An exercise machine comprising a frame, a first hand grip, and a second hand grip. The first and second hand grips are each operably associated with the frame for traveling along converging first and second hand paths respectively.
EXERCISE EQUIPMENT WITH CONVERGENT HAND GRIPS

This application claims the benefit of U.S. Provisional Application No. 60/694,723, filed Jun. 28, 2005.

FIELD OF INVENTION

This invention relates to exercise equipment, more specifically to stationary cardiovascular exercise equipment, and most specifically to stationary cardiovascular exercise equipment with arm links movable along a reciprocating or closed loop path.

BACKGROUND

Stationary exercise equipment designed to work the upper-body typically includes pivoting arm links attached to a workload. Such stationary exercise equipment includes both weight training equipment and cardiovascular equipment.

Pivoting arm links on conventional stationary exercise equipment are sometimes configured to travel concurrently (e.g., a bench press station or a rowing machine) and sometimes configured to travel counter currently (e.g., elliptical exercise machines, ski simulation machines, stationary bicycles, etc.), but are always configured to travel along paths which are parallel to one another and parallel to the path traveled by any associated foot support links. Such parallel arm motion, while generally effective for providing the desired weight lifting or cardiovascular exercise, can feel clumsy and awkward to the user causing some users to reduce or even discontinue use of the exercise machine.

Accordingly, a need exists for stationary cardiovascular exercise equipment which provides a more natural movement of the arms when exercising the upper-body.

SUMMARY OF THE INVENTION

A first embodiment of the claimed invention is an exercise machine comprising a frame, a first hand grip, and a second hand grip. The first and second hand grips are each operably associated with the frame for traveling along converging first and second hand paths respectively.

A second embodiment of the claimed invention is an exercise machine comprising a frame, a first foot support, a second foot support, a right hand grip, and a left hand grip. The frame defines a primary transverse axis. The first and second foot supports are each operably associated with the frame for traveling along a foot path configured orthogonally relative to the primary transverse axis. The right and left hand grips are each operably associated with a foot support for traveling along converging hand paths when the foot supports travel along the foot paths, wherein each hand path is angled relative to each foot path.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of one embodiment of the invention deployed on an elliptical exercise machine.

FIG. 2 is a top view of the arm link portion of the invention shown in FIG. 1.

FIG. 3 is a perspective view of one of the arm link connection brackets on the invention shown in FIG. 1.

FIG. 4 is a cross-sectional view of the arm link connection bracket shown in FIG. 3 taken along line 4-4.

FIG. 5 is a right side view of a second embodiment of the invention deployed on an elliptical exercise machine with elements of the frame removed to facilitate viewing of other components of the invention.

FIG. 6 is a left side view of the invention shown in FIG. 5.

FIG. 7 is an enlarged left side view of the front end portion of the invention shown in FIG. 6 with the foot link and elements of the frame removed to facilitate viewing of other components of the invention.

FIG. 8 is a top view of the arm link connection subassembly shown in FIGS. 5-7 viewed along line 8-8.

FIG. 9 is a perspective view of the arm link connection subassembly shown in FIG. 8.

FIG. 10 is an exploded perspective view of the arm link connection subassembly shown in FIG. 9.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Nomenclature

