



- (51) International Patent Classification:
A63B 69/00 (2006.01)
- (21) International Application Number:
PCT/NO2016/050056
- (22) International Filing Date:
29 March 2016 (29.03.2016)
- (25) Filing Language:
Norwegian
- (26) Publication Language:
English
- (30) Priority Data:
20150385 30 March 2015 (30.03.2015) NO
- (71) Applicant: **KLATREFABRIKKEN AS** [NO/NO];
Breiflåtveien 15, 4017 Stavanger (NO).
- (72) Inventor: **SKJÆRSETH, Eirik**; Admiral Cruys Gate
11A, 4012 Stavanger (NO).
- (74) Agent: **HÅMSØ PATENTBYRÅ ANS**; P.O. Box 171,
4302 Sandnes (NO).

(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, BN, 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, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, 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, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: A DIGITALISATION UNIT FOR A HOLD ATTACHED TO A CLIMBING WALL

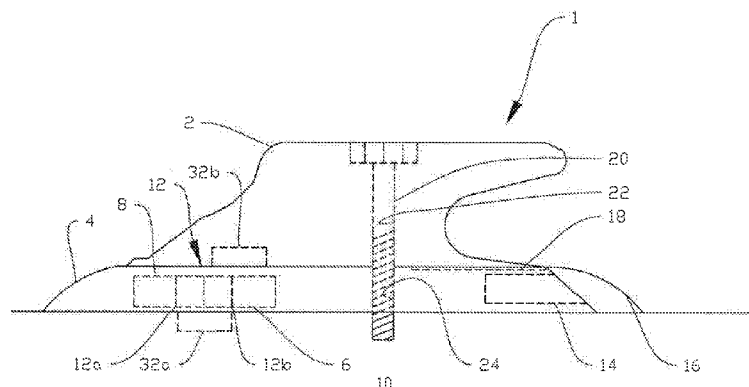


Fig. 1

(57) Abstract: A digitalisation unit (4) for a hold (1) attached to a climbing wall (10) is described, the digitalisation unit (4) being arranged to be placed in contact with or in the vicinity of the hold (1) during use, and the digitalisation unit (4) comprising: an energy source (14); a wireless communication device (8); an annunciator (6); and an identification sensor (12b) arranged to give a unique identification of the hold (1). A system including one or more digitalisation units (4) is described as well.



Published:

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

A DIGITALISATION UNIT FOR A HOLD ATTACHED TO A CLIMBING WALL

The present invention relates to a digitalisation unit for exercise equipment, and a system comprising a digitalisation unit and an exercise system.

5 In an activity centre / exercise space with various pieces of exercise equipment, a user will often be left to himself/herself, and progress in the exercise and variation of exercises will often be the user's own responsibility. The exercise will often be repetitive, unbalanced in stress, not very inspiring and with no or little progress.

10 In what follows, the exercise equipment will often be exemplified by a hold and the exercise space by an artificial climbing wall, but it will be understood that a digitalisation unit according to the present invention is not restricted to use in climbing walls, but could also be used in other types of exercise spaces together with other types of exercise equipment.

15 Today, an artificial climbing wall comprises panels/walls with screw-/bolt-on holds. The panels/walls are often put together at different angles so that the climbing wall constitutes a three-dimensional structure. The holds come in different shapes, colours and sizes. A climbing route is formed by setting all the holds allowed in the route in one and the same colour, for example. The climbing wall may thus appear not to be very flexible. A user may also make/improvise a climbing route himself/herself at his/her own desire. Information on which holds are part of such an improvised route is passed
20 orally to other users wanting to copy the route. When using different colour combinations, there will be limitations on the positioning of holds as it is often not practically possible to place the holds with a tighter spacing than approximately 20 cm. In addition, the number of colours that are easily distinguishable is limited. Furthermore, the holds become worn and soiled with magnesium and friction rubber used in climbing,
25 so that colour combinations or other marks defining a climbing route become worn and thereby difficult to recognise. Today, a user will often spend a great deal of his training time localising a climbing route and holds within the climbing route and planning what patterns of movements will have to be used to complete the climbing

route. To create a new climbing route, the different holds that are to be included in the route must be screwed to the climbing wall, marked and recorded in a so-called log, which may be a very time-consuming process.

