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(54) **Exercise machine with adaptive interface**

Übungsgerät mit anpassbarer Schnittstelle

Machine d'exercice avec interface adaptative

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Description

[0001] The present invention relates to an exercise machine with an adaptive interface.

[0002] Modern exercise machines for performing aerobic type exercises, such as treadmills, exercise bicycles, elliptical movement machines, rowing machines and the like, are equipped with interactive interfaces which allow the checking of the parameters relating to the exercise being performed (time, distance covered, calories used, and others) as well as allowing management of these parameters using active controls, so that the exercise is performed in the desired ways, if necessary preset by the user or his trainer. Nowadays such interfaces preferably consist of a "touch screen" display, which forms a surface in which there are both "virtual" push-buttons for actively controlling machine functions and, where required by the user, entertainment elements such as television programmes, films selected by the user, or other items.

[0003] In practice, it was found that the prior art interactive interfaces are not without disadvantages, particularly when the above-mentioned exercise is performed on a treadmill. While exercising by walking or running on the treadmill, the user's balance and/or his central position on the belt may be altered by viewing moving images and/or by staring at images positioned along the lateral edges of the display screen. It was found that an image at the side of the screen, especially in "wide" format screens, obliges the subject to divert his gaze to the side or even to turn his head to the side in order to keep his gaze central. These two conditions induce or promote neuromotor reflexes which, acting on the symmetry of the step action tend to alter the balance, causing the user to knock his arms against the treadmill lateral handgrips, or his feet against the guards at the sides of the belt. Said situation may even involve a risk of falling, with possible injury to the subject.

[0004] Moreover, while running on the treadmill, the speed causes, through a greater frequency of steps for higher speeds, a greater frequency of oscillations by the subject's body (and therefore head) along the vertical axis. Therefore, the running speed also affects the frequency of the variations of the angle of incidence of the gaze on a fixed screen: higher speeds correspond to more frequent variations of said angle of incidence. Compensating adjustment by the eye muscles so as to keep the image fixed on the retina may therefore be insufficient. At higher running speeds a user will have greater difficulty clearly perceiving the image on the display.

[0005] In addition, as the speed and therefore the frequency of body oscillations increase, it is more difficult to use one's fingers to precisely operate the machine control push-buttons located on the display.

[0006] At present, to overcome these disadvantages, the general tendency is to increase the dimensions of the machine control push-buttons, consequently increasing the surface area of the display and therefore the ma-

chine dimensions. Said partial solution to the problem is no longer acceptable.

[0007] In addition, a technical solution is known from patent document US2007/0167293, regarding a control system for an exercise apparatus provided with contact elements with pre-assigned configuration, which can be activated selectively or in combination.

[0008] It is also known from patent document US2004/0014566 an exercising apparatus provided with a display which can be inclined in different positions to adjust the angle of view of the user. However, these solutions do not provide safety and comfort in the use of the exercise machine, taking into account the variations in the conditions of use of the machine during the exercise performed by the user.

[0009] The technical purpose of the present invention is therefore to overcome the above-mentioned disadvantages, by providing an exercise machine with an adaptive interface which allows the user to keep his gaze on the display while exercising, even with moving images, without feeling troublesome sensations and without risking loss of balance, in particular if the exercise machine is a treadmill.

[0010] Within the scope of said technical purpose, the present invention has for an aim to provide an exercise machine with an adaptive interface which allows the user, while exercising, to operate the controls on the screen easily and without any difficulty, even when exercising at high speeds, and even in critical situations such as those involving sudden loss of balance, or the like, in particular if the exercise machine is a treadmill. Another aim of the present invention is to provide an exercise machine with an adaptive interface which allows the user to concentrate better and to "immerse himself" in the multimedia content which can be shown on the display while exercising, above all at low speeds.

[0011] Yet another aim of the present invention is to provide an exercise machine with an adaptive interface which has a simple structure, is easy to make in practice, operates safely and effectively and is relatively inexpensive.

[0012] Said purpose and aims are all achieved by the present exercise machine with an adaptive interface, comprising at least one processing unit designed to manage and control the machine, sensor means for transferring information about the machine operating state to said processing unit, at least one user interface equipped with means for displaying the machine current operating state and manual control means for the machine functions, characterised in that it comprises optimisation means, controlled by the processing unit and designed to modify the display means and the manual control means when there are variations in at least one machine operating parameter detected by the sensor means.

[0013] The technical features of the invention, with reference to the above aims, are clearly described in the claims below, and its advantages are more apparent from the detailed description which follows, with reference to

the accompanying drawings which illustrate preferred, non-limiting embodiments of the invention provided merely by way of example without restricting the scope of the inventive concept, and in which:

- Figure 1 illustrates a first example embodiment of an exercise machine with an adaptive interface in accordance with the invention;
- Figure 2 illustrates the adaptive interface in accordance with the invention in a first operating condition;
- Figure 3 illustrates the adaptive interface in accordance with the invention in a second operating condition;
- Figure 4 is a block diagram of the exercise machine in accordance with the invention;
- Figure 5 is a side elevation view of a detail of a second example embodiment of the exercise machine in accordance with the invention;
- Figure 6 illustrates a third example embodiment of an exercise machine with an adaptive interface in accordance with the invention.

[0014] With reference to the accompanying drawings, and in particular with reference to Figure 1, the numeral 1 denotes a first example embodiment of an exercise machine with an adaptive interface in accordance with the invention. Figure 4 shows a functional block diagram of the exercise machine.

[0015] The first example embodiment described below relates to an exercise machine consisting of a conventional type treadmill. However, it should be noticed that the exercise machine may also be of another type (an exercise bicycle, a rowing machine, etc.), without in any way limiting the scope of the present invention. The treadmill comprises a frame 2 which rotatably supports a belt 3 on two parallel rollers, not illustrated in the Figures. The user exercises by walking and running on the belt.

[0016] The treadmill also comprises, supported by two uprights 4, a console 5, from which there extend two lateral safety handles 6 which allow the user to lean on them while exercising.

