METHOD AND DEVICE TO ENABLE AND ASSIST THE ELDERLY AND FEMALES TO EXERCISE THEIR THIGH AND GLUTEUS MUSCLES

Inventor: Zeev Steinmetz, Ashdod (IL)

Correspondence Address:
UZI EZRA HAVOSHA & PARTNERS
HADAR-DAFNA HOUSE 39 SHAOUL HAMELECH STREET
TEL AVIV 64928

ABSTRACT
This squat exercise machine is comprised of a dynamic seat connected to a dynamic foot-plate where the weights are used to counter the weight of the exerciser and thereby assist him to raise himself from a squatting position to a starting sitting position. The squat exercise machine exercises the thigh muscles otherwise known as the quadriceps and the buttock muscles otherwise known as the gluteus group of muscles. At least one adjustable hand bar is positioned to aid entry to and exit from the machine and at least one handle to help to stabilize the user while exercising.

A method for using the assisted squat exerciser is comprised of sitting on the dynamic seat, and with the aid of gravity, allowing the body to lower towards the floor whereupon the legs will be in a squatting position. With the aid of the weights, the thigh and gluteus muscles lift the seated body to its starting sitting position.
METHOD AND DEVICE TO ENABLE AND ASSIST THE ELDERLY AND FEMALES TO EXERCISE THEIR THIGH AND GLUTEUS MUSCLES

FIELD OF THE INVENTION

[0001] This invention is in the field of exercise resistance machines for improvement of general health, especially strengthening the thigh and buttock muscles known in Latin as quadriceps and gluteus. These muscles control the ability to stand up from a seated position, increase thigh strength, knee stability and thereby reduce falls, improves walking, standing, and movement. The exercising provides physiotherapeutic effects to strengthen, build and rebuild muscles and bone mass and prevent muscle and bone mass deterioration. This patent relates to and caters for the special needs of the elderly, those convalescing from injury or surgery and for women.

BACKGROUND OF THE INVENTION

[0002] The use of machines for exercising the body is well known in the art. For many decades it has been considered beneficial for a person’s health to exercise regularly. The benefits are many and probably some that we are not yet aware. A few of the better known benefits are to the functioning of the heart, the blood vessels, the blood cells, the muscles, the bone structure, the functioning of the brain, the levels of cholesterol and blood sugars, and the general feeling of well-being. There was a time when it was felt to be not so beneficial for the elderly to exercise but now it is considered also very beneficial. Obviously, the degree of stress on the body and length of time of such exercise varies from person to person depending on age, general health and any specific disabilities endured.

[0003] One of the factors that make it difficult for the elderly is their lack of agility. They often have pain when moving their various limbs. This discourages them from starting to exercise even though when they have exercised, usually they feel better than beforehand. If they avoid exercising then they do not enjoy the many side benefits of exercising and a vicious cycle is sometimes created whereby their health deteriorates generally. Most prior art exercise machines do not take into account the special needs of the elderly and therefore help to create this barrier. The machines are often cumbersome, sometimes complicated to operate, without easily understandable instructions, without handles to aid entering and exiting and without taking into account the sometimes frail and painful limbs of the elderly. They are basically designed for the young and middle aged.

[0004] The elderly either currently suffer from ailments that are best assisted by controlled exercise or are likely to suffer from such ailments if they do not exercise, for example, heart disease, weight control, walking stability, osteoporosis or lower back pains.

[0005] Daily activities, that a younger person performs automatically without realizing how many muscles and joints are involved, can be a major cause of pain and other discomforts throughout the day for the elderly or disabled.

[0006] Examples of such daily activities are bending to tie shoes, getting in and out of the car or bath, walking up stairs or a hill, pushing a shopping cart, carrying groceries and simply stretching to reach items. These are but a few of the hundreds of activities that an elderly person has to do daily and without regular exercising and muscle strengthening these everyday activities become more difficult as the person ages.

[0007] Women are more prone than men to a bone disease called osteoporosis, usually from the age of menopause and older. One of the major recommended preventative measures for osteoporosis is regular exercising of the weight bearing kind in order to increase the bone mass. Furthermore, females more than males, require special features in exercise machines to cater for their more delicate body structures. Therefore, it would be preferable for the elderly, those convalescing and females, to use exercise machines that are purpose built and user friendly for their specific needs. The apparatus of this invention is specifically and professionally designed for the special needs of this group of users. The innovation of this invention includes and/or takes into account amongst others, the following factors:

[0008] the user’s general lack of agility and possibility of various pains when moving into position to start exercising, during the exercising and when exiting,

[0009] to give as much as possible clutter free access and a minimum of overhead apparatus to ease entry/exit and to avoid accidental injury to the user or a helper of the user,

[0010] a dynamic seat,

[0011] weights that are an adjustable counter-balance to the body weight,

[0012] a foot-plate that is dynamic, adjusting its angle proportionately to the height of the seat to reduce strain to the knees, lower back and the Achilles Tendon,

[0013] the need for smaller gradations of weights so that the counter balance effect can be gradually decreased,

[0014] the proper placing of handles and bars to aid entering and leaving the machines and stabilizing handles to optionally hold while exercising,

[0015] notices and instructions written in clear language and large print,

and many other features for the benefit of the infirm as are herein described in greater detail.

