Title: AN APPARATUS FOR MULTIPURPOSE TRAINING AND EXERCISE

Abstract: The present invention provides for an apparatus for multipurpose physical training and fitness exercise. The apparatus comprise of a base frame or console configured to be placed on a floor with a pair of cables and drums run by electric motors. The electric motors are controlled by a computer which enables the motors to produce force and haptic (tactile) sensations to the user. The console has means for fixing human supports and training gear for a number of different power and weight training exercises.
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An apparatus for multipurpose training and exercise

Field of the Invention

The present invention relates to an apparatus for multipurpose physical training and exercise. The apparatus is configured for indoor use, preferably within a professional environment as in a training studio. The inventive apparatus has a basic console which utilises motors for haptic force feedback and may be built or altered for a plurality of options for physical weight training and fitness exercises.

Background of the Invention

A training studio or gymnasium has a variety of training equipment and training apparatus for improving fitness and strength, such as ellipticals, treadmills, ergometer bikes, spinners and different weight-training apparatus. Most of the simple apparatus people use without coaching and therefore with the risk of accidents and injuries. This especially applies to weight training apparatus and specifically where free weights are involved. Weight-training apparatus should therefore be used under surveillance of a coach although this is usually not the case. When performing bench press exercises with free weights, a helper or coach should always be present.

Injuries do not always come from trapping oneself on weights or dropping weights or dumbbells on body parts, but may also come from using too heavy weights or working oneself to exhaustion, thus harming muscles tendons and risking heart failure.

Currently there are several solutions for training apparatus and equipment which utilise computer-controlled motors, also called robotics.

These are solutions where a motor or motors are controlled by a computer which, together with sensors and or encoders and especially designed computer programs, make electric motors produce resistance as a simulation for any given weight and force.
US2011/0172058 (Deaconu et al.) discloses use of electric motors in training equipment.

The training and test apparatus TrainITest from the company Inmotion Intelligence AB from Sweden, see http://www.inmotionintelligence.com/, uses robotics to test human physical muscle activities. Although it can be used for a number of training exercises, it only depends on a single cable which a user is made to pull in various manners. The cable is guided by an arm movable in a vertical direction which then offers different exercises.

PCT publication WO 03/030092 describes the use of electric motors to produce force in order to give haptic feedback sensation to the user. This technology is here used in rotary control devices for electronic equipment such as phones and computers and for infotainment systems in vehicles.

Summary of the Invention

It is an object of the present invention to provide an apparatus for multipurpose and safe training and exercise. The inventive apparatus has a basic console which may be built or altered for a plurality of options for muscle training and fitness exercises.

This object is achieved in an apparatus as defined in the appended claims.

The apparatus comprises of a base frame or console configured to be placed on a floor with a pair of cables and drums run by electric motors. The electric motors are controlled by a computer which enables the motors to produce force and haptic (tactile) sensations to the user. The console has means for fixing human supports and training gear for a number of different power and weight training exercises. This includes exercises such as bench press, squat and weight lifting, dumbbell training, down pull exercises, shoulder press/overhead press and others. The invention also has embodiments for more special exercises such as for performing rowing and skiing.

The drums of the apparatus, which are powered by the electric motors and fully controlled by computer programmed code, produce resistance, desired speed and haptic feedback to the cables of which at an opposite end, equal or variable pulled
and pushed by a user as part of a physical training exercise, the rotary motion of the drums is controlled by a computer according to a software program and efforts by the user.

The console has a screen, preferably a touch screen, for graphic display and interactive communication and feedback between apparatus and user including display of apparatus functions, user options and exercise feedback and for user input of data.

One main feature of the inventive apparatus is to provide safe weight-training exercises. The apparatus computer runs a program where each and every user has its own profile which is stored in the apparatus and/or in a remote computer as part of a network, and which the user may feed with personal data related to body, health and fitness. A training programme is then issued by the apparatus which the user has to follow. The apparatus will then adjust its resistance levels according to the training programme which is set to a safe level for the user. This prevents the user from over exhaustion and there are no physical heavy objects which the user may drop and therefore accidents caused by such errors will not occur.

