



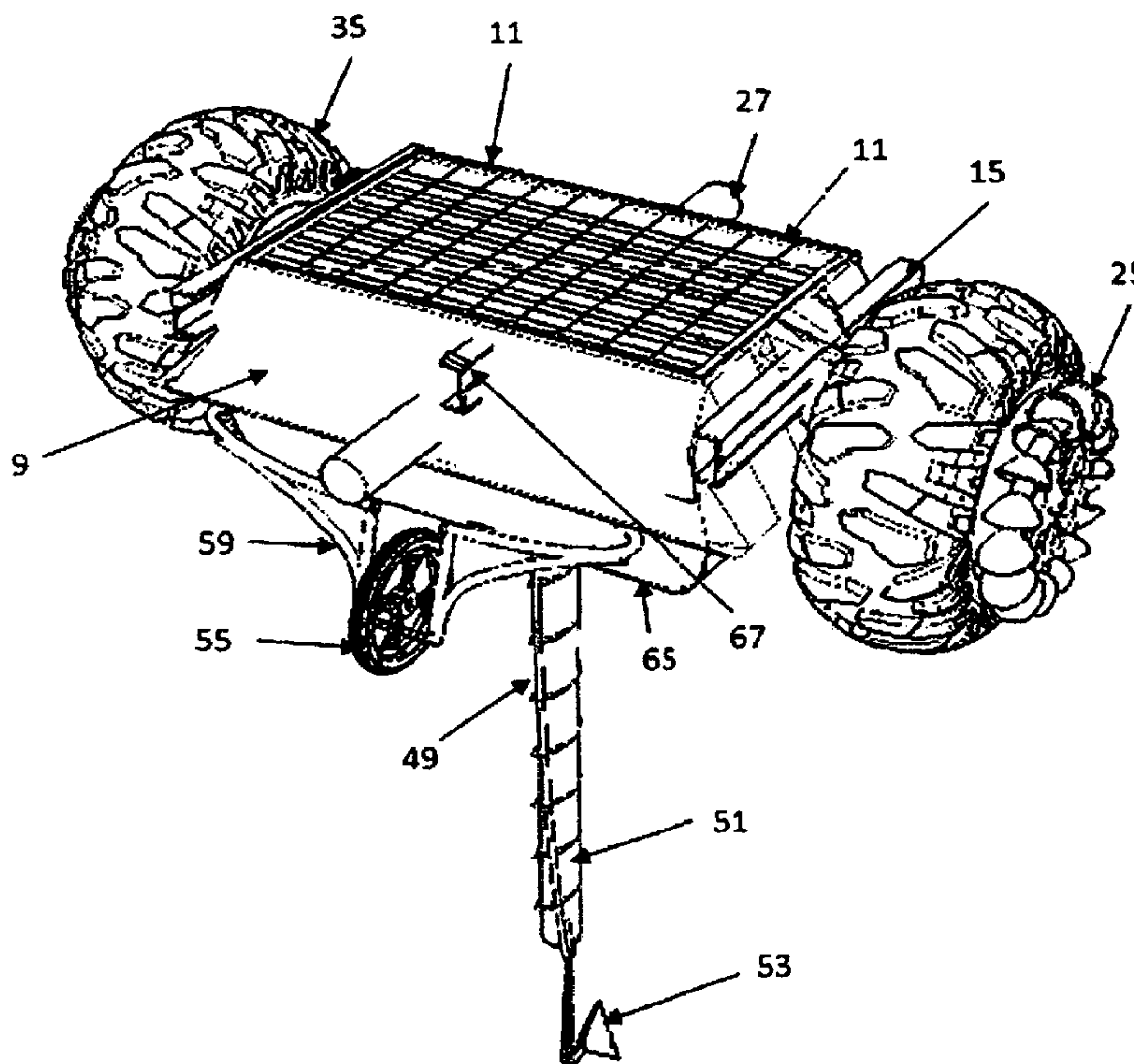
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 (54) Title: MICRODREDGING SYSTEM AND METHOD OF USING THE SAME



**FIG. 2**

(57) **Abrégé/Abstract:**

Microdredging systems comprising a pumping platform and loading platform are described. In certain embodiments, system operates autonomously and is adapted to allow the loading platform undock from the pumping platform for disposal of the removed sediment.

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(54) Title: MICRODREDGING SYSTEM AND METHOD OF USING THE SAME

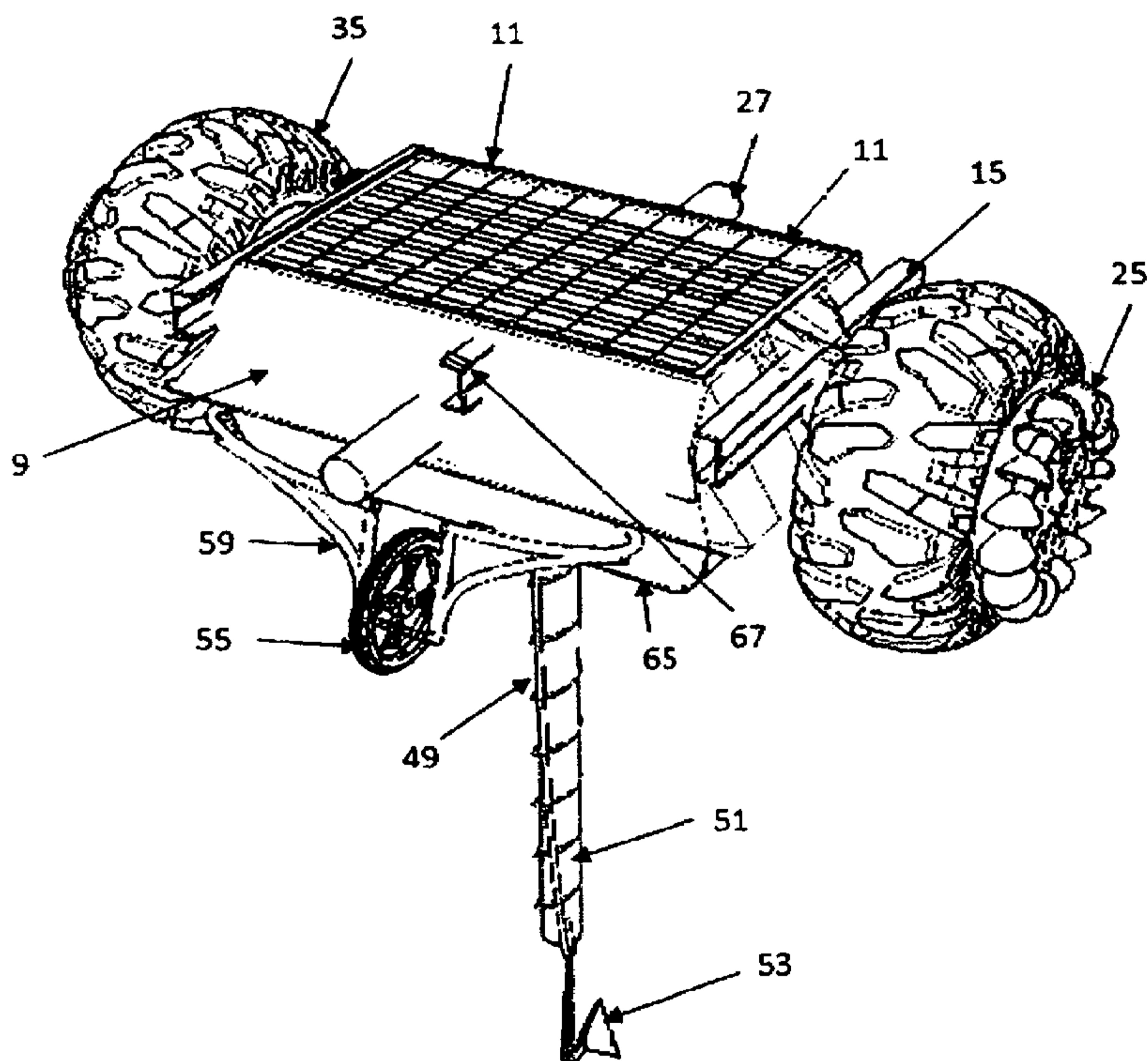


FIG. 2

(57) Abstract: Microdredging systems comprising a pumping platform and loading platform are described. In certain embodiments, system operates autonomously and is adapted to allow the loading platform undock from the pumping platform for disposal of the removed sediment.

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## MICRODREDGING SYSTEM AND METHOD OF USING THE SAME

### FIELD

[001] The present disclosure relates to a microdredging system comprising one or more buoyant platforms that are adapted to remove sediment from below the surface of a body of water.

### BACKGROUND

[002] Methods of dredging a body of water often implement the use of large piece of excavation equipment supported on a barge and requiring the use of one or more onboard operators. These methods are often expensive and can only be accomplished at depths at which the excavator can reach. Other types of dredging systems implement the use of barges that also require the use of one or more onboard operators and periodic, expensive implementation. In addition, most systems are limited in that operations must be ceased when the platform is loaded with sediment, requiring the entire system to be moved to the nearest accessible land or distant aquatic dumping grounds for offloading. Accordingly, there remains a need to develop dredging systems that are relatively inexpensive and are capable of a continuous operating schedule that does not necessarily require the constant presence of onboard operators.

### SUMMARY

[003] Described herein is a system comprising:

a buoyant pumping platform comprising at least one suction device adapted to deploy to a detected location below a surface of a body of water where sediment is located, and raise the sediment;

a location device adapted to determine the detected location; and

a buoyant loading platform adapted to engage with the buoyant pumping platform, wherein said loading platform is adapted to receive the raised sediment.

[004] Also described herein is a method comprising:

delivering a microdredger system to a primary site on a surface of a body of water, said microdredger system comprising a buoyant loading platform, a buoyant pumping platform, at least one suction device, and a location device;

providing a detected location of sediment below the surface of the body of water through the use of the location device;

deploying the at least one suction device to the detected location;

raising the sediment from the detected location via the at least one suction device;

loading the raised sediment onto the buoyant loading platform;

moving the buoyant loading platform to a secondary site; and

discharging the raised sediment from the buoyant loading platform.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

[005] **FIG. 1** is an exploded view of an exemplary pumping platform.

[006] **FIG. 2** is a perspective illustration of an exemplary pumping platform.

[007] **FIG. 3** is a top view of an exemplary pumping platform.

[008] **FIG. 4** is a top view of an exemplary pumping platform with the top panel/cover removed.

[009] **FIG. 5** is a side view of an exemplary pumping platform.

[010] **FIG. 6** is a front view of an exemplary pumping platform.

[011] **FIG. 7** is an exploded view of an exemplary loading platform.

[012] **FIG. 8** is a perspective illustration of an exemplary loading platform

[013] **FIG. 9** is a top view of an exemplary loading platform.

[014] **FIG. 10** is a top view of an exemplary loading platform with top panel/cover removed.

[015] **FIG. 11** is a rear view of an exemplary loading platform.

[016] **FIG. 12** is a side view of an exemplary loading platform.

[017] **FIG. 13** is a front view of an exemplary loading platform.

[018] **FIG. 14** is a side view of a pinion stepper with roller.

[019] FIG. 15 is a side view of an exemplary microdredging system comprising a loading platform docked to a pumping platform.

#### DETAILED DESCRIPTION

[020] The following is a description of exemplary microdredging systems and components thereof. The embodiments described herein are exemplary in nature and are not intended to be limited in structure or application.

[021] As used in this specification and the appended claims, the articles “a,” “an,” and “the” include plural referents unless expressly and unequivocally limited to one referent.

[022] Described herein is a system comprising:

a buoyant pumping platform comprising at least one suction device adapted to deploy to a detected location below a surface of a body of water where sediment is located, and raise the sediment;

a location device adapted to determine the detected location; and

a buoyant loading platform adapted to engage with the buoyant pumping platform, wherein said loading platform is adapted to receive the raised sediment.

[023] Also described herein is a method comprising:

delivering a microdredger system to a primary site on a surface of a body of water, said microdredger system comprising a buoyant loading platform, a buoyant pumping platform, at least one suction device, and a location device;

providing a detected location of sediment below the surface of the body of water through the use of the location device;

deploying the at least one suction device to the detected location;

raising the sediment from the detected location via the at least one suction device;

loading the raised sediment onto the buoyant loading platform;

moving the buoyant loading platform to a secondary site; and



discharging the raised sediment from the buoyant loading platform.