5 It is known to digitalise climbing walls by the entire wall and/or the holds being made configurable. In that way the climbing wall is made more flexible. The Norwegian patent 334136 discloses a method of moving in a physically configurable space and a device for use in the method. In one of the embodiments described, the physically configurable space comprises a configurable element in the form of a climbing wall, where the holds contain light sources which may be switched on and off to define a climbing route. Another example of a fully digital climbing wall is marketed under the name 10 of DigiWall®. Here, both the wall and the holds are specially adapted.

The drawbacks of the above-mentioned digital climbing walls are that they are relatively costly. It is also costly to turn an existing climbing wall, or some other exercise space, into a digital climbing wall or exercise space. For a climbing wall this involves, 15 in practice, having to replace substantially the whole wall including the holds or replacing the holds and modifying the wall so that arrangements are made for communication with and energy supply to the holds.

Correspondingly, it is also costly to digitalise other types of exercise equipment that is used in different types of exercise spaces, such as in an activity centre, in a parkour 20 park, on a gymnastics floor *et cetera*.

It is also a drawback in the prior art that analogue exercise equipment cannot be integrated in systems including a digital network of exercise equipment without the analogue pieces of exercise equipment having to be replaced in their entirety.

25 The invention has for its object to remedy or reduce at least one of the drawbacks of the prior art or at least provide a useful alternative to the prior art.

The object is achieved through the features which are specified in the description below and in the claims that follow.

The invention is defined by the independent claims. The dependent claims define advantageous embodiments of the invention.

30 In a first aspect, the invention relates to a digitalisation unit for exercise equipment, the digitalisation unit being arranged to be placed in contact with the exercise equipment, characterised by the digitalisation unit comprising:

- an energy source;
- a wireless communication device;
- an annunciator; and
- an identification sensor arranged to give a unique identification of the exercise equipment.

This solves several of the problems mentioned initially. It will be possible to digitalise existing exercise equipment, without modifying the equipment itself, by the exercise equipment being provided with a digitalisation unit / adapter containing an energy source of its own, a device for communication with the surroundings and an annunciator. The energy source may typically be a battery, preferably a replaceable one. The annunciator may emit signals arranged to be perceived by a user. It may be one or more light sources, typically diode light (LED), but it could also include light sources or sources that are arranged to emit signals that can be perceived tactually by a user. Further, the digitalisation unit includes an identification sensor which may provide a unique identification of the exercise equipment.

The communication device may be arranged to communicate wirelessly by means of one or more of the following methods of communication:

- local wireless network (Wi-Fi);
- mobile network (for example 4G);
- radio-frequency identification (RFID);
- Bluetooth[®]; and
- near field communication (NFC).

The identification sensor may be arranged to identify the exercise equipment by the identification sensor achieving local contact with an identification tag/unit on the exercise equipment. It may be, for example, an RFID or NFC tag placed on the exercise equipment, enabling the identification sensor to uniquely identify the exercise equipment. Information on the exercise equipment identified may further be communicated from the digitalisation unit to a control unit via the communication device. The control unit may communicate with a network of identified pieces of exercise equipment, as will be described in further detail below. In a more advanced embodiment, the identification sensor may be of a type which is arranged to recognise the exercise equipment by its design. This may be different forms of radar-scanning sensors, for example such as a so-called XeThru sensor available from the company Novelda.

In one embodiment, one or more digitalisation units according to the first aspect of the invention can be used to digitalise a climbing wall without there being any need to

modify the wall or the holds as the adapter / digitalisation unit contains both the energy source and the necessary electronics. The digitalisation unit will be attachable to the hold and/or the climbing wall, preferably in such a way that, during use, the digitalisation unit will be located between the hold and the climbing wall. Conventional
5 holds are attached to the climbing wall by means of bolts. By forming both the hold and the adapter with bolt holes, both the hold and the digitalisation unit can be screwed to the climbing wall with one and the same bolt.

In one embodiment, the digitalisation unit may be arranged to be attached to the exercise equipment by means of a fastening means. The fastening means may typically
10 be a bolt, one or more screws, Velcro® or an adhesive of a kind known *per se*. The digitalisation unit may be formed with a bolt hole, complementarily matching a fastening bolt.

In one embodiment, the digitalisation unit may further include a touch sensor; a sensor arranged to sense a user's touch on or proximity to the digitalisation unit. A person skilled in the art will know that a number of different types of sensors could be
15 used for this purpose. As an example, the touch sensor may be taken from a group of sensors responding to pressure, temperature, electrical resistance, radio frequencies or light, wherein the light does not necessarily have to be visible. A touch sensor in the form of a pressure sensor could also be used to sense whether the digitalisation
20 unit is adequately fixed to the exercise equipment, for example whether a hold is adequately fixed to a climbing wall.