**Brief Description of the Drawings**

The features of the invention and the inherent improvements over prior art will be described with reference to the accompanying drawings which illustrate preferred embodiments of the invention by example and in which:

Fig. 1 shows a perspective view of the console of the invention.
Fig. 2a shows a perspective view of the console of the invention where only part of the frame is shown and where covers are removed; fig. 2b shows a side view.
Fig. 3a, 3b shows a perspective view of the invention for bench press exercises.
Fig. 4 shows a perspective view of the invention for squat and weight-lifting exercises.
Fig. 5 shows a perspective view of the invention for dumbbell exercises.
Fig. 6 shows a perspective view of the invention for down pull exercises
Fig. 7 shows a perspective view of the invention for shoulder press/overhead press exercises.
Fig. 8a shows a perspective view of the invention for rowing exercises, 8b and 8c shows top and frontal view.
Fig. 8d shows a perspective view of the invention for paddling exercises, 8e and 8f shows frontal and top view.

Fig. 9a shows a perspective view of the invention for ski exercises, figs 9b and 9b a frontal and side view of same.

Fig. 10 shows a block schematic of the invention's functions and interface system.
Fig. 11 shows a schematic representation of designing a training program.
Fig. 12 shows a schematic representation of an interface menu.
Fig. 13 shows a schematic representation of the invention in a gym setting.

Detailed Description of the Invention

With reference to fig. 1 the inventive apparatus comprises of a base frame or console 1 configured to be placed on a floor. The console has brackets 4, 5, 6, 7, 8, and 9 for where to fix human supports, training gear for a number of different power, weight and other training exercises, as will be further described below with reference to figs. 3-9.

As shown in figs. 2a-2b, a pair of cables 10, 11 are connected to drums 12, 13. The drums 12, 13 of the apparatus are powered by the electric motors 14, 15, which are controlled by a computer which, together with encoders or sensors and custom designed computer programs, will produce resistance, wanted speed and haptic feedback to the cables which at an opposite end are pulled by a user as part of a physical training exercise. This aspect is further disclosed below with reference to fig. 10.

The cables are guided on to the drums through cable guides 20, 21. The cable guides 20, 21 are connected on to bolts 22, 23, both guides and bolts are threaded and engage, the bolts partly being worm gears. The bolts have at one end gears 24, 25 which engage in gears 26, 27 fixed on to one end portion of the drums 12, 13. As the drums rotate, the rotation of the bolts 22, 23 moves the guides 20, 21 which travel from side to side within the width of the drums 12, 13 so that the cables are tidily reeled on and off the drums. As seen in fig 2b, which is a view of the left side of the console, the cables, here also indicated by dotted line, run under pulley wheels 28, 29 before being guided out of the console in a vertical direction.

The rotary motion of the drums 12, 13 is powered by the electric motors 14, 15 controlled by a computer according to a software program and the efforts of the
user. Encoders read the motion of the drums and cables which is processed by the computer. Also, there are means/force sensors of measuring the force applied by the user to the drums and cables which enables the computer to process the right data for the motors to produce resistance to the drums, cables and user. The console also has a user interface station with screen 40, preferably a touch screen, for graphic display and interactive communication and feedback between apparatus and user, for instance showing apparatus functions, user options and exercise feedback and for user input of data. Further disclosures regarding the system of resistance and the interactivity with the user are disclosed below with reference to figs. 10 -13.

The following will disclose how the invention works as a console for a plurality of power and weight-training exercises.

For several of the embodiments a frame structure 45 supports a bench 46 which is partly foldable in a vertical position.

