TREADMILLS WITH ADJUSTABLE DECKS AND RELATED METHODS

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ABSTRACT
A treadmill may comprise a base and a deck comprising a treadmill. A front of the deck may be rotatably coupled to the base, and the deck may be rotatable between an operating position and a storage position. A front deck height adjustment mechanism may be located at a front portion of the deck, and a rear deck height adjustment mechanism may be located at a rear portion of the deck.
TREADMILLS WITH ADJUSTABLE DECKS AND RELATED METHODS

CROSS-REFERENCE TO RELATED APPLICATIONS

0001 This application claims priority to U.S. Provisional Patent application 61/786,019 filed on Mar. 14, 2013.

TECHNICAL FIELD

0002 Embeddings of the present invention relate to treadmills, deck adjustment mechanisms for treadmills and related methods.

BACKGROUND

0003 Running long distances has become a relatively popular activity, with many runners participating in marathons. Some runners enjoy the challenge of running distances longer than a marathon, such as 100 miles or more. In addition to running on roads and sidewalks, trail running has become popular. Accordingly, many long distances races are being run on mountain trails. However, conventional treadmills have not been configured to simulate such terrain for exercise and training purposes.

0004 Many conventional treadmills may include a platform that may be positioned to provide an incline to facilitate a more strenuous workout for fitness and/or weight loss.

0005 U.S. Pat. No. 6,945,912 to Avraham Levi describes a treadmill that provides height adjustment for both the front and the rear of the treadmill. The treadmill is taught to move up and down with a user’s stride, to more closely simulate walking up a hill without the same stress on the legs that may be experienced by exercising on a stair stepping device. Thus, the treadmill may provide an exercise that is more exciting than a conventional treadmill with less leg strain than a stair stepping device. The treadmill includes a large surrounding framework to facilitate the front and rear height adjustment of the treadmill. Thus, the treadmill would require a relatively large amount of floor space and would not be practical for many users to keep at their home.

SUMMARY

0006 In one aspect of the present disclosure, a treadmill may comprise a base and a deck comprising a treadbelt.

0007 In a further aspect, which may be combined with other aspects herein, a front of the deck may be rotatably coupled to the base and the deck may be rotatable between an operating position and a storage position.

0008 In a further aspect, which may be combined with other aspects herein, a front deck height adjustment mechanism may be located at a front portion of the deck.

0009 In a further aspect, which may be combined with other aspects herein, a rear deck height adjustment mechanism may be located at a rear portion of the deck.

0010 In a further aspect, which may be combined with other aspects herein, a motor may be located at the front portion of the deck.

0011 In a further aspect, which may be combined with other aspects herein, the motor may be configured to operate the rear deck height adjustment via an elongate power transmission device.

0012 In a further aspect, which may be combined with other aspects herein, the elongate power transmission device may comprise a screw.

0013 In a further aspect, which may be combined with other aspects herein, the rear deck height adjustment mechanism may comprise wheeled legs.

0014 In a further aspect, which may be combined with other aspects herein, the elongate power transmission device may comprise a barrel and a piston rod.

0015 In a further aspect, which may be combined with other aspects herein, the elongate power transmission device may comprise at least one of a chain, a belt, and a cable.

0016 In a further aspect, which may be combined with other aspects herein, the rear deck height adjustment mechanism may be configured to position the deck at a decline.

0017 In a further aspect, which may be combined with other aspects herein, the treadmill may comprise a frame extending from the base.

0018 In a further aspect, which may be combined with other aspects herein, the treadmill may comprise a console supported by the frame.

0019 In a further aspect, which may be combined with other aspects herein, the motor and elongate power transmission device may be configured to selectively move the deck between the operating position and the storage position.

0020 In a further aspect, which may be combined with other aspects herein, the storage position may comprise a substantially vertical deck orientation, with the rear portion of the deck overlying the front portion of the deck.

0021 In a further aspect, which may be combined with other aspects herein, the rear deck height adjustment mechanism may comprise a scissor jack.

