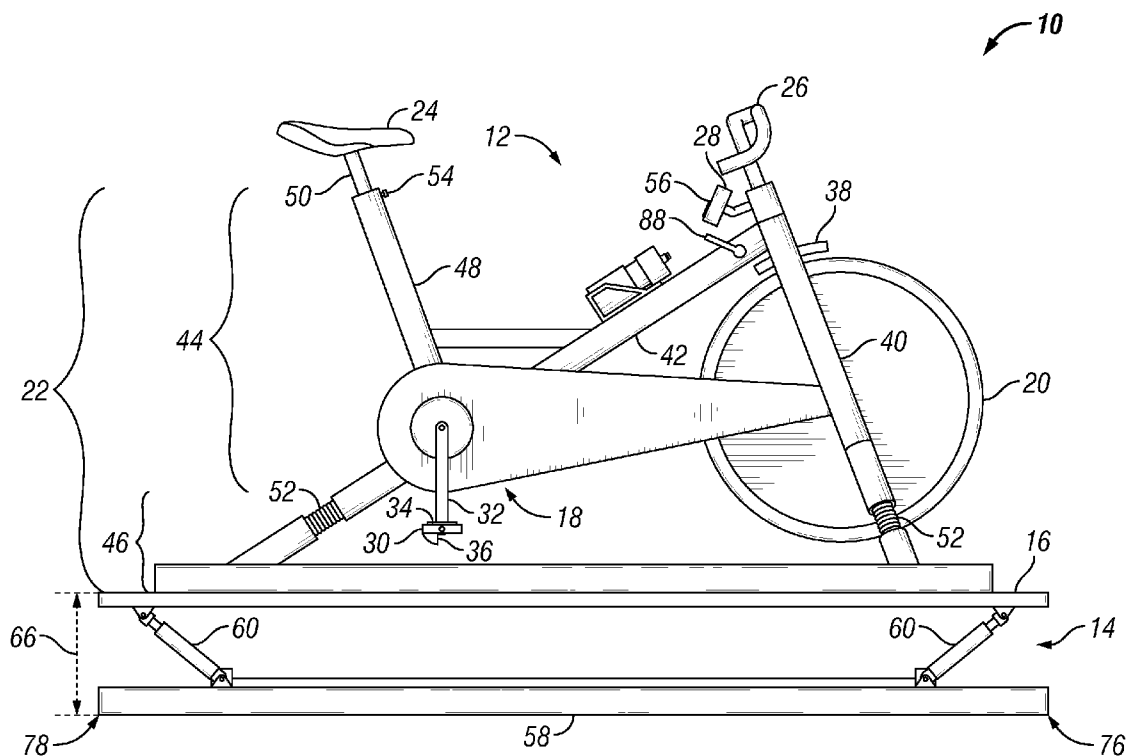




US 20120071301A1

(19) **United States**(12) **Patent Application Publication****Kaylor et al.**(10) **Pub. No.: US 2012/0071301 A1**(43) **Pub. Date: Mar. 22, 2012**(54) **ADJUSTABLE INCLINING AND DECLINING
EXERCISE BICYCLE**(52) **U.S. Cl. 482/57**(57) **ABSTRACT**(75) Inventors: **Jenny L. Kaylor**, Boise, ID (US);
Michael G. Walcom, Meridian, ID
(US); **Andrew S. Ragland**, Boise,
ID (US)(73) Assignee: **JEMIAN FITNESS LLC**(21) Appl. No.: **12/888,301**(22) Filed: **Sep. 22, 2010****Publication Classification**(51) **Int. Cl.**
A63B 22/06 (2006.01)

An exercise apparatus comprises an exercise cycle having a pedal assembly configured to rotate and at least one flywheel. The pedal assembly is in an operative relationship with the flywheel such that rotating the pedal assembly causes the flywheel to rotate. The exercise cycle comprises a frame connected to the pedal assembly, the frame supporting a seat for a user. The exercise apparatus further comprises a base configured to support the exercise cycle and to dynamically tilt the exercise cycle to simulate cycling on an inclined surface. The base comprises a platform configured to support the frame of the exercise cycle. The base further comprises at least one actuator configured to support at least part of the platform, the at least one actuator connected to the platform and configured to dynamically tilt the platform during operation of the exercise cycle.



