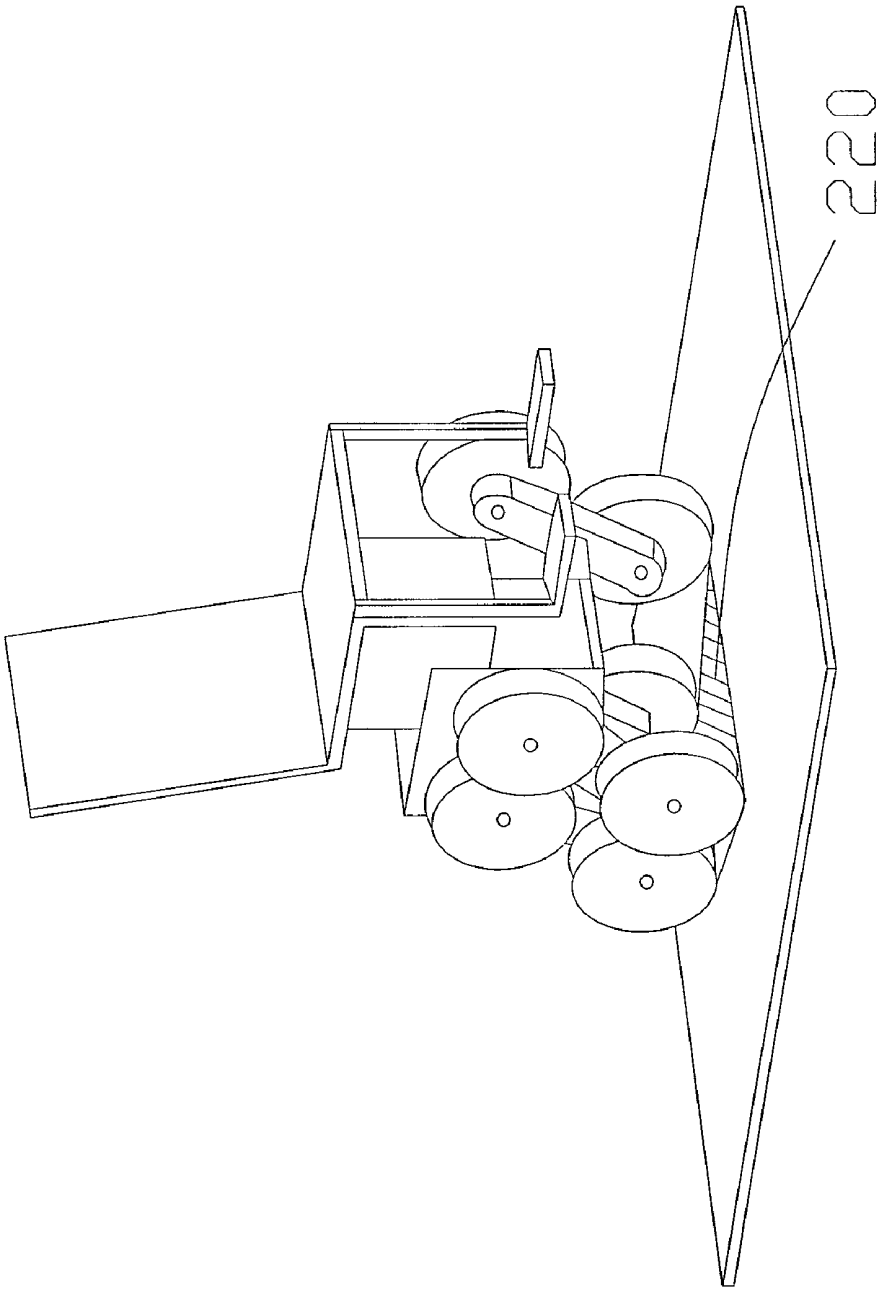


Fig. 11

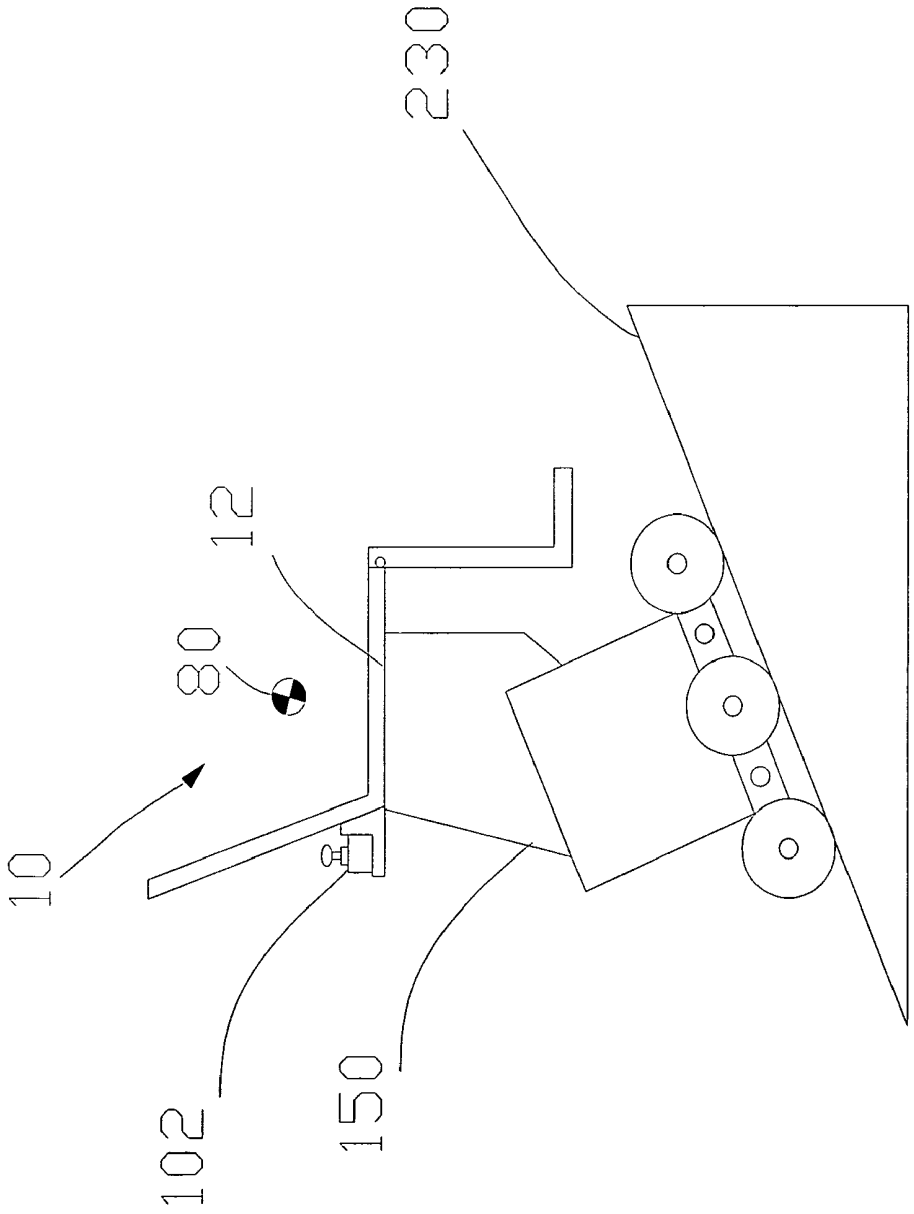


Fig. 12

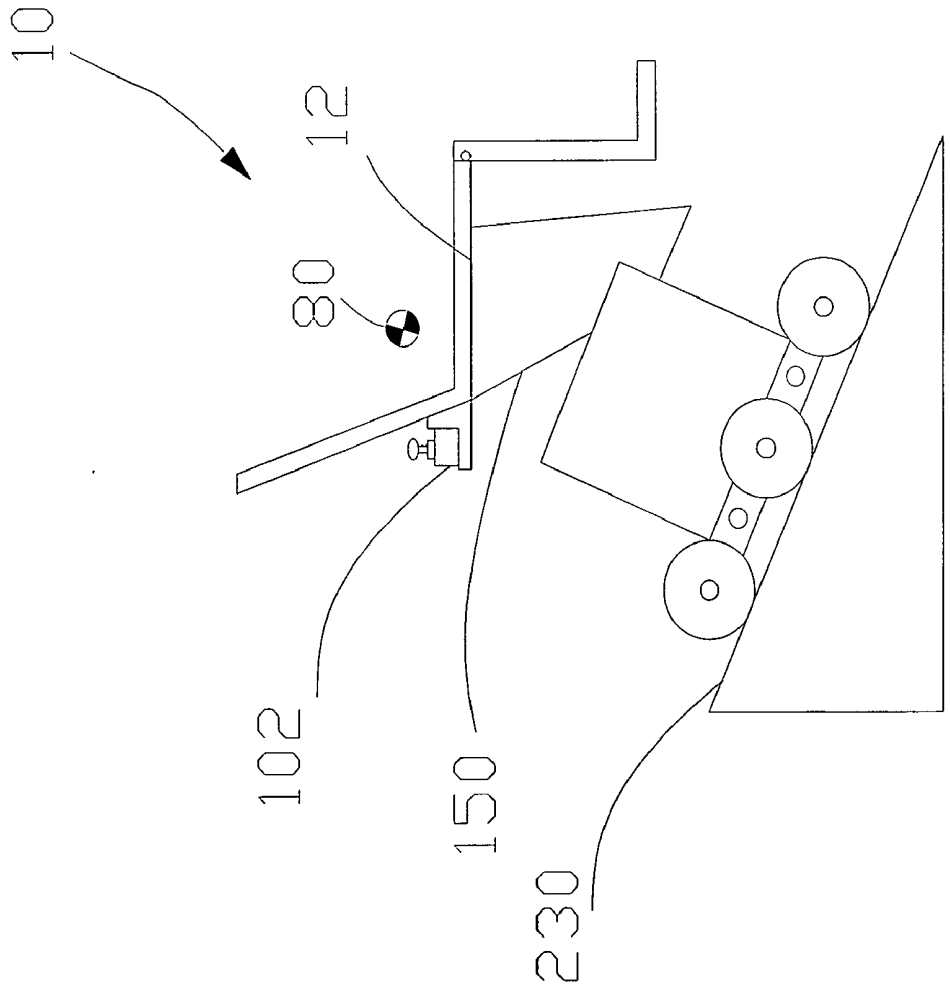


Fig. 13

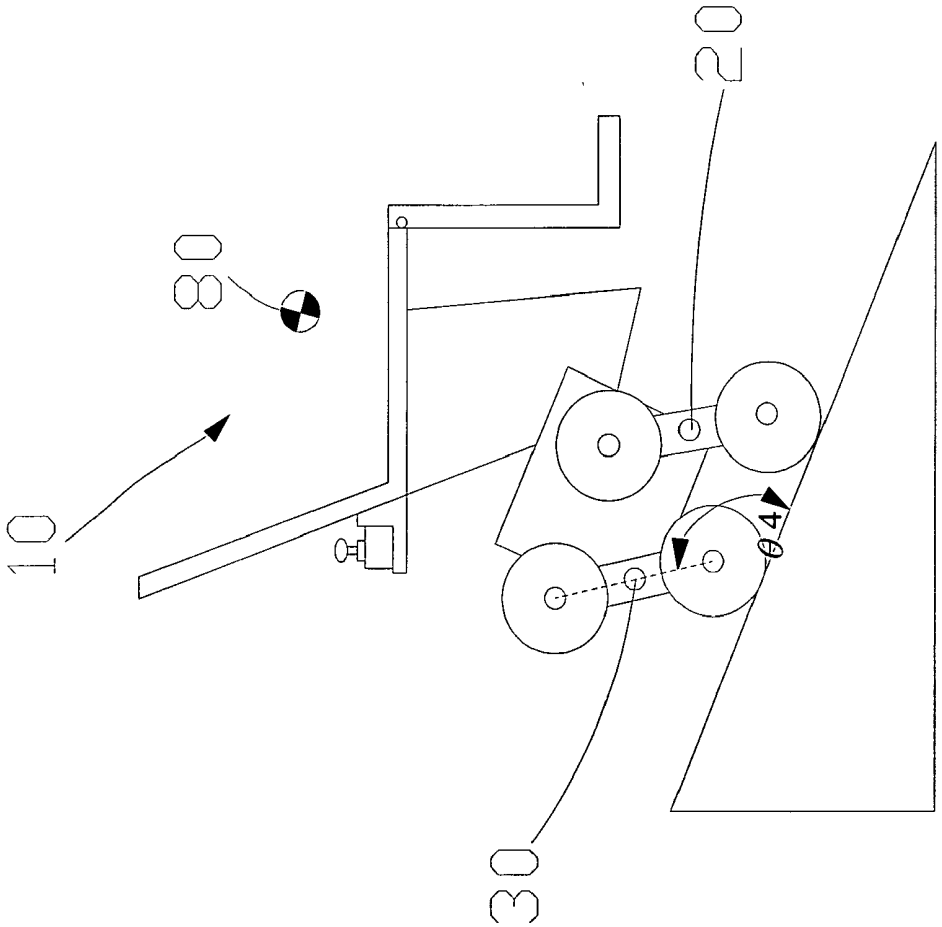


Fig. 14

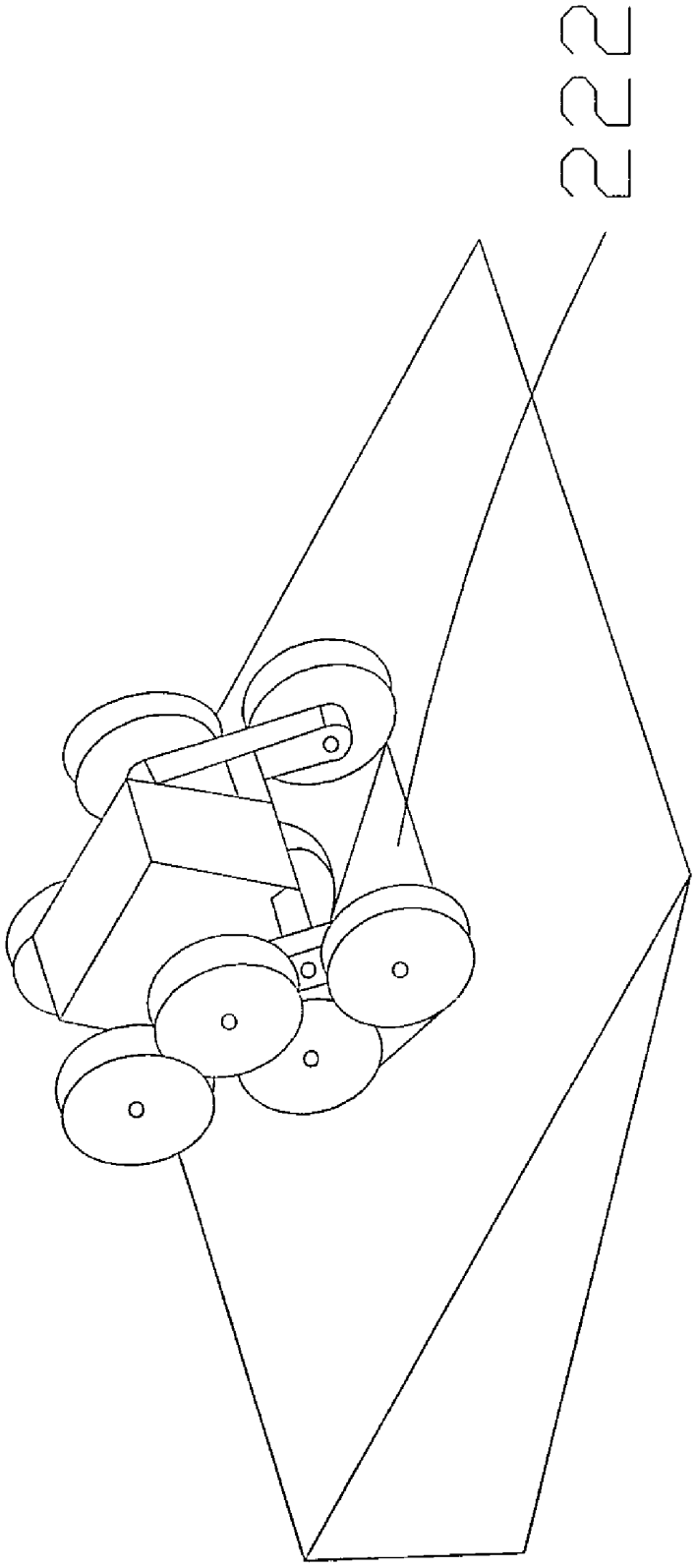


Fig. 15

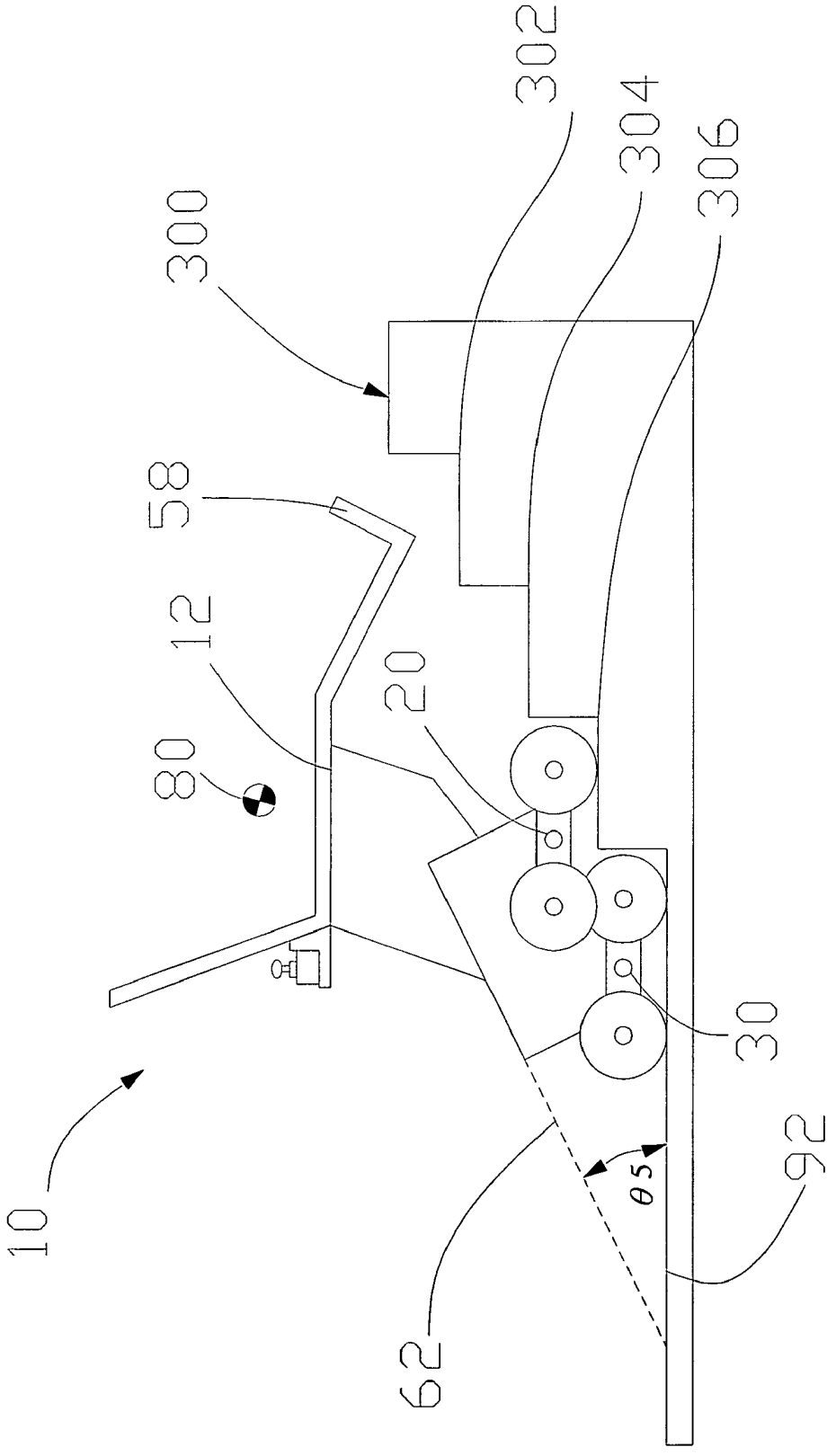


Fig. 16

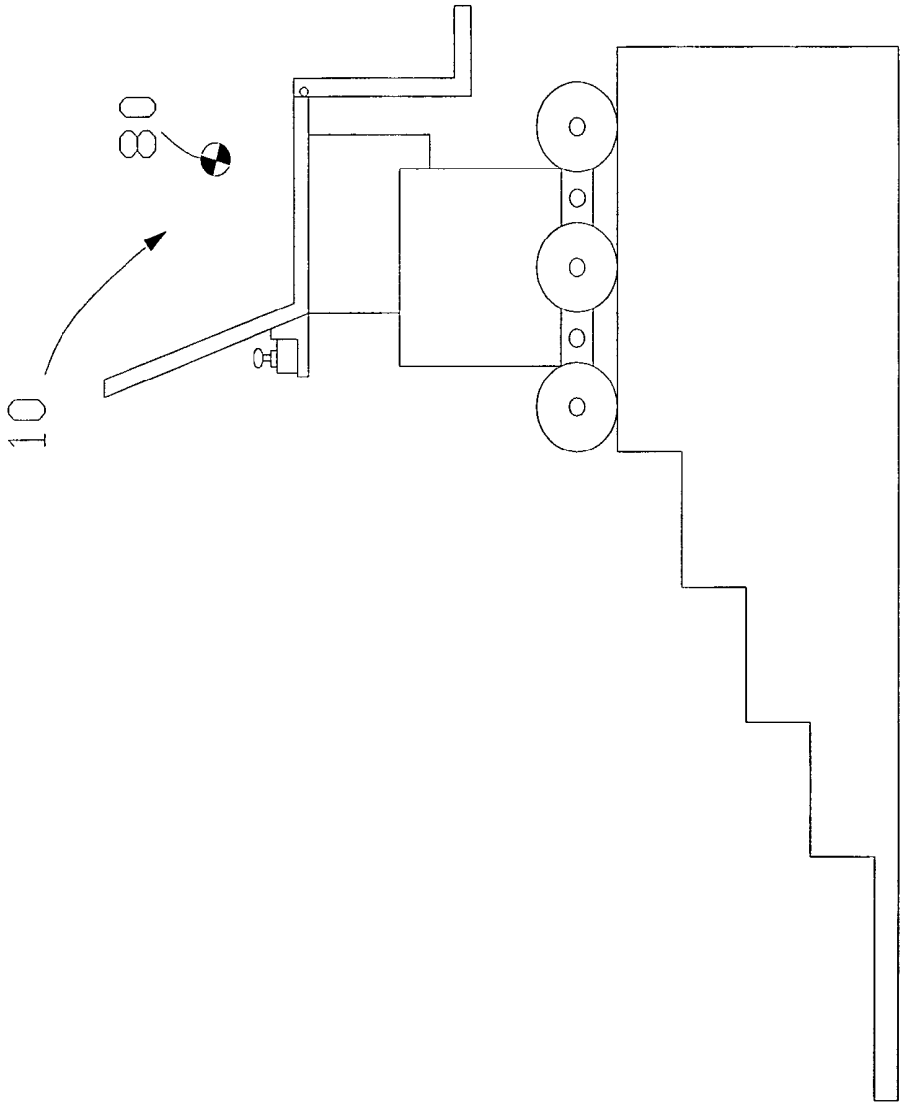


Fig. 17

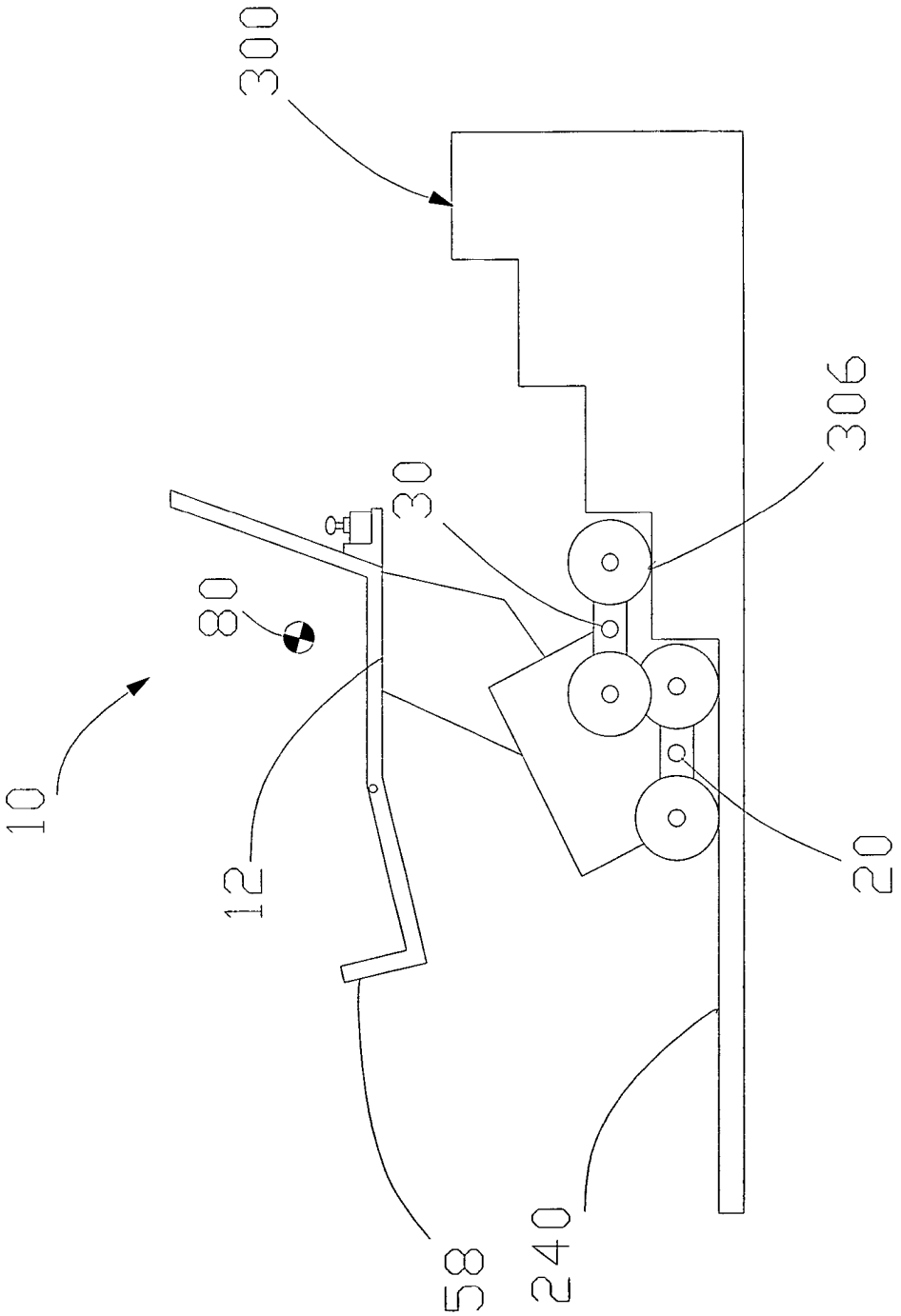


Fig. 18

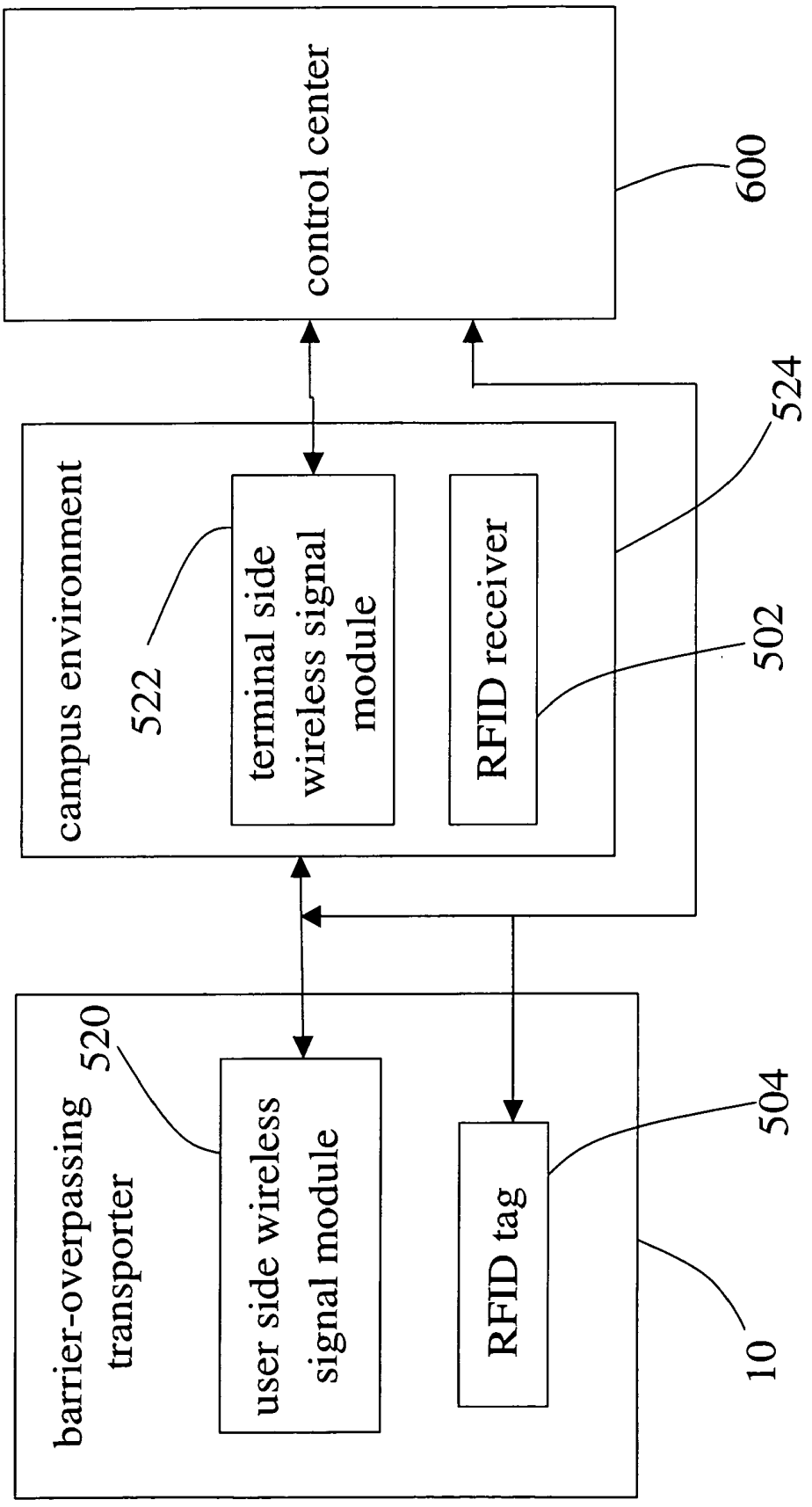

control center
600
campus environment
522
terminal side wireless signal module
RFID receiver
524
502
barrier-overpassing transporter
520
user side wireless signal module
RFID tag
504
10

Fig. 19

BARRIER-OVERPASSING TRANSPORTER

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a barrier-overpassing transporter, particularly to an intelligent level-adjust barrier-overpassing transporter.

[0003] 2. Description of the Related Art

