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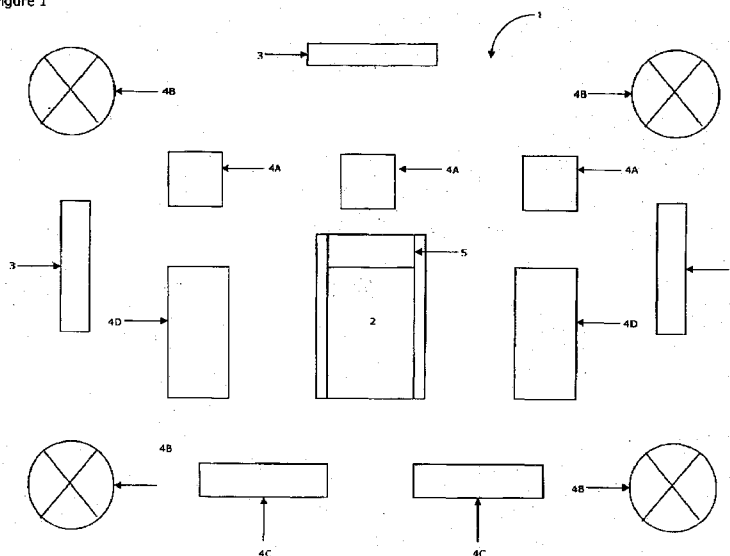
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(54) Title: AN EQUIPMENT TESTING APPARATUS

Figure 1



(57) Abstract: An equipment testing apparatus for wearable equipment which includes a motion emulation apparatus arranged in use to emulate an activity with which the wearable equipment to be tested is used. The apparatus also includes at least one image display device arranged to present a plurality of images to a user which simulate a view experienced by a participant in the activity emulated by the motion emulation apparatus. The apparatus also includes at least one environmental variable simulator arranged to simulate the exposure of a user to an environmental variable experienced by a participant in the activity emulated by the motion emulation apparatus. The equipment testing apparatus allows a user to use the motion emulation apparatus to emulate an activity while the user wears the equipment to be tested and said at least one environmental variable simulator changes the user's exposure to the environmental variable it simulates.



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AN EQUIPMENT TESTING APPARATUS

TECHNICAL FIELD

This invention relates to an equipment testing apparatus method and system arranged for testing of wearable equipment during the emulation of
5 at least one activity. Preferably this invention may be adapted to test eyewear during sporting or military focused activities. Those skilled in the art should appreciate that other applications are also envisioned.

BACKGROUND TO THE INVENTION

In the field of athletic sporting performance or in military applications every
10 possible advantage is of critical importance to a participant. In particular, long hours of training and practice can test and extend the performance of an athlete or soldier - with preferably this training exposing the participant to a wide range of possible environmental conditions which they may have to cope with in future.

15 In the field of sporting endeavour some attempts have been made to simulate common playing conditions during practice sessions, such as the approaches described in US patent applications 2004/0006926 and 2006/0287024.

The gear and equipment employed by athletes and military personnel is also
20 critical to their overall or ultimate success. Soldiers and athletes both need to be familiar with and trust their gear, particularly in situations where they may be faced with adverse or uncommon climatic and environmental conditions. At the very least, it would be useful for a soldier or athlete to experience how their gear will perform in a number of different
25 environmental conditions so as to be prepared for such an event in the future, without any unexpected results in the way their gear performs.

Current state of the art technology provides these people very little
information about the suitability or performance of their gear prior to its selection and actual use in the field or during competition. In particular,
30 athletes and military personnel need to select their gear and equipment

with access to limited information regarding how this equipment will perform when used with their own style of movement or body conformation, and also how this equipment will perform over a range of environmental conditions. Furthermore, an athlete or soldiers style of movement and body conformation when interacting with a wide range of environmental conditions makes it difficult to predict how well particular forms of equipment will assist or improve performance.