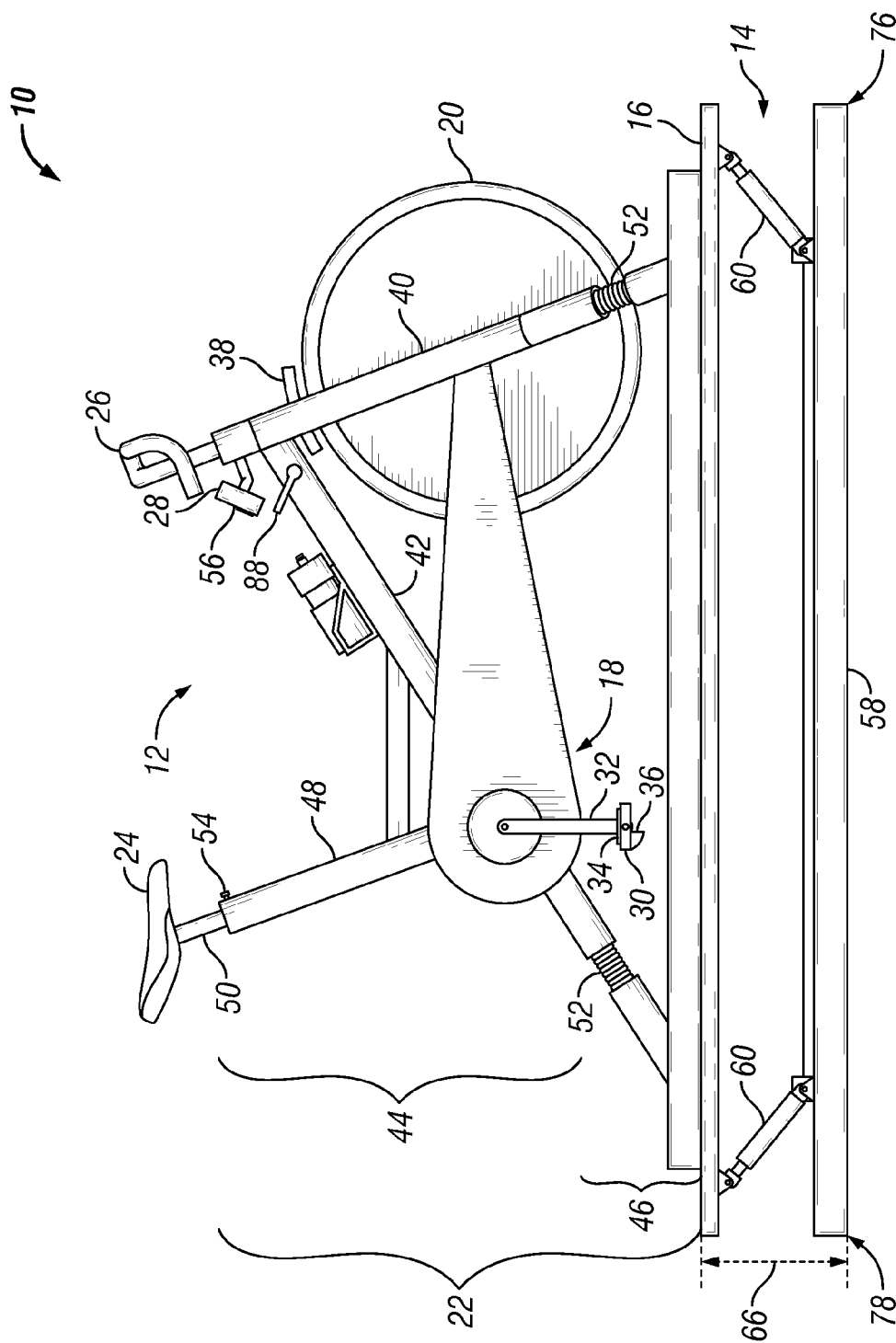


FIG. 1

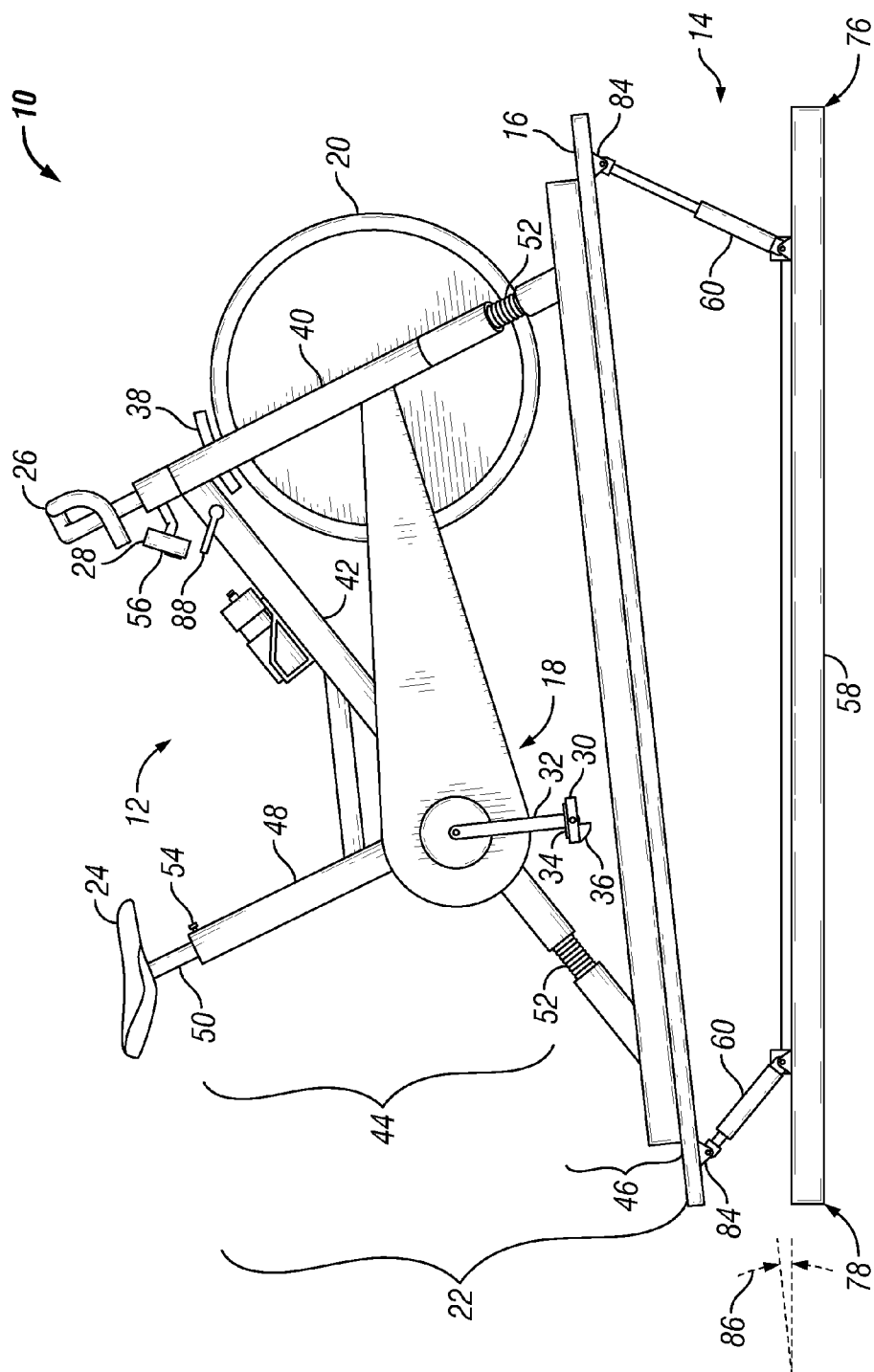


FIG. 2A

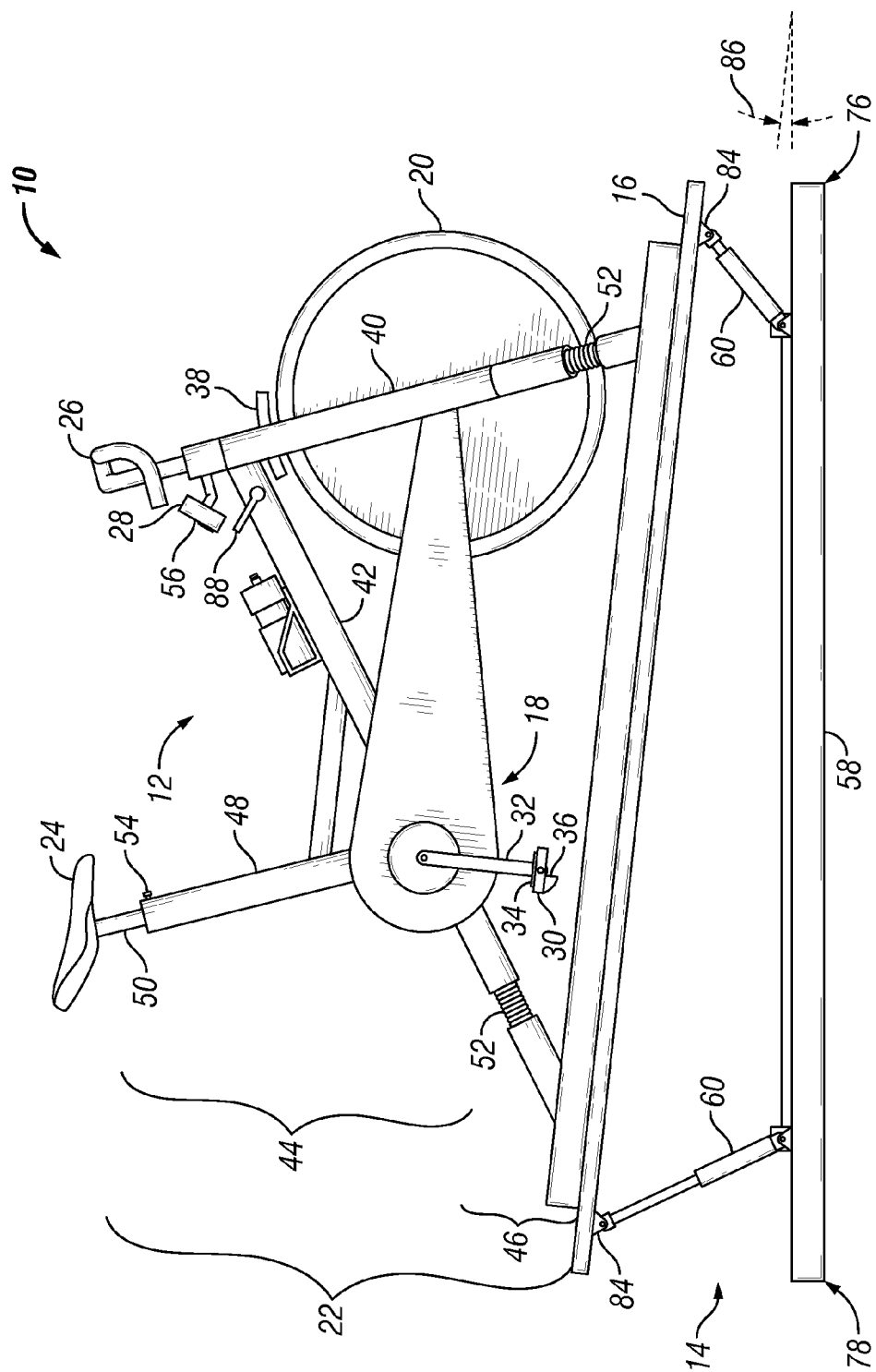


FIG. 2B

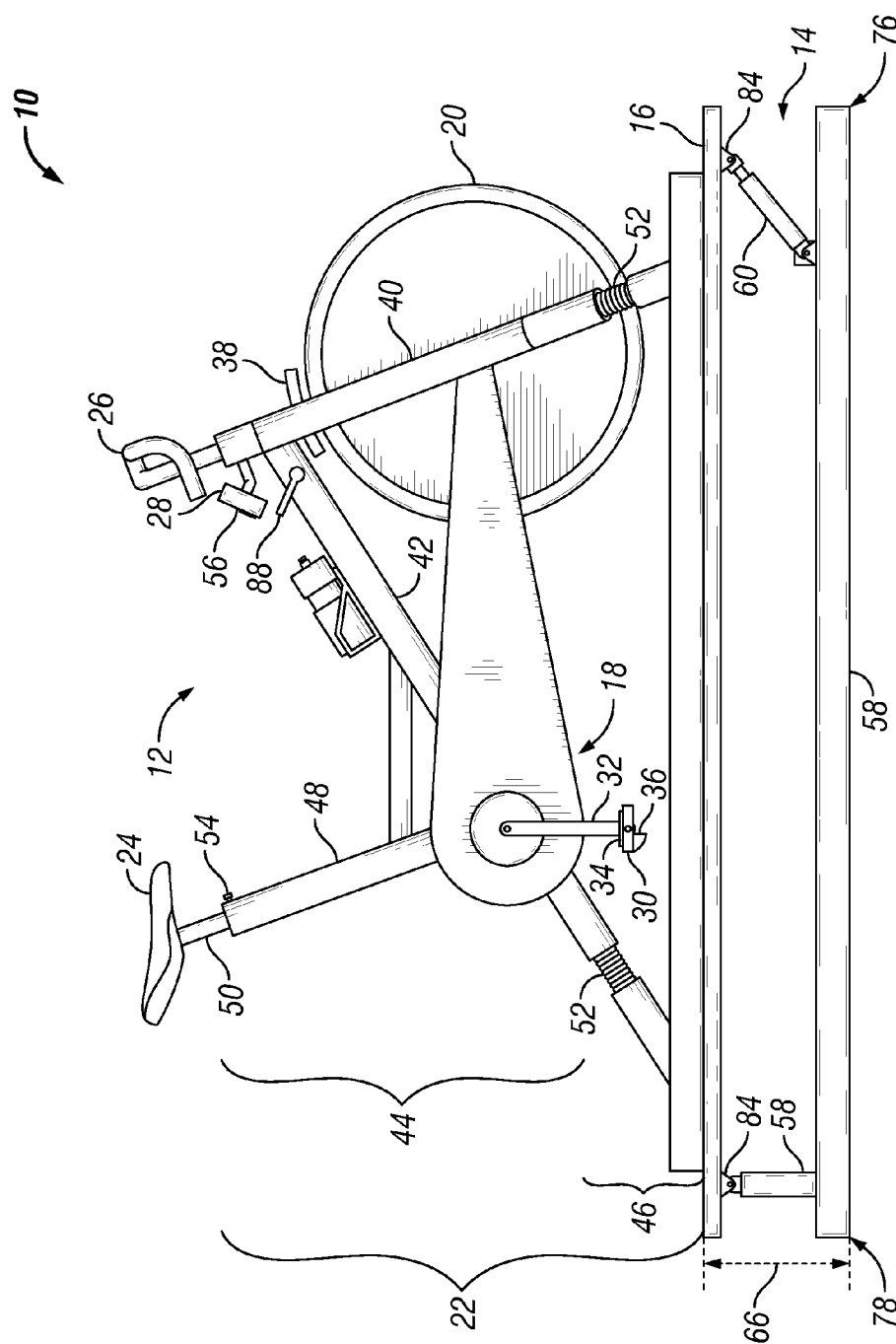


FIG. 3

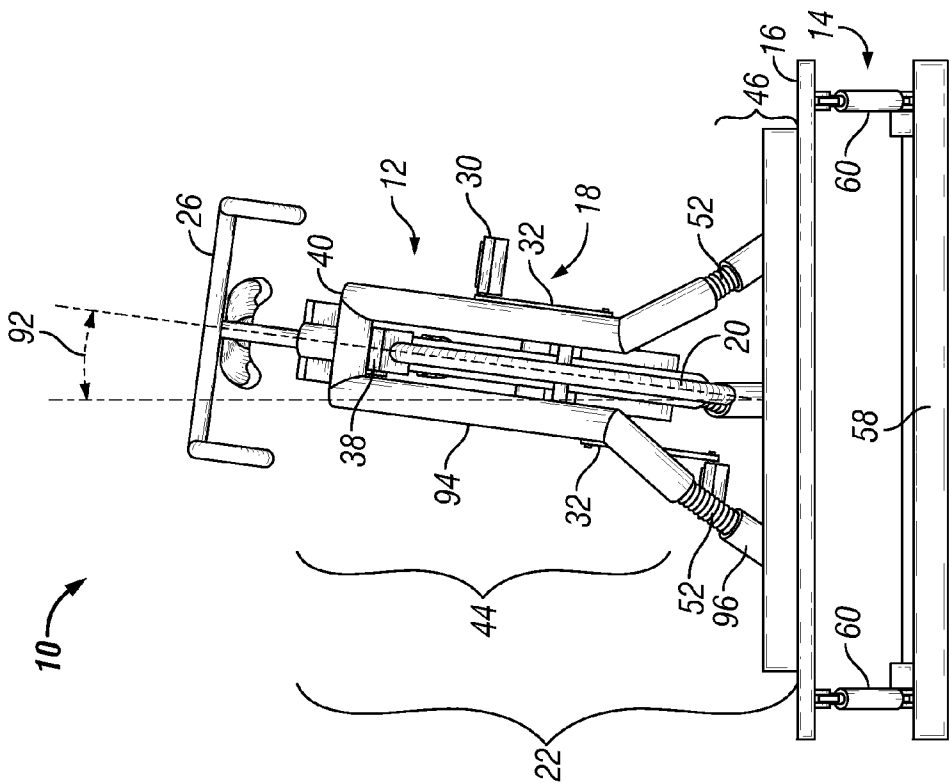


FIG. 4B

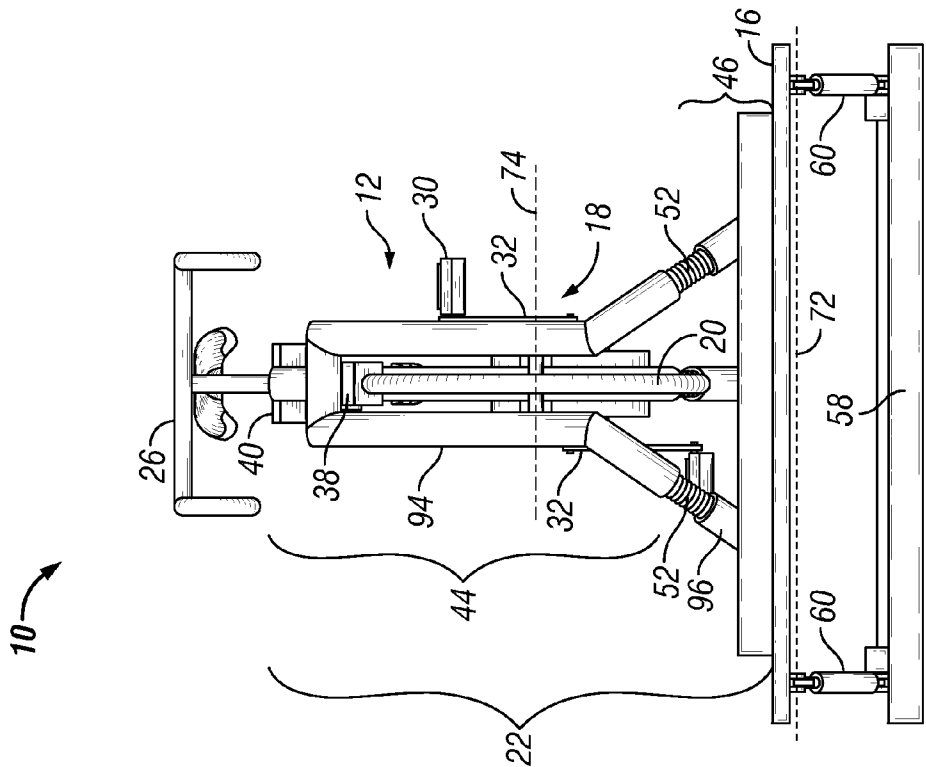


FIG. 4A

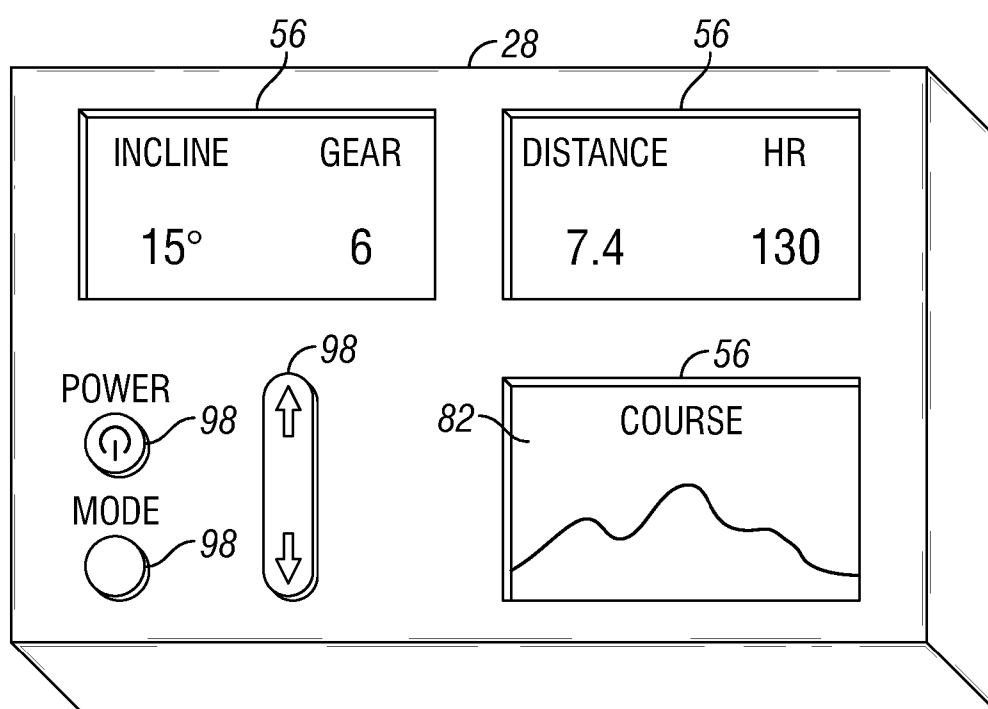


FIG. 5

ADJUSTABLE INCLINING AND DECLINING EXERCISE BICYCLE

TECHNICAL FIELD

[0001] The present invention relates generally to exercise equipment and more specifically to an adjustable inclining and declining exercise bicycle.

BACKGROUND

[0002] Traditional stationary bicycles allow users to exercise by moving their legs in a pedaling motion. Traditional stationary bicycles, however, do not allow a user to simulate the operation of a bicycle under a variety of road conditions. For example, traditional stationary bicycles are generally positioned horizontally and therefore do not simulate the operation of a bicycle up or down an inclined surface. Further, traditional stationary bicycles generally do not allow a user to simulate the side-to-side swaying motion that may occur during the pedaling of an actual bicycle. Because traditional stationary bicycles generally do not incline, decline, or sway from side-to-side, traditional stationary bicycles do not effectively exercise and condition all muscles typically used in actual cycling. As a result of the foregoing limitations, traditional stationary bicycles are typically ineffective in training a user for competitive and/or recreational cycling under various road conditions.

SUMMARY

[0003] In accordance with the present disclosure, the disadvantages and problems associated with traditional stationary bicycles have been substantially reduced or eliminated.

[0004] In some embodiments, an exercise apparatus comprises an exercise cycle having a pedal assembly configured to rotate and at least one flywheel. The pedal assembly may be in an operative relationship with the flywheel such that rotating the pedal assembly causes the flywheel to rotate about a first axis. The exercise cycle may comprise a frame connected to the pedal assembly, the frame supporting a seat for a user. The exercise apparatus may further comprise a base configured to support the exercise cycle, the base further configured to dynamically tilt the exercise cycle to simulate cycling on an inclined surface. The base may comprise a platform configured to support the frame of the exercise cycle. The base may further comprise at least one actuator configured to support at least part of the platform, the at least one actuator connected to the platform and configured to dynamically tilt the platform during operation of the exercise cycle. The at least one actuator may be configured to dynamically tilt the platform about a second axis that is parallel to the first axis.

