(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
25 November 2010 (25.11.2010)

PCT

(10) International Publication Number
WO 2010/133988 A1

(51) International Patent Classification:
A61H 23/02 (2006.01) *A63B 71/06* (2006.01)
A63B 23/02 (2006.01)

(21) International Application Number:
PCT/IB2010/051944

(22) International Filing Date:
4 May 2010 (04.05.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09160578.2 19 May 2009 (19.05.2009) EP

(71) Applicant *(for all designated States except US)*: **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **STUT, Wilhelmus, J., J.** [NL/NL]; c/o High Tech Campus Building 44, NL-5656 AE Eindhoven (NL).

(74) Agents: **KROEZE, John** et al.; High Tech Campus 44, NL-5600 AE Eindhoven (NL).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH,

[Continued on next page]

(54) Title: TACTILE EXERCISE MAT

(57) Abstract: The present invention relates to a tactile exercise mat (1) and a method of operating it. The tactile exercise mat comprises a plurality of actuators (2, 6, 7, 8, 9, 30, 31) distributed therein and a controller adapted to control the plurality of actuators. The controller is adapted to access predefined actuator configurations defining exercise configurations and to control the actuators in accordance with the predefined actuator configurations. In an advantageous embodiment, the controller is communicatively connected to one or more sensors for sensing the actual movement of the user.

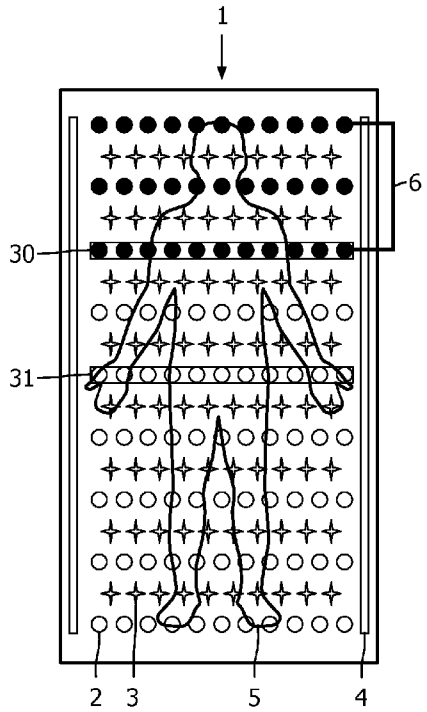

FIG. 3A

WO 2010/133988 A1

GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

Tactile exercise mat

FIELD OF THE INVENTION

The present invention relates to an exercise mat and to a method of operating the mat; more particularly, to a tactile exercise mat comprising controllable actuators.

BACKGROUND OF THE INVENTION

It is generally accepted that exercising has a positive impact on health and well-being. Nevertheless, in spite of the availability of many exercise tools and facilities, many people worldwide still fail to exercise at a level that is recommended to maintain a good physical fitness level. In fact, many people do not know exactly how to exercise, which exercises to do, in which order these exercises can best be done, how many repetitions are effective, how fast the repetitions need to be done, etc.

Several solutions for getting guidance and feedback during exercising are available today. One way is to hire a personal trainer, which may not be the most cost-effective and flexible solution. Another way is to use a system that guides the user in doing exercises with the help of video and/or audio means. Examples are the Wii Fit (using both video and audio means) and NextFitness (using only audio means). The disadvantage of systems that only use video means is that the user has to watch a screen, which, depending on the position of the latter, may lead to undesired body postures for many exercises. For example, the push-up exercise should be done with the user's head facing the ground; however, when using a wall-mounted display, the user has to lift his head. The disadvantage of systems that only use audio means, instead, is that the user has to convert the instructions heard into movements of specific body parts. Other disadvantages of audio-based systems is that other people nearby may be disturbed or that the user has to wear a head-set.

US 2008/0096183 discloses an exercise mat having visual displays on its surface, which aid the user in carrying out exercises by means of illustrations (e.g., images) to provide visual instructions to the user. Nevertheless, this solution still falls back to the afore-mentioned disadvantages for exercises during which the user does not face the exercise mat and therefore is not able to appropriately follow the instructions provided thereon.

Hence, there is the need for a solution that avoids such disadvantages while still providing the user with guidance throughout exercises without the need for outside assistance.

SUMMARY OF THE INVENTION

The inventor has had the insight that there is a need in the art for a generic solution, which, on the one hand, is versatile in its use with respect to the types of exercises that can be carried out and, on the other hand, provides guidance to the user in a way which work together with the exercises.

