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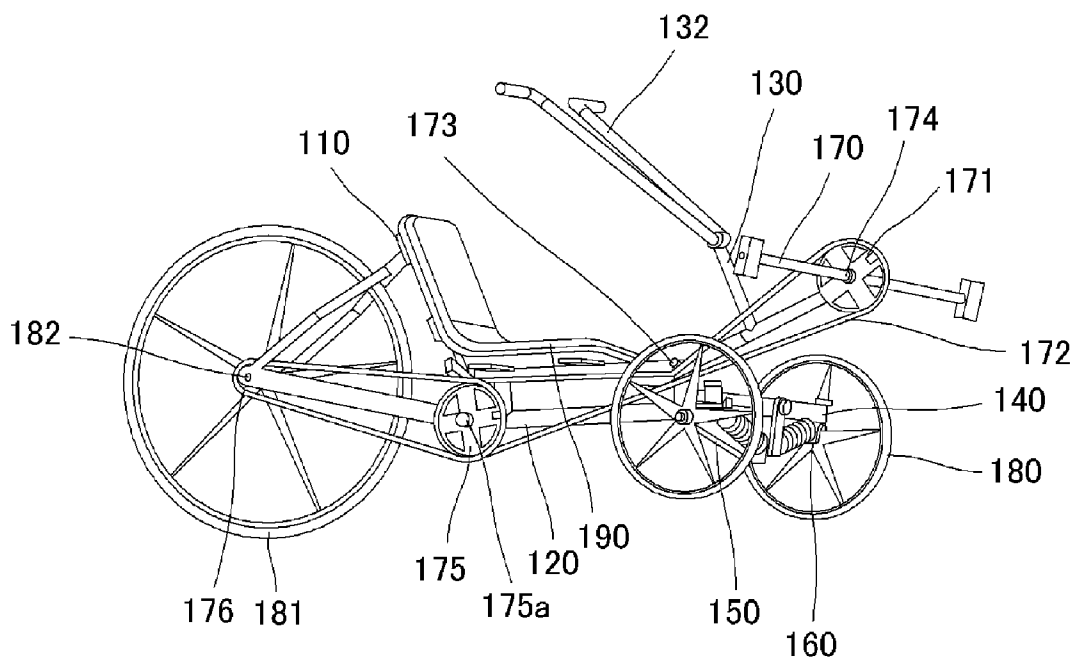
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[Continued on next page]

(54) Title: TRIKE



(57) Abstract: The document relates to a trike, and more particularly, to a trike which allows a user to make a pair of front wheels at the front to change directions by moving the center of weight to the left and the right and move forward by rotating the rear wheel, which is easily foldable, and which can be easily converted into a manual trike designed to be driven with both hands and both feet.

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# Description

## TRIKE

### Technical Field

- [1] The document relates to a trike, and more particularly, to a trike which allows a user to make a pair of front wheels at the front to change directions by moving the center of weight to the left and the right and move forward by rotating the rear wheel, which is easily foldable, and which can be easily converted into a manual trike designed to be driven with both hands and both feet.

### Background Art

- [2] A conventional apparatus for generating power by using a human body includes a trike. A conventional bicycle changes directions by hand and generates a driving force by foot.

### Disclosure of Invention

#### Technical Problem

- [3] However, there is a drawback that it is difficult to convert the conventional trike into a manual trike designed to be driven with both hands and both feet because the conventional trike is complicated to fold and changes directions by hand. converted into a manual tricycle.
- [4] The present invention has been made in an effort to solve the aforementioned conventional problem and provide a trike, which can be easily folded and unfolded, and allows the rider to make a pair of front wheels change directions by shifting the centre of weight and move forward by rotating the rear wheel.

#### Technical Solution

- [5] An aspect of this document is to provide a trike, characterized in that: dropouts are formed on the rear lower end of a rear frame to rotatably secure a rear wheel with a known free gear attached thereto, hinge holes are disposed on the front lower end of the rear frame and hinged to a hinge hole disposed on the rear lower end of a central frame such that a bracket can be folded and unfolded by folding holders placed at an upper side, a steering bar is disposed at the front lower end of a central frame and rotatably secured to a steering bar bracekt of a front wheel axle, a front frame insert is disposed on the front upper end to insert and fix a front frame, a steering bracket is disposed at the front lower side to secure steering rods to the bottom and balancing devices to the center, a pedal crank bracket is disposed on the front end of the front frame to rotatably secure a known pedal crank and a handle bracket is disposed upward from the center to secure the handle, king pin brackets are disposed at both left and right sides of a front wheel axle to rotatably insert and secure king pins wih knuckle

arms attached thereto, respectively, thereby connecting a steering bracket of the front frame and the pair of nuckle arms secured to the left and right by a pair of steering rods, and when a user sitting on a saddle fixedly disposed on the rear frame and the central frame moves the center of weight left and right, the steering rods at both sides moves the pair of knuckle arms rotatably secured to the left and right by the king pins, respectively, thereby performing steering, and a pair of balancing device ebrackets disposed on the left and right upper sides of the front wheel axle and a pair of balancing device secured to the steering bracket of the front frame helps to balance the center of the user's weight, and when the center of weigth is shifted left and right, a direction change is made, and the trike moves forward by rotating the rear wheel connected by the chain by turning the pedals with feet like a typical lie-down type bicycle.

[6] In another aspect, the trike further comprises a pair of handle support bars and a pair of driving rods, by which the trike can be converted into a lever type hand & feet bike by connecting the pedals and the handle support bars by the driving rods.

[7] In still another aspect, the trike further comprises a known handle crank portion, by which the trike can be converted into a hand & feet bicycle of a handle crank type by connecting the pedal crank and the handle crank.

[8] In yet another aspect, the trike can be used as a hand & feet bicycle of a lever type on which the user rides in an upright bicycle manner by inserting a known saddle post to the upper side of the rear frame and coupling a known general bicycle saddle to the upper end.

### **Advantageous Effects**

[9] As described above, the trike according to the present invention can be easily folded and unfolded, can be easily converted into a manual trike, and reduces the idle rotation of the wheels when going up a hill because a rear wheel drive system is employed.

[10] The embodiments described above are merely embodiments for embodying a trike according to the present invention. The present invention is not limited to the embodiments. It will be understood that those skilled in the art can make various modifications and changes thereto without departing from the scope and technical spirit of the present invention defined by the appended claims.

### **Brief Description of the Drawings**

[11] The implementation of this document will be described in detail with reference to the following drawings in which like numerals refer to like elements.

[12] FIG. 1 is a perspective view of a trike according to a first embodiment of the present invention.

[13] FIG. 2 is a front view of a trike according to the first embodiment of the present

invention.

- [14] FIG. 3 is a perspective view of the rear frame of the trike according to the first embodiment of the present invention.
- [15] FIG. 4 is a perspective view of the central frame of the trike according to the first embodiment of the present invention.
- [16] FIG. 5 is a perspective view of the front frame of the trike according to the first embodiment of the present invention.
- [17] FIG. 6 is a perspective view of the front wheel axle of the trike according to the first embodiment of the present invention.
- [18] FIG. 7 is a perspective view of the nuckle arm of the trike according to the first embodiment of the present invention.
- [19] FIG. 8 is a perspective view of a steering rod of the trike according to the first embodiment of the present invention.
- [20] FIG. 9 is a perspective view of the balancing device holder of the trike according to the first embodiment of the present invention.
- [21] FIG. 10 is an operational diagram of a method for folding a trike according to the first embodiment of the present invention.
- [22] FIG. 11 is a side view of a hand & foot lever-type trike according to a second embodiment of the present invention.
- [23] FIG. 12 is a side view of a hand & foot handle crank-type trike according to a third embodiment of the present invention.
- [24] FIG. 13 is a perspective view of a hand & foot upright bicycle type trike according to a fourth embodiment of the present invention.