[0005] In other embodiments, a method comprises connecting at least one actuator to a platform, the actuator configured to tilt the platform about a first axis. The method further comprises connecting an exercise cycle to the platform, the platform configured to support the exercise cycle. The exercise cycle may comprise a pedal assembly configured to rotate and at least one flywheel. The pedal assembly may be in an operative relationship with the flywheel such that rotating the pedal assembly causes the flywheel to rotate about a second axis, the second axis being parallel to the first axis. The exercise cycle may further comprise a frame connected to the pedal assembly, the frame supporting a seat for a user.

[0006] The present disclosure provides various technical advantages. Various embodiments may have none, some, or all of these advantages. One advantage is that the exercise apparatus may allow a user to exercise by simulating the operation of a bicycle under a variety of road conditions. In particular, the exercise apparatus may allow a user to train for recreational and/or competitive cycling by simulating the operation of a bicycle on a level surface, up an incline, and/or down an incline. Another advantage is that the exercise apparatus may allow a user to exercise indoors in a stationary environment while simulating the operation of a bicycle on various slopes at various resistance levels. Another advantage of the exercise apparatus is that, while allowing the simulated operation of a bicycle on various slopes, the exercise apparatus may allow the user to simulate the side-to-side swaying caused by the shifting of a user's weight while pedaling under actual conditions. By simulating the operation of a bicycle under a variety of road conditions, the exercise apparatus may more effectively and/or efficiently allow a user to train for recreational and/or competitive cycling.

[0007] Other advantages of the present disclosure will be readily apparent to one skilled in the art from the description and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] For a more complete understanding of the present disclosure and its advantages, reference is now made to the following description taken in conjunction with the accompanying drawings, in which:

[0009] FIG. 1 illustrates a cycling exercise system, according to certain embodiments;

[0010] FIGS. 2A and 2B illustrate side views of the cycling exercise system with a platform in a tilted position, according to certain embodiments;

[0011] FIG. 3 illustrates a side view of an alternative embodiment of a cycling exercise system, according to certain embodiments;

[0012] FIGS. 4A and 4B illustrate front views of a cycling exercise system, according to certain embodiments; and

[0013] FIG. 5 illustrates a controller for a cycling exercise system, according to certain embodiments.

DETAILED DESCRIPTION