[0017] The treadmill is equipped, in the known way, with a processing unit, labelled 7 in Figure 4, designed to manage and control the machine. There are also actuator means 8, also of the known type, which in this particular example embodiment are active, that is to say, there consist of an electric motor which drives the rotation of the belt 3. The treadmill also comprises sensor means, labelled 9, designed to transfer to the processing unit 7, from one moment to the next, information about the machine operating state, such as detection of user presence on the belt, the belt speed of rotation, the belt incline and other information.

[0018] The console 5 is advantageously equipped with a user interface, labelled 10 as a whole, which allows the user to actively interact with the machine, that is to say, to manage all operating parameters relating to the exercise being performed, such as the time elapsed, distance

covered, incline, etc.

[0019] The user interface 10 comprises means 11 for displaying the machine current operating state, and manual control means, labelled 12 as a whole, which can be operated by the user. The user can use the display and control means to define as required the machine operating parameters (time, speed, belt incline, etc.) before performing the exercise and, above all, while exercising.

[0020] Figure 2 schematically illustrates a user interface 10 of a modern exercise machine. In said interface 10 the above-mentioned display means 11 comprise a monitor 13 forming a display 14 preferably of the "touch screen" type. In particular, an upper area 15 of the display is preferably designed to show the above-mentioned machine operating parameters (time, speed, belt incline, etc.) from one moment to the next, whilst the central area of the display 14 may be used to display entertainment content for the user while exercising.

[0021] In contrast, the manual control means 12 usually comprise primary manual controls 17, that is to say, those of fundamental importance for correct management of machine operation, and secondary manual controls 18, that is to say, those designed to manage the machine entertainment content (videos, music and other such content).

[0022] The primary manual controls 17 preferably consist of virtual push-buttons (that is to say, predetermined areas defined in the touch screen which, if touched with a finger, due to phenomena involving local capacitive variation give rise to electrical signals) for a machine fast start, stop, variation in the speed of belt 3 rotation, variation in the belt 3 incline relative to the horizontal plane, and other equivalent push-buttons for managing the main functions of the machine. The primary manual controls 17 are preferably located in the lower part of the display 14.

[0023] The secondary manual controls 18, preferably located along one side of the display 14, in contrast consist for example of virtual push-buttons for managing television programmes which can be shown on the touch screen, for managing radio programmes which can be listened to using earphones, for managing music tracks, and for managing any other means of entertainment for the user while exercising.

[0024] According to the invention, the exercise machine advantageously comprises optimisation means, labelled 19 in the diagram in Figure 4, controlled by the processing unit 7, designed to modify the display means 11 and the manual control means 12 of the interface 10 when there is a variation in at least one of the machine operating parameters, defined in more detail in the following description, the parameter being detected by the sensor means 9.

[0025] In this way the interface 10 therefore becomes an adaptive interface, that is to say, able to modify its features with regard to user requirements, from one moment to the next.

[0026] In more detail, the optimisation means 19 are

designed to modify the dimensions of the means 11 for displaying the machine operating state when there are variations in said operating parameter. In the same way, the above-mentioned optimisation means 19 are designed to modify the dimensions of the manual control means 12 when there are variations in said parameter.

[0027] The operating parameter referred to appropriately consists of the speed at which the exercise is performed and, in the particular example embodiment described herein, the speed of rotation of the treadmill belt 3, corresponding to a predetermined user walking or running speed.

[0028] For a better understanding, reference should be made to Figure 3, which illustrates the adaptive interface 10 in an operating condition at high speed (run), compared with Figure 2, which illustrates the same interface 10 in an operating condition at low speed (walk).

[0029] Following selection of said parameter, the optimisation means 19 reduce the dimensions of the display means 11, according to a predetermined calculation algorithm, when the speed increases, thus allowing improved concentration of the user's gaze on the interface 10. In particular, the optimisation means 19 act in such a way as to reduce the dimensions of the display 14, as is schematically illustrated in Figure 3, so that while exercising the user's gaze is directed at a zone having a smaller surface area. This gives a noticeable improvement in the clarity of the image perceived, and a smaller variation in the angle of incidence of the gaze during the run. As a result, the exercise can be performed in greater comfort. The above-mentioned predetermined calculation algorithm is, for example, an algorithm based on an inverse linear relationship between the speed at which the exercise is performed and the dimensions of the display 14. However, it may be of a different type, depending on the specific application requirements.

[0030] The optimisation means 19 are also designed to increase the dimensions of the primary manual control means 17 according to at least one predetermined calculation algorithm when there is an increase in the speed at which the exercise is performed, so that they are more easily and rapidly accessible, above all at the highest speeds. This is of fundamental importance above all regarding the push-buttons for varying the belt 3 speed and the emergency stop push-button. The predetermined calculation algorithm is, for example, based on a direct linear relationship between the speed at which the exercise is performed and the dimensions of the primary manual control means 17. However, it may be of a different type, depending on the specific application requirements.

[0031] Even more advantageously, the optimisation means 19 are designed in such a way that while the exercise is performed they simultaneously increase the dimensions of the primary manual control means 17 and reduce the dimensions of the display 14, thus achieving a synergic effect of increasing comfort and increasing the accessibility of the controls, and therefore increasing safety.

[0032] Another advantageous feature of the present invention is the fact that the optimisation means 19 are designed to remove from the user interface 10, and therefore from the display 14, the secondary manual control means 18, according to a predetermined calculation algorithm, when there is an increase in said speed (in particular when a predetermined "threshold" value is exceeded). In this way, the user is in no way distracted by the presence of controls which are not strictly necessary for the management of machine operation while exercising at high speed. In other words, it was found that an average user running at high speed on a treadmill directs his attention practically exclusively at the primary manual controls 17, whilst he tends not to bother with the secondary controls 18. He tends to focus all of his physical and mental energy on exercising, and not on managing entertainment content, which could therefore distract him, creating awkward or dangerous situations.

[0033] Appropriately, the optimisation means 19 may also be designed to increase, according to a predetermined calculation algorithm, the dimensions of the upper area 15 of the display intended for displaying the machine operating parameters, when there is an increase in the running speed, so that said upper area 15 is more visible, above all at the highest speeds.

[0034] In the example embodiment described herein, the optimisation means 19 are appropriately connected to the exercise machine processing unit 7 and are controlled by the latter. The optimisation means may consist of at least one dedicated hardware module, suitably made by assembling electronic components.