For example, in the case of eyewear a wearers face and head conformation are unique and will need to be considered to ensure an adequate and an effective fit. However, once an appropriate fit has been achieved it is not currently possible to test how such eyewear would perform for a wearer over a range of varying environmental conditions. In particular, such eyewear could be comfortable and effective on a wearer when the wearer is stationary but also when exposed to specific wind speeds and wind directions that could result in eye irritation or condensation forming on the eyewear lenses.

It would be of advantage to have a system, method and/or apparatus which provided further information to a user regarding the performance of wearable equipment at or during a time of purchase or supply. In particular, it would be of advantage to have a system method and/or apparatus which could be employed to simulate the performance of wearable equipment over a range of varying environmental conditions prior to the selection, assignment, or purchase of such equipment.

SUMMARY OF THE INVENTION

According to one aspect of the present invention there is provided an equipment testing apparatus for wearable equipment which includes,

a motion emulation apparatus arranged in use to emulate an activity with which the wearable equipment to be tested is used, and

at least one image display device arranged to present a plurality of images to a user which simulate a view experienced by a participant in the activity emulated by the motion emulation apparatus, and

at least one environmental variable simulator arranged to simulate the exposure of a user to an environmental variable experienced by a participant in the activity emulated by the motion emulation apparatus,

5 wherein the equipment testing apparatus allows a user to use the motion emulation apparatus to emulate an activity while the user wears the equipment to be tested and said at least one environmental variable simulator changes the users exposure to the environmental variable it simulates.

The present invention is adapted to provide an equipment testing apparatus
10 for wearable equipment. The present invention may preferably be employed to allow a user to test the suitability of a particular piece of wearable equipment prior to equipping or purchasing this equipment. The testing apparatus of the invention can be employed to expose both the user and equipment to a range of environmental variables while the user performs a
15 simulation of an activity in which the equipment is normally used.

The activity to be simulated or emulated in conjunction with the present invention will be dictated by the form, construction, or arrangement of a motion emulation apparatus employed in the invention.

For example, in a preferred embodiment a motion emulation apparatus may
20 be formed by a stationary bicycle assembly, thereby allowing the invention to emulate the performance of cycling related activities.

Preferably a motion emulation apparatus is adapted to execute at least one variable resistance programming scheme.

Preferably a motion emulation apparatus is adapted to capture user
25 performance information.

Those skilled in the art should also appreciate that well known static exercise machine technology and functionality may be integrated within such a motion emulation apparatus. For example variable resistance programming schemes, calorie, time, distance, and heartbeat monitoring
30 sensors, and potentially also data output systems capable of measuring and

also transmitting data representative of a users' performance may be integrated into the motion emulation apparatus.

As discussed above it should be appreciated that a wide range of different types of motion emulation apparatus may be employed in conjunction with the present invention. For example, in one alternative embodiment the present invention may employ a treadmill facility as a motion emulation apparatus. Treadmills can be used to emulate a users' performance of walking, running, or jogging based activities and again may employ a well known ancillary technology functions currently present within static exercise machines.

In yet other embodiments various other forms of motion emulation apparatus may be employed such as, for example, elliptical training machines used to emulate skiling based activities, stationary rowing machines, or any other appropriate apparatus which can emulate or simulate an activity with which wearable equipment may require testing.

Those skilled in the art should appreciate that the form of the motion emulation apparatus employed will also dictate the type of wearable equipment which can be or will be tested in conjunction with the invention. For example, wearable equipment particular to specific activities such as protective helmets, body armour, wrist guards, or other similar types of equipment may be tested in some embodiments but not others. It is envisioned that the present invention may also be utilised in a number of embodiments to test apparel which could have an effect on the ultimate performance of a user in relation to a particular activity.

In a preferred embodiment the present invention may be arranged or utilised to test the performance of eyewear with respect to a particular activity being emulated. Those skilled in the art should appreciate that eyewear may encompass a range of different types of equipment such as, for example, sun glasses, protective eyewear, ophthalmic or prescription eyewear, helmet visor systems or skiing goggles for example. Those skilled in the art should appreciate that this set of examples should however be seen in no way as limiting to the scope of the present invention.