[0014] FIG. 1 illustrates a cycling exercise system 10, according to certain embodiments. System 10 may allow a user to exercise by simulating the operation of a bicycle under a variety of road conditions. System 10 may allow a user to train for recreational and/or competitive cycling by simulating the operation of a bicycle on a level surface, up an incline, and/or down an incline. System 10 may allow a user to exercise indoors in a stationary environment while simulating the operation of a bicycle on various slopes at various resistance levels. In some embodiments, while allowing the simulated operation of a bicycle on various slopes, system 10 may allow the user to simulate the side-to-side swaying caused by the shifting of a user's weight while pedaling under actual conditions. By simulating the operation of a bicycle under a variety of road conditions, system 10 may more effectively and/or efficiently allow a user to train for recreational and/or competitive cycling. In some embodiments, system 10 may comprise an exercise cycle 12 and a base 14 having a tiltable platform 16.

[0015] Exercise cycle 12 may comprise any suitable device that facilitates exercise through a pedaling motion. In some embodiments, exercise cycle 12 may be an upright stationary bicycle such as, for example, a spinning-style exercise bicycle. In other embodiments, exercise cycle 12 may be a recumbent stationary bicycle. In yet other embodiments, exercise cycle 12 may be a conventional bicycle that is rendered stationary by propping up at least one wheel of the bicycle with a bicycle trainer stand. In such embodiments, the bicycle trainer stand may be positioned on base 14 of system 10. Thus, exercise cycle 12 may comprise any suitable device that facilitates exercise through a pedaling motion. In some embodiments, exercise cycle 12 may comprise a pedal assembly 18, a flywheel 20, a frame 22, a seat 24, a handlebar assembly 26, and a controller 28.

[0016] Pedal assembly 18 may be configured to rotate in response to a force applied by the user. Pedal assembly 18 may be in an operative relationship with flywheel 20 such that the rotation of pedal assembly 18 causes flywheel 20 to rotate. Pedal assembly 18 may comprise any suitable assembly (e.g., a crankset) that allows the user to rotate flywheel 20 through a pedaling motion. In some embodiments, pedal assembly 18 may comprise a pair of pedals 30. Each pedal 30 may be rotatably connected to a crank arm 32 that is connected to a drive wheel such as, for example, a sprocket, pulley, cam, gear, and/or other suitable device. In response to a force applied by the user, pedal 30 may cause crank arm 32 to rotate, which may cause the drive wheel to rotate. In some embodiments, the drive wheel may be coupled by at least a belt, chain, and/or drive shaft to an axle of flywheel 20. Thus, the rotation of the drive wheel may cause flywheel 20 to rotate.