### **Best Mode for Carrying Out the Invention**

- [25] Hereinafter, an implementation of this document will be described in detail with reference to the accompanying drawings.
- [26] FIG. 1 is a perspective view of a trike according to a first embodiment of the present invention. FIG. 2 is a front view of a trike according to the first embodiment of the present invention. FIG. 3 is a perspective view of the rear frame of the trike according to the first embodiment of the present invention. FIG. 4 is a perspective view of the central frame of the trike according to the first embodiment of the present invention. FIG. 5 is a perspective view of the front frame of the trike according to the first embodiment of the present invention. FIG. 6 is a perspective view of the front wheel axle of the trike according to the first embodiment of the present invention. FIG. 7 is a perspective view of the nuckle arm of the trike according to the first embodiment of the present invention. FIG. 8 is a perspective view of a steering rod of the trike according to the first embodiment of the present invention. FIG. 9 is a perspective view

of the balancing device holder of the trike according to the first embodiment of the present invention. FIG. 10 is an operational diagram of a method for folding a trike according to the first embodiment of the present invention. FIG. 11 is a side view of a hand & foot lever-type trike according to a second embodiment of the present invention. FIG. 12 is a side view of a hand & foot handle crank-type trike according to a third embodiment of the present invention. FIG. 13 is a perspective view of a hand & foot upright bicycle type trike according to a fourth embodiment of the present invention.

[27] As shown in FIGs. 1 and 2, the trike according to the first embodiment of the present invention broadly comprises a rear frame 110, a central frame 120, a front frame 130, a front wheel axle 140, a handle 132, a pair of balancing devices 143, a balancing device holder 144, a pair of steering rods 150, a pair of knuckle arms 160, a pair of pedals 170, a crank gear 171, a pair of idle gears 175, an idle gear shaft 175a, a pair of chains 172, a pair of front wheels 180, a rear wheel 181, and a saddle 190 with a backrest and a bottom portion separated from each other.

[28] In the rear frame 110, as shown in FIG. 3, dropouts 112 are formed on the rear lower ends of a known chain stay 113 such that the rear wheel 181 with a known free gear 176 attached thereto is rotatably secured by a wheel shaft 182, a bracket 114 having hinge holes 114a is disposed on the front lower end of the chain stay 113 to be hinged by the idle gear shaft 175a to a bracket 123 having a hinge hole 123a disposed on the rear lower end of the central frame 120 such that it can be folded and unfolded by folding holders 121 of the central frame 120, and saddle brackets 111 with a plurality of saddle fixing holes 111a perforated thereon are transversely disposed on the front upper side so that the backrest portion of the saddle 190 can be fixed by screw spikes or the like by a known method.

[29] In the central frame 120, as shown in FIG. 4, a bracket 123 having hinge holes 123a hingeable to the rear frame 110 is disposed on the rear lower end of a straight member and a holding folder bracket 121a is disposed in a transverse direction on the rear side of the straight member and a trapezoidal member placed at an upper side, to thus secure, by a pair of folding holder securing bolts 122b, a pair of folding holders elastically supported by a pair of folding holder springs 122, so that the rear frame 110 can be fixed by the pair of folding holders 121 by pushing the pair of folding holders 121 forward and folding and unfolding them downward, a steering bar 126 is extended forward at the front of a straight member placed at a lower side and a balancing device holder securing portion 129 made of a screw cut at both sides is disposed on the front end, a steering bar bracket 145 of a front wheel axle 140 is rotatably secured to the steering bar 126 and then is inserted into the balancing device holder securing portion 129 so as to restrict rotation by a balancing device holder securing hole 144a of a

balancing device holder 144, perforated in the shape of a cross section of the screw cut at both sides, and fixed by a balancing device holder securing nut 129a, a front frame insert 125 is disposed on the front upper end of the straight member at the upper side so as to insert the front frame 130, fix it at an appropriate length to a front frame fixing bracket 126 having a front frame fixing bolt hole 126a by a known front frame fixing bolt 126b, and attach a tension gear shaft 124 to a front lateral side, the front a steering bracekt 128 having a pair of steering rod securing holes 128a and a pair of balancing device securing holes 128b is fixedly disposed, by welding or the like, downward from the front lower side of the straight member placed at the lower side, and saddle brackets 111 having a plurality of saddle fixing holes 111a are attached to the upside of the straight member placed at the upper side so that the saddle 190 can be fixed by screw spikes or the like.

[30] In the front frame 130, as shown in FIG. 5, a known pedal crank bracket 133 is disposed on the front end of a straight member to rotatably secure the pair of known pedals 170, and the member is extended at a right angle upward from the center part to dispose a known handle bracket 131 and secure the known handle 132 at an proper angle by a known method.

[31] In the front wheel axle 140, as shown in FIG. 6, king pin brackets 141 are vertically disposed at both left and right sides of a straight member and a steering bar bracket is horizontally disposed at the center in a back-and-forth direction, and a pair of balancing device brackets 142 is disposed at the bottom of both sides, respectively, by welding or the like.

[32] As the handle 132, an appropriate one is selected from known bicycle handles and used, and secured to the handle bracket 131 at an proper angle.

[33] As the pair of balancing devices 143, known shock absorbers containing an elastic member is used, and one end and the other end of each are hingeably secured to the balancing device bracket 142 of the front wheel axle 140 and to the steering bracket 128 and the balancing device securing holes 128b of the balancing device holder 144, respectively, by balancing device securing bolts 143a.

[34] In the balancing device holder 144, as shown in FIG. 9, a balancing device holder securing hole 144a capable of serving as a key groove is perforated at the center of the upper side of a T-shaped member, and a pair of balancing device securing holes 144b is perforated at both sides of the underside.

[35] In the pair of steering rods 150, as shown in FIG. 8, a pair of known ball joints 151 is secured and disposed at both ends, respectively, and one end and the other end of each are secured to the steering rod securing holes 128a of teh steering bracket 128 and to a plurlaity of ball joint securing holes 161 performed on the pair of knuckle arms 160, respectively, by a known method.

- [36] In each of the pair of knuckle arms 160, as shown in FIG. 7, a king pin 162 is vertically formed upward from the front end of a fan-shaped board, a plurality of ball joint securing holes 161 is perforated on the rear of the knuckle arm 160, a wheel shaft securing hole 163 is longitudinally perforated on a member laterally attached under the center part, a wheel shaft fixing bolt hole 164 is perforated at a right angle at the center part thereof, and the king pin 162 is rotatably secured to the king pin bracket 141 of the front wheel axle 140 by a king pin nut 162a.
- [37] The crank gear 171 is fixed to one side of the pair of known pedals 170 so as to be opposite to both opposite ends of a crank shaft 174, and rotatably secured to the pedal crank bracket 133 of the front frame 130.
- [38] The pair of idle gears 175 are fixed such that two sheets may have a proper interval like a double chain gear, and rotatably secured to one side of the idle gear shaft 175a.
- [39] One of the pair of chains 172 is connected to the crank gear 171 at the front and one of the idle gears 175 to adjust the tensile force of the chain by a known tension gear 173 rotatably secured to the tension gear shaft 124, and the other thereof connects the other one of the idle gears 175 and the free gear 176 of the rear wheel 181.
- [40] The rear wheel 181 has the known free gear 176 attached thereto, and rotatably secured to the dropouts 112 by the wheel shaft 182.
- [41] Each of the pair of front wheels 180 is rotatably secured to parts of the wheel shaft 182, and the other parts of the wheel shaft 182 are inserted into the wheel shaft securing hole 163 and fixed to the wheel shaft fixing bolt hole 164 by a bolt.
- [42] The saddle 190 is divided into a backrest portion and a bottom portion. The backrest portion and the bottom portion are fixed to the rear frame and the saddle fixing holes 111a of the saddle brackets 111 of the central frame 120. In order to fold the saddle 190, as shown in FIG. 9, the folding holders 121 elastically supported by the holding folder spring 122 are loosened to pull the rear frame 110 back and fold it, and the known front frame fixing bolt 126b secured to the front frame fixing bracket 126 is loosened to separate the front frame 130 or put it back further, thereby reducing the volume. In the same manner, the handle 132 can be folded as well.
- [43] In a second embodiment of the present invention, as shown in FIG. 11, the trike further comprises a pair of handle support bars 211 with known handles 210 attached thereto, respectively, and a pair of driving rods 220 with a pair of ball joints 221 secured to both opposite ends. A pair of known handle support bar brackets 213 is disposed at the left and right on the upper end of an upward member of a front frame 230. The handle support bars 211 having a handle support bar securing hole 212 are hingeably secured to the center part. The ball joint 221 at one end of the pair of driving rods 220 is secured to the lower ends of the handle support bars 211, respectively, by a known method, and the ball joint 221 with no bolt is secured to the other end thereof.