The present invention addresses the above needs by providing, in a first aspect, a tactile exercise mat, which comprises a plurality of actuators distributed therein and a controller adapted to control the plurality of actuators, wherein the controller accesses predefined actuator configurations defining exercise configurations for one or more users, and wherein one or more actuators of the plurality of actuators is controlled in accordance with the predefined actuator configurations.

The tactile exercise mat according to the present invention adds the functionality of tactile stimulation to a conventional exercise mat, by use of an arrangement of actuators distributed therein. Such functionality provides guidance to users throughout an exercise without the need for any outside assistance. Moreover, the guidance is provided in a way so there no need for the user to place the head or other body parts in a position which may counteract the performance of the exercise.

In an advantageous embodiment, the tactile exercise mat further comprises one or more sensors (e.g., pressure sensors) distributed therein and communicatively connected to the controller. Such sensors are able to retrieve useful information (e.g., the number, the size and the position of the one or more users using the mat), which can be used to adjust the tactile stimulation accordingly, as well as in connection with providing feedback as to the progress and general conductance of the exercise.

Advantageously, the tactile exercise mat further comprises one or more light emitting elements (e.g., LEDs). The latter provides visible feedback to the users to inform them about e.g. the percentage of exercise correctly carried out.

In a further aspect, the present invention relates to a method of operating the tactile exercise mat in accordance with the first aspect of the invention, wherein the exercise configurations correlate an area on the exercise mat with a body part of the user, and wherein

the exercise mat is operated by actuating an actuator in the area of the exercise mat correlated to the body part in accordance with the exercise configuration.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will be described, by way of example only, with reference to the drawings, in which:

Fig. 1 is a schematic illustration of a tactile exercise mat;

Figs. 2A - 2C show three examples of exercises;

Figs. 3A - 3C are schematic illustrations of actuator configurations correlated to different exercises; and

Fig. 4 is a flow chart illustrating embodiments of operating a tactile exercise mat.

DESCRIPTION OF EMBODIMENTS

Embodiments of a tactile exercise mat are disclosed in the following.

Fig. 1 illustrates a tactile exercise mat 1 comprising a plurality of actuators 2 distributed therein. A controller (not shown) is adapted to control the plurality of actuators by accessing predefined actuator configurations, the latter being derived from exercise configurations. An exercise configuration correlates an area on the mat with a body part of the user, which shall be either moved or kept on the mat according to the exercise to be performed, and the timing of such actions. The tactile exercise mat is operated by actuating an actuator in the area of the mat correlated to the body part to be moved or kept on the mat in accordance with the exercise configuration. The actuators need not be continuously active, but may be activated according to the rhythm of the exercise. The tactile exercise mat provides therefore guidance to the user throughout an exercise by means of tactile instructions, without the need for outside assistance or substantial experience. Indeed, the user can feel what he should do thanks to the tactile stimuli generated by the mat. The use of tactile stimulation is particularly useful for, but not limited to, exercises during which the user is not watching the exercise mat, or cannot easily check whether certain body parts (e.g., lower part of the back) are or are not touching the mat.

Fig. 1 further illustrates sensors 3 and light emitting elements 4; these will be further explained below.

Fig. 2 depicts users carrying out three exercise configurations: the “crunch” (Fig. 2A), the “shoulder bridge” (Fig. 2B) and the “superman” (Fig. 2C), respectively.

Although only those three examples are shown and used as a reference in the following, this choice is in no way intended to limit the scope of the present invention, as indeed many other types of exercises may be contemplated (e.g., conventional sit ups, leg raises lying supine with knees bent or straight, hanging leg raises, pelvic tilts, exercises using abdominal sit up machines, etc.). To this end, exercises involving two or more users (e.g., two persons laying on opposite sides of the mat, each performing the "crunch", and passing to each other a weighted ball at each repetition, etc.) should also be considered within the scope of the present invention.

For a user to carry out the exercise of Fig. 2A (the "crunch"), the exercise configuration should reflect that and convey to the user to keep the back and the feet on the mat, while lifting the head and the shoulders. In particular, the shoulders, at the end of each repetition, shall rest on the mat. Accordingly, in an exemplary embodiment, the exercise configuration could specify that the rows of actuators in the head and shoulder area of the user may be activated, such as the three rows indicated with reference numeral 6 (see Fig. 3A). Since the head should be lifted from the mat during the entire set, the actuators in the head area may be continuously active. However, as the shoulders should rest on the mat at the end of each repetition, the actuators in the shoulder area 30 may only be active at the start of each repetition; to indicate that the user should move the shoulders back to the mat, the actuators in another area (e.g., the lower back 31) may generate a brief stimulus. Thus, a simplified exemplary exercise configuration related to the "crunch" (Fig. 3A) could specify:

- Activate the three rows marked with reference numeral 6;
- Briefly activate the row marked with reference numeral 30 (lift shoulders);
- Wait specified time;
- Briefly activate row marked with reference numeral 31 (lower shoulders);
- Wait specified time;
- Repeat steps b)-e) until number of repetitions has been completed; and
- Deactivate the three rows marked with reference numeral 6.