[0017] Pedal assembly 18 may comprise any suitable type of pedals 30 such as, for example, platform pedals (e.g., flat pedals), clip-in pedals, and/or cage pedals (e.g., toeclip pedals). In some embodiments, pedal assembly 18 may comprise combination pedals 30. One side of a combination pedal 30 may have a clip-in attachment 34 that clips to the sole of a cycling shoe. The opposite side of the combination pedal 30 may have a cage 36 (e.g., toeclip) into which the toe of a user's shoe may be inserted. Thus, combination pedals 30 may accommodate both cycling shoes and non-cycling shoes. For example, one user wearing cycling shoes may use the clip-in side of the combination pedal 30 while another user wearing another type of shoe may use the cage side of the combination pedal 30. Pedal assembly 18 may comprise any suitable type of pedals 30.

[0018] Exercise cycle 12 may comprise one or more flywheels 20. As noted above, pedal assembly 18 may be in an operational relationship with flywheel 20. Flywheel 20 may comprise a circular or substantially circular object configured to revolve about an axis. Flywheel 20 may comprise a disk, drum, ring, circular frame, and/or any suitable type of wheel. In some embodiments, flywheel 20 may have a sufficient moment of inertia to cause the rotational speed of flywheel 20 to be uniform or substantially uniform. In some embodiments, the weight of flywheel 20 may be concentrated around the rim of flywheel 20. Accordingly, flywheel 20 may be configured to resist changes in its rotational speed. This resistance to change in rotational speed may require a user to exert more energy in order to accelerate the rate of pedaling. By requiring the user to exert more energy, system 10 may provide an effective and/or efficient exercise activity for the user.

[0019] Exercise cycle 12 may comprise any suitable number of flywheels 20. Although the term "bicycle" (e.g., "stationary exercise bicycle") is used sometimes herein to describe exercise cycle 12, it should be understood that exercise cycle 12 may comprise one, two, three, or any suitable number of flywheels 20.

[0020] In some embodiments, exercise cycle 12 may comprise a tension assembly 38 in proximity to flywheel 20. Tension assembly 38 may be operable to adjust the force required to rotate flywheel 20. Exercise cycle 12 may comprise any suitable type of tension assembly 38. For example, tension assembly 38 may comprise a magnetic resistance unit that uses one or more magnets to exert a magnetic force on flywheel 20 and/or on the axle of flywheel 20. As another example, tension assembly 38 may comprise an eddy current brake configured to exert a resistance force that opposes the rotation of flywheel 20. As yet another example, tension assembly 38 may comprise one or more rollers and/or belts that provide a friction force in resistance to the rotation of flywheel 20. Thus, tension assembly 38 may comprise any suitable device that provides an adjustable resistance level associated with the rotation of flywheel 20.

[0021] Pedal assembly 18 and flywheel 20 may be coupled to frame 22. Frame 22 may comprise any suitable rigid structure configured to support various components of exercise cycle 12 such as, for example, pedal assembly 18, flywheel 20, seat 24, and/or handlebar assembly 26. In some embodiments, frame 22 comprises multiple rigid members connected together. At least one member of frame 22 may be a fork member 40 that supports flywheel 20. In some embodiments, frame 22 comprises a down tube 42 between pedal assembly 18 and handlebar assembly 26. Down tube 42 of frame 22 may be equipped with a bottle holder and a bottle for a beverage.

[0022] Exercise cycle 12 may comprise any suitable type of frame 22 such as, for example, a diamond frame, step-through frame, and/or Y-foil frame. Frame 22 may comprise any suitable material such as, for example, steel, aluminum, titanium, carbon fiber, and/or thermoplastic material.

[0023] In some embodiments, frame 22 of exercise cycle 12 comprises an upper frame 44 and a lower frame 46. Upper frame 44 may connect to handlebar assembly 26 and may comprise a seat tube 48 into which a seat post 50 may be inserted. Lower frame 46 may support upper frame 44 and may be connected to base 14. Lower frame 46 may be connected to upper frame 44 by one or more flexible connectors 52.

[0024] Flexible connector 52 may be any suitable type of connector that allows upper frame 44 to tilt side-to-side relative to lower frame 46. In some embodiments, flexible connector 52 may comprise a helical spring, rubber joint, and/or other suitable connector. Flexible connector 52 may permit upper frame 44 to sway from side-to-side as the weight of the user shifts while pedaling. Thus, flexible connector 52 may allow system 10 to simulate the side-to-side swaying of a bicycle during operation. In some embodiments, flexible connector 52 may have a stiffness that is sufficient to limit the side-to-side swaying of upper frame 44 to less than a configurable angle 92 (e.g., less than thirty degrees from vertical).

[0025] As noted above, frame 22 may comprise seat tube 48 into which seat post 50 of seat 24 may be inserted. Seat tube 48 may comprise a clamp 54 that allows seat post 50 to be quickly unfastened, removed, and replaced. Seat tube 48 may have a standardized dimension such that seat tube 48 may

interface with any standard seat post 50. By providing frame 22 with seat tube 48 having a standardized dimension, system 10 may allow a user to easily customize exercise cycle 12 with different types of seats 24.

[0026] Seat 24 may be any suitable type of cycling seat 24. For example, seat 24 may be a mesh seat, a hardshell seat, and/or a padded seat. In some embodiments, seat 24 may be configured as a male-specific seat 24 or a female-specific seat 24. Seat 24 and/or seat tube 48 may be configured such that a user may adjust the height and/or lateral position of seat 24. For example, a particular user (e.g., a shorter user) may slide seat 24 forward such that seat 24 is closer to handlebar assembly 26 while another user (e.g., a taller user) may slide seat 24 towards the rear of frame 22 such that seat 24 is further from handlebar assembly 26. By allowing a user to adjust the height and/or lateral position of seat 24, system 10 may accommodate users of different sizes and body types.

[0027] In some embodiments, frame 22 may be connected to handlebar assembly 26. Handlebar assembly 26 may comprise any suitable type of handlebars. For example, handlebar assembly 26 may comprise drop handlebars, track handlebars, flat handlebars (e.g., mountain bike style handlebars), aerobars (e.g., triathlon bars), bullhorn handlebars, recumbent handlebars, and/or any suitable type of handlebars. In some embodiments, the interface between frame 22 and handlebar assembly 26 may be standardized such that users may easily customize exercise cycle 12 with different types of handlebars.

[0028] Handlebar assembly 26 and/or frame 22 may be configured such that a user may adjust the height and/or lateral position of handlebar assembly 26. For example, a particular user (e.g., a shorter user) may adjust handlebar assembly 26 to be closer to seat 24 while another user (e.g., a taller user) may adjust handlebar assembly 26 to be further from seat 24. By allowing a user to adjust the height and/or lateral position of handlebar assembly 26, system 10 may accommodate users of different sizes and body types.

[0029] In some embodiments, exercise cycle 12 may comprise one or more controllers 28. Controller 28 represents any suitable device configured to control the operation of system 10. A particular user may use controller 28 to select a simulated course 82, to adjust the incline of exercise cycle 12, and/or to change the resistance of exercise cycle 12. In some embodiments, controller 28 may comprise one or more graphical user interfaces 56 that display the user's heart rate, the amount of time elapsed during a given exercise session, the revolutions per minute of flywheel 20, the simulated speed of travel, the terrain of a simulated course 82, the level of incline, the simulated distance traveled, and/or any suitable information.

[0030] Controller 28 may comprise a computer, personal digital assistant (PDA), and/or any other suitable device (wireless, wireline, or otherwise), component, or element capable of receiving, processing, storing, and/or communicating information. Controller 28 may comprise any suitable user interface such as a display, touchscreen, and/or keypad. In some embodiments, controller 28 may be communicatively coupled to tension assembly 38 to control the resistance applied to flywheel 20. Controller 28 may be communicatively coupled to one or more components of base 14 to control the incline of exercise cycle 12. System 10 may comprise any suitable number of controllers 28.

