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(54) **EXERCISE MACHINE AND METHOD FOR PERFORMING AN EXERCISE**

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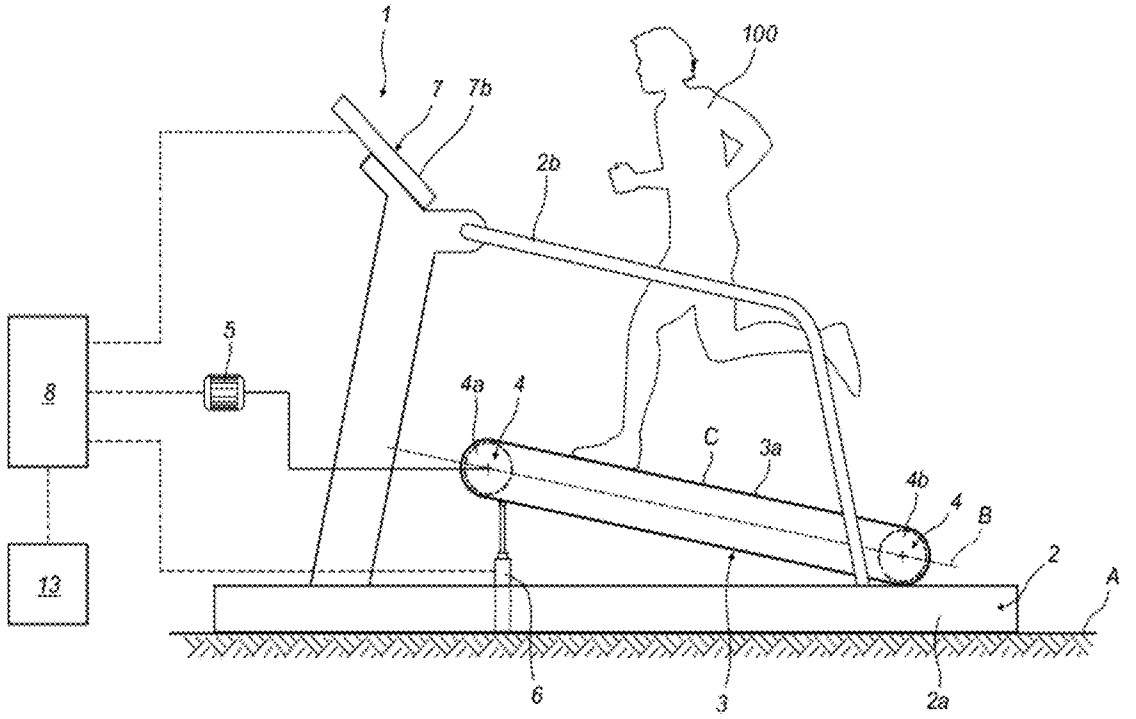
(57) **ABSTRACT**

An exercise machine of the treadmill type comprises a motor (**5**) connected to a belt (**3**) and able to be activated for driving the belt, an actuator (**6**) associated with the belt (**3**) for angling it, an interface (**7**) designed to allow the user (**100**) to set a basic pair of values relating to predetermined operating parameters and corresponding to a machine operating configuration. The machine also comprises a processor (**8**) programmed to derive a user (**100**) oxygen consumption value depending on the basic pair of values and for calculating, the oxygen consumption value being equal, at least one alternative pair of values which involves lower energy consumption by the motor (**5**) compared with the basic pair.