The respective ball joints are secured to a known pedal shaft. As the handles 210 are moved back and forth with both hands, the trike moves forward by rotating a rear wheel 281 with both feet. A detailed structure and operation method of the trike will be omitted because the present invention is the same as a method for driving a limb-driven automatic steering bicycle in the previous application (No. 10-2005-0023426) of the present inventor.

[44] In a third embodiment of the present invention, as shown in FIG. 12, a pair of known hand bicycle handles 310 with a known handle crank gear 311 attached to one side is rotatably coupled to a known handle crank bracket 313 disposed on the upper end of an upward member of a front frame, and a chain 312 is further included and connected to the handle crank gear 311 and one of a pair of crank gears 371 of a double chain type. As the handles 310 are rotated, the trike moves forward by rotating a rear wheel 381 with both feet. A detailed structure and operation method of the trike will be omitted because the present invention is the same as a method for driving a hand & feet-driven bicycle in the previous application (No. 10-2005-0084463) of the present inventor.

[45] In a fourth embodiment of the present invention, as shown in FIG. 13, a user uses the trike in a general upright bicycle method although the driving method is the same as that of the second embodiment. A known general bicycle saddle 490 is secured to a known saddle post 491 and inserted and fixed to an upright member of a rear frame 410 in a known general bicycle saddle securing method. The trike further comprises a pair of handle support bars 411 with known handles 410 attached thereto, respectively, and a pair of driving rods 420 with a pair of ball joints 421 secured to both opposite ends. A pair of known handle support bar brackets 413 is disposed at the left and right on the upper end of an upward member of a front frame 430. The handle support bars 411 having a handle support bar securing hole 412 are hingeably secured to the center part. The ball joint 421 at one end of the pair of driving rods 420 is secured to the lower ends of the handle support bars 411, respectively, by a known method, and the ball joint 421 with no bolt is secured to the other end thereof. The respective ball joints are secured to a known pedal shaft. As the handles 410 are moved back and forth with both hands, the trike moves forward by rotating a rear wheel 481 with both feet. The trike is used in a general bicycle manner.

[46] In one of the first, second, third, and fourth embodiments, the trike further comprises a known brake and a parking brake device which has a brake mounted at the handle and wheel portions and connects them by a cable for braking operation. The descriptions of a structure, attaching method, and operation thereof will be omitted.

[47] In one of the first, second, third, and fourth embodiments, the trike further comprises a known transmission on the pedal crank gear and the wheels.

## Mode for the Invention

- [48] The trike according to the present invention comprises: a rear frame; a central frame hinged to the rear frame; a front frame inserted into the front end of the central frame, and having a steering bar; a handle formed on the front frame; a front wheel axle rotatably secured to the steering bar; a pair of balancing devices secured to the central frame and the front wheel axle; a pair of knuckle arms secured to both sides of the front wheel axle; a pair of steering rods connecting a steering bracket and the knuckle arms; a pair of pedals rotatably secured to the front frame; a crank gear fixed to one of the pedals; an idle gear shaft for connecting the rear frame and the central frame; an idle gear attached to the idle gear shaft; a pair of front wheels formed on the knuckle arms; a rear wheel formed on the rear frame; and a pair of chains for transmitting power to the rear wheel via the crank gear and the idle gear, wherein the steering rods steers by moving the knuckle arms according to the center of a user's weight, and the balancing device is configured to balance the center of the user's weight and make a direction change as the center of weight is shifted.
- [49]
- [50] \*In the rear frame, the rear wheel with a free gear attached thereto is secured to the rear lower end by a wheel shaft, a bracket is disposed on the front lower end of a chain stay to be coupled by the idle gear shaft to a bracket disposed on the rear lower end of the central frame such that it can be folded and unfolded by folding holders of the central frame, and saddle brackets are disposed on the front upper side to fix a saddle.
- [51] In the central frame, a bracket is disposed on the rear lower end and a holding folder bracket is disposed on the rear side to dispose a pair of folding holders, a steering bar is extended forward at the front of a lower side and a balancing device holder securing portion is disposed on the front end, a steering bar bracket of a front wheel axle is secured to the steering bar and then a balancing device holder is inserted into a balancing device holder securing hole and fixed to a balancing device holder securing portion by a balancing device holder securing nut, a front frame insert is disposed on the front upper end so as to insert the front frame, fix the same at an appropriate length, and attach a tension gear shaft to a front lateral side, a steering bracket having a plurality of steering rod securing holes and a plurality of balancing device securing holes is fixedly disposed under the front lower side, and saddle brackets are attached to the upside so that the saddle can be fixed.
- [52] In the front frame, a pedal crank bracket is disposed on the front end to rotatably secure the pair of pedals, and a handle bracket is disposed upward from the center part to secure the handle at an proper angle for use.
- [53] In the front wheel axle, king pin brackets are disposed at both left and right sides

and a steering bar bracket is disposed at the center in a back-and-forth direction, and a pair of balancing device brackets is disposed at the bottom of both sides.

[54] In the balancing device holder, a balancing device holder securing hole is perforated at the center of the upper side, and a pair of balancing device securing holes is perforated at both sides of the underside.

[55] In each of the pair of knuckle arms, a king pin is formed upwad from the front end, a plurality of ball joint securing holes is perforated on the rear of the nuckle arm, an axle shaft securing hole is longitudinally perforated at a lower side of the center part, an axle shaft fixing bolt hole is perforated at the center thereof, and the king pin is secured to a king pin bracket of the front wheel axle.

[56] The trike further comprises a pair of handle support bars with known handles attached thereto and a pair of driving rods, and as the handles are moved back and forth with both hands, the trike moves forward by rotating a rear wheel with both feet in a hand & feet bicycle manner.

[57] A pair of hand bicycle handles is coupled to a handle crank bracket disposed on a front frame, and a chain is further included, and as the handles are rotated, the trike moves forward by rotating a rear wheel with both feet in a hand & feet bicycle manner.

[58] The trike further comprises a saddle secured to a saddle post, a pair of handle support bars with known handles attached thereto, and a pair of driving rods, and as the handles are moved back and forth with both hands, the trike moves forward by rotating a rear wheel with both feet in an upright hand & feet bicycle manner.

[59] The trike further comprises a known brake and a parking brake device which has a brake mounted at the handle and wheel portions and connects them by a cable for braking operation.

[60] The trike further comprises a known transmission on the pedal crank gear and the wheels.

