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(72) Inventor; and

(71) Applicant : WALLACE, Leonard [US/US]; 7723 West Sunset Highway #10, Spokane, Washington 99224 (US).

(74) Agents: PLAGER, Mark et al.; PlagerSchack LLP, 16152 Beach Boulevard Suite 207, Huntington Beach, California 92647 (US).

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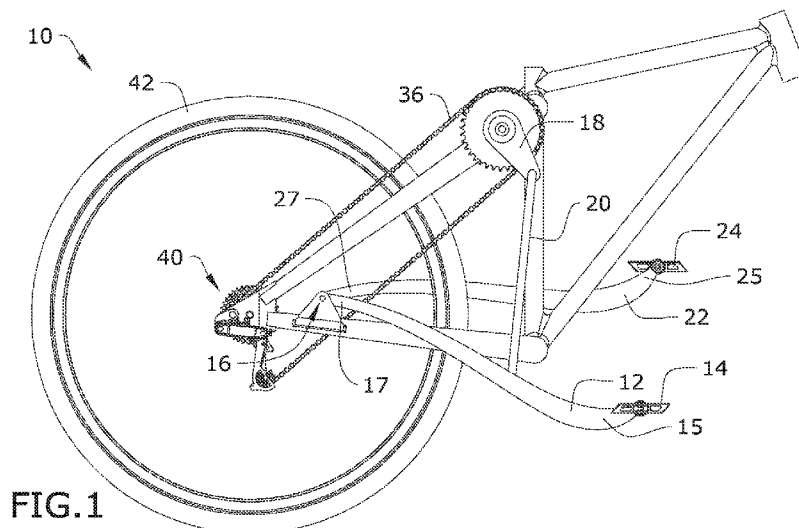
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(54) Title: EFFICIENT BICYCLE CONSTRUCTION



(57) Abstract: This invention relates to bicycle construction. Previously, rotary crank pedal systems were inefficient in creating torque. Embodiments of the present invention use a pivot point (32) on a rear wheel attached to a first spring return (16) and a second spring return (26). A first pedal arm (12) is connected to a first pedal (14) and to the first spring return while connected to a first power connector (20) on the first pedal arm. A second pedal arm (22) is connected to a second pedal (24) and to the second spring return while connected to a second power connector (30) on the second pedal arm. A sprocket (34) is engaged with a drive chain (38). Pushing the pedals creates torque on the drive shaft.

EFFICIENT BICYCLE CONSTRUCTION

TECHNICAL FIELD

[0001] The embodiments herein relate generally to an improvement over existing bicycle constructions by increasing torque input to a bicycle with a linear to rotary drive system, rather than a rotary to rotary drive system.

BACKGROUND ART

[0002] Prior to embodiments of the disclosed invention the bicycle constructions are based on a rotary crank pedal drive system that uses the rotary to rotary drive system and are not efficient in using the torque. The rotary drive system uses only 50 % of the torque when pedal is substantially perpendicular to a derailleur system connected to pedal, thus the bicycles produced a large pedal offset. Embodiments of the disclosed invention solve this problem.

DISCLOSURE OF THE INVENTION

[0003] A bicycle pedal system is modified to increase torque input and to efficiently power a bicycle by using a pedal system in a linear to rotary drive system, rather than a rotary to rotary drive system. The pedal system for a road bicycle, on both first and second sides, includes a pedal arm connected to a pedal on one end and a power connector on other end. Further, the power connector is connected to a sprocket via a ratcheting arm and the sprocket is further connected to a chain and derailleur system via a drive chain. When the pedal is pushed by a rider in a linear motion causing the sprocket to rotate thereby rotating a bicycle wheel. The linear motion keeps angle of movement of the pedal arms about 90 degrees that increases torque input and limits pedal offset.

BRIEF DESCRIPTION OF THE FIGURES

[0004] Figure 1 shows a side detail view of one embodiment of the present invention;

[0005] Figure 2 shows a perspective view of one embodiment of the present invention;

[0006] Figure 3 shows a side detail view of one embodiment of the present invention shown in an exemplary initial configuration;

[0007] Figure 4 shows a side detail view of one embodiment of the present invention shown in an exemplary secondary configuration;

[0008] Figure 5 shows a side detail view of one embodiment of the present invention;

[0009] Figure 6 shows a perspective detail view of one embodiment of the present invention;

[0010] Figure 7 shows a side detail view of one embodiment of the present invention shown in an exemplary initial configuration;

[0011] Figure 8 shows a side detail view of one embodiment of the present invention shown in an exemplary secondary configuration;

[0012] Figure 9 shows a side detail view of one embodiment of the present invention;

[0013] Figure 10 shows a perspective detail view of one embodiment of the present invention;

[0014] Figure 11 shows a side detail view of one embodiment of the present invention shown in an exemplary initial configuration; and

[0015] Figure 12 shows a side detail view of one embodiment of the present invention shown in an exemplary secondary configuration.