[0004] There are everywhere stairs in the world; however, free-barrier accesses are not always sophisticated enough. Facing stairs, a common transporter can just do nothing. When uphill, the rider not only must be frightened by a tilting seat but also has to risk turning upside down. There have been researches and developments of intelligent barrier-overpassing and stair-climbing transporters or auxiliary instruments for many years. However, the prevalence is still very low. When a transporter overpasses a barrier or goes up/downstairs, the rider often tilts with the transporter. However, the conventional transporters rarely have a level-adjust function. If there is, it is usually too high in cost or not so perfect in performance because it adopts too expensive technology or uses a low-precision sensor. Briefly to speak, the poor popularization of barrier-overpassing transporters may be attributed to insufficient functions, low safety, fabrication hardness, bulky volume and high price.

[0005] A Taiwan patent No. 567159 disclosed "Mechanical Improvements to a Personal Vehicle", wherein a set of rotary wheeled arms and a complicated sensing method are used to overpass a barrier and maintain the horizontality of a support frame. Although the prior art can take the rider to overpass a barrier, a safe stair-climbing action of such a machine still needs a human assistance or an environmental aid (such as a stair rail). Besides, once the electronic system of the conventional machine malfunctions or the power supply is interrupted, the rider together with the vehicle may tilt and then fall down from a staircase.

[0006] Accordingly, the present invention proposes a barrier-overpassing transporter to effectively overcome the abovementioned problems.