Furthermore, those skilled in the art should also appreciate that a wide range of types of equipment other than eyewear may also be tested in conjunction with the present invention depending on the particular activity with which such equipment is generally used.

5 Preferably the testing apparatus provided includes at least one image display device. An image display device may be employed to present a plurality of images to a user which simulate the view experience by a participant of the activity being emulated. For example, in an embodiment where a stationary bicycle is provided as a motion emulation apparatus, an
10 image display device can present a series of images or video to simulate the user riding a bicycle along a road, track, or over off-road terrain. Those skilled in the art should appreciate that appropriate images or video content may be presented to a user via an image display device depending on the form or arrangement of the motion emulation apparatus and the activity it
15 emulates.

In a preferred embodiment the image display device receives information or transmissions that provide an indication of the users' current performance of the activity being emulated. For example, where a stationary bicycle is employed within the invention the speed at which the user turns the
20 bicycles crank and potentially also the resistance setting which the user is working against can be provided to an image display device or any ancillary componentry to control or modify the form of the images presented to a user. In such cases, if the stationary bike used is emulating a hill climbing program, the images presented to the user can reflect an inclined path with
25 the change in scenery presented to a user reflecting the speed at which the user cranks the peddles of the stationary bicycle.

In a preferred embodiment the present invention may include a plurality of image display devices arranged so as to at least partially surround a user
30 emulating an activity. An array of display devices may be positioned around the sides and to the front of a user employing the motion emulation apparatus, giving the user a 180 degree or more view of images simulating that experienced during the activity being emulated.

The present invention employs at least one environmental variable simulator to simulate the exposure of a user to an environmental variable which is normally experienced by a participant in the activity emulated. Such environmental variables may cover a wide range of conditions or situations that could be experienced by a user employing the wearable equipment to be tested. With a combination of motion emulation apparatus and preferably a number of environmental variable simulators, the present invention may be used to adequately test the utility of particular wearable equipment for a specific user, taking into account both the unique body conformation and also performance style of that particular user. As the invention allows for a realistic emulation of both a specific activity and also preferably a range of environmental variables, the user can be given relatively accurate feedback as to the suitability of the equipment being testing.

Reference in general will also be made to the present invention employing a plurality of environmental variable simulators. However those skilled in the art should appreciate that in one particular alternative embodiment a single environmental variable simulator only may be employed - or in other instances a relatively small numbers of simulators may be provided. Reference in general throughout the specification to a specific set of environmental variable simulators used by the present invention should in no way be seen as limiting.

Those skilled in the art should appreciate that the present invention may employ a range or number of environmental variable simulators, where the examples set out below should not be considered exhaustive or limiting to the scope of the present invention:

- A wind simulator capable of simulating variable wind speeds and also variable wind directions as experienced by a user.
- A rain, snow, sleet, or hail simulator capable of exposing users to these weather conditions with varying intensities of flow rate and impact speed.

- A light intensity and composition simulator capable of exposing a user to high light levels including variations in glare, light angles with respect to the horizon (potentially to simulate sun strike), in addition to variable levels of UV radiation.
- 5 - An ambient atmosphere simulator capable of varying relative humidity and air temperature in the vicinity of a user.
- An atmospheric particle simulator, capable of simulating exposure of a user to smoke or dusty air.
- A terrain variation simulator capable of simulating irregularities in the ground covered by a user such as for example pot holes, loose gravel road surfaces, inclined or declined paths, or slippery icy surfaces.
- 10 - An audio signal simulator capable of producing sound or audio representative of sounds normally heard by a participant within the activity being emulated.

15 Again, as described above, those skilled in the art should appreciate the above examples of environmental variable simulators should in no way be seen as exhaustive or limiting with respect of the scope of the present invention.

20 Preferably, the present invention also incorporates a control structure, system or apparatus.

Preferably such a control system is adapted to receive at least one testing parameter which the control system uses to control the operation of at least one environmental variable simulator.