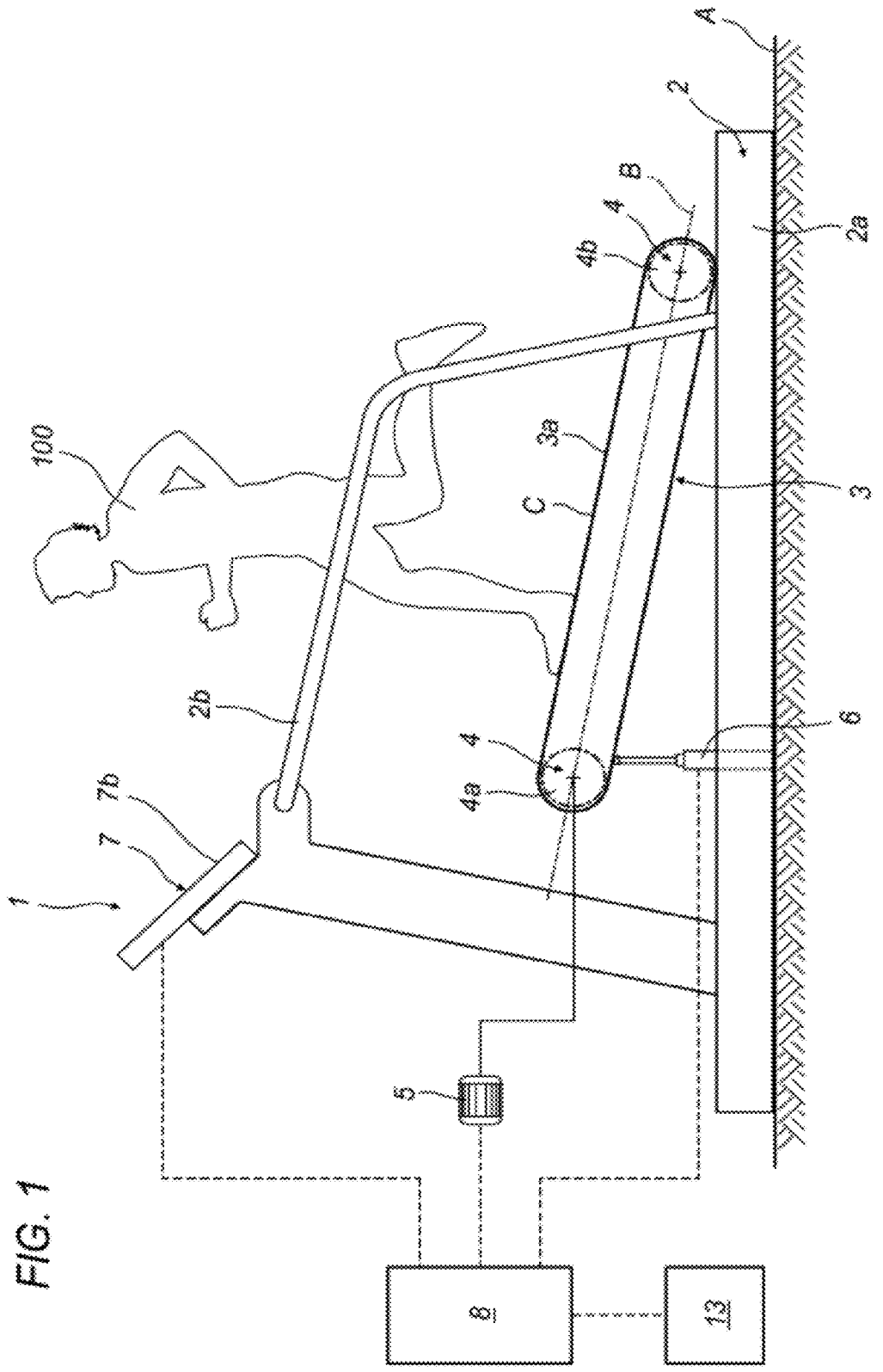


FIG. 1

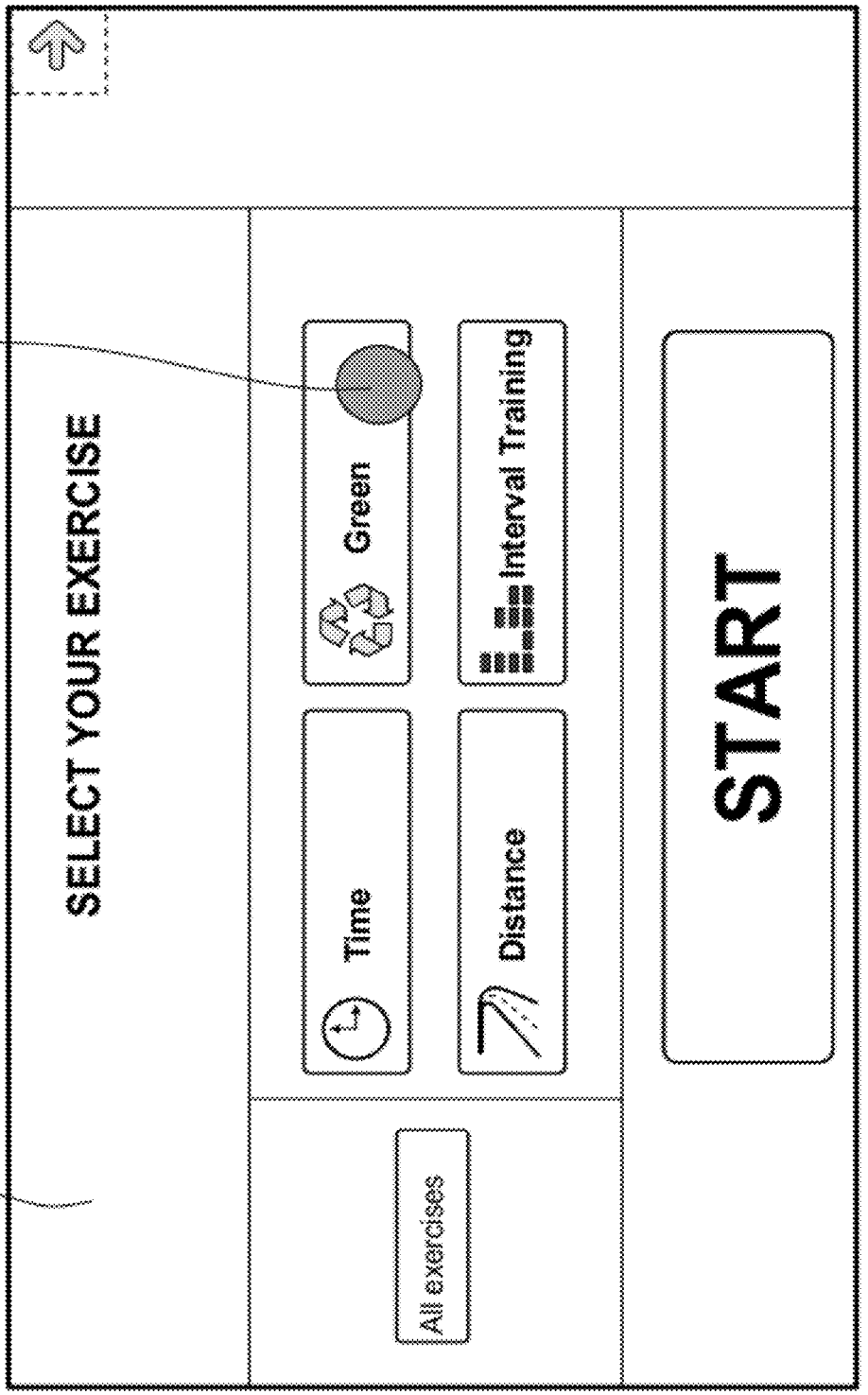

SELECT YOUR EXERCISE
Green
Interval Training
Time
Distance
All exercises
START
14
7