Fig. 3a and 3b show the invention as an apparatus for bench press exercises. The bench 46 is supported on frame structure 45 which is connected on to brackets 4 and 5 of the console and on an adjustable frame structure 45’ which is supported directly on to the floor. A leg 47 supports the foldable part 46’ of the bench 46. On each side of the bench is fixed a vertical structure 51, 51’ fixed at the bottom ends on to brackets 6, 7 of the console and connected together by a beam 48. Cable 10, 11 is connected by bar 50 which is positioned on hooks 52 when not in use.

Numerals 53, 53’ indicate safety catch of bar 50. If the user lying on the bench lifting bar should lose the bar, power on the motors 14, 15, will be stopped so as not to crush the user. This is further disclosed below. However if the computer and or system fails, there are safety catches 53, 53’.

The bar 50 functions as a free weight discs bar but in this case the resistance of the cable created from the motors 14, 15 will simulate and replace any wanted weight discs.

Fig. 4 shows the invention as an apparatus for weight-lifting exercises. A platform 60 for standing is located between the cables 10, 11 which are connected together by bar 50. The bar can be placed on hooks 62 which are fixed onto two vertical structures 64, 64’. The platform 60 is at one end fixed to brackets 4 and 5 and at
the other end supported by legs 65, 65' on to the floor. At the front end of platform 60 and between cables 10, 11, there is indicated with dotted lines a pair of safety catches, 63, 63'. Similar to what is disclosed in figs. 3a-3b, the catches will in case of failure of the system prevent injury if the user drops the bar 50, whereby it is pulled towards the floor and user's feet.

The bar 50 has the same function as for the apparatus in fig. 3 but in this case the user will stand and lift the bar, and or lift it whilst bending knees doing squat exercises.

Fig. 5 shows the invention as an apparatus for dumbbell exercises. A seat 44 (46) with a back rest 46' which can fold into a bench, is placed on to the console between each of cable 10, 11 which at each end has a handle 70 70'. A leg 47 supports the backrest 46' of the seat, the leg placed in grooves along frame part 45'. A platform 68 is placed on the console, fitted to brackets 4, 5, and in front of seat 44, and supported on legs 65, 65'.

The user will in this case sit on the seat, placing feet on platform 68 and lift the handles 70, 70'. The user may also fold down backrest 46' so to make a bench 46 which the user may use for dumbbell exercises lying down.

Fig. 6 shows the invention as an apparatus for performing down-pull exercises. A seat/bench 44 (46) is placed on to the console between each of the cables 10, 11, the seat supported on frame structures 45 and 45', similar to the manner disclosed in figs. 5 and 7. On each side of the bench is erected a frame structure 71 fixed on to brackets 4, 5, 6 and 7, the frame supporting bar 50 which is fixed to cables 10 and 11 in such a manner that the bar hangs over the seat/bench for a user to reach. The cables 10, 11 are supported and guided through pulleys 72, 72', 73, 73', 74, 74'.

A user will sit on the seat and pull the bar down in front or behind his/her head. The seat backrest can be folded down as a bench for a variety of training exercises.

Fig. 7 shows the invention as an apparatus for performing shoulder press or overhead press exercises. Seat 44 (46) is placed on to the console, similar to the manner disclosed in figs. 5 and 6. A frame structure 51, 51', 48 as disclosed above relative to fig. 3a, 3b, supports the bar 50 when not in use. To the frame 51, 51' is
indicated with dotted lines a pair of safety catches, 78, 78', similar to what is disclosed in figs. 3a-3b.

A user will sit on the seat and force the bar up above his/her head. The seat backrest can be folded down to a bench for a variety of training exercises.

The following will disclose how the invention works as a console for fitness training performing rowing and ski exercises.

