US 20130072356A1

(19) **United States**

(12) **Patent Application Publication**

Machida et al.

(10) **Pub. No.: US 2013/0072356 A1**

(43) **Pub. Date: Mar. 21, 2013**

(54) **STATIONARY EXERCISE BICYCLE**

(75) Inventors: **Clair Machida**, Etobicoke (CA); **Thomas Stumpp**, Penetanguishene (CA); **Ursula Cafaro**, Etobicoke (CA); **Theo Reichart**, Hillsdale (CA)

(73) Assignee: **C.O.R.E. TEC INC.**, Toronto (CA)

(21) Appl. No.: **13/617,610**

(22) Filed: **Sep. 14, 2012**

Related U.S. Application Data

(60) Provisional application No. 61/534,919, filed on Sep. 15, 2011.

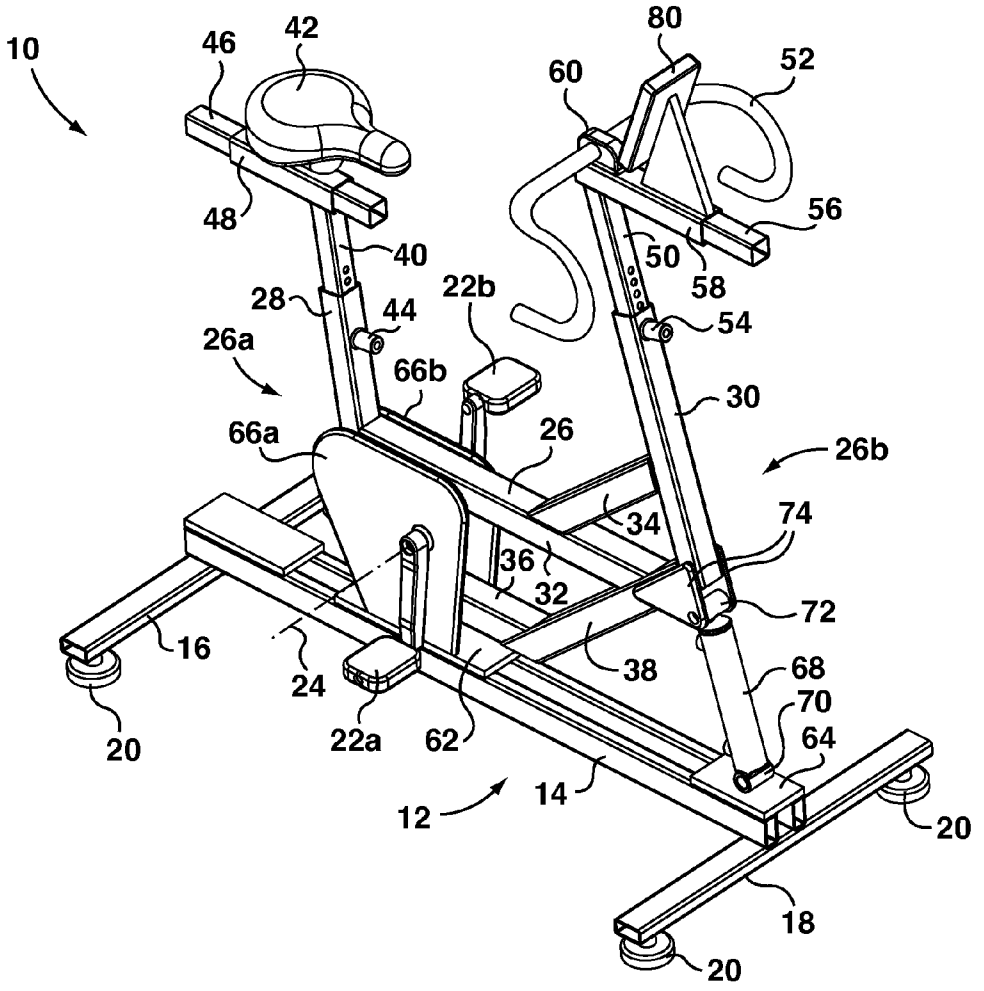
Publication Classification

(51) **Int. Cl.**
A63B 22/06 (2006.01)

(52) **U.S. Cl.**
USPC **482/58**

(57) **ABSTRACT**

A stationary exercise bicycle includes a base, and right and left pedals mounted to the base. The pedals are configured to rotate in operation about an axis of rotation. A frame has a rear end pivotally mounted to the base, and a forward end spaced apart from the rear end. A saddle is coupled to the rear end of the frame, and a handlebar is coupled to the forward end of the frame. The stationary exercise bicycle includes an actuator coupling the frame to the base. The actuator is configured to pivot the frame relative to the base about the axis of rotation, which can enable the rider to maintain the same general position as the frame is pivoted between normal and inclined positions.



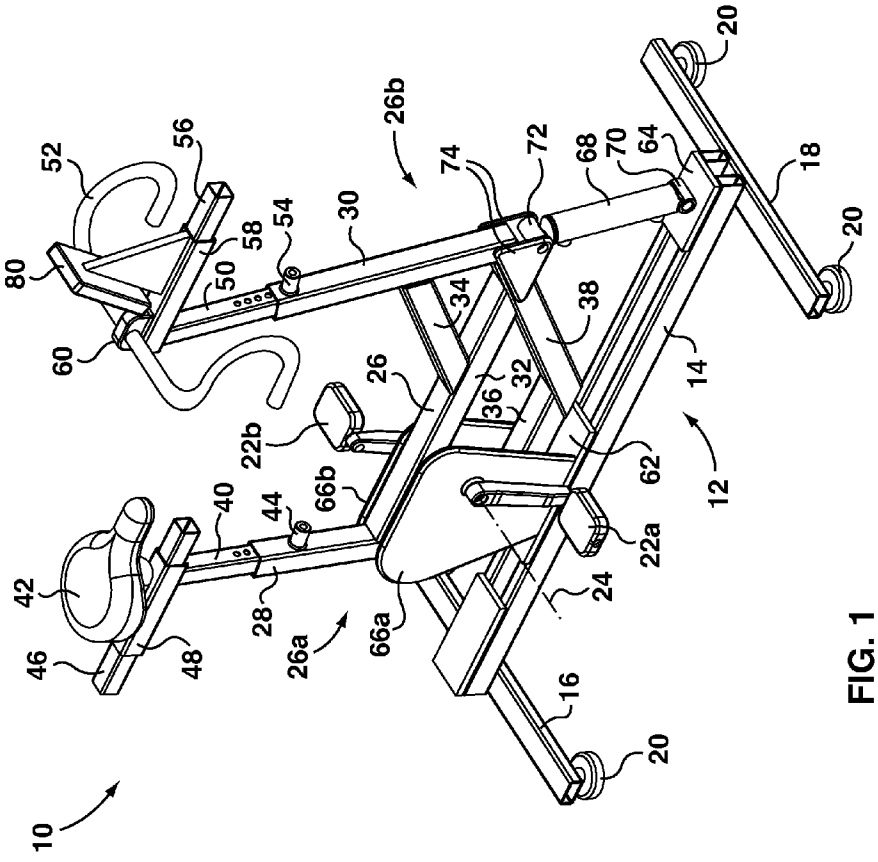

10
12
14
16
18
20
22a
22b
24
26
26a
26b
28
30
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
62
64
66a
66b
68
70
72
74
80