25 Such a control system can be employed to drive or manage the operation of the invention to ensure that the equipment worn by a user is tested effectively with at least one environmental variable being modified over a selected range of values or settings. In a further preferred embodiment a programmable micro processor or similar device such as a personal computer may be adapted to provide such a control system. This computer

system can be programmed with appropriate software and to receive input testing parameters such as the environmental variables to be simulated during an upcoming use of the invention in addition to the timing of which such variables are to be changed or modified and also the range over which such variables are to be modified. This control apparatus can also select an appropriate set of display images or video to be presented to a user during use of the invention and may also receive performance information from the motion emulation apparatus. This performance information can in turn be used by the control system or apparatus to change the rate at which the scenery images displayed to a user changes relative to the performance of the user indicated by such performance information.

In some embodiments such a control system or apparatus may also be used to implement variable resistance testing programs to be completed by a user during the use of the invention. For example the control system may change the resistance experienced by a user peddling a stationary bicycle, or the speed of which a static treadmill surface moves to control the speed at which a user must walk or run to keep up with the invention. Such variable resistance programs may also be synchronised with the images or video supplied to an image display device to provide the user with a sense or realism when their performance with respect to the invention is modified.

In a preferred embodiment, the present invention may include or incorporate a performance recording apparatus. Such a recording apparatus may be used to record and collate information pertaining to the performance of the equipment worn and tested during use of the present invention.

In a further preferred embodiment, such a performance recording apparatus may include an audio capture microphone. This microphone may also be associated a memory storage device linked to or worn by a user of the invention. This microphone system can be used to record any verbal comments or feedback provided by the user during the course of the testing completed using the present invention. In other embodiments a performance recording apparatus may include a video camera system used

to record video images of a user employing the motion emulation apparatus during at least a portion of time which the invention is used. Those skilled in the art should appreciate that a range of different types of recording systems may be combined in conjunction with the present invention to provide such a performance recording apparatus. Furthermore, any data information or signals recorded by such an apparatus may also be time stamped or otherwise referenced or indexed to indicate the phase of the testing process of which such information was recorded and potentially the current environmental variables experienced by a user. In other embodiments metadata associated with or identifying the current environmental variable settings employed may be integrated into data or information recorded or and stored by the performance recording apparatus. The use of metadata bedded into such recordings clearly identifies the environment in which the user is currently performing when feedback or information is recorded with respect to the performance of the equipment being tested.

Preferably, an image display device may be adapted to display to a user video recordings captured by a performance recording device.

For example, in a preferred embodiment where a performance recording apparatus incorporates a video camera system, the output of such a camera system may subsequently be played back to a user using at least one of the image display devices provided in conjunction with the present invention. This immediate playback of recorded video to a user after the completion of a testing procedure can be useful in allowing a user to quickly make up their mind as to whether to purchase or equip the equipment tested.

In this specification, unless the context clearly indicates otherwise, the term "comprising" has the non-exclusive meaning of the word, in the sense of "including at least" rather than the exclusive meaning in the sense of "consisting only of". The same applies with corresponding grammatical changes to other forms of the word such as "comprise", "comprises" and so on.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

5 Figure 1 is a block schematic plan view of an equipment testing apparatus as provided in accordance with a preferred embodiment of the present invention, and

Figure 2 shows a flowchart of steps executed in a method of using the equipment testing apparatus shown with respect to Figure 1.

10 DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Figure 1 is a block schematic plan view of an equipment testing apparatus as provided in accordance with the present invention.

Figure 1 illustrates an equipment testing apparatus 1 composed from a number of components shown schematically. The apparatus 1 includes a
15 motion emulation apparatus, provided in the embodiment shown by a treadmill 2. This treadmill is located at approximately the centre of the collection of components used to implement the apparatus 1.

The apparatus 1 also includes three separate image display devices, implemented by liquid crystal displays 3. Each of these displays are
20 arranged so as to substantially surround the sides and front of the treadmill 2. The displays are arranged to present images of scenes which a user of the treadmill could expect to see during a simulated walk or running activity.