Figs. 8a, 8b and 8c show the inventive console with means for performing rowing exercises. An elongated upper frame structure 80 is at one end supported on legs 81, 81' which are fixed on the console 1 at brackets 4 and 5. The other end of upper frame 80 is supported on legs 82, 82' which are in direct contact with the floor. The upper frame structure is rotary connected on to the legs on axles 84, 84' along the length axis of the frame, this configuration enabling tilt motion of the frame. A suspension comprising of dampers and springs 86, 86' supports and softens tilt motion of the upper frame 80. The upper frame has rails 88, 88' along its entire length and on both sides of which a seat 90 is guided for travelling along the frame. The seat is on each side fixed with arms 92, 92' which support oars 93, 93', the oars motion able in all directions connected on ball joints 94, 94'. Cables 10, 11 are fixed to the oars 93, 93'. On the frontal end of frame is fixed means 95, 95' for support of the user's feet. When the user sits on the seat 90 with feet placed on supports 95, 95' and grips on to the oars 93, 93', resistance from cable is generated as rowing in water. The seat will also move backwards and forwards as the user pulls on the oars. At the same time the user will have to keep in balance as the upper frame and seat will tilt from side to side.

Figs. 8d, 8e and 8f show the inventive console with means for performing paddle exercises as using a kayak. The frame structure 80 is similar to the one of the above-disclosed rower. Cables 10, 11 run over guide wheels 97, 97' which are connected on an axle 98 fixed perpendicular on to the elongated part of frame in front of seat, the said cables being fixed to each end portion of oar 96. When the user sits on the seat with feet placed on supports, gripping on to the oar 96 and making a paddling motion, resistance from cables is generated as paddling in water, the motion and function much the same as for the said rower.
The dampers 86, 86' may have fixed resistance or be of an adjustable type. Dampers with magneto-rheological fluid can be used as they can be adjusted from soft to hard motion. Variation of electric power creates a magnetic field with varied strength which controls the flow of fluid within the damper.

This effect can create a soft and easily tiltable motion or a steady and less tiltable rower. The dampers can also be controlled by the computer, whereby reacting according to a program and environment as graphically shown on the apparatus screen. This means that the dampers are softened or stiffened according to the program and behavior of the user.

In the event of a rower with full computer-controlled tilt, the dampers are assisted or replaced by a motorized actuator.

Figs. 9a, 9b and 9c show the invention as an apparatus for performing classic cross-country ski exercises. A frame structure 100 is connected to the console 1, at one end fixed on to brackets 4 and 5 and the other end supported directly on to floor. The frame has an upper structure 100’ with two tracks 102, 102’ where two “sliders” 103, 103’ are guided. The sliders are made so one can fasten a platform, or as here shown, roller skis 101, 101’, with fastening means (ski bindings) 104, 104’ to which a user can fasten shoes, preferably ski shoes. The skis are only fastened at the front wheel thereby enabling the rear and heel of a user to move naturally in an upward fashion as when skiing classic cross-country for real. The wires 10, 11 connect the sliders 103, 103’ to the cable, drums and motors of the invention which then are a source of resistance when moving skis in a backward fashion.

The frame 100 is also equipped with a pair of belts 106, 106’ placed on the outer sides of the tracks 102, 102’, the belts representing the terrain on which the ski poles of the skier are “stuck” into. A pair of ski poles 107, 107’ without sharp or pointed ends is used. The belts 106, 106’ are powered by a motor 110 and will always run at the same speed. The upper frame 100’ with tracks and belts can be elevated at the front, at an incline, in order to simulate an uphill terrain. A motor and actuator 112 enable lift and lowering of the frame, illustrated by arrow 108 and dotted lines 109 fig. 9c.
As for the other embodiments described, the cable motors are controlled by the computer of the invention. This embodiment does however have two extra motors 110 and motor and actuator 112 which also are controlled by the computer of the inventive apparatus. The computer will adapt the speed of the belts to reflect the speed of the skier depending on the motion of the "sliders" cables and drums.

The user will see the ski program as a graphical 3D animation of a ski track on the screen 40. As the terrain moves from flat to uphill, the upper frame 100' is moved at an incline, the resistance from the drums 12, 13 on the "skis" 101, 101' increases and the terrain belts 106, 106' move slower. To increase speed, the skier must move skis faster and put power on to ski poles and belts which then also will increase speed. Fast forward and downhill motion is simulated by the terrain belts moving fast and any pole use must be rapid.