One or more of the touch sensors mentioned above may be used, individually or in combination, for, among other things, sensing the user's position, posture, time consumption at or between different positions in a climbing wall, for example, and the
25 area of contact in a position. Further, via calculations, the user's speed, acceleration and power in different directions may be sensed directly or indirectly. The data may be communicated to and stored in a control unit and be used, in the future, to recreate a user's movement in a climbing wall or some other exercise space, among other things.

In one embodiment, the digitalisation unit may include a sensor arranged to sense the position and/or orientation in an exercise space, for example in a climbing wall. By
30 orientation is meant, here, the rotational position of the digitalisation unit, for example around a fastening bolt. In a climbing wall, this will be particularly practical if climbing routes are to be made and/or information on different climbing routes including the digitalisation unit, in which the position of the digitalisation unit will coincide with the
35 position of a hold, is to be stored. Information on the position and/or orientation of the

hold may be communicated to a control unit. The sensor may be taken from the group mentioned above, but it may also include other types of sensors such as a gyroscope and a GPS. Said position and/or orientation sensor may also be arranged to communicate with a position and/or orientation indicator on the climbing wall, as will be explained in what follows. Since the digitalisation unit is also provided with an identification sensor, the digitalisation unit may obtain information about both the identity and the position/orientation of the exercise equipment and communicate this to a control unit, via the communication device. The control unit may further be arranged to control a plurality of different digitalisation units according to the invention, in order to, among other things, switch lights or other annunciators on and off in order to define an exercise route, but also to store information on the identities of different pieces of exercise equipment and preferably also the positions/orientations of the pieces of exercise equipment as mentioned above.

The digitalisation unit may also be arranged to communicate, by means of the wireless communication device, with a user of the exercise equipment. By a user is meant, in what follows, a person who is on, in or at the exercise equipment, and various equipment that this person makes use of, whether it be, for example, hand-held electronic equipment like mobile phones and tablet computers, body-worn or garment-worn electronic devices like watches, bracelets, glasses, biosensors and other so-called "wearables". Communication with the user may be used to, among other things, identify the user so that, by means of the control unit, training exercises, such as climbing routes, can be tailored, adapted to the wishes, needs and capacity of the individual user, as was described in the above-mentioned Norwegian patent 334136 as well.

In a second aspect, the invention relates to a system comprising a digitalisation unit according to the first aspect of the invention and a piece of exercise equipment, the system further including a control unit arranged to communicate with the communication device, wherein the control unit is arranged to, among other things, control the annunciator of the digitalisation unit and receive information about the identity of the exercise equipment and preferably also the position and/or orientation in the exercise space.

In one embodiment, the control unit may be integrated in a digitalisation unit according to the first aspect of the invention. Various digitalisation units may thus be used, wherein one or a few of these digitalisation units work as a base, as a control unit is integrated therein. Alternatively, the control unit may be placed externally relative to the digitalisation units.

In one embodiment, the system may further be arranged for communication with a user who is at, on or in the exercise equipment. As mentioned above, a user is defined here as a person who is in or at the exercise equipment, and also various equipment that this person makes use of, whether it be, for example, hand-held electronic
5 equipment like mobile phones and tablet computers, body-worn or garment-worn electronic devices like watches, bracelets, glasses, biosensors and other so-called "wearables". The control unit may thus communicate directly with a user or collect information on the user's movement in the exercise space via the communication devices of different digitalisation units according to the first aspect of the invention.

10 In one embodiment, the system may further include a storing unit. This may be practical for storing information on the individual user and his/her biological data, and also the user's and other users' previous movements in the exercise space.

In a preferred embodiment, the storing unit may thus be connected to a user relationship record (CRM system).

15 The exercise equipment may be a hold integrated in a climbing wall as described above. In a preferred embodiment, the hold and the digitalisation unit may both be formed with bolt holes complementarily matching one and the same fastening bolt.