[61]

[62]

## Claims

- [1] A trike, comprising:  
a rear frame;  
a central frame hinged to the rear frame;  
a front frame inserted into the front end of the central frame, and having a steering bar;  
a handle formed on the front frame;  
a front wheel axle rotatably secured to the steering bar;  
a pair of balancing devices secured to the central frame and the front wheel axle;  
a pair of knuckle arms secured to both sides of the front wheel axle;  
a pair of steering rods connecting a steering bracket and the knuckle arms;  
a pair of pedals rotatably secured to the front frame;  
a crank gear fixed to one of the pedals;  
an idle gear shaft for connecting the rear frame and the central frame;  
an idle gear attached to the idle gear shaft;  
a pair of front wheels formed on the knuckle arms;  
\*a rear wheel formed on the rear frame; and  
a pair of chains for transmitting power to the rear wheel via the crank gear and the idle gear,  
wherein the steering rods steers by moving the knuckle arms according to the center of a user's weight, and the balancing device is configured to balance the center of the user's weight and make a direction change as the center of weight is shifted.
- [2] The trike of claim 1, wherein, in the rear frame, the rear wheel with a free gear attached thereto is secured to the rear lower end by a wheel shaft, a bracket is disposed on the front lower end of a chain stay to be coupled by the idle gear shaft to a bracket disposed on the rear lower end of the central frame such that it can be folded and unfolded by folding holders of the central frame, and saddle brackets are disposed on the front upper side to fix a saddle.
- [3] The trike of claim 1, wherein, in the central frame, a bracket is disposed on the rear lower end and a holding folder bracket is disposed on the rear side to dispose a pair of folding holders, a steering bar is extended forward at the front of a lower side and a balancing device holder securing portion is disposed on the front end, a steering bar bracket of a front wheel axle is secured to the steering bar and then a balancing device holder is inserted into a balancing device holder securing hole and fixed to a balancing device holder securing portion by a balancing device holder securing nut, a front frame insert is disposed on the front

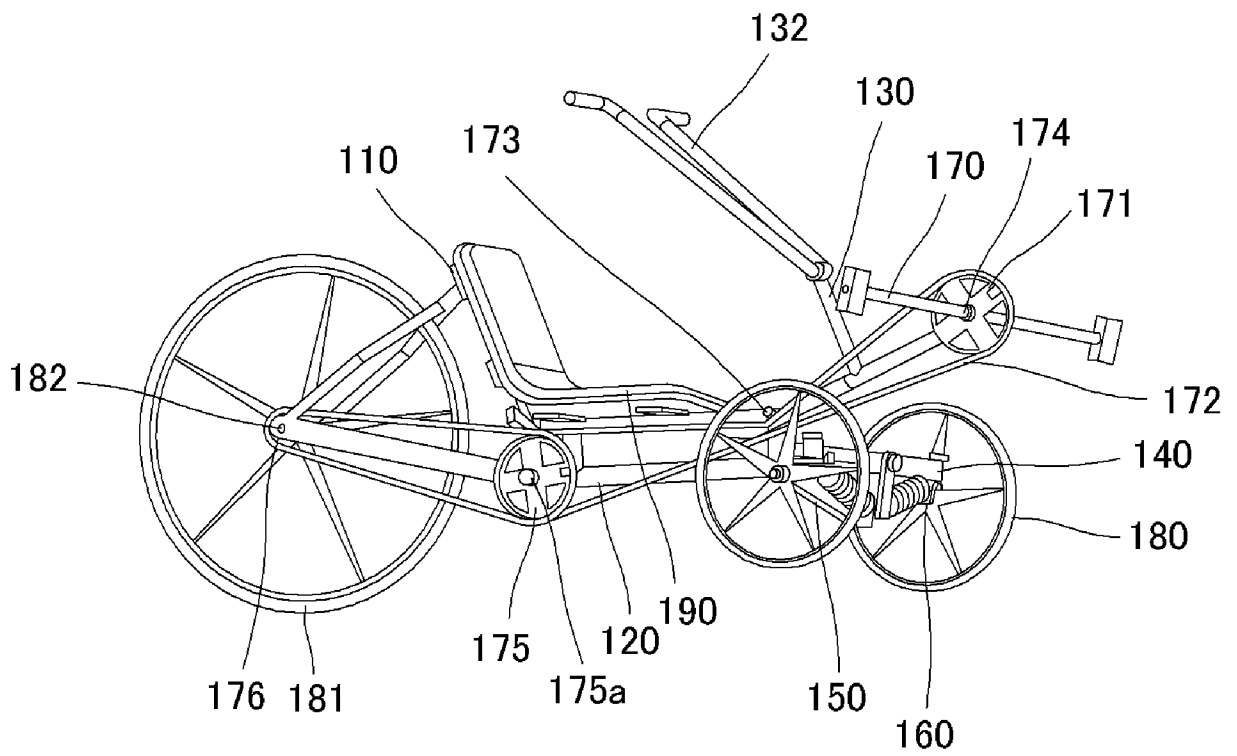
upper end so as to insert the front frame, fix the same at an appropriate length, and attach a tension gear shaft to a front lateral side, a steering bracekt having a plurality of steering rod securing holes and a plurality of balancing device securing holes is fixedly disposed under the front lower side, and saddle brackets are attached to the upside so that the saddle can be fixed.

- [4] The trike of claim 1, wherein, in the front frame, a pedal crank bracket is disposed on the front end to rotatably secure the pair of pedals, and a handle bracket is disposed upward from the center part to secure the handle at an proper angle for use.
- [5] The trike of claim 1, wherein, in the front wheel axle, king pin brackets are disposed at both left and right sides and a steering bar bracket is disposed at the center in a back-and-forth direction, and a pair of balancing device brackets is disposed at the bottom of both sides.
- [6] The trike of claim 1, wherein, in the balancing device holder, a balancing device holder securing hole is perforated at the center of the upper side, and a pair of balancing device securing holes is perforated at both sides of the underside.
- [7] The trike of claim 1, wherien, in each of the pair of knuckle arms, a king pin is formed upwrad from the front end, a plurality of ball joint securing holes is perforated on the rear of the nuckle arm, an axle shaft securing hole is longi-tudinally perforated at a lower side of the center part, an axle shaft fixing bolt hole is perforated at the center thereof, and the king pin is secured to a king pin bracket of the front wheel axle.
- [8] The trike of claim 1, further comprising: a pair of handle support bars with known handles attached thereto; and a pair of driving rods, and as the handles are moved back and forth with both hands, the trike moves forward by rotating a rear wheel with both feet in a hand & feet bicycle manner.
- [9] the trike of claim 1, wherein a pair of hand bicycle handles is coupled to a handle crank bracket disposed on a front frame, and a chain is further included, and as the handles are rotated, the trike moves forward by rotating a rear wheel with both feet in a hand & feet bicycle manner.
- [10] The trike of claim 1, further comprising: a saddle secured to a saddle post; a pair of handle support bars with known handles attached thereto; and a pair of driving rods, and as the handles are moved back and forth with both hands, the trike moves forward by rotating a rear wheel with both feet in an upright hand & feet bicycle manner.
- [11] The trke of claim 1, further comprising a known brake and a parking brake device which has a brake mounted at the handle and wheel portions and connects