Also arranged around the treadmill are a series of components forming a
25 number of environmental variable simulators 4. A number of different types of variable simulators are provided to emulate conditions anticipated or expected by an actual walker, runner, jogger, or marcher.

In particular, the apparatus 1 includes an array of three light intensity and composition simulators 4A. These light simulators face towards the front of

the treadmill 2 and can be used to simulate varying lighting conditions, in addition to varying sun angles in outdoor activities.

The apparatus 1 also includes an array of wind simulators 4B which enclose or encircle the treadmill 2. These wind simulators 4B are formed by a series of fans which can be swivelled to adjust their angle or orientation with respect to the treadmill 2. The speed at which each fan 4B rotates can also be adjusted depending on the intensity of wind to be simulated. Furthermore, 1, 2, or potentially 3 or 4 fans may be activated at the same time with the particular fans activated simulating a particular direction of wind flow.

The apparatus 1 also includes two audio signal simulators, formed by a pair of speakers 4C located to the rear of the treadmill 2. This set of speakers can be used to produce a stereo sound field in close proximity to the treadmill 2 to approximate sounds normally heard by a participant of the activity simulated with the treadmill 2.

The last type of environmental variable simulator incorporated into the apparatus 1 is a pair of rain simulators 4D disposed to either side of the treadmill 2. These rain simulators 4D incorporate a water supply and an array of water spraying or atomising nozzles which can be arranged to project water towards a user of the treadmill 2. Furthermore through co-operation with the wind simulation fans 4B, the speed of the simulated rain impacting a user of the treadmill 2 can also be adjusted.

The apparatus 1 also includes a performance recording apparatus 5 mounted on the front of the treadmill 2. This performance recording apparatus 5 incorporates a microphone and a video camera system arranged to capture audio and video of a user of the treadmill during operation of the apparatus.

This captured information can be used to evaluate the performance of equipment employed by a user as the treadmill is used and each of the environmental variable simulators 4A-4D are activated. In the embodiment illustrated with respect to Figure 1, the microphone and video camera

provided are arranged to capture speech from a user, with the video camera being trained on the user's face to capture imagery of eyewear worn by the user. In this embodiment the invention is employed to assess the performance of eyewear worn by a user during the simulation of treadmill based activity such as walking, running, jogging, or marching.

Figure 2 shows a flowchart of steps executed in a method of using the equipment testing apparatus shown with respect to Figure 1.

In the first stage of this process (A), the apparatus employed is activated either through depression of a power activation button or switch associated with the treadmill or activation of a motion sensor deployed within the vicinity of the apparatus.

On activation of the apparatus, stage (B) of this process is executed where the user is asked to select a particular activity or action program to be executed by the treadmill. Such an activity program can specify the distance to be travelled by a user, the speed to be travelled by the user, and other performance related variables detailing the particular activity to be completed.

Once an activity program is selected by a user, stage (C) of this process is executed to receive information relating to a particular range of environmental variables to be simulated. At stage (C) the user is prompted to enter the identity of specific environmental variables to be simulated or tested in combination with a range of intensities or particulars relevant to each variable. For example, at this stage a user can enter a testing program which provides a high volume high speed rainfall simulation coupled with a high speed cross wind.

Once stage (C) of this process is completed, stage (D) is executed with the activation of any performance recording components integrated into the apparatus. These performance recording microphone and video camera systems need to be activated prior to any use of the treadmill.

At stage (E) of this process, the activity program selected by the user at stage (B) is run in combination with the environmental variable simulations

identified and particularised at stage (C). This program runs for the duration or distance specified initially by the user at stage (B). While the program is run, the array of displays surrounding the front of the treadmill are operated to display to the user a range of scenery normally experienced by a jogger, walker, or runner travelling at the speeds which are simulated by the operation of the treadmill.

At stage (F) of this process, the completion of the activity program is confirmed to stop the operation of the treadmill and the associated environmental variable simulators.