In an example of an exercise configuration relevant for the exercise as illustrated in Fig. 2B (the "bridge"), the user shall keep the head, the shoulders and the feet on the mat, while lifting the back. Accordingly, the rows of actuators 7 in the back area of the user may be activated (see Fig. 3B). Finally, in an example of exercise configuration relevant for the exercise as illustrated in Fig. 2C (the "superman"), the user shall keep the belly on the mat, while lifting the rest of the body. Accordingly, the rows of actuators 8 and 9 in those areas of the user may be activated (see Fig. 3C). Obviously, other activation configurations

are possible, where, for example, instead of moving the body part being stimulated, the user could keep it on the tactile exercise mat 1.

In a situation of use, the controller may be programmed with exercise configurations and their corresponding actuator configurations. In an embodiment, the controller may comprise a storage means (e.g., a small memory chip), where it stores such predefined actuator configurations in a database. In another embodiment, the controller may access such configurations from a server on the Internet, where it can also download possible updates. A user may select a given exercise configuration via the controller (e.g., manually, vocally, etc.), which may in embodiments be integrated with the tactile exercise mat 1 or may be detached but wired or wirelessly connected to that. In the latter cases, the controller may communicate with the tactile exercise mat 1 by means of any suitable type of wired or wireless medium using any suitable bandwidth.

Examples of actuators particularly suited for the present invention are pancake-shaped excenter rotating-mass motors, which are lightweight, thin and inexpensive. Nevertheless, any other type of actuator may be used consistent with the tactile exercise mat 1, such as vibrating-eccentric mass motors (EMC), heaters (e.g., resistive elements), coolers (e.g., peltier elements), electroactive polymers, Transcutaneous Electro Nerve Stimulation (TENS), piezo actuators, shape memory alloys, etc.

In one embodiment, the tactile exercise mat 1 further comprises one or more sensors 3 (cf. Fig. 1) distributed therein and adapted to monitor the execution of the exercises, such as the number of repetitions done. The one or more sensors are communicatively connected to the controller, which is adapted to compare their readings to the predefined actuator configurations. The result of such a comparison may be a difference measure, which is outputted to the user in order to provide feedback on the percentage of exercise correctly carried out. For example, when an exercise has been performed 100% correctly, all actuators may be briefly activated (together, or gradually by starting from the feet and ending at the head); when an exercise has been done 50% correctly, instead, only half of the actuators may be briefly activated.

In another embodiment, the one or more sensors 3 are adapted to determine the number, position and size of the one or more users on the tactile exercise mat 1 and input such information to the controller so as to control the plurality of actuators 2, 6, 7, 8, 9 in accordance therewith. Basically, the one or more sensors may be used to determine an area on the mat which is in contact with the user(s). They may be used, for example, to determine the number of users laying on or sitting on the mat, their positions and sizes (e.g., for small

persons the areas for the feet and the head will be closer to each other than for tall persons). This information may be inputted in the controller so as to control the plurality of actuators in response to the detected number, positions and sizes of the one or more users.

In other embodiments, the one or more sensors 3 are not comprised in the tactile exercise mat 1 but attached to body parts of the user carrying out the exercise; that could be the case, for example, of a person having a sensor (e.g., an accelerometer) attached to his wrist or other body parts while carrying out the crunch exercise, where the acceleration data from that sensor provides information on the number of repetitions done.

Examples of sensors are pressure sensors, light sensors, accelerometers, proximity sensors, force sensors (e.g., piezo polymers, ceramic strain gauges, etc.), force and position-sensing resistors, pyroelectric, passive infrared sensors, binary "on/off" sensors, etc. In particular, proximity sensors tailored for the range of applications within the scope of the present invention are optical sensors, capacitive sensors, inductive sensors and infrared reflection sensors.