[024] In certain embodiments, the buoyant loading platform is adapted to dock and undock from the buoyant pumping platform. In certain embodiments, the buoyant loading platform is adapted to dock and undock from the buoyant pumping platform through the use of one or more electromagnets. In certain embodiments, the buoyant pumping platform is adapted to trigger the operation of the suction device upon the docking of the buoyant loading platform. In certain embodiments, the buoyant loading platform comprises a load sensor. In certain embodiments, the load sensor comprises a weight sensor or a buoyancy sensor. In certain embodiments, the load sensor is adapted to determine a capacity of the buoyant loading platform for receiving the sediment. In certain embodiments, the buoyant loading platform is adapted to undock from the buoyant pumping platform as determined by the load sensor. In certain embodiments, the buoyant loading platform is adapted to transport the sediment to a remote site after undocking from the buoyant pumping platform. In certain embodiments, the buoyant loading platform is adapted to transport the sediment to a remote site through the use of a locomotion system. In certain embodiments, the locomotion system comprises at least one of a propeller system, a wheel system, a track system, or jet propulsion.

[025] In certain embodiments, the location device comprises at least one of an echo sounder, a remote controller, or a GPS locator. In certain embodiments, the buoyant pumping platform comprises a motion system. In certain embodiments, the motion system comprises at least one of a propeller system, a wheel system, a track system, or jet propulsion. In certain embodiments, the motion system comprises a wheel system. In certain embodiments, the motion system comprises a paddle structure.

[026] In certain embodiments, the at least one suction device comprises a suction hose. In certain embodiments, the at least one suction device comprises an air hose. In certain embodiments, the air hose is connected to a spool, wherein the spool is adapted to coil and uncoil the air hose. In certain embodiments, the suction hose is adapted to coil, retract, collapse, or telescope. In certain embodiments, the suction hose associated the air hose. In certain embodiments, the suction hose is connected to the air hose. In certain embodiments, the spool is adapted to deploy the suction hose to the detected depth via the uncoiling of the air hose. In certain embodiments, the suction device comprises an air compressor. In certain embodiments, the compressor is adapted to provide compressed air to the air hose. In certain embodiments, the

air hose comprises an auger spike. In certain embodiments, the auger spike is adapted to loosen the sediment at the detected depth via agitation. In certain embodiments, the auger spike is adapted to be agitated by an action created by the spool. In certain embodiments, the suction hose is adapted to remove sediment from the detected depth via air bubbles from the compressed air provided by the air hose.

[027] In certain embodiments, the pumping platform comprises a sediment exit tube. In certain embodiments, the sediment exit tube is adapted to deliver sediment to the buoyant loading platform. In certain embodiments, the pumping platform is adapted to deliver sediment to the buoyant loading platform. In certain embodiments, the sediment is wet. In certain embodiments, the buoyant loading platform is adapted to separate water from sediment. In certain embodiments, the buoyant loading platform comprises a screening system. In certain embodiments, the buoyant loading platform comprises a silt screen.

[028] In certain embodiments, the buoyant loading platform is adapted to discharge the sediment in an aquatic environment or a terrestrial environment. In certain embodiments, the buoyant loading platform is adapted to discharge the sediment via a bucket system. In certain embodiments, the buoyant loading platform is adapted to discharge the sediment via a clamshell mechanism. In certain embodiments, the loading platform comprises a bagging or blocking system that allows for the collection of sediment. In certain embodiments, the system is adapted to form bricks/blocks from the reclaimed sediment, thus providing a “green” alternative to simple sediment disposal.

[029] In certain embodiments, the system further comprises at least one power source. In certain embodiments, the at least one power source comprises one or more of a battery, a generator, and a photovoltaic device. In certain embodiments, the buoyant loading platform is adapted to locate the buoyant pumping platform for docking. In certain embodiments, the buoyant loading platform is adapted to locate the buoyant pumping platform for docking via communications with one or more controllers.

[030] **FIGS. 1 – 6** provide details regarding the structure of an exemplary buoyant pumping platform **100**. The buoyancy of the pumping platform may be effected by any suitable means known to those of skill in the art, including the use of materials such as foam/styrofoam, air bladders, plastics, and/or hull-type water displacement structures. Floatation of exemplary pumping platform **100** is accomplished in part by housing **65** and tires **35**. Housing **65** contains



battery(ies) **29**, microcontroller housing **17**, transducer **45**, and transducer housing **33**. A microcontroller is contained in microcontroller housing **17**. The primary components of the suction device are also contained in housing **65**, including air tank **43**, compressor **31**, air hose **49**, air hose spool **63**, chain **19**, sprocket **23**, and bearing plate **69**. Suction hose **51**, auger spike **53** and the distal end of air hose **49** are located for primary operation below housing **65**.

[031] Pumping platform **100** operates primarily through microcontroller **21** (a “controller”), which is connected to transducer **45**. Transducer **45** serves as a location device that is capable of determining when and where the system will operate. In certain embodiments transducer **45** comprises an echo sounder, which operates by using echo pulses to determine the depth/location of detected sediment below the surface for removal. In certain embodiments, transducer **45** may comprise 3-dimensional mapping technology. Information gathered from transducer **45** will determine whether pumping platform **100** stays to pump sediment at a particular location, or continues searching for sediment removal targets. Data gathered by transducer **45** is relayed to the microcontroller contained in housing **17**, which communicates with stepper motors **13** to set the location of pumping platform **100** and activate the suction device, respectively.

[032] More specifically, in certain embodiments data received from the microcontroller is relayed to stepper motors **13** to direct the motion of pumping platform **100**. In certain embodiments, the movement and location of pumping platform **100** can be accompanied with loading platform **200** docked. Alternatively, the locomotion of pumping platform **100** and loading platform **200** can be accomplished independently, wherein loading platform **200** docks to pumping platform **100** subsequent to detection and location of a desired sediment removal target. Relaying of data to stepper motor(s) **13** will set hub chain(s) **19** into motion, which will transfer power to hub(s) **39** and wheel(s) **35**. Movement of the platform may be enhanced by attaching paddle(s) **25** to the wheel system via lug nut extensions **61**.

[033] Data received/processed by the microcontroller may also direct the operation of the suction system. With particular reference to **FIG. 4**, the microcontroller will initiate the operation of stepper motor **18**, which transfers motion to sprocket **23** via chain **19**. Sprocket **23** is connected to air hose spool **63**, which rests on bearing plate **69**. Rotation of air hose spool **63** will unwind and release the desired length of air hose **49**, which extends below through an aperture in housing **65**. Suction hose **51** is attached to the bottom of housing **65** and is in fluid

communication with exit tube 27. Suction hose 51 may comprise any suitable material, and is retractable, expandable and/or telescoping in nature. The proximal end of suction hose 51 is connected to housing 65. Air hose 49 is attached alongside suction hose 51, such that the release of a length of air hose 49 from air hose spool 63 will deploy suction hose 51 below the surface of the water and towards a sediment removal target. Auger spike 53 will “anchor” the distal end suction hose 51 on the desired sediment target. The proximal end of air hose 43 is in fluid communication with air tank 43, which will provide pressurized air to the air hose upon deployment of suction hose 51. The distal end of air hose 49 is situated to provide pressurized air towards the distal end of suction hose 51 and auger spike 53. Turbulence created by the air hose/exiting air will loosen sediment, aided partially by movement of auger spike 53, and send a stream of air bubbles into the distal end of suction hose 51. The rush of bubbles up through suction hose 51 creates lift and, thus, the suction of water and sediment up through suction hose 51 and into exit tube 27. As shown, in certain embodiments exit tube 27 is adapted to have at least two exit apertures, allowing loading platform 200 to dock from either side of pumping platform 100. A switching valve can be implemented to switch flow of water and sediment through exit tube 27 to the side the loading platform docks.

[034] Operation of the suction device can be accomplished according to any suitable methods according to those of skill in the art. In certain embodiments, the charging of air tank 43 with air is accomplished by compressor 31. The operation of compressor 31 may be initiated by the docking of loading platform 200 to pumping platform 100. In certain embodiments, the docking of loading platform 200 to pumping platform 100 will trigger reed switch 67, which will signal microcontroller 21 to turn on compressor 31 and initiate pumping/suction. Alternatively, or in addition, reed switch 109 may be placed on loading platform 200 (see FIG. 9).

[035] Additional components of pumping platform 100 include trailing wheel frame 59 and trailing wheel 55, which can provide stability to the pumping platform in water and when a terrestrial environment is encountered. Bilge pump 37 can be used to remove any water that collects at the bottom of housing 65. Framing 15 is implemented to support cover 9, which mates to housing 65 and provides protection to the suction device and other mechanical/electrical components of the pumping platform. Solar panel(s) 11 may be affixed to the outer surface of cover 9 to provide power to the system via the charging of batteries 29. Batteries 29 may be



used to power the entire system, including any necessary microcontrollers, transducers, and stepper motors.

[036] FIGS. 7 - 13 illustrate exemplary buoyant loading platform 200 that is adapted to receive sediment from pumping platform 100. The buoyancy of loading platform 200 may be effected by any suitable means known to those of skill in the art, including the use of materials such as foam/styrofoam, air bladders, plastics, and/or hull-type structures. Floatation of exemplary loading platform 200 is accomplished in part by tires 81. Cover 73 covers the contents of pumping platform 200, including the battery(ies) 111, microcontroller housing 115, microcontroller 113, drivetrain stepper motor(s) 85, drive chain(s) 87 and sprocket(s) 107 associated with axle 89. Also included, per FIG. 7, are pinion track 77, stepper bearing(s) 105 (floating in space), silt screen 103, silt screen frame 95, and bucket 97. Panel(s) 79, bar 75, and frame pieces 119 provide stabilization and support to loading platform 200. Photovoltaic panel 71 may be affixed to cover 73 to provide power/recharging to batteries 111.

[037] Loading platform 200 operates primarily through microcontroller 113 (a “controller”), which is communication with drivetrain stepper motor(s) 85. Microcontroller 113 can provide commands to motor(s) 85, which can activate the drivetrain axle 89 via chains 87 and sprockets 107. Power is transferred from axle 89 to hub(s) 91, which effect locomotion of the platform via tire(s) 81 and paddle wheel(s) 83 affixed by lugnut extensions 117. Trailing wheel 101 is affixed by frame 99, which may provide further support to the locomotion of platform 200 on land or in the water.

[038] Upon docking to pumping platform 100, loading platform 200 may receive wet sediment from exit tube 27 via an aperture in cover 73. With particular reference to FIG. 10, wet sediment will enter the interior of loading platform 200 where it is introduced to silt screen 103. Solids are collected on the silt screen, while water is free to pass below to bucket 97. As seen in FIG. 7, bucket 97 may comprise two ½ shells. These ½ shells may be adapted to where they are not water tight when in the closed position, thereby allowing water that collects in bucket 97 from the silt screen to pass back into the aquatic environment. Load sensors may be implemented to communicate with microcontroller 113 when the loading platform is filled to capacity. Upon doing so, the microcontroller of the loading platform and/or pumping platform



can instruct loading platform **200** to undock from pumping platform **100**, and mobilize the drivetrain of the loading platform to head to the desired location for unloading.

[039] Unloading of solids from loading platform **200** may occur at an aquatic or terrestrial location (a secondary site) away from the sediment removal. Unloading of the sediment collected on silt screen **103** is accomplished primarily by pinion stepper motors (not shown in **FIG. 7**) located at each corner of bucket **97**. An exemplary pinion stepper **112** is shown in **FIG. 14**, which is associated with pinion bearing(s) **105**. As shown in **FIG. 10**, pinion bearing(s) **105** are associated with the corners of bucket **97**. Upon receiving commands to dump from microcontroller **113**, the pinion steppers will “climb” the arc of pinion track **77**, resulting in the opposing rotational motion of the ends of the two  $\frac{1}{2}$  shells of bucket **97**. Thus, bucket **97** opens via a “clamshell” mechanism. Silt screen **103**, fastened to bucket **97** via silt screen frame **95**, will mimic the motion of the opening bucket, such that the collected sediment will slide off the silt screen and down through the open bucket to the desired dump site.

[040] **FIG. 15** demonstrates an exemplary microdredger with loading platform **200** docked to pumping platform **100**. As noted above, the operation of the individual platforms may be determined by commands received from one or more microcontrollers. In certain embodiments, the controllers of the loading platform and the pumping platform can be in communication with each other, such as by wireless communication (e.g., radio frequency via antennae). In certain embodiments, the controllers on either platform can send and receive operation commands from the other. In certain embodiments, the controller on the pumping platform can provide commands for both the suction device and the locomotion of the pumping platform on the surface of the water, while in another embodiment separate controllers can provide those respective commands. In certain embodiments, operation of the suction device may be initiated from a command received from the pumping platform controller, which is triggered by a signal received by the docking of the loading platform to the pumping platform.