0022 In a further aspect, which may be combined with other aspects herein, the rear deck height adjustment mechanism may comprise a crossbar hinged to a frame of the deck.

0023 In a further aspect, which may be combined with other aspects herein, a first leg may extend from the crossbar proximate to a first end of the crossbar.

0024 In a further aspect, which may be combined with other aspects herein, a second leg may extend from the crossbar proximate to a second end of the crossbar.

0025 In a further aspect, which may be combined with other aspects herein, a lever arm may extend from a central region of the crossbar.

0026 In a further aspect, which may be combined with other aspects herein, the lever arm may be coupled to the elongate power transmission device.

0027 In a further aspect, which may be combined with other aspects herein, the method may further comprise raising a rear portion of the deck with a motor coupled to the base of the treadmill.

0028 In a further aspect, which may be combined with other aspects herein, the method may further comprise rotating a screw with the motor to raise the rear portion of the deck.

0029 In a further aspect, which may be combined with other aspects herein, the method may further comprise rotating the screw with the motor to raise the rear portion of the deck.

0030 In a further aspect, which may be combined with other aspects herein, raising the rear portion of the deck with the motor located at the front of the deck may comprise raising the rear portion of the deck with the motor located forward of a pivot point between the deck and the base when the deck is in the operating position.

0031 In a further aspect, which may be combined with other aspects herein, the method may further comprise utilizing...
ing the motor as a counter weight to facilitate moving the deck from the operating position to the storage position.

0032. In an additional aspect of the present disclosure, a method of manufacturing a treadmill may comprise providing a base.

0033. In a further aspect, which may be combined with other aspects herein, the method may further comprise providing a deck comprising a treadmill.

0034. In a further aspect, which may be combined with other aspects herein, the method may further comprise rotatably coupling a front of the deck to the base to facilitate rotation of the deck between an operating position and a storage position.

0035. In a further aspect, which may be combined with other aspects herein, the method may further comprise positioning a front deck height adjustment mechanism at a front portion of the deck.

0036. In a further aspect, which may be combined with other aspects herein, the method may further comprise positioning a rear deck height adjustment mechanism at a rear portion of the deck.

0037. In a further aspect, which may be combined with other aspects herein, the method may further comprise positioning a motor at the front portion of the deck.

0038. In a further aspect, which may be combined with other aspects herein, the method may further comprise coupling the motor to the rear deck height adjustment with an elongate power transmission device.

0039. In a further aspect, which may be combined with other aspects herein, coupling the motor to the rear deck height adjustment with the elongate power transmission device may comprise coupling the motor to the rear deck height adjustment with a screw.

0040. In a further aspect, which may be combined with other aspects herein, positioning the rear deck height adjustment mechanism at the rear portion of the deck may comprise positioning a rear deck height adjustment mechanism comprising wheeled legs at the rear portion of the deck.

0041. In a further aspect, which may be combined with other aspects herein, coupling the motor to the rear deck height adjustment with the elongate power transmission device may comprise coupling the motor to the rear deck height adjustment with a barrel and a piston rod.

0042. In a further aspect, which may be combined with other aspects herein, coupling the motor to the rear deck height adjustment with the elongate power transmission device may comprise coupling the motor to the rear deck height adjustment with at least one of a chain, a belt, and a cable.

0043. FIG. 4A is a schematic side view of the deck and the portion of the base of FIG. 2, wherein a rear deck height adjustment mechanism is in a raised position.

0044. FIG. 4B is a schematic side view of the deck and the portion of the base of FIG. 2, wherein a front deck height adjustment mechanism is in a raised position.

0045. FIG. 5 is a schematic side view of the deck and the portion of the base of FIG. 2, wherein the deck is in a stowed position.

0046. FIG. 6 is a side detail view of an elongate power transmission device including a piston rod and cylinder for a treadmill according to an embodiment of the present disclosure.