BEST MODE OF THE INVENTION

[0016] A bicycle pedal system is configured to increase torque input in order to efficiently power a bicycle. The bicycle pedal system used a linear to rotary drive system, rather than a rotary to rotary drive system, by configuring the pedal system to produce a linear motion in about 90 degrees that is then transferred thereby rotating a sprocket followed by rotating a bicycle wheel. The present invention discloses three embodiment configured to fit to three kinds of bicycles, namely, road, mountain and touring.

[0017] By way of example, and referring to Figures 1-4, one embodiment of bicycle pedal system 10 comprises a first pedal arm 12, connected to a first pedal 14 at a first pedal arm first end 15 and to a first spring return 16 at a first pedal arm second end 17 while connect to a first ratcheting arm 18 with a first power connector 20 on the first pedal arm 12.

[0018] Similarly, a second pedal arm 22 is connected to a second pedal 24 at a second pedal arm first end 25 and to a second spring return 26 at a second pedal arm second end 27 while connected to a second ratcheting arm 28 with a second power connector arm 30 in between said arm.

[0019] Further, the first and the second spring return are connected to a pivot point 32 such that the first and the second arms rotate on the pivot point when the respective pedals are pushed. The first power connector and the second power connector are perpendicularly attached to the first and the second pedal arms, respectively.

[0020] Furthermore, a sprocket 34 is engaged with a drive chain 36, whereas coaxially connected to the first power connector on one side and to the second power connector on opposite side via a coaxially connected driveshaft 38. When a rider pushes the first pedal, the sprocket rotates via the first power connector coupled to the first ratcheting arm.

[0021] Similarly, when the rider pushes the second the sprocket rotates via the second power connector coupled to the second ratcheting arm. Furthermore, a chain and derailleur system 40 is mounted on a rear wheel 42 of the bicycle and is connected to the sprocket by the engaged drive chain. To ride the bicycle fitted with the pedal system, the rider pushes the pedal arms in a linear motion, moving the arms on the pivot point that then rotates the sprocket and powers the bicycle using a linear to rotary drive system.

[0022] In a second embodiment, and referring to Figures 5-8, the bicycle pedal system is configured to fit to a mountain bicycle 110. The bicycle pedal system comprises a first pedal arm 112, connected to a first pedal 114 on one end and to a first spring return 116 on opposite end while perpendicularly connected to a first power connector 118 in between said arm. Further, a first torque chain 120 is slidably connected to the first power connector via a first chain connector 122, and rotatably engaged with two longitudinally arranged sprockets: a first ratcheting sprocket 124 and a first return sprocket 126. Similarly, a second pedal arm 128 is connected to a second pedal 130 on one end and to a second spring return 132 on opposite end while perpendicularly connected to a second power connector 134 in between said arm. A second torque chain 136 is slidably engaged with the second power connector via a second chain connector 138 and is rotatably engaged with two longitudinally arranged sprockets: a second ratcheting sprocket 140 and a second return sprocket 142. Further, the first and the second return sprockets are connected to each other by a free-spinning axle shaft 144. Likewise, the first and second ratcheting sprockets are connected to each other by a driveshaft 146 that in turn, is coaxially connected to a sprocket 148. Further,

the ratcheting sprocket and the corresponding return sprocket are aligned in a first plane such that the ratcheting sprockets are parallel to each other and the return sprockets are parallel to each other. When the rider pushes the first pedal, both the first ratcheting and the first return sprockets rotate via the first chain connector, that in turn rotates the sprocket. Similarly, when the rider pushes the second pedal, both the second ratcheting and the second return sprockets rotate that in turn rotates the sprocket. In addition, the first and the second arms rotate on a pivot point 150 via the first and the second spring returns when the respective pedals are pushed. Furthermore, a chain and derailleur system 152 is mounted on a rear wheel 154 of the bicycle and is connected to the sprocket by a drive chain 156 engaged with the sprocket. To ride the bicycle fitted with the pedal system, the rider pushes the pedal arms in a linear motion that rotates the sprocket, powers the bicycle using a linear to rotary drive system.

[0023] In a third embodiment, and referring to Figures 9-12, the bicycle pedal system is configured to fit to a touring bicycle 210. The bicycle pedal system comprises a first pedal arm 212, connected to a first pedal 214 on one end and to a first spring return 216 on opposite end while perpendicularly connected to a first power connector 218 in between said arm. Further, a first torque chain 220 is slidably connected to the first power connector via a first chain connector 222, and rotatably engaged with two longitudinally arranged sprockets: a first ratcheting sprocket 224 and a front return sprocket 226. Similarly, a second pedal arm 228 is connected to a second pedal 230 on one end and to a second spring return 232 on opposite end while perpendicularly connected to a second power connector 234 in between said arm. A second torque chain 236 is slidably engaged with the second power connector via a second chain connector 238 and is rotatably engaged with two longitudinally arranged sprockets: a second ratcheting sprocket 240 and a rear return sprocket 242 in a second plane. Further, the first and the second return sprockets are connected to each other by a free-spinning axle shaft 244. Though in some embodiments, the free spinning axis shaft can be omitted or replaced with two individual axis shafts. The first torque chain 220 can be adjusted with a chain angle connector 262. Likewise, the first and second ratcheting sprockets are connected to each other by a driveshaft 246 that in turn, is coaxially connected to a sprocket 248. Further, the ratcheting sprocket and the corresponding return sprocket are perpendicularly arranged but the ratcheting sprockets are parallel to each other and the return sprockets are parallel. When the rider pushes the first pedal, both the first ratcheting and the first return sprockets rotate via the first chain connector, that in turn rotates the sprocket. Similarly, when the rider pushes the second pedal, both the second ratcheting and the second return sprockets rotate that in turn rotates the sprocket. In addition, the first and the second