In one embodiment, the tactile exercise mat 1 further comprises light emitting elements 4 (e.g., LEDs) (cf. Fig. 1), which provide visual guidance and feedback (e.g., the above-mentioned difference measure can be outputted in the form of light stripes instead of tactile stimuli); this is particularly useful for, but not limited to, exercises during which the user is faced towards the mat (cf. Fig. 2C). One skilled in the art would realize that various other configurations (in terms of shapes, placements, etc.) than that shown in Fig. 1 could be employed for the light emitting elements. As an example, the light emitting element may be in the form of a display field, such as a flexible display, which could be incorporated into the mat. In embodiments where the tactile exercise mat comprises both sensors and light emitting elements additional functionalities may be offered. For example, the one or more sensors 3 may be used to determine the user's shoulder width; later, when the user has to carry out an exercise where the hands should be placed on the mat at the shoulder's width, light patterns may indicate where he should position his hands. Therefore, the tactile exercise mat provides the user a rich yet natural way of receiving guidance and feedback.

In general, all suitable types of user-detectable feedback (e.g., tactile, visible, audible, etc.) can be envisioned and combined in the present invention. Furthermore, if the controlled is associated with a screen, the information may be displayed there over.

In one embodiment, the circuitry in the tactile exercise mat 1 may be bendable circuitry, so that the mat can be flexible, and it can be rolled and unrolled, thus being easier and more convenient to store and transport.

The tactile exercise mat 1 may be fabricated from any suitable material, such as rubber and foam.

Although the tactile exercise mat 1 as shown in Fig. 1 is rectangular in shape, one skilled in the art would realize that various other shapes could be used (e.g., polyhedron, square, circle, semi-circle, oval, etc.).

The tactile exercise mat 1 may have any suitable dimension. For example, if used for carrying out stretching exercises, it could be dimensioned such that any user could be comfortably sitting or laying on it. In embodiments, the present invention could also be dimensioned such that it could be used by more than one user at the same time, e.g., during an exercise class in a fitness center.

The tactile exercise mat 1 may be used on horizontal surfaces (e.g., floors), inclined surfaces (e.g., benches for exercising abdominals), surfaces presenting different angular inclinations in different sections of their support structure (e.g., chairs), on curved surfaces, etc. If desired, the mat may be provided with one or more attachment devices such as a hook or a clamp, which allow the apparatus to be affixed to a vertical surface (e.g., a door). Finally, the present invention can also be incorporated into another object such as an exercise bench, a bed, etc.

The tactile exercise mat 1 may be provided with graphics, such as a stylized representation of the human body 5 (cf. Fig. 3), to facilitate the orientation of a user with respect to the mat surface.

The tactile exercise mat 1 may be powered by any suitable source of energy such as a battery system (e.g., internal/external single or multiple battery packs), an electrical outlet (e.g., a wall socket, an automobile cigarette lighter plug, etc.), solar cells, a small generator, and so forth.

Although the invention described herein may provide one or more users with all the instructions necessary to perform an exercise or various exercises without the need for outside assistance, media components (e.g., VHSs, CDs, DVDs, Blue-Ray discs, etc.) may be used in conjunction with said mats to further enhance the user's experience.

Fig. 4 shows a flow chart 10 illustrating embodiments of operating a tactile exercise mat, wherein the exercise configurations correlate an area on the exercise mat with a body part of the user, and wherein the tactile exercise mat is operated by actuating an actuator in the area of the tactile exercise mat correlated to the body part in accordance with the exercise configuration. Fig. 4 illustrates the situation where the tactile exercise mat further comprises one or more sensors.

An exemplary implementation of the functioning of a tactile exercise mat may comprise the following steps:

40: Start;

11: Load the exercise configuration of the current exercise; the exercise configuration defines the actuator patterns and sensor patterns for the exercise;

12: Activate the actuators that should be kept lifted during the entire exercise 12;

13: Activate the actuators that correspond to the body parts that should be moved up and down during a repetition;

14: Wait until the sensors have detected upward motion;

15: Deactivate the actuators that correspond to the body parts that should be moved up and down during a repetition;

16: Wait until the sensors have detected downward motion;

17: Check whether more repetitions need to be done by the user(s); if so 18, start again from 13;

19: Deactivate the actuators;

20: Check whether more exercises need to be done by the user(s); if so 21, start again from 11.

41: Stop.

The invention can be implemented in any suitable form including hardware, software, firmware or any combination of these. The invention or some features of the invention can be implemented as computer software running on one or more data processors and/or digital signal processors. The elements and components of an embodiment of the invention may be physically, functionally and logically implemented in any suitable way. Indeed, the functionality may be implemented in a single unit, in a plurality of units or as part of other functional units. As such, the invention may be implemented in a single unit, or may be physically and functionally distributed between different units and processors.