0047. FIG. 7 is a side detail view of deck height adjustment mechanism comprising a scissor jack for a treadmill according to an embodiment of the present disclosure.

0048. FIG. 8 is a schematic side view of the deck and the portion of the base of a treadmill in a stowed position, wherein a motor for operating a rear deck height adjustment mechanism is utilized to move the deck to the stowed position, wherein the deck is in a stowed position, according to an embodiment of the present disclosure.

0049. FIG. 9 is a schematic side view of the deck and the portion of the base of FIG. 2. Throughout the drawings, identical reference numbers designate similar, but not necessarily identical, elements.

DETAILED DESCRIPTION

0050. FIG. 1 is an isometric view of a treadmill according to an embodiment of the present disclosure.

0051. FIG. 2 is a schematic top view of a deck and a portion of a base of the treadmill of FIG. 1.

0052. FIG. 3 is a schematic side view of the deck and the portion of the base of FIG. 2.

0053. In some embodiments, a treadmill 10 may include a base 12 and a deck 14 having a front portion 15 pivotally attached to the base 12. The deck 14 may include a treadmill 16 that may provide a continuous running surface during operation of the treadmill 10. A frame 18 may extend from the base 12 and support a console 20. Additionally, the frame 18 may include one or more handrails 22 to provide support and balance to a user.

0054. The deck 14 may be supported by a deck frame 24, as shown in FIG. 2, which may include a left side rail 26 and a right side rail 28 connected by laterally extending crossmembers 30. A front roller 32 (see FIG. 3) may be rotatably coupled to and extend between the side rails 26, 28 at a front portion 15 of the deck frame 24. Likewise, a rear roller 34 (see FIG. 3) may be rotatably coupled to and extend between the side rails 26 and 28 at a rear portion 17 of the deck frame 24. Additionally, a support surface 36 (see FIG. 1) may be coupled to and extend between the side rails 26 and 28 at a location between the front and rear rollers 32 and 34.

0055. The treadbelt 16 may be routed around the rollers 32 and 34 and the support surface 36, to provide a continuous running surface. In some embodiments, a drive motor 40 may be mounted to the deck frame 24 or the base 12 of the treadmill 10 and a belt 42, or other power transmission device, may extend between the drive motor 40 and the front roller 32, to selectively rotate the front roller 32, and thus rotate the treadbelt 16.

0056. A rear deck height adjustment mechanism 50 may be located at a rear portion 17 of the deck 14. In one embodiment, the rear deck height adjustment mechanism 50 may be rotatably coupled to the side rails 26 and 28 of the deck frame 24. The rear deck height adjustment mechanism 50 may comprise a cross-bar 52, a left leg 54 extending from the cross-bar 52 proximate to a first end and a right leg 56 extending from the cross-bar 52 proximate to a second end. Each of the left leg 54 and the right leg 56 may include a wheel 58 positioned...
to contact the floor underlying the treadmill 10, when the deck 14 is in an operating position (e.g., a horizontal orientation, see FIGS. 1-4).

[0058] A lever arm 60 may extend from a central region of the cross-bar 52 of the rear deck height adjustment mechanism 50. Accordingly, when a force is applied to the lever arm 60 a torque may be applied to the rear deck height adjustment mechanism 50 and the legs 54 and 56 of the rear deck height adjustment mechanism 50 may rotate relative to the deck frame 24.

[0059] A first motor 62, for operating the rear deck height adjustment mechanism 50, may be located at the front portion 15 of the deck 14. An elongate power transmission device 64 may extend from the first motor 62 to the lever arm 60 of the rear deck height adjustment mechanism 50. For example, the elongate power transmission device 64 may comprise a screw 66 that extends through the nut 68. Accordingly, helical threads of the screw 66 may be intermeshed with corresponding helical threads of the nut 68. As the first motor rotates, the elongate power transmission device 64 also rotates, which causes the helical threads to move with respect to the nut 68 causing the nut 68 and the cross-bar 52 to move. As the cross-bar 52 moves, the left leg 54 and the right leg 56 pivot together with respect to the deck 14 thereby raising or lowering the rear portion 17 of the deck 14.

