The present invention is an exercise machine to be used mainly for lower body exercises that involve quads, shins, thighs, and hip areas of a user and provides a moving seat frame that supports the weight of the user to use it as a source of a resistance as a pedal is pushed away. The resistance can be adjusted by changing the ratio between the seat movement and the pedal movement. The machine can be foldable for a stowed position. A preferred embodiment includes a base assembly that stands on a floor, a seat assembly movable substantially in vertical direction to support the user’s weight and use it as a source of the resistance, and a pedal assembly supporting a pedal that moves away from the seat assembly when pushed by the user. The pedal assembly and the seat assembly are linked together so that when the pedal is pushed away, the seat assembly is lifted up from its rest position. The amount of the lift on the seat assembly per given displacement of the pedal can be adjusted by changing the leverage between the pedal assembly and the seat assembly. Greater the lift on the seat assembly per given pedal displacement, greater the resistance the user feels on the pedal.
GRAVITY LEG EXERCISE MACHINE

CROSS-REFERENCES TO RELATED APPLICATIONS

[0001] This application is entitled to the benefit of Provisional Patent Application Ser. No. 60/923,320, filed on Apr. 13, 2007.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] This invention relates generally to fitness exercise machines for training lower body exercises such as quads, shins, thighs and hip utilizing a user's own weight as a resistance.

[0004] 2. Description of Related Art Including Information Disclosed Under 37 CFR 1.97 and 1.98

[0005] A number of lower body exercise machines, utilizing the user's body weight as a source of resistance, have been introduced. U.S. Pat. No. 5,527,249 to Harris shows a bench with support pads moving upward as the user uses a handle which actuates a lever with a roller, rolling on a track to lift the pads. The track can be set at different angles to control the lift of the pads. However, the adjusting the angle of the track can be difficult since it is under the pads near the floor. U.S. Pat. No. 5,603,678 to Wilson illustrates an apparatus for leg exercise. The user sits on a moving frame that moves away from the pedal as he or she pushes a stationary pedal with his or her feet. It may get some resistance from the user's weight depending on the angle of the motor's movement of the moving frame, however it uses and needs a rubber band or another equivalent device for a primary source of the resistance. U.S. Pat. No. 6,533,710 B1 to Lin shows an apparatus similar to Wilson's, but it uses more of the user's weight as the resistance in the beginning of the exercise motion profile. However the user's weight as the resistance diminishes as the motion profile continues, which is the reason why it also needs a rubber band or equivalent to compensate the diminishing force curve. U.S. Pat. No. 6,676,577 B2 to Stearns shows a chair like apparatus with a moving frame being a seated area and a pedal on a stationary frame. The overall motion profile of the moving frame is more vertical compared to the other arts in the field, but the seating angle can be uncomfortable when the user's legs are fully extended or the starting position must be at a half extended position of the user's legs. U.S. Pat. No. 6,743,158 to Giannelli shows a leg press machine with a moving seat frame on an inclined track. As the user pushes the fixed pedal, the whole body goes up on the inclined track partially utilizing the user's weight as a resistance. The machine is combined with a weight and a cable system to provide a full resistance for the exercise. There are other arts in the field that use the user's weight as a source of the resistance whether partially or fully for the lower body exercises. However, they are either big structurally or not very user friendly in terms of adjusting the amount of resistance or simply too costly to build.

SUMMARY OF THE INVENTION

[0006] The present invention teaches certain benefits in construction and use which give rise to the objectives described below.

[0007] The present invention is an exercise machine to be used mainly for lower body exercises that involve quads, shins, thighs, and hip areas of a user and provides a moving seat frame that supports the weight of the user to use it as a source of a resistance as a pedal is pushed away. The resistance can be adjusted by changing the ratio between the seat movement and the pedal movement. The machine can be foldable for a stowed position. A preferred embodiment includes a base assembly that stands on a floor, a seat assembly movably substantially in vertical direction to support the user's weight and use it as a source of the resistance, and a pedal assembly supporting a pedal that moves away from the seat assembly when pushed by the user. The pedal assembly and the seat assembly are linked together so that when the pedal is pushed away, the seat assembly is lifted up from its rest position. The amount of the lift on the seat assembly per given displacement of the pedal can be adjusted by changing the leverage between the pedal assembly and the seat assembly. Greater the lift on the seat assembly per given pedal displacement, greater the resistance the user feels on the pedal. The seat assembly comprises a seat pad and a back pad supported by a seat frame. The user gets on the seat pad, rests her or his back against the back pad, and places her or his feet on the pedal with the legs drew in. As the user pushes the pedal away by extending the legs, her or his body moves up supported by the seat assembly. The machine offers a small space requirement since the linkage system is placed under and between the seat and the pedal.

[0008] A primary objective of the present invention is to provide an apparatus having advantages not taught by the prior art.

[0009] Another objective is to provide such an apparatus that is compact in size and footprint.

[0010] Another objective is to provide such an apparatus that offers a user a full range of motion for the lower body exercises while having the compact size of the apparatus.

[0011] Another objective is to provide such an apparatus that utilizes the user's body weight as a source of resistance for the exercises.