As mentioned above, different positions in the climbing wall may be provided with particular position and/or orientation indicators arranged to communicate with a digitali-
20 sation unit according to the first aspect of the invention. This may be done, for example, by each bolt hole, or the area around the bolt hole, in the climbing wall being provided with a unique RFID or NFC tag. Said tags may be integrated in a simple sticker. When a digitalisation unit according to the first aspect of the invention is attached to a bolt hole in the climbing wall, the communication device of the digitalisa-
25 tion unit may establish contact with the position and/or orientation indicator in the climbing wall and, further, thereby be able to communicate the position and/or orientation of the digitalisation unit in the climbing wall to the control unit.

By the digitalisation unit further being arranged to uniquely identify the exercise equipment to or at which it is attached, it will be possible by means of the control unit
30 to build a digital network of pieces of exercise equipment / holds that, in the first place, were completely analogue, in which each piece of exercise equipment is uniquely identified and in which the positions and possibly also the orientations of the exercise equipment in the exercise space are given. In this way, it will be possible to build an almost virtual exercise space by means of information collected and transmitted

from the digitalisation unit. Several digitalisation units of a corresponding type may be used together to build said virtual exercise space. The virtual positions of the different digitalisation units are integrated in a virtual map by means of triangulation, for example.

- 5 In one embodiment, the system may further include one or more digitalisation units of a somewhat simpler type, called subunits in what follows. A subunit comprises an energy source, a wireless communication device and an annunciator, in a manner corresponding to that of a digitalisation unit, but the subunit is not provided with an identification sensor. One or more subunits may be included in a system together with one
- 10 or more digitalisation units, wherein, however, the position-finding of the subunit and the identification of a piece of exercise equipment connected to or at the subunit may be carried out by an adjacent digitalisation unit with an integrated control unit, typically via Bluetooth® and so-called beacon technology. By using one or more subunits together with one or more digitalisation units, the entire exercise space may still be
- 15 digitalised and integrated in a virtual network, but at a reduced cost. In a system according to the second aspect of the invention, different users connected to the system may also communicate with each other.

A system including one or more subunits as described above is described as well, the system not necessarily having to include one or more digitalisation units according to

20 the first aspect of the invention. In a system like that, the identification of one or more pieces of exercise equipment in the system may have been predefined in the control unit of the system.

In what follows, examples of preferred embodiments are described, which are visualised in the accompanying drawings, in which:

- 25 Figure 1 shows a digitalisation unit according to the first aspect of the invention in a side view;
- Figure 2 shows a climbing wall including a plurality of digitalisation units according to the first aspect of the invention in a front view; and
- Figure 3 shows a system according to the second aspect of the invention in a
- 30 front view.

In what follows, the reference numeral 2 indicates exercise equipment in the form of a hold. The hold 2 is attached to a digitalisation unit 4 according to the first aspect of the invention. In the embodiment shown, the digitalisation unit 4 and the hold 2 to-

gether form a grip 1. The reference numeral 10 indicates an exercise space in the form of a climbing wall, whereas the reference numeral 100 indicates a system according to the second aspect of the invention. The figures are shown in a schematic and simplified manner, and the various components in the figures are not necessarily depicted to scale.

Figure 1 shows the grip 1 comprising a piece of exercise equipment in the form of a conventional hold 2 attached to a digitalisation unit / adapter 4. The adapter 4 is provided with an annunciator 6 in the form of one or more diode lights (LED lights), a communication device 8 and a sensor package 12. The various components are driven by an energy source 14 in the form of a battery. The battery 14 is replaceably positioned within a hatch 16. The battery 14 can be replaced without the grip 1 having to be removed from the climbing wall 10. The adapter 4 is further provided with a pressure sensor 18 arranged to sense a touch on the hold 2. The pressure sensor 18 is also arranged to sense whether the hold 2 is adequately fixed to the climbing wall 10. A bolt 20 complementarily fits a bolt hole 22 in the hold and a bolt hole 24 in the adapter and also a bolt hole, not shown, in the climbing wall 10. The communication device 8 enables communication with a control unit, for example via a wireless network, and with a user who is in the climbing wall 10, for example via radio-frequency identification or near field communication. The sensor package 12 contains a first sensor 12a in the form of an RFID sensor arranged to sense the position of the grip 1 and, in an alternative embodiment, also its orientation around the bolt hole, not shown, on the climbing wall 10 by the first sensor 12a being arranged to read the position of a position indicator 32a, in the form of an RFID tag, on the climbing wall 10. The position of the position indicator 32a has been predefined and thus enables a unique position indication of each individual digitalisation unit / adapter 4 according to the first aspect of the invention. Further, the sensor package 12 includes an identification sensor 12b, this, too, being shown in the form of an RFID sensor. The identification sensor 12b is arranged to read the identity of the hold 2 by this being provided with an RFID tag 32b as well. Alternative sensors that may be included in the sensor package 12 are described in the general part of the description.