[0016] Prior art has addressed some aspects of the needs of older people. For example, U.S. Pat. No. 5,308,802 issued to Miller reveals a moveable exercise machine that can be brought to a chair ridden person to exercise. The novelty is more in the portability features than the use of the machine itself. US Patent Application No. 20040220019 issued to Maser reveals a special feature for older people namely that in a pedal machine both pedals can start at their lowest level instead of one up and one down. The Japanese Patent No. 2004016577 issued to Shigeo et al. reveals an exercise machine where the user can exercise in a recumbent position but the range of movements of the arms and legs is limited with no possibility of increasing or decreasing the stress to the arms or legs. Finally, U.S. Pat. No. 6,652,419 issued to Rota showing how beneficial the rebounding type of exercise is for all aged users especially the elderly.

[0017] The uniqueness of this invention is the combination of all its various features into one device as are herein described.

[0018] After years of research the innovators of this invention have found solutions to the above mentioned problems generally and to the specific problems and needs of the elderly and infirm. The result is incorporated in the apparatus of this invention as hereinafter described. The result is
a user friendly machine that the infirm will want to use because it answers their special needs. It will help them overcome that so important initial step of starting to exercise.

Another object of this invention is to enhance a person’s ability to balance. Another object of this invention is for the said exercise machine to be stably resting on the ground when in use and optionally moveable when so desired.

Another object of this invention is to ease the access to and exit from the exercise machine for example so that there is no overhanging apparatus potentially capable of causing head or other injury and without sharp edges protruding from the apparatus.

Another object of the invention is to have at least one adjustable static hand support bar to increase the user’s stability while using the machine and/or while entering or exiting.

Another object of the invention is to make instructions for the user simple to understand and written in large print in a color that contrasts with its background. It is also an object to permanently affix the said instructions on the said exercising machine.

Another object of the invention is to have a picture on the body of the apparatus in a clearly visible position and color, illustrating an everyday task. This task the infirm often find difficult to carry out and is made easier by strengthening the specific muscles that the machine of this invention helps to strengthen. State of art exercise machines often mention on the machine the name of the muscles that will be strengthened by the machine or sometimes they have a picture of those muscles in a picture of a body. The user of an exercise machine will be able to relate much easier to a picture of the everyday task that will be enhanced by using the machine. It will give the user a greater incentive to work diligently at the said exercises.

One of the everyday tasks that is associated with this invention is getting up from a chair.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and form a part of this specification, illustrate embodiments of the invention and, together with the description, serve to explain, by way of example only, the principles of the invention:

Fig A is a side sectional diagram of the essential parts of the exercise machine of this invention.

Fig B is a back sectional diagram of the essential parts of the exercise machine of this invention.

Fig C is a top sectional diagram of the essential parts of the exercise machine of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As will be appreciated the present invention is capable of other and different embodiments than those discussed above and described in more detail below, and its several details are capable of modifications in various aspects, all without departing from the spirit of the invention. Accordingly, the drawings and description of the embodiments set forth below are to be regarded as illustrative in nature and not restrictive.

Fig A shows the side view of this invention. The machine can be referred to as an assisted squat exercise machine 100. The user can use the adjustable static handle 156 (more clearly seen in Figs B and C) to assist maneuvering himself into position on the dynamic seat 102.
to begin to exercise. The adjustment mechanism 157 enables the user to adjust the static handle 156 to the position comfortable for his arm’s length. A spring loaded pin is placed in one of the holes of the disc that turns on the axle 158 thereby moving the handle 156 closer to or further from the seat 102. Once in position on the seat 102 the user may wish to hold onto the static side handles 104 and Fig C 104 to stabilize himself while exercising or hold the adjustable static handle Fig B 156.

[0038] The meaning herein of an adjustable static handle is that its position is adjustable using a spring loaded pin in a holed disc where the said handle is attached eccentrically onto the said disc. The different said holes represent different distances of the said handle from the said exerciser. Once the said pin is in position the handle remains static until re-adjusted.