arms rotate on a pivot point 250 via the first and the second spring returns when the respective pedals are pushed. Furthermore, a chain and derailleur system 252 is mounted on a rear wheel 254 of the bicycle and is connected to the sprocket by a drive chain 256 engaged with the sprocket. In some embodiments To ride the bicycle fitted with the pedal system, the rider pushes the pedal arms in a linear motion that rotates the sprocket, powers the bicycle using a linear to rotary drive system.

[0024] As used in this application, the term “a” or “an” means “at least one” or “one or more.”

[0025] As used in this application, the term “about” or “approximately” refers to a range of values within plus or minus 10% of the specified number.

[0026] As used in this application, the term “substantially” means that the actual value is within about 10% of the actual desired value, particularly within about 5% of the actual desired value and especially within about 1% of the actual desired value of any variable, element or limit set forth herein.

[0027] All references throughout this application, for example patent documents including issued or granted patents or equivalents, patent application publications, and non-patent literature documents or other source material, are hereby incorporated by reference herein in their entireties, as though individually incorporated by reference, to the extent each reference is at least partially not inconsistent with the disclosure in the present application (for example, a reference that is partially inconsistent is incorporated by reference except for the partially inconsistent portion of the reference).

[0028] A portion of the disclosure of this patent document contains material which is subject to copyright protection. The copyright owner has no objection to the facsimile reproduction by anyone of the patent document or the patent disclosure, as it appears in the Patent and Trademark Office patent file or records, but otherwise reserves all copyright firsts whatsoever.

[0029] Any element in a claim that does not explicitly state “means for” performing a specified function, or “step for” performing a specified function, is not to be interpreted as a “means” or “step” clause as specified in 35 U.S.C. §112, ¶ 6. In particular, any use of “step of” in the claims is not intended to invoke the provision of 35 U.S.C. §112, ¶ 6.

[0030] Persons of ordinary skill in the art may appreciate that numerous design configurations may be possible to enjoy the functional benefits of the inventive systems. Thus, given the wide variety of configurations and arrangements of embodiments of the

present invention the scope of the invention is reflected by the breadth of the claims below rather than narrowed by the embodiments described above.

INDUSTRIAL APPLICABILITY

[0031] Embodiments of the disclosed invention can be useful to increase torque input to efficiently power a bicycle.

WHAT IS CLAIMED IS:

1. A bicycle pedal system, configured to increase torque input to efficiently power a bicycle; the bicycle pedal system comprising:

a pivot point on a rear wheel, attached to a first spring return and a second spring return;

a first pedal arm, connected to a first pedal on a first pedal arm first end and to the first spring return on first pedal arm second end while connected to a first power connector on the first pedal arm;

a second pedal arm, connected to a second pedal on second pedal arm first end and to the second spring return on a second pedal arm second end while connected to a second power connector on the second pedal arm,

a sprocket, engaged with a drive chain, coaxially connected to the first power connector and to the second power connector via a coaxially connected driveshaft;

wherein pushing the first pedal rotates the sprocket via the first power connector while pushing the second pedal rotates the sprocket via the second power connector;

a chain and derailleur system, mounted on the rear wheel of the bicycle and connected to the sprocket by the drive chain;

wherein a rider pushes the first pedal arm and the second pedal arm in a linear motion that rotates the sprocket and powers the bicycle using a linear to rotary drive system.

2. The bicycle pedal system of Claim 1, further comprising:

a first ratcheting arm, attached to the first pedal arm; wherein the first power connector is perpendicularly attached to the first pedal arm;

a second ratcheting arm, attached to the second pedal arm; wherein the second power connector is perpendicularly attached to the second pedal arm;

wherein pushing the first pedal rotates the sprocket via the first power connector coupled to the first ratcheting arm while pushing the second pedal rotates the sprocket via the second power connector coupled to the second ratcheting arm to power the bicycle.

