Disclosed is a motorized rehabilitation apparatus and method for disabled, impaired or injured individuals, which trains a proper gait, increases blood flow, relieves stress, and reconditions lower body muscles and joints. The device comprises a powered stationary bicycle having a seat, handle grips, and rotating foot pedals that receive motive input from an electric motor and user input. The device further includes a pair of thigh braces that are connected together between the user's thighs via a hingable link and chain that controls and trains an individual's limbs through the pedal rotation. The disclosed method further combines the present bicycle device for rehabilitation in conjunction with visual stimuli in the way of a three dimensional television display that stimulates endorphins, relieves mental stress and allows the motive input from the bicycle and mild user input to exercise the limbs of a user without focusing on the rehabilitation activity.
MOTORIZED LOWER BODY REHABILITATION DEVICE AND METHOD

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 61/500,327 filed on Jun. 23, 2011, entitled “Mobilizer 1.” The patent application identified above is incorporated here by reference in its entirety to provide continuity of disclosure.

BACKGROUND OF THE INVENTION

[0002] 1. Field Of The Invention

[0003] The present invention relates to exercise and rehabilitation equipment. More specifically, the present invention relates to a powered stationary bicycle and method of rehabilitation that trains a proper gait and provides exercise and rehabilitation for impaired, injured or disabled individuals.

[0004] Stationary bicycles and exercise machines are utilized extensively for rehabilitation sessions to build strength, increase range of motion and mobility, and to further introduce muscle activity to individuals to improve fitness or to recover physical ability. These devices are generally stationary bicycles and similar devices that receive input from the individual transferring energy in the form of work into the device rotation or movement. While these devices are helpful for injured individuals and those with slight impairment, they are strenuous for those individuals with severe impairments, physical ailments, injuries and the elderly. Traditional stationary bicycles and rehabilitation machines of this type receive their motive input from the user. The present invention relates to a rehabilitation means and method that provides its own motive input and accepts measured input from the user during exercise and rehabilitation session.

[0005] For the impaired, elderly or injured, a motorized stationary bicycle provides a means to move a user’s limbs and introduce motion that may otherwise be painful or difficult. This induced motion facilitates blood flow into the extremities, loosens joint stiffness and begins to exercise damaged or underutilized muscles. Devices of this type exist in the art, and are generally related to limb movement machines or motorized bicycle machines that facilitate movement for impaired users. The present invention discloses an improvement to such devices and a method of rehabilitation that is particularly suited for reducing pain, improving an individual’s gait and further for relaxing the user while engaging in the activity.

[0006] The present method and device contemplates a motorized stationary bicycle in conjunction with a thigh brace element and a visual stimulus that allows the user to avoid focusing on the exercise and enjoy the activity without contemplating its operation or success. Specifically, the present invention provides a motorized set of pedals and a seat for a user to operate their legs in a rotational manner, while the thigh brace controls the user’s upper leg region and the visual stimulus allows the user to focus on a scene, movie or other visually interesting or motivating activity. Visual entertainment stimulates endorphins, a natural protein that combats stress and pain for overall well being, while the operation of the bicycle and motion of the user’s legs retrain the user and exercises atrophied or damaged limbs. The present invention trains an individual’s gait, relieves stressed and weakened joints and muscles, reconditions injured or healing joints such as those with knee and hip replacements, and utilizes an adjustable inner thigh brace to maintain proper alignment at variable pedal speeds. The method and device retrain the brain through muscle repetition and muscle memory. It has been shown that the combination of elements and the method of use provided herein benefit the elderly, those with special needs and anyone else wishing to strengthen their lower body, mobilize their joints, and realign their walking gait.

[0007] 2. Description of the Prior Art

[0008] Devices have been disclosed in the prior art that relate to rehabilitation and exercise bicycles. These include devices that have been patented and published in patent application publications. These devices generally relate to motorized and pedal-driven apparatuses specifically designed for impaired or disabled users having rotatable cranks for limb movement. While these devices provide novel means of exercise, they fail to contemplate the unique aspects that allow the present device to successfully train and exercise an impaired or disabled user. The devices deemed most relevant to the present disclosure are herein described for the purposes of highlighting and differentiating the unique aspects of the present invention, and further highlighting the drawbacks existing in the prior art.