[041] In certain embodiments, the operation of the system may be determined by commands received from an offsite location, i.e., not the primary location of sediment removal. For example, in certain embodiments the operation of the system is determined by an offsite beacon controller. In certain embodiments, the beacon controller may be placed in a location nearby to the pumping operation, such as a sediment discharge site (i.e., secondary site). In

certain embodiments, locomotion, pumping, undocking, and the location of sediment discharge can all be controlled by commands received from a primary beacon controller. In certain embodiments, the pumping platform and loading platform may each comprise a controller associated with a battery and antenna, thereby allowing three-way communication between platforms and the beacon controller. This will allow for platforms to recognize the location of each other at all times, thereby allowing for the determination of a new sediment target and the re-docking of the loading platform to the pumping platform. The beacon controller can contain preset commands, or receive commands from another offsite source (e.g., communications received from a mobile device or computer via WiFi and/or LTE). Communication with the system may take place by any suitable wired or wireless communication methods known to those of skill in the art, including satellite, GPS, infrared, Bluetooth, and/or WiFi. In certain embodiments, one or more microdredgers can receive continuous commands from the beacon controller, hypothetically allowing the devices to operate autonomously 24 hours / day.

**[042]** In other embodiments, the microdredging system may receive commands directly from an offsite or onsite control center, such as a remote control, computer system, or a mobile device comprising software designed to interface with the controllers and onboard electronics of the pumping platform and the loading platform. In this embodiment, the system would not require intermediate communications through a beacon controller.

**[043]** In other embodiments, the system may operate autonomously, wherein the commands provided by the controllers are determined by an onboard software and electronics system that relies on input from various external sensors (e.g., load sensors, location devices, docking sensors, etc.). In certain embodiments, the system may operate semi-autonomously, wherein at least some system commands are determined by communications received from an independent source such as control center and/or a beacon controller.

**[044]** The foregoing descriptions and embodiments have been provided for purposes of illustration. They are not intended to be exhaustive or limit the scope of what is described and/or claimed herein.

#### Additional Embodiments

**[045]** A system comprising:



a buoyant pumping platform comprising at least one suction device adapted to deploy to a detected location below a surface of a body of water where sediment is located, and raise the sediment;

a location device adapted to determine the detected location; and

a buoyant loading platform adapted to engage with the buoyant pumping platform, wherein said loading platform is adapted to receive the raised sediment.

[046] The system according to embodiment 1, wherein the buoyant loading platform is adapted to dock and undock from the buoyant pumping platform.

[047] The system according to any one of embodiments 1-2, wherein the buoyant loading platform is adapted to dock and undock from the buoyant pumping platform through the use of one or more electromagnets.

[048] The system according to any one of embodiments 1-3, wherein the buoyant pumping platform is adapted to trigger the operation of the at least one suction device upon the docking of the buoyant loading platform.

[049] The system according to any one of embodiments 1-4, wherein the buoyant loading platform comprises a load sensor.

[050] The system according to embodiment 5, wherein the load sensor comprises a weight sensor or a buoyancy sensor.

[051] The system according to any one of embodiments 5-6, wherein the load sensor is adapted to determine a capacity of the buoyant loading platform for the raised sediment.

[052] The system according to embodiment 7, wherein the buoyant loading platform is adapted to undock from the buoyant pumping platform upon reaching the capacity.



- [053] The system according to any one of embodiments 2-8, wherein the buoyant loading platform is adapted to transport the sediment to a remote site after undocking from the buoyant pumping platform.
- [054] The system according to any one of embodiments 1-9, wherein the buoyant loading platform is adapted to transport the sediment to a remote site through the use of a locomotion system.
- [055] The system according to embodiment 10, wherein the locomotion system comprises at least one of a propeller system, a wheel system, a paddle system, a track system, or jet propulsion.
- [056] The system according to any one of embodiments 1-11, wherein the location device comprises at least one of an echo sounder, a remote controller, or a GPS locater.
- [057] The system according to any one of embodiments 1-12, wherein the buoyant pumping platform comprises a motion system.
- [058] The system according to embodiment 13, wherein the motion system comprises at least one of a propeller system, a wheel system, a paddle system, a track system, or jet propulsion.
- [059] The system according to any one of embodiments 13-14, wherein the motion system comprises a wheel system.
- [060] The system according to embodiment 15, wherein the wheel system comprises a paddle structure.
- [061] The system according to any one of embodiments 1-16, wherein the at least one suction device comprises a suction hose.

- [062] The system according to any one of embodiments 1-17, wherein the at least one suction device comprises an air hose.
- [063] The system according to embodiment 18, wherein the air hose is connected to a spool, and wherein the spool is adapted to coil and uncoil the air hose.
- [064] The system according to any one of embodiments 18-19, wherein the suction hose is adapted to coil, retract, collapse, or telescope.
- [065] The system according to any one of embodiments 17-20, wherein the suction hose is associated the air hose.
- [066] The system according to any one of embodiments 17-21, wherein the suction hose is connected to the air hose.
- [067] The system according to any one of embodiments 19-22, wherein the spool is adapted to deploy the suction hose to the detected depth via the uncoiling of the air hose.
- [068] The system according to any one of embodiments 1-23, wherein the suction device comprises an air compressor.
- [069] The system according to embodiment 24, wherein the compressor is adapted to provide compressed air to the air hose.
- [070] The system according to any one of embodiments 18-25, wherein the air hose comprises an auger spike.
- [071] The system according to embodiment 26, wherein the auger spike is adapted to loosen the sediment at the detected location via agitation.
- [072] The system according to any one of embodiments 26-27, wherein the auger spike is adapted to be agitated by an action created by the spool.

- [073] The system according to any one of embodiments 17-28, wherein the suction hose is adapted to remove the sediment from the detected location via air bubbles from the compressed air provided by the air hose.
- [074] The system according to any one of embodiments 1-29, wherein the pumping platform comprises a sediment exit tube.
- [075] The system according to embodiment 30, wherein the sediment exit tube is adapted to deliver the raised sediment to the buoyant loading platform.
- [076] The system according to any one of embodiments 1-31, wherein the pumping platform is adapted to deliver the raised sediment to the buoyant loading platform.
- [077] The system according to any one of embodiments 1-32, wherein the raised sediment is wet.
- [078] The system according to any one of embodiments 1-33, wherein the buoyant loading platform is adapted to separate water from the raised sediment.
- [079] The system according to any one of embodiments 1-34, wherein the buoyant loading platform comprises a screening system.
- [080] The system according to any one of embodiments 1-35, wherein the buoyant loading platform comprises a silt screen.
- [081] The system according to any one of embodiments 1-36, wherein the buoyant loading platform is adapted to discharge the sediment in an aquatic environment or a terrestrial environment.
- [082] The system according to any one of embodiments 1-37, wherein the buoyant loading platform is adapted to discharge the sediment via a bucket system.



- [083] The system according to any one of embodiments 1-37, wherein the buoyant loading platform is adapted to discharge the raised sediment via a clamshell mechanism.
- [084] The system according to any one of embodiments 1-39, further comprising at least one power source.
- [085] The system according to embodiment 40, wherein the at least one power source comprises one or more of a battery, a generator, and a photovoltaic device.
- [086] The system according to any one of embodiments 1-41, wherein the buoyant loading platform is adapted to locate the buoyant pumping platform for docking.
- [087] The system according to any one of embodiments 1-42, wherein the buoyant loading platform is adapted to locate the buoyant pumping platform for docking via communications between one or more controllers.
- [088] The system according to embodiment 43, wherein the buoyant loading platform and the buoyant pumping platform each comprise at least one controller.
- [089] The system according to any one of embodiments 43 and 44, further comprising a beacon controller adapted to communicate with the controllers of the buoyant loading platform and/or the buoyant pumping platform.
- [090] The system according to any one of embodiments 1-43, wherein the buoyant loading platform comprises a bagging or blocking system that allows for the collection of the raised sediment.
- [091] A method comprising:
- delivering a microdredger system to a primary site on a body of water, said microdredger comprising a buoyant loading platform, a buoyant pumping platform, at least

one suction device, and a location device;

providing a detected location of sediment below the surface of the body of water through the use of the location device;

deploying the at least one suction device to the detected location;

raising the sediment from the detected location via the at least one suction device;

loading the raised sediment onto the buoyant loading platform;

moving the buoyant loading platform to a secondary site; and

discharging the raised sediment from the buoyant loading platform.

**[092]** The method according to embodiment 47, wherein the buoyant loading platform is docked to the buoyant pumping platform during loading of the raised sediment.

**[093]** The method according to embodiment 48, wherein buoyant loading platform is undocked from the buoyant pumping platform prior to moving to the secondary site.

**[094]** The method according to any one of embodiments 47-49, wherein locomotion of the buoyant loading platform on the body of water comprises the use of commands provided by a controller.

**[095]** The method according to any one of embodiments 47-50, wherein locomotion of the buoyant pumping platform on the body of water comprises the use of commands provided by a controller.

**[096]** The method according to embodiment 51, wherein the controllers are in wireless communication with each other.

[097] The method according to any one of embodiments 50-52, wherein the commands of one or more of the controllers are provided by communications from an offsite control center and/or an offsite beacon controller.

[098] The method according to any one of embodiments 47-53, further comprising returning buoyant loading platform to the primary site after discharging the raised sediment.

[099] The method according to any one of embodiments 47-54, wherein the buoyant loading platform is docked to the buoyant pumping platform at the primary site.

[0100] The method according to embodiment 55, wherein the buoyant loading platform undocks from the buoyant pumping platform prior to moving to the secondary site.

[0101] The system according to embodiment 1, wherein the buoyant loading platform and the buoyant pumping platform each independently comprises a locomotion system that allows platforms to travel about the surface of the body of water.

[0102] The system according to embodiment 57, wherein the locomotion system of the buoyant loading platform is adapted to allow the loading platform to about a terrestrial surface.



**CLAIMS:**

## 1. A system comprising:

a buoyant pumping platform comprising at least one suction device adapted to deploy to a detected location below a surface of a body of water where sediment is located, and raise the sediment;

a location device adapted to determine the detected location; and

a buoyant loading platform adapted to dock and undock from the buoyant pumping platform through a docking system, said loading platform being further adapted to receive the raised sediment and discharge the raised sediment,

wherein the buoyant loading platform and the buoyant pumping platform each comprises a locomotion system that allows the platforms to independently travel about the surface of the body of water.

2. The system according to claim 1, wherein the docking system comprises one or more electromagnets.
3. The system according to claim 1, wherein the buoyant pumping platform is adapted to trigger operation of the at least one suction device upon the docking of the buoyant loading platform.
4. The system according claim 1, wherein the buoyant loading platform comprises a load sensor.
5. The system according to claim 4, wherein the load sensor comprises a weight sensor or a buoyancy sensor.
6. The system according to claim 4, wherein the load sensor is adapted to determine a capacity of the buoyant loading platform for the raised sediment received.
7. The system according to claim 6, wherein the buoyant loading platform is adapted to undock from the buoyant pumping platform upon reaching the capacity.
8. The system according to claim 1, wherein the locomotion system of the buoyant loading platform allows for the transport of the received sediment to a secondary site when undocked from the pumping platform.
9. The system according to claim 8, wherein the locomotion system comprises at least one of a

- propeller system, a wheel system, a paddle system, a track system, or jet propulsion.
10. The system according to claim 1, wherein the location device comprises at least one of an echo sounder, a remote controller, or a GPS locator.
  11. The system according to claim 1, wherein the locomotion system of the buoyant pumping platform comprises at least one of a propeller system, a wheel system, a paddle system, a track system, or jet propulsion.
  12. The system according to claim 8, wherein the locomotion system comprises a wheel system with an optional paddle structure.
  13. The system according to claim 1, wherein the at least one suction device comprises a compressor, a suction hose, and an air hose.
  14. The system according to claim 13, wherein the suction hose is adapted to coil, retract, collapse, or telescope.
  15. The system according to claim 13, wherein the at least one suction device further comprises an auger spike adapted to loosen the sediment at the detected location via agitation.
  16. The system according to claim 1, wherein the pumping platform is adapted to deliver the raised sediment to the buoyant loading platform via a sediment exit tube in fluid connection with the at least one suction device.
  17. The system according to claim 1, wherein the buoyant loading platform is adapted to discharge the raised sediment in an aquatic environment or a terrestrial environment.
  18. The system according to claim 1, further comprising a power source selected from at least one of a battery, a generator, or a photovoltaic device.
  19. The system according to claim 1, wherein the buoyant loading platform and the buoyant pumping platform comprise a first controller and a second controller, respectively.
  20. The system according to claim 19, wherein the locomotion of the buoyant loading platform is determined by commands received from the first controller, and the locomotion of the buoyant pumping platform is determined by commands received from the second controller.
  21. The system according to claim 8, wherein the locomotion system of the buoyant loading platform is adapted to allow the loading platform to travel on a terrestrial surface.