SUMMARY OF THE INVENTION

[0007] The primary objective of the present invention is to provide a barrier-overpassing transporter, which integrates a ground contact module, a sensing/adjusting module and a wireless transceiver module to promote the safety, stability and convenience of a barrier-overpassing transporter.

[0008] Another objective of the present invention is to provide a barrier-overpassing transporter, which utilizes a ground contact module to decrease the torque required to advance the transporter and reduce the cost of the transporter.

[0009] Still another objective of the present invention is to provide a barrier-overpassing transporter, which utilizes a sensing/adjusting module to implement multi-directional level detection, tilt adjustment and level control.

[0010] Further another objective of the present invention is to provide a barrier-overpassing transporter, which utilizes a wireless transceiver module to implement realtime monitoring, promote motion prediction accuracy and provide instant convenience for a user.

[0011] To achieve the abovementioned objectives, the present invention proposes a barrier-overpassing transporter, which comprises: a support frame carrying a rider or another load; a sensing/adjusting module coupled to the support frame, detecting a tilting state of the support frame and maintaining the support frame in a horizontal state; a ground contact module supporting an effective load and utilizing ground contact elements to lift the support frame to overpass a surface of a barrier; and a wireless transceiver module collecting and transmitting information to enable adjustments and activities responding to interior states of the transporter and enhance safety and interactivity between the transporter and environment.