[0035] Alternatively, where it proves particularly advantageous and economical, the optimisation means 19 may be of the software type. In more detail, they may be made by means of suitable modifications to the existing exercise machine management software, resident in the processing unit 7.

[0036] The following is a brief non-limiting description, provided by way of example only, of an optimisation process for defining the correct dimensions of the display means 11 and of the manual control means 12 while the user is exercising at a predetermined speed.

[0037] Said process, consisting of a calculation algorithm implemented by the optimisation means 19, involves a set of parameters, some set in advance and others detected by the exercise machine sensor means 9, hereinafter listed with respective example abbreviations:

- the maximum speed at which it is safe to display full screen images (usually 6 km/h, that is to say, 1 km/h less than the speed at which a person has to start running to avoid being thrown off the treadmill), in short "V min";
- the maximum speed at which a user can exercise, which in this case corresponds to the maximum speed at which the user can still look at a screen while running, usually between 16 km/h and 18 km/h,

- in short "V max";
- the current speed at which the user is exercising, in short "V user";
- the maximum size of the display 14, in short "D max";
- the minimum size at which an image can be shown on the display 14 and still have a meaning or be legible, in short "D min";
- the minimum size at which each push-button can be shown on the display 14, in short "BD min";
- the maximum size at which each push-button can be shown on the display 14, in short "BD max";
- the current size at which the push-buttons are shown on the display 14, in short "BD user";
- the current size of the display 14, in short "D user";
- the set of primary manual controls 17, in short "PB";
- the set of secondary manual controls 18, in short "SB";
- the set of manual controls 12 currently shown on the screen, in short "B user".

[0038] The optimisation process comprises a step of comparing "V user" and "V min": if "V user" is less than "V min", there follows a step of assigning the "D max" value to "D user", a step of assigning the "BD min" value to "BD user", and a step of assigning the combined "PB" and "SB" sets to the "B user" set.

[0039] If, in contrast, during the comparison step, "V user" is greater than "V min", there follows a step of assigning to "D user" the value of "D min" plus the value of "V user" minus "V min" divided by the product of "V max" minus "V min" multiplied by "D max" minus "D min", and a step of assigning to "BD user" the value of "BD min" plus the value of "V user" minus "V min" divided by the product of "V max" minus "V min" multiplied by "BD max" minus "BD min", and a step of assigning the "PB" set to the "B user" set.

[0040] Therefore, as indicated the invention achieves the preset aims.

[0041] The optimisation means 19, which can be perfectly integrated in a conventional type exercise machine, allow the elimination of problems relating to correct viewing of the display 14 by the user while running, even at the highest speeds, making the user interface 10 able to adapt to the various conditions for performing the exercise. Moreover, they allow noticeable improvement in user safety conditions during a run, in particular as regards rapid accessibility of the push-buttons for reducing the speed and/or the machine emergency stop push-button.

[0042] Figure 5 is a schematic detailed view of a second example embodiment of an exercise machine with an adaptive interface 10 in accordance with the invention.

[0043] In this second example embodiment the optimisation means 19 advantageously comprise an actuator 20, controlled by the exercise machine processing unit 7, designed to modify the machine operating state display means 11. In more detail, the actuator 20 allows modification of the position of the display means 11 relative to the position of the user, according to a predeter-

mined calculation algorithm depending on the speed at which the exercise is performed. The actuator 20, controlled by the processing unit 7, basically allows variation of the vertical position and/or angle of the display means 11 relative to the machine console 5, and therefore relative to the user's eyes, so that looking at the display 14 while running is more comfortable and safer. It was found that the typical position adopted by the user's head while running at the highest speeds requires adjustment of the position of the display 14 to obtain viewing angles and directions which are ergonomically more correct than those required, for example, for exercise consisting of a walk.

[0044] The actuator 20 may consist, for example, of at least one electric motor, connected to transmission means which are basically of the known and conventional type, allowing the monitor 13 to be translated and/or rotated according to the speed at which the exercise is performed on the exercise machine.

[0045] Figure 6 is a schematic view of a third example embodiment of the exercise machine with an adaptive interface 10 in accordance with the invention.

[0046] In this third example embodiment the exercise machine consists of an exercise bicycle comprising a frame 21 rotatably supporting a movement unit 22 with pedals 23. The frame 21 also supports a saddle 24 and a front upright 25 at the top of which the user interface 10 is located, equipped with machine operating state display means 11, and connected to a handgrip 26 for the user's hands.

[0047] In this example embodiment the optimisation means 19 are advantageously designed to modify the display means 11 with regard to a different machine operating parameter, detected by the sensor means 9, and specifically the distance between the user's head and the interface 10 while the user is exercising. In more detail, the optimisation means 19 vary the dimensions of the display means 11, and in particular of the display 14, according to at least one predetermined calculation algorithm, depending on the posture of the user on the exercise machine.

[0048] For this purpose, the machine is equipped with manual contact type sensor means 9, located in the machine handgrip zones and designed to detect the position of the hands so as to identify the posture adopted by the user on the exercise machine, and therefore the distance separating his eyes from the display 14.

[0049] Detecting the user's posture on the machine therefore allows variation of the dimensions of the display 14 in inverse proportion to the distance separating the user's eyes from it. In other words, if the user on the bicycle adopts a position in which he is leaning forwards, the dimensions of the display 14 are reduced by a predetermined quantity by the calculation algorithm. In contrast, if the user on the bicycle adopts a position in which he is leaning backwards, the dimensions of the display 14 are increased by a predetermined quantity. This guarantees the optimum display 14 size for each user posture.

[0050] Also in the example embodiment just described, the optimisation means 19 are appropriately connected to the exercise machine processing unit 7 and are controlled by the latter. They may consist of at least one dedicated hardware module, or they may be of the software type.

[0051] The invention described above is susceptible of industrial application and may be modified and adapted in many other ways without thereby departing from the scope of the inventive concept. Moreover, all details of the invention may be substituted by technically equivalent elements without departing from the protective scope of the claims herein.