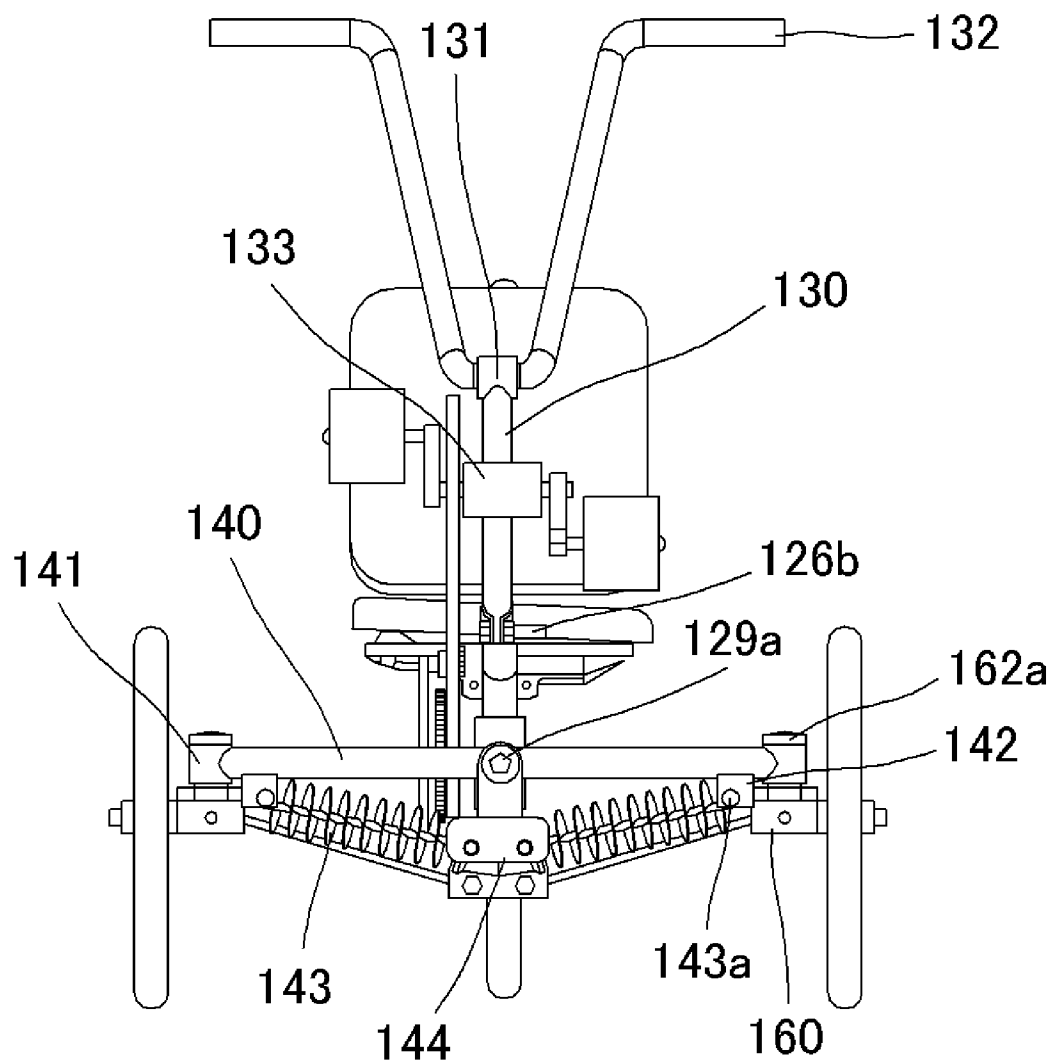
them by a cable for braking operation.

- [12] The trike of claim 1, further comprising a known transmission on the pedal crank gear and the wheels.

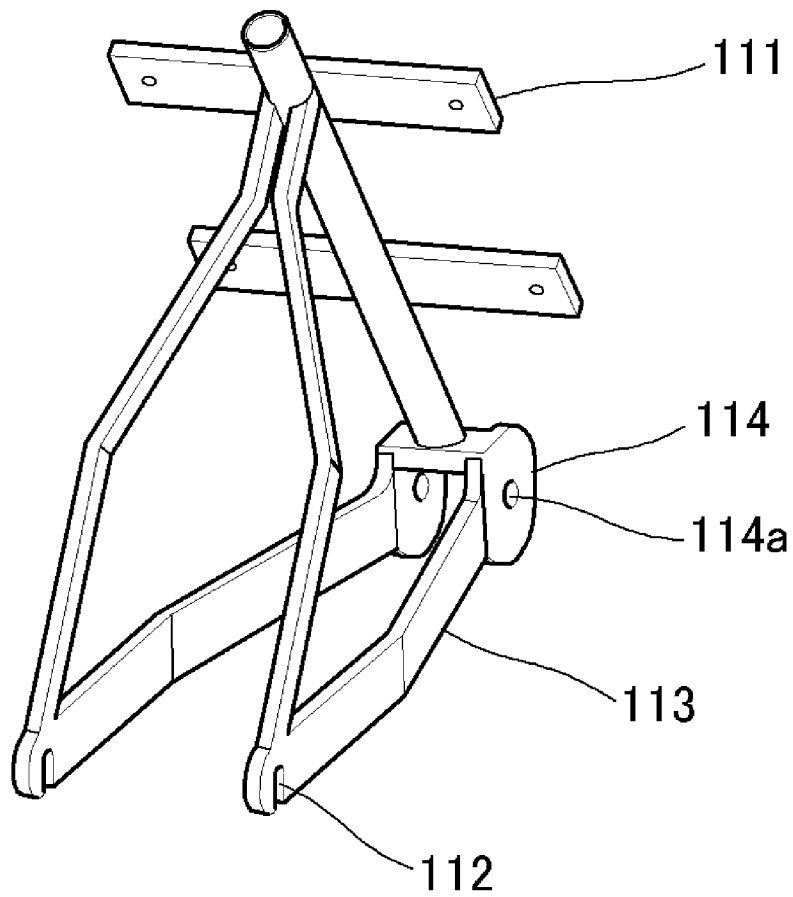
[Fig. 1]



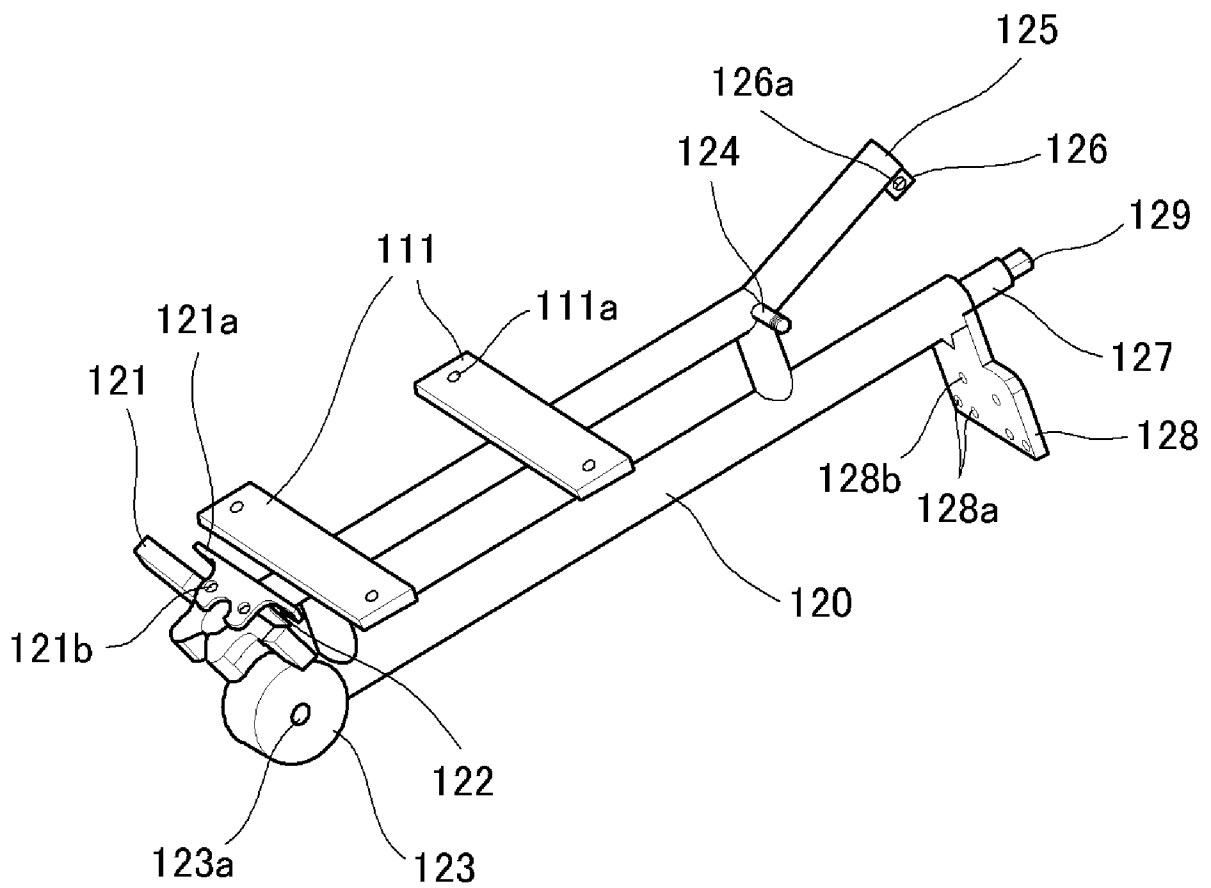
[Fig. 2]