[0012] Below, the embodiments are described in detail in cooperation with the attached drawings to make easily understood the objectives, technical contents, characteristics and accomplishments of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIG. **1** is a side view of a barrier-overpassing transporter according to the present invention;

[0014] FIG. **2** is a perspective view of a barrier-overpassing transporter according to the present invention;

[0015] FIG. **3** is a top view of a barrier-overpassing transporter according to the present invention;

[0016] FIG. **4** is a diagram showing the flowchart of an automatic control process of a barrier-overpassing transporter according to the present invention;

[0017] FIG. **5** is a sectional view of a multi-directional tilt-sensing device according to the present invention;

[0018] FIG. **6**A is a diagram schematically showing a barrier-overpassing transporter and a balance mechanism device on a horizontal ground according to the present invention;

[0019] FIG. **6**B is a sectional view of a sensing device according to the present invention when a barrier-overpassing transporter on a horizontal ground;

[0020] FIG. **7**A is a diagram schematically showing that a support frame has been adjusted by a balance mechanism device according to the present invention when a barrier-overpassing transporter on a forward-tilting ground;

[0021] FIG. **7**B is a sectional view of a sensing device according to the present invention when a barrier-overpassing transporter on a forward-tilting ground;

[0022] FIG. **8**A is a diagram schematically showing that a support frame has been adjusted by a balance mechanism device according to the present invention when a barrier-overpassing transporter on a side-tilting ground;

[0023] FIG. **8**B is a sectional view of a sensing device according to the present invention when a barrier-overpassing transporter on a side-tilting ground;

[0024] FIG. **9** is a side view schematically showing that a barrier-overpassing transporter moves on a flat ground according to the present invention;

[0025] FIG. **10** is a side view schematically showing that the flat ground and the rotation arm contain a non-zero angle when a barrier-overpassing transporter moves on a flat ground according to the present invention;

[0026] FIG. **11** is a perspective view schematically showing that the contact points between the ground contact elements and the flat ground form a plane when a barrier-overpassing transporter moves on a flat ground according to the present invention;

[0027] FIG. **12** is a diagram schematically showing that the body's gravity center is moved forward when a barrier-overpassing transporter moves uphill according to the present invention;

[0028] FIG. **13** is a diagram schematically showing that the body's gravity center is moved backward when a barrier-overpassing transporter moves downhill according to the present invention;

[0029] FIG. **14** is side view schematically showing that the flat ground and the rotation arm contain a non-zero angle when a barrier-overpassing transporter moves downhill according to the present invention;

[0030] FIG. **15** is a perspective view schematically showing that the contact points between the ground contact elements and the downhill ground form a plane when a barrier-overpassing transporter moves downhill according to the present invention;

[0031] FIG. **16** is a side view schematically showing that a barrier-overpassing transporter is moving upstairs according to the present invention;

[0032] FIG. **17** is a side view schematically showing that a barrier-overpassing transporter has been upstairs according to the present invention;

[0033] FIG. **18** is a side view schematically showing that a barrier-overpassing transporter is moving downstairs according to the present invention; and

[0034] FIG. **19** is a flowchart for the cooperation of a barrier-overpassing transporter and a wireless transceiver module according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0035] Refer to FIG. **1** a side view of a barrier-overpassing transporter according to the present invention. The barrier-overpassing transporter **10** of the present invention comprises: a support frame **12** carrying a rider or another load; a sensing/adjusting module **100** coupled to the support frame **12**, detecting a tilting state of the support frame **12** and maintaining the support frame **12** in a horizontal state; and a ground contact module **16** used to transport the support frame to overpass a ground, an equivalent ground or another surface. The sensing/adjusting module **100** further comprises a multi-directional tilt-sensing device **102** used to sense a tilting state of the support frame **12** and a balance mechanism device **150** covered by a deformable protection housing and maintaining the support frame **12** in a horizontal state according to signals output by the multi-directional tilt-sensing device **102**. A rider or another load is referred to as an "effective load" in the specification and the attached claims. The terminology "ground" includes any surface supporting the transporter in the specification and the attached claims. The terminology "balance mechanism device" includes any device capable of adjusting the support frame **12** and maintaining a horizontal state of the support frame **12** in the specification and the attached claims, and the device may include a deformable protection housing.

[0036] Refer to FIG. **2** and FIG. **3** respectively a perspective view and a top view of a barrier-overpassing transporter according to the present invention. The operation mode described herein can apply to a transporter having at least one ground contact elements wherein each said ground contact element pivotally coupled to ends of rotation arm and driven by said rotation arm to rotate with respect to center of said rotation arm to enable said transporter to overpass a barrier. Each lateral side of the transporter has a first rotation arm **20** and a second rotation arm **30**.The ground contact elements include wheels **40**, **42**, **44**, **46**, **48**, **50**, **52**, and **54**. The movement that one ground contact element is driven by rotation arm to rotate with respect to the center of rotation arm is referred to as a "cluster motion" in the specification and the attached claims. The cooperation of the motions of the ground contact elements enables the movement of the transporter. The summation of the ground contact elements includes a first cluster **36** and a second cluster **38**. The first cluster **36** includes wheels **40**, **42**, **44** and **46**, which are driven to rotate by the first rotation arms **20** with respect to the centers of the first rotation arms **20**, and the second cluster **38** includes wheels **48**, **50**, **52** and **54**, which are driven to rotate by the second rotation arms **30** with respect to the centers of the second rotation arms **30**. The first cluster **36** or the second cluster **38** is referred to as a "cluster" elsewhere in the specification and the attached claims. The first rotation arm **20** or the second rotation arm **30** is referred to as a "cluster jointer" elsewhere in the specification and the attached claims. The motion that the cluster is driven to rotate by the cluster jointer can change the height of the support frame **12** with respect to the ground. The height of the support frame **12** can also be changed by other mechanism or mechanical skills. Refer to FIG. **4** a diagram showing the flowchart of an automatic control process of a barrier-overpassing transporter according to a preferred embodiment of the present invention. In the preferred embodiment, a driving device **14** controls six motors **13** and the balance mechanism device **150**. The driving device **14** is controlled by a user's interface **19**, the sensing device **102** or a server **17** to perform adjustments of the transporter. When the sensing device **102** detects a condition needing an adjustment, it enables the driving device **14** to operate via contact electrodes **110** coupled to the driving device **14**. When the driving device **14** receives a signal for adjustment, it controls the six motors **13** to drive the ground contact module **16** and the support frame **12** to operate and controls the balance mechanism device **150** to balance the transporter.

[0037] Refer to FIG. **5** a sectional view of a multi-directional tilt-sensing device **102** according to the present invention. In the multi-directional tilt-sensing device **102**, a container **104** contains a liquid dielectric **120** and has at least two pairs of contact electrodes **110** thereinside. The container **104** also has a circuit connection module **160** thereinside used to separate the positive and negative electrodes of the contact electrodes **110** and a bottom electrode **112** to prevent the electrodes from short circuit lest the circuit be damaged. When the support frame **12** is tilted, the liquid dielectric **120** still maintains horizontal and triggers the conduction state of the contact electrode **110** in the tilting direction. Then, the balance mechanism changes the tilt angle of the support frame **12** and restores the support frame **12** back to a horizontal state.