Claims

1. An exercise machine with an adaptive interface, comprising at least one processing unit (7) designed to manage and control the machine, sensor means (9) for transferring information about the machine operating state to said processing unit (7), at least one user interface (10) equipped with means (11) for displaying the machine current operating state and manual control means (12) for the machine functions, the machine comprising optimisation means (19), controlled by the processing unit (7) and designed to modify the display means (11) and the manual control means (12) when there are variations in at least one machine operating parameter detected by the sensor means (9), wherein the operating parameter consists of the speed at which the user performs the exercise, the optimisation means (19) being designed to increase the dimensions of the manual control means (12) according to a predetermined calculation algorithm when said speed increases, so that they are more easily and rapidly accessible, and wherein the display means (11) comprise at least one "touch screen" type display (14) and the manual control means (12) comprise at least one push-button in the "touch screen" type display which is designed to manage at least one respective machine operating parameter.
2. The exercise machine according to claim 1, **characterised in that** the optimisation means (19) are designed to modify the dimensions of the machine operating state display means (11) when there are variations in at least one machine operating parameter.
3. The exercise machine according to claim 1, **characterised in that** the optimisation means (19) are designed to modify the dimensions of the manual control means (12) when there are variations in at least one machine operating parameter.
4. The exercise machine according to one or more of the foregoing claims, **characterised in that** the operating parameter consists of the speed at which the user performs the exercise, the optimisation means (19) being designed to reduce the dimensions of the machine operating state display means (11) according to a predetermined calculation algorithm when said speed increases, allowing improved concentration of the user's gaze on the interface (10).
5. The exercise machine according to one or more of the foregoing claims, **characterised in that** the operating parameter consists of the speed at which the user performs the exercise, the optimisation means (19) being designed to reduce the dimensions of the display means (11), allowing improved concentration of the user's gaze on the interface (10), and to increase the dimensions of the manual control means (12), so that they are more easily and rapidly accessible, according to respective predetermined calculation algorithms, when there is an increase in the speed.
6. The exercise machine according to one or more of the foregoing claims, **characterised in that** the operating parameter consists of the speed at which the user performs the exercise and also be **characterised in that** the manual control means (12) comprise primary manual controls (17), of fundamental importance for correct machine management, and secondary manual controls (18), designed to manage the machine entertainment content, the optimisation means (19) being designed to remove the secondary manual control means (18) from the user interface, according to at least one predetermined calculation algorithm, when there is an increase in the speed.
7. The exercise machine according to one or more of the foregoing claims, **characterised in that** the optimisation means (19) are designed to increase, according to at least one predetermined calculation algorithm, the dimensions of at least an upper area (15) of the display means (11) designed to show the machine operating parameters, when there is an increase in the speed at which the user performs the exercise.
8. The exercise machine according to one or more of the foregoing claims, **characterised in that** the optimisation means (19) comprise at least one hardware module which is operatively connected to the processing unit (7) and controlled by the processing unit.
9. The exercise machine according to one or more of the foregoing claims, **characterised in that** the optimisation means (19) are of the software type.
10. The exercise machine according to claim 2, **characterised in that** the operating parameter consists of

the distance separating the user's head from the interface (10), the optimisation means (19) being designed to vary the dimensions of the display means (11), according to at least one predetermined calculation algorithm, depending on the posture of the user on the machine.

11. The exercise machine according to claim 10, **characterised in that** it comprises sensor means (9), located along the machine handgrip (26), being designed to detect the position of the user's hands so as to identify the user's posture on the exercise machine, and therefore the distance separating the user's head from the display means (11).

12. A process for optimising the user interface (10) of an exercise machine, wherein it implements the following steps one after another:

- detecting the speed at which the exercise is performed on the exercise machine;
- reducing the dimensions of the machine operating state display means (11), according to at least one predetermined calculation algorithm, when there is an increase in said speed;
- increasing the dimensions of the primary manual control means (17), according to at least one predetermined calculation algorithm, when there is an increase in said speed,

wherein the display means (11) comprise at least one "touch screen" type display (14) and the manual control means (12) comprise at least one push-button in the "touch screen" type display which is designed to manage at least one respective machine operating parameter.

13. The process according to claim 12, **characterised in that** it comprises a step of removing the secondary manual control means (18) from the display means (11), according to at least one predetermined calculation algorithm, when there is an increase in said speed.

14. A process for optimising the user interface (10) of an exercise machine, wherein it implements the following steps one after another:

- detecting the user's posture on the exercise machine, using sensor means (9);
- modifying the dimensions of the exercise machine operating state display means (11), according to at least one predetermined calculation algorithm, when there is a variation in said posture.

15. A process according to claim 14, wherein the modifying step is carried out with regard to a machine

operating parameter detected by the sensor means (9), and specifically the distance between the user's head and the user interface (10) while the user is exercising.

Patentansprüche

1. Übungsgerät mit anpassbarer Schnittstelle, beinhaltend zumindest eine Verarbeitungseinheit (7) zur Verwaltung und Steuerung des Gerätes, Sensormittel (9) zum Übertragen von Informationen über den Betriebszustand des Gerätes an die Verarbeitungseinheit (7), zumindest eine Benutzerschnittstelle (10), die mit Mitteln (11) zur Anzeige des aktuellen Betriebszustandes des Gerätes und mit Handbedienmitteln (12) zur manuellen Steuerung der Gerätefunktionen ausgestattet ist, wobei das Gerät Optimierungsmittel (19) beinhaltet, die von der Verarbeitungseinheit (7) gesteuert werden und dafür ausgelegt sind, die Anzeigemittel (11) und die Handbedienmittel (12) zu verändern, wenn Änderungen bei zumindest einem Betriebsparameter des Gerätes durch die Sensormittel (9) erkannt werden, worin der Betriebsparameter in der Geschwindigkeit besteht, mit der der Benutzer die Übung ausführt, wobei die Optimierungsmittel (19) dafür ausgelegt sind, die Abmessungen der Handbedienmittel (12) nach einem vorbestimmten Berechnungsalgorithmus zu vergrößern, wenn sich die genannte Geschwindigkeit erhöht, so dass leichter und schneller darauf zugegriffen werden kann, und worin die Anzeigemittel (11) zumindest ein berührungssensitives "Touchscreen"-Display (14) beinhalten und die Handbedienmittel (12) zumindest eine Drucktaste an dem "Touchscreen"-Display beinhalten, die zur Verwaltung zumindest eines entsprechenden Betriebsparameters des Gerätes dient.
2. Übungsgerät nach Anspruch 1, **dadurch gekennzeichnet, dass** die Optimierungsmittel (19) dafür ausgelegt sind, die Abmessungen der Anzeigemittel (11) für den Betriebszustand des Gerätes zu verändern, wenn Änderungen bei zumindest einem Betriebsparameter des Gerätes auftreten.
3. Übungsgerät nach Anspruch 1, **dadurch gekennzeichnet, dass** die Optimierungsmittel (19) dafür ausgelegt sind, die Abmessungen der Handbedienmittel (12) zu verändern, wenn Änderungen bei zumindest einem Betriebsparameter des Gerätes auftreten.
4. Übungsgerät nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Betriebsparameter in der Geschwindigkeit besteht, mit der der Benutzer die Übung ausführt, wobei die Optimierungsmittel (19) dafür ausgelegt