[0060] In further embodiments, an elongate power transmission device 64 may comprise a barrel 94 and a piston rod 96, as shown in FIG. 6. In yet further embodiments, an elongate power transmission device may comprise at least one of a chain, a belt, and a cable.

[0061] Referring again to FIG. 2, a front deck height adjustment mechanism 70 may be located at a front portion 15 of the deck 14. In one embodiment, the front deck height adjustment mechanism 70 may be rotatably coupled to the side rails 26 and 28 of the deck frame 24. The front deck height adjustment mechanism 70 may comprise a crossbar 72, a left arm 74 extending from the crossbar 72 proximate to a first end and a right arm 76 extending from the crossbar 72 proximate to a second end. Each of the left arm 74 and the right arm 76 may be also be rotatably coupled to the base 12 of the treadmill 10.

[0062] A lever arm 78 may extend from a central region of the crossbar 72 of the front deck height adjustment mechanism 70. Accordingly, when a force is applied to the lever arm 78 a torque may be applied to the front deck height adjustment mechanism 70 and the arms 76 and 78 of the front deck height adjustment mechanism 70 may rotate relative to the deck frame 24 and the base 12 of the treadmill 10.

[0063] A second motor 80, for operating the front deck height adjustment mechanism 70, may be located at the front portion 15 of the deck 14. A power transmission device 82 may extend from the second motor 80 to the lever arm 78 of the front deck height adjustment mechanism 70. For example, a screw 84 may extend from the second motor 80 to the lever arm 78 of the front deck height adjustment mechanism 70. A nut 86 may be hinged to the lever arm 78 of the front deck height adjustment mechanism 70, and the screw 84 may extend through the nut 86. Accordingly, helical threads of the screw 84 may be intermeshed with corresponding helical threads of the nut 86.

[0064] The rear deck height adjustment mechanism 50 and the front deck height adjustment mechanism 70 may be actuated independently of one another. Thus, a user, a trainer, or a program may send instructions to the first motor 62 to raise or lower without sending instructions to the second motor 80 and vice versa. The user may control either the front deck height adjustment mechanism 50 or the rear deck height adjustment mechanism 70 through a control console of the treadmill. Such a control console may also control the tread belt speed and other operating parameters of the treadmill. In some examples, the user selects a pre-programmed exercise routine. Such a program may also send independent instructions to the rear deck height adjustment mechanism 50 and the front deck height adjustment mechanism 70. In yet another example, the user executes a program that mimics the terrain of a selected jogging route, and the program sends independent instructions to the rear deck height adjustment mechanism 50 and the front deck height adjustment mechanism 70 to mimic the uphill and downhill slopes of the selected jogging route.

[0065] In the illustrated examples, the first motor 62 is located in the front portion 15 of the treadmill 10 adjacent to the underside of the deck 14. However, in other examples, the first motor 62 is located in the rear portion 17 of the treadmill 10. In such an example, power transmission device 64 may have a similar length to the power transmission device 82.

[0066] The rear deck height adjustment mechanism 50 may have the ability to cause the declining slope to range from zero degrees to 60 degrees with respect to the floor that supports the treadmill 10. Thus, the rear deck height adjustment mechanism 50 may cause the declining slope of the deck 14 to be anywhere between zero and 60 degrees. For example, the rear deck height adjustment mechanism 50 may cause the declining slope to be 5 degrees, 10 degrees, 15 degrees, or anywhere there between. Likewise, the front deck height adjustment mechanism 70 may have the ability to cause a forward slope of the deck 14 to range between zero and 60 degrees. As a result, the front deck height adjustment mechanism 70 may cause the forward slope of the deck 14 to be anywhere between zero and 60 degrees. For example, the front deck height adjustment mechanism 70 may cause the declining slope to be 5 degrees, 10 degrees, 15 degrees, or anywhere there between. In some examples, independent signals may be sent to the rear and front deck height adjustment mechanisms 50, 70 at the same time. In such an example, the overall slope of the deck 14 will depend on the relatively heights of the front and rear portions 15, 17 of the treadmill 10.