3. The bicycle pedal system, of Claim 1, further comprising:

a first torque chain, slidably connected to the first power connector via a first chain connector, and rotatably engaged with a first ratcheting sprocket and a first return sprocket that are longitudinally arranged, parallel to each other in a first plane; wherein the first power connector is perpendicularly connected to the first pedal arm;

a second torque chain, slidably engaged with the second power connector via a second chain connector and rotatably engaged with a second ratcheting sprocket and a second return sprocket that are longitudinally arranged, parallel to each other in a second plane; wherein the second plane is parallel to the first plane; wherein the second power connector is perpendicularly connected to the second pedal arm;

a free-spinning axle shaft, connected to the first return sprocket and the second return sprocket;

wherein pushing the first pedal rotates both the first ratcheting sprocket and the first return sprocket via the first chain connector, in turn, rotating the sprocket while pushing the second pedal rotates both the second ratcheting sprocket and the second return sprocket via the second chain connector, in turn, rotating the sprocket.

4. The bicycle pedal system, of claim 1 further comprising:

a first torque chain, slidably connected to the first power connector via a first chain connector, and rotatably engaged with a first ratcheting sprocket and a front return sprocket that are perpendicularly arranged;

a second torque chain, slidably engaged with the second power connector via a second chain connector and rotatably engaged with a second ratcheting sprocket and a rear return sprocket that are perpendicularly arranged, such that the second ratcheting sprocket and the rear return sprocket are perpendicular while the first ratcheting sprocket and the second ratcheting sprocket as well as the front return sprocket and the rear return sprocket are parallel to each other,

a free-spinning axle shaft, connected to the front return sprocket and the rear return sprocket;

wherein pushing the first pedal rotates both the first ratcheting and the front return sprocket via the first chain connector, in turn, rotating the sprocket, and pushing the second pedal rotates both the second ratcheting sprocket and the rear return sprocket via the second chain connector, in turn, rotating the sprocket.

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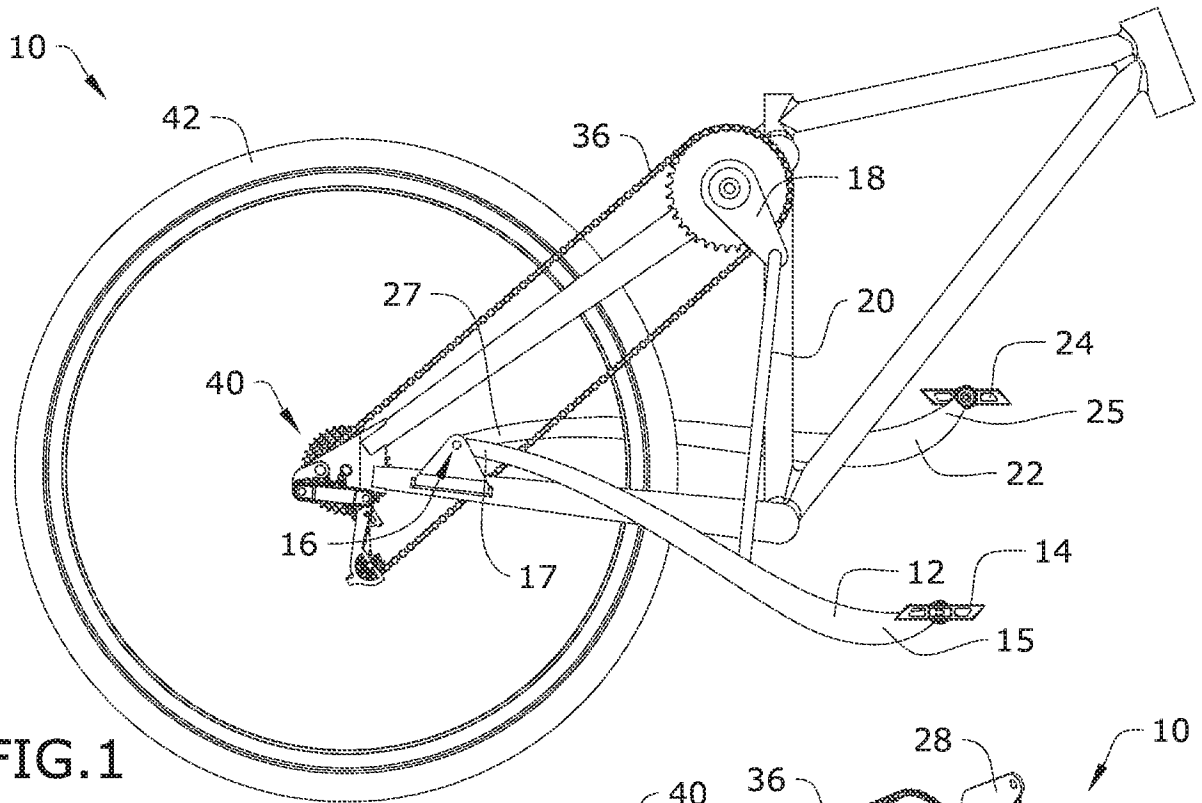