[0039] The function of the weights 106 in this invention is the opposite of their regular function of being the main source of resistance for the muscles being exercised. In this invention the weights act as a counter-weight to the weight of the body thereby helping the body rise from the squatting position. The exerciser who is weak will use more weights but as he strengthens his thigh and buttock muscles he will use fewer weights, making his said muscles work harder to straighten his legs.

[0040] The weights 106 are housed in the weight housing 108 and are stacked vertically. The cable 110 is attached to a bored pin-rod 112 at one end and to a link 120 to the seat 102 at its other end. The cable 110 can be, alternatively, a belt or a chain. The bored pin-rod 112 has at least one hole corresponding to the number of weights 106. The weights 106 each have a hole in them passing horizontally from front to back. The pin 114 is inserted through the chosen weight and into one of the holes in the bored pin-rod 112. When the exerciser lowers himself in the seat 102, the weight of his body will raise the weights 106. The amount of weights 106 to rise is the one with the pin 114 through it and any weights above it. The lower the pin 114 is placed in the stack of weights 106, the more weights 106 will be lifted and hence the greater the assistance to the exerciser when he raises his body from the squatting position.

[0041] The seat 102 moves on a rail 124 situated under the seat 102. As the exerciser lowers his body to a squatting position the seat 102 will slide forward to its front extremity of rail 124 giving maximum comfort and support to the exerciser as he goes into the squatting position. The reverse movement namely as he rises from the squatting position, the seat 102 will slide backward to its rear extremity of rail 124. The said sliding helps the gluteus muscles to exercise well. A static seat would limit such movement and hinder the said exercising of the gluteus muscles.

[0042] A further innovation of this invention is the dynamic foot-plate 130. The foot-plate 130 is attached to the link 132. Link 134, at its lower end is attached to link 132 and at its upper end is attached to the seat 102 via the link 120. There is a bearing 136 to which the link 134 is connected. When seat 102 lowers, link 134, which is pivoted at the bearing 136 raises the link 132 and hence raises the foot-plate 130 at its lower end 131. The foot-plate 130 is pivotally attached to the frame of the exercising machine 100 at point 129. The effect of raising of the foot-plate 130 when the exerciser is in a squatting position is to reduce the stretch effect on the Achilles tendon and reduce pressure on the knees and lower back of the exerciser. The main purpose of the dynamic foot-plate 130 is to maintain the angle between the shin bone and the foot, close to 90° as the exerciser lowers to a squatting position and as he returns to a straight legged position.

[0043] The reverse process occurs as the exerciser raises himself from the squatting position. The lower end 131 of the footplate 130 will drop to its original position, preserving the close to 90° angle as described above.

[0044] Link 135 moves in parallel to link 134 and is attached to the seat 102 at point 122 with a bearing. The links 134 and 135 support the seat 102, connect the weights 106 to the seat 102 via the cable 110 and provide the link to the foot-plate 130 as described above.

[0045] The half range limiter bar 137 is extendable and retractable as needed. It moves mechanically, sliding inside a cylindrical tube whose diameter is slightly larger than the limiter bar 137. The said cylindrical tube housing is attached to the link 134. When extended, the bar 137 comes into contact with the protrusion 139 as the seat 102 and link 134 descend thereby preventing the full squat position. This feature and innovation is to assist those with for example, restricted hip movements after a hip replacement operation. When the bar is retracted the seat 102 is able to descend and thereafter ascend freely, utilizing its maximum range.

[0046] The adjustable seat height lever 140 is used to adjust the maximum height of the seat 102 at the start of and during the exercising. The lever 140 is spring loaded and attached to pin 146. The lever 140 is pivotally joined to disc 142 at coupling 148. When the lever 140 is pulled perpendicularly from the face of the disc 142, the pin 146 is pulled out of one of the seat height adjustment holes 144 and can be re-inserted in another hole 144. This adjustment changes the maximum height of seat 102 as seat 102 is pivotally linked to the lever 140 and disc 142 via the link 135 and bearing 122.

[0047] Fig B is the front view of the assisted squat exercise machine 100. The parallel links 134 and 135 are connected to the seat 102 by the links 152 and 150 respectively. The sliding seat rail 124 is situated under seat 102 and the static handles 104 are on either side of the seat 102. The adjustable static steadying handle 156 puts out perpendicular to the weight stack housing 108. The spring loaded adjustable seat height lever 140 holds the pin 146 in its chosen hole as described in relation to Fig A. The counterweight 154 counter-balances the weight of seat 102 and the apparatus attached thereto. The foot-plate 130 is opposite the seat 102.