sind, die Abmessungen der Anzeigemittel (11) für den Betriebszustand der Maschine nach einem vorbestimmten Berechnungsalgorithmus zu verringern, wenn sich die genannte Geschwindigkeit erhöht, um die verbesserte Konzentration des Benutzerblicks auf die Schnittstelle (10) zu ermöglichen.

5. Übungsgerät nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Betriebsparameter in der Geschwindigkeit besteht, mit der der Benutzer die Übung ausführt, wobei die Optimierungsmittel (19) dafür ausgelegt sind, bei einer Erhöhung der Geschwindigkeit jeweils nach vorbestimmten Berechnungsalgorithmen die Abmessungen der Anzeigemittel (11) zu verringern, um die verbesserte Konzentration des Benutzerblicks auf die Schnittstelle (10) zu ermöglichen, und die Abmessungen der Handbedienmittel (12) zu vergrößern, so dass leichter und schneller darauf zugegriffen werden kann.
6. Übungsgerät nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Betriebsparameter in der Geschwindigkeit besteht, mit der der Benutzer die Übung ausführt, und ferner **dadurch gekennzeichnet, dass** die Handbedienmittel (12) primäre Handbedienelemente (17) beinhalten, die von grundlegender Bedeutung für die korrekte Geräteverwaltung sind, und sekundäre Handbedienelemente (18), die zur Verwaltung der Unterhaltungsfunktionen des Gerätes dienen, wobei die Optimierungsmittel (19) dafür ausgelegt sind, die sekundären Handbedienmittel (18) entsprechend zumindest einem vorbestimmten Berechnungsalgorithmus von der Benutzerschnittstelle zu entfernen, wenn eine Geschwindigkeitserhöhung erfolgt.
7. Übungsgerät nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Optimierungsmittel (19) dafür ausgelegt sind, entsprechend zumindest einem vorbestimmten Berechnungsalgorithmus die Abmessungen von zumindest einem zur Anzeige der Betriebsparameter des Gerätes dienenden oberen Bereich (15) der Anzeigemittel (11) zu vergrößern, wenn sich die Geschwindigkeit erhöht, mit der der Benutzer die Übung ausführt.
8. Übungsgerät nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Optimierungsmittel (19) zumindest ein Hardware-Modul beinhalten, das mit der Verarbeitungseinheit (7) wirkverbunden ist und von der Verarbeitungseinheit gesteuert wird.
9. Übungsgerät nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet,**

dass die Optimierungsmittel (19) vom Typ Software sind.

10. Übungsgerät nach Anspruch 2, **dadurch gekennzeichnet, dass** der Betriebsparameter in dem Abstand besteht, der zwischen dem Kopf des Benutzers und der Schnittstelle (10) vorhanden ist, wobei die Optimierungsmittel (19) dafür ausgelegt sind, die Abmessungen der Anzeigemittel (11), entsprechend zumindest einem vorbestimmten Berechnungsalgorithmus zu ändern, der von der Körperhaltung des Benutzers auf dem Gerät abhängt.
11. Übungsgerät nach Anspruch 10, **dadurch gekennzeichnet, dass** es Sensormittel (9) beinhaltet, die entlang dem Handgriff (26) des Gerätes angeordnet sind und dafür ausgelegt sind, die Position der Hände des Benutzers zu erfassen, um die Körperhaltung des Benutzers auf dem Übungsgerät und somit den Abstand zwischen dem Kopf des Benutzers und den Anzeigemitteln (11) zu erkennen.
12. Verfahren zur Optimierung der Benutzerschnittstelle (10) eines Übungsgerätes, worin nacheinander die folgenden Schritte enthalten sind:
 - Erfassen der Geschwindigkeit, mit der die Übung auf dem Übungsgerät ausgeführt wird;
 - Verringern der Abmessungen der Anzeigemittel (11) für den Betriebszustand des Gerätes, entsprechend zumindest einem vorbestimmten Berechnungsalgorithmus, bei einer Erhöhung dieser Geschwindigkeit;
 - Vergrößern der Abmessungen der primären Handbedienmittel (17), entsprechend zumindest einem vorbestimmten Berechnungsalgorithmus, bei einer Erhöhung dieser Geschwindigkeit,
 worin die Anzeigemittel (11) zumindest ein berührungssensitives "Touchscreen"-Display (14) beinhalten und die Handbedienmittel (12) zumindest eine Drucktaste an dem "Touchscreen"-Display beinhalten, die zur Verwaltung zumindest eines entsprechenden Betriebsparameters des Gerätes dient.
13. Verfahren nach Anspruch 12, **dadurch gekennzeichnet, dass** es einen Schritt beinhaltet, um die sekundären Handbedienmittel (18) bei einer Erhöhung der Geschwindigkeit entsprechend zumindest einem vorbestimmten Berechnungsalgorithmus von den Anzeigemitteln (11) zu entfernen.
14. Verfahren zur Optimierung der Benutzerschnittstelle (10) eines Übungsgerätes, worin nacheinander die folgenden Schritte enthalten sind:
 - Erfassen der Körperhaltung des Benutzers auf

dem Übungsgerät mit Hilfe der Sensormittel (9);
 - Ändern der Abmessungen der Anzeigemittel
 (11) für den Betriebszustand des Übungsgerä-
 tes, entsprechend zumindest einem vorbe-
 stimmten Berechnungsalgorithmus, bei einer
 Änderung der genannten Körperhaltung.