FIG. 1

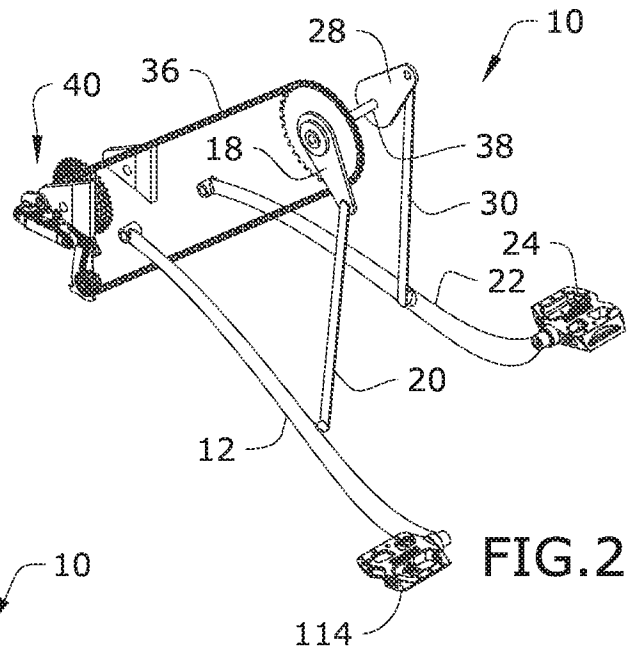


FIG. 2

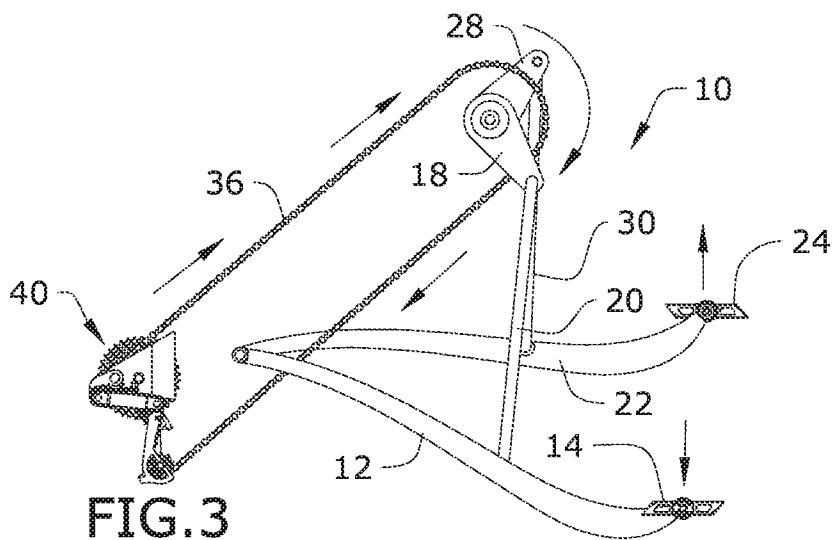


FIG. 3

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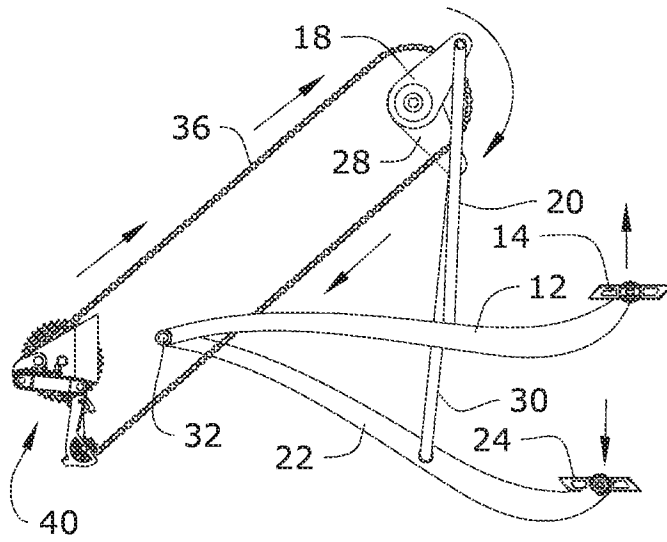