FIG. 1

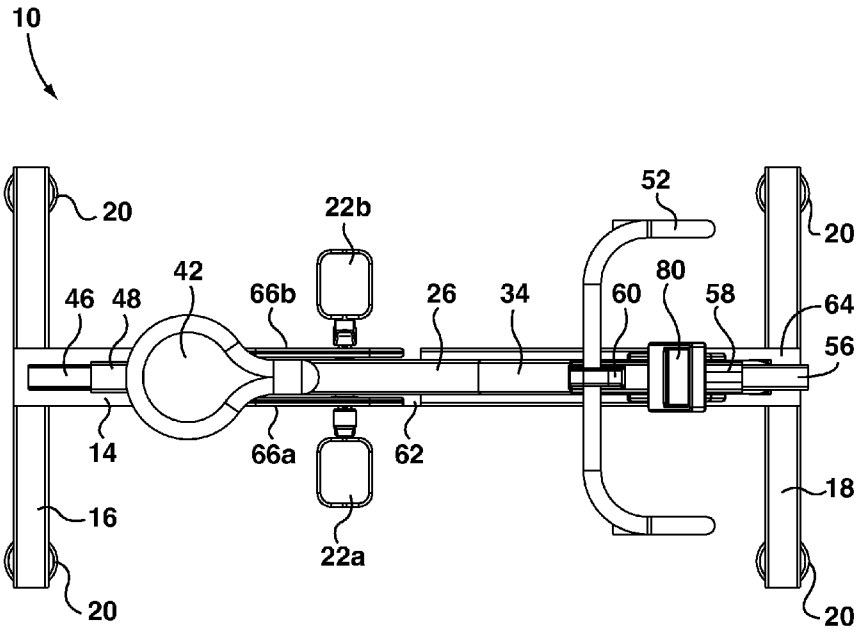

10
20
22b
52
20
42
80
46
48
66b
26
34
60
58
64
56
14
66a
62
18
16
22a
20
20

FIG. 2

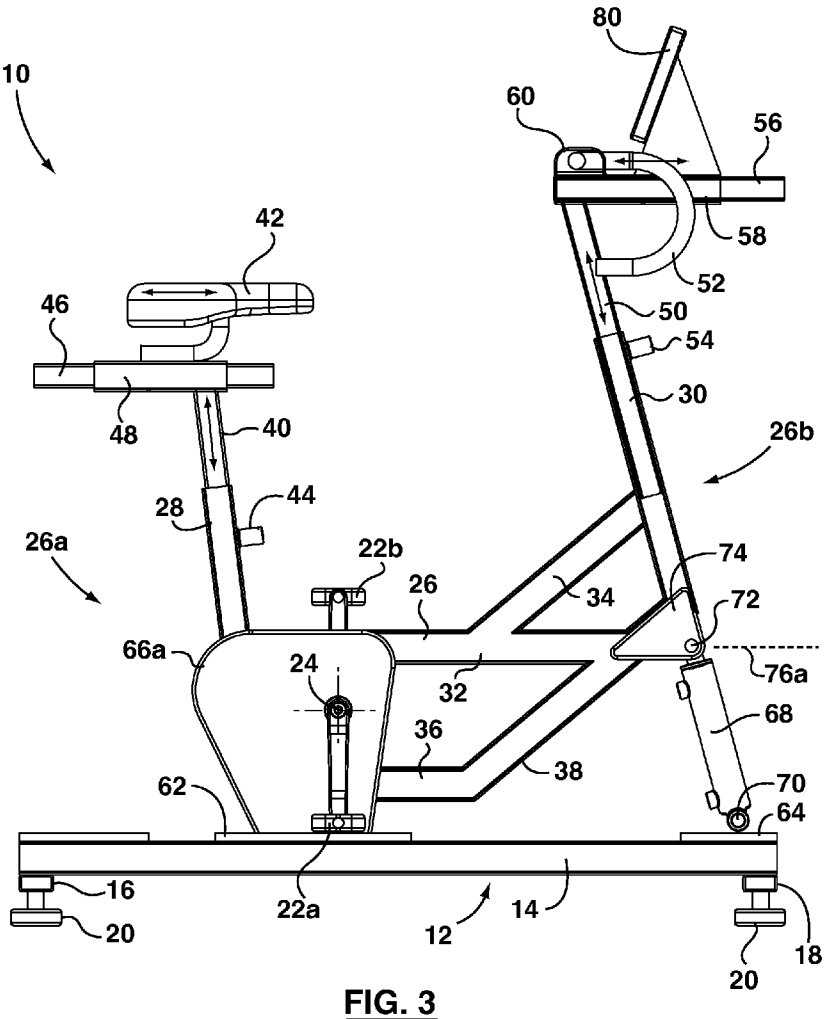

10
80
60
56
42
58
46
52
50
54
30
48
40
26b
28
44
26a
22b
74
26
34
72
66a
24
32
76a
68
36
38
62
70
64
16
22a
12
14
18
20
20