The final stage of this process (G) is executed through activation of a playback system to display to a user in any video recordings made during the operation of the treadmill. This video content can be time stamped to indicate the environmental variables simulated at particular points in time cross referenced with current video footage. Such time stamps are also applied to all recorded performance audio. This audio material can be played back in synchronisation with video footage to also provide performance information in the form of an audio or speech commentary given by a user.

In the embodiments discussed with respect to Figures 1 and 2 the invention is used to test the performance of eyewear worn by a user employing the treadmill. The environmental variable simulators provided can be used to expose the user and the eyewear worn to a range of different environmental variables which could potentially be experienced by a user. The performance recording components of the invention are used to record additional data or information particular to the performance of such eyewear which can be played back after the testing operation is completed.

It will be apparent that obvious variations or modifications may be made which are in accordance with the spirit of the invention and which are intended to be part of the invention, and any such obvious variations or modifications are therefore within the scope of the invention. Although the invention is described above with reference to specific embodiments, it will

be appreciated by those skilled in the art that it is not limited to those embodiments, but may be embodied in many other forms.

CLAIMS:

1. An equipment testing apparatus for wearable equipment which includes:
 - 5 - a motion emulation apparatus arranged in use to emulate an activity with which the wearable equipment to be tested is used;
 - at least one image display device arranged to present a plurality of images to a user which simulate a view experienced by a participant in the activity emulated by the motion emulation apparatus; and
 - 10 - at least one environmental variable simulator arranged to simulate the exposure of a user to an environmental variable experienced by a participant in the activity emulated by the motion emulation apparatus;
- 15 wherein the equipment testing apparatus allows a user to use the motion emulation apparatus to emulate an activity while the user wears the equipment to be tested and said at least one environmental variable simulator changes the user's exposure to the environmental variable it simulates.
- 20
2. An equipment testing apparatus as claimed in claim 1 wherein the wearable equipment is sports equipment.
3. An equipment testing apparatus as claimed in claim 1 or claim 2
- 25 wherein the wearable equipment is protective equipment.
4. An equipment testing apparatus as claimed in any previous claim where the wearable equipment is eyewear.
- 30 5. An equipment testing apparatus as claimed in any previous claim wherein a motion emulation apparatus is adapted to execute at least one variable resistance programming scheme.

6. An equipment testing apparatus as claimed in any previous claim wherein a motion emulation apparatus is adapted to capture user performance information.

5

7. An equipment testing apparatus as claimed in any previous claim wherein the motion emulation apparatus is formed from a treadmill.

8. An equipment testing apparatus as claimed in any one of claims 1 to 10 6 wherein the motion emulation apparatus is formed from an elliptical training machine.

9. An equipment testing apparatus as claimed in any one of claims 1 to 15 6 wherein the motion emulation apparatus is formed from a stationary rowing machine.

10. An equipment testing apparatus as claimed in any one of claims 1 to 6 wherein a motion emulation apparatus is formed from a stationary bicycle.

20

11. An equipment testing apparatus as claimed in any previous claims which includes a plurality of environmental variable simulators formed from any combination or permutation of:

- 25 - a wind simulator capable of simulating variable wind speeds and also variable wind directions as experienced by a user;
- a rain, snow, sleet, or hail simulator capable of exposing users to these weather conditions with varying intensities of flow rate and impact speed;
- a light intensity and composition simulator capable of exposing a 30 user to high light levels including variations in glare, light angles with respect to the horizon, and variable levels of UV radiation;
- an ambient atmosphere simulator capable of varying relative humidity and air temperature in the vicinity of a user;
- an atmospheric particle simulator, capable of simulating

exposure of a user to smoke or dusty air;

- a terrain variation simulator capable of simulating irregularities in the ground covered by a user such as pot holes, loose gravel road surfaces, inclined or declined paths, or slippery icy surfaces;

5 - an audio signal simulator capable of producing audio representative of sounds normally heard by a participant within the activity being emulated.

12. An equipment testing apparatus as claimed in any previous claim
10 wherein an image display device presents a plurality of images to a user which simulate the view experience by a participant of the activity being emulated.