15. Verfahren nach Anspruch 14, worin der Änderungs-
 schritt unter Berücksichtigung eines von den Sen-
 sormitteln (9) erfassten Betriebsparameters des Ge-
 rätes ausgeführt wird, und speziell des Abstandes,
 der zwischen dem Kopf des Benutzers und der Be-
 nutzerschnittstelle (10) besteht, während der Benut-
 zer die Übung ausführt.

Revendications

1. Une machine d'exercice avec interface adaptative,
 comprenant au moins une unité de traitement (7)
 destinée à gérer et à contrôler la machine, des
 moyens à capteur (9) pour transférer des informa-
 tions sur l'état de fonctionnement de la machine à
 ladite unité de traitement (7), au moins une interface
 utilisateur (10) dotée de moyens (11) pour afficher
 l'état de fonctionnement courant de la machine et
 des moyens de commande manuels (12) pour les
 fonctions de la machine, ladite machine comprend
 des moyens d'optimisation (19), asservis à l'unité de
 traitement (7) et destinés à modifier les moyens d'af-
 fichage (11) et les moyens de commande manuels
 (12) dans le cas de variations d'au moins un para-
 mètre de fonctionnement de la machine détecté par
 les moyens à capteur (9), ladite machine d'exercice
 étant **caractérisée en ce que** le paramètre de fonc-
 tionnement est constitué par la vitesse à laquelle
 l'utilisateur effectue l'exercice, les moyens d'opti-
 misation (19) étant destinés à augmenter les dimen-
 sions des moyens de commande manuels (12) en
 fonction d'un algorithme de calcul prédéfini quand
 ladite vitesse augmente, de manière à ce qu'ils
 soient plus facilement et plus rapidement accessi-
 bles, et **caractérisée en ce que** les moyens d'affi-
 chage (11) comprennent au moins un afficheur (14)
 de type à écran tactile et les moyens de commande
 manuels (12) comprennent au moins un bouton situé
 dans l'afficheur de type à écran tactile et destiné à
 gérer au moins un paramètre de fonctionnement res-
 pectif de la machine.
2. La machine d'exercice selon la revendication 1, **ca-
 ractérisée en ce que** les moyens d'optimisation (19)
 sont destinés à modifier les dimensions des moyens
 (11) d'affichage de l'état de fonctionnement de la
 machine dans le cas de variations d'au moins un
 paramètre de fonctionnement de la machine.
3. La machine d'exercice selon la revendication 1, **ca-**

ractérisée en ce que les moyens d'optimisation (19)
 sont destinés à modifier les dimensions des moyens
 de commande manuels (12) dans le cas de varia-
 tions d'au moins un paramètre de fonctionnement
 de la machine.

4. La machine d'exercice selon une ou plusieurs des
 revendications précédentes, **caractérisée en ce
 que** le paramètre de fonctionnement est constitué
 par la vitesse à laquelle l'utilisateur effectue l'exer-
 cice, les moyens d'optimisation (19) étant destinés
 à réduire les dimensions des moyens (11) d'afficha-
 ge de l'état de fonctionnement de la machine en fonc-
 tion d'un algorithme de calcul prédéfini quand ladite
 vitesse augmente, de manière à permettre une
 meilleure concentration du regard de l'utilisateur sur
 l'interface (10).
5. La machine d'exercice selon une ou plusieurs des
 revendications précédentes, **caractérisée en ce
 que** le paramètre de fonctionnement est constitué
 par la vitesse à laquelle l'utilisateur effectue l'exer-
 cice, les moyens d'optimisation (19) étant destinés
 à réduire les dimensions des moyens d'affichage
 (11), de manière à permettre une meilleure concen-
 tration du regard de l'utilisateur sur l'interface (10),
 et à augmenter les dimensions des moyens de com-
 mande manuels (12), de manière à ce qu'ils soient
 plus facilement et plus rapidement accessibles, en
 fonction d'algorithmes de calcul prédéfinis respec-
 tifs, dans le cas d'une augmentation de la vitesse.
6. La machine d'exercice selon une ou plusieurs des
 revendications précédentes, **caractérisée en ce
 que** le paramètre de fonctionnement est constitué
 par la vitesse à laquelle l'utilisateur effectue l'exer-
 cice et également **caractérisée en ce que** les
 moyens de commande manuels (12) comprennent
 des commandes manuelles principales (17), d'im-
 portance fondamentale pour la gestion appropriée
 de la machine, et des commandes manuelles auxi-
 liaires (18), destinées à gérer les contenus de diver-
 tissement de la machine, les moyens d'optimisation
 (19) étant destinés à éliminer les moyens de com-
 mande manuels auxiliaires (18) de l'interface utiliza-
 teur, en fonction d'au moins un algorithme de calcul
 prédéfini, dans le cas d'une augmentation de la vi-
 tesse.
7. La machine d'exercice selon une ou plusieurs des
 revendications précédentes, **caractérisée en ce
 que** les moyens d'optimisation (19) sont destinés à
 augmenter, en fonction d'au moins un algorithme de
 calcul prédéfini, les dimensions d'au moins une zone
 supérieure (15) des moyens d'affichage (11), desti-
 née à afficher les paramètres de fonctionnement de
 la machine, dans le cas d'une augmentation de la
 vitesse à laquelle l'utilisateur effectue l'exercice.