[0031] Exercise cycle 12 may be connected to base 14 of system 10. Base 14 may support exercise cycle 12 and may be

operable to tilt exercise cycle 12 to simulate the operation of a bicycle on a level surface, up an incline, and/or down an incline. By providing a tiltable base 14, system 10 may allow a user to exercise indoors in a stationary environment while simulating the operation of a bicycle on various slopes at various resistance levels. Base 14 may comprise one or more support members 58, a platform 16, and one or more actuators 60.

[0032] Support member 58 of base 14 may be configured to support actuators 60 and/or platform 16. In some embodiments, support member 58 may comprise one or more rigid beams, posts, and/or sheets of material. Support member 58 may be configured to rest on a floor (e.g., the floor of a gym or house). Support member 58 may comprise any suitable material such as, for example, steel, aluminum, titanium, carbon fiber, and/or a thermoplastic material.

[0033] Platform 16 may comprise a flat or substantially flat sheet of material on which exercise cycle 12 is positioned. In some embodiments, exercise cycle 12 may be positioned on the upper side of platform 16 while one or more actuators 60 may be pivotally connected to the lower side of platform 16. Platform 16 may represent the upper side of base 14 while support member 58 may represent the lower side of base 14. Platform 16 may be elevated from and/or separated from support member 58 by a configurable distance. Thus, base 14 may have any suitable height 66. In some embodiments, height 66 of base 14 in its normal (e.g., horizontal) position may be from three inches to eighteen inches. In other embodiments, height 66 of base 14 in its normal (e.g., horizontal) position may be from four inches to twelve inches.

[0034] One or more actuators 60 may be positioned between support member 58 and platform 16. In some embodiments, a first end of actuator 60 may be connected to support member 58 and a second end of actuator 60 may be connected to platform 16. Actuator 60 may be configured to extend such that at least a portion of platform 16 may be raised. Platform 16 may be normally horizontal. However, when actuator 60 is extended and/or retracted, actuator 60 may raise and/or lower a portion of platform 16 such that platform 16 tilts from a horizontal position to an inclined or declined position. Platform 16 may be configured to tilt about any suitable axis. In some embodiments, platform 16 may tilt about an axis that is parallel to the axis around which flywheel 20 rotates.

[0035] Actuator 60 may represent any suitable device configured to extend and/or retract. In some embodiments, actuator 60 represents a hydraulic cylinder. In other embodiments, actuator 60 represents a worm drive comprising a worm screw and a worm gear. In some embodiments, actuator 60 may extend vertically. In other embodiments, actuator 60 may be positioned at an angle.

[0036] Base 14 may comprise any suitable number and combination of actuators 60. In some embodiments, base 14 may be substantially rectangular and may comprise two actuators 60—one actuator 60 positioned in each of the corners at the front end 76 of base 14 (i.e., the end of base 14 towards which a user faces during operation of system 10). At the back end 78 of base 14 (i.e., the end of base 14 away from which a user faces during operation of system 10), platform 16 may be pivotally connected to support member 58. In such embodiments, actuators 60 may extend to tilt platform 16 upwards, thereby simulating the operation of a bicycle up an

incline. Similarly, actuators 60 may retract to tilt platform 16 downwards, thereby simulating the operation of a bicycle down an incline.

[0037] In other embodiments, base 14 may be substantially rectangular and may comprise four actuators 60—one actuator 60 positioned in each of the corners of base 14. In such embodiments, the two actuators 60 at the front end 76 of base 14 may extend to tilt platform 16 upwards and/or the two actuators 60 at the back end 78 of base 14 may extend to tilt the platform 16 downwards. Base 14 may comprise any suitable number and/or combination of actuators 60.

[0038] Actuators 60 in base 14 may be communicatively coupled to controller 28. Thus, the user of system 10 may adjust the tilt of platform 16 by changing the level of incline displayed by controller 28. In some embodiments, when platform 16 is tilted upwards to simulate cycling up an incline, controller 28 may automatically adjust tension assembly 38 to increase the resistance on flywheel 20. When platform 16 is tilted downwards to simulate cycling down an incline, controller 28 may automatically adjust tension assembly 38 to decrease the resistance on flywheel 20. System 10 may dynamically change the tilt of platform 16 while the user is operating exercise cycle 12. Thus, the tilt of platform 16 may change at multiple times during an exercise session to simulate the operation of a bicycle over a hilly course 82. In some embodiments, one or more components of system 10 may be electrically powered. For example, electricity may power actuators 60, controller 28, tension assembly 38, and/or any suitable component of system 10.

[0039] In operation, a user may sit on seat 24 while using his or her legs to rotate pedals 30 of exercise cycle 12. During the course of an exercise session, the incline of platform 16 may change to simulate the operation of a bicycle. In some embodiments, the incline of platform 16 may change at various times during an exercise session according to a pre-configured course 82 defined by software that is stored in controller 28 and that is selected by user at the beginning of the exercise session. In other embodiments, the user may, at various times during an exercise session, use an input device of controller 28 to change the incline of platform 16.

[0040] To simulate cycling on a level surface, controller 28 may cause actuators 60 to maintain platform 16 in a horizontal position. To simulate cycling up an inclined surface, controller 28 may cause actuators 60 to tilt platform 16 upwards such that the front end of platform 16 is elevated relative to the back end of platform 16. In conjunction with tilting platform 16 upwards, controller 28 may cause tension assembly 38 to increase the tension on flywheel 20, thereby increasing the resistance to the rotation of pedals 30. Thus, system 10 may simulate cycling up an inclined surface.

[0041] Conversely, to simulate cycling down an inclined surface, controller 28 may cause actuators 60 to tilt platform 16 downwards such that the back end of platform 16 is elevated relative to the front end of platform 16. In conjunction with tilting platform 16 downwards, controller 28 may cause tension assembly 38 to decrease the tension on flywheel 20, thereby decreasing the resistance to the rotation of pedals 30. Thus, system 10 may simulate cycling down an inclined surface. As noted above, flexible connectors 52 may permit upper frame 44 to sway from side-to-side to further simulate the operation of a bicycle under actual conditions.

[0042] FIGS. 2A and 2B illustrate side views of system 10 with platform 16 in tilted positions, according to certain embodiments. As described above, system 10 may comprise

exercise cycle 12 connected to base 14 having a tiltable platform 16. Platform 16 of base 14 may be connected to one or more actuators 60. Base 14 may comprise any suitable type of actuator 60. In some embodiments, actuator 60 may be a linear actuator 60 that applies force to platform 16 in a linear matter. For example, actuator 60 may be a mechanical linear actuator 60 such as for example, a worm drive, a jackscrew, and/or a segmented spindle. In other embodiments, actuator 60 may be a hydraulic actuator 60 that linearly displaces a piston by pressurizing and/or depressurizing a fluid in the hydraulic actuator 60. A hydraulic actuator 60 may comprise one or more hydraulic pumps and one or more hydraulic cylinders. In yet other embodiments, actuator 60 may be an electro-mechanical actuator 60 such as, for example, an electric motor that causes a lead screw to rotate, which in turn causes the linear movement of a lead nut along the axis of the lead screw. Base 14 may comprise any suitable number and combination of mechanical, hydraulic, electro-mechanical, and/or other suitable types of actuators 60.

[0043] Base 14 may comprise any suitable number of actuators 60. In some embodiments, one end of a particular actuator 60 may be supported by support member 58 of base 14 while the opposite end of actuator 60 may be connected to platform 16. Actuator 60 may be connected to platform 16 by any suitable connector 84. For example, a particular end of actuator 60 may be pivotally connected to platform 16 by a pivot hinge that allows platform 16 to rotate relative to the particular end of actuator 60. As another example, a particular end of actuator 60 may be pivotally connected to platform 16 by a pin-in-slot joint that allows platform 16 to slide and/or rotate relative to the particular end of actuator 60. Actuator 60 may be connected to the bottom, to the top, and/or to a side of platform 16.

[0044] In some embodiments, at least one actuator 60 may be positioned at the front end 76 of base 14 and at least one other actuator 60 may be positioned at the back end 80 of base 14. Each actuator 60 may extend and/or retract to cause platform 16 to tilt. For example, to cause platform 16 to tilt upwards, the particular actuator 60 at the front end 76 of base 14 may extend, as illustrated in FIG. 2A. To then cause platform 16 to tilt downwards, the particular actuator 60 at the front end 76 of base 14 may retract while the actuator 60 at the back end 78 of base 14 extends, as illustrated in FIG. 2B. Platform 16 may tilt about an axis that is perpendicular to frame 22 of exercise cycle 12 and parallel to an axis about which flywheel 20 rotates. Thus, by tilting platform 16, system 10 may allow a user to simulate riding a bicycle on a level surface, riding a bicycle up a slope (as illustrated in FIG. 2A), and/or riding a bicycle down a slope (as illustrated in FIG. 2B).