[0067] In addition to utilizing lever-type deck height adjustment mechanisms, in some embodiments at least one of the front deck height adjustment mechanism and the rear deck height adjustment mechanism may comprise a scissor jack 98, as shown in FIG. 7. In such an example, the front portion 15 and/or the rear portion 17 of the deck 14 can be raised and lowered without pivoting the right leg or the left legs of the height adjustment mechanisms on wheels as described in FIGS. 4A and 4B. In the example of FIG. 7, a jack shaft 700 may be coupled to a first joint 702 and a second joint 704 with a threaded section 706. As the threaded section 706 rotates in a first direction, the first and second joints 702, 704 are brought closer together, which causes the first jack leg 708 and a second jack leg 710 to extend vertically. Such a vertical extension can be used to raise either the front portion 15 or the rear portion 17 of the deck 14.

[0068] Likewise, when the threaded section 706 rotates in an opposite, second direction, the first and second joints 702, 704 are spread farther apart. As the joints 702, 704 spread farther apart, the jack legs 708, 710 retract vertically. Such a vertical retraction can be used to lower either the front portion 15 or the rear portion 17 of the deck 14.
In some embodiments, a lift assist device 90 for facilitating the movement of the deck between the operating position and the storage position may extend between the deck frame 24 and the base 12 of the treadmill 10, as shown in FIG. 5. The lift assist device 90 may comprise a pneumatic cylinder 92 that extends between the base 12 and the deck frame 24. The pneumatic cylinder 92 may be configured to store energy when the deck 14 is lowered from the stored position to the operating position (e.g., energy may be stored in the pneumatic cylinder as compressed gas as the length of the pneumatic cylinder 92 is retracted). The stored energy in the pneumatic cylinder 92 may then be utilized to assist in lifting the deck 14 from the operating position (e.g., compressed gas in the pneumatic cylinder 92 may expand, assisting in extending the length of the pneumatic cylinder 92). In further embodiments, the lift assist device 90 may comprise one or more of a spring, a counterweight, and a pulley.

The placement of the first motor 62, for the rear deck height adjustment mechanism 50, at the front portion 15 of the deck 14 may facilitate the movement of the deck 14 between the operating position and the storage position.

In some embodiments, both the first and second motors 62 and 80 may be positioned forward of the hinge point between the deck 14 and the base 12 of the treadmill 10. In this position, the weight of the first and second motors 62 and 80 may provide a counter weight to the portion of the deck 14 that extends rearward of the hinge point between the deck 14 and the base 12 of the treadmill 10. Accordingly, the amount of weight that a user would lift to move the deck 14 from the operating position to the stowed position may be reduced.

In further embodiments, the first motor 62 may be positioned at or rearward of the hinge point between the deck 14 and the base 12 of the treadmill 10. The first motor 62 may be adjacent the hinge point, so that leverage provided by the length of the deck 14 extending rearward of the hinge point may facilitate lifting of the first motor 62.

In additional embodiments, as shown in FIG. 8, a treadmill 100 may be configured to move a deck 114 between the operating position and the storage position under the power of a first motor 162. In such embodiments, the first motor 162 may be hingably attached to a base 112 and positioned so that as the first motor 162 turns an elongate power transmission device 164 beyond a certain point, the rear portion 17 of the deck 114 may be urged upward to the storage position (see FIG. 8).

Likewise, the first motor 162 may be rotated in the other direction, and the elongate power transmission device 164 may rotate to lower the deck 114 from the storage position to the operating position.