[0009] Specifically, U.S. Pat. No. 6,740,010 to Sze discloses a motorized stationary bicycle for lower body rehabilitation, wherein the bicycle comprises a frame, a pair of pedals and an electric motor and drivetrain for driving the pedals. The drivetrain is claimed as a drive shaft, coupler, worm gear and toothed gear for transforming the motor rotation into rotation of the pedals. The devices is designed such that once the motor is rotating, the gears cause the step pedals to turn in a synchronized motion, inducing leg movement of the exerciser while limiting frictional damage by way of incorporation of the drivetrain worm gear. While disclosing a novel and specifically designed stationary bicycle having an electric motor and drivetrain, the Sze device does not disclose the novel rehabilitation elements of the present invention. The present invention utilizes a powered stationary bicycle for rehabilitation, however the key components for its success include the incorporate of visual stimuli and a specifically designed leg brace that controls and stimulates thigh movement.

[0010] Another such device is U.S. Pat. No. 4,402,502 to Peters, which discloses an exerciser for disabled persons that comprises a frame having rotatable pedal and hand cranks for connection to the limbs of a user. The cranks are include a means of firmly holding the operators respective limbs while in use, while optionally supplying a motive means of rotating the cranks. A clutch is included to power the cranks while the motive means is in operation without causing damage, while the frame itself is designed to accommodate disable users in a wheelchair. The Peters device describes a novel means of introducing motion or allowing limb exercise for disabled users. However, the structure and operation of the Peters device differs considerably from the present invention, which is related specifically to a lower body rehabilitation device that is powered, includes visual stimuli and a brace for leg rehabilitation purposes.

[0011] Similar to the Peters device, U.S. Pat. No. 3,991,749 to Zent discloses an exercising apparatus having rotatable foot pedals and hand crank arms, wherein a seated user places his feet on the pedals and grasps the crank arms. A motor within the housing the device drives the foot pedals and crank arms in a rotational motion, wherein the crank arms and
pedals are connected along the sides of the device frame. Several embodiments are for driving the cranks and for the direction of travel between the crank arms and foot pedals; however the structure and intent of the Zen device similarly fails to disclose the novel features of the present invention. While related to exercise equipment having motive power, the Zen device does not contemplate the elements that comprise the present invention apparatus or rehabilitation method.

Finally, U.S. Pat. No. 6,220,991 to Sellers discloses a motorized exercise bicycle that includes a frame having a pedal assembly interconnected with an electric motor; a fan blade and reciprocating handle bar assembly. The motor drives the pedal assembly and reciprocates the handles to assist physically challenged or disabled users during exercise. The device includes a frame with an upstanding seat portion having the user’s legs suspended below the seat. Similar to the aforementioned exercise and rehabilitation devices in the prior art, the Sellers device fails to disclose the novel rehabilitation elements and the structure of the present invention, wherein a powered stationary bicycle and method of use is provided for the physically challenged, elderly and those requiring rehabilitation exercise.

The present invention provides a means to train those with proper walking ailments or conditions with a means to recover strength and realign their body for a proper walking structure. The present invention further provides a means of exercise and rehabilitation for disabled, impaired or elderly individuals who may otherwise not be able to readily pedal a standard stationary bicycle independent of motorized input. The incorporation of a thigh control element facilitates proper training of a walking motion, while the visual stimulus allows the user to relax and enjoy the activity and not contemplate or becoming quickly tired of its operation. The visual stimulus increases compliance with regular training and encourages the user to provide input to the device for increasing strength and exercise. It is submitted that the present invention substantially diverges in design elements and steps from the prior art, and consequently it is clear that there is a need in the art for an improvement to existing walking gait training and rehabilitation devices. In this regard the instant invention substantially fulfills these needs.

SUMMARY OF THE INVENTION

In view of the foregoing disadvantages inherent in the known types of motorized stationary bicycles now present in the prior art, the present invention provides a new device and method associated with a motorized stationary bicycle, wherein the same can be utilized for providing convenience for the user when correcting a user’s walking gait, rehabilitating impaired or injured users, and further for introducing exercise to those unable to utilize standard stationary bicycles.