Although the present invention has been described in connection with the specified embodiments, it is not intended to be limited to the specific form set forth herein. Rather, the scope of the present invention is limited only by the accompanying claims. In the claims, the term “comprising” does not exclude the presence of other elements or steps. Additionally, although individual features may be included in different claims, these may possibly be advantageously combined, and the inclusion in different claims does not imply that a combination of features is not feasible and/or advantageous. In addition, singular references do not exclude a plurality. Thus, references to "a", "an", "first", "second" etc. do

not preclude a plurality. Furthermore, reference signs in the claims shall not be construed as limiting the scope.

CLAIMS:

1. A tactile exercise mat (1) comprising a plurality of actuators (2) distributed therein and a controller adapted to control the plurality of actuators, wherein the controller accesses predefined actuator configurations defining exercise configurations for one or more users, and wherein one or more actuators of the plurality of actuators is controlled in accordance with the predefined actuator configurations.

2. The tactile exercise mat (1) according to claim 1 further comprising one or more sensors (3) distributed therein and communicatively connected to the controller.

3. The tactile exercise mat (1) according to claim 1, wherein the controller is communicatively connected to one or more sensors attached to a user of the exercise mat, wherein the one or more sensors, when in use, are adapted to detect movement of the user.

4. The tactile exercise mat (1) according to claim 2 or 3, wherein the controller is further adapted to compare readings from the one or more sensors (3) to the predefined actuator configurations.

5. The tactile exercise mat (1) according to claim 2, wherein the one or more sensors (3) are adapted to determine the number, size or position of one or more users and input such information to the controller so as to control the plurality of actuators (2, 6, 7, 8, 9, 30, 31) in accordance therewith.

6. The tactile exercise mat (1) according to claim 2, wherein the one or more sensors (3) are pressure sensors.

7. The tactile exercise mat (1) according to claim 2, wherein the one or more sensors (3) are light sensors.

8. The tactile exercise mat (1) according to claim 1 further comprising one or more light emitting elements (4).

9. The tactile exercise mat (1) according to claim 1, wherein the circuitry in the mat is bendable circuitry.

10. A method of operating a tactile exercise mat (1),

- the tactile exercise mat comprising a plurality of actuators (2) distributed therein and a controller adapted to control the plurality of actuators, wherein the controller accesses predefined actuator configurations defining exercise configurations for one or more users, and wherein one or more actuators of the plurality of actuators is controlled in accordance with the predefined actuator configurations; and

wherein the exercise configurations correlate an area on the tactile exercise mat with a body part of the user, and wherein the tactile exercise mat is operated by actuating an actuator in the area of the tactile exercise mat correlated to the body part in accordance with the exercise configuration (12, 13).

11. The method according to claim 9, wherein the tactile exercise mat (1) further comprises one or more sensors (3), and wherein the method further comprises comparing readings from the one or more sensors to the predefined actuator configurations (14, 16) so as to generate a difference measure, and outputting the difference measure to the user.