FIG. 2

FIG. 3

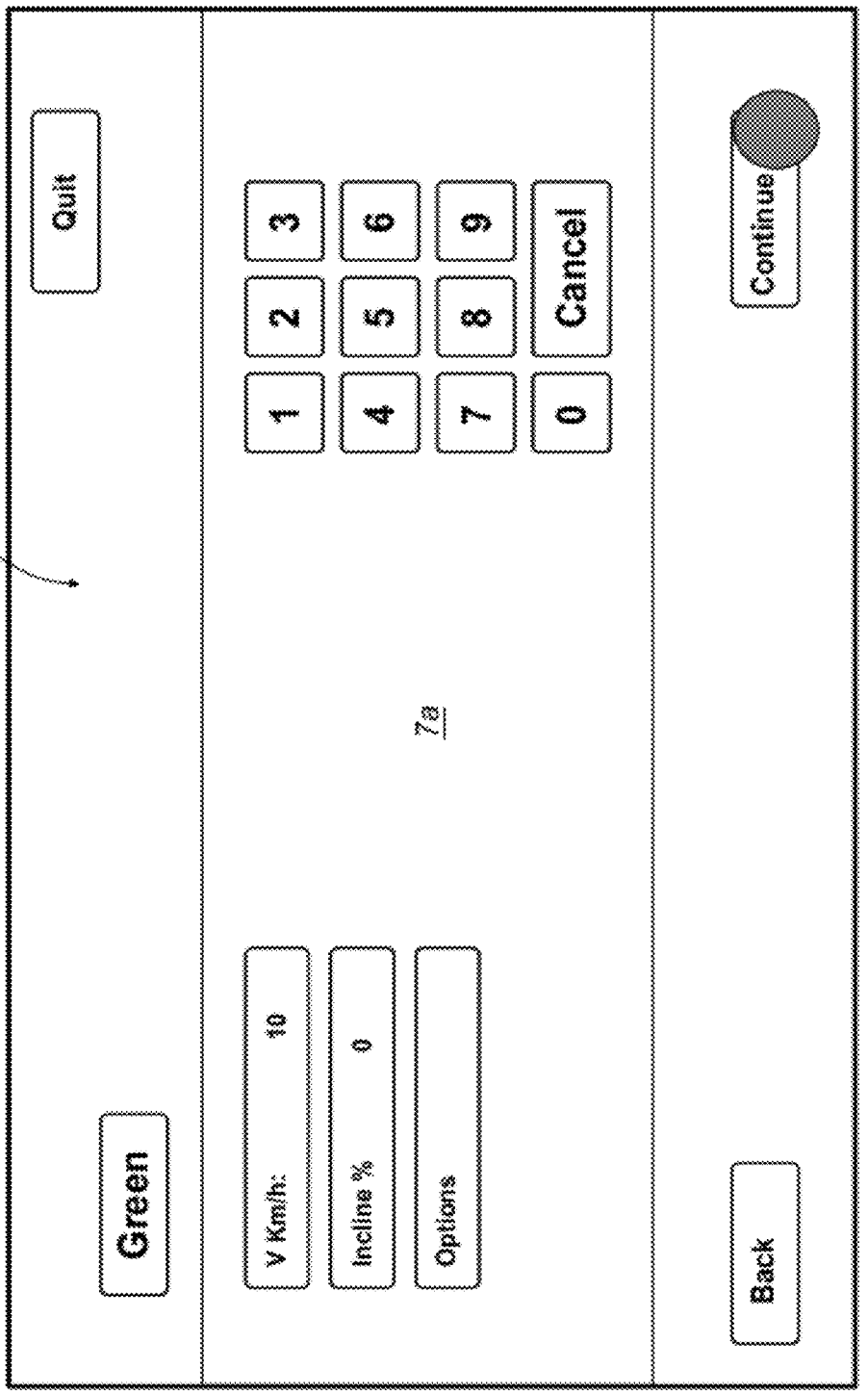

7
Quit
Green
V Km/h: 10
Incline % 0
Options
1
2
3
4
5
6
7
8
9
0
Cancel
7a
Continue
Back

FIG. 4

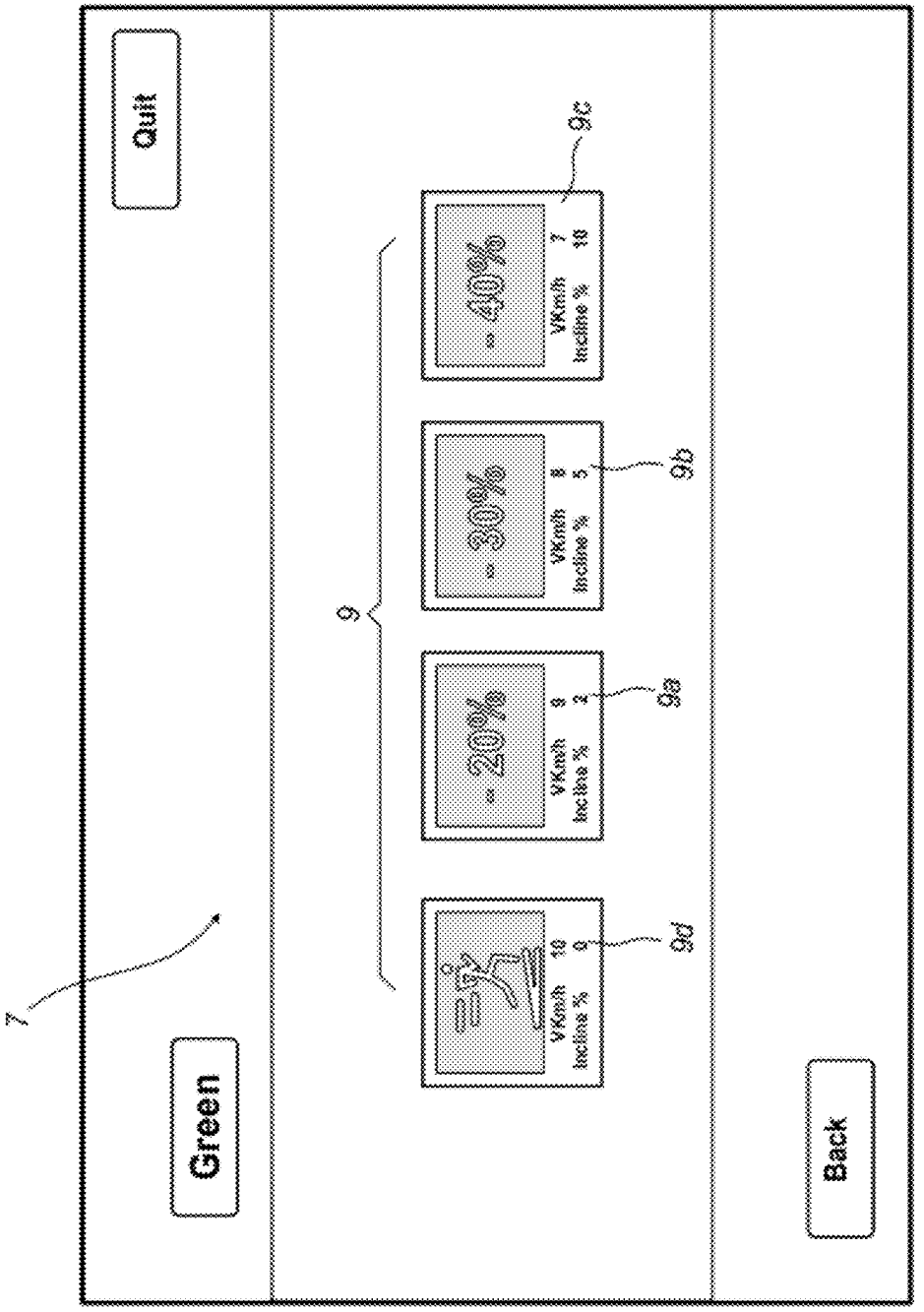
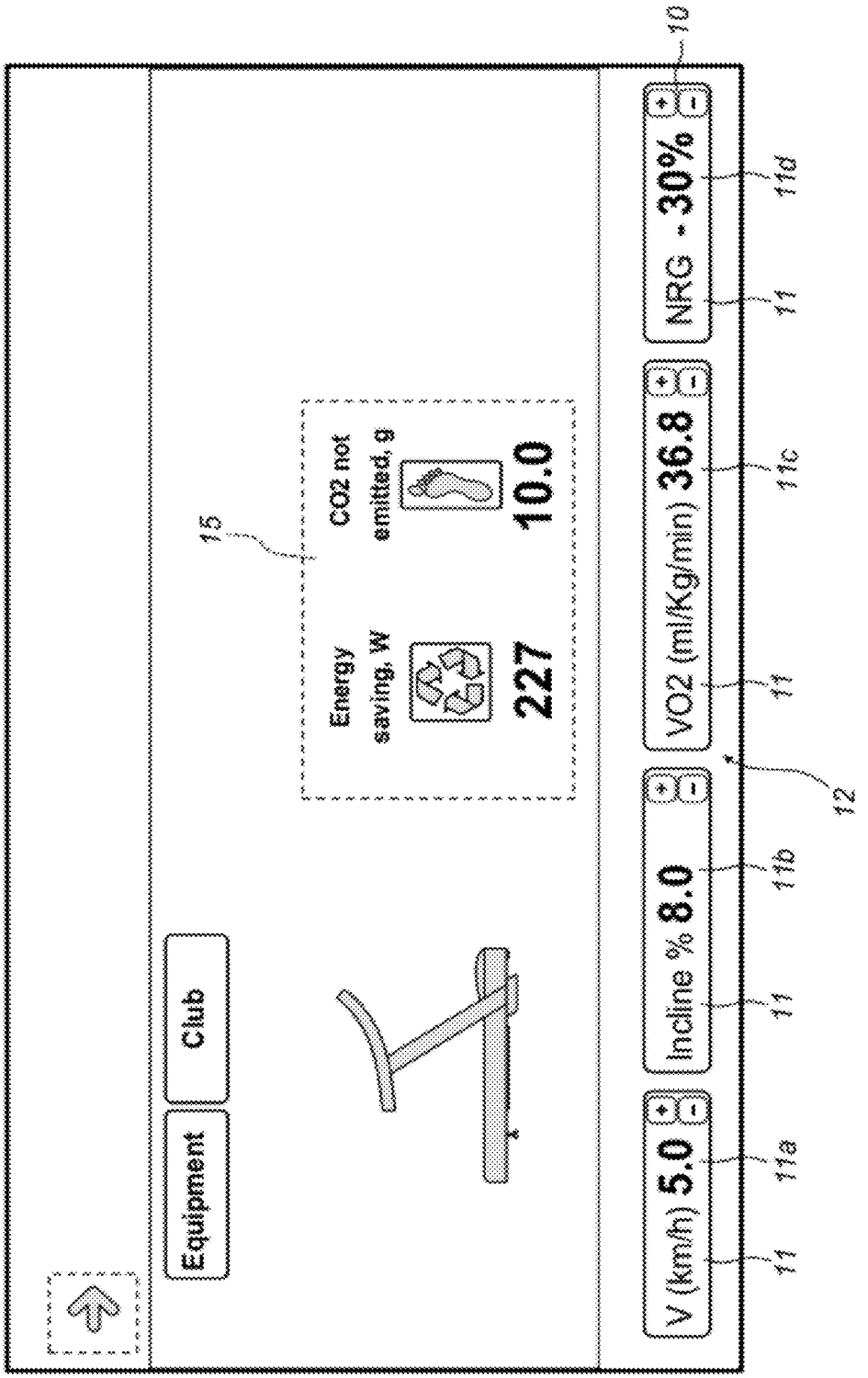


FIG. 5


Equipment
Club
15
CO2 not emitted, g
10.0
Energy saving, W
227
10
V (km/h) 5.0
11a
Incline % 8.0
11b
VO2 (ml/Kg/min) 36.8
11c
NRG - 30%
11d
11
12

EXERCISE MACHINE AND METHOD FOR PERFORMING AN EXERCISE

BACKGROUND OF THE INVENTION

[0001] This invention relates to an exercise machine, preferably of the treadmill type, and a method for performing an exercise, preferably using said machine.