Figure 2 shows a climbing wall 10 including a great number of grips 1 with digitalisation units 4 according to the first aspect of the invention. In the figure, it is also indicated that a set of such grips 1 has activated LED lights 6, so that these are indicating a climbing route. The LED lights 6 may illuminate the area around the hold 2, or the LED lights may shine up through the hold if this is provided in a completely or partially transparent material.

Figure 3 shows a system 100 according to the second aspect of the invention in a highly simplified manner. In addition to the climbing wall 10 with digitalisation units 4, the system 100 includes a control unit 28. The control unit 28 is arranged to communicate wirelessly with the communication device 8 of the digitalisation unit 4, for example via a wireless network. The control unit 28 may thus be used to adjust the LED lights 6 of the individual digitalisation units 4, both by switching them on and off and by changing their colour(s), to define one or several different climbing routes in the climbing wall 10. The control unit is further arranged to receive information about the identities and positions of the different holds 2 in the climbing wall 10. The different digitalisation units 4 could further be arranged to communicate directly with a user 26, the concept of user having been defined above. By the digitalisation unit 4 also communicating with a position indicator 32a, as shown in figure 1, the control unit 28 may identify the position of the individual digitalisation unit 4 on the climbing wall 10. The position of the individual position indicator 32a on the climbing wall 10 will typically have been fed into the control unit 28 in advance, whereas the identity of the hold 2 may also be defined in advance for each RFID tag 32b on a hold 2 and stored in a database in the storing unit 30. In the exemplary embodiment shown, the system 100 includes a storing unit 30 integrated in the control unit 28.

It should be noted that all the above-mentioned embodiments illustrate the invention, but do not limit it, and persons skilled in the art will be able to construct many alternative embodiments without departing from the scope of the attached claims. In the claims, reference numbers in parentheses are not to be regarded as restrictive. The use of the verb "to comprise" and its different forms does not exclude the presence of elements or steps that are not mentioned in the claims. The indefinite article "a" or "an" before an element does not exclude the presence of several such elements.

The fact that some features are indicated in mutually different dependent claims does not indicate that a combination of these features cannot be used with advantage.

C l a i m s

1. A digitalisation unit (4) for exercise equipment (2), the digitalisation unit (4) being arranged to be placed in contact with or in the vicinity of the exercise equipment (2) during use, c h a r a c t e r i s e d i n that the
5 digitalisation unit (4) comprises:
 - an energy source (14);
 - a wireless communication device (8);
 - an annunciator (6); and
 - an identification sensor (12b) arranged to give a unique identification of
10 the exercise equipment (2).
2. The digitalisation unit (4) according to claim 1, wherein the digitalisation unit (4) is arranged to be attached to the exercise equipment (2) by means of a fastening means (20).
3. The digitalisation unit (4) according to claim 2, wherein the digitalisation unit (4) is formed with a bolt hole (24) and arranged to be attached to the exercise equipment (2) by means of a bolt.
15
4. The digitalisation unit (4) according to any one of the preceding claims, wherein the energy source (14) is a replaceable battery.
5. The digitalisation unit (4) according to any one of the preceding claims,
20 wherein the annunciator (6) comprises a light source, such as an LED light.
6. The digitalisation unit (4) according to any one of the preceding claims, wherein the digitalisation unit (4) further includes a touch sensor (18).
7. The digitalisation unit (4) according to any one of the preceding claims, wherein the digitalisation unit (4) includes a sensor (12a) arranged to sense
25 the position and/or orientation of the digitalisation unit (4) in an exercise space.
8. The digitalisation unit (4) according to any one of the preceding claims, wherein the wireless communication device (8) is arranged to communicate with a control unit (28).
9. The digitalisation unit (4) according to any one of the preceding claims,
30 wherein the wireless communication device (8) is arranged to communicate with a user (26) of the exercise apparatus (2).