FIG. 3

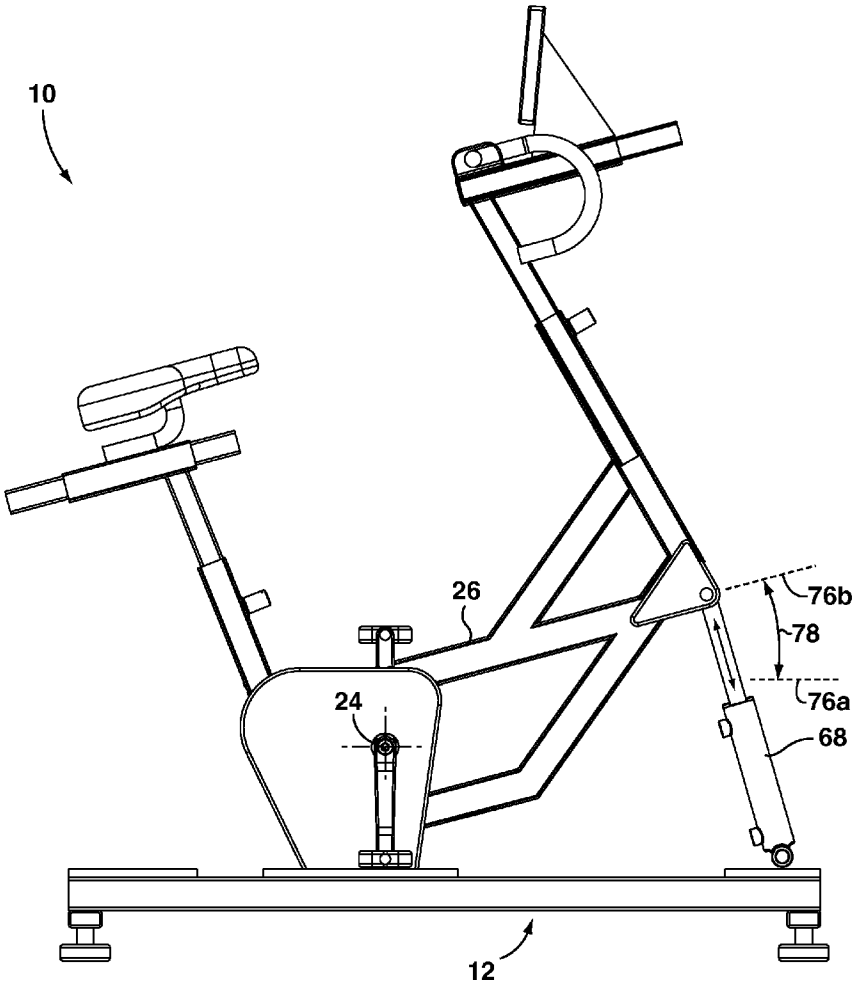


FIG. 4

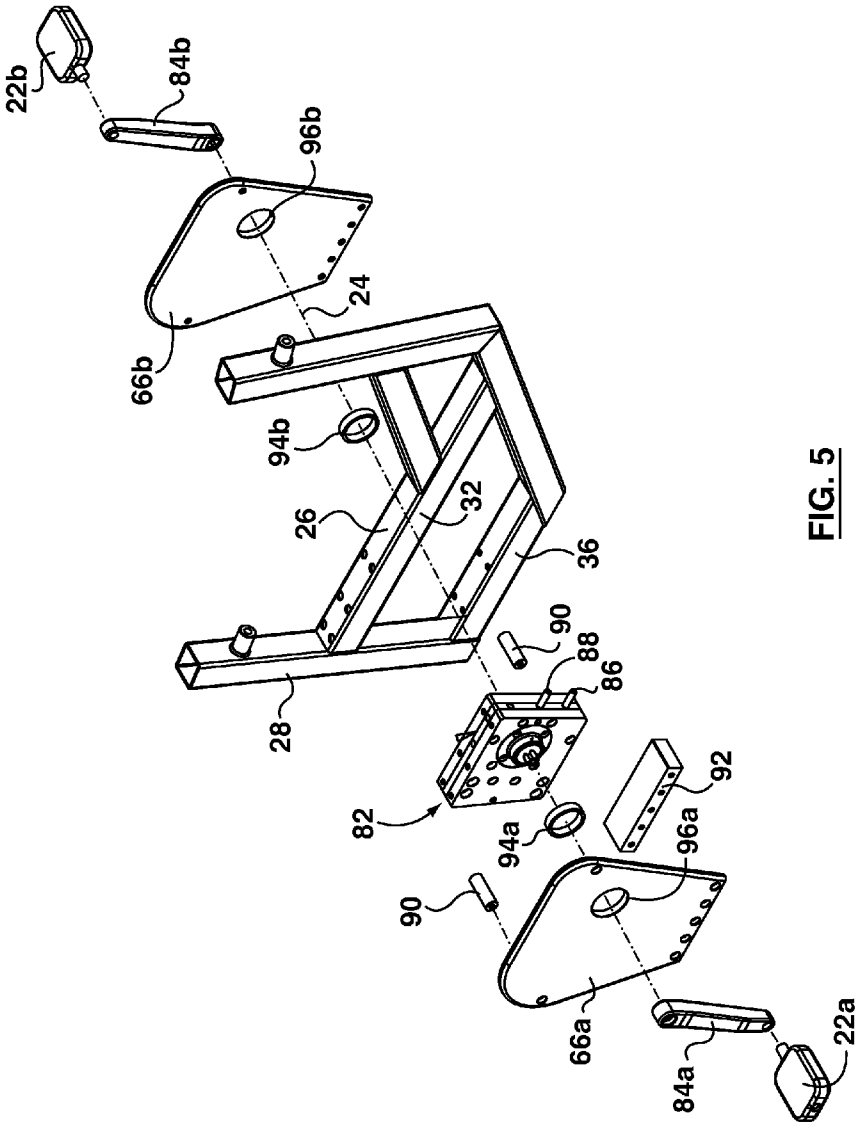

22b
84b
96b
24
66b
94b
26
32
36
90
88
86
28
82
92
94a
96a
90
66a
84a
22a

FIG. 5

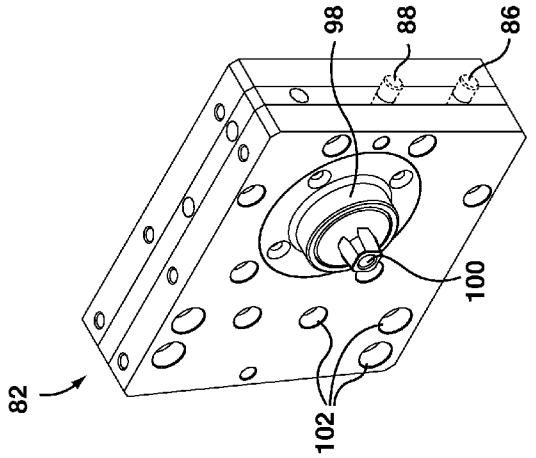


FIG. 6B

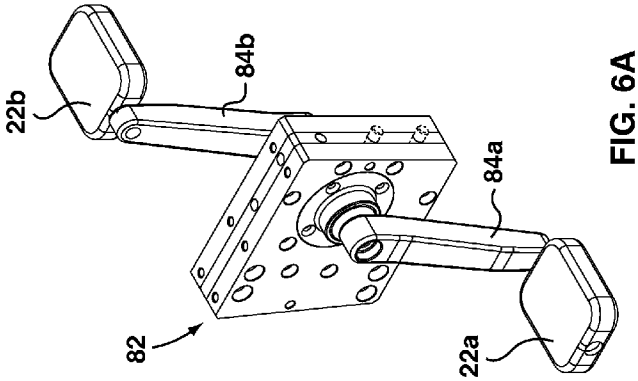


FIG. 6A

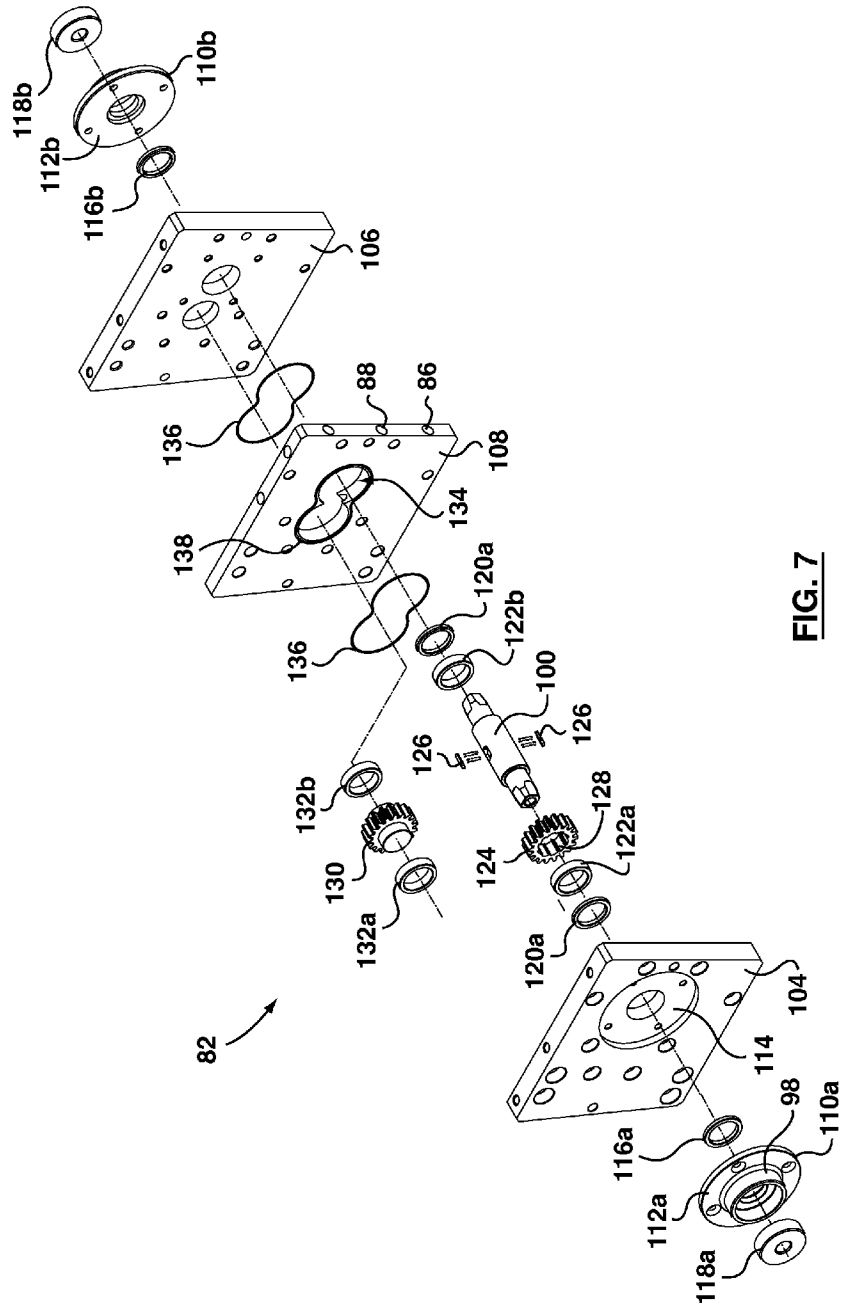

118b
110b
112b
116b
106
88
86
136
108
134
138
120a
122b
136
100
126
126
132b
128
130
122a
124
132a
120a
104
82
114
98
110a
116a
112a
118a