10 Exercise Machine
20 Frame
21 Cross Beam
22 First Mounting Bracket
30 Drive Shaft
40 Crank Arm
50 Foot Link
56 Foot Support
60 Roller on Foot Link
70 Rocker Arm
80 Connector Link
90 Guide Rail
100 Arm Link
100a First End of Arm Link
100b Second End of Arm Link
110 Intermediate Link
110a First End of Intermediate Link
110b Second End of Intermediate Link
120 Coupling Link
120a First End of Coupling Link
120b Second End of Coupling Link
130 Hand Grips
130a Right Hand Grip
130b Left Hand Grip
131p Path Traveled by the Right Hand Grip
132p Path Traveled by the Left Hand Grip
[0044] 200 Bracket Connecting Arm Link to Frame
[0045] 210 Primary Shaft
[0046] 210a First End of Primary Shaft
[0047] 210b Second End of Primary Shaft
[0048] 220 Primary Bearing
[0049] 230 Secondary Shaft
[0050] 230a First End of Secondary Shaft
[0051] 230b Second End of Secondary Shaft
[0052] 240 U-Joint
[0053] 250 Housing
[0054] 260 Fitting
[0055] 270 Bearing Unit
[0056] 300 Axle
[0057] 310 Turnbuckle
[0058] 310a First End of Turnbuckle
[0059] 310b Second End of Turnbuckle
[0060] 320 Bent Crank
[0061] 320a First End of Bent Crank
[0062] 320b Second End of Bent Crank
[0063] 330 Bearing Housing
[0064] 340 Flanged Bearing
[0065] 350 Arm Axle
[0066] 360 Arm Mounting Bracket
[0067] 360a First End of Arm Axle
[0068] 360b Second End of Arm Axle
[0069] 351 Mounting Plate on Arm Axle
[0070] 352 Post on Arm Axle
[0071] 360 First End Foot Link Pivot Point
[0072] 372 Second End Foot Link Pivot Point
[0073] 373 Rocker Pivot Point
[0074] 374 Crank Pivot Point
[0075] 375 First End Intermediate Link Pivot Point
[0076] 376 Second End Intermediate Link Pivot Point
[0077] 377 Arm Link Pivot Point
[0078] 378 Coupling Link Pivot Point
[0079] 379 First Turnbuckle Pivot Point
[0080] 380 Second Turnbuckle Pivot Point
[0081] 381 Angled Axis
[0082] 382 x Lateral Axis
[0083] 383 y Longitudinal Axis
[0084] 384 y1 Forward Longitudinal Direction
[0085] 385 z Transverse Axis
[0086] 386 z1 Primary Transverse Axis
[0087] 387 z2 Secondary Transverse Axis
[0088] r Right Hand Grip Axis of Rotation
[0089] s Left Hand Grip Axis of Rotation
[0090] α Angle of Convergence

Description

[0091] Referring to FIGS. 1, 2, 5, 6 and 7, the invention is an exercise machine 10 having a frame 20 and right and left hand grips 130r and 130l each operably associated with the frame 20 for traveling along longitudinally y converging first and second hand paths 131p and 132p, respectively.

[0092] The exercise machine 10 may be substantially any type of exercise machine having arm links 100 which travel forward and backward relative to a user (not shown) for working the upper body. Suitable exercise machines 10 includes specifically, but not exclusively, bench press stations, stationary bicycles equipped with arm links, elliptical exercise machines equipped with arm links, rowing machines, stair climbers equipped with arm links, treadmills equipped with arm links, ski simulation machines, etc. Preferred exercise machines 10 are stationary cardiovascular exercise machines having arm links 100. Without intending to be limited thereby, the balance of the disclosure shall be provided in connection with elliptical exercise machines. A wide variety of elliptical exercise machines equipped with arm links for working the upper body are known, such as those described in U.S. Pat. Nos. 6,972,754, 4,733,419, 6,726,690, 6,719,665, 6,689,019, 6,645,129, 6,629,909, 6,629,079, 6,612,969, 6,579,210, 6,575,877, 6,569,061, 6,565,486, 6,554,750, 