22. The system according to claim 1, wherein the system operates autonomously or semi-autonomously.
23. The system according to claim 22, wherein that deployment of the suction device, raising the sediment, discharging the raised sediment, or travelling of the loading platform and/or pumping platform about the surface of the body of water is determined by commands received from at least one controller in communication with one or more external sensors.
24. A method comprising:
- delivering a microdredger system to a primary site on a body of water, said microdredger comprising a buoyant loading platform, a buoyant pumping platform, at least one suction device, and a location device;
  - providing a detected location of sediment below the surface of the body of water through the use of the location device;
  - deploying the at least one suction device to the detected location;
  - raising the sediment from the detected location via the at least one suction device;
  - loading the raised sediment onto the buoyant loading platform;
  - moving the buoyant loading platform to a secondary site; and
  - discharging the raised sediment from the buoyant loading platform.

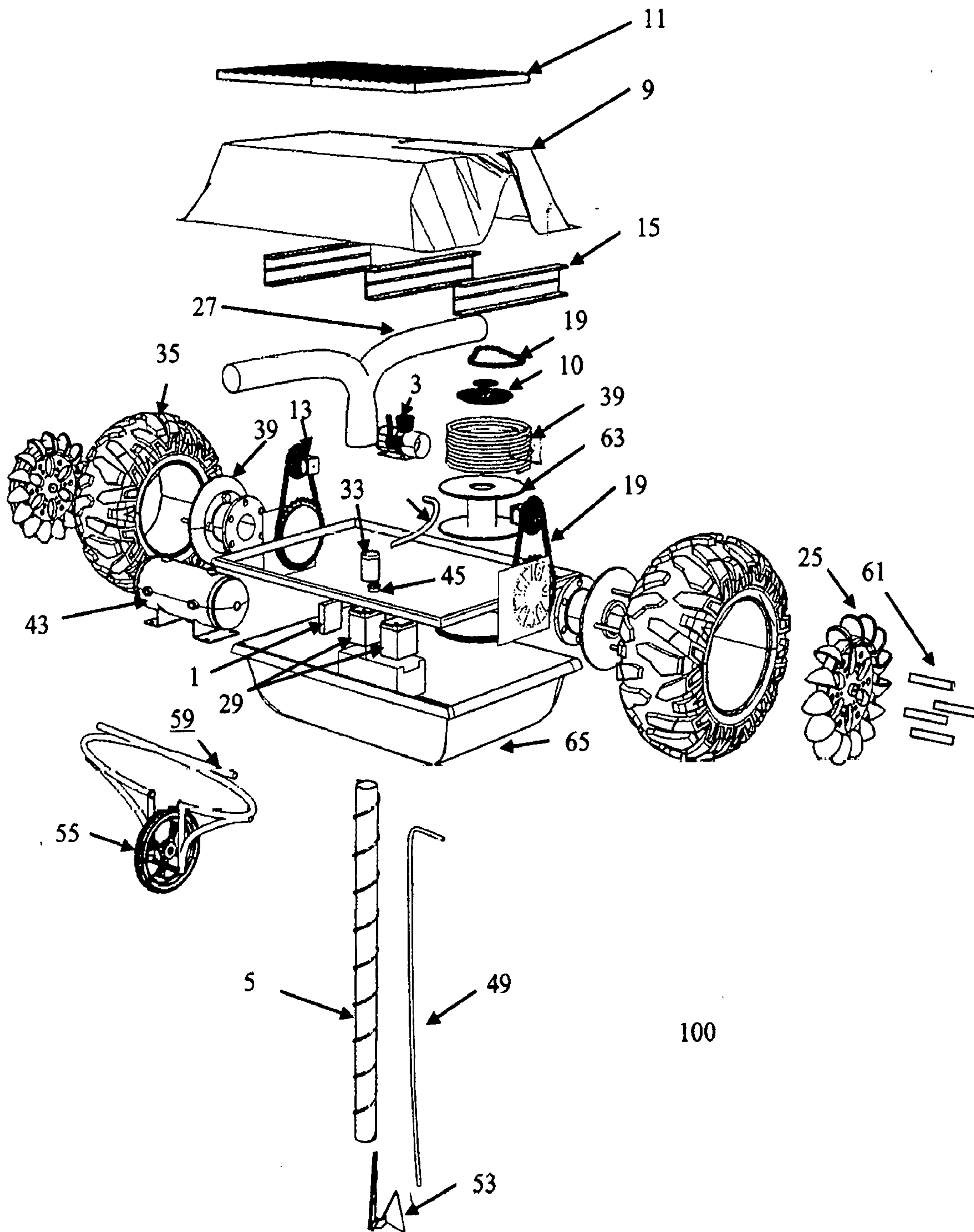


FIG. 1



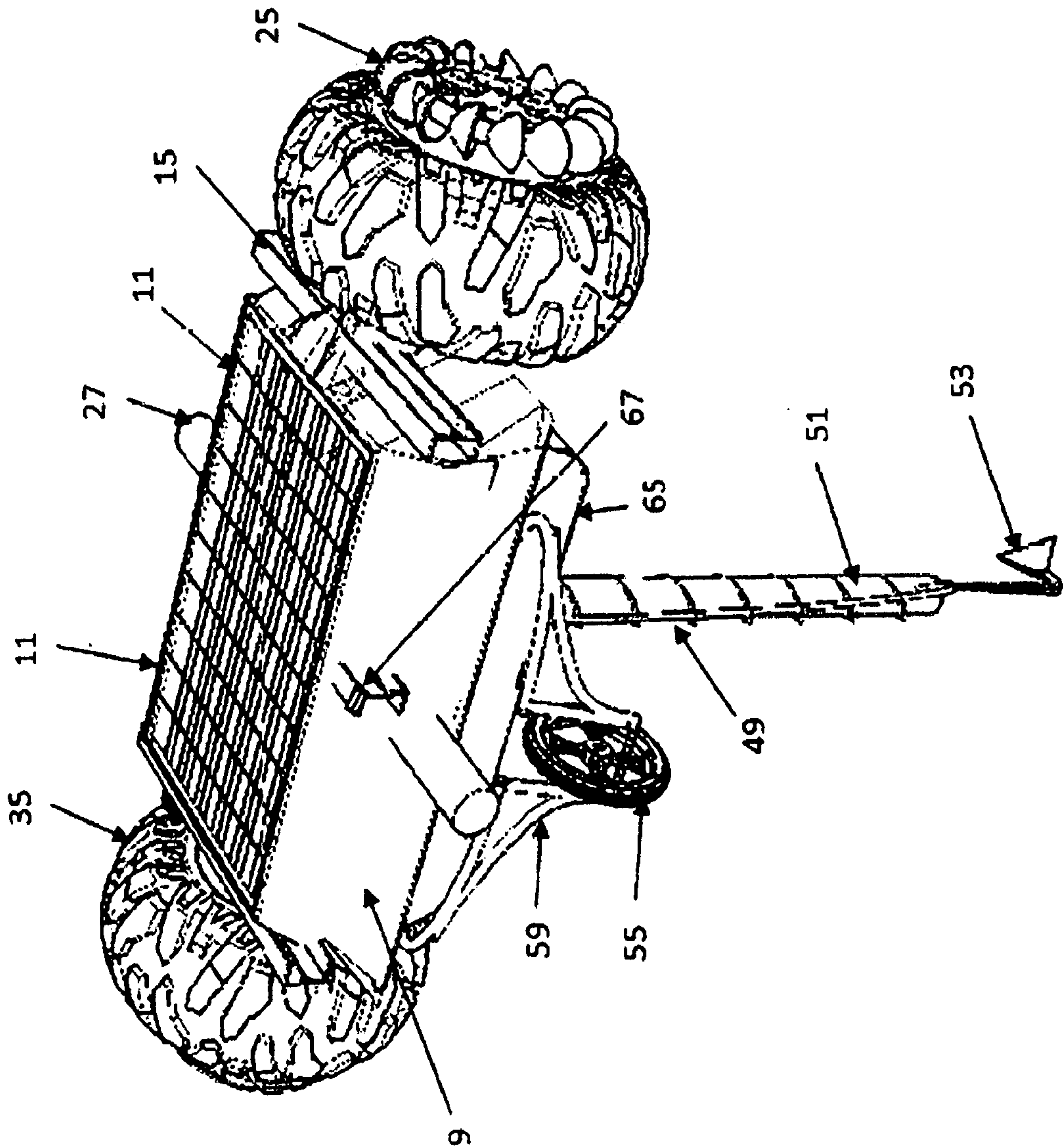


FIG. 2

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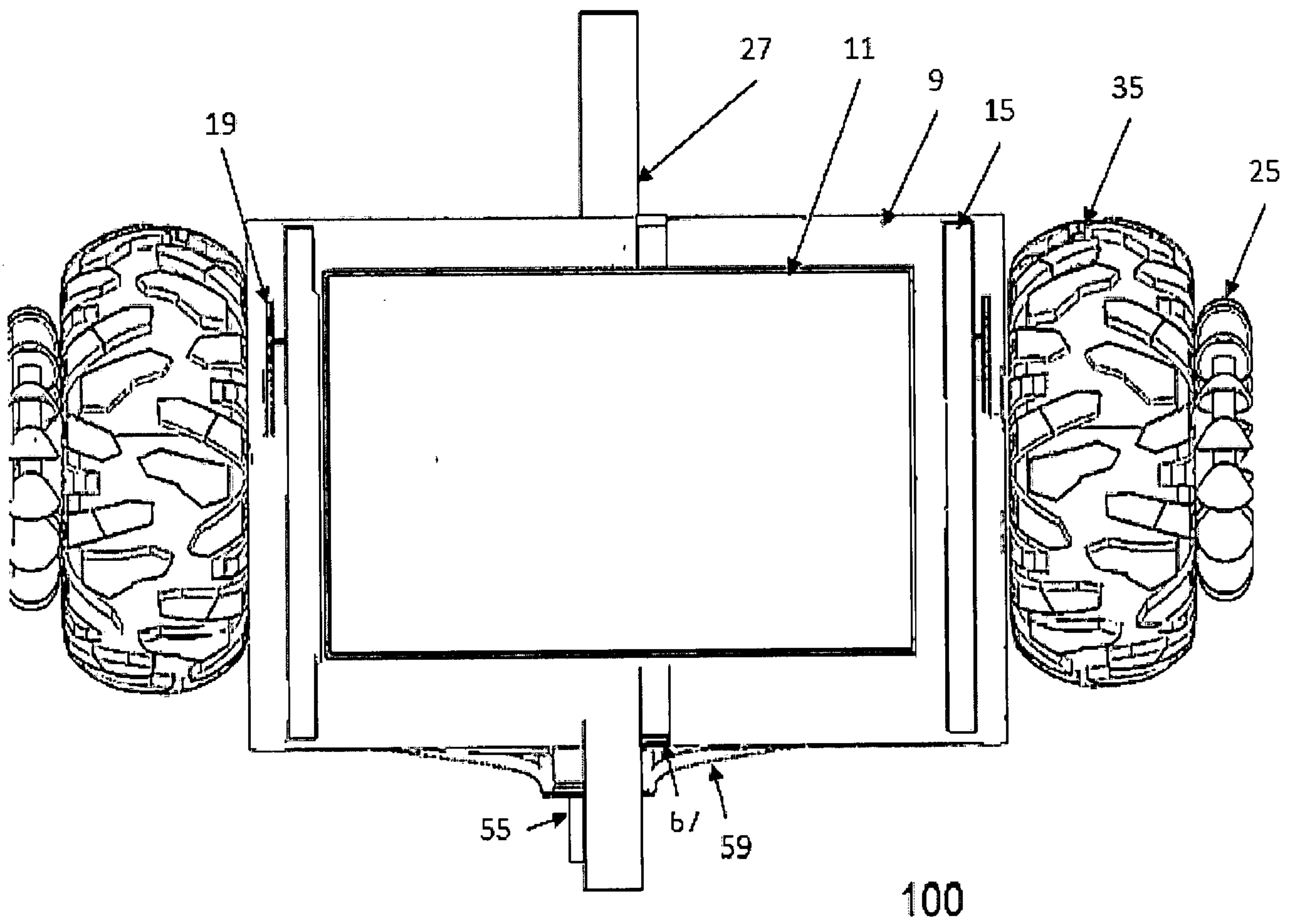