13. An equipment testing apparatus as claimed in any previous claim
15 wherein the image display device receives information that provides an indication of the user's current performance of the activity being emulated.

14. An equipment testing apparatus as claimed in any previous claim
20 which includes a plurality of image display devices arranged so as to at least partially surround a user emulating an activity.

15. An equipment testing apparatus as claimed in any previous claim
25 which includes a control system adapted to receive at least one testing parameter which the control system uses to control the operation of at least one environmental variable simulator.

16. An equipment testing apparatus as claimed in claim 15 wherein the
control apparatus selects an appropriate set of display images to be
presented to a user during use of the invention.

30

17. An equipment testing apparatus as claimed in claim 16 wherein the
control apparatus receives performance information from the motion
emulation apparatus which it uses to determine the rate of change of
display images presented to user.

18. An equipment testing apparatus as claimed in any previous claim which includes a performance recording apparatus adapted to record and collate information pertaining to the performance of the equipment worn
5 and tested.

19. An equipment testing apparatus as claimed in claim 18 wherein a performance recording apparatus includes an audio capture microphone.

10 20. An equipment testing apparatus as claimed in claim 18 or claim 19 wherein a performance recording apparatus includes a video camera system.

15 21. An equipment testing apparatus as claimed in any one of claims 18 to 20 wherein any data information or signals recorded by a performance recording apparatus is time stamped or otherwise referenced to indicate the time during the testing process when the information was recorded.

20 22. An equipment testing apparatus as claimed in claim 20 or claim 21 wherein an image display device is adapted to display to a user video recordings captured by a performance recording device.