FIG. 4

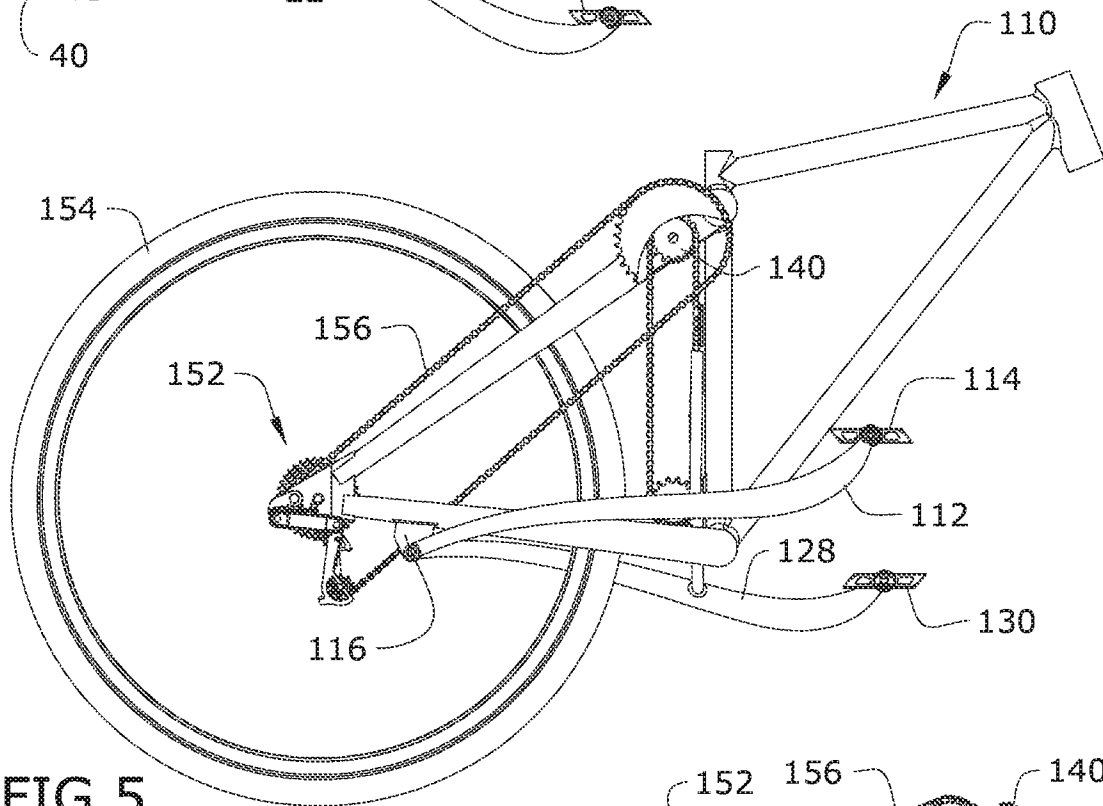


FIG. 5

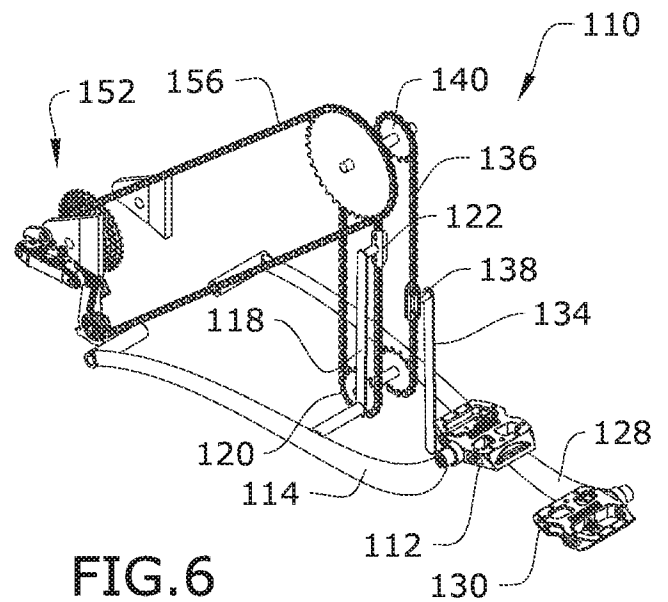


FIG. 6

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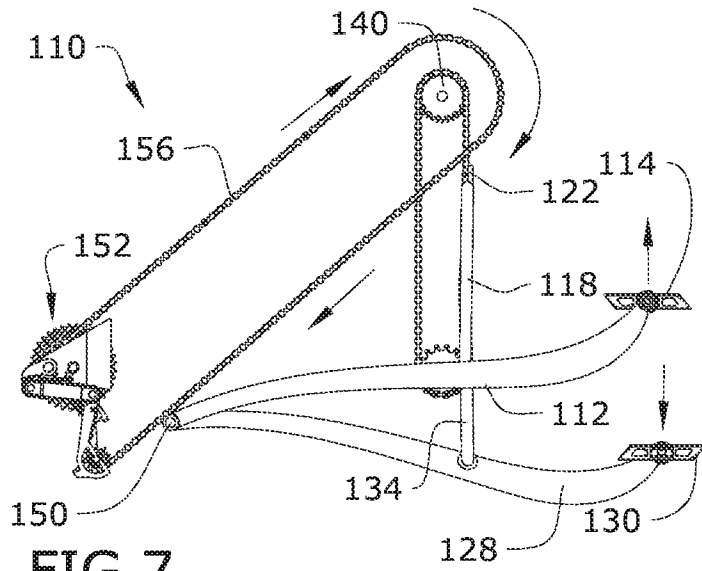