FIG.3



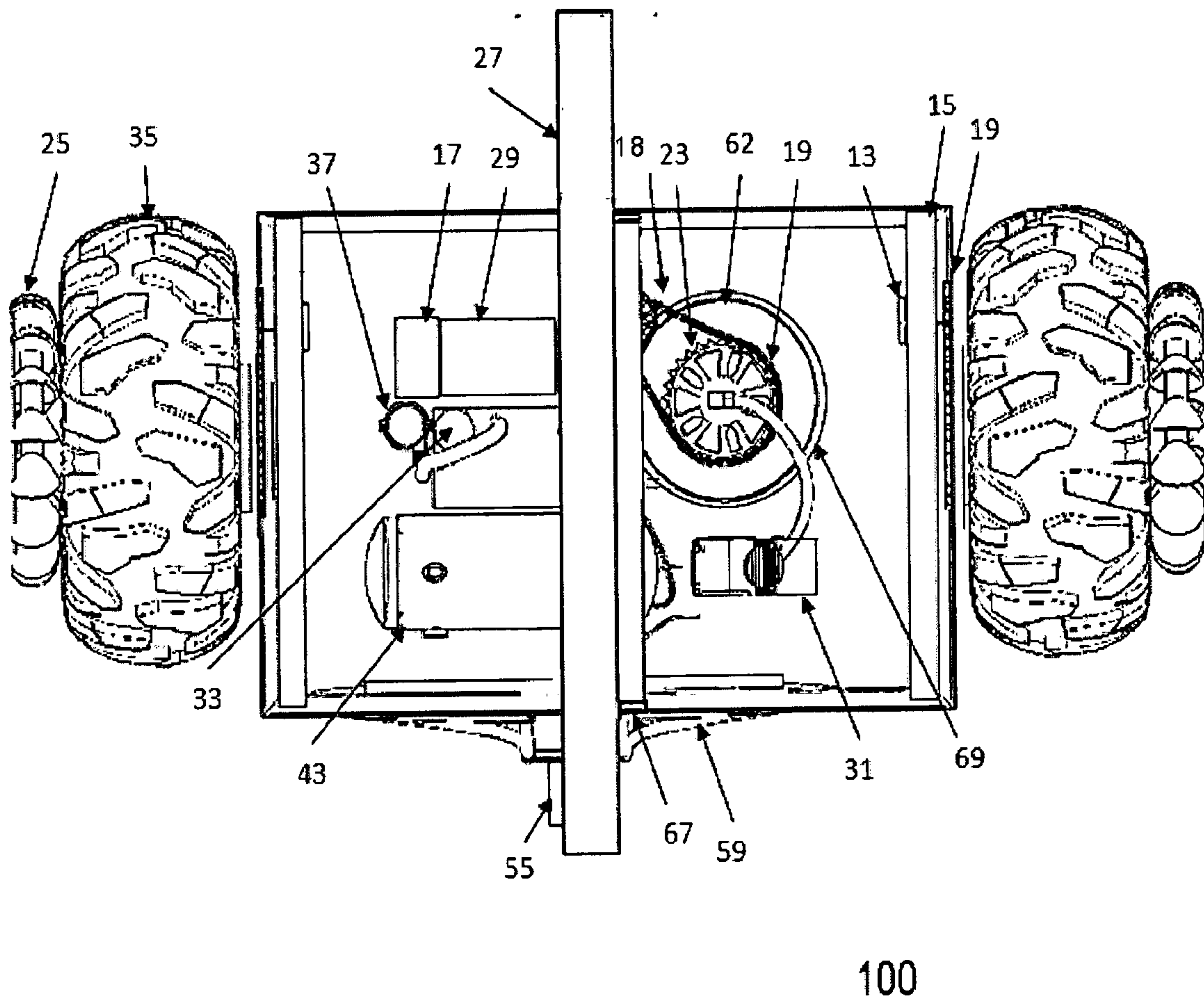


FIG.4

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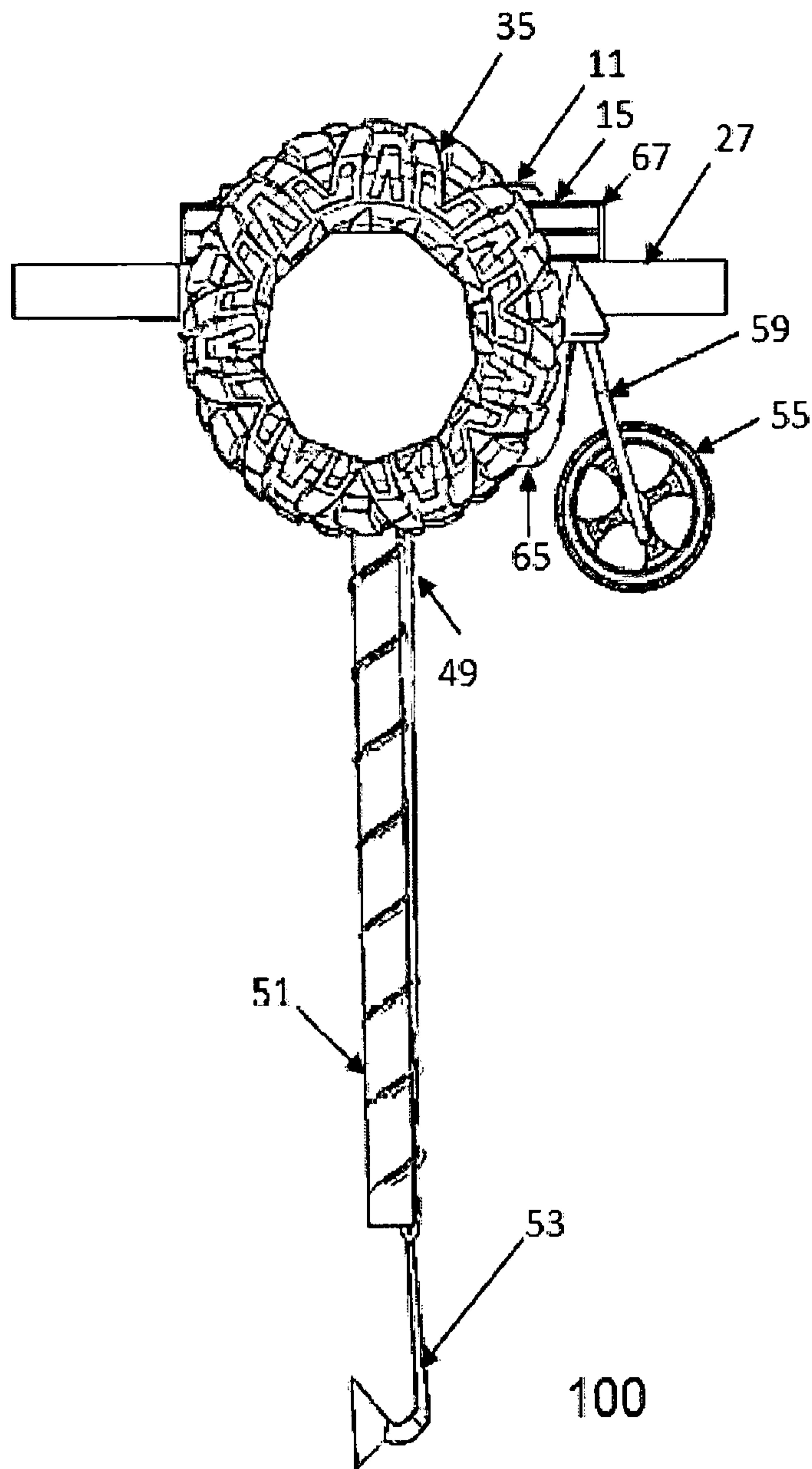


FIG. 5

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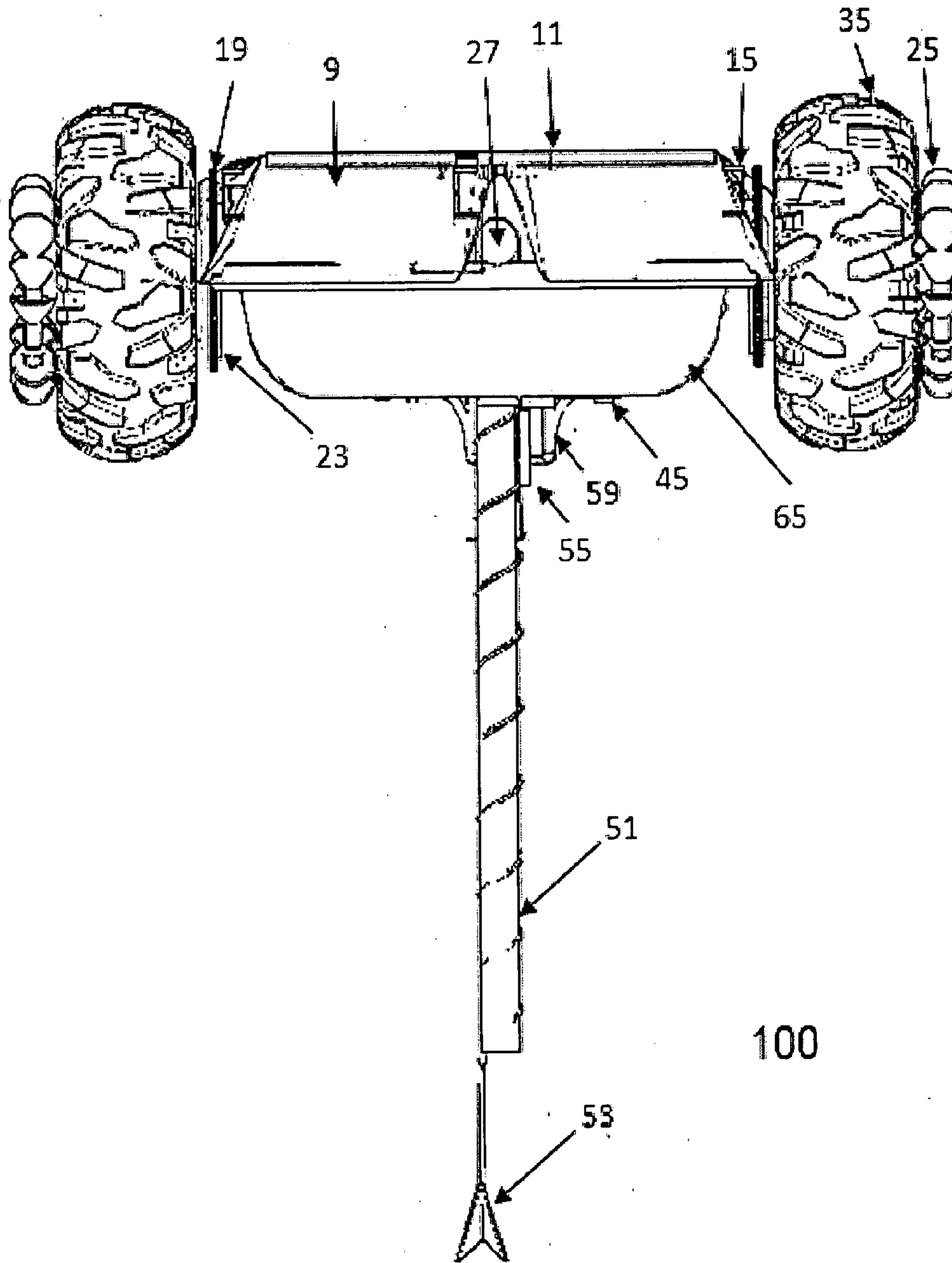