12. A computer program product adapted to carry out the method according to claim 10 when running on a computer.

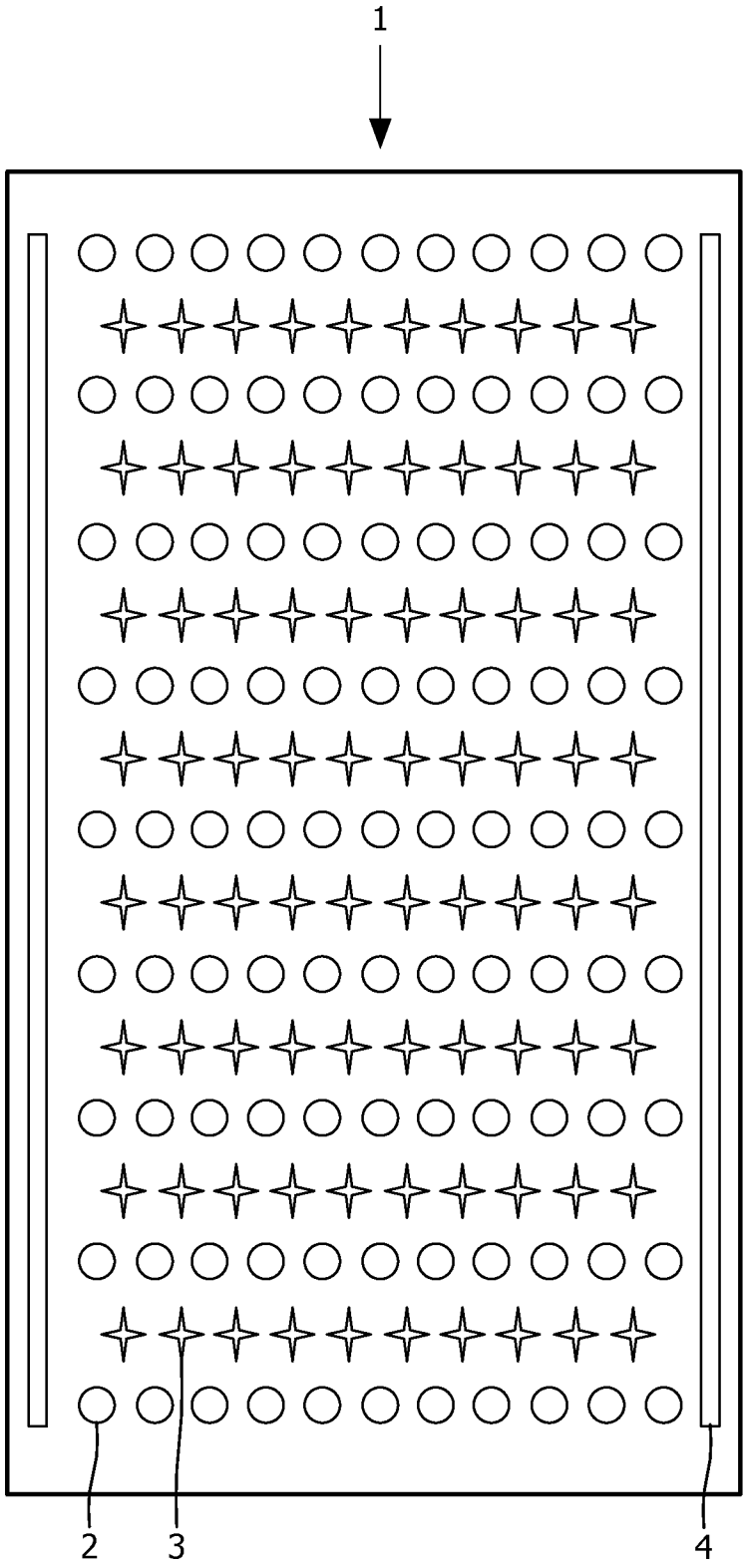

FIG. 1

FIG. 2C

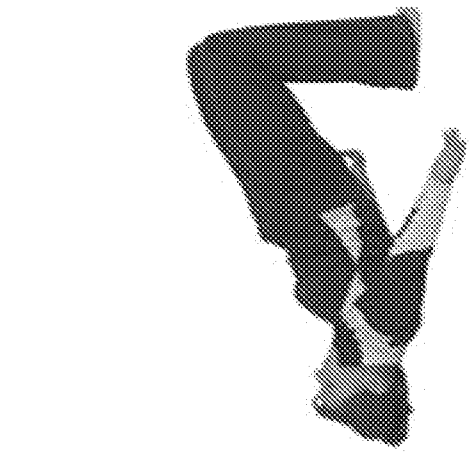

FIG. 2B

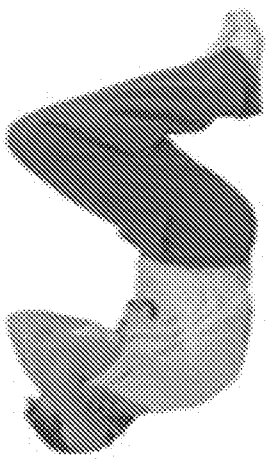

FIG. 2A

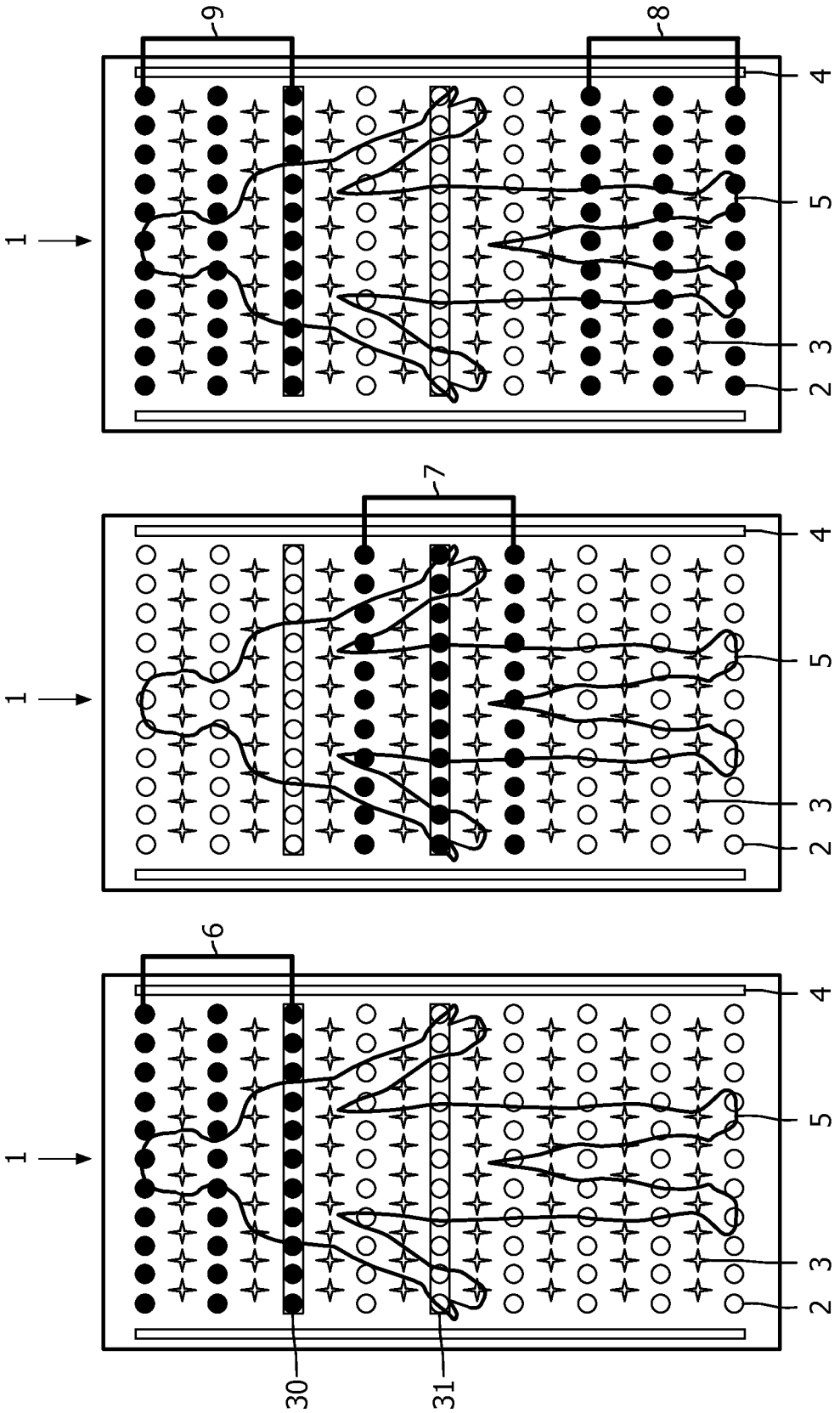

FIG. 3C

FIG. 3B

FIG. 3A

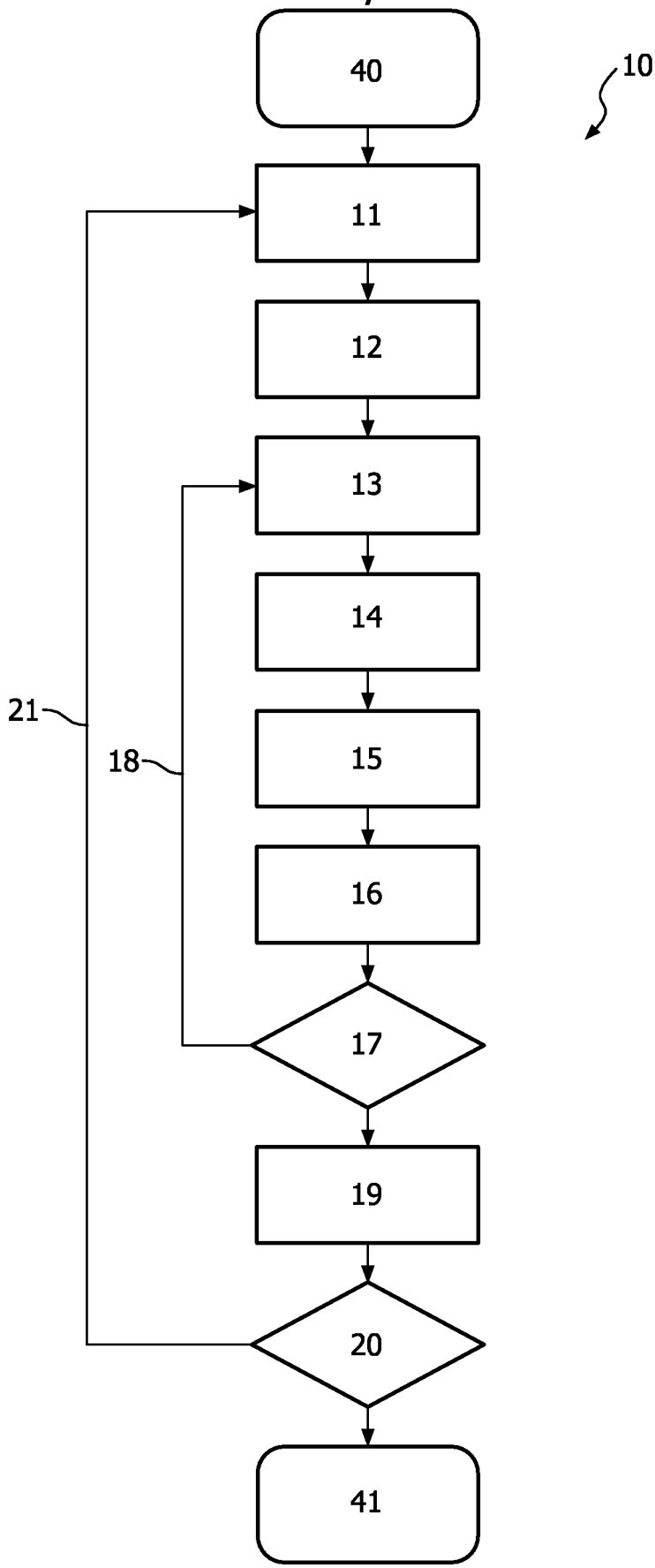

FIG. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2010/051944

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61H23/02 A63B23/02 A63B71/06
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A63B A61H

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 practical, search terms used)
EPO-Internal, WPI Data

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 5 188 096 A (YOO YOUNG-YOON [KR]) 23 February 1993 (1993-02-23) column 2, line 40 - column 6, line 4; figures 1-6	1,9,10, 12 2-9,11