10. The digitalisation unit (4) according to any one of the preceding claims, wherein the communication device (8) is arranged to communicate by means of one or more of the following methods of communication:
- local wireless network (Wi-Fi);
 - 5 - mobile network (for example 4G);
 - radio-frequency identification (RFID);
 - bluetooth;
 - near field communication (NFC).
11. The digitalisation unit according to any one of the preceding claims, wherein
- 10 the identification sensor is taken from a group comprising:
- radio-frequency identification;
 - bluetooth;
 - near field communication.
12. A system (100) including a digitalisation unit (4) according to claim 1 and
- 15 exercise equipment (2), wherein the system (100) further includes a control unit (28) arranged to communicate with the communication device (8) of the digitalisation unit (4) and receive information about the exercise equipment (2) identified by the identification sensor (12b).
13. The system according to claim 12, wherein the exercise equipment (2) fur-
- 20 ther includes an identification tag (32b) arranged to be uniquely identified by the identification sensor (12b).
14. The system (100) according to claim 13, wherein the system (100) further includes a storing unit (30).
15. The system (100) according to claim 14, wherein the storing unit (30) fur-
- 25 ther is connected to a user relationship record (CRM system).
16. The system (100) according to any one of claims 13-15, wherein the exercise equipment (2) is a hold attached to a climbing wall (10).
17. The system (100) according to claim 16, wherein the digitalisation unit (4) is arranged to be attached between the hold (2) and the climbing wall (10).
- 30 18. The system according to claim 17, wherein the hold (2) and the digitalisation unit (4) are both formed with bolt holes (22, 24), complementarily matching one and the same anchor bolt (20).

19. The system according to any one of claims 12-18, wherein the system further includes one or more sub-units comprising:

- an energy source (14);
- a wireless communication device (8); and
- an annunciator (6).