[0002] This invention is applied in particular in the sector of fitness and gym equipment.

[0003] There are prior art exercise machines comprising a belt trained around at least two revolving rollers and forming an exercise platform for a user, allowing the user to walk or run on the spot, commonly known as treadmills.

[0004] Such machines are equipped with a motor for driving at least one of the rollers, for driving the belt at a predetermined speed, usually selected in advance by the user by means of an interface located in front of him.

[0005] Moreover, more high-tech treadmills are equipped with an actuator associated with the belt for angling it relative to the horizontal plane, so that the user has the sensation of running uphill.

[0006] Even the inclination parameter (i.e.: the angle of inclination) can be set by the user with the above-mentioned interface, which is normally designed to perform many functions, both controlling the machine, and providing the user with entertainment while he exercises.

[0007] Consequently, in prior art machines, the user can act independently on the belt movement speed and/or incline depending on his level of tiredness or the training goal.

[0008] Disadvantageously, the prior art machines described above have particularly high energy consumption, especially for operating configurations involving high speed and a low belt incline.

[0009] In fact, a high belt speed corresponds to high energy consumption by the motor associated with it.

[0010] However, said disadvantage is accentuated both by the current economic and environmental situations.

[0011] In particular for gyms, which are supplied with a large number of these machines, the disadvantage in economic terms has a considerable effect on internal budgets.

[0012] The aim of this invention is to provide an exercise machine and a method for performing an exercise which overcome the above-mentioned disadvantages of the prior art.

SUMMARY OF THE INVENTION

[0013] In particular, the aim of this invention is to provide an exercise machine which allows the possibility of choosing a type of training with limited energy consumption.

[0014] Said aim is fulfilled by the exercise machine according to this invention, comprising:

[0015] a belt trained around at least two revolving rollers to form an exercise platform for a user **100**, allowing the user to walk or run on the spot;

[0016] a motor connected to at least one of the rollers and able to be activated to drive the belt;

[0017] an actuator associated with the belt to angle the exercise platform relative to a machine supporting surface by rotation about an axis parallel to the axes of rotation of the rollers;

[0018] an interface designed to allow the user to set a basic pair (or combination) of values for parameters consisting of a belt movement speed and an exercise platform incline; said basic pair of values defining a corresponding basic operating configuration of the machine;

[0019] a processor associated with the motor and with the actuator for controlling them and connected to the interface for receiving the basic pair of values set.

[0020] According to this invention, the machine is characterized in that it comprises a processor programmed for:

[0021] estimating a value of a parameter representative of the exercise intensity (preferably oxygen consumption in the unit of time, which the user would consume while performing the exercise) with the machine in a basic operating configuration, depending on the basic pair of values,

[0022] deriving at least one alternative pair of values for the parameters, different to said basic pair of values and corresponding to an exercise intensity (oxygen consumption) equal to the estimated value and to an energy consumption by the machine motor lower than that corresponding to the basic pair of values, the interface being designed to allow the user to select a machine operating configuration corresponding to said at least one alternative pair of values, thus allowing the processor to control the motor and the actuator depending on the operating configuration selected.

[0023] Moreover, the aim of this invention is to provide a method for performing an exercise using an exercise machine which limits its energy consumption.

[0024] According to this invention, that aim is fulfilled by the method for performing an exercise using an exercise machine comprising a belt forming an exercise platform for a user and trained around at least two revolving rollers driven by a motor, allowing the user to walk or run on the spot, characterized in that it comprises the following steps:

[0025] setting a basic pair of values for parameters consisting of a belt movement speed and an exercise platform incline;

[0026] estimating a value of a parameter representative of the exercise intensity (preferably oxygen consumption in the unit of time, which the user would consume while performing the exercise) with the machine in the basic operating configuration;

[0027] deriving at least one alternative pair of values for the parameters, different to the basic pair and corresponding to an exercise intensity (oxygen consumption) equal to the estimated value and to an energy consumption by the motor lower than that corresponding to the basic pair of values;

[0028] selection by the user of a machine operating configuration corresponding to said at least one pair of values;

[0029] setting the machine in the corresponding operating configuration.

[0030] Preferably, the method of the invention allows the user to input desired values (in absolute or relative terms) of the energy consumption by the motor, whereby the machine is set to a pair of values which correspond to the input value of energy consumption and to said estimated value of exercise intensity.

[0031] Preferably, said at least one alternative pair of values for the parameters derived is displayed together with information about the energy consumption by the motor corre-

sponding to said pair of values; hence, the user is allowed to perform the selection taking into account the energy consumption by the motor.

[0032] Preferably, the exercise machine of the invention has an interface configured for allowing the user to input desired values (in absolute or relative terms) of the energy consumption by the motor; the processor is programmed for setting to a pair of values which correspond to said input value of energy consumption and to said estimated value of exercise intensity.

[0033] Preferably, said interface is configured for displaying information about the energy consumption by the motor corresponding to said derived at least one alternative pair of values for the parameters, whereby the user is allowed to perform the selection taking into account the energy consumption by the motor.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034] This and other features of the invention will become more apparent from the following description of a preferred, non-limiting embodiment of the exercise machine, shown purely by way of example, with reference to the accompanying drawings, in which:

[0035] FIG. **1** is a schematic side view of an exercise machine according to this invention;

[0036] FIGS. **2** to **5** are views of the machine interface of FIG. **1** in successive operating modes.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0037] The exercise machine **1** comprises a supporting frame **2** with a base **2***a* resting on the floor and a portion **2***b* for supporting a user **100**.

[0038] The base **2***a* rests on a supporting surface "A" for the machine **1**, preferably horizontal.

[0039] Along the base **2***a* there is preferably a belt **3** trained around at least two revolving rollers **4**, each roller revolving about its own axis of rotation.

[0040] More precisely, the belt **3** can slide around the rollers **4** in such a way as to form an endless moving surface, or exercise platform **3***a*.

[0041] In other words, the machine **1** is of the treadmill type.

[0042] Preferably, the two rollers **4** rotate about axes of rotation which are parallel and are aligned in a machine **1** exercise direction "B".

[0043] Consequently, the machine comprises a front roller **4***a* and a rear roller **4***b*.

[0044] In particular, the portion of belt **3** which extends between the two rollers **4** forms the exercise platform **3***a* for the user **100**, allowing the user to walk or run on the spot.

[0045] The exercise platform **3***a* forms an exercise surface "C" on which the user **100** can walk or run.

[0046] Preferably, the belt **3** is made of material with a high friction coefficient (anti-slip), so as to allow optimum grip between the sole of the user's foot and the exercise platform during the exercise.

[0047] The machine **1** comprises driving means associated with the belt **3** for driving its movement and/or moving it in space.

[0048] In particular, the machine **1** comprises a motor **5** connected to at least one of the rollers **4** and able to be activated to drive the belt **3**.

[0049] The motor **5** can be activated to drive the rotation of the above-mentioned roller **4** (or both rollers) at a predetermined speed, so as to allow the user **100** to walk or run at a predetermined walking or running speed.

[0050] Preferably, the motor **5** is of the electric type.

[0051] In other words, the motor **5** is connected to the mains power supply to draw from the latter the power it needs in order to operate.

[0052] Consequently, an increase in the speed of the rollers **4** corresponds to an increase in motor **5** energy consumption.

[0053] It should be noticed that the motor **5** energy consumption corresponds to the power that the motor **5** draws from the mains (hereinafter referred to as absorbed power).