[0012] A further objective is to provide such an apparatus that provides an adjustment on resistance levels.

[0013] A further objective is to provide such an apparatus that provides a foldable frame for a stowed position when it is not in use.

[0014] Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWING

[0015] The accompanying drawings illustrate the present invention. In such drawings:

[0016] FIG. 1 is a plan view of a preferred embodiment in a starting position of an exercise movement.

[0017] FIG. 2 is a plan view of the embodiment in an ending position of the exercise movement.

[0018] FIG. 3 is a plan view of the embodiment in a stowed position for storage.

[0019] FIG. 4 is a plan view of the embodiment with an additional resistance source for the exercises.
CALL OUT LIST OF THE ELEMENTS

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DETAILED DESCRIPTION OF THE INVENTION

The above described drawings FIGS. 1 and 4 illustrate the invention, a gravity leg exercise machine, an apparatus comprising a base assembly standing on a floor and including a first base frame and a second base frame mechanically linked to first base frame so that first base frame and second base frame are foldable for a stowed position. The embodiment shown in FIG. 1 has second base frame pivotedly linked to first base frame of base assembly at a base first pivot on first base frame. The embodiment shown in FIG. 1 further shows first base frame having a number of adjustment holes for a slider that has a pin and slides on first base frame to selectively engage to the holes and set a position of slider. Pin can be a separate pin or a spring-loaded pin that is built in as a part of slider. A base link is pivotally connected between a base second pivot on second base frame and a base slider pivot on slider so that by adjusting the position of slider on first base frame, the angle between first base frame and second base frame of base assembly may be set at a desired angle. Once slider is fixed at a position of one of holes on first base frame, the components of base assembly becomes a rigid structure to provide a support structure for a seat assembly and a pedal assembly to operate properly as a lower body exercise machine.

Seat assembly includes a seat frame that has a seat first pivot, a seat second pivot, and a seat third pivot, and supports a back pad near the upper end of seat frame. A seat pad frame supporting a seat pad is pivotally engaged at seat first pivot on seat frame so that seat pad fixed on seat pad frame may be folded for a stowed position as shown in FIG. 3. When seat pad on seat pad frame is pulled out as shown in FIG. 1 for a user to sit on, seat pad frame is fixed at a seat stop on seat frame to securely support the weight of the user. Seat assembly further includes a seat first link that is pivotally connected to seat second pivot on seat frame at a first end of seat first link and also pivotally connected to a base fourth pivot on first base frame of base assembly at a second end of seat first link as shown in FIGS. 1 and 2. Alternatively, the second end of seat first link may also be connected to a pivot point on any member of base assembly, not shown. A force adjuster that has a number of positions is fixedly placed near the second end of seat first link on the opposite side of seat second pivot so that base fourth pivot is in between seat second pivot and force adjuster. Positions may be notches, holes, or a ratchet. Alternatively, force adjuster may also be fixedly placed on the same side of seat second pivot so that force adjuster is in between seat second pivot and base fourth pivot, not shown. Seat assembly further includes a seat second link that is pivotally connected to seat third pivot on seat frame at a first end of seat second link and is also pivotally connected to base second pivot on second base frame at a second end of seat second link. Alternatively, the second end of seat second link may also be pivotally connected at a pivot point a distance away from base second pivot on base assembly or even on pedal assembly near a base third pivot at where pedal assembly is pivotally connected, not shown.

Pedal assembly includes a pedal frame pivotally connected at a base third pivot of base assembly, a pedal supported by pedal frame, and a pedal pivot on pedal frame. Pedal assembly further includes a pedal link that is pivotally connected at pedal pivot on pedal frame at a base first end of pedal link and is connected to force adjuster of seat assembly at a second end of pedal link. The second end of pedal link where force adjuster is engaged holds a pedal pin that is placed into one of positions on force adjuster. In the case force adjuster is placed on seat first link between base fourth pivot and seat second pivot, pedal link can be placed at a pivot position on the opposite side of pedal so that base third pivot is between pedal and the attachment point of pedal link on pedal frame, not shown.

FIG. 1 shows a starting position for an exercise in which the user sits on seat pad, leans her or his back against back pad, and places her or his feet on pedal with her or his legs drawn in. As the user pushes the foot away from the seating area, pedal link connected to force adjuster of seat assembly moves seat assembly upward with the user sitting on the seat assembly and providing a source of resistance for the exercises as shown in FIG. 2. The amount of the resistance can be adjusted by selectively moving pedal pin on pedal link closer to the point of force adjuster. Basically selectively moving pedal pin closer to the base fourth pivot will increase the resistance, causing an increase in the upward displacement of the seat frame. The space between the seat and the pedal may be adjusted to accommodate different body size users by moving and selectively fixing slider on first base assembly at one of holes. Basically selectively fixing slider closer to base first pivot will create a larger room between the seat and the pedal for a larger person. FIG. 3 shows the embodiment in a stowed position for storage in which seat pad is folded up and slider of base assembly is positioned so that first base frame, second base frame, and base link are substantially next to each other in a compact space.