[0038] Refer to FIG. **6**A to FIG. **8**B. FIG. **6**A is a diagram schematically showing a barrier-overpassing transporter and a balance mechanism device on a flat ground according to the present invention. FIG. **6**B is a sectional view of a sensing device according to the present invention when a barrier-overpassing transporter on a flat ground. FIG. **7**A is a diagram schematically showing that a support frame has been adjusted by a balance mechanism device according to the present invention when a barrier-overpassing transporter on a forward-tilting ground. FIG. **7**B is a sectional view of a sensing device according to the present invention when a barrier-overpassing transporter on a forward-tilting ground. FIG. **8**A is a diagram schematically showing that a support frame has been adjusted by a balance mechanism device according to the present invention when a barrier-overpassing transporter

on a side-tilting ground. FIG. **8**B is a sectional view of a sensing device according to the present invention when a barrier-overpassing transporter on a side-tilting ground. When the barrier-overpassing transporter is in a horizontal state, the height differences between the liquid dielectric **120** and the contact electrodes **110** are equal, and the liquid dielectric **120** does not contact the contact electrodes **110**. When the barrier-overpassing transporter is on a forward-tilting or side-tilting ground, a part of contact electrodes **110** contact the liquid dielectric **120**. Thus, the liquid dielectric **120** enables the conduction state between the contact electrode **110** and the bottom electrode **112** at the bottom of the hemispherical container **120**. When the barrier-overpassing transporter is on a forward-tilting ground, the level plane of the liquid dielectric **120** and the extension line of the bottom contain an angle θ_1. When the barrier-overpassing transporter is on a side-tilting ground, the level plane of the liquid dielectric **120** and the extension line of the bottom contain an angel θ_2. Thereby, the sensing device **102** can detect the tilt of the support frame **12** and feedback signals to the balance mechanism device **150**. Then, the balance mechanism device **150** adjusts the support frame **12** to a horizontal state.

[0039] Refer to FIG. **9** a diagram schematically showing that a barrier-overpassing transporter moves on a flat ground according to the present invention. When the barrier-overpassing transporter **10** moves on a flat ground **200**, the first rotation arms **20** of the first cluster **36** and the second rotation arms **30** of the second cluster **38** are parallel to the flat ground **200**, and all the ground contact elements contact the ground. Refer to FIG. **10** and FIG. **11**. When the barrier-overpassing transporter **10** moves on a flat ground **200**, the flat ground **200** and the first rotation arm **20** of the first cluster **36**/the second rotation arm **30** of the second cluster **38** may contain a non-zero angle θ_3. Then, a part of ground contact elements contact the flat ground **200**, and the contact points form a plane **220**. Via the plane **220**, the transporter can move stably on the flat ground **200**.

[0040] Refer to FIG. **12** and FIG. **13** diagrams respectively schematically showing that a barrier-overpassing transporter moves uphill or downhill according to the present invention. When the barrier-overpassing transporter moves on a tilting ground **230**, e.g., moves uphill, the support frame **12** can be maintained in a horizontal state via the multi-directional tilt-sensing device **102** and the balance mechanism device **150**, and the body's gravity center **80** moves toward the advance direction with respect to the transporter (moving forward). When the transporter moves downhill, the body's gravity center **80** moves opposite to the advance direction with respect to the transporter. Refer to FIG. **14** and FIG. **15**. When the barrier-overpassing transporter **10** moves on the tilting ground **230**, the tilting ground **230** and the first rotation arm **20** of the first cluster **36**/the second rotation arm **30** of the second cluster **38** may contain a non-zero angle θ_4. No matter what degree the angle has, the contact points between the tilting ground and the ground contact elements can form a plane **222**. Via the plane **222**, the transporter can move stably on the tilting ground **230**.

[0041] Refer to FIG. **16** and FIG. **17** diagrams respectively schematically showing that a barrier-overpassing transporter is moving upstairs and has been upstairs according to the present invention. When the barrier-overpassing transporter **10** meets a barrier **300** and intends to overpass the barrier **300**, the pedal **58** will be adjusted to an appropriate angle to facilitate overpassing the barrier **300**. The first and second clusters synchronously rotate until the ground contact elements of the first cluster contact the third stairstep **302** of a staircase. Firstly, the barrier-overpassing transporter **10** begins to tilt; at the same time, the support frame **12** can be maintained at a horizontal state and moved forward via the multi-directional tilt-sensing device and the balance mechanism device, and the body's gravity center **80** is thus also moved forward. The first and second clusters keep on synchronously rotating, and the tilting degree is maintained fixed until the first and second rotation arms **20** and **30** resumes horizontality. While the transporter is going to finish climbing one stairstep, the tilting degree changes again. Before the tilting degree changes, the barrier-overpassing transporter **10** can climb the stair stably. When the tilting degree increases, the multi-directional tilt-sensing device and the balance mechanism device can maintain the support frame **12** at a horizontal state and move the support frame **12** forward, and the body's gravity center **80** can thus be moved forward also. The tilting degree of the barrier-overpassing transporter **10** in the specification and the attached claims is defined by an angle θ_5 contained by the long axis **62** of the transporter base and the horizontal surface **92**. When the ground contact elements of the first cluster contact the first stairstep **306** of the staircase, the ground contact elements of the second cluster contact the second stairstep **304**, and the first rotation arms **20** and the second rotation arms **30** are vertical to the horizontal plane. Then, the tilting degree decreases; via the multi-directional tilt-sensing device and the balance mechanism device, the support frame **12** is maintained at a horizontal state and moved backward, and the body's gravity center **80** is thus also moved backward. Finally, all the ground contact elements of the first cluster and a part of the ground contact elements of the second cluster contact the first stairstep **306**, and the first rotation arms **20** and the second rotation arms **30** are parallel to the horizontal plane. At this time, the barrier-overpassing transporter **10** resumes horizontality; via the multi-directional tilt-sensing device and the balance mechanism device, the support frame **12** also resumes horizontality as if it had not gone upstairs, and the pedal **58** is also adjusted to an appropriate angle. Thus, the stair-climbing activity is completed. As the support frame **12** is capable of rotation, the barrier-overpassing transporter **10** may also undertake stair climbing after the support frame **12** has 180 degrees rotated.

[0042] Refer to FIG. **18** a diagram schematically showing that a barrier-overpassing transporter is moving downstairs according to the present invention. When the barrier-overpassing transporter **10** meets a barrier **300** and intends to overpass the barrier **300**, the pedal **58** will be adjusted to an appropriate angle to facilitate overpassing the barrier **300**. At beginning, the barrier-overpassing transporter **10** advances continuously, the first rotation arms **20** and the second rotation arms **30** are parallel to the horizontal plane. Once the ground contact elements of the first cluster do not contact a ground but hangs in the air, the barrier-overpassing transporter **10** begins to tilt. At this time, the support frame **12** can be maintained at a horizontal state and moved backward via the multi-directional tilt-sensing device and the balance mechanism device, and the body's gravity center **80** is thus also moved backward. The tilting degree is maintained fixed until the transporter is going to finish stair descending. Before the tilting degree changes, the barrier-overpassing transporter **10** can move downstairs stably. At this time, the first and second clusters keep on synchronously rotating to stably descend stairs. Via the multi-directional tilt-sensing device