It is therefore an object of the present invention to provide a new and improved walking gait training and rehabilitation device that has all of the advantages of the prior art and none of the disadvantages.

It is another object of the present invention to provide a motorized stationary bicycle that is particularly suited for those with walking gait or posture disabilities, including motor development and control disorders such as cerebral palsy.

Another object of the present invention is to provide a motorized stationary bicycle that is particularly suited for injured or impaired users requiring exercise and muscle development prior to walking or exercising independently of motorized input.

Yet another object of the present invention is to provide a motorized stationary bicycle that is particularly suited for elderly individuals that may have muscle and joint pain, wherein exercise and increased blood flow facilitates pain relief and improve motor function.

Another object of the present invention is to provide a motorized stationary bicycle having a means to control a user’s upper legs for properly training and controlling the thigh region through each pedal rotation.

A further object of the present invention is to provide a motorized stationary bicycle having a visual stimulus to encourage users, release endorphins and to redirect attention away from the exercise at hand for increased effectiveness thereof and compliance with regular exercise routines.

Other objects, features and advantages of the present invention will become apparent from the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTIONS OF THE DRAWINGS

Although the characteristic features of this invention will be particularly pointed out in the claims, the invention itself and manner in which it may be made and used may be better understood after a review of the following description, taken in connection with the accompanying drawings wherein like numeral annotations are provided throughout.

FIG. 1 shows a perspective view of the present device.

FIG. 2 shows a side view of the present device and associated method.

FIG. 3 shows a perspective view of the present device in a working state, along with a close-up view of the limb control brace.

FIG. 4 shows a view of the control interface of the present invention.

FIG. 5 shows a perspective view of the user chair adjustability.

FIG. 6 shows a perspective view of the limb control brace.

DETAILED DESCRIPTION OF THE INVENTION

Reference is made herein to the attached drawings. Like reference numerals are used throughout the drawings to depict like or similar elements of the walking gait training and lower body rehabilitation device. For the purposes of presenting a brief and clear description of the present invention, the preferred embodiment will be discussed as used for training proper walking gait, building leg strength and improving overall health of users through motorized input. The figures are intended for representative purposes only and should not be considered to be limiting in any respect.

Referring now to FIGS. 1 and 2, there are shown a perspective and side view of the present walking gait training and lower body rehabilitation device. The apparatus of the present invention comprises a seat and motorized bicycle assembly having a frame 16, a seated user chair 11, and a motorized set of foot pedals 14 that position the user such that the user’s legs are forward of their torso while seated therein. Along the frame 16 is a housing 15 adapted to contain a motor drive means for the foot pedals 14, which comprises a belt-
driven assembly having an electric motor and drivetrain that induces controlled and variable speed rotation of the foot pedals, which are each attached to a rotary member within the housing via their respective pedal cranks. The motorized pedals are driven in a uniform rotational direction and at opposite phases, as is commonly provided in bicycle and stationary bicycle devices. Each foot pedal includes a platform upon which the user may exert force, along with a plurality of straps that are adapted to form over the exterior of a user’s shoe and secure their feet to each pedal. The user chair provides a location for which the user to sit, while the user’s feet are extended forward and secured into each foot pedal. The motor drives the pedals in a given rotational direction based on a desired speed and direction chosen by the user or a healthcare professional overseeing the user. Speed of the pedals is controlled via a control interface 13 in front and in reach of the user chair, wherein the user may reach and control the speed while the device is in operation and the user is engaged therewith. Above the control interface 13 is an emergency stop button, which may be readily depressed if operation of the device is immediately desired due to injury or emergency complications.

The motorized pedal device is a uniquely designed structure that has similarities to commonly found exercise and motorized stationary bicycles, however the configuration of the present device, its construction and intended use are unique. Along the housing 15 is located a junction 30, along with a controller for the motor assembly. These elements accept NC power, distribute power to the electric motor and control the overall operation of the present device. Within the housing 15 are a means of monitoring backpressure on the cranks of each foot pedal, wherein the desired rotation during operation is known and resistive force encountered from the user’s legs and feet on the cranks is continually monitored. If the condition arises wherein resistance from the user reaches a given threshold based on feedback loop of the measuring means, the operation of the device ceases and the pedals stop rotating. This safety mechanism prevents the motorized assembly from rotating the user in a manner that may be harmful, and further considers the user’s input as a means to prevent uncontrolled or harmful rotation of his or her limbs. Force applied in the direction of the device operating rotation is accepted and encouraged, as the user is increasing output and obtaining higher levels of exercise. The belt driven motor allows this input via slippage of the drive belt if necessary.