8. La machine d'exercice selon une ou plusieurs des revendications précédentes, **caractérisée en ce que** les moyens d'optimisation (19) comprennent au moins un module matériel qui est opérationnellement associé à l'unité de traitement (7) et asservi à cette même unité de traitement. 5
9. La machine d'exercice selon une ou plusieurs des revendications précédentes, **caractérisée en ce que** les moyens d'optimisation (19) sont de type logiciels. 10
10. La machine d'exercice selon la revendication 2, **caractérisée en ce que** le paramètre de fonctionnement est constitué par la distance séparant la tête de l'utilisateur de l'interface (10), les moyens d'optimisation (19) étant destinés à faire varier les dimensions des moyens d'affichage (11), en fonction d'au moins un algorithme de calcul prédéfini, selon la posture de l'utilisateur sur la machine. 15
11. La machine d'exercice selon la revendication 10, **caractérisée en ce qu'elle** comprend des moyens à capteur (9), situés le long de la poignée (26) de la machine, et destinés à détecter la position des mains de l'utilisateur de manière à identifier la posture dudit utilisateur sur la machine d'exercice, et donc la distance séparant la tête de l'utilisateur des moyens d'affichage (11). 20
12. Un procédé d'optimisation de l'interface utilisateur (10) d'une machine d'exercice, où il met en oeuvre, l'une après l'autre, les phases suivantes : 25
- détecter la vitesse à laquelle l'exercice est effectué sur la machine d'exercice ; 35
 - réduire les dimensions des moyens (11) d'affichage de l'état de fonctionnement de la machine, en fonction d'au moins un algorithme de calcul prédéfini, dans le cas d'une augmentation de ladite vitesse ; 40
 - augmenter les dimensions des moyens de commande manuels principaux (17), en fonction d'au moins un algorithme de calcul prédéfini, dans le cas d'une augmentation de ladite vitesse, 45
- où les moyens d'affichage (11) comprennent au moins un afficheur (14) de type à écran tactile et les moyens de commande manuels (12) comprennent au moins un bouton situé dans ledit afficheur de type à écran tactile et destiné à gérer au moins un paramètre de fonctionnement respectif de la machine. 50
13. Le procédé selon la revendication 12, **caractérisé en ce qu'il** comprend une phase consistant à éliminer les moyens de commande manuels auxiliaires (18) des moyens d'affichage (11), en fonction d'au 55
- moins un algorithme de calcul prédéfini, dans le cas d'une augmentation de ladite vitesse.
14. Un procédé d'optimisation de l'interface utilisateur (10) d'une machine d'exercice, où il met en oeuvre, l'une après l'autre, les phases suivantes :
- détecter la posture de l'utilisateur sur la machine d'exercice, par le biais de moyens à capteur (9) ;
 - modifier les dimensions des moyens (11) d'affichage de l'état de fonctionnement de la machine d'exercice, en fonction d'au moins un algorithme de calcul prédéfini, dans le cas d'une variation de ladite posture.
15. Le procédé selon la revendication 14, où la phase de modification est effectuée relativement à un paramètre de fonctionnement de la machine détecté par les moyens à capteur (9) et, spécifiquement, la distance entre la tête de l'utilisateur et l'interface utilisateur (10) alors que l'utilisateur effectue l'exercice.