6,551,218, 6,544,146, 6,540,646, 6,527,680, 6,527,677, 6,500,396, 6,482,132, 6,482,130, 6,461,277, 6,450,925, 6,440,042, 6,436,007, 6,422,977, 6,422,976, 6,416,442, 6,409,635, 6,409,632, 6,398,695, 6,390,953, 6,368,252, 6,361,476, 6,350,219, 6,340,340, 6,338,698, 6,313,362, 6,302,830, 6,302,825, 6,277,054, 6,254,514, 6,248,046, 6,248,045, 6,248,044, 6,238,321, 6,217,485, 6,210,305, 6,206,804, 6,196,948, 6,183,397, 6,171,215, 6,168,552, 6,152,859, 6,149,551, 6,142,915, 6,135,923, 6,126,574, 6,113,518, 6,099,439, 6,090,014, 6,077,013, 6,083,143, 6,080,091, 6,080,086, 6,077,198, 6,077,197, 6,063,009, 6,053,847, 6,045,487, 6,042,512, 6,042,512, 6,030,320, 6,027,431, 6,027,430, 6,024,676, 6,017,295, 6,015,011, 5,997,445, 5,993,359, 5,989,159, 5,967,954, 5,957,814, 5,947,972, 5,938,570, 5,938,568, 5,938,567, 5,924,963, 5,924,962, 5,921,894, 5,919,118, 5,916,064, 5,911,649, 5,910,072, 5,895,339, 5,893,820, 5,882,281, 5,879,271, 5,876,307, 5,857,941, 5,848,954, 5,846,166, 5,836,855, 5,823,919, 5,803,871, 5,792,028, 5,792,026, 5,788,610, 5,788,609, 5,766,113, 5,755,643, 5,755,642, 5,746,683, 5,743,834, 5,738,614, 5,733,227, 5,722,558, 5,692,994, 5,690,589, 5,685,804, 5,683,333, 5,653,662, 5,611,758, 5,611,756, 5,595,553, 5,593,371, 5,591,107, 5,577,985, 5,573,480, 5,562,574, 5,540,637, 5,529,554, 5,518,473, 5,516,471, 5,545,774, 5,423,729, 5,401,226, 5,290,211, 5,261,294, 5,254,059, and United States Published Patent Numbers, 2002/0019298, 2003/0022763, 2003/0027690, 2001/0036886, 2001/0051562, 2004/0053748, 2002/0055420, 2004/0077463, 2004/0093339, 2004/0097340, 2007/0102291, 2002/0165066. All may be modified to provide converging hand grips in accordance with this invention.
One embodiment of an elliptical exercise machine 10 equipped with converging handgrips 130 is shown in FIGS. 1-4. Briefly, the elliptical exercise machine 10 shown in FIGS. 1 and 2 includes (a) a frame 20, (b) a drive shaft 30 supported on the frame 20 and defining a primary transverse axis z1, (c) left and right sinusoidal shaped foot links 50, (d) a first connection system (not collectively numbered) associated with the first end (unnumbered) of each foot link 50 for coupling the first end of the associated foot link 50 to the drive shaft 30 so that the first end of the associated foot link 50 travels in an elliptical or oval path (not shown) relative to the drive shaft 30, (e) a foot support 56 extending from a second longitudinal end (unnumbered) of each foot link 50, (f) a roller 60 attached to and extending below each foot link 50 proximate the second longitudinal end (unnumbered) of the foot link 50 and defining a second end foot link pivot point p2, (g) guide rails 90 attached to the frame 20 for engaging the roller 60 on each foot link 50 so as to guide the second longitudinal end of each foot link 50 along a reciprocating path (not shown) as the first end of the foot link 50 travels in an elliptical or oval path, (h) left and right arm links 100a and 100b (collectively arm link 100) each pivotally attached to the frame 20 at a first end 100a of arm link pivot point p1, (i) a second connection system (not collectively numbered) associated with the first end 100a of each arm link 100 for coupling the first end 100a of the associated arm link 100 to the drive shaft 30 for pivoting the arm link 100 about arm link pivot point p1 as the drive shaft 30 rotates about the primary transverse axis z1, and (j) hand grips 130 attached to the second end 100b of each arm link 100.