FIG. 7

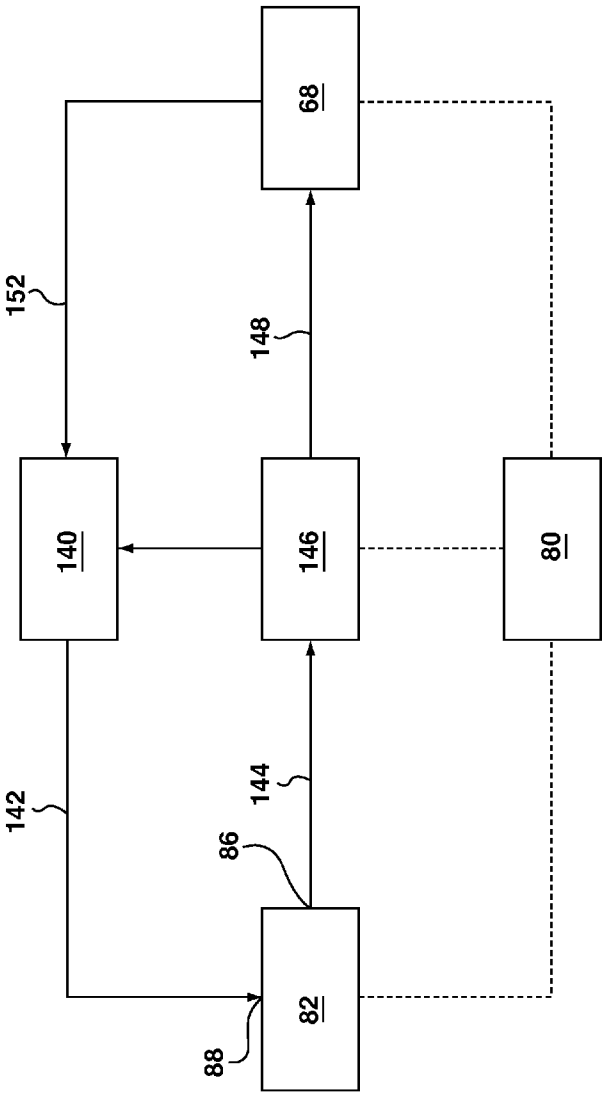


FIG. 8

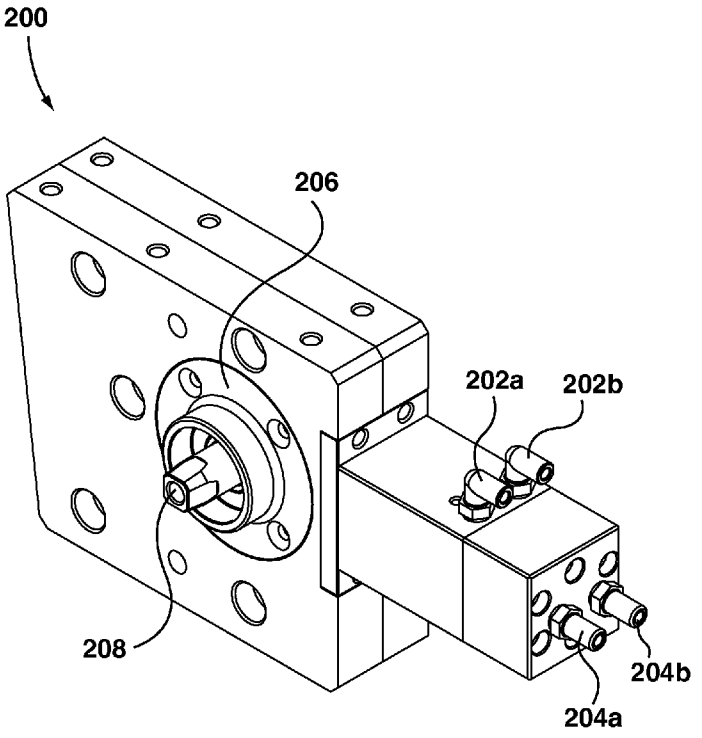


FIG. 9

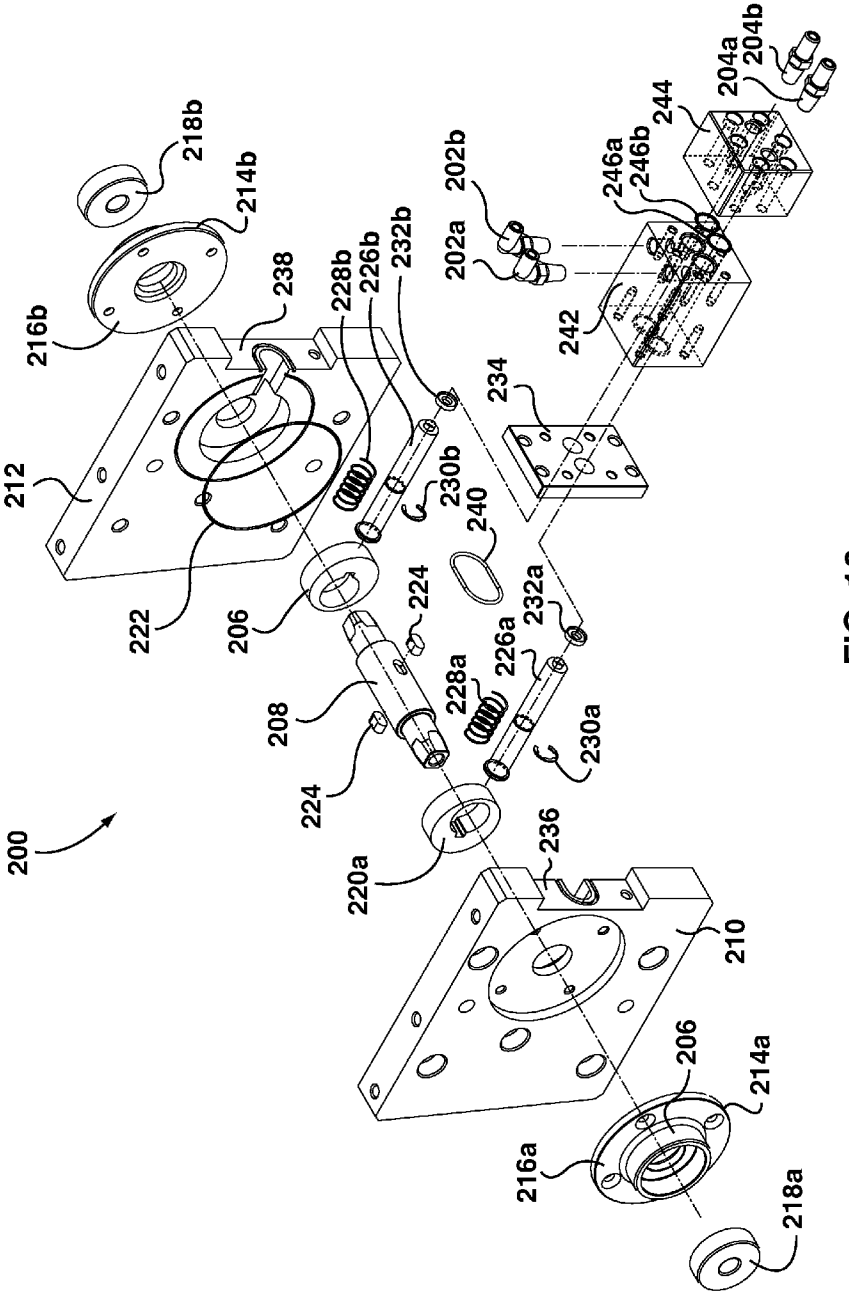

200
212
216b
218b
214b
238
228b
226b
232b
202b
202a
246a
246b
244
204a
204b
242
234
230b
240
222
206
224
232a
226a
228a
208
230a
224
220a
236
210
206
214a
216a
218a

FIG. 10

STATIONARY EXERCISE BICYCLE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to U.S. Provisional Application No. 61/534,919 filed on Sep. 15, 2011, the entire contents of which are hereby incorporated herein by reference.

FIELD

[0002] The present disclosure relates to a stationary exercise bicycle for indoor cycling.

BACKGROUND

[0003] The following paragraphs are not an admission that anything discussed in them is prior art or part of the knowledge of persons skilled in the art.

[0004] Indoor cycling, often referred to as SPINNING™, is a form of exercise that involves using a stationary exercise bicycle in a classroom setting. A typical class can involve a single instructor at the front of the class who leads participants through routines that are designed to simulate terrain and situations similar to riding a road bicycle outdoors. Some of the movements and positions include hill climbs, sprints and interval training. The instructor can use music, motivation, visualization and enthusiastic coaching to lead students through a ride that suits their fitness level and goals. An advantage of indoor cycling is that each participant can control his/her level of intensity to suit their individual ability or fitness level, but still remain as a part of a group.

[0005] Indoor cycling classes generally use specialized stationary bicycles. Features of these bicycles can include a mechanical device to modify the difficulty of pedaling, specially shaped handlebars offering various positions, and multiple adjustment points to fit the bicycle to a range of riders. The bicycles can also include a weighted flywheel which simulates the effects of inertia and momentum when riding a real bicycle. Typically, the difficulty of the workout can be modulated by the individual in two ways: by varying the resistance to the flywheel attached to the pedals; and/or by changing the cadence (the speed at which the rider pedals).

INTRODUCTION

[0006] The following paragraphs are intended to introduce the reader to the more detailed description that follows and not to define or limit the claimed subject matter.

[0007] According to an aspect of the present disclosure, a stationary exercise bicycle can include: a base; right and left pedals coupled to the base, and configured to rotate in operation about an axis of rotation; a frame having a rear end pivotally mounted to the base, and a forward end spaced apart from the rear end; a saddle coupled generally to the rear end of the frame; a handlebar coupled generally to the forward end of the frame; and an actuator coupling the frame to the base, the actuator configured to pivot the frame relative to the base about the axis of rotation.