and the balance mechanism device, the support frame **12** can be maintained at a horizontal state and moved backward, and the body's gravity center **80** is thus also moved backward. The first and second clusters keep on synchronously rotating, and the tilting degree is maintained fixed; thus, the barrier-overpassing transporter **10** can descend the staircase stably. The first and second clusters keep on synchronously rotating until the ground contact elements of the first cluster **36** contact a ground **240** and the ground contact elements of the second cluster **38** contact the first stairstep **306**. At this time, the first and second rotation arms **20** and **30** resumes horizontality. Then, the tilting degree decreases, and the multi-directional tilt-sensing device and the balance mechanism device maintains the support frame **12** at a horizontal state and moves the support frame **12** forward, and the body's gravity center **80** can thus be moved forward. Then, a part of ground contact elements of the first and second clusters contact the ground **240**, and the first and second clusters keep on synchronously rotating; the multi-directional tilt-sensing device and the balance mechanism device maintains the support frame **12** at a horizontal state and moves the support frame **12** forward, and the body's gravity center **80** is moved forward. Finally, the pedal **58** is adjusted to an appropriate angle. Thus, the stair-descending activity is completed. As the support frame **12** is capable of rotation, the barrier-overpassing transporter **10** may also undertake stair descending after the support frame **12** has 180 degrees rotated.

[0043] Refer to from FIG. **16** to FIG. **18** for further functions of the barrier-overpassing transporter according to the present invention. In addition to rotating synchronously, the first and second clusters can also operate in another mode via the control of a rider or another control means to make the motion smoother when the barrier-overpassing transporter **10** is going to move up/downstairs. The barrier-overpassing transporter **10** is apt to be unstable while it is going to finish stair climbing or while it just begins to descend a staircase. At this time, non-synchronous rotation of the first and second clusters can make stair climbing/descending more stably. The non-synchronous rotation can be manually operated by a rider (via a user's interface) or automatically operated by a control system. Via the multi-directional tilt-sensing device and a wireless transceiver module, the driving device can adjust and operate the transporter. When receiving signals, the driving device controls the balance mechanism device to perform adjustment and controls six motors to operate the first and second clusters to move the transporter up/downstairs stably.

[0044] Refer to FIG. **19** a flowchart for the cooperation of a barrier-overpassing transporter and a wireless transceiver module according to the present invention. The wireless transceiver module comprises: a RFID (Radio Frequency Identification) tag **504** recording the identity of the user of the transporter and the related information and a user side wireless signal module **520** used to transmit and receive signals. In a campus environment **524**, RFID information transmission systems are installed in the places wherein a disabled person may need help, such as a staircase. Thus, at least one RFID receiver **502** and at least one terminal side wireless signal module **522** are equipped in each staircase. When a barrier-overpassing transporter of the present invention intends to go upstairs, the RFID receiver **502** receives a signal from the RFID tag **504**. Then, the information about the operational safety of the barrier-overpassing transporter, such as the position and speed of the barrier-overpassing transporter, the staircase slope, the status of the rider, etc., is sent to a control center **600**. The control center **600** processes the information and feedback the processed information to the user side wireless signal module **520** via the terminal side wireless signal module **522**. The information received by the user side wireless signal module **520** includes the length, width and height of the staircase which the rider intends to climb. According to the information, whether the transporter can climb the staircase is determined. If the result is positive, the first and second clusters are controlled to synchronously or non-synchronously rotate so that the transporter can climb the staircase at the highest efficiency. Further, the operational states of the components of the transporter are also feedbacked to the control center **600** so that the control center **600** can learn whether the rider needs a special aid or whether the transporter malfunctions. Besides, the transporter and the control center **600** can feedback information to each other to update information so that the rider can have higher safety and more convenience.

[0045] Those embodiments described above are to exemplify the present invention to enable the persons skilled in the art to understand, make and use the present invention. However, it is not intended to limit the scope of the present invention. Any equivalent modification or variation according to the spirit of the present invention is to be also included within the scope of the claims stated below.

What is claimed is:

1. A barrier-overpassing transporter comprising:
- a support frame supporting an effective load;
- a sensing/adjusting module coupled to said support frame, detecting a tilting state of said support frame and maintaining said support frame in a horizontal state;
- a ground contact module arranged below said support frame supporting said effective load and lifting said support frame to overpass a surface of a barrier; and
- a wireless transceiver module arranged on said support frame, collecting and transmitting information to enable adjustments and activities responding to interior states of said transporter.

2. A barrier-overpassing transporter according to claim **1**, wherein said sensing/adjusting module further comprises:
- a sensing device coupled to said support frame and used to detect a tilting state of said support frame; and
- a balance mechanism device joined to said support frame and maintaining said support frame in a horizontal state according to signals output by said sensing device.

3. A barrier-overpassing transporter according to claim **2** further comprising a deformable protection housing covering said balance mechanism device.

4. A barrier-overpassing transporter according to claim **2**, wherein said sensing device is a multi-directional tilt-sensing device.

5. A barrier-overpassing transporter according to claim **1**, wherein said ground contact module further comprises:
- at least one rotation arm coupled to a base and used to rotate said ground contact module;
- at least one ground contact element pivotally coupled to ends of said rotation arm and driven by said rotation arm to rotate with respect to center of said rotation arm to enable said transporter to overpass a barrier; and
- a driving device installed in said ground contact module and generating a current, wherein said current is amplified by a servo amplifier to drive a wheel servo motor and a cluster servo motor.

6. A barrier-overpassing transporter according to claim 5, wherein at least four contact points of said ground contact elements contact a ground.

7. A barrier-overpassing transporter according to claim 5, wherein said ground contact elements are manually or automatically controlled.

8. A barrier-overpassing transporter according to claim 5, wherein said ground contact elements include at least one pair of wheels driven by said rotation arm to rotate with respect to center of said rotation arm.

9. A barrier-overpassing transporter according to claim 1, wherein said support frame can rotate.

10. A barrier-overpassing transporter according to claim 1, wherein height of said support frame with respect to a ground can be changed by rotation of said ground contact elements driven by said rotation arms, activities of another mechanism, or another mechanical skill.

11. A barrier-overpassing transporter according to claim 1, wherein when said barrier-overpassing transporter moves uphill, said support frame is maintained in a horizontal state, and body's gravity center is moved toward a same direction as said transporter advances.

12. A barrier-overpassing transporter according to claim 1, wherein when said barrier-overpassing transporter moves downhill, said support frame is maintained in a horizontal state, and body's gravity center is moved toward a direction opposite to an advance direction of said transporter.

13. A barrier-overpassing transporter according to claim 1, wherein said wireless transceiver module further comprises:

a radio-frequency identification tag attached to said barrier-overpassing transporter and recording identity of a user and related information; and

a user side wireless signal module installed in said barrier-overpassing transporter and used to receive and transmit information.

14. A barrier-overpassing transporter according to claim 13, wherein said user side wireless signal module receives signals from environment and interior of said barrier-overpassing transporter and then sends out said signals.

15. A barrier-overpassing transporter according to claim 13, wherein said signals said user side wireless signal module receives from environment and interior of said barrier-overpassing transporter include: a ratio of length to width of a staircase, a staircase slope, rider information, and safe-operation information of said barrier-overpassing transporter.

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