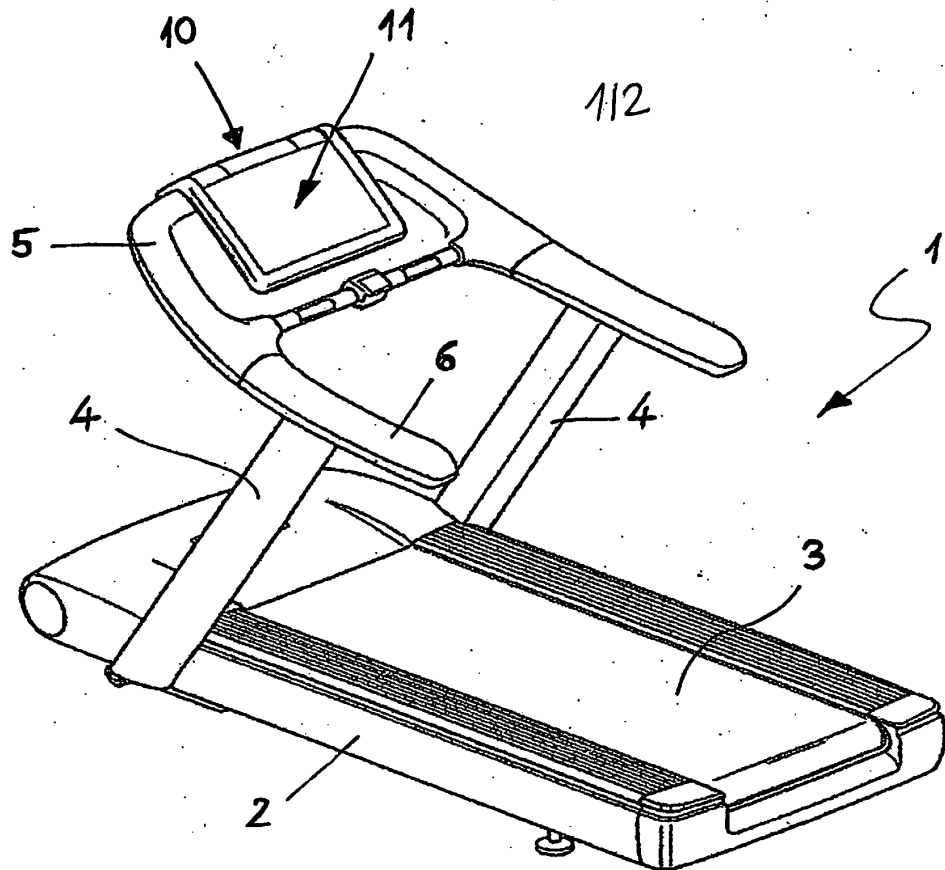


Fig. 1

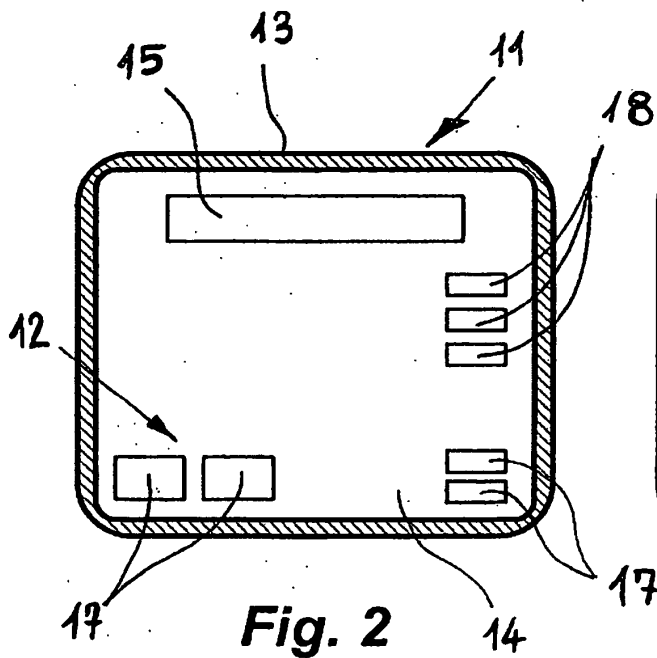


Fig. 2

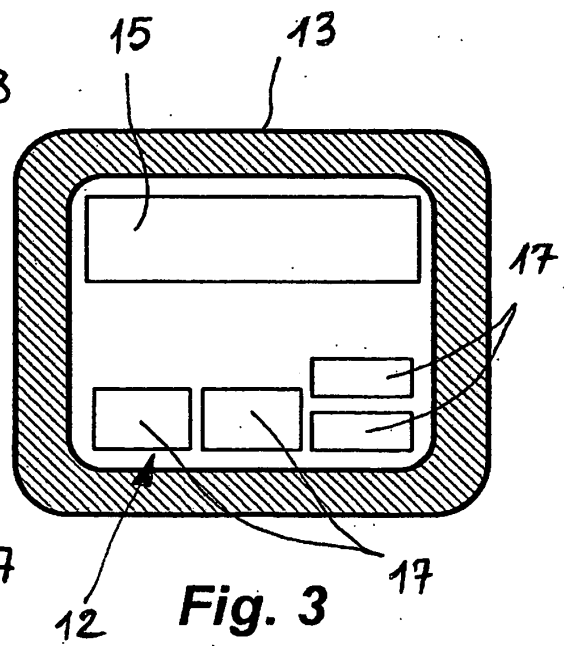


Fig. 3

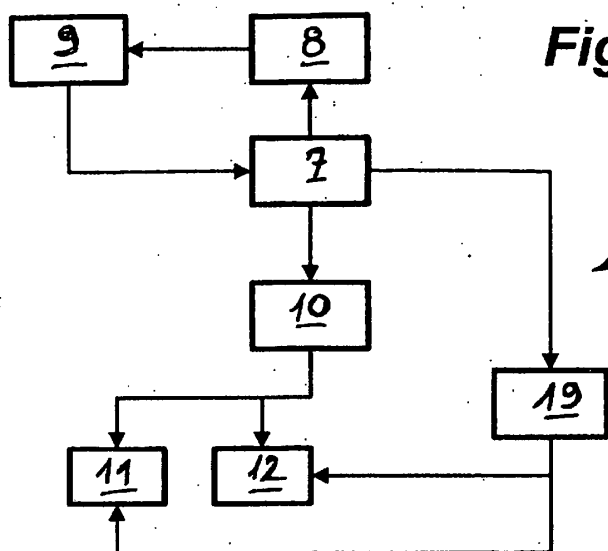


Fig. 4

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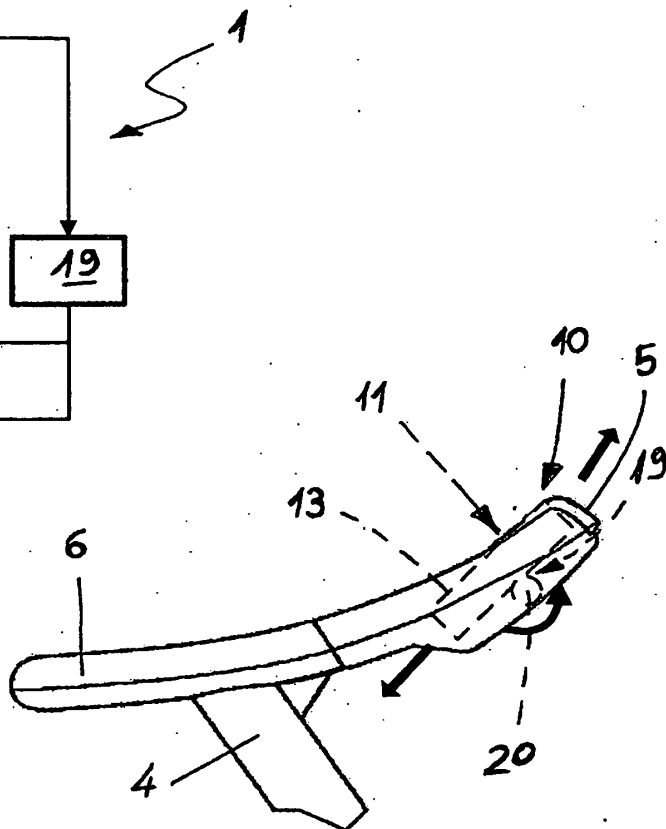


Fig. 5

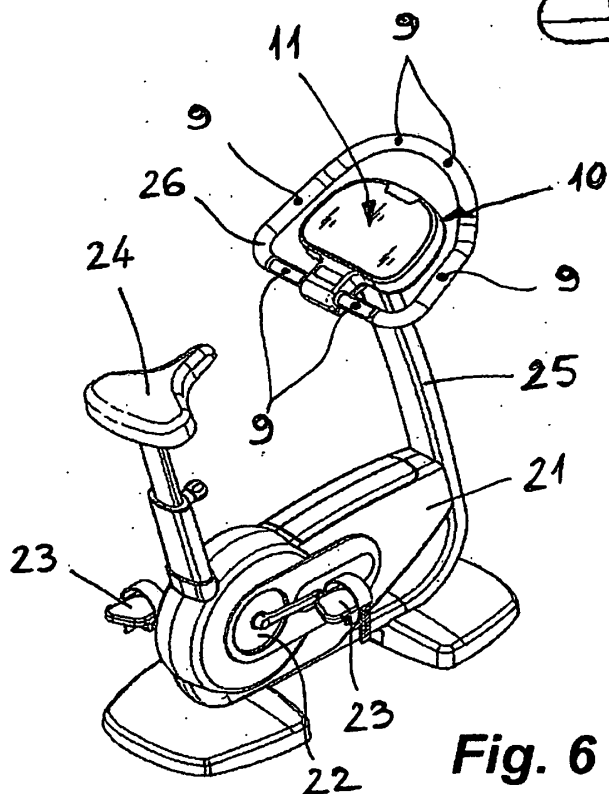


Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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