[0008] According to an aspect of the present disclosure, a stationary exercise bicycle can include: a base; a frame; a crank assembly pivotally coupling the frame to the base, the crank assembly comprising a spindle; right and left pedals mounted to the spindle, and configured to rotate in operation about an axis of rotation; and a hydraulic cylinder coupling the frame to the base, the hydraulic cylinder configured to pivot the frame relative to the base about the axis of rotation between normal and inclined positions.

[0009] According to an aspect of the present disclosure, a stationary exercise bicycle can include: a base; right and left pedals coupled to the base, and configured to rotate in operation about an axis of rotation; a frame coupled to the base, the frame comprising a saddle and a handlebar; and a linear actuator coupling the frame to the base, the linear actuator configured to pivot the frame relative to the base about the axis of rotation between normal and inclined positions.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The drawings included herewith are for illustrating various examples of apparatuses and methods of the present disclosure and are not intended to limit the scope of what is taught in any way. In the drawings:

[0011] FIG. **1** is perspective view of a stationary exercise bicycle;

[0012] FIG. **2** is a top view of the stationary exercise bicycle of FIG. **1**;

[0013] FIG. **3** is a side view of the stationary exercise bicycle of FIG. **1**, in which a frame of the stationary exercise bicycle is shown in a normal position;

[0014] FIG. **4** is a side view of the stationary exercise bicycle of FIG. **1**, in which the frame is shown in an inclined position;

[0015] FIG. **5** is an exploded view of several parts of the stationary exercise bicycle of FIG. **1**;

[0016] FIGS. **6**A and **6**B are detailed perspective views of a crank assembly of the stationary exercise bicycle of FIG. **1**, with and without crank arms and pedals, respectively;

[0017] FIG. **7** is an exploded perspective view of the crank assembly of FIGS. **6**A and **6**B;

[0018] FIG. **8** is schematic flow diagram of a hydraulic system;

[0019] FIG. **9** is a detailed perspective view of another crank assembly of the stationary exercise bicycle of FIG. **1**; and

[0020] FIG. **10** is an exploded perspective view of the crank assembly of FIG. **9**.

DETAILED DESCRIPTION

[0021] Various apparatuses or methods are described below to provide an example of an embodiment of each claimed invention. No embodiment described below limits any claimed invention and any claimed invention may cover apparatuses and methods that differ from those described below. The claimed inventions are not limited to apparatuses and methods having all of the features of any one apparatus or method described below or to features common to multiple or all of the apparatuses or methods described below. It is possible that an apparatus or method described below is not an embodiment of any claimed invention. Any invention disclosed in an apparatus or method described below that is not claimed in this document may be the subject matter of another protective instrument, for example, a continuing patent application, and the applicant(s), inventor(s) and/or owner(s) do not intend to abandon, disclaim or dedicate to the public any such invention by its disclosure in this document.