[0045] Actuators 60 may be configured to tilt platform 16 according to any suitable angle 86. In some embodiments, actuators 60 may be configured to tilt platform 16 at any angle 86 from zero to thirty degrees from horizontal. In other embodiments, actuators 60 may be configured to tilt platform 16 at any angle 86 from zero to forty-five degrees from horizontal.

[0046] In some embodiments, frame 22 of exercise cycle 12 may be securely connected to platform 16. For example, frame 22 may be bolted, welded, bracketed, or otherwise anchored to platform 16. A secure connection between frame 22 and platform 16 may prevent exercise cycle 12 from sliding relative to platform 16 when platform 16 is in a tilted position.

[0047] As described above, system 10 may comprise controller 28 that controls the angle 86 of incline of platform 16. Controller 28 may be communicatively coupled to actuators 60 by any suitable connection such as, for example, a wired and/or wireless connection. In response to signals from controller 28, actuators 60 may change the angle 86 of incline of platform 16.

[0048] In some embodiments, controller 28 may be communicatively coupled to tension assembly 38. As explained above, tension assembly 38 is generally operable to adjust the force required to rotate flywheel 20. Exercise cycle 12 may comprise any suitable type of tension assembly 38. For example, tension assembly 38 may comprise a magnetic resistance unit, an eddy current brake, a roller system, and/or a belt system. In some embodiments, in conjunction with causing actuators 60 to tilt platform 16, controller 28 may cause tension assembly 38 to adjust the force required to rotate flywheel 20. For example, as actuators 60 cause platform 16 to tilt upwards, tension assembly 38 may increase the resistance of flywheel 20 in order to simulate the more strenuous pedaling required to propel a bicycle uphill. As actuators 60 cause platform 16 to tilt downwards, tension assembly 38 may decrease the resistance of flywheel 20 in order to simulate the less strenuous pedaling required to propel a bicycle downhill.

[0049] In some embodiments, exercise cycle 12 may comprise one or more gear shifters 88. Gear shifter 88 may allow the user to simulate the operation of a bicycle at different gear levels. Gear shifter 88 may comprise one or more levers positioned on handlebar assembly 26 and/or on the down tube 42 of frame 22. Gear shifter 88 may be communicatively coupled to controller 28 and/or tension assembly 38. Gear shifter 88 may allow the user to select a simulated gear (e.g., first gear, second gear, tenth gear, twelfth gear, etc.) for pedaling exercise cycle 12. Controller 28 may estimate a simulated distance traveled based at least in part on the selected gear. In some embodiments, the selection of a lower gear (e.g., first gear) may result in decreased resistance as well as decreased distance traveled for each revolution of pedals 30. Similarly, the selection of a higher gear (e.g., tenth gear) may result in increased resistance as well as increased distance traveled for each revolution of pedals 30. By providing one or more gear shifters 88, system 10 may provide an enhanced simulation of the operation of an actual bicycle under various conditions.

[0050] FIG. 3 illustrates a side view of an alternative embodiment of system 10, according to certain embodiments. In some embodiments, a particular end of platform 16 may be maintained at a fixed height 66 while the opposite end of platform 16 may be supported by one or more movable actuators 60. For example, the back end of platform 16 may be pivotally connected to a vertical support member 58 while the front end of platform 16 may be pivotally connected to at least one actuator 60. In such embodiments, to simulate the operation of a bicycle up a slope, actuator 60 at the front end 76 of base 14 may extend, causing platform 16 to tilt upwards while pivoting about the connection between platform 16 and the vertical support member 58 at the back end 78 of base 14. Similarly, to simulate the operation of a bicycle down a slope, actuator 60 at the front end 76 of base 14 may retract to less than its normal length, thereby causing platform 16 to tilt downwards while pivoting about the connection between platform 16 and the vertical support member 58 at the back end 78 of base 14.

[0051] In other embodiments, the front end of platform 16 may be pivotally connected to a vertical support member while the back end of platform 16 may be pivotally connected to at least one actuator 60. In such embodiments, to simulate the operation of a bicycle down a slope, actuator 60 at the back end 78 of base 14 may extend, causing platform 16 to tilt downwards while pivoting about the connection between platform 16 and a vertical support member at the front end 76 of base 14. Similarly, to simulate the operation of a bicycle up a slope, actuator 60 at the back end 78 of base 14 may retract to less than its normal length, thereby causing platform 16 to tilt upwards while pivoting about the connection between platform 16 and the vertical support member 58 at the front end 76 of base 14. Thus, in some embodiments, base 14 may be configured with actuators 60 positioned at only one end of base 14.

[0052] Base 14 may be configured to have any suitable height 66 in the normal (e.g., horizontal) position. For example, where only one end of platform 16 is configured to raise or lower, base 14 may be configured to have height 66 from twelve inches to thirty inches when in the horizontal position. As another example, where only one end of platform 16 is configured to raise or lower, base 14 may be configured to have height 66 from eighteen to twenty-four inches when in the horizontal position.

[0053] Although FIG. 3 illustrates actuators 60 positioned near the front end 76 of base 14, it should be understood that, in other embodiments, actuators 60 may be positioned to cause the back end 78 of platform 16 to raise and/or lower.

[0054] FIGS. 4A and 4B illustrate front views of system 10, according to certain embodiments. As explained above, system 10 may comprise exercise cycle 12 and base 14. Exercise cycle 12 may comprise pedal assembly 18, flywheel 20, and frame 22. In some embodiments, frame 22 comprises fork member 40 between which flywheel 20 may be supported. Frame 22 may comprise upper frame 44 and lower frame 46. Upper frame 44 may be connected to lower frame 46 by one or more flexible connectors 52.

[0055] Flexible connector 52 may be any suitable type of connector that allows upper frame 44 to tilt from side-to-side relative to lower frame 46. In some embodiments, flexible connector 52 may comprise a helical spring, rubber joint, and/or other suitable connector. Flexible connector 52 may permit upper frame 44 to sway from side-to-side as the weight of the user shifts while pedaling. For example, FIG. 4A illustrates exercise cycle 12 that is upright while FIG. 4B illustrates exercise cycle 12 that is tilted laterally due to the user shifting his or her weight while pedaling.

[0056] Flexible connector 52 may have a stiffness that is sufficient to limit the side-to-side swaying of upper frame 44 to less than a configurable angle 92. Flexible connector 52 may be configured to permit upper frame 44 to tilt laterally (e.g., sway from side-to-side) up to any suitable angle 92. In some embodiments, flexible connector 52 may permit upper frame 44 to tilt laterally up to an angle 92 of thirty degrees from vertical. In other embodiments, flexible connector 52 may permit upper frame 44 to tilt laterally up to an angle 92 of fifteen degrees from vertical.

[0057] In some embodiments, to allow exercise cycle 12 to sway, at least a portion of fork member 40 of frame 22 may be angled away from flywheel 20. For example, fork member 40 of frame 22 may comprise an upper portion 94 (e.g., above the axle of flywheel 20) that is substantially vertical and a lower portion 96 (e.g., below the axle of flywheel 20) that angles

laterally away from flywheel 20. In the lower portion 96 of fork member 40, each prong of fork member 40 may be slanted according to any suitable angle such as, for example, thirty degrees or fifteen degrees from vertical. Thus, frame 22 of exercise cycle 12 may be configured to safely permit the side-to-side swaying of a user during operation of exercise cycle 12. As explained above, in addition or as an alternative to permitting the side-to-side swaying of frame 22, system 10 may dynamically tilt platform 16 about an axis 72 that is parallel to the axis 74 about which flywheel 20 rotates.

[0058] FIG. 5 illustrates controller 28 for system 10, according to certain embodiments. Controller 28 may represent any suitable device configured to control the operation of system 10. A particular user may use controller 28 to select a simulated course 82, to adjust the incline of exercise cycle 12, and/or to change the resistance of exercise cycle 12.