In operation, a user may move the deck 14 of the treadmill 10 (see FIGS. 1-5) from the storage position to the operating position. A user may then exercise on the treadmill 10 while a variety of slopes are simulated by the treadmill 10. A substantially flat surface may be simulated by the treadmill 10 while a user runs on the treadmill 10, such as by lowering both the front deck height adjustment mechanism 70 and the rear deck height adjustment mechanism 50 to a fully lowered position, as shown in FIGS. 1-3. By operating the second motor 80, the front deck height adjustment mechanism 70 may be raised to simulate running up a slope, as shown in FIG. 4.5. When the front deck height adjustment mechanism 70 is lowered, the first motor 62 may be operated to raise the rear deck height adjustment mechanism 50 to simulate running down a slope, as shown in FIG. 4A.

INDUSTRIAL APPLICABILITY

Running long distances has become a relatively popular activity, with many runners participating in marathons. Some runners enjoy the challenge of running distances longer than a marathon, such as 100 miles or more. In addition to running races on roads and sidewalks, trail running has become popular. Accordingly, many long distances races are being run on mountain trails. However, conventional treadmills have not been configured to simulate such terrain for exercise and training purposes. Treadmills according to embodiments of the present disclosure provide improvements over such conventional treadmills.

Additionally, by providing a declining deck, the present treadmill provides for the ability to focus on previously underdeveloped muscle groups such as a runner’s quads and core. Further, such a declining slope may assist a user in training for races that have routes that incorporate downhill sections.

In some embodiments, a treadmill may include a base and a deck having a front portion pivotally attached to the base. The deck may include a treadmill belt that may provide a continuous running surface during operation of the treadmill. A frame may extend from the base and support a console. Additionally, the frame may include one or more handrails to provide support and balance to a user.

The deck may be supported by a deck frame, which may include a left side rail and a right side rail connected by laterally extending cross-members. A front roller may be rotatably coupled to and extend between the side rails at a front portion of the deck frame. Likewise, a rear roller may be rotatably coupled to and extend between the side rails at a rear portion of the deck frame. Additionally, a support surface may be coupled to and extend between the side rails at a location between the front and rear rollers.

The treadmill belt may be routed around the rollers and the support surface, to provide a continuous running surface. In some embodiments, a drive motor may be mounted to the deck frame or the base of the treadmill and a belt, or other power transmission device, may extend between the drive motor and the front roller, to selectively rotate the front roller, and thus rotate the treadmill belt.

A rear deck height adjustment mechanism may be located at a rear portion of the deck. In one embodiment, the rear deck height adjustment mechanism may be rotatably coupled to the side rails of the deck frame. The rear deck height adjustment mechanism may comprise a cross-bar, a left leg extending from the cross-bar proximate to a first end and a right leg extending from the cross-bar proximate to a second end. Each of the left leg and the right leg may include a wheel positioned to contact the floor underlying the treadmill, when the deck is in an operational position (e.g., a horizontal orientation).

A lever arm may extend from a central region of the cross-bar of the rear deck height adjustment mechanism. Accordingly, when a force is applied to the lever arm a torque may be applied to the rear deck height adjustment mechanism and the legs of the rear deck height adjustment mechanism may rotate relative to the deck frame.

A first motor, for operating the rear deck height adjustment mechanism, may be located at the front portion of the deck. An elongate power transmission device may extend...
from the first motor to the lever of the rear deck height adjustment mechanism. For example, the elongate power transmission device may comprise a screw extending from the first motor located at the front of the deck to the lever of the rear deck height adjustment mechanism. A nut may be hinged to the lever of the rear deck height adjustment mechanism, and the screw may extend through the nut. Accordingly, helical threads of the screw may be intermeshed with corresponding helical threads of the nut.

In further embodiments, the elongate power transmission device may comprise a barrel and a piston rod, as shown in FIG. 6. In yet further embodiments, the elongate power transmission device may comprise at least one of a chain, a belt, and a cable.

Alternatively, the rear deck height adjustment mechanism and/or the front deck height adjustment mechanism may include any number of height adjustment mechanisms including, but not limited to, a scissor jack, hydraulic pistons, electric solenoid type pistons, geared jacks, and the like. Furthermore, the rear deck height adjustment mechanism and/or the front deck height adjustment mechanism may be actuated in response to any number of inputs including, but not limited to, computer or electrical commands, manual adjustment, and the like.