[0054] The machine **1** also comprises an actuator **6** associated with the belt **4** to angle the exercise platform **3***a* relative to a surface "A" supporting the machine **1**, by rotation about an axis parallel with the axes of rotation of the rollers **4**.

[0055] In other words, the actuator **6** lifts one roller **4** relative to the other (the front roller **4***a* relative to the rear roller **4***b*), keeping the axes of rotation parallel with each other to simulate an upward slope.

[0056] Consequently, the exercise surface "C" can be angled relative to the surface "A" supporting the machine **1**, allowing the user **100** the most diverse exercising possibilities.

[0057] The actuator **6** acts on the belt **3**, making it rotate, or simply lifting the front roller **4***a* and obtaining a rotation of the exercise platform **3***a* about the rear roller **4***a*.

[0058] Alternatively, the lifting may occur by means of rototranslation, that is to say, movement of the rear roller along the horizontal plane and the front roller along the vertical plane (or an angled plane).

[0059] Preferably, the actuator **6** is associated with the front roller **4***a* in such a way as to provide a stable support for the belt **3** even when the exercise platform **3***a* is set at an angle.

[0060] The actuator **6** may be of the linear or curved type.

[0061] In the embodiment illustrated, the actuator **6** is positioned at the front roller **4***a* and has a substantially vertical operating direction.

[0062] It should be noticed that, in the embodiment illustrated, the entire belt **3** is angled relative to the supporting surface "A".

[0063] However, in alternative embodiments, a system of rollers and return devices could be used to allow angling only for the exercise platform.

[0064] In the embodiment illustrated, the actuator **6** is of the hydraulic/pneumatic type.

[0065] In alternative embodiments, the actuator may be of the electric or electromechanical type.

[0066] To allow the user **100** to interact with the many machine **1** functions, the machine **1** comprises an interface **7** positioned in front of (or at the side of) a user **100** exercising position (that is to say, a position adopted by the user **100** while exercising).

[0067] In this way, the user **100** can easily reach the interface **7** even during the most demanding exercises.

[0068] More precisely, the interface **7** is positioned at a height at which it is particularly easy to reach and view.

[0069] In the embodiment illustrated, the interface **7** is immediately in front of the front roller **4***a*, at a height greater than that of the front roller.

[0070] Preferably, the interface **7** comprises a display **7***b* (or screen) and a control panel, more preferably a touch-screen.

[0071] Alternatively, the control panel may be a keyboard which is separate from the screen **7***b*.

[0072] The interface **7** comprises a data entry module **7***a* designed to allow the user **100** to enter a plurality of data useful for performing the exercise (that is to say, operating parameters).

[0073] Preferably, the interface **7** is designed to allow the user **100** to set a basic pair (or combination) of values relating to predetermined operating parameters and corresponding to a machine **1** operating configuration.

[0074] The term "operating configuration" refers to the machine operating mode comprising the incline and movement speed set.

[0075] The expression "basic pair" refers to a couple of values, each associated with a respective parameter, entered by the user **100** at the start of the exercise session or the single exercise.

[0076] Said parameters preferably comprise the user **100** walking or running speed and the incline of the exercise platform **3***a* (that is to say, an angle α of inclination for it).

[0077] More precisely, the interface **7** (or the data entry module) is designed to receive from the user **100** data about the desired walking or running speed.

[0078] Said desired walking or running speed ideally corresponds to a speed, in the opposite direction, of movement (that is to say, sliding) of the belt **3** during the exercise.

[0079] Consequently, hereinafter reference is made to one or the other with the same meaning, unless expressly otherwise indicated.

[0080] Moreover, the interface **7** (or the data entry module) is designed to allow the user **100** to set the desired incline of the exercise platform **3***a*.

[0081] That incline may be expressed as an angle α relative to the horizontal plane (that is to say, the supporting surface "A") or, preferably, as a percentage gradient of the exercise platform.

[0082] It should be noticed that hereinafter, for simplicity, reference is made to the belt **3** incline rather than the exercise platform **3***a* incline, since that is more intuitive and in line with the embodiment illustrated.

[0083] Therefore, the interface **7** is associated both with the motor **5** (for setting its speed) and with the actuator **6** (for setting its extension or rotation), preferably by means of a suitable processor **8**.

[0084] The above-mentioned processor **8** is in fact set up to receive the data from the interface **7** and is designed to process them so as to control the driving means.

[0085] In other words, the processor **8** is associated with the motor **5** and with the actuator **6** for controlling them.

[0086] Therefore, the processor **8** is set up to receive data about the walking or running speed and the incline (angle α) set by the user **100** and it is designed to set (or activate) the motor **5** and/or the actuator **6** accordingly.

[0087] In other words, the processor **8** is connected to the interface for receiving data representative of the basic pair of values set.

[0088] According to this invention, the machine **1** can be selectively switched between an energy saving mode and a standard mode.

[0089] For that purpose, the machine **1** comprises a switching unit **14** which can be selected by the user **100** for setting the machine **1** either to the energy saving mode or to the standard mode.

[0090] The switching unit **14** may be integrated in the interface **7** or it may be positioned separately from it.

[0091] In spite of that, the interface **7** and the switching unit **14** are associated since setting the standard mode rather than the energy saving mode involves a variation in the interface **7** (that is to say, what the interface **7** displays for the user **100**).

[0092] In the standard mode, the processor **8** is simply set up to receive the basic pair of values (belt **3** speed and exercise platform **3***a* incline) and is designed to set the motor **5** and the actuator **6** accordingly, that is to say, in such a way that the motor drives the belt **3** at the speed set and translates the actuator **6** by an amount such that it provides the exercise platform with the gradient (or incline) set.

[0093] In contrast, in the energy saving mode, the processor is programmed to derive a value of a parameter representative of the exercise intensity, with the machine **1** in the basic operating configuration, depending on the basic pair of values.

[0094] Preferably, said parameter representative of the exercise intensity corresponds to oxygen consumption in the unit of time.

[0095] However, said parameter may also be other measurements, provided that they are representative (that is to say, correlated with) the exercise intensity, or the intensity of the physical activity of the user while exercising. For example, the parameter could be calories burned in the unit of time (as an alternative to or in combination with oxygen consumption).

[0096] It should be noticed that calories burned differs from oxygen consumption substantially in terms of a weight factor (i.e.: the weight of the user) with which oxygen consumption is not related.

[0097] For that reason, the parameter representative of the exercise intensity is preferably oxygen consumption, so that there is no need for a weight sensor or for the user to set his weight before exercising.

[0098] Therefore, in the following description reference is only made to oxygen consumption, without thereby limiting the scope of the invention.

[0099] Therefore, having set the desired operating configuration (i.e.: the belt **3** movement speed and the exercise platform **3***a* incline) the processor derives (that is to say, calculates) the quantity of oxygen absorbed in the unit of time by the user **100** during the exercise.

[0100] That absorption is commonly known as VO2 (where "V" is the symbol for volume, "O2" for oxygen) and it is higher the more strenuous the exercise is, because the body reacts to greater physical stress by absorbing more oxygen so as to maintain high performance levels.

[0101] It should be noticed that the expression "oxygen consumption" usually means (in this text) a value irrespective of the time spent exercising, that is to say, in the unit of time.

[0102] However, in alternative embodiments the oxygen consumption could be calculated as an overall value for the exercise, that is to say, also depending on the exercising time desired by the user.

[0103] However, it should be noticed that the evaluations below relating to oxygen consumption in the unit of time may refer in equal measure to overall oxygen consumption for the

exercise by means of simple mathematical operations which include the time spent exercising amongst the input parameters.

[0104] The processor **8** is also programmed to calculate, said oxygen consumption value being equal, at least one alternative pair (or combination) of values relating to the same parameters, corresponding to a respective machine **1** operating configuration (alternative operating configuration) which involves lower energy consumption by the motor **5** compared with the basic pair.