FIG.6



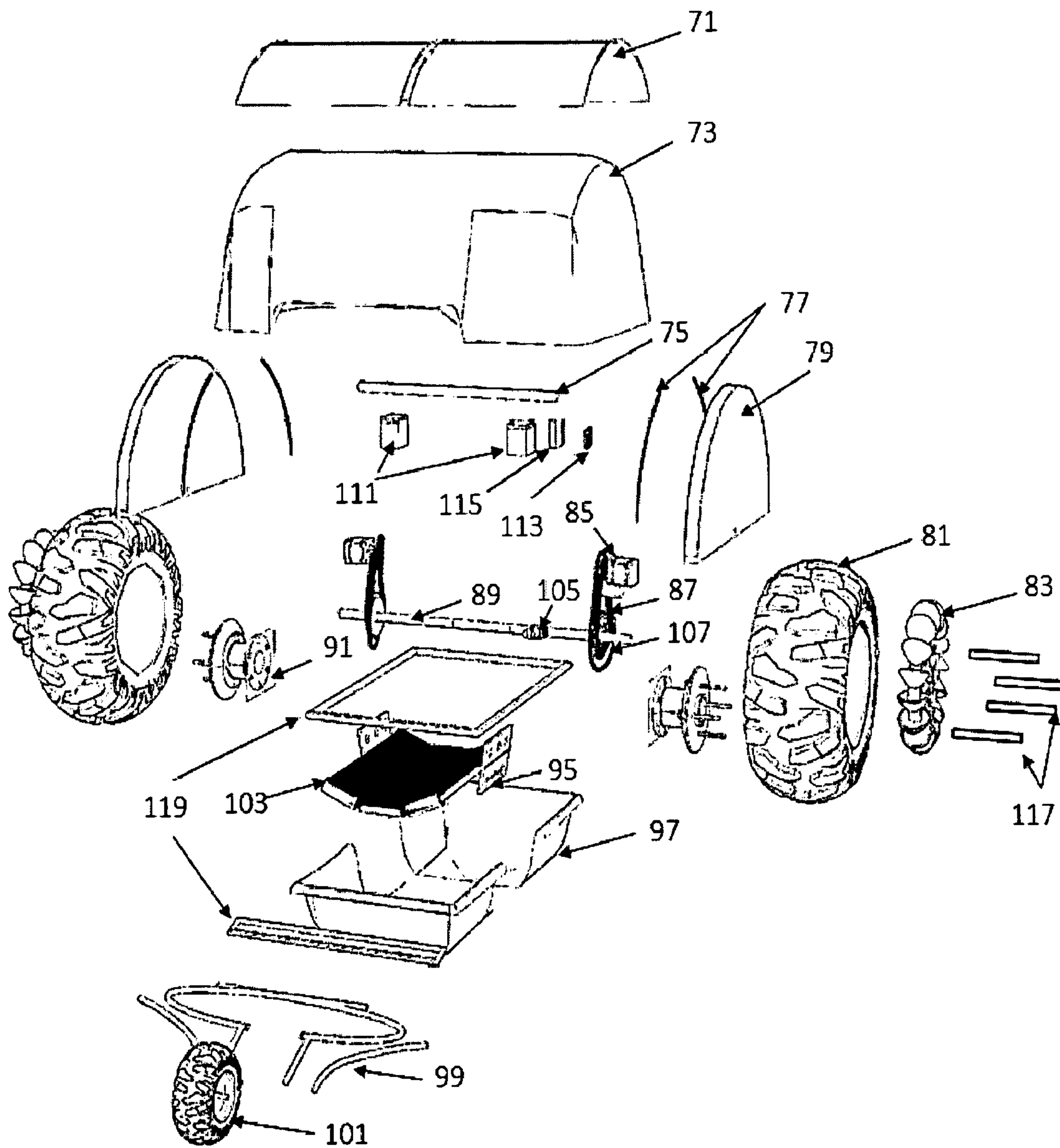


FIG. 7

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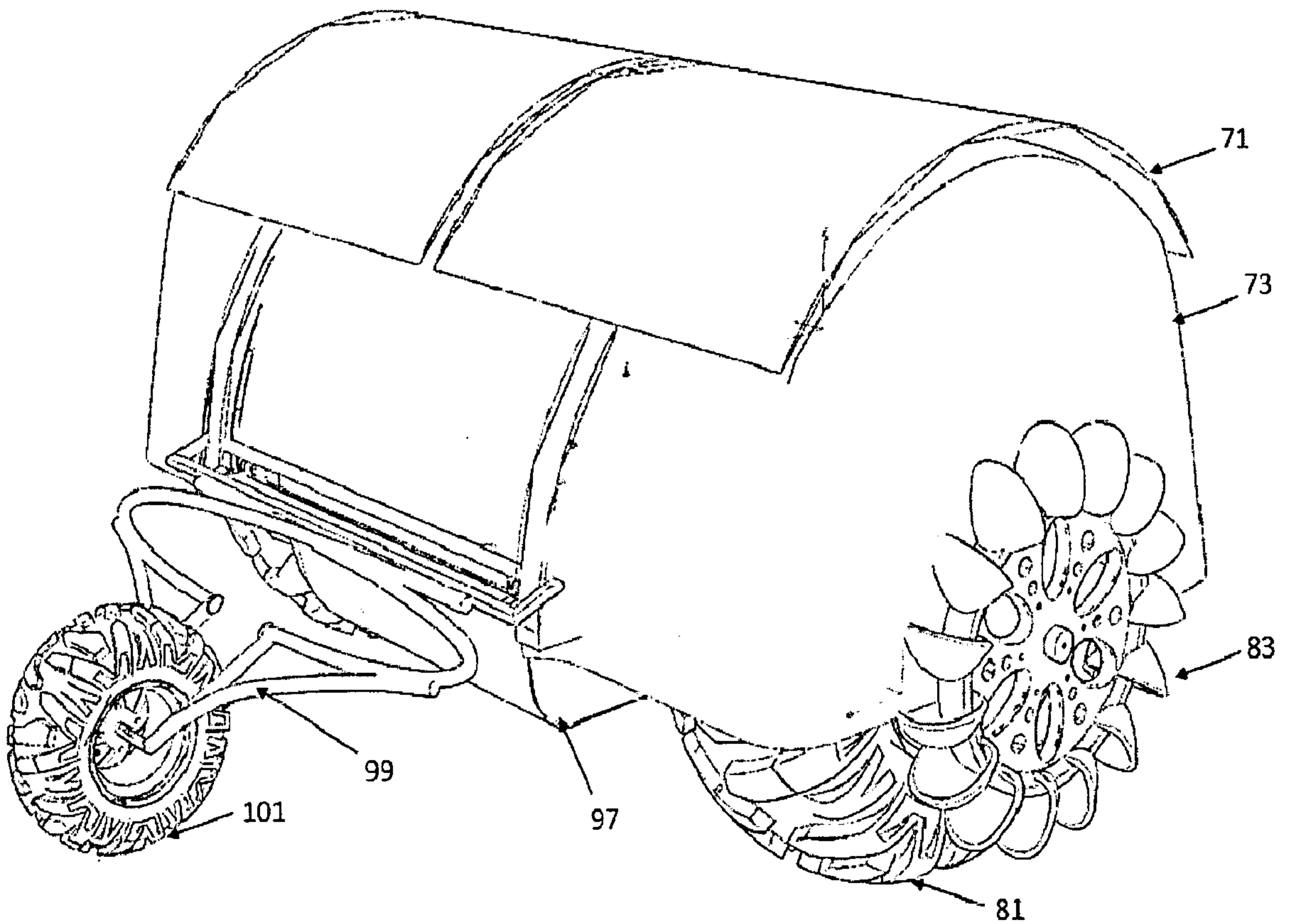


FIG. 8

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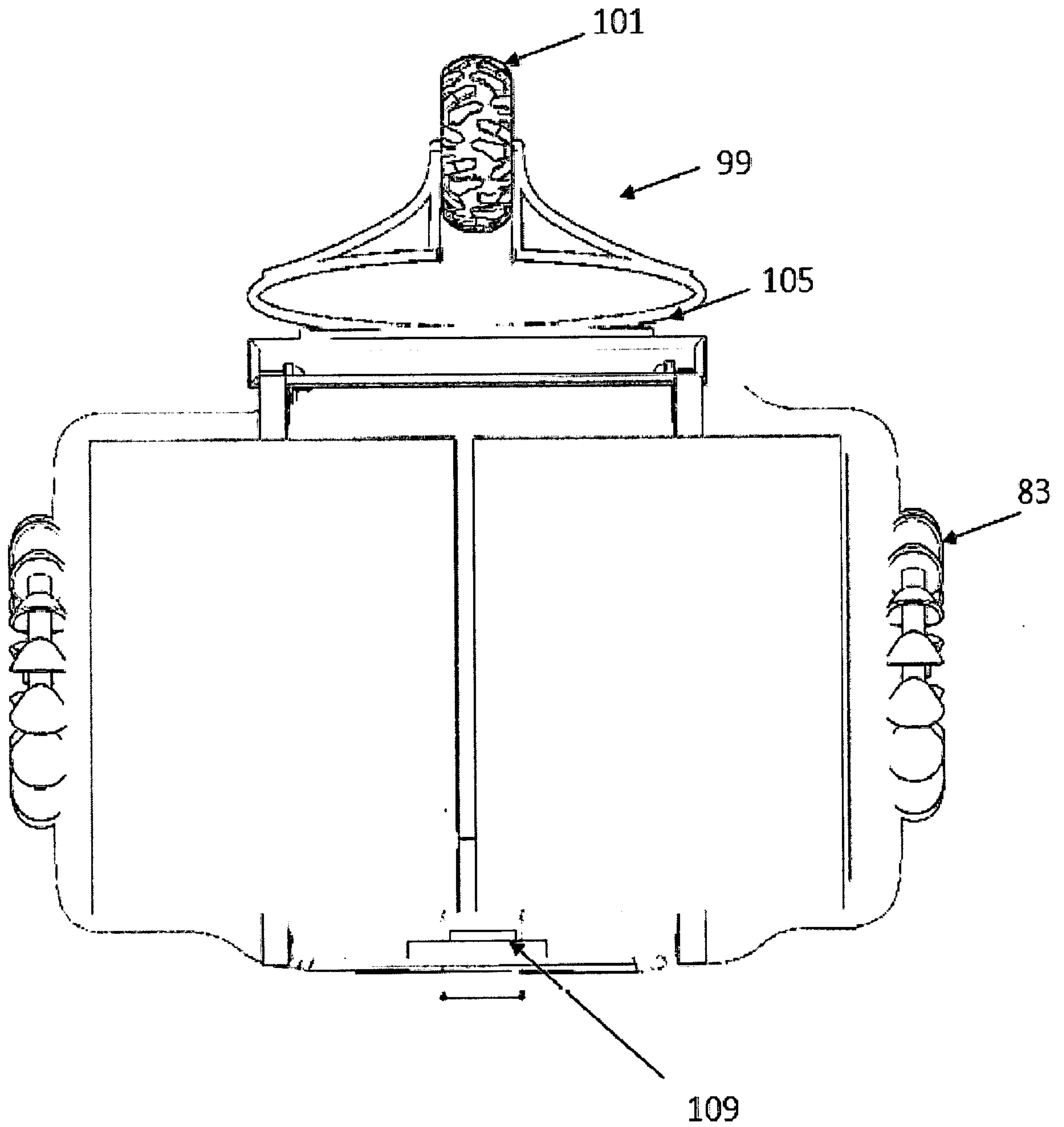