[0022] Referring to FIGS. **1**, **2** and **3**, an example of a stationary exercise bicycle is shown generally at **10**.

[0023] The stationary exercise bicycle **10** includes a base **12**. In the example illustrated, the base **12** is formed of a

longitudinal base member **14** which extends between a rearward lateral base member **16** and a forward lateral base member **18**. Outer ends of the lateral base members **16**, **18** include ground engaging feet **20**.

[0024] The stationary exercise bicycle **10** includes right and left pedals **22***a*, **22***b* coupled to the base **12**. The pedals **22***a*, **22***b* rotate in operation about an axis of rotation **24**.

[0025] The stationary exercise bicycle **10** includes a frame **26**. The frame **26** has a rearward end **26***a* pivotally mounted to the base **12**, and a forward end **26***b* spaced apart from the rearward end **26***a*.

[0026] In the example illustrated, the frame **26** includes a seat tube **28** at the rearward end **26***a*, and a head tube **30** at the forward end **26***b*. The seat and head tubes **28**, **30** are arranged generally upright, and the angle of each can be varied, as can the dimension between them, depending on desired geometry. For example, and not intended to be limiting, the seat tube **28** can be arranged, when in a normal position, at an angle of approximately 7 degrees aft, whereas the head tube **30** can be arranged at an angle of approximately 15 degrees aft. Furthermore, a horizontal distance between centers of the seat and head tubes **28**, **30** (measured at the top of the seat tube **28**) can be approximately 592 mm.

[0027] In the example illustrated, the frame **26** further includes a first top tube **32** extending generally between the seat and head tubes **28**, **30**. A first down tube **34** is connected between the head and top tubes **30**, **32**. As illustrated, the frame **26** can also include a second top tube **36** and a second down tube **38** which extend generally between the seat and head tubes **28**, **30**. The top tubes **32**, **36** are spaced apart to accommodate a crank assembly (described below). In some examples, the frame **26** can be formed from 2" structural steel tubing having a ⅛" wall thickness, and with a powder coat. With the tubes **28**, **30**, **32**, **34**, **36**, **38** secured (e.g., welded) to one another, the frame **26** can be a relatively rigid structure.

[0028] A seat post **40** is received in the seat tube **28**, and couples a saddle **42** to the rearward end **26***a* of the frame **26**. An adjustment mechanism **44** can be provided to lock the position of the seat post **40** relative to the seat tube **28**, to set the height of the saddle **42** as desired. As illustrated, a generally horizontal seat slide bar **46** is mounted to the seat post **40**. A sleeve **48** slides over the slide bar **46**. The saddle **42** is fixed to the sleeve **48**. An adjustment mechanism (not shown) can be provided to lock the position of the sleeve **48** relative to the slide bar **46**, to set the fore/aft position of the saddle **42**.

[0029] Similarly, a head post **50** is received in the head tube **30**, and couples a handlebar **52** to the forward end **26***b* of the frame **26**. An adjustment mechanism **54** can be provided to lock the position of the head post **50** relative to the head tube **30**, to set the height of the handlebar **52** as desired. As illustrated, a generally horizontal head slide bar **56** is mounted to the head post **50**. A sleeve **58** slides over the slide bar **56**. The handlebar **52** is fixed to the sleeve **58** via a bracket **60**. As with handlebars on a typical road bicycle, the bracket **60** can allow for the position of the handlebar **52** to be raised or lowered (by pivoting about the bracket **60**) as desired. An adjustment mechanism (not shown) can be provided to lock the position of the sleeve **58** relative to the slide bar **56**, to set the fore/aft position of the handlebar **52**.

[0030] Mounting plates **62**, **64** are secured to the base member **14**. In the example illustrated, right and left cradle plates **66***a*, **66***b* are secured to the mounting plate **62** using, for example, fasteners (not shown). As illustrated, the cradle plates **66***a*, **66***b* can be arranged to be upstanding, generally parallel to one another. The rearward end **26***a* of the frame **26** is arranged between, and pivotally supported by, the cradle plates **66***a*, **66***b*, as described in further detail below.

[0031] An actuator **68** couples the frame **26** to the base **12**. In the example illustrated, the actuator **68** is a linear actuator, with a lower end secured to the mounting plate **64** at a pivotal connection **70**. An upper end of the actuator **68** is secured to the forward end **26***b* of the frame **26** at a pivotal connection **72**, via a pair of mounting plates **74**. The mounting plates **74** are arranged on either side of a junction between the head tube **30** and the second down tube **38** of the frame **26**.

[0032] Referring to FIGS. **3** and **4**, the actuator **68** can pivot the frame **26** relative to the base **12** about the axis of rotation **24** between a normal position (in which the actuator **68** is retracted, shown in FIG. **3**) and an inclined position (in which the actuator **68** is extended, shown in FIG. **4**). The frame **26** pivots about the axis of rotation **24** between the normal and inclined positions. In the normal position the top tube **32** is aligned with line **76***a*, whereas in the inclined position the top tube **32** is aligned with line **76***b*. The lines **76***a*, **76***b* define an incline angle **78**. The incline angle **78** is zero when in the normal position. In some examples, the incline angle **78** can be up to about 15 degrees in the inclined position. In some examples, the incline angle **78** can be up to about 20 degrees in the inclined position.

[0033] As mentioned above, indoor cycling classes can use specialized stationary bicycles. If a rider's position is not optimal on the stationary bicycle, injuries can occur. Problems with the lower back and knees are the most common types of injuries that can be sustained using stationary bicycles. To avoid injury, the biomechanical position of the rider should be established, and maintained, as closely to optimal as possible.

[0034] With this in mind, the frame **26** of the stationary exercise bicycle **10** rotates about the axis of rotation **24** of pedals **22***a*, **22***b*, which can enable the rider to maintain the same general position as the frame **26** is pivoted between the normal and inclined positions. In other words, the relative distances between the pedals **22***a*, **22***b*, the saddle **42** and the handlebar **52** (the points of contact between the rider and the stationary exercise bicycle **10**) are the same when the frame **26** is in the normal and inclined positions, and any intermediate position in between the normal and inclined positions. As such, the biomechanical position of the rider is maintained, and the risk of injury can be reduced.

[0035] As illustrated in FIGS. **1**, **2** and **3**, the stationary exercise bicycle **10** can include a control device **80**. The control device **80** includes a means for user input (for example, a mechanical lever, buttons, and/or a touch screen), and can include a means for providing information to the user (for example, a liquid crystal display). In the example illustrated, the control device **80** is mounted to the sleeve **58**, but various configurations are possible. In other examples, the control device can consist of two or more components arranged in separate locations on the stationary exercise bicycle **10**.

[0036] In some examples, the control device **80** can be used to command the actuator **68** to move the frame **26** between the normal and inclined positions. Furthermore, optionally, the control device **80** can be used to control a resistance of the pedals **22***a*, **22***b*. In some examples, the resistance can be increased as the incline angle **78** increases between the normal and inclined positions. In some examples, the resistance can be proportional to the incline angle **78**, thereby simulating

a hill climb. Moreover, in some examples, the control device **80** can be used to control the resistance of the pedals **22***a*, **22***b* independent of the incline angle **78** (e.g., to increase resistance to simulate wind).