[0105] Preferably, the processor **8** is programmed to calculate, said oxygen consumption value being equal, a plurality of alternative pairs (or combinations) of values relating to the same parameters, each corresponding to a respective machine **1** alternative operating configuration which involves lower energy consumption by the motor **5** compared with the basic pair.

[0106] In other words, the processor **8** is programmed to supply the user **100** with one or more alternative operating configurations which allow energy saving, that is to say, a reduction in the motor absorbed power, with the same training in the exercise session.

[0107] The above-mentioned alternative pairs are formed by a value relating to the belt **3** movement speed and a value relating to the exercise platform **3***a* incline.

[0108] In particular, the alternative pairs calculated by the processor **8** have a lower walking or running speed and a higher exercise platform **3***a* incline compared with the basic pair set.

[0109] In fact, as already indicated, the motor **5** is directly responsible for driving the belt **3**, and consequently the motor energy consumption is directly proportional to the belt **3** movement speed.

[0110] However, a simple reduction in speed would involve not just a reduction in motor **5** energy consumption, but also a reduction in VO2 (oxygen consumption).

[0111] With regard to that, it should be noticed that with an increase in the gradient (or incline of the exercise platform **3***a*) the exercise becomes more difficult, requiring a higher VO2.

[0112] As a result, to reduce motor **5** energy consumption while keeping the oxygen consumption in the unit of time unchanged, it is necessary to reduce the belt **3** movement speed while at the same time increasing the exercise platform **3***a* incline.

[0113] According to the invention, the interface **7** is designed to allow the user **100** to select the machine (alternative) operating configuration corresponding to the alternative pair (or to the alternative pairs) of values.

[0114] Preferably, the interface **7** is designed to display the alternative pair or alternative pairs to the user **100**.

[0115] The processor **8** is programmed to calculate the alternative pairs of values depending on predetermined percentage reductions in motor **5** energy consumption compared with the energy consumption generated by the basic pair.

[0116] Advantageously, the interface **7** is designed to display the alternative pairs to the user **100**, correlating them with the respective (percentage) reduction in energy consumption.

[0117] In the embodiment illustrated, the interface **7** presents the user **100** with the alternative pairs which involve an energy saving of 20%, 30% and 40%.

[0118] However, it is possible to program the interface to display any pair for any energy saving compatible with the basic combination set by the user **100**.

[0119] The term compatible refers to the fact that, if the basic pair requires a particularly high gradient or particularly low speed, the processor will automatically tend to exclude from the alternative pairs those comprising gradient/speed values prohibitive for the user or relating to operating configurations which cannot be achieved by the machine **1**.

[0120] For example, the processor **8** is programmed to keep the walking or running speed preferably outside (far from) a range of between 6.5 km/h and 7.5 km/h since in that range it is not clear if the user must be running or walking (with significant repercussions on the actual VO2 value).

[0121] With regard to that, the interface **7** (and in particular the display **7***b*) comprises an icon **9** associated with each of the alternative pairs of values derived by the processor.

[0122] Said icons **9** can be selected by the user **100** to control (preferably by means of the processor **8**) the actuator **6** and the motor **5** so as to bring the machine **1** into the operating configuration corresponding to the selected alternative pair.

[0123] In particular, a first icon **9***a* is correlated with a 20% energy saving, a second icon **9***b* is correlated with a 30% energy saving and a third icon **9***c* is correlated with a 40% energy saving.

[0124] Preferably, the interface also comprises a fourth icon **9***d* correlated with the basic pair of parameters set by the user **100**.

[0125] Therefore, the interface **7** is associated (by means of the processor **8**) with the actuator **6** and with the motor **5**.

[0126] In fact, once the user **100** has selected the preferred alternative combination (using the corresponding icon **9**), the interface sends (preferably by means of the processor **8** or by means of a special control unit) the motor **5** and the actuator **6** signals representative of the belt **3** movement speed (that is to say, the motor **5** operating speed) and the exercise platform **3***a* incline (that is to say, the extension of the actuator **6**).

[0127] Preferably, the processor **8** is programmed to calculate a trend (that is to say, substantially continuous operation) of the exercise platform **3***a* incline value depending on the reduction in the speed of the belt **3**.

[0128] In other words, the processor **8** correlates the gradient and speed parameters substantially continuously.

[0129] As a result, for each belt **3** movement speed value (and therefore each motor **5** energy consumption value), the processor **8** can calculate the corresponding exercise platform **3***a* gradient value which keeps the oxygen consumption unchanged.

[0130] In light of this, the machine **1** (in particular the interface **7**) comprises a tuning module **10** which can be used by the user **100**, while exercising, to vary the energy consumption of the motor **5** between a maximum value, at which the values of the operating parameters correspond to those of the basic pair, and a minimum value at which, the user **100** oxygen consumption in the unit of time being equal, the incline of the exercise platform **3***a* has a predetermined maximum value.

[0131] For that purpose, the processor **8** is designed to receive said motor **5** energy consumption value set by the user **100**, for calculating the corresponding pair of values of the parameters and controlling the motor **5** and the actuator **6** accordingly.

[0132] In other words, the tuning module **10** can be used by the user **100**, while exercising, to control the energy consumption of the motor **5** between a minimum energy saving configuration, in which the values of the operating parameters correspond to those of the basic combination, and a maximum energy saving configuration, at which the combination of values is such that, the user oxygen consumption being equal, the power absorbed by the motor is minimized.

[0133] More precisely, the tuning module **10** is designed to allow the user **100** to continuously vary the energy saving value between two limits.

[0134] The tuning module **10** is associated with the processor **8** in such a way that with each variation in the motor **5** energy consumption (set by the user using the tuning module **10**), the processor **8** calculates a corresponding pair of belt **3** incline and speed values which keeps the user **100** oxygen consumption (that is to say, VO2) unchanged.

[0135] Moreover, the tuning module **10** is connected to the motor **5** and to the actuator **6** for controlling them depending on the energy saving configuration set.

[0136] In other words, the tuning module **10** is associated with the motor **5** and with the actuator **6** (by means of the processor **8**) for setting the machine **1** operating configuration in real time after the variation set by the user for the motor energy consumption **5** by means of the tuning module **10**.

[0137] For example, the tuning module **10** comprises a lever or a push-button panel positioned on the machine **1** frame, preferably close to the interface **7**.

[0138] However, preferably, the tuning module **10** is associated with (and more preferably included in) the interface **7** display **7***b* and comprises a special icon on the touch screen or a special key.

[0139] The processor **8** is programmed to (continuously) correlate all of the operating parameters described above, that is to say, the user **100** walking or running speed or belt movement speed **3**, the belt **3** exercise platform **3***a* incline, the motor energy saving and the user **100** oxygen consumption.

[0140] Advantageously, in this way, if there is a variation in each of said parameters the corresponding values of the remaining parameters are available.

[0141] With regard to that, the interface **7** comprises a plurality of control elements **11**, each associated with a respective parameter, which can be displayed during the exercise and selected by the user **100** for selectively setting the value of the respective parameter.

[0142] Advantageously, that allows the user **100** to set the value of a first parameter (or fixed parameter) as required and at the same time to vary the value of a second parameter (or guide parameter), obtaining the simultaneous display of the corresponding variation of the values of the remaining parameters.

[0143] More precisely, the processor **8** is programmed to determine the value of the other parameters depending on the fixed parameter and the guide parameter set by the user **100** and to set the machine **1** to the corresponding operating configuration.

[0144] For example, the user **100** can, during the exercise, set a desired energy saving value (preferably a percentage) and vary the exercise platform **3***a* incline, increasing the oxygen consumption to make the exercise more challenging.

[0145] Alternatively, the user **100** can set a desired belt **3** incline value, since he does not think he can exceed that value.