A front deck height adjustment mechanism may be located at a front portion of the deck. In one embodiment, the front deck height adjustment mechanism may be rotatably coupled to the side rails of the deck frame. The front deck height adjustment mechanism may comprise a cross-bar, a left arm extending from the cross-bar proximate to a first end and a right arm extending from the cross-bar proximate to a second end. Each of the left arm and the right arm may also be rotatably coupled to the base of the treadmill.

A lever arm may extend from a central region of the cross-bar of the front deck height adjustment mechanism. Accordingly, when a force is applied to the lever arm a torque may be applied to the front deck height adjustment mechanism and the arms of the front deck height adjustment mechanism may rotate relative to the deck frame and the base of the treadmill.

In addition to utilizing lever-type deck height adjustment mechanisms, some embodiments at least one of the front deck height adjustment mechanism and the rear deck height adjustment mechanism may comprise a scissor jack, as shown in FIG. 7, hydraulic pistons, electric solenoid type pistons, geared jacks, and the like.

A second motor, for operating the front deck height adjustment mechanism, may be located at the front portion of the deck. A power transmission device may extend from the motor to the lever of the front deck height adjustment mechanism. For example, a screw may extend from the motor to the lever of the front deck height adjustment mechanism. A nut may be hinged to the lever of the front deck height adjustment mechanism, and the screw may extend through the nut. Accordingly, helical threads of the screw may be intermeshed with corresponding helical threads of the nut.

In addition to utilizing lever-type deck height adjustment mechanisms, some embodiments at least one of the front deck height adjustment mechanism and the rear deck height adjustment mechanism may comprise a scissor jack, as shown in FIG. 7.

In some embodiments, a lift assist device, for facilitating the movement of the deck between the operating position and the storage position, may extend between the deck frame and the base of the treadmill. The lift assist device may comprise a pneumatic cylinder that extends between the base and the deck frame. The pneumatic cylinder may be configured to store energy when the deck is lowered from the stored position to the operating position (e.g., energy may be stored in the pneumatic cylinder as compressed gas as the length of the pneumatic cylinder is retracted). The stored energy in the pneumatic cylinder may then be utilized to assist in lifting the deck from the operating position (e.g., compressed gas in the pneumatic cylinder may expand, assisting in extending the length of the pneumatic cylinder). In further embodiments, the lift assist device may comprise one or more of a spring, a counterweight, and a pulley.

The placement of the first and second motors, for the rear deck height adjustment mechanism and the front deck height adjustment mechanism, respectively, at the front portion of the deck may facilitate the movement of the deck between the operating position and the storage position.

In some embodiments, the first and second motors may be positioned forward of the hinge point between the deck and the base of the treadmill. In this position, the weight of the first and second motors may provide a counter weight to the portion of the deck that extends rearward of the hinge point between the deck and the base of the treadmill. Accordingly, the amount of weight that a user would lift to move the deck from the operating position to the stowed position may be reduced.

In further embodiments, the first and second motors may be positioned at or rearward of the hinge point between the deck and the base of the treadmill. The first and second motors may be adjacent the hinge point, so that leverage provided by the length of the deck extending rearward of the hinge point may facilitate lifting of the deck and motors.

In additional embodiments, a treadmill may be configured to move the deck between the operating position and the storage position under the power of the first motor. In such embodiments, the first motor may be hingably attached to the base and positioned so that as the motor turns the elongate power transmission device beyond a certain point, the rear portion of the deck may be urged upward to the storage position.