[0037] In some examples, the stationary exercise bicycle **10** can utilize hydraulics. As illustrated, the actuator **68** can comprise a hydraulic cylinder. For the purposes of clarity, hydraulic connections between the actuator **68** and other components of the stationary exercise bicycle **10** have been omitted from the drawings.

[0038] Referring now to FIGS. **5**, **6**A and **6**B, a crank assembly **82** is coupled to the pedals **22***a*, **22***b* by crank arms **84***a*, **84***b*, respectively. The crank assembly **82** can be configured to drive hydraulic fluid from an inlet port **88** to an outlet port **86**, as described in further detail below.

[0039] The crank assembly **82** can be secured to the frame **26**, with fasteners (not shown), between tubes **28**, **32**, **36**, and arranged between the cradle plates **66***a*, **66***b* (which are secured to the base **12**, as shown in FIG. **1**). The cradle plates **66***a*, **66***b* can be secured to one another and maintained in a spaced apart relationship using spacers **90** and spacing block **92**, along with fasteners (not shown). Bearings **94***a*, **94***b* can be received in apertures **96***a*, **96***b* of the cradle plates **66***a*, **66***b*, respectively, in press fit arrangement, for example. The bearings **94***a*, **94***b* support generally cylindrical journal portions **98** (see FIG. **6**B, and in which the left journal portion is obscured from view) of the crank assembly **82**.

[0040] Although not illustrated, to maintain clearance between the frame **26** and the cradle plates **66***a*, **66***b*, at least one insert (e.g., formed of hardened steel) can be disposed on inner surfaces of each of the cradle plates **66***a*, **66***b*, which can engage complementary inserts (e.g., formed of bronze) disposed on opposing sides of the frame **26**. The inserts can form a friction bearing that provides lateral support to the frame **26**, throughout the range of motion between the normal and inclined positions.

[0041] The crank assembly **82** further includes a spindle **100**, which extends through the apertures **96***a*, **96***b*. The crank arms **84***a*, **84***b* are secured to ends of the spindle **100**. The journal portions **98** are generally concentric with respect to the spindle **100**. As such, the frame **26** pivots about the axis of rotation **24** defined by the spindle **100**. The crank assembly **82** can include two or more housing plates, and a plurality of holes **102** can be provided to allow the housing plates to be secured by fasteners (not shown).

[0042] Referring to FIG. **7**, the crank assembly **82** is shown to include a right housing plate **104**, a left housing plate **106**, and a center housing plate **108** sandwiched between the housing plates **104**, **106**. Right and left inserts **110***a*, **110***b* include the journal portions **98** (again, with the left journal portion obscured from view). The inserts **110***a*, **110***b* further include flange portions **112***a*, **112***b*, which are received in complementary recesses **114** formed in the housing plates **104**, **106** (the recess of the housing plate **106** is obscured from view). The inserts **110***a*, **110***b* can be rigidly fastened to the housing plates **104**, **106**, respectively. Outer seals **116***a*, **116***b* can be provided between the inserts **110***a*, **110***b* and the spindle **100**. The inserts **110***a*, **110***b* at either side of the crank assembly **82** support spindle bearings **118***a*, **118***b*, respectively. The spindle bearings **118***a*, **118***b* in turn support ends of the spindle **100**.

[0043] Between the housing plates **104**, **106**, inner seals **120***a*, **120***b* and spindle bushings **122***a*, **122***b* can be arranged on both sides of the spindle **100**. A main gear **124** surrounds the spindle **100**. At least one spring-loaded pawl **126** is located along the outer circumference of the spindle **100**, and is arranged to engage teeth **128** that are located along the inner circumference of the main gear **124**. The pawl **126** and the teeth **128** form a ratchet mechanism that allows the pedals **22***a*, **22***b* to drive rotary motion of the main gear **124** when pedaling forward, but disengages allowing the main gear **124** to continue rotating when pedaling ceases.

[0044] An idler gear **130** is arranged adjacent to and meshed with the main gear **124**. The idler gear **130** is retained and supported by the housing plates **104**, **106**, and with idler gear bushings **132***a*, **132***b* arranged therebetween, respectively. The main gear **124** and the idler gear **130** form a gear pump that operates to draw hydraulic fluid from the inlet port **88**, through a cavity **134** around an outer perimeter of the gears **124**, **130**, to the outlet port **86**. Fluid conduits (not shown) formed in the center housing plate **108** connect the ports **86**, **88** and the cavity **134**. Gaskets **136** located in grooves **138** can be provided on either side of the center housing plate **108** and surrounding the cavity **134**, ensuring a good seal between the housing plates **104**, **106**, **108** to prevent hydraulic fluid from leaking from the cavity **134**.

[0045] Referring now to FIG. **8**, a hydraulic fluid reservoir **140** is connected by a fluid line **142** to the inlet port **88** of the crank assembly **82**. In various examples, the reservoir **140** can be located hidden in the frame **26**, between the cradle plates **66***a*, **66***b*, or can be an external component attached to the base **12**. Pedaling drives the hydraulic fluid out of the outlet port **86** to a fluid line **144**, which delivers the pressurized fluid to a control valve module **146**. The control valve module **146** can selectively deliver the fluid to the actuator **68** via a fluid line **148**, or back to the reservoir **140** via a pressure relief line **150**. Fluid is returned to the reservoir **140** from the actuator **68** via a fluid line **152**.

[0046] The control device **80** can be operably linked to the crank assembly **82**, the control valve module **146** and the actuator **68**, either mechanically (e.g., linked with a cable mechanism(s)) or electronically (e.g., linked by wires, or wirelessly). By controlling the flow of hydraulic fluid between the crank assembly **82**, the control valve module **146**, and the actuator **68**, the control device **80** can be used to selectively control the position of the frame **26** between the normal and the inclined positions. Furthermore, by restricting the flow of hydraulic fluid out of the crank assembly **82** using, for example, the control valve module **146**, the control device **80** can be used to selectively control the resistance of the pedals **22***a*, **22***b*. As mentioned above, the resistance and the incline angle **78** of the frame **26** can be associated, or can be set independent of one another.

[0047] The control device **80** can also be linked to one or more sensors (not shown) located in the crank assembly **82**, the control valve module **146**, the actuator **68**, or elsewhere. For example, the control device **80** can be linked to a sensor in the crank assembly **82** that provides information related to cadence. The control device **80** can also be linked to a sensor in the control valve module **146** that provides information related to pressure of the hydraulic fluid, which can be correlated to power output. The control device **80** can further be linked to a sensor in the actuator **68** that provides information related to incline angle **78**. Various sensor arrangements are possible.

[0048] Referring now to FIG. **9**, another crank assembly suitable for the stationary exercise bicycle **10** is shown generally at **200**. The crank assembly **200** is configured to drive

hydraulic fluid from inlet ports **202***a*, **202***b* to outlet ports **204***a*, **204***b*, as described in further detail below. The crank assembly **200** can be secured to the frame **26** of the stationary exercise bicycle **10** generally as described herein with reference to the crank assembly **82**.

[0049] Similar to the crank assembly **82**, the crank assembly **200** includes journal portions **206** and a spindle **208**. The journal portions **206** are generally concentric with respect to the spindle **208**. As such, in examples where the stationary exercise bicycle **10** includes the crank assembly **200**, the frame **26** pivots about an axis of rotation defined by the spindle **208**.