[0146] Also, the user **100** can set the oxygen consumption value, varying the belt **3** speed or incline.

[0147] Advantageously, in this way the user **100** has full control of the operating and energy consumption parameters and can manage them as desired.

[0148] In the preferred embodiment, the control elements **11** form a control panel **12** which can be displayed on the interface **7** screen during the exercise or alternatively can be reduced to an icon.

[0149] In particular, a first control element **11***a* is correlated with the belt **3** movement speed, a second control element **11***b* is correlated with the exercise platform **3***a* gradient, a third control element **11***c* is correlated with the user **100** oxygen consumption and a fourth control element **11***d* is correlated with the motor energy saving.

[0150] It should be noticed that in such a case the fourth control element **11***d* corresponds to the tuning module **10**.

[0151] Preferably, the processor **8** is also programmed for calculating, depending on the values of the parameters of the alternative pair set (gradient and speed), a value for the power saved by the motor compared with the corresponding energy consumption determined by the basic combination of values.

[0152] In other words, the processor **8** is designed to calculate both the motor **5** instantaneous absorbed power (or energy consumed during the exercise) and the hypothetical motor **5** absorbed power (energy consumed) if the user **100** had decided to stick to the basic pair of values that was initially set.

[0153] At the same time, the processor **8** calculates the difference (in absolute and/or percentage terms) between the above-mentioned two values and sends a signal representative of that difference to the interface **7**, which is designed to display the energy saving value for the user **100** to see.

[0154] Moreover, the processor **8** is programmed to calculate, depending on the values of the parameters of the alternative combination set, a value representative of the amount of the carbon dioxide saving (i.e.: not emitted) after setting the alternative combination, compared with the amount of carbon dioxide that would hypothetically have been emitted into the environment if the basic combination had been set.

[0155] In other words, and similarly to what was already indicated, the processor **8** calculates the difference (in absolute and/or percentage terms) between the value of carbon dioxide emitted in actual operating conditions and the value of carbon dioxide that would hypothetically have been emitted into the environment if the user **100** had decided to stick to the basic combination of values that was initially set.

[0156] The processor **8** also sends a signal representative of that difference to the interface **7**, which is designed to display to the user **100** the value of carbon dioxide not emitted into the environment thanks to setting the energy saving mode.

[0157] In the embodiment illustrated, the interface **7** comprises a display box **15** which makes available to the user **100** the above-mentioned saving values (energy and carbon dioxide).

[0158] Advantageously, the real-time display of energy saving and reduced environmental impact of the exercise stimulates the user **100** to make greater use of the energy saving mode offered by the machine **1**.

[0159] Moreover, preferably, the processor **8** is designed to receive as an input the duration of the exercise (or a signal representative of the time) and to calculate, depending on said duration, the motor **5** energy saving value and/or the carbon dioxide saving value for the exercise, for making said value calculated available to the user.

[0160] More preferably, the processor **8** is programmed to add together the motor **5** energy saving value and/or the carbon dioxide saving value for the exercise with a corresponding overall motor **5** energy saving value and/or carbon dioxide saving value for the previous exercises, for updating the overall value at the end of each exercise.

[0161] For that purpose, the interface **7** is designed to display to each user **100** at the end of each exercise (or exercise session) the overall motor **5** energy saving value and/or the overall carbon dioxide saving value.

[0162] Therefore, the machine **1** comprises a memory **13** designed to record the overall motor **5** energy saving value and/or the overall carbon dioxide saving value in successive exercise sessions by the same user **100** or different users.

[0163] More precisely, the memory **13** is associated with the processor **8** for receiving the energy and carbon dioxide saving values at the end of each exercise, for adding them together to obtain the overall values for energy saving (and carbon dioxide not emitted) during the machine **1** lifetime (or during a predetermined period of time, for example one day, one week or one month).

[0164] Moreover, the memory **13** is designed to provide the processor **8** with said overall value in such a way that the processor **8** can add to the overall saving value of the previous sessions the instantaneous saving value of the exercise in progress.

[0165] In light of this, the interface **7** is designed to display to each user **100** during each exercise session the overall motor **5** energy saving value and/or the overall value of carbon dioxide not emitted.

[0166] The expression "overall value" therefore refers to the sum of the energy saving (and carbon dioxide not emitted) values of the machine **1** thanks to the energy saving mode during its lifetime.

[0167] Advantageously, that makes the user aware of the environmental effectiveness of the energy saving mode.

[0168] This invention also relates to a method for performing an exercise using the exercise machine **1**, comprising the steps of setting a desired basic pair of operating parameters; the parameters comprising a walking or running speed and an exercise platform **3***a* incline, and deriving the user **100** oxygen consumption value depending on said basic combination of parameters.

[0169] More precisely, the method also comprises the step of estimating the oxygen consumption value in the unit of time, which the user **100** would consume by performing an exercise with the machine **1** in the basic operating configuration, depending on the basic pair of values.

[0170] In other words, it comprises a step of calculating, said oxygen consumption value being equal, a plurality of alternative combinations of values each corresponding to a respective machine operating configuration which involves lower energy consumption by the motor **5** compared with the basic combination.

[0171] Moreover, the method comprises deriving at least one alternative pair of values for the parameters, different to the basic pair and corresponding to an oxygen consumption equal to the estimated value and to an energy consumption by the motor **5** lower than that corresponding to the basic pair of values.

[0172] More precisely, the method comprises deriving a plurality of alternative operating configurations which allow energy saving, that is to say, a reduction in the motor absorbed power, with the same training in the exercise session.

[0173] After that, the user **100** selects a machine operating configuration corresponding to one of the pairs of values and the machine is set to the corresponding operating configuration.

[0174] Preferably, the alternative combinations are displayed for the user **100** who can select the preferred alternative combination.

[0175] The method described above may be implemented at the start of an exercise session or during said session.

[0176] For that purpose, the method may comprise the following steps between the step of setting the basic pair of operating parameters and the step of deriving the user **100** oxygen consumption value:

- **[0177]** user **100** performance of the exercise in a standard mode according to the basic pair of values set;
- **[0178]** presentation to the user of an energy saving mode which involves lower energy consumption by the motor **5** compared with the basic combination;
- **[0179]** user **100** selection of the energy saving mode.

[0180] Advantageously, that allows the user to arbitrarily decide when to perform the exercise in energy saving mode.

[0181] Moreover, the method according to this invention comprises the possibility of varying the operating parameters continuously during the session.

[0182] In particular, the method comprises a step of displaying during the exercise the values relating to a plurality of parameters, including the user **100** walking or running speed (or belt **3** movement speed), the exercise platform **3***a* incline, the motor **5** energy saving and the user **100** oxygen consumption.

[0183] During the exercise, the user **100** can select a first of said parameters as the fixed parameter, the value of that parameter selected remaining constant in subsequent calculations.

[0184] The user **100** can also set a second of said parameters, thus defining a control parameter.

[0185] In real time, a processor **8** calculates the value of the remaining parameters depending on the value of the fixed parameter and on the value set for the control parameter.

[0186] In other words, the method comprises calculation (by a suitable processor) of the corresponding values of the remaining parameters depending on the instantaneous value of the first and second parameters.

[0187] Preferably, setting of the machine **1** in the operating configuration corresponding to the parameter values set and calculated occurs in real time.

[0188] Advantageously, that allows the user **100** to have full control of his exercise and the parameters associated with it.

[0189] The invention achieves the preset aims and brings important advantages.

[0190] In fact the machine according to this invention allows a reduction in motor energy consumption (and the consequent pollution) by suggesting to the user a plurality of solutions which are more environmentally-friendly but equally effective in terms of training.

[0191] Advantageously, by means of the interface, the machine **1** informs the user of how much energy can be saved with the configuration he selected.