In operation, a user may move the deck of the treadmill from the stowed position to the operating position. A user may then exercise on the treadmill while a variety of slopes are simulated by the treadmill. A substantially flat surface may be simulated by the treadmill while a user runs on the treadmill, such as by lowering both the front deck height adjustment mechanism and the rear deck height adjustment mechanism to a fully lowered position, as shown in FIGS. 1-3. By operating the second motor, the front deck height adjustment mechanism may be raised to simulate running up a slope, as shown in FIG. 4B. When the front deck height adjustment mechanism is lowered, the first motor may be operated to raise the rear deck height adjustment mechanism to simulate running down a slope, as shown in FIG. 4A.

In view of the foregoing, treadmills according to embodiments of the present disclosure may be utilized for training for running on varied terrain, including downhill slopes. Additionally, treadmills according to embodiments of the present disclosure may be utilized for low exertion exercises, such as walking down a decline, for users who are unable to exercise at high exertion levels or who are undergoing physical therapy for an injury.
What is claimed is:
1. A treadmill comprising:
   a base;
   a deck comprising a treadbelt, a front of the deck rotatably coupled to the base, the deck rotateable between an operating position and a storage position;
   a front deck height adjustment mechanism located at a front portion of the deck; and
   a rear deck height adjustment mechanism located at a rear portion of the deck.
2. The treadmill of claim 1, wherein the rear deck height adjustment mechanism includes a motor located in the front portion of the deck, the motor configured to operate the rear deck height adjustment via an elongate power transmission device.
3. The treadmill of claim 1, wherein the elongate power transmission device comprises a screw.
4. The treadmill of claim 1, wherein the rear deck height adjustment mechanism comprises wheeled legs.
5. The treadmill of claim 1, wherein the elongate power transmission device comprises a barrel and a piston rod.
6. The treadmill of claim 1, wherein the elongate power transmission device comprises at least one of a chain, a belt, and a cable.
7. The treadmill of claim 1, wherein the rear deck height adjustment mechanism is configured to position the deck at a decline.
8. The treadmill of claim 1, further comprising:
   a frame extending from the base; and
   a console supported by the frame.
9. The treadmill of claim 1, wherein the motor and elongate power transmission device are configured to selectively move the deck between the operating position and the storage position.
10. The treadmill of claim 1, wherein the storage position comprises a substantially vertical deck orientation, with the rear portion of the deck overlying the front portion of the deck.
11. The treadmill of claim 1, wherein the rear deck height adjustment mechanism comprises a scissor jack.
12. The treadmill of claim 1, wherein the rear deck height adjustment mechanism comprises a crossbar hinged to a frame of the deck;
   a first leg extending from the crossbar proximate to a first end of the crossbar;
   a second leg extending from the crossbar proximate to a second end of the crossbar; and
   a lever arm extending from a central region of the crossbar, the lever arm coupled to the elongate power transmission device.
13. A method of operating a treadmill, the method comprising:
   rotating a deck of a treadmill about a front of the deck relative to a base of the treadmill to move the deck from a storage position to an operating position; and
   raising a rear portion of the deck with a motor located at the front of the deck.
14. The method of claim 13, further comprising rotating a screw with the motor to raise the rear portion of the deck.
15. The method of claim 13, wherein raising the rear portion of the deck with a motor located at the front of the deck comprises raising the rear portion of the deck with a motor coupled to the base of the treadmill.
16. The method of claim 13, further comprising utilizing the motor as a counter weight to facilitate moving the deck from the operating position to the storage position.
17. A treadmill comprising:
   a base;
   a deck comprising a treadbelt, a front of the deck rotatably coupled to the base, the deck rotateable between an operating position and a storage position;
   a front deck height adjustment mechanism located at a front portion of the deck;
   a rear deck height adjustment mechanism located at a rear portion of the deck; and
   a motor located at the front portion of the deck, the motor configured to operate the rear deck height adjustment via an elongate power transmission device.
18. The treadmill of claim 17, wherein the elongate power transmission device comprises a screw.
19. The treadmill of claim 17, wherein the rear deck height adjustment mechanism comprises wheeled legs.
20. The treadmill of claim 17, wherein the motor and elongate power transmission device are configured to selectively move the deck between the operating position and the storage position.

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