FIG. 4 shows an additional source of resistance force for the exercises on gravity leg exercise machine. In addition to using the user’s body weight as a resistance, a cable may be attached at a cable point on seat assembly. A cable is mechanically linked to a weight so that the displacement of seat assembly causes weight to be
lifted providing additional weight to the primary source of resistance, the user's weight. Also as well known in the art, the cable and the weight can be replaced with a weight directly attached on seat assembly 50 eliminating the cable. An advantage of using cable 104 though is that the weight can be remotely placed or in another machine, which can be connected to seat assembly 50 using cable 104 and pulleys. Other additional resistance source can be a shock, a spring, or a rubber band that can be mechanically related to the seat assembly to provide the resistance as well known in the field.

[0026] Although the invention has been disclosed in detail with reference only to the above embodiments, those skilled in the art will appreciate that various other embodiments can be provided without departing from the scope of the invention. Accordingly, the invention is defined only by the claims set forth below.

1. A gravity leg exercise machine comprising:
   a. a base assembly for supporting the gravity leg exercise machine on a floor,
   b. a seat assembly comprising a four bar linkage system, a seat pad on at least one link of the four bar linkage system, and a force adjuster, wherein the force adjuster is used to adjust the amount of resistance on the gravity leg exercise machine, and pivotally joining with the base assembly so that the seat pad moves substantially in a vertical direction when the four bar linkage system is urged, and
   c. a pedal assembly comprising a pedal, a pedal frame structurally supporting the pedal and pivotally joined with the base assembly, and a pedal link, wherein the pedal link is pivotally joined with the pedal frame and adjustably engaged with the force adjuster so that the base assembly, the pedal frame, and the pedal link, when combined, move as another four bar linkage system.

2. The gravity leg exercise machine of claim 1, further comprising: a slider in the base assembly wherein the slider can be locked on a first base frame of the base assembly or released to make the gravity leg exercise machine foldable for a stowed position.

3. The gravity leg exercise machine of claim 2 wherein the slider in the base assembly is selectively and adjustably engaged with the first base frame of the base assembly so that the distance between the pedal and the seat pad can be adjusted to accommodate different body size users.

4. A gravity leg exercise machine comprising:
   a. a base assembly for supporting the gravity leg exercise machine on a floor,
   b. a seat assembly comprising a four bar linkage system and a seat pad on at least one link of the four bar linkage system, and pivotally joining with the base assembly so that the seat pad moves substantially in a vertical direction when the four bar linkage system is urged, and
   c. a pedal assembly comprising a pedal, a pedal frame structurally supporting the pedal and pivotally joined with the base assembly, and a pedal link, wherein the pedal link is pivotally joined with the pedal frame and pivotally engaged with the seat assembly so that the base assembly, the pedal frame, the seat assembly, and the pedal link, when combined, move as another four bar linkage system.

5. The gravity leg exercise machine of claim 4, further comprising: a slider in the base assembly wherein the slider can be locked on a first base frame of the base assembly or released to make the gravity leg exercise machine foldable for a stowed position.

6. The gravity leg exercise machine of claim 5 wherein the slider in the base assembly is selectively and adjustably engaged with the first base frame of the base assembly so that the distance between the pedal and the seat pad can be adjusted to accommodate different body size users.

7. The gravity leg exercise machine of claim 4 wherein the pedal link is selectively and adjustably engaged with the seat assembly so that the amount of resistance can be adjusted for the exercise by changing the leverage between the seat assembly and the pedal frame.

8. The gravity leg exercise machine of claim 4, further comprising: a seat pad, a seat frame supporting a back pad in the seat assembly wherein the seat pad is foldable for the stowed position and is substantially parallel with the seat frame in the stowed position.

9. A gravity leg exercise machine comprising:
   a. a base assembly for supporting the gravity leg exercise machine on a floor,
   b. a seat assembly comprising a four bar linkage system and a seat pad on at least one link of the four bar linkage system, and pivotally joining with the base assembly so that the seat pad moves substantially in a vertical direction when the four bar linkage system is urged, and
   c. a pedal assembly comprising a pedal, a pedal frame structurally supporting the pedal and pivotally joined with the base assembly, and a pedal link, wherein the pedal link is pivotally joined with the pedal frame and pivotally engaged with the seat assembly.

10. The gravity leg exercise machine of claim 9, further comprising: a slider in the base assembly wherein the slider can be locked on a first base frame of the base assembly or released to make the gravity leg exercise machine foldable for a stowed position.

11. The gravity leg exercise machine of claim 10 wherein the slider in the base assembly is selectively and adjustably engaged with the first base frame of the base assembly so that the distance between the pedal and the seat pad can be adjusted to accommodate different body size users.

12. The gravity leg exercise machine of claim 9 wherein the pedal link is selectively and adjustably engaged with the seat assembly so that the amount of resistance can be adjusted for the exercise by changing the leverage between the seat assembly and the pedal frame.

13. The gravity leg exercise machine of claim 9, further comprising: a seat pad, a seat frame supporting a back pad in the seat assembly wherein the seat pad is foldable for the stowed position and is substantially parallel with the seat frame in the stowed position.

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