FIG.9



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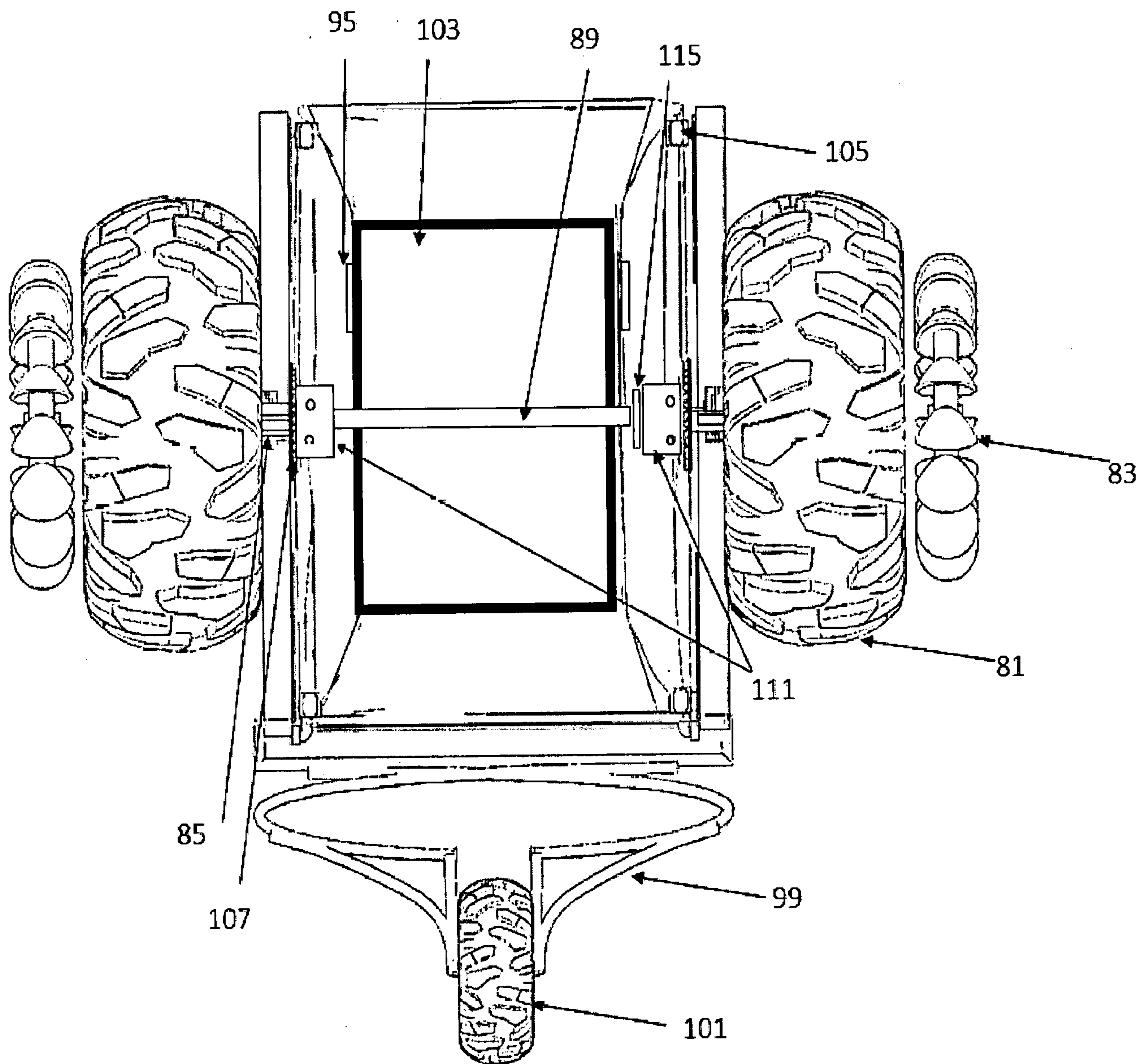


FIG.10

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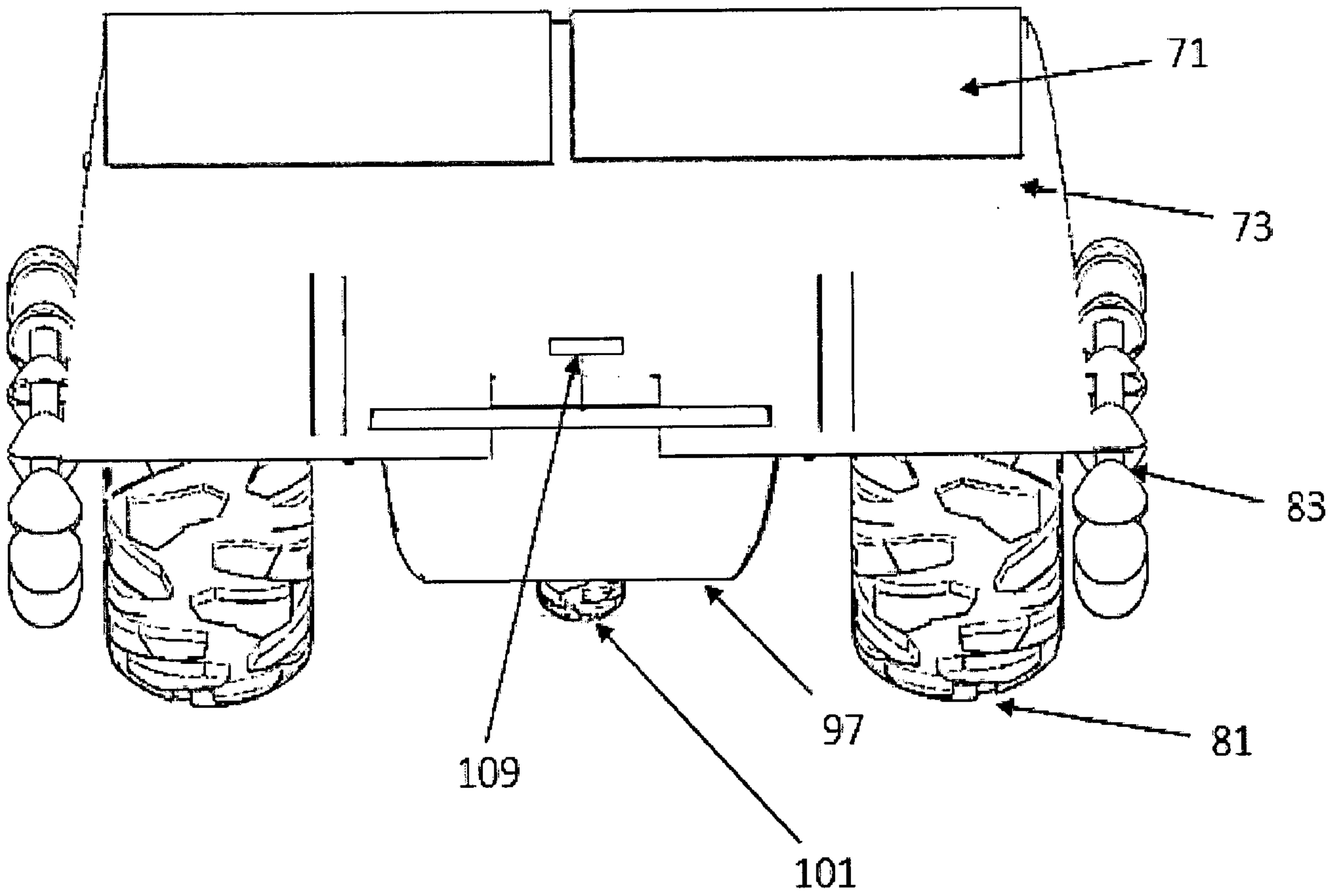


FIG.11

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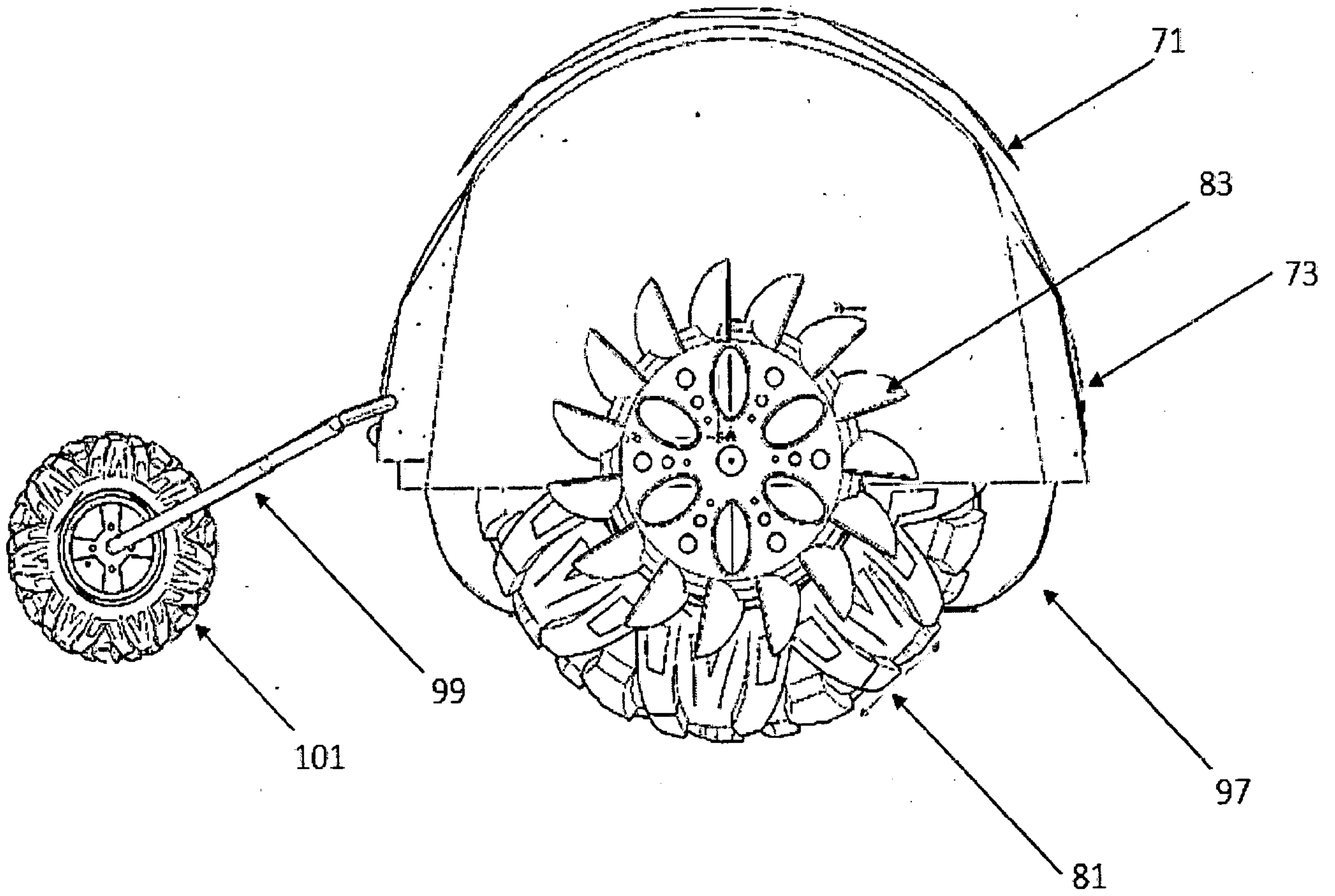