The first connection system includes (i) a connector link 80 pivotally attached at a first end (unnumbered) to the first end of the foot link 50 at a first end of foot link pivot point p1 and pivotally attached at a second end (unnumbered) of a rocker arm 70 at a rocker pivot point p2, (ii) a rocker arm 70 pivotally attached at a first end (unnumbered) to the frame 20 and pivotally attached at a second end (unnumbered) to the connector link 80 at the rocker pivot point p2, and (iii) a crank arm 40 attached at a first end (unnumbered) to the drive shaft 30 and pivotally attached at a second end (unnumbered) to the connector link 80 at a crank pivot point p4 which is positioned on the connector link 80 intermediate the first end foot link pivot point p1 and the rocker pivot point p2.

The second connection system includes (i) the crank arm 40, (ii) an intermediate link 110 pivotally attached at a first end 110a to the second end of the crank arm 40 at a first end intermediate link pivot point p3 and pivotally attached at a second end 110b to the first end 120a of a coupling link 120 at a second end intermediate link pivot point p5 and (iii) a coupling link 120 pivotally attached at a first end 120a to the second end 110b of the intermediate link 110 and pivotally attached at a second end 110b to the first end 100a of the arm link 100 at the arm link pivot point p7.

As shown in FIGS. 1-4, the arm links 100 are pivotally attached to the frame 20 at the arm link pivot point p7 by a bracket 200 which alters the path traveled by the right and left hand grips 130r and 130l (collectively hand grips 130) from the conventional paths of travel (i.e., paths which are parallel to one another, parallel to the path traveled by the foot support 56 and orthogonal to the primary transverse axis z1) to converging paths 131p and 132p (i.e., paths which converge towards one another when traveling forward y1, and are angled relative to the path traveled by the foot support 56). The paths 131p and 132p preferably converge at an angle α of between about 5° to 150° (i.e., each hand path 131p and 132p is angled between about 5° to 75° relative to the primary transverse axis z1 to create an angle of convergence α of between about 5° to 150°), most preferably at an angle α of between about 10° to 45°. Viewed from a different perspective, the hand grips 130r and 130l reciprocate about an axis of rotation r and s, respectively, with the axes of rotation r and s converging at a supplemental angle to the angle α at which the paths 131p and 132p converge. (i.e., when the paths 131p and 132p converge at an angle α of 5° the axes of rotation r and s converge at a supplemental angle of 175° and when the paths 131p and 132p converge at an angle α of 150° the axes of rotation r and s converge at a supplemental angle of 30°).

FIGS. 3 and 4 show one embodiment of a bracket 200 capable of imparting the desired converging paths of travel 131p and 132p to the hand grips 130. The second end 120b of the coupling link 120 is fixedly attached to the first end 210a of a primary shaft 210. The primary shaft 210 extends through one of the vertical stanchions (not separately numbered) of the frame 20 and is rotatably supported by a primary bearing 220 secured to the frame 20.

A secondary shaft 230 is attached at a first end 230a to the second end 210b of the primary shaft 210 through a U-joint 240 and fixedly attached at a second end 230b to a fitting 260 which is fixedly attached to the first end 100a of the arm link 100. The secondary shaft 230 is rotatably supported at an angle (unnumbered) relative to the secondary transverse axis z2 by a bearing unit 270 which is attached to the frame 20 at the appropriate angle by housing 250.

This assembly (not collectively numbered) translates pivoting of the coupling links 120 about the secondary transverse axis z2 to converging reciprocating longitudinal y motion of the hand grips 130 by allowing the secondary shafts 230 to be longitudinally y angled relative to the associated primary shaft 210 with pivoting of the coupling link 120 translated to longitudinal y motion of the hand grips 130 through a sequence of (i) rotation of the primary shaft 210 about the secondary transverse axis z2, (ii) rotation of the secondary shaft 230 about a hand grip axis of rotation (i.e., a right hand grip axis of rotation r for the right hand grip 130r and a left hand grip axis of rotation s for the left hand grip 130l), (iii) rotation of the fitting 260 about the corresponding hand grip axis of rotation r or s, and (iv) pivoting of the arm link 100 about the corresponding hand grip axis of rotation r or s.

Another embodiment of an elliptical exercise machine 10 equipped with converging handgrips 130 is shown in FIGS. 5-10. Briefly, the elliptical exercise machine 10 shown in FIGS. 5-7 includes (a) a frame 20, (b) a drive shaft 30 supported on the frame 20 and defining a primary transverse axis z1, (c) left and right foot links 50, (d) a first connection system (not collectively numbered) associated with the first end (unnumbered) of each foot link 50 for coupling the first end of the associated foot link 50 to the drive shaft 30 so that the first end of the associated foot link 50 travels in an elliptical or oval path (not shown) relative
to the drive shaft 30, (e) a foot support 56 extending from a second longitudinal end (unnumbered) of each foot link 50, (f) a roller 60 attached to and extending below each foot link 50 proximate the second longitudinal end (unnumbered) of the foot link 50 and defining a second end foot link pivot point p2, (g) guide rails 90 attached to the frame 20 for engaging the roller 60 on each foot link 50 so as to guide the second longitudinal end of each foot link 50 along a reciprocating path (not shown) as the first end of the foot link 50 travels in an elliptical or oval path; (h) left and right arm links 100r and 100s (collectively arm link 100) each pivotally attached to the frame 20 proximate a first end 100a of the arm link 100 at arm link pivot point p1, (i) a second connection system (not collectively numbered) associated with the first end 100a of each arm link 100 for coupling the first end 100a of each arm link 100 to the associated coupling link 120 so that pivoting of the associated coupling link 120 correspondingly pivots the arm link 100 about pivot point p1, and (j) hand grips 130 attached to the second end 100b of each arm link 100.

[0101] The first connection system includes (i) a connector link 80 pivotally attached at a first end (unnumbered) to the first end of the foot link 50 at a first end foot link pivot point p1 and pivotally attached at a second end (unnumbered) to a second end (unnumbered) of a rocker arm 70 at a rocker pivot point p3, (ii) a rocker arm 70 pivotally attached at a first end (unnumbered) to the frame 20 and pivotally attached at a second end (unnumbered) to the connector link 80 at the rocker pivot point p3 and (iii) a crank arm 40 attached at a first end (unnumbered) to the drive shaft 30 and pivotally attached at a second end (unnumbered) to the connector link 80 at a crank pivot point p4 which is positioned on the connector link 80 intermediate the first end foot link pivot point p1 and the rocker pivot point p3.