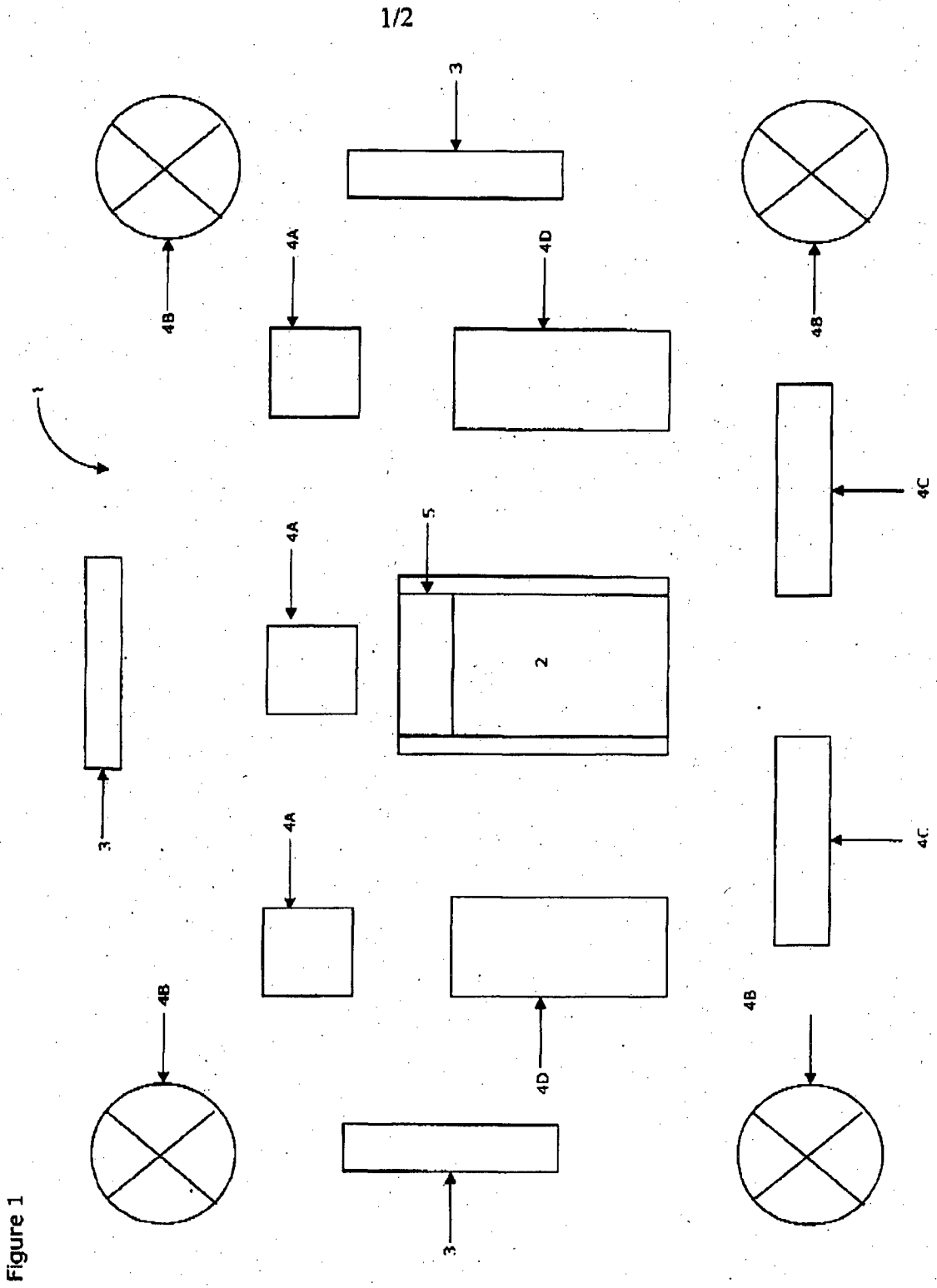
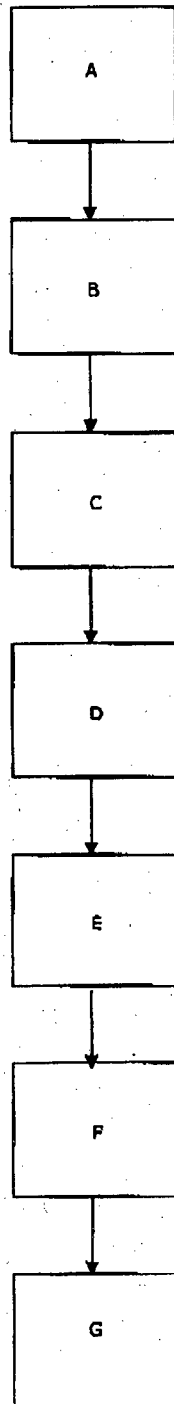


Figure 2

2/2



INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER		
Int. Cl.		
<i>A63B 21/00</i> (2006.01) <i>A63B 71/00</i> (2006.01) <i>A63B 71/08</i> (2006.01) <i>A63B 69/00</i> (2006.01)		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPODOC, WPI, Patent lens, Google, key word include: test, wear, treadmill, bicycle, emulate, simulate, display (and similar terms)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2009/0209393 A1 (CRATER et al.) 20 August 2009 See paragraphs [0018], [0023], [0026], [0029]-[0034], figs 2-5	1, 5-13, 15-17 2-4, 14, 18-22
Y	WILLIAMS, M. E. Jr. 'Form-Fitted Athletic Wear Comfort and Performance Optimization' North Carolina State University, Master of Science thesis. 2009. issue date 27 April 2010. (retrieved on 2012-1-19). Retrieved from the internet http://repository.lib.ncsu.edu/ir/handle/1840.16/6350 See in particular pages 85-97	2-4, 14, 18-22
A	US 2010/0022354 A1 (FISHER) 28 January 2010	
A	US 7074162 (KUO) 11 July 2006	
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Date of the actual completion of the international search 19 January 2012		Date of mailing of the international search report 27 January 2012
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. +61 2 6283 7999		Authorized officer CADE MCTAGGART AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No : +61 2 6283 7926

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU2011/001331

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
US	2009209393	NONE					
US	2010022354	NONE					
US	7074162	TW	559087U	US	2004038778	US	6824501
		US	2004038780				
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.							
END OF ANNEX							