FIG.12



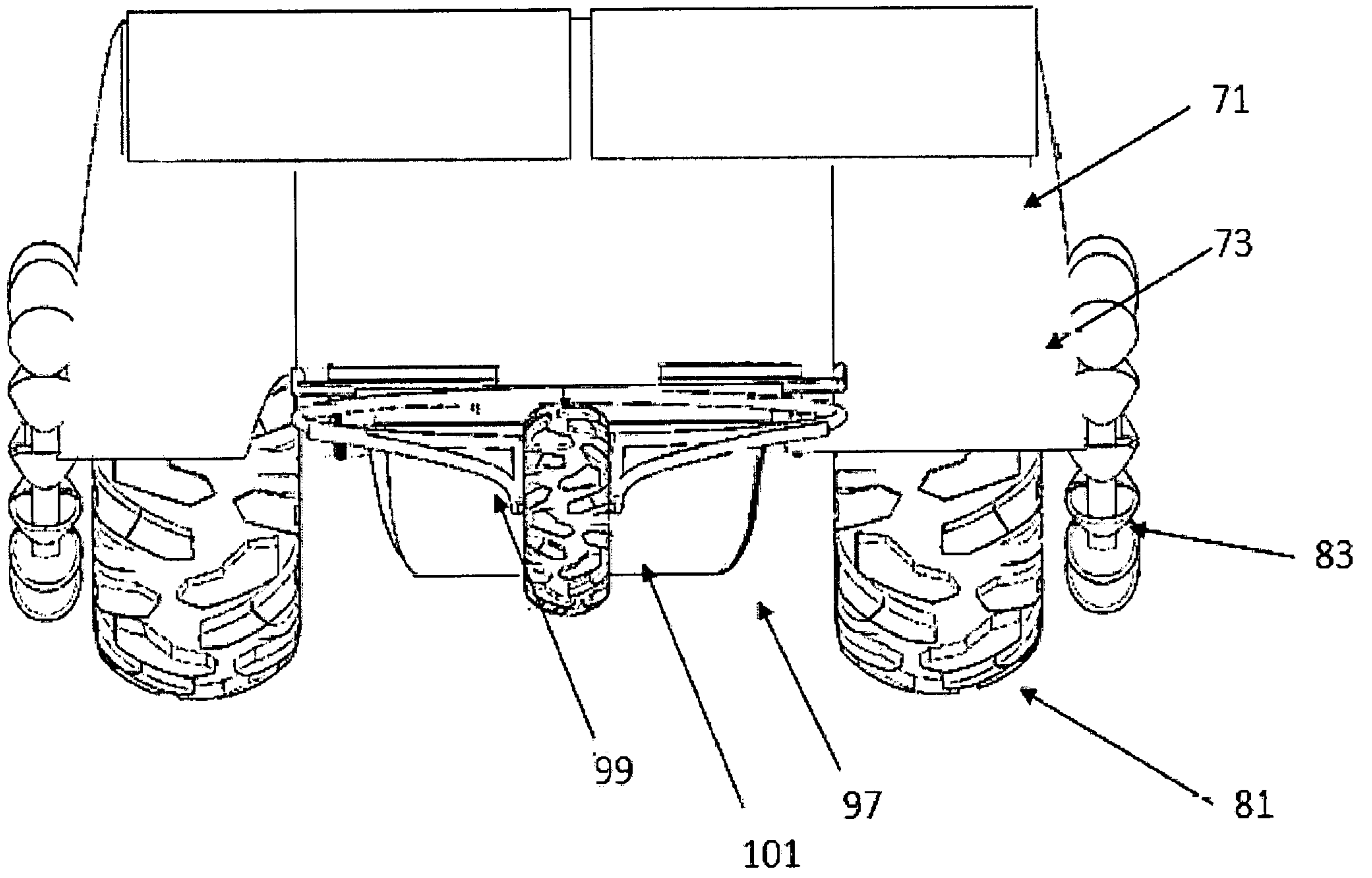


FIG. 13

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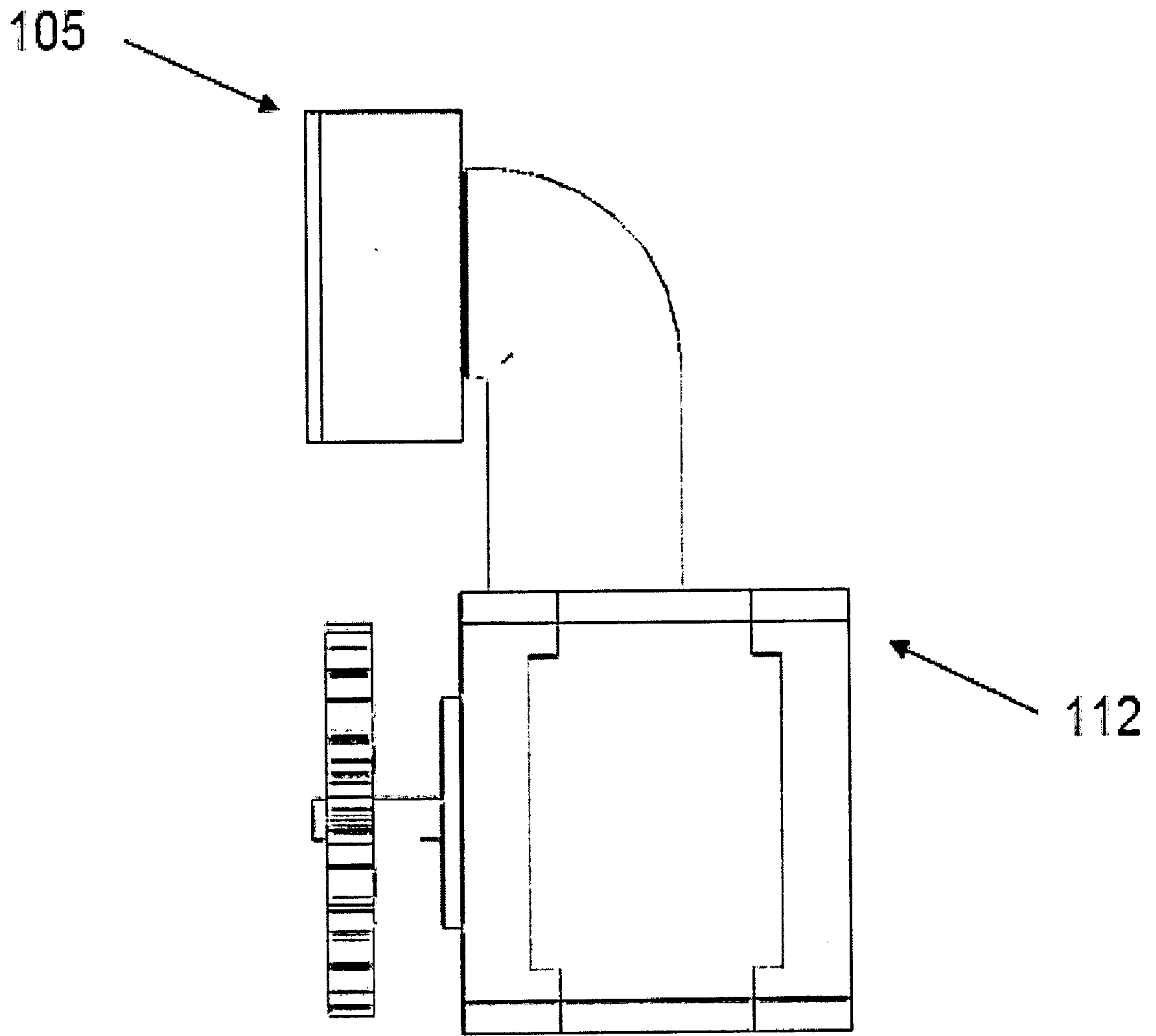


FIG. 14

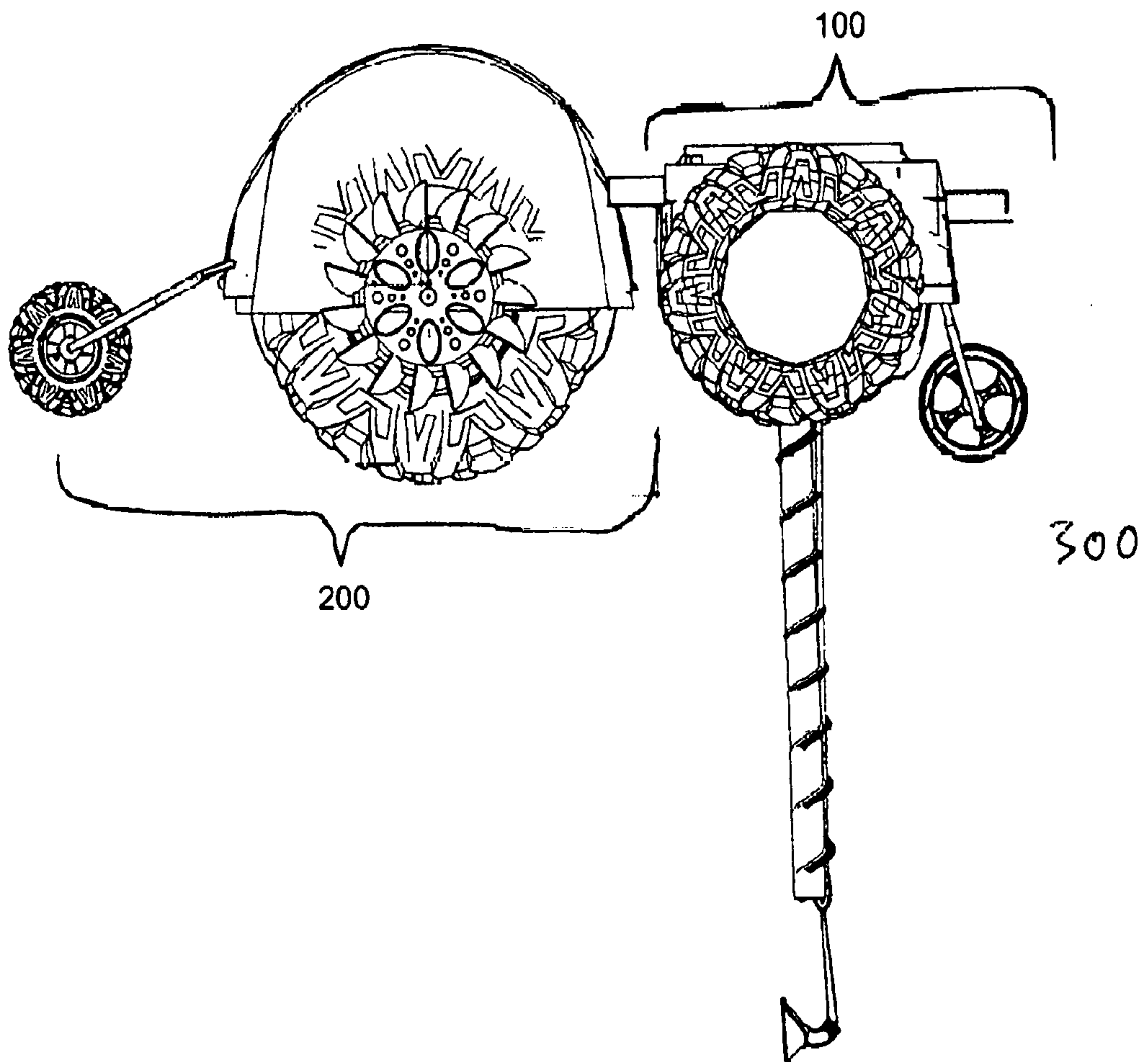
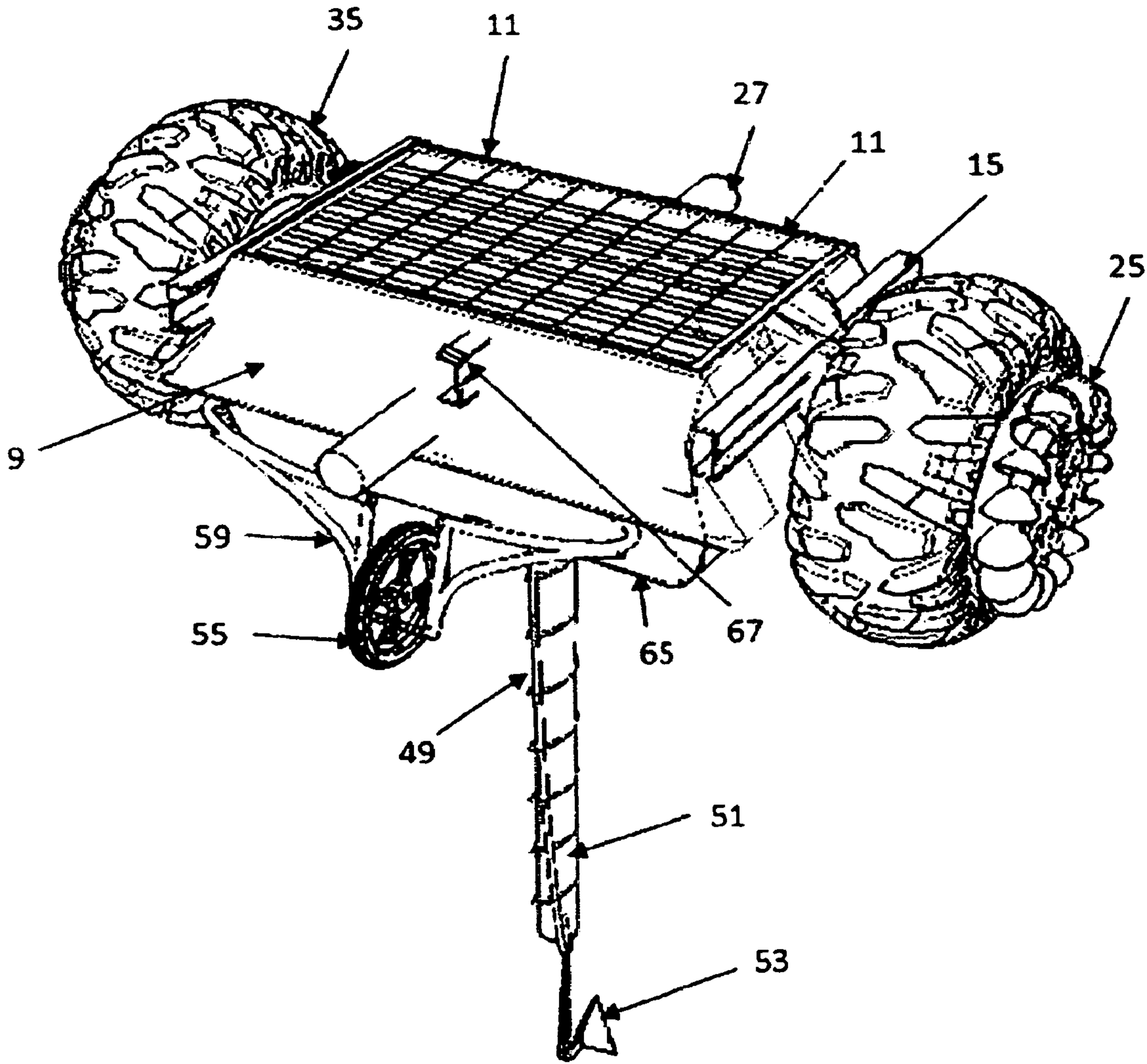


FIG. 15





**FIG. 2**