Y	WO 01/08755 A1 (SMITH & NEPHEW [GB]; GRANVILLE NICHOLAS WILLIAM [GB]; POUNDER NEILL MA) 8 February 2001 (2001-02-08) page 4, line 15 - page 30, line 10; figures 1-11	2,4-9,11
Y	WO 2008/049151 A1 (BAKER RICHARD JOHN [AU]) 2 May 2008 (2008-05-02) page 11, line 20 - line 28; figure 1	3

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 September 2010	01/10/2010

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Fax: (+31–70) 340–3016	Jekabsons, Armands

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2010/051944

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 03/084618 A1 (RYLL THOMAS [DE]) 16 October 2003 (2003-10-16) page 11, line 16 - page 19, line 32; figures 1-7	1-12
A	WO 2008/053591 A1 (SSD CO LTD [JP]; UESHIMA HIROMU [JP]) 8 May 2008 (2008-05-08) * abstract; figures 1-6	1-12
A	WO 2005/010907 A1 (SSD CO LTD [JP]; NAKANISHI YOSHIAKI [JP]; YAMADA SAYUKI [JP]) 3 February 2005 (2005-02-03) page 1, line 6 - page 22, line 24; figures 1-14	1-12

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2010/051944

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5188096 A	23-02-1993	AU 7289191 A	19-09-1991
		CA 2038093 A1	16-09-1991
		DE 4108323 A1	19-09-1991
		FR 2659550 A1	20-09-1991
		GB 2241894 A	18-09-1991
		HK 126994 A	25-11-1994
		IT 1244766 B	08-08-1994
		JP 4220256 A	11-08-1992
WO 0108755 A1	08-02-2001	AU 4940500 A	19-02-2001
		CA 2375333 A1	08-02-2001
		EP 1185340 A1	13-03-2002
		JP 2003505217 T	12-02-2003
WO 2008049151 A1	02-05-2008	AU 2007289025 A1	15-05-2008
		AU 2009202959 A1	13-08-2009
		AU 2009202962 A1	13-08-2009
		CA 2700843 A1	02-05-2008
		GB 2458392 A	23-09-2009
		US 2010015585 A1	21-01-2010
WO 03084618 A1	16-10-2003	AU 2003218760 A1	20-10-2003
		AU 2003227033 A1	20-10-2003
		DE 10216296 A1	30-10-2003
		WO 03084613 A2	16-10-2003
		EP 1525036 A1	27-04-2005
		JP 2005522248 T	28-07-2005
WO 2008053591 A1	08-05-2008	NONE	
WO 2005010907 A1	03-02-2005	JP 4292272 B2	08-07-2009
		JP 2006190490 A	20-07-2006