1/3

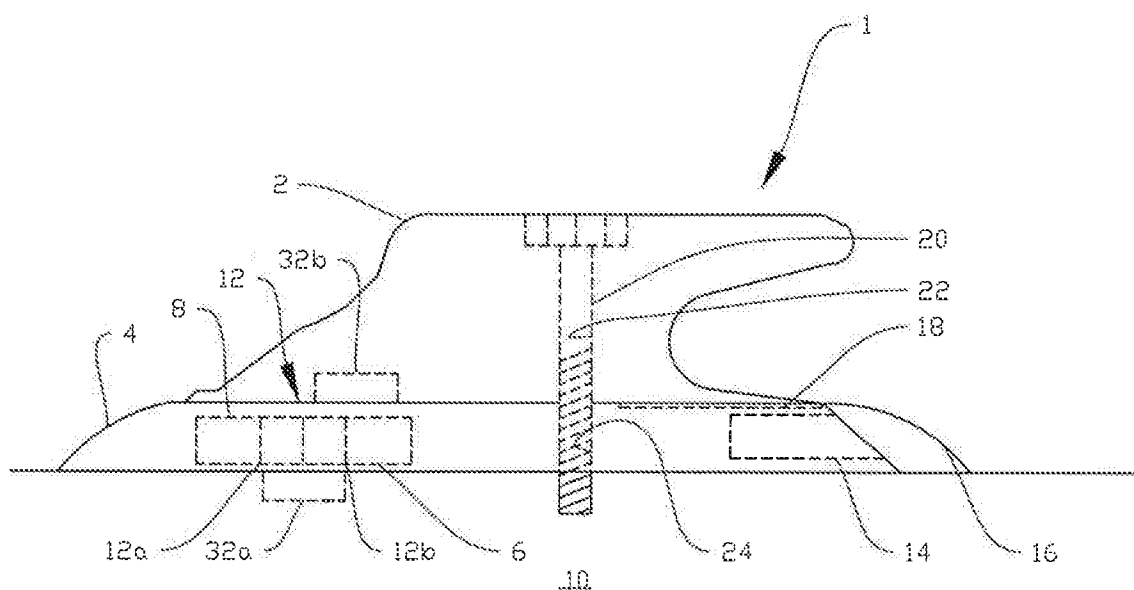


Fig. 1

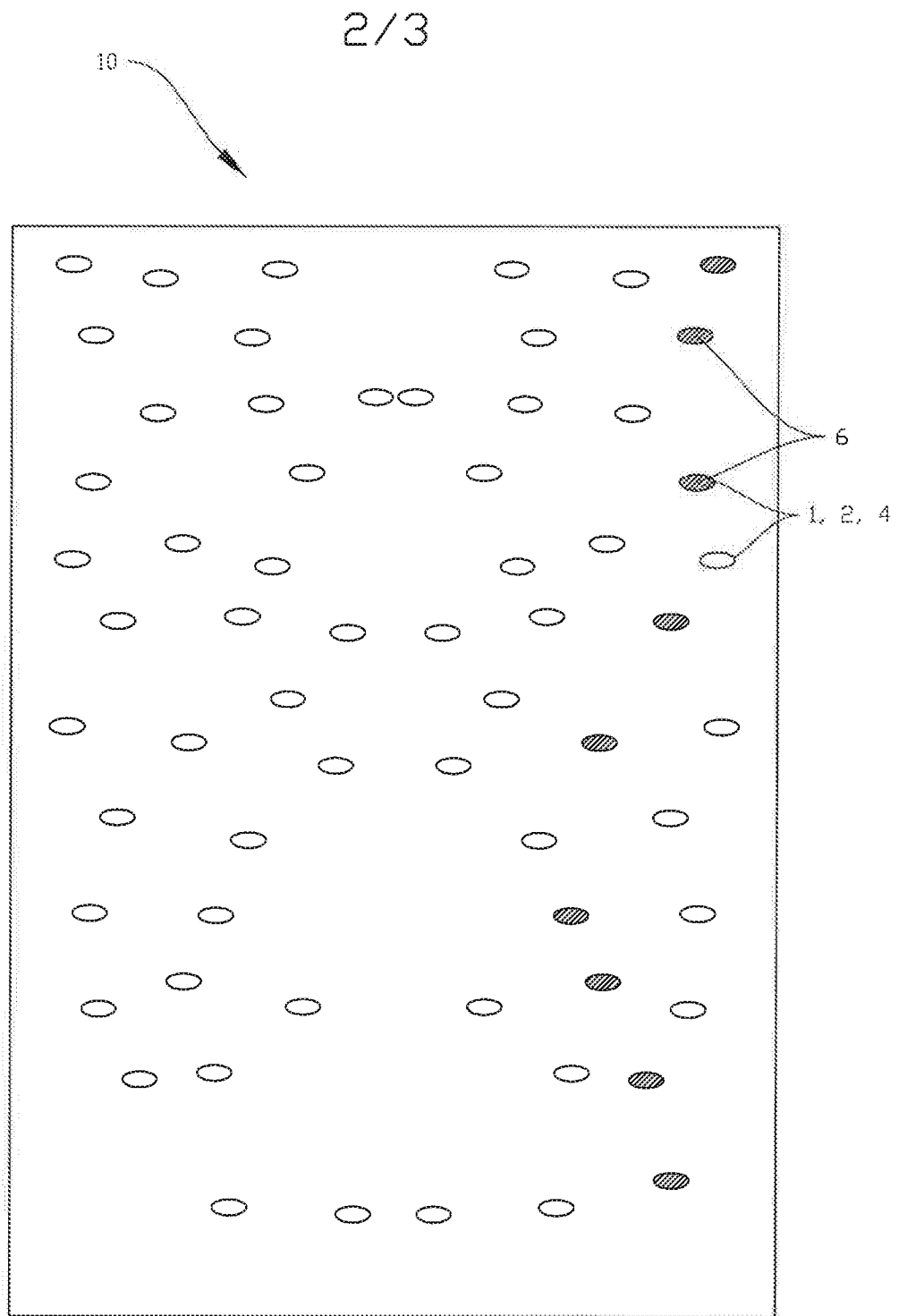


Fig. 2

3/3

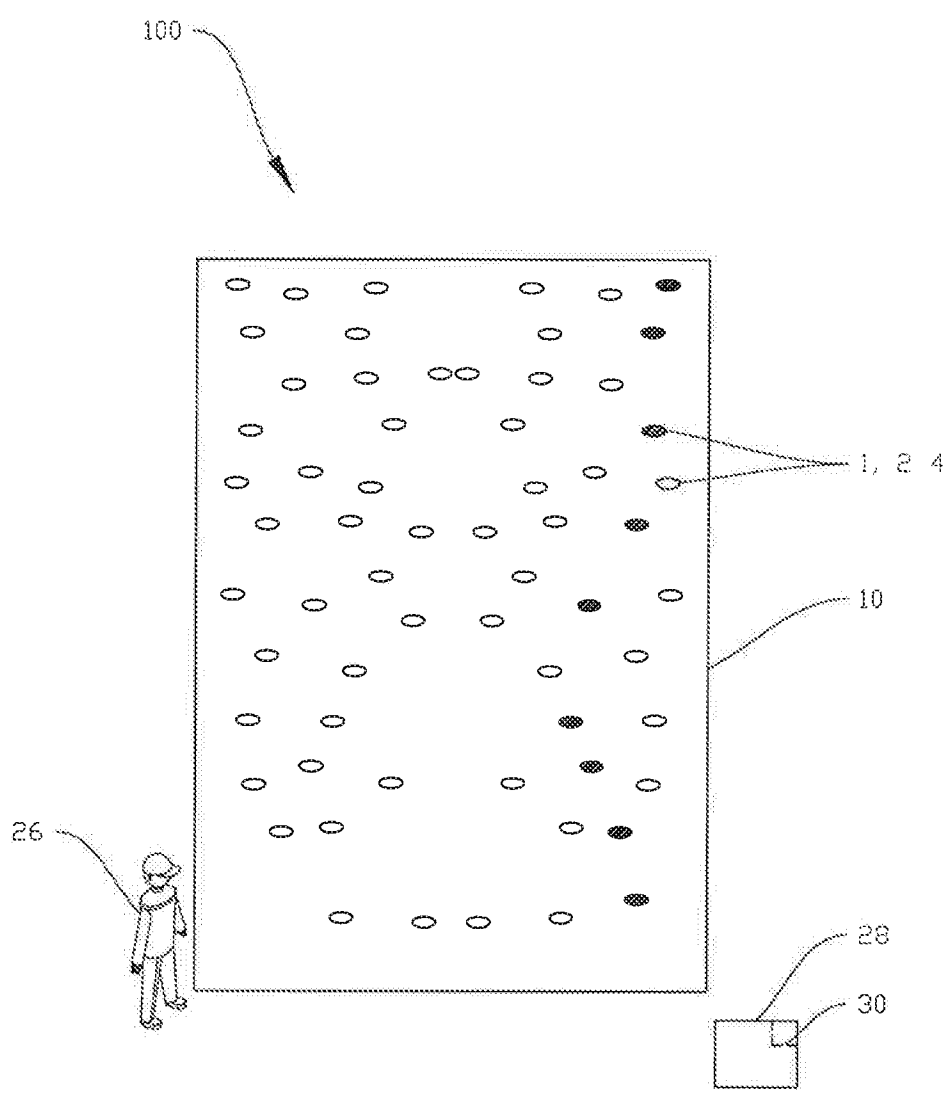


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO2016/050056

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

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)

IPC: A63B

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

SE, DK, FI, NO classes as above

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

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 8668626 B1 (HOROWITZ MATANYA B ET AL), 11 March 2014 (2014-03-11); abstract; columns 3-4; figures --	1-19
Y	US 20130337979 A1 (COSTE BERTRAND ET AL), 19 December 2013 (2013-12-19); paragraphs [0013], [0027], [0028], [0032]; figure 1 --	1-19
Y	US 8808145 B1 (PARSONS CHRIS PAUL ET AL), 19 August 2014 (2014-08-19); abstract; columns 3-4 --	1-19
Y	DE 102013002287 B3 (HAAS FLORIAN ET AL), 8 May 2014 (2014-05-08); whole document --	1-19

☒ Further documents are listed in the continuation of Box C.☒ 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 application or patent 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

05-07-2016

Date of mailing of the international search report

12-07-2016

Name and mailing address of the ISA/SE

Patent- och registreringsverket

Box 5055

S-102 42 STOCKHOLM

Facsimile No. + 46 8 666 02 86

Authorized officer

Anders Toll

Telephone No. + 46 8 782 28 00

INTERNATIONAL SEARCH REPORTInternational application No.
PCT/NO2016/050056

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 9519602 A1 (STRICKLER JAMES H ET AL), 20 July 1995 (1995-07-20); whole document -- -----	1-19

Continuation of: second sheet
International Patent Classification (IPC)
A63B 69/00 (2006.01)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/NO2016/050056

US	8668626 B1	11/03/2014	NONE			
US	20130337979 A1	19/12/2013	EP	2648815 A1	16/10/2013	
			FR	2968572 B1	20/12/2013	
			WO	2012076825 A1	14/06/2012	
US	8808145 B1	19/08/2014	NONE			
DE	102013002287 B3	08/05/2014	WO	2014121944 A1	14/08/2014	
WO	9519602 A1	20/07/1995	US	5732954 A	31/03/1998	