[Fig. 3]

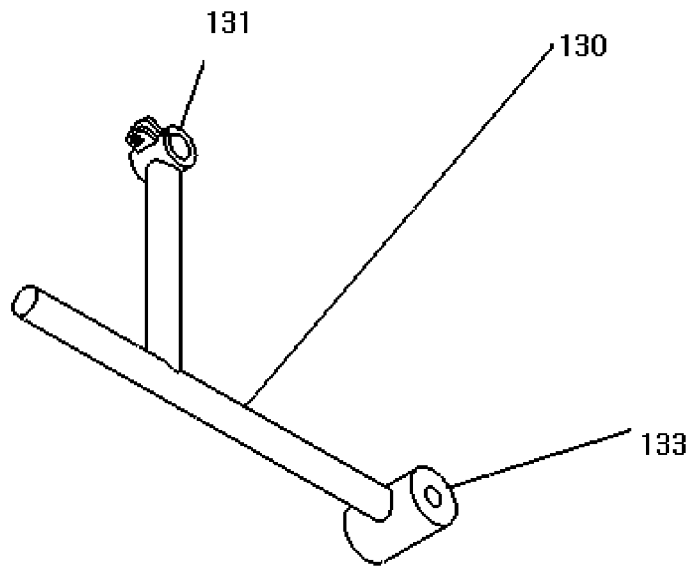


[Fig. 4]

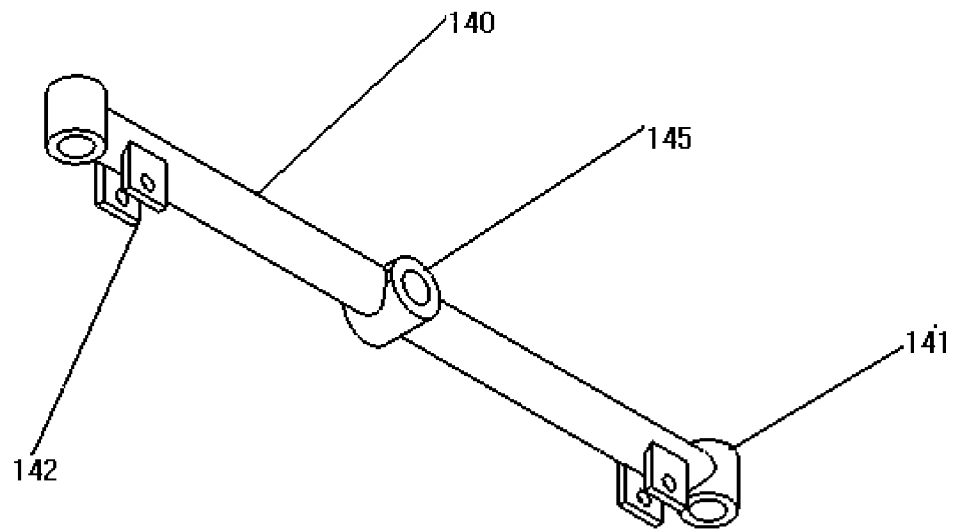




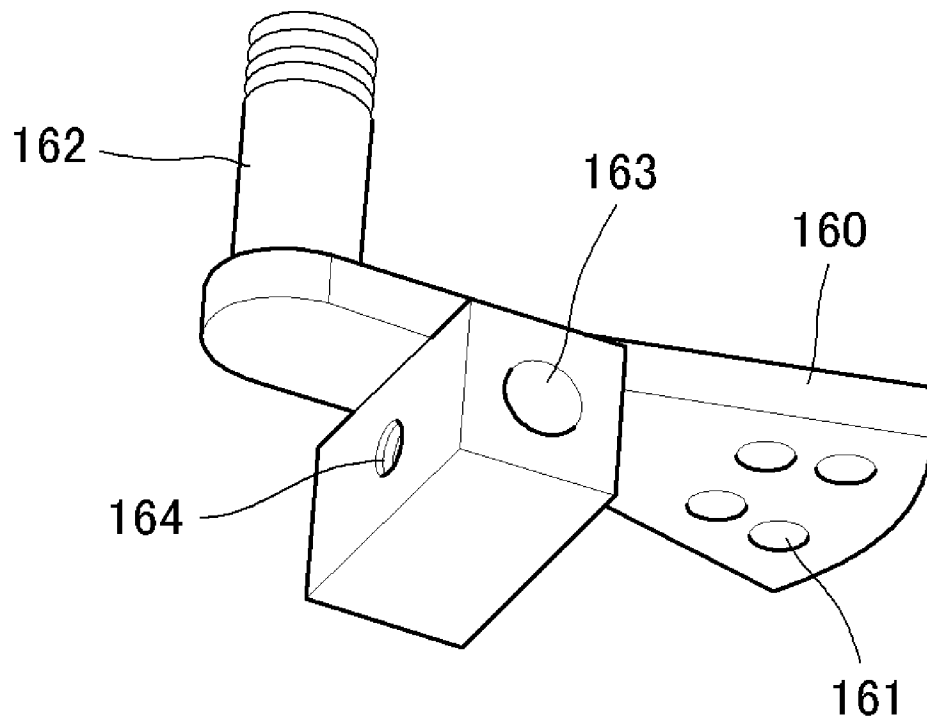
[Fig. 5]



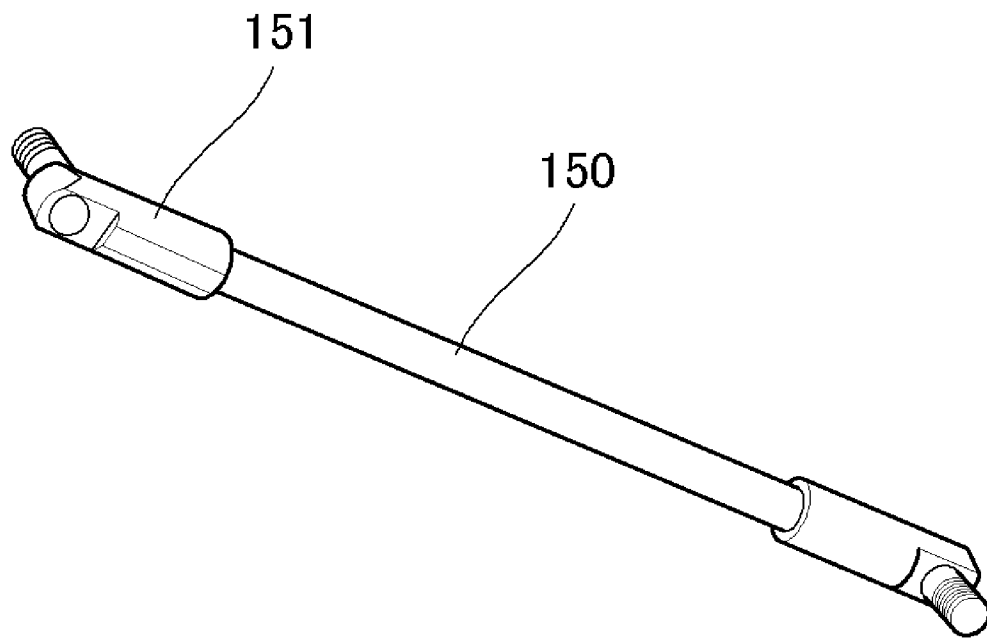
[Fig. 6]