[0192] Moreover, the possibility of continuously varying the parameters during the exercise allows variation of the type of exercise, while leaving the oxygen consumption unchanged, making the exercise not just more environmentally-friendly, but also more enjoyable and varied.

What is claimed is:

1) An exercise machine comprising:

a belt (**3**) trained around at least two revolving rollers (**4**) to form an exercise platform (**3***a*) for a user (**100**), allowing the user (**100**) to walk or run on the spot;

a motor (**5**) connected to at least one of the rollers (**4**) and able to be activated to drive the belt (**3**);

an actuator (**6**) associated with the belt (**3**) to incline the exercise platform (**3***a*) relative to a surface (A) supporting the machine (**1**), by rotation about an axis parallel with the axes of rotation of the rollers (**4**);

an interface (**7**) designed to allow the user (**100**) to set a basic pair of values for parameters consisting of a belt (**3**) movement speed and an exercise platform (**3***a*) incline; said basic pair of values defining a corresponding basic operating configuration of the machine;

a processor (**8**) associated with the motor (**5**) and with the actuator (**6**) for controlling them and connected to the interface (**7**) for receiving the basic pair of values set,

wherein the processor (**8**) is programmed for:

estimating a value of a parameter representative of the exercise intensity, with the machine (**1**) in the basic operating configuration, depending on the basic pair of values;

deriving at least one alternative pair of values for the parameters, different to said basic pair of values and corresponding to an exercise intensity equal to the estimated value and to an energy consumption by the motor (**5**) lower than an energy consumption corresponding to the basic pair of values, the interface being designed to allow the user (**100**) to select an operating configuration of the machine corresponding to said at least one alternative pair of values, thus allowing the processor to control the motor (**5**) and the actuator (**6**) depending on the operating configuration selected.

2) The exercise machine according to claim **1**, wherein the at least one alternative pair of values derived has a lower walking or running speed and a higher exercise platform (**3***a*) incline compared with the basic pair set.

3) The exercise machine according to claim **1**, wherein the interface is designed to display to the user (**100**) said at least one alternative pair of values and/or a value representative of an energy saving of the motor (**5**) corresponding to said at least one alternative pair.

4) The exercise machine according to claim **3**, wherein the interface (**7**) comprises a display defining a plurality of icons (**9**) associated with a corresponding plurality of alternative pairs of values of the parameters and/or with a corresponding plurality of motor (**5**) energy saving values corresponding to said alternative pairs; each icon (**9**) being selectable by the user (**100**) for controlling the actuator (**6**) and the motor (**5**) so as to bring the machine (**1**) into the operating configuration corresponding to the alternative pair of values and/or to the energy saving value selected.

5) The machine according to claim **1**, wherein the interface (**7**) comprises a tuning module (**10**) which can be used by the user (**100**), while exercising, to vary the energy consumption of the motor (**5**) between a maximum value, at which the values of the operating parameters correspond to those of the basic pair, and a minimum value at which, at the same exercise intensity, the incline of the exercise platform (**3***a*) has a predetermined maximum value, the processor (**8**) being designed to receive said motor (**5**) energy consumption value set by the user, for calculating the corresponding pair of values of the parameters and consequently controlling the motor (**5**) and the actuator (**6**).

6) The machine according to claim **1**, wherein the interface (**7**) comprises one or more control elements (**11**), which can be displayed to the user (**100**) during the exercise and can be selected by the user for setting the value of corresponding parameters, said parameters being selected from the following list:

belt (**3**) movement speed;

incline of the belt (**3**) exercise platform (**3***a*);

motor (**5**) energy saving;

exercise intensity.

7) The machine according to claim **6**, wherein the processor (**8**) is programmed to determine the value of the remaining parameters depending on a parameter set by the user (**100**) by means of the corresponding control element (**11**), the interface (**7**) being designed to receive in real time the values of said parameters and to display them for the user (**100**).

8) The exercise machine according to claim **1**, wherein the processor (**8**) is programmed to calculate, depending on the alternative pair of values set and the basic pair of values, a value representative of the motor (**5**) energy saving as a consequence of the setting of the alternative pair, compared with the energy consumption corresponding to the basic pair, the interface (**7**) being set up to display to the user (**100**) said value representative of the energy saving.

9) The exercise machine according to claim **1**, wherein the processor (**8**) is programmed to calculate, depending on the alternative pair of values selected, a value representative of the amount of carbon dioxide not emitted into the environment as a consequence of the setting of the alternative pair, compared with the basic pair, the interface (**7**) being set up to display for the user (**100**) said value representative of the carbon dioxide not emitted.

10) The exercise machine according to claim **8**, wherein the processor (**8**) is designed to receive as an input the duration of the exercise and to calculate, depending on said duration, a motor (**5**) energy saving value and/or a carbon dioxide saving value for the exercise, for making said value calculated available to the user.

11) The exercise machine according to claim **10**, wherein the processor (**8**) is programmed to add together the motor (**5**) energy saving value and/or the carbon dioxide saving value for the exercise with a corresponding overall motor (**5**) energy saving value and/or carbon dioxide saving value for the previous exercises, for updating the overall value at the end of each exercise, the interface (**7**) being designed to display to each user (**100**) at the end of each exercise session said overall motor (**5**) energy saving value and/or said overall carbon dioxide saving value.

12) The exercise machine according to claim **1**, comprising a switching unit (**14**) which can be selected by the user (**100**) for switching the machine (**1**) from an energy saving mode, in which the processor (**8**) calculates said at least one alternative pair and allows the user (**100**) to select the corresponding operating configuration, to a standard mode, in which the operating parameters remain those of the basic pair, and vice versa; the switching unit (**14**) being selectable at any time by the user (**100**).

13) The exercise machine according to claim **1**, wherein the parameter representative of the exercise intensity corresponds to user oxygen consumption in the unit of time.

14) A method for performing an exercise using an exercise machine comprising a belt (**3**) forming an exercise platform (**3***a*) for a user (**100**) and trained around at least two revolving rollers (**4**) driven by a motor (**5**), allowing the user (**100**) to walk or run on the spot, wherein it comprises the following steps:

setting a basic pair of values for parameters consisting of a belt (**3**) movement speed and an exercise platform (**3***a*) incline;

estimating a value of the exercise intensity with the machine (**1**) in the basic operating configuration;

deriving at least one alternative pair of values for the parameters, different to the basic pair and corresponding to an exercise intensity equal to the estimated value and to an energy consumption by the motor (**5**) lower than that corresponding to the basic pair of values;

selection by the user (**100**) of a machine operating configuration corresponding to said at least one pair of values;

setting the machine in the corresponding operating configuration.

15) The method according to claim **14**, comprising the following steps:

providing the user (**100**) with a switching unit (**14**) selectable by the user (**100**) himself, before or during an exercise, for activating a motor (**5**) energy saving mode, the estimating, deriving, selecting and setting steps being performed in response to a selection of the energy saving mode using the switching unit.

16) The method according to claim **14**, comprising the steps of:

displaying, during the exercise, values relating to a plurality of parameters, said parameters being selected from the following list:

belt (**3**) movement speed;

incline of the belt (**3**) exercise platform (**3***a*);

motor (**5**) energy saving;

exercise intensity.

17) The method according to claim **16**, comprising the steps of:

selection by the user (**100**) of a first of said parameters as the fixed parameter, the value of that parameter selected remaining constant in subsequent calculations;

setting by the user (**100**) of the value of a second of said parameters, thus defining a control parameter;

calculation of the value of the remaining parameters depending on the value of the fixed parameter and on the value set for the control parameter.

18) The method according to claim **17**, comprising a step of

setting of the machine (**1**) in the operating configuration corresponding to the parameter values calculated, in real time, and/or a step of

displaying for the user the values calculated for said parameters.

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