Fig. 10 shows a block schematic of the invention. Numeral 120 represents a computer processor unit (CPU) with software 122, screen 123 and means for input 124. The inventive console will have an interface and control console 40 with a screen as shown in figs 1-9, preferably a touch screen which then acts as means for input from the user. Means for input may also be a keypad, buttons, multifunctional switches or by voice through a microphone 156.

Software is installed in the computer and programs are included for exercises related to the version of the invention and wanted physical exercise. The computer is programmed for control of motors and actuators to interact with training programs, as read directly from installed programs or from a CD, USB memory stick or any other memory card or medium, or from a portable hard drive, illustrated by numeral 126. Also the apparatus may use programmes from a remote server 128, either locally or through the internet which provides for communication and online training interactively with other users or communication with a coach.

Direct communication can take place by use of online streaming and video camera 129 and audio through microphone 156 and speaker 157.

Power controller 130, which controls power from batteries 131 or from the mains 132, is connected with an input/output board (IO) 133 which again is connected with the CPU, 120 the IO signals the power controller distribution of power within the apparatus as the drum motors 134/14, 135/15, and other drive motors and actuators 112 and 110 shown on embodiment for skiing, fig 9a-c, and the MR
dampers or actuators for the rower in fig. 8. The motors 134 and 135 are connected to the cable drums 136 (12) and 137 (13) enabling them rotary motion and control of cable motion. The inventive apparatus and its different embodiments have sensors or encoders 138, 139 for detection of rotary motion of the motors and cable drums, the signals of which are processed by the IO and computer. For the drums, rotary encoders are useful for converting rotary position to a digital electronic signal.

Motors and actuators as illustrated by numeral 140, 141 are for custom control of functions and mechanical motion in addition to the drum and cable control of the invention. Accompanying sensors are illustrated by numerals 142, 143.

The embodiment of the invention for rowing or paddling exercises, as seen in figs. 8a and 14a, is shown with dampers 86, 86’, 206, 206’ which, when of magneto-rheological fluid type, can be controlled by the IO and computer. A sensor 146 is shown for additional motion readings if dampers are assisted or replaced by an actuator. Numeral 80/200 represents the frame of the rower/paddler.

The embodiment of the invention for cross-country ski exercise is shown with frame 100, upper frame 100’, belts 106, 106’, belt motor 110, incline motor and actuator 112 and sensors 144 and 145. The CPU will through IO board 133 signal motor 112 to adjust incline according to the environment and terrain/track program it is simulating, and signal drums to add resistance to skis and adjust speed of belts which simulate the terrain for the use of ski poles.

The computer is programmed according to any of the shown embodiments of the invention and type of apparatus and for which exercises are to be performed.

For detecting and positioning of the cable drums’ positions, a type of rotary encoders is used, for instance incremental rotary encoders. Such encoders are used to track motion and can be used to determine position and velocity. They can be of mechanical or optical type and, as the direction can be determined, very accurate measurements can be made. This enables the motors/drums to act according to a programmed force curve. Such a force curve is the result of force/resistance relative to a distance and or time.
In the event of performing bench press as disclosed in fig 3, the force produced when pushing weight bar in an upward direction represents a constant weight, for example 30 kg at a defined upper speed, in the upward direction. The same applies when lowering the bar, but if the speed of the bar in the downward direction gets too high, say as if the bar is dropped and no counterforce is applied, the force from the motors is nulled to avoid damage to the user lying on the bench.

To assist the readings from encoders and sensors, there can also be means to measure the force any user puts on the cables and drums, illustrated by numerals 147, 148. This can for example be of a type strain gauge load cells or piezoelectric load cells of which the load cells convert a force into electric signals which are read and processed by the IO and computer into values for use within the apparatus and exercise programs.