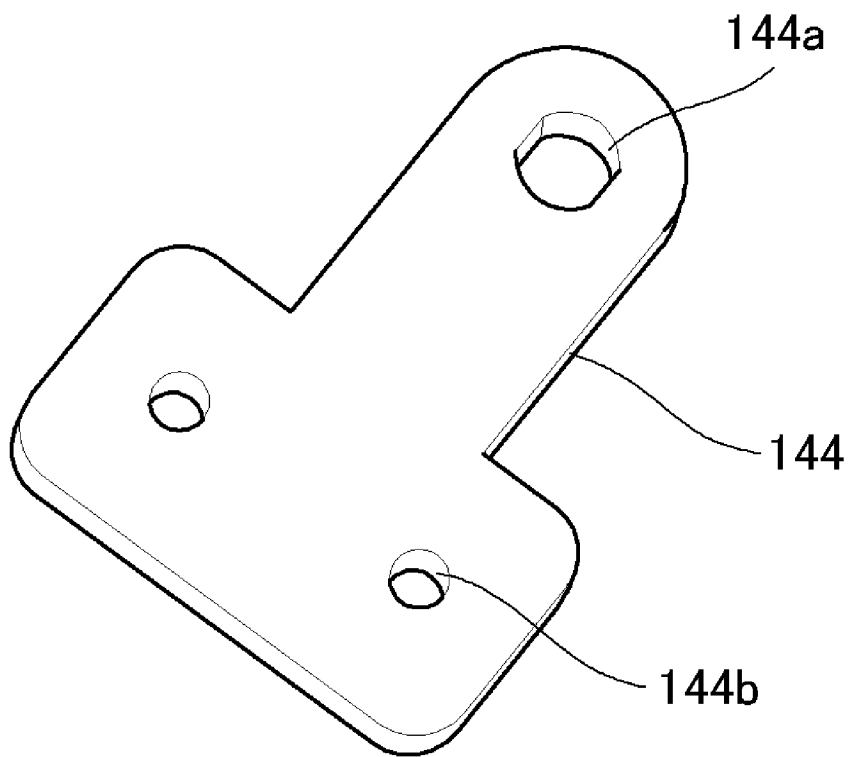
[Fig. 7]



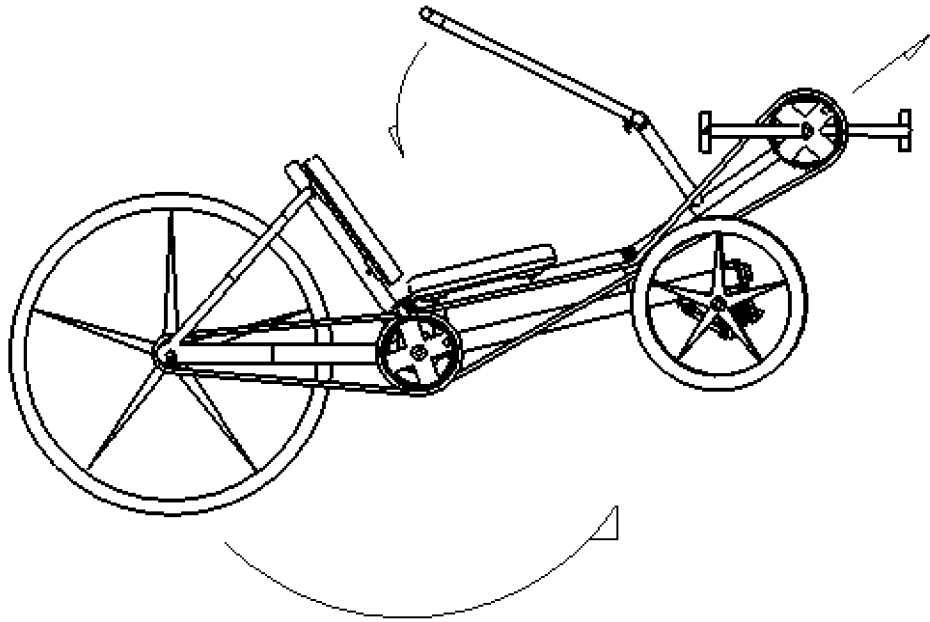
[Fig. 8]



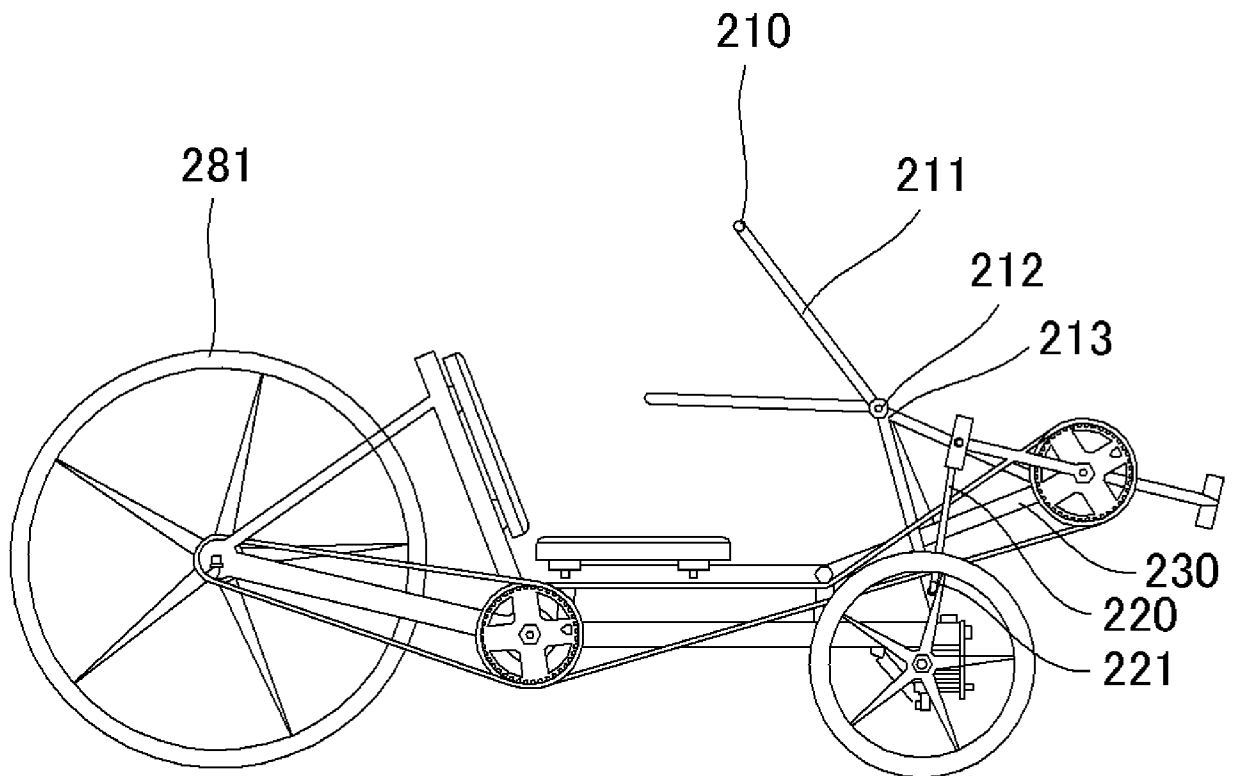
[Fig. 9]