FIG. 7

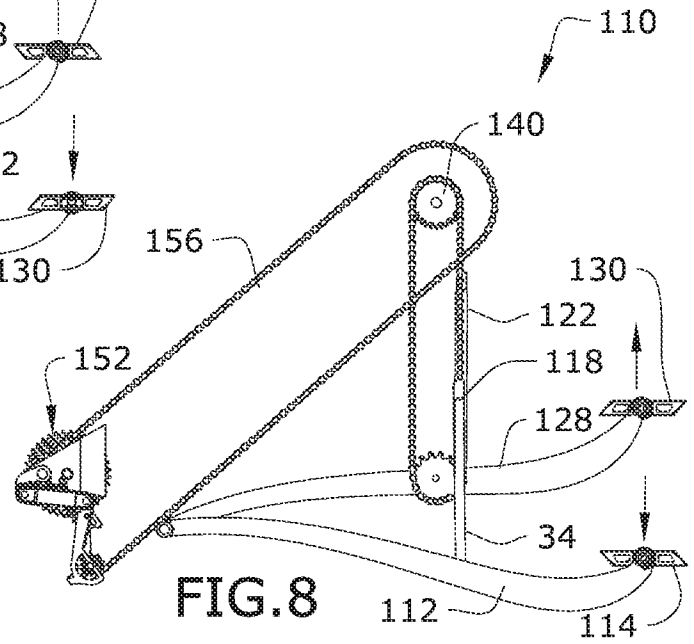


FIG. 8

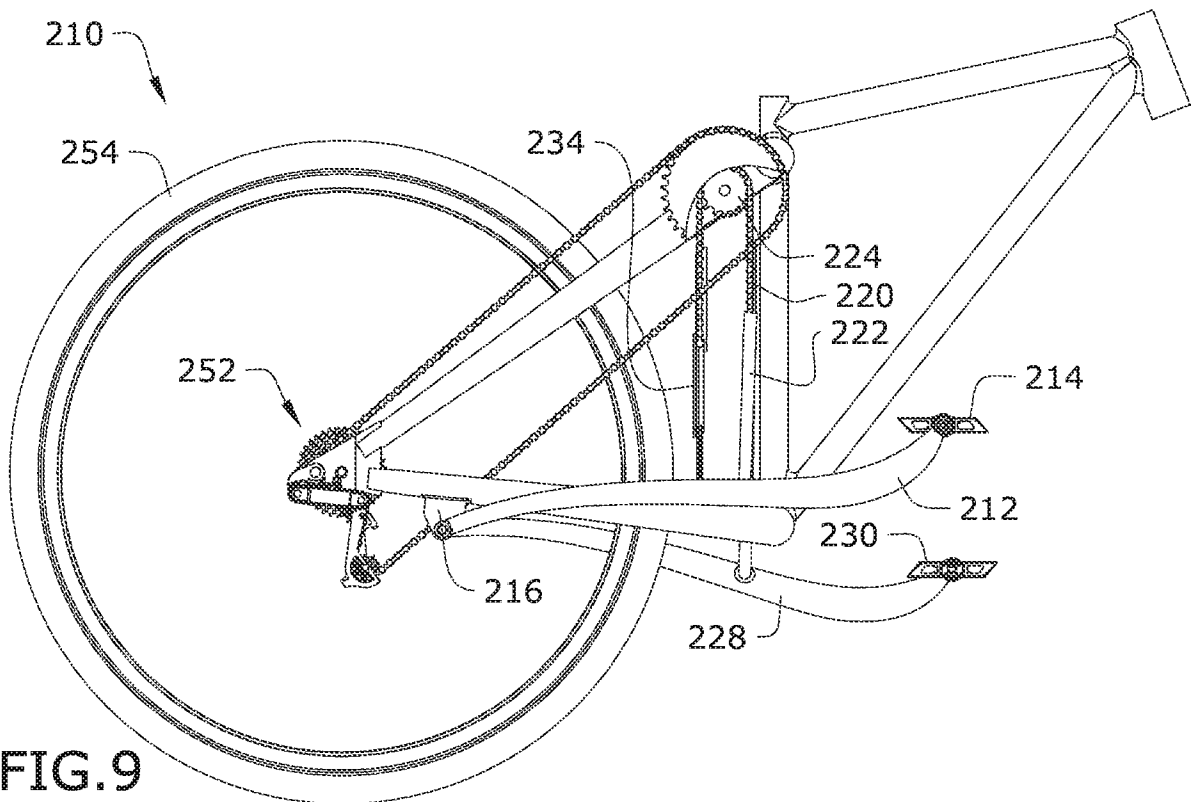


FIG. 9

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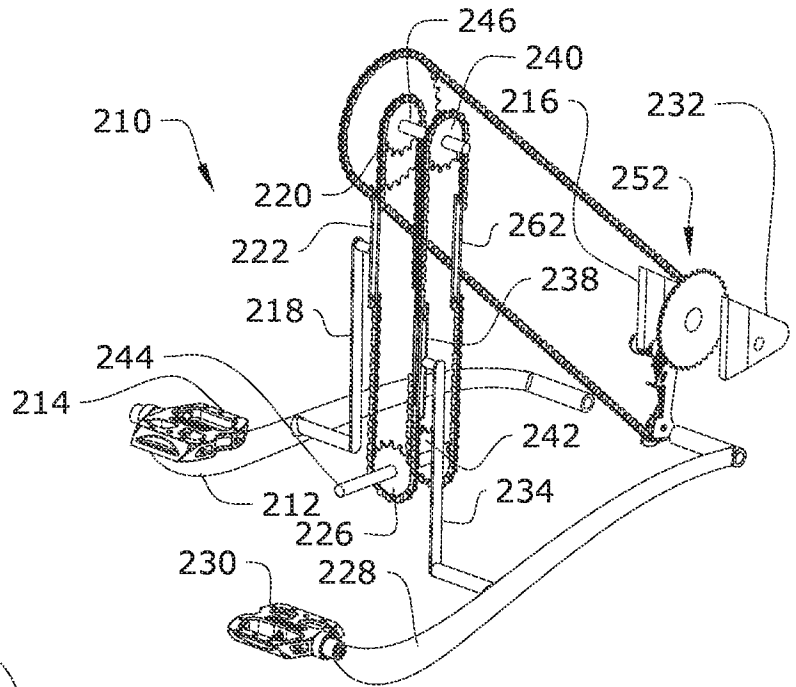


FIG. 10

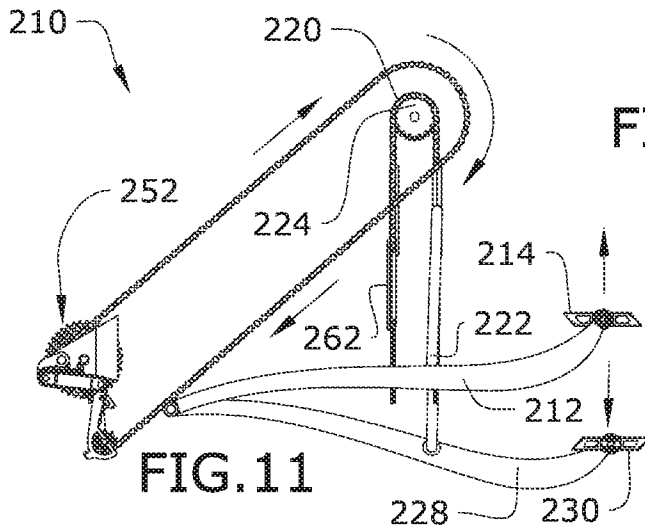


FIG. 11

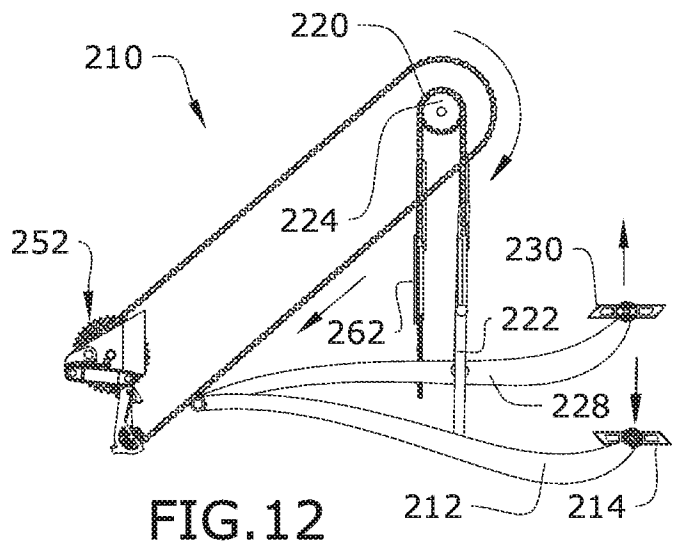


FIG. 12

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2017/019208

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B62M 1/24; B62M 1/26; B62M 1/28; B62M 1/30 (2017.01)

CPC - B62M 1/24; B62M 1/26; B62M 1/28; B62M 1/30 (2017.02)

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)

See Search History document

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

USPC - 280/251; 280/252; 280/253; 280/255 (keyword delimited)

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

See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2009/0224506 A1 (SAKIROV) 10 September 2009 (10.09.2009) entire document	1, 2
Y	KR 10-1101950 B1 (LEE) 02 January 2012 (02.01.2012) see machine translation	1, 2
A	US 4,666,173 A (GRAHAM) 19 May 1987 (19.05.1987) entire document	1-4
A	US 4,564,206 A (LENHARDT) 14 January 1986 (14.01.1986) entire document	1-4
A	US 2007/0228687 A1 (PARKER) 04 October 2007 (04.10.2007) entire document	1-4

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

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

17 April 2017

Date of mailing of the international search report

15 MAY 2017

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Authorized officer

Blaine R. Copenheaver

PCT Helpdesk: 571-272-4300
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