[0059] In some embodiments, controller 28 comprises a computer, personal digital assistant (PDA), and/or any other suitable device (wireless, wireline, or otherwise), component, or element capable of receiving, processing, storing, and/or communicating information. Controller 28 may comprise one or more memory modules operable to store software for the operation of system 10. Controller 28 may further comprise one or more processors communicatively coupled to a memory module and operable to execute the software stored therein. In some embodiments, the software in controller 28 may comprise instructions associated with various simulated courses 82 for exercise cycle 12. For example, controller 28 may comprise software for beginner level courses 82 (e.g., moderate incline and resistance levels) and advanced level courses 82 (e.g., extreme incline and resistance levels). In some embodiments, controller 28 may comprise software for particular courses 82 that simulate mountainous terrain and software for other courses 82 that simulate gradually sloping terrain. Controller 28 may comprise software for any suitable number and/or combination of courses 82 for the simulated operation of a bicycle.

[0060] In some embodiments, controller 28 may comprise an interface that allows controller 28 to communicate with a network via a wired and/or wireless connection. For example, controller 28 may comprise an interface for communicating with other devices over the Internet. In some embodiments, controller 28 may be configured to download information (e.g., software for courses 82) from a network. In addition, or alternatively, controller 28 may be configured to upload information (e.g., exercise statistics) to other devices over a network.

[0061] In some embodiments, controller 28 may comprise one or more input devices 98 (e.g., dials, buttons, keypads, etc.) that allow a user to select various criteria for a given exercise session. For example, a user may use input device 98 of controller 28 to select a particular course 82 (e.g., mountainous terrain, flat terrain, etc.). In response to the selection from the user, controller 28 may vary the resistance level and/or incline of exercise cycle 12 during the exercise session to simulate the selected course 82.

[0062] In addition, or alternatively, a user may use input device 98 of controller 28 to select the duration of the exercise session (e.g., thirty minutes, forty-five minutes, etc.). In response to the selection of a duration, controller 28 may calibrate the length of each section of the selected course 82 such that the selected course 82 may be completed within the selected duration of the exercise session. In addition, or alternatively,

a user may use input device 98 of controller 28 to select a gear level and/or incline level for exercise cycle 12.

[0063] Controller 28 may comprise one or more graphical user interfaces 56 that display information associated with the exercise session. For example, graphical user interface 56 may display the user's heart rate, the amount of time elapsed since the beginning of or until the end of a given exercise session, the revolutions per minute of flywheel 20, the simulated speed of travel, the terrain of the selected course 82, the level of incline of platform 16, the selected gear level, and/or any suitable information. System 10 may comprise any suitable number and/or combination of controllers 28. In some embodiments, controller 28 may be mounted on frame 22 in proximity to handlebar assembly 26.

[0064] The present disclosure encompasses all changes, substitutions, variations, alterations and modifications to the example embodiments described herein that a person having ordinary skill in the art would comprehend. Similarly, where appropriate, the appended claims encompass all changes, substitutions, variations, alterations, and modifications to the example embodiments described herein that a person having ordinary skill in the art would comprehend.

What is claimed is:

1. An exercise apparatus, comprising:

an exercise cycle comprising:

a pedal assembly configured to rotate;

at least one flywheel, the pedal assembly in an operative relationship with the flywheel such that rotating the pedal assembly causes the flywheel to rotate about a first axis; and

a frame connected to the pedal assembly, the frame supporting a seat for a user;

a base configured to support the exercise cycle, the base further configured to dynamically tilt the exercise cycle to simulate cycling on an inclined surface, the base comprising:

a platform configured to support the frame of the exercise cycle; and

at least one actuator configured to support at least part of the platform, the at least one actuator connected to the platform and configured to dynamically tilt the platform during operation of the exercise cycle, the at least one actuator configured to dynamically tilt the platform about a second axis that is parallel to the first axis.

2. The apparatus of claim 1, the base further comprising a horizontal support member configured to rest on a floor, the support member connected to a first end of the at least one actuator, the second end of the at least one actuator pivotally connected to the platform of the base.

3. The apparatus of claim 2, the actuator being positioned between the support member and the platform, the actuator configured to extend during operation of the exercise cycle, the extension of the actuator causing the platform to tilt about the second axis.

4. The apparatus of claim 1, the frame comprising:

an upper frame configured to support the user, the upper frame comprising a vertical seat tube;

a lower frame configured to support the upper frame, the lower frame connected to the platform; and

at least one flexible connector between the upper frame and the lower frame, the at least one flexible connector configured to allow the upper frame to tilt from side-to-side about a third axis that is perpendicular to the second axis.

5. The apparatus of claim 4, the at least one flexible connector comprising a spring with a stiffness sufficient to limit the side-to-side tilting of the upper frame to less than thirty degrees from vertical.

6. The apparatus of claim 1, wherein:

the platform comprises a first end in proximity to the flywheel of the exercise cycle;

the platform comprises a second end opposite the first end; the base comprises a first actuator positioned in proximity to the first end of the platform; and

the base comprises a second actuator positioned in proximity to the second end of the platform.

7. The apparatus of claim 6, wherein the first actuator is configured to extend, the extension of the first actuator causing the platform to tilt so as to simulate cycling up an inclined surface.

8. The apparatus of claim 6, wherein the second actuator is configured to extend, the extension of the second actuator causing the platform to tilt so as to simulate cycling down an inclined surface.

9. The apparatus of claim 1, wherein the at least one actuator comprises at least one of:

a hydraulic cylinder; and

a worm drive.

10. The apparatus of claim 1, wherein the frame comprises:

a standardized seat tube configured to interface with seat posts connected to different types of seats; and

a standardized handlebar interface configured to interface with different types of handlebars.

11. The apparatus of claim 1, wherein the pedal assembly comprises a pair of pedals, each pedal comprising a first side having a clip interface and a second side having a cage interface.

12. The apparatus of claim 1, the exercise cycle further comprising a tension assembly configured to adjust a resistance to rotation of the flywheel.

13. The apparatus of claim 12, the exercise cycle further comprising an electronic controller configured to control the at least one actuator and the tension assembly, the electronic controller comprising a graphical user interface that allows a user to select an angle of the platform.

14. The apparatus of claim 13, wherein, in response to a change in the angle of the platform, the tension assembly automatically adjusts the resistance to rotation of the flywheel.

15. The apparatus of claim 1, the exercise cycle further comprising:

at least one gear shifter configured to allow selection of a simulated gear for pedaling the exercise cycle; and

an electronic controller communicatively coupled to the at least one gear shifter, the electronic controller configured to estimate a simulated distance traveled based at least in part on the selected gear.

16. A method, comprising:

connecting at least one actuator to a platform, the at least one actuator configured to tilt the platform about a first axis; and

connecting an exercise cycle to the platform, the platform configured to support the exercise cycle, the exercise cycle comprising:

a pedal assembly configured to rotate;

at least one flywheel, the pedal assembly in an operative relationship with the flywheel such that rotating the pedal assembly causes the flywheel to rotate about a second axis, the second axis being parallel to the first axis; and

a frame connected to the pedal assembly, the frame supporting a seat for a user.

17. The method of claim 16, the at least one actuator configured to extend during operation of the exercise cycle, the extension of the at least one actuator causing the platform to tilt about the first axis.

18. The method of claim 17, the extension of the at least one actuator causing the platform to tilt so as to simulate cycling up an inclined surface.

19. The method of claim 17, the extension of the at least one actuator causing the platform to tilt so as to simulate cycling down an inclined surface.

20. The method of claim 16, wherein the frame comprises: an upper frame connected to a handlebar assembly;

a lower frame configured to support the upper frame, the lower frame connected to the platform; and

at least one flexible connector between the upper frame and the lower frame, the at least one flexible connector configured to allow the upper frame to tilt from side-to-side about a third axis that is perpendicular to the first axis.

21. The method of claim 16, wherein the at least one actuator comprises at least one of:

a hydraulic cylinder; and

a worm drive.

22. An exercise apparatus, comprising:

an exercise cycle comprising:

a pedal assembly configured to rotate;

at least one flywheel, the pedal assembly in an operative relationship with the flywheel such that rotating the pedal assembly causes the flywheel to rotate; and

a frame connected to the pedal assembly, the frame supporting a seat for a user;

a base configured to support the exercise cycle, the base further configured to dynamically tilt the exercise cycle to simulate cycling on an inclined surface, the base comprising:

a platform configured to support the frame of the exercise cycle; and

at least one actuator configured to support at least part of the platform, the at least one actuator connected to the platform and configured to dynamically tilt the platform during operation of the exercise cycle.

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