[0102] As shown in FIGS. 7-10, the second connection system includes (i) an intermediate link 110 pivotally attached at a first end 110a to the second end of the crank arm 40 at pivot point p4, (ii) a coupling link 120 pivotally attached at a first end 120a to the second end 120b of the intermediate link 110 at an intermediate link pivot point p3 and pivotally attached at a second end 120b to the frame 20 at a coupling link pivot point p3, (iii) a turnbuckle 310 pivotally attached at a first end 310a to the coupling link 120 at a first turnbuckle pivot point p3, spaced a distance along the length of the coupling link 120 from the coupling link pivot point p3, (iv) a bent crank arm 320 pivotally attached at a first end 320a to the second end 320b of the turnbuckle 310 at a second turnbuckle pivot point p15, (v) an arm axle 350 rotatably mounted to the frame 20 for rotation about an angled axis w with a first end 350a of the arm axle 350 fixedly secured to the second end 320b of the bent crank arm 320 and the second end 350b of the arm axle 350 fixedly secured to the first end 100a of the associated arm link 100 through an arm mounting bracket 360.

[0103] A standard linkage member may be used to operably interconnect the coupling link 120 and the bent crank arm 320 rather than a turnbuckle 310, but a turnbuckle 310 type linkage is generally preferred as it can accommodate a modest misalignment of the interconnected parts.

[0104] The turnbuckle 310 and bent crank arm 320 may alternatively be configured and arranged to attach the first end 310a of the turnbuckle 310 to a pivoting member other than the coupling link 120 (i.e., attachment to the crank arm 40, the rocker arm 70, the connector link 80, etc.) in which case the intermediate link 110 and coupling link 120 are no longer needed.

[0105] A bearing housing 330 and flanged bearing 340 are employed to rotatably secure the arm axle 350 to the frame 20. The bearing housing 330 is secured to the frame 20 by a first mounting bracket 22 attached to a crossbeam 21 on the frame 20.

[0106] The angled mounting of the arm axle 350 relative to the transverse axis z of the exercise machine 10 alters the path traveled by the right and left hand grips 130r and 130s (collectively hand grip 130) from the conventional paths of travel (i.e., paths which are parallel to one another, parallel to the path traveled by the foot support 56 and orthogonal to the primary transverse axis x1) to converging paths 131r and 132s (i.e., paths which converge towards one another when traveling forward y1 and are angled relative to the path traveled by the foot support 56).

I claim:

1. An exercise machine comprising:

   (a) a frame; and

   (b) first and second hand grips each operably associated with the frame for traveling along converging first and second hand paths respectively.

2. The exercise machine of claim 1 wherein the exercise machine is a stationary cardiovascular exercise machine.

3. The exercise machine of claim 1 wherein the hand paths converge at an angle of between about 5° to 150° relative to one another.

4. The exercise machine of claim 1 wherein (i) each hand grip reciprocates about an axis of rotation, and (ii) the axes of rotation converge at an angle of between about 175° to 30° relative to one another.

5. The exercise machine of claim 4 wherein the axes of rotation are angled between about 175° to 135° relative to one another.

6. The exercise machine of claim 1 wherein (i) the exercise machine is configured and arranged to accommodate a user on the exercise machine in a particular orientation relative to the exercise machine, and (ii) the right and left hand grips converge when traveling along the hand paths away from a user exercising on the exercise machine.

7. An exercise machine comprising:

   (a) a frame defining a primary transverse axis;

   (b) first and second foot supports each operably associated with the frame for traveling along a foot path configured orthogonally relative to the primary transverse axis; and

   (c) right and left hand grips each operably associated with a foot support for traveling along converging hand paths when the foot supports travel along the foot paths, wherein each hand path is angled relative to each foot path.

8. The exercise machine of claim 7 wherein the exercise machine is a stationary cardiovascular exercise machine.

9. The exercise machine of claim 7 wherein each hand path is angled between about 5° to 45° relative to the primary transverse axis.
10. The exercise machine of claim 7 wherein (i) the exercise machine is configured and arranged to accommodate a user on the exercise machine in a particular orientation relative to the exercise machine, and (ii) the right and left hand grips converge when traveling along the hand paths away from a user exercising on the exercise machine.