[0050] Referring to FIG. **10**, the crank assembly **200** is shown to include a right housing plate **210** and a left housing plate **212**. Right and left inserts **214***a*, **214***b* include the journal portions **206** (with the left journal portion obscured from view). The inserts **214***a*, **214***b* further include flange portions **216***a*, **216***b*, which are received in complementary recesses formed in the housing plates **210**, **212**. The inserts **214***a*, **214***b* can be rigidly fastened to the housing plates **210**, **212**, respectively. The inserts **214***a*, **214***b* at either side of the crank assembly **200** support spindle bearings **218***a*, **218***b*, respectively. The spindle bearings **218***a*, **218***b* in turn support ends of the spindle **208**.

[0051] In the example illustrated, an O-ring **222** is seated in a groove provided in at least one of the housing plates **210**, **212**, and provides a seal therebetween. Cam elements **220***a*, **220***b* are arranged adjacent to one another, around the spindle **208**. Drive keys **224** are disposed along the outer circumference of the spindle **208**, and provide for locking rotational engagement between the cam elements **220***a*, **220***b* and the spindle **208**.

[0052] In the example illustrated, piston elements **226***a*, **226***b* are arranged generally orthogonal to an axis of the spindle **208**, and in registration with the cam elements **220***a*, **220***b*, respectively. Return springs **228***a*, **228***b*, held in place by spring clips **230***a*, **230***b*, bias the piston elements **226***a*, **226***b* to bear against the cam elements **220***a*, **220***b*, respectively. End seals **232***a*, **232***b* provide a seal between the piston elements **226***a*, **226***b* and a flange plate **234**. The flange plate **234** is mounted to recesses **236**, **238** of the housing plates **210**, **212**, and a gasket **240** provides a seal therebetween. A piston housing block **242** is mounted to the flange plate **234** and at least partially receives the piston elements **226***a*, **226***b*. A check valve block **244** is mounted to the piston housing block **242**, and O-rings **246***a*, **246***b* provide seals therebetween.

[0053] In use, rotation of the spindle **208** causes corresponding rotation of the cam elements **220***a*, **220***b*. In the example illustrated, the cam elements **220***a*, **220***b* alternately activate a reciprocating movement of the piston elements **226***a*, **226***b*. Due to the arrangement of the cam elements **220***a*, **220***b* positioned offset from one another by 180°, motion of the piston elements **226***a*, **226***b* generally oppose one another. Thus, while the piston element **226***a* is in a compression stroke, the piston element **226***b* is alternately in a decompression or suction stroke, and vice versa.

[0054] During the compression stroke, the piston elements **226***a*, **226***b* move (by movement of the cam elements **220***a*, **220***b*) generally away from the spindle **208**, forcing hydraulic fluid out of the respective piston element **226***a*, **226***b* to the outlet ports **204***a*, **204***b* via the check valve block **244**. During the decompression stroke, the piston elements **226***a*, **226***b* move (by force of the return springs **228***a*, **228***b*) towards the spindle **208**, drawing hydraulic fluid into the respective piston element **226***a*, **226***b* from the inlet ports **202***a*, **202***b*. In this manner, the crank assembly **200** acts as a pump that operates to draw hydraulic fluid between the inlet ports **202***a*, **202***b* to the outlet ports **204***a*, **204***b*. The crank assembly **200** can be implemented in a hydraulic system similar to the crank assembly **82** as described herein with reference to FIG. **8**.

[0055] While the above description provides examples of one or more processes or apparatuses, it will be appreciated that other processes or apparatuses may be within the scope of the accompanying claims.

We claim:

1. A stationary exercise bicycle, comprising:
- a base;
- right and left pedals coupled to the base, and configured to rotate in operation about an axis of rotation;
- a frame having a rear end pivotally mounted to the base, and a forward end spaced apart from the rear end;
- a saddle coupled generally to the rear end of the frame;
- a handlebar coupled generally to the forward end of the frame; and
- an actuator coupling the frame to the base, the actuator configured to pivot the frame relative to the base about the axis of rotation.

2. The stationary exercise bicycle of claim **1**, wherein the actuator couples the forward end of the frame to the base.

3. The stationary exercise bicycle of claim **2**, wherein the actuator pivots the frame between normal and inclined positions.

4. The stationary exercise bicycle of claim **3**, wherein, in the inclined position, an incline angle of the frame is about 15 degrees.

5. The stationary exercise bicycle of claim **3**, wherein the actuator is a linear actuator.

6. The stationary exercise bicycle of claim **5**, further comprising a first pivotal connection coupling an upper end of the actuator to the forward end of the frame, and a second pivotal connection coupling a lower end of the actuator to the base.

7. The stationary exercise bicycle of claim **6**, further comprising right and left upstanding cradle plates mounted to the base, and a crank assembly pivotally supported between the cradle plates and secured to the frame

8. The stationary exercise bicycle of claim **7**, wherein the crank assembly comprises a spindle, and the right and left pedals are coupled to the spindle.

9. The stationary exercise bicycle of claim **8**, wherein each of the cradle plates comprises an aperture, and the spindle extends through the apertures.

10. The stationary exercise bicycle of claim **9**, wherein the frame comprises a seat tube, and first and second top tubes secured to the seat tube, and the crank assembly is secured between the seat tube and the first and second top tubes of the frame.

11. The stationary exercise bicycle of claim **7**, wherein the actuator comprises a hydraulic cylinder.

12. The stationary exercise bicycle of claim **11**, wherein the hydraulic cylinder and the crank assembly are connected so that hydraulic fluid power from the crank assembly causes the frame to pivot.

13. The stationary exercise bicycle of claim **12**, wherein the crank assembly comprises gears forming a gear pump.

14. The stationary exercise bicycle of claim **12**, wherein the crank assembly comprises at least one cam element coupled to the spindle, and at least one piston element coupled to the cam element.

15. The stationary exercise bicycle of claim **12**, further comprising a control device configured to move the actuator to pivot the frame.

16. The stationary exercise bicycle of claim **15**, wherein the control device is configured to control a resistance of the pedals.

17. A stationary exercise bicycle, comprising:

a base;

a frame;

a crank assembly pivotally coupling the frame to the base, the crank assembly comprising a spindle;

right and left pedals mounted to the spindle, and configured to rotate in operation about an axis of rotation; and

a hydraulic cylinder coupling the frame to the base, the hydraulic cylinder configured to pivot the frame relative to the base about the axis of rotation between normal and inclined positions.

18. The stationary exercise bicycle of claim **17**, wherein the crank assembly comprises gears forming a gear pump, and the hydraulic cylinder and the crank assembly are connected so that hydraulic fluid power from the crank assembly causes the frame to pivot between the normal and inclined positions.

19. The stationary exercise bicycle of claim **17**, wherein the crank assembly comprises at least one cam element coupled to the spindle, and at least one piston element coupled to the cam element, and the hydraulic cylinder and the crank assembly are connected so that hydraulic fluid power from the crank assembly causes the frame to pivot between the normal and inclined positions.

20. A stationary exercise bicycle, comprising:

a base;

right and left pedals coupled to the base, and configured to rotate in operation about an axis of rotation;

a frame coupled to the base, the frame comprising a saddle and a handlebar; and

a linear actuator coupling the frame to the base, the linear actuator configured to pivot the frame relative to the base about the axis of rotation between normal and inclined positions.

* * * * *