Further provided by the present apparatus and method is a means of visual stimulation 19 for the user while in operation, which preferably is provided in the form of a forward-mounted or stand-alone television device, and preferably projects three dimensional scenes or movies to motivate and stimulate the user during workouts or rehabilitation sessions. In use, a user is seated in the chair 11 with his or her legs secured within each foot pedal and placed forward of his or her seated position in the chair 11. A speed is chosen on the control interface 13, wherein the legs of the user move in a reciprocal motion similar to pedaling a bike or engaging in a walking motion. The user is capable of providing input into the pedals as the device is in operation; however this is not required for proper operation as the motor drives the user’s legs independently of external input. Further input from the user, however, can facilitate greater exercise and physical output, facilitating blood flow and loosening of the joints and muscles within the lower body. While the user’s legs are being mobilized, the visual stimulation relieves mental stress, stimulates the release of endorphins and further to relaxes or motivates the user while operating the device.

The visual stimulation 19 provides scenic views, a movie or set of images that are adapted to improve the overall experience and effectiveness of the exercise. The television may be mounted to the frame 16 or alternatively positioned in front of the user and unattached from the frame. It is not desired to limit the structure of the present device to one that accommodates a television stand, but rather to disclose elements of the overall assembly that are necessary for affecting the desired results, while realigning one’s walking gait, rehabbing an injured or impaired individual, or further providing an exercise device for the elderly. In place of a television and stand, an image or motion picture project may further be provided forward of the user and project theretofrom, wherein visual stimulation is provided via the projected image and scene emanating along a wall surface facing the user. This embodiment requires an adequate projection surface for proper operation, but does not require the physical aspects of the television or a stand therefor.

Further elements of the present device include user handles 26 that extend from the seat 11 for the user to grasp during operation of the device, along with a safety shutoff cord that allows the motor to cease when the user desires. The shutoff cord extends from the user to the control interface 13, whereby removal of a clip attached to the cord from the interface 13 shuts down the device in a similar fashion as a treadmill safety tether. The frame 16 is one that is adapted to support the chair 11 and the housing 15 that controls the motorized pedals 14 of the assembly. It may be positioned on rollers or lie flat against a ground surface if so designed. Adjustment of the seat position is further contemplated in the way of an adjustable seat support, wherein the distance between the seat 11 and the pedals 14 is adjustable, the angle of the seat, the height and tilt of the seat are also readily adjustable. The seat itself is mounted to the frame utilizing a pneumatic piston that allows for height adjustability above the seat support, while the support attaches to a slideable platform 17 along the upper portion of the frame. This slideable platform is positionable along the frame using a pin engagement that locks the two together and prevents relative motion, allowing for distance adjustability between the seat 11 and the pedals 14.

The present device is a motorized pedal operated rehabilitation device for lower body exercise, training and rehabilitation. It is unique in that it trains an individual’s gait, relieves stressed and weakened joints and muscles, reconditions injured or healing joints such as those with knee and hip replacements, and further maintains proper alignment of the user’s legs and lower body at variable operational speeds. The device is adapted to retrain the user’s brain through repetition of movement, muscle memory and strength development, wherein the user’s legs are moved and the user’s mind is stimulated to produce tangible results while the user’s mind is not focused on the activity or is stimulated by the visual projection in front of the user. The device allows for adjustable speeds for varying stages of rehabilitation, and is ideal for use by physicians, physical therapists, and trainers.

Referring now to FIG. 3, there is shown a perspective view of the present invention in a working state, wherein a user 21 is seated within the chair and her feet are securely fastened to each pedal 14. The user is engaged by the turning pedals, while the visual stimulation is operational for mental amusement and stimulation purposes. Three dimensional
stimulation has been shown as most effective, wherein the user employs polarized or similar three dimensional glasses technology and a three dimensional television or projection technology to be more fully engaged by the visual images projected therefrom. As the pedals are driven, the users legs are moved in a reciprocal manner, wherein the motor can drive the pedals in either rotational direction, forward or reverse. Increased blood flow and manipulation of the user’s leg joints facilitates healing, training and strength development for atrophied or impaired limbs.