[0048] Fig C shows the assisted squat exercise machine 100 from the top view. The parts visible in this figure are the dynamic seat 102, the static steadying handles 104 and the adjustable static handle 156. The foot-plate 130 is positioned opposite the seat 102 and next to the weights housing 108. The counter-weight 154 is to neutralize the weight of the seat 102 so that the exerciser exercises with the exact weight of the weights Fig A 106.

What is claimed:
1. An exercise machine comprising a frame,
a dynamic seat,
a dynamic foot-plate attached by a series of links to the said seat,
adjustable assistance weights to assist the exerciser to rise from the squatting position,
at least one static handle to aid stabilization, whereby people generally and especially the elderly, infirm and females can exercise their quadriceps and gluteus muscles.

2. An exercise machine as claimed in claim 1 wherein the said resistance is adjustable.

3. An exercise machine as claimed in claim 2 wherein the said adjustability is in increments of at most two kilograms.

4. An exercise machine as claimed in claim 3 where the extent of the assistance is chosen by means of inserting a pin in a horizontal hole passing through the width of a chosen weight and into a bored pin-rod that is attached to a cable joining the said bored pin-rod to the said dynamic seat whereby that weight and all the weights above it are lifted by the said cable.

5. An exercise machine as claimed in claim 1 wherein the said weights are attached by means of a cable and pulleys to a pivotal link connecting to the said dynamic seat.

6. An exercise machine as claimed in claim 5 wherein the said stack of weights and the said pin are easily accessible and adjustable by the user of the said exercising machine.

7. An exercise machine as claimed in claim 1 further comprising a numbered dial with a means to adjust the position of the said stabilization handle.

8. An exercise machine as claimed in claim 7 wherein the said adjustment is effected with a spring-loaded pin entering synchronized holes in two parallel adjacent discs, one disc being attached to the stationary frame of the said exercise machine and the other disc being attached to the connecting bar of the said stabilization handle.

9. An exercise machine as claimed in claim 8 wherein the said adjustment is graded by numbers on a disc.

10. An exercise machine as claimed in claim 1 further comprising a numbered dial with a means to adjust the maximum height position of the said dynamic seat.

11. An exercise machine as claimed in claim 1 wherein the said dynamic seat moves on a rail situated on its longitudinal axis and underneath the said seat.

12. An exercise machine as claimed in claim 11 wherein the said dynamism is represented by the said seat sliding back and forth as the legs are raised and lowered during exercising.

13. An exercise machine as claimed in claim 1 wherein the said seat and back-support is dynamic in an arc motion.

14. An exercise machine as claimed in claim 13 wherein the said arc motion is a partial rotation on its central horizontal axis.

15. An exercise machine as claimed in claim 1 further comprising a retractable half range limiting bar attached to the frame of the said dynamic seat and a corresponding protrusion to interfere the free movement of the said limiting bar as the said dynamic seat descends.

16. An exercise machine as claimed in claim 1 further comprising at least three wheels for moving the said machine where at least one wheel mechanism lifts the said exercise machine off the ground causing the weight of the said exercising machine to rest on the said wheel and of which at least one wheel is lockable thereby enabling the said exercise machine to rest firmly on the ground or optionally, be moved on the said wheels.

17. An exercise machine as claimed in claim 1 wherein the access to the said exercise machine is open and uncluttered thereby easing the entry to and exit from the said exercising machine by the elderly or infirm and easing the work of a helper of the said elderly or infirm.

18. An exercise machine as claimed in claim 1 wherein the said stabilization is during entry to and exit from the said exercising machine as well as during the action of exercising.

19. An exercise machine comprising a frame, a dynamic constant-angle footrest for pressure-free support of the feet when pressing upwards from a squat position, a dynamic seat with back-support, adjustable assistance weights to assist the exerciser to rise from the squatting position, at least one static steadying handle, at least one adjustable static handle to aid stabilization, instructions for use of the said exercising machine, at least one picture of an everyday task that is enhanced by the use of the said exercising machine, whereby people generally and especially the elderly, infirm and females can exercise their leg and buttock muscles.

20. An exercise machine as claimed in claim 19 wherein the said instructions are in large clear print well contrasted with the background of the said print being visible and readable by the user of the said exercise machine when ready to exercise.

21. An exercise machine as claimed in claim 19 wherein the said everyday task is performed by the body of the said exercising machine in a position easily visible and designed to be easily understandable which task is being represented.

22. An exercise machine as claimed in claim 21 wherein the said everyday task is standing from a seated position.

23. An exercise machine as claimed in claims 1 and 19 further comprising an adjustable seat height lever wherein the starting height of the said dynamic seat is adjustable by the user whereby enabling users of differing heights to adjust the maximum height of the said dynamic seat to suit the height of the said users.

24. An exercise machine as claimed in claim 1 wherein the said cable is substituted by a belt or chain.

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