Another example on how the invention works is described when performing dumbbell exercises as disclosed in fig 5. A user will choose wanted dumbbell weight on the apparatus console/touchscreen which the apparatus accordingly will apply weight on to the handles as the user starts to lift. As the user descends the dumbbells force is still applied as long as the user applies a counter weight. If no counter weight is applied, the apparatus will not produce any force (weight) on to the handles.

Another aspect of the invention is related to the users and a system for user profiles. The computer of the apparatus will have a program which enables a database of users and user data. A user profile and identification is then made for each user, which enables the invention settings and exercise programs accordingly. The invention is therefore made to act as a personal trainer and to safeguard the user.

The following represents a system for a gym or training studio where the invention is part of the apparatus available. The computer and system of the invention may also apply for apparatus such as a treadmill, spinner, ergometer, elliptical trainer etc.

It is essential that correct data from each user is stored in order to provide correct resistance to training exercises and a correct level of safety.
The following is supported by fig. 11, showing a schematic where box 150 represents choice for new user after an account is opened.

To make a profile, the following data from the user is stored, 152;

- sex
- age
- weight
- height
- build (body mass).

To record training level 153, one needs to know how fit the user is and the user will when first registering leave information about how much training and exercise one has performed. The user may also test and store;

- rest pulse
- max pulse.

For a professional training level the user may also test oxygen absorption.

Each user must also choose why they want to exercise and what their goal 154 is;

- lose weight
- build muscles
- general fitness
- rehabilitation after injury
- etc.

The user may choose apparatus 155 and method where this is natural as for instance training general fitness and for warming up, for example using a:

- rower or paddler apparatus
- ski apparatus
- treadmill
- bicycle trainer
- ergometer.

The user may want to train towards fitness or skills in specific sports 156 as;

- athletics (running, jumping, javelin, etc.)
- fighting sports (boxing/judo)
- long distance running
- ball sports (soccer, handball, basketball, etc.)
- cycling
- swimming
- skiing
- etc.

The skills and fitness level of each user are also recorded or tested in order for the invention to provide correct exercise level and level of safety. The computer of the invention is set up to provide for a training and exercise program for each user 160.

The system also enables a coach to overrun and change the training program for a user. This means that the coach can access the training program and change for instance resistance within the apparatus. The coach can also communicate directly with the user online audio-visual through the screen of the apparatus.

Fig. 12a suggests an opening page on the interactive console of the apparatus using a touchscreen. Page 170 shows a login page where if an account or membership has been opened the user may enter a personal page and profile 171 as illustrated in fig. 12b.

On this page is suggested an information box 172 which states “today’s agenda” telling the user which training and exercises to do. By pressing start 173, the apparatus which is in use will start and provide for settings according to the user profile. In example using apparatus as seen in fig. 3, bench press, the correct weight and number of repetitions are set according to the training program for the user. All the data regarding the training session will be displayed before the user during the session. The program also provides the user with a number of options such as training program overview 175, goals/progression 176, motivation 177, suggestions 178, diet 179, friends 180 (membersite or shortcut to i.e. Facebook), pictures 181 and music/video database 182.

A time schedule for activities and physical exercise is provided for each user which they must follow. If a user does not follow the scheduled program and training instructions, the user will be informed by the apparatus interface, when logged on to the training server or by messages sent to the user directly on SMS or by e-mail.
For example, if a user exceeds the level of training suggested in the given program, a warning will occur and in extreme cases the apparatus will stop. If the user “forgets” a training session, a reminder will be sent by e-mail or SMS.

The invention with the different embodiments is preferably to be used in a gym or studio and may therefore be connected together in order to share the same database of user profiles as illustrated in fig 13.

Each user may be identified by the apparatus of the invention from use of any of the following:
- by entering a code
- card and reader (magnetic or electronic)
- by use of wireless code units (IR, Bluetooth, etc.)
- use of personal units such as mobile phone (Bluetooth).

In relation to the invention when used in a gym 190, illustrated in fig. 13, all the apparatus 192 could be connected with an external terminal 193 which each user 195 could log onto when arriving at the gym.