[0037] Connecting to both of the user’s thigh region is a limb control brace, which comprises a first and second thigh-receiving cuff that is attachable to the user’s thighs using a removable attachment means. Between the two cuffs is at least one hingeable link having its terminal ends pivotably attached to each cuff interior portion and the link having an adjustable length. This link ensures the legs of the user stay in close proximity to one another during the pedal rotation, preventing uncontrolled movement and further training the user’s lower body proper walking posture and motion. The hingeable ends of the link allow the thighs to operate in a scissors manner while being driven by the foot pedals, however splayed or limb interference is prevented by the link maintaining the desired distance between thighs.

[0038] Also included may be a linkage or a tether that further prevents movement of the thighs, wherein the tether provides a less rigid means of constraining the user’s thighs while moving in conjunction with a single rigid linkage. This provides greater freedom of movement and user control between his or her legs, which is desired by higher strength or further developed users requiring less limb control assistance. Together, the control brace, the motive operation of the pedals and the visual stimulus function to introduce motion, exercise and therapy for an ailing, elderly or impaired individual.

[0039] Referring now to FIG. 4, there is shown a perspective view of the present motorized bicycle control interface, which comprises rotational speed control, a rotational direction control for the pedals, an operation on/off switch, and further two means of ceasing power to the assembly in the event of an emergency. A removable clip closes a circuit that allows functionality of the motor, wherein the clip may be removed if the user desires the machine to quickly cease operation. This is a common feature of motorized exercise machines, including treadmills and bicycles, wherein an emergency situation such as the user falling or hurting themselves may prevent them from quickly turning down the speed and ceasing the operation of the device, which may otherwise cause injury to the user. Also provided is an emergency stop button above the interface that can be depressed to cease operation of the device in the event of an emergency or the end of a workout. Positioning of the control interface is preferably along the frame and in front of the user or along the motor housing of the assembly and in close proximity to the seated user, wherein ready access to the interface is achievable while seated and the device is in operation. The emergency tether is connected to the user to allow the clip to be easily removed from the interface in the event of an emergency.

[0040] Referring now to FIG. 5, there is shown a perspective view of the seat adjustability elements that allow the user seat to be adjusted to accommodate users of different size and gender and those having particular seating preferences. The seat is supported by an upstanding post that supports the seat platform. Mounted on the platform is a pneumatic cylinder that is adjustable via a seat height crank handle 34, which introduces air in the cylinder or allows it to escape and thus lower the seat. Further provided is the seat bottom angle adjustment with respect to the frame level, seat back tilt adjustment, and further the handle bar positioning adjustment. The handle bar adjustment changes the angle of the handle bars with respect to the seat for improved overall ergonomics. Therefore, the seat is readily adjustable for any user, wherein the seat may be moved, tilted, raised, lowered and angled to provide the most comfortable seating and leg position while the user’s legs are being rotated.

[0041] Referring now to FIG. 6, there is shown a view of the present control brace of the present invention. The control brace provides a pair of cuffs that securely and removably connect to the thigh portions of the user’s legs while the user is seated and the device is operating the user’s legs in a reciprocal manner. At least one hingeable link between the braces prevents the user’s legs from separating or flailing wildly with respect to one another, and for aligning the user’s legs in a proper position through the pedal travel. A secondary link or chain may also be provided to further control the user’s legs in more than one discrete location. The use of a tether or chain as a second link reduces the overall constraint of the device and allows more freedom of movement for more controlled and advanced users. The control brace trains the user’s legs to adjust their walking gait, particularly for those having conditions that result in unsteady gait, scissors and toe walking or those with involuntary spasms that hinder a normal walking gait. Through repeated use of the assembly and the control brace, the user’s brain and muscles are trained a proper gait that can improve the user’s ability to walk by themselves or improve their gait while away from the device.