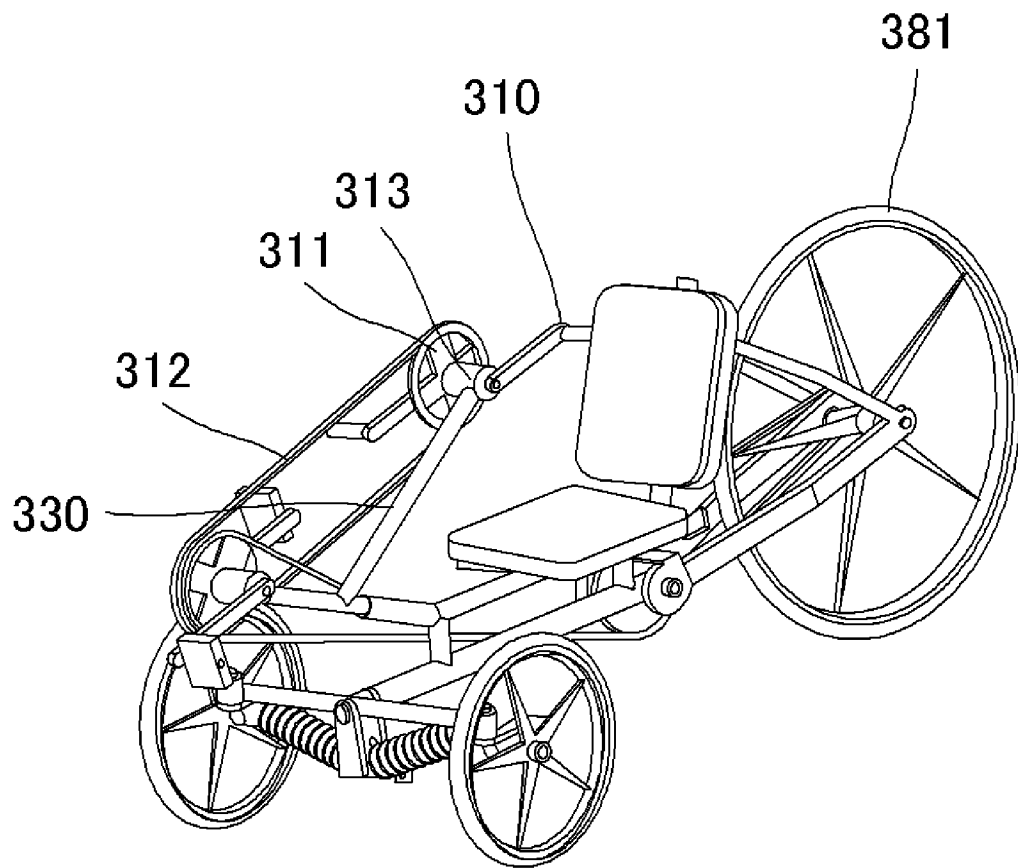
[Fig. 10]



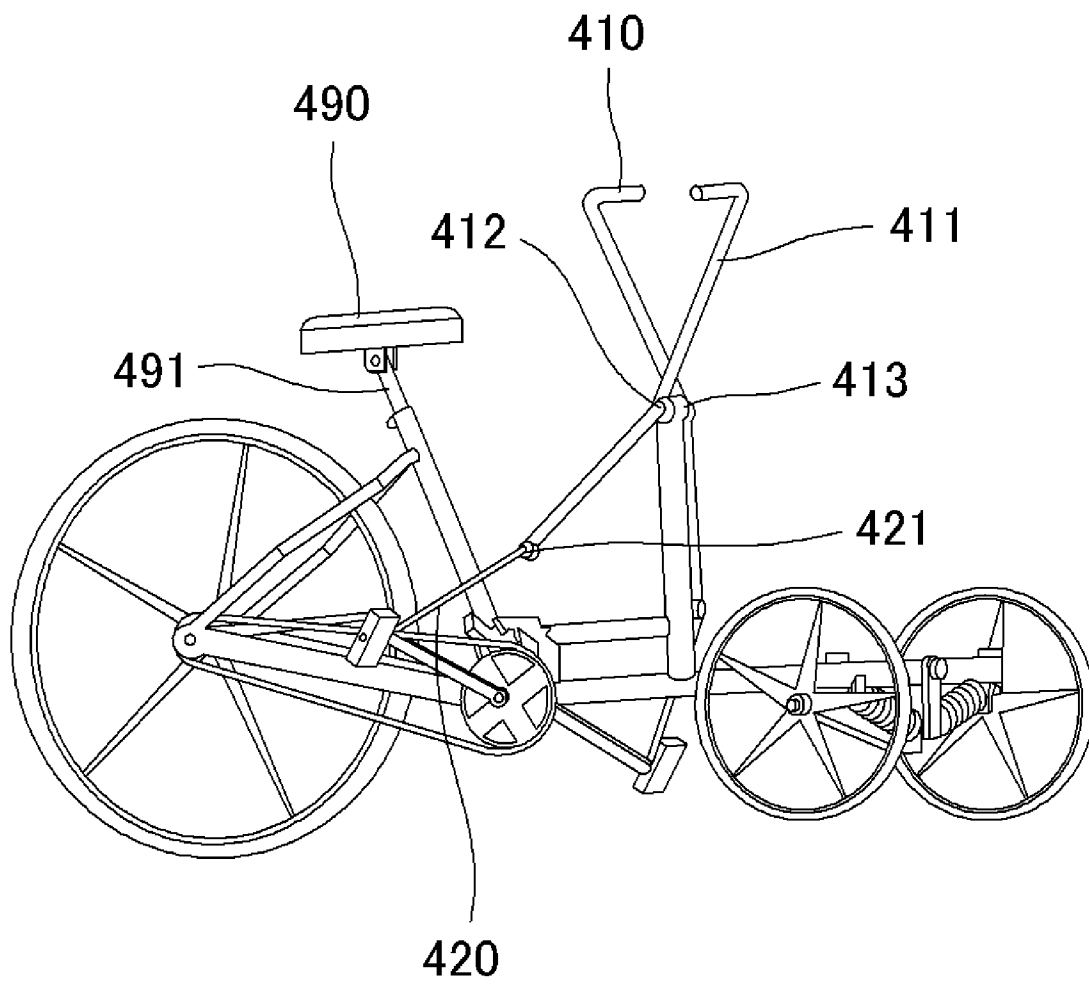
[Fig. 11]



[Fig. 12]



[Fig. 13]



**A. CLASSIFICATION OF SUBJECT MATTER*****B62M 1/12(2006.01)i***

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 8 B62M 1/12

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models since 1975

Japanese utility models and applications for utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS (KIPO internal) &amp; keywords: "fold", "frame", and "cycle"

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                           | Relevant to claim No. |
|-----------|--|-----------------------|
| A         | US 6,378,882 B1 (JOHN DEVINE) 30 April 2002<br>See column 1, line 39 - column 3, line 15 and figures 1-3.    | 1-12                  |
| A         | US 4,541,647 A (NORMAN L. BRAUN) 17 September 1985<br>See claims 1-8 and figures 1-2.                        | 1-12                  |
| A         | JP 11-310186 A (MATSUI YOSHIJIRO) 09 November 1999<br>See paragraph [0008]-paragraph [0011] and figures 1-3. | 1-12                  |
| A         | KR 10-2005-0040655 A (CHOI, JIN MAN) 03 May 2005<br>See claims 1-7 and figures 1-8.                          | 1-12                  |

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

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"&amp;" document member of the same patent family

Date of the actual completion of the international search

13 DECEMBER 2007 (13.12.2007)

Date of mailing of the international search report

**13 DECEMBER 2007 (13.12.2007)**

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Telephone No. 82-42-481-5470



**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/KR2007/004376**

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|---|---------------------|----------------------------|---------------------|
| US 06378882 B1                            | 30.04.2002          | None                       |                     |
| US 04541647 A                             | 17.09.1985          | None                       |                     |
| JP 11-310186 A                            | 09.11.1999          | None                       |                     |
| KR 10-2005-0040655 A                      | 03.05.2005          | None                       |                     |