The invention may also be connected with a server 196 which has a program for handling the users of a gym with an arrangement of the inventive apparatus. Such an arrangement opens for a website and database of the invention to be accessed by the users through the internet. Through the website, the user can access the program which can handle requests from the users such as bookings and access to one’s user profile and training program.

The invention described can be subject to modifications and variations without thereby departing from the scope of the inventive concept as disclosed with reference to the drawings and further stated in the claims. To the extent that certain functional elements can be replaced by other elements to enable the same function to be performed by the various embodiments disclosed, such technical equivalents are included within the scope of the invention.
Claims

1. An apparatus for multipurpose physical training and fitness exercises, characterized in
   - a base frame (1) configured to be placed on a floor,
   - a pair of electric motors (14, 15),
   - a pair of cable drums (12, 13) connected to the motors,
   - a pair of cables (10, 11) mounted on the cable drums,
   - means (4, 5, 6, 7, 8, 9) for fixing human supports and training gear for a
     number of different weight training and fitness exercises,
   - sensors and/or encoders connected to the motors and/or cables,
   - computing means connected to the motors and sensors/encoders,
   wherein the drums are powered by the electric motors and are adapted to provide resistance and haptic feedback to the cables which in free ends thereof are pulled by a user as part of a physical training exercise, the rotary motion of the drums being controlled by the computer according to a software program and the efforts of the user.

2. An apparatus according to claim 1, wherein the motors and drums are adapted to produce and receive resistance and haptic force feedback to and from on the cables as a result of generated force and speed, and/or generated force and distance.

3. An apparatus according to claim 1, wherein the encoders and/or sensors are adapted to feed signals to the computer which run programs to make motors run according to characters of generated force and speed, and or generated force and distance.

4. An apparatus according to claim 1 or 3, wherein said sensors include load cells adapted to read load forces on the cables and drums.

5. An apparatus according to claim 1, wherein the computer is adapted to execute a program for generating a training and exercise program tailored to a user on basis of user data as;
   - sex
   - age
   - weight
- length
- build (body mass)
- training level and fitness,
and of user’s wishes to;
- lose weight
- build muscles
- general fitness
- rehabilitation after injury
and of user’s wishes to train towards fitness or skills in specific sports as;
- athletics (running, jump, javelin, etc.)
- fighting sports (boxing/judo)
- long distance running
- ball sports (soccer, handball, basketball, etc.)
- cycling
- swimming
- ski
- rowing

wherein the apparatus on basis of the generated program will provide correct level of resistance for the training exercises and for safety level.

6. An apparatus according to claim 1, wherein the apparatus has a screen (40) and interface console, preferably a touch screen, for interactive graphic display of apparatus functions, user options, real time animation of training session, results and exercise feedback and for user input of data.

7. An apparatus according to claim 1, wherein the computer is adapted to store a profile for each user with personal data related to body, health and fitness.

8. An apparatus according to claim 1 or 5, wherein the apparatus is part of a gymnasium and where the computers of several of embodiments of the apparatus are connected with each other, and or to a terminal and remote server, providing the user with same access and profile whether accessing directly on to the apparatus, the terminal or server.

9. An apparatus according to claim 1, wherein said cables are at one end connected to said drums which each are connected to an electric motor, and
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guided spaced apart in a vertical like direction, and where the cables are at
each other end fixed to means for a user to hold, pull, push or kick.

10. An apparatus according to claim 1 wherein the computer is adapted to
control the resistance performed by the motors according to a program run
by the computer and settings done by the user.

11. An apparatus according to claim 1, wherein the motors are adapted to stop
producing force and the drums will reel out cable when;
- no force is applied to the cables
- there is produced overload of force from the user onto the cables.

12. An apparatus according to claim 1, wherein the apparatus is adapted to reel
out cable ending the training session if set weight and resistance of the
apparatus is more than safe values identified by the user profile.