[0042] It is realized that many individuals have an improper walking gait, which can affect their complete body alignment. This misalignment can also negatively impact a person’s posture and can stem from a number of different impairments or disabilities. Without a proper means of rehabilitation or training, individuals may notice that their joints begin to cease operation as they should and muscles begin to atrophy, while some may also experience poor circulation as a result of poor mobility. The present device is adapted to provide an exercise, rehabilitation and training device for several classes of users, including: impair or handicapped users, those with disorders that affect lower body movement, the elderly, and finally the injured and recovering. The device trains an individual’s gait, increases blood flow, relieves joints and muscle pain, reconditions injured or healing joints such as those with knee and hip replacements, and improves leg function for those having health conditions that otherwise limit mobility or operation.

[0043] Associated with the apparatus of the present invention is an accompanying method of use, wherein a method of rehabilitation, training and exercise for impaired, injured or elderly persons is disclosed. The method comprises utilizing a motorized pedal bicycle to rotate a user’s lower body and legs in a reciprocal motion, while also allowing the user to input force on the bicycle pedals if desired and able. The method further comprises utilizing a visual stimulus to improve the individual’s mood, stimulate the mind and endorphin release, and to further distract and encourage the user while his or her legs are being mobilized. Finally, the method contemplates controlling the motion of the user’s legs using a pair of linked thigh braces, which control the thighs of a user and improve the user’s gait.
It is therefore submitted that the instant invention has been shown and described in what is considered to be the most practical and preferred embodiments. It is recognized, however, that departures may be made within the scope of the invention and that obvious modifications will occur to a person skilled in the art. With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention.

Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

I claim:

1. A walking gait training and lower body rehabilitation device, comprising:
   a motorized stationary bicycle device having a frame, a user seat, a pair of user pedals forward of said seat, and a motor and drivetrain assembly for rotating said pedals via first and second pedal crank;
   a visual stimulus forward of said seat.
2. The device of claim 1, wherein said pedals further comprise a securement means for securing said user’s feet to each pedal.
3. The device of claim 1, wherein said motor is variable speed and controllable by said user.
4. The device of claim 1, wherein said visual stimulus further comprises a television.
5. The device of claim 1, wherein said television further comprises a three dimensional display technology.
6. The device of claim 1, wherein said visual stimulus is a projector that projects images away from said user and onto a surface.
7. The device of claim 1, further comprising:
   a control brace connecting to a first and second thigh region of said user, said brace comprising a first and second removable thigh cuff surrounding each thigh and connected therebetween via at least one link having a pivotal connection to each cuff.
8. The device of claim 7, wherein a first link and a second tether are utilized for increased freedom of movement.
9. The device of claim 1, further comprising a control interface for controlling said pedal rotation speed, direction and operation.
10. The device of claim 1, wherein said motor and drivetrain assembly further comprise a means of monitoring back pressure against a desired operational direction, wherein said pedal cranks are ceased if a threshold back pressure is applied by a user to prevent injury or further unwanted rotation.
11. The device of claim 1, wherein said seat is adjustable position relative to said foot pedals is adjustable via a sliding platform connection that is positionally secured via a pin lock mechanism along said frame.
12. A walking gait training brace, comprising:
   a control brace connecting to a first and second thigh region of a user, said brace comprising a first and second removable thigh cuff surrounding each thigh and connected therebetween via at least one link having a pivotal connection to each cuff.
13. A walking gait training and lower body rehabilitation method, comprising the steps of:
   utilizing a stationary and motorized pedal bicycle to rotate a user’s legs in a reciprocal motion;
   utilizing a visual stimulus in front of said user to improve mood, stimulate said user’s mind and release endorphins, and to further distract and encourage said user while his or her legs are being mobilized.
14. The method of claim 13, further comprising the steps of:
   allowing the user to input force on the bicycle pedals if desired and able.
15. The method of claim 13, further comprising the steps of:
   controlling the motion of said user’s legs using a pair of linked thigh braces to control said user’s thighs and improve said user’s gait.
16. The method of claim 13, further comprising the steps of:
   utilizing a feedback means of monitoring back pressure against said pedal bike operational direction, and ceasing said pedal cranks if a threshold back pressure is applied by a user to prevent injury or further unwanted rotation.

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