13. An apparatus according to claim 1, wherein said means for fixing human
supports and training gear comprise frame structures protruding along the
surface of the base at centre front and rear.

14. An apparatus according to claim 13, wherein said frame structures are a pair
of tracks with holes or sockets, along and between said location of cables,
and that the frame structures also comprise of tracks with holes or sockets
at the front and rear of the base.

15. An apparatus according to claim 1, wherein the means for power and weight
training exercises for fitting on to the base provides for weight training and
exercise from the group:
- bench press
- squat/ weight lifting
- dumbbell training
- down-pull exercises
- shoulder press/overhead press
- horizontal pull – row
- vertical pull - ski.
16. An apparatus according to claim 1, wherein the base is equipped with a bar (50) connecting the free ends of the cables, an adjustable bench (46, 46') for lying and resting the back on, located between a pair of vertical columns (64, 64') which has hooks (62) for holding said bar, the apparatus being set up for bench press (Fig. 3a-b).

17. An apparatus according to claim 1, wherein the base is equipped with a bar connecting the free ends of the cables, a platform for standing on located between a pair of vertical columns which has hooks for holding said bar, the apparatus being set up for weight lifting or squat exercises (Fig. 4).

18. An apparatus according to claim 1, wherein the free ends of the cables are equipped with handles, the base having a bench or seat for lying down or sitting on and a platform for resting feet or standing on which is located between a pair of vertical columns which have hooks for holding said bar, the apparatus being set up for dumbbells and one hand weight lifting exercises (Fig. 5).

19. An apparatus according to claim 1, wherein the base is equipped with a bar connecting the free ends of the cables and a bench or seat for sitting on located between a vertical frame structure (71) of which support the said bar and cable in such manner the bar is hanging over the bench for a user to reach, the cable being supported and guided through pulleys (73, 74, 73', 74'), the apparatus being set up for performing down pull exercises (Fig. 6).

20. An apparatus according to claim 1, wherein the base is equipped with a bar connecting the free ends of the cables, an adjustable bench or seat for sitting on located between a pair of vertical columns which have hooks for holding said bar, the apparatus being set up for shoulder press (Fig. 7).

21. An apparatus according to claim 1, wherein the base is equipped with an elongated frame structure, which is tiltable relative the base, and which has rails along its entire length of which a seat is guided for travelling along the frame, the seat on each side being fixed with arms which support, in all directions, a pair of motionable oars, which are fixed to the cables, the apparatus being set up for rowing exercises (Fig 8a-c).
22. An apparatus according to claim 1, wherein the base is equipped with an elongated frame structure, of which is tiltable relative the base, and which has rails along its entire length of which a seat is guided for travelling along the frame, and wherein positioned in front of seat is a motionable oar, which is fixed to the cables in each end, the apparatus being set up for paddling exercises (Fig. 8d-f).

23. An apparatus according to claim 1, wherein the base is equipped with a frame, at one end connected to the base, the other end supported by the floor, said frame comprising;
   - a pair of tracks of which guides a pair of sliding means
   - a pair of roller belts
   - an electric motor connected to belt rollers
   - an electric motor with vertically working actuator,
wherein said cables of the invention is connected to the slide means of which fixes means for roller skis or feet platforms, the roller belts placed on each side of said tracks of which are endlessly brought on said rollers, the electric motor and actuator located in frontal position enabling incline of frame with tracks and belts, the apparatus enabling skiing exercises (Fig. 9).
Fig. 10
Fig. 11
**Fig. 12a**

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**Fig. 12b**
### INTERNATIONAL SEARCH REPORT

**International application No**

PCT/NO2014/050051

#### A. CLASSIFICATION OF SUBJECT MATTER

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According to International Patent Classification (IPC) or to both national classification and IPC

#### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A63B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

#### Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

#### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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See patent family annex.

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Date of the actual completion of the international search

5 August 2014

Date of mailing of the international search report

12/08/2014

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk
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