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(54) **An apparatus for selecting a cycle short pad and a method of selecting a cycle short pad**

Vorrichtung zur Auswahl eines Sitzpolsters für eine Radhose und Verfahren zur Auswahl desselben Sitzpolsters

Appareil permettant de sélectionner un coussin d'assise de cuissard de cycliste, et procédé de sélection du même coussin d'assise

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Description

[0001] The present invention relates to an apparatus for selecting a cycle short pad. More particularly, but not exclusively, the present invention relates to an apparatus for selecting a cycle short pad comprising a saddle which in turn comprises a plurality of pressure sensors and a processor which compares the data from the pressure sensors to data stored in a database to suggest a preferred cycle short pad. The present invention also relates to a method of selecting a cycle short pad. More particularly, but not exclusively, the present invention relates to a method of selecting a cycle short pad comprising the steps of receiving pressure data from a plurality of pressure sensors in a saddle while a user cycles to produce a user pressure data set and then comparing the user pressure data set to a plurality of stored pressure data sets to select a preferred cycle short pad.

[0002] Cycle shorts that include integrated cycle short pads to cushion the user are known. The pads absorb shocks and smooth pressure points when sitting on a bicycle saddle so increasing comfort for the wearer.

[0003] Different people create peak pressures on different areas on the saddle. Because of this a number of cycle companies have released saddles of different width options. The fitting processes used to date to select the correct saddle width for a given user are crude and unreliable.

[0004] DE202010008146U1 (Biomechanik Muenster MbH Ges), which disclosure is very close to the terms of the preamble of claim 1, discloses a manufacturing apparatus for an individualised saddle for a two wheeled vehicle, in particular a bicycle saddle, featuring a device which detects the anatomical characteristics of the buttocks of a subject, whereupon the detection device generates data for the anatomical characteristics, characterised in that the manufacturing apparatus features a production facility for a saddle body and a data processing device digitally connected to the detection device for the generation of production data for an individualised and anatomically matched saddle mould from the collected data.

[0005] DE102009045829A1 (Hexonia GmbH) discloses a device for the calculation of pressure distribution underneath a saddle on an horses back. Provided is a saddle which features at least two pressure sensor unit zones. Each of the pressure sensor unit zones feature a laminar structure composed of two materials of differing rigidity for the distribution of pressure. The more rigid material faces the saddle and the softer material faces the horses back. To each pressure sensor unit zone is allocated at least one sensor. The sensor is arranged in such a way that it registers a pressure on the more rigid material.

[0006] DE20112013U1 (Oehler Claus) discloses a customisation device for the individual preparation of saddles for bicycles, characterised in that the device features a measuring saddle with at least one pressure measuring mechanism located on or in the seat for the purposes of planar and localised measurement of the local contact pressure of the buttocks of the subject.

[0007] The present invention seeks to overcome the drawbacks of the prior art.

[0008] Accordingly, in a first aspect, the present invention provides an apparatus for selecting a cycle short pad comprising

a saddle comprising a plurality of pressure sensors adapted to measure the pressure applied to the saddle by a user at a plurality of spaced apart points on the saddle;

a processor connected to the pressure sensors adapted to receive the data generated by the pressure sensors and produce a user pressure data set; and,

a database connected to the processor,

characterised in that

the database comprising a plurality of stored pressure data sets and a cycle short pad associated with each stored pressure data set; and,

the processor is adapted to compare the user pressure data set to each of the stored pressure data sets of the database to identify a preferred cycle short pad.

[0009] The apparatus according to the invention allows a far more accurate and less subjective choice of cycle short pad to be made so increasing user comfort.

[0010] Preferably, the saddle comprises a covering sleeve, the pressure sensors being arranged in the covering sleeve.

[0011] Preferably, the processor is wirelessly connected to the pressure sensors, preferably by Bluetooth®.

[0012] Preferably, the user pressure data set and each of the stored pressure data sets is a map of peak pressure as a function of position on the saddle.

[0013] Preferably, the processor employs a best fit algorithm to compare the user pressure data set to each of the stored pressure data sets.

[0014] Preferably, the best fit algorithm calculates a pressure variation score for each stored pressure data set, the cycle short pad associated with the stored pressure data set having the smallest pressure variation score being the preferred cycle short pad, the pressure variation score for a stored pressure data set being calculated by

(i) determining for each point in the stored pressure data set the difference between the stored pressure at that point and the pressure at the corresponding point in the user data set; and,

(ii) summing the modulus of the differences over the whole stored pressure data set to produce the pressure variation score.

[0015] In a further aspect of the invention there is provided a method of selecting a cycle short pad comprising the steps of

arranging a user on a saddle, the saddle comprising a

plurality of pressure sensors arranged at a plurality of spaced apart points on the saddle;
receiving data from the pressure sensors whilst the user cycles to produce a user pressure data set;
characterised in that
the method further comprises the step of comparing the user data set to each of a plurality of stored pressure data sets, each stored pressure data set having a cycle short pad associated therewith, to identify a preferred cycle short pad.

[0016] Preferably, the user pressure data set and each of the stored pressure data sets is a map of peak pressure as a function of position on the saddle.

[0017] Preferably the comparison step comprises employing a best fit algorithm to compare the user pressure data set to each of the stored pressure data sets.

[0018] The present invention will now be described by way of example only and not in any limitative sense with reference to the accompanying drawings in which

Figure 1 shows, in schematic form, a known method of selecting a cycle saddle for a user; and,

Figure 2 shows, in schematic form an apparatus according to the invention.

[0019] Different people create different pressures on the saddle in different areas due to a combination of their sit riding position, bone width geometry (the distance/width between their sit bones), their pelvic flexibility and their adopted riding position, ranging from an upright position for relaxed riding through to an aggressive posture for time trials and racing for aerodynamic advantage. The combination of these factors creates a pressure profile on the saddle for any given rider.

[0020] Because of this over recent years a number of cycle companies have released a number of different width options of saddles of the same model. Shown schematically in figure 1 is the method used to date to correctly prescribe the correct width of cycle saddle for a user.

[0021] The user is asked to sit on a chair or bench that has a flat plate 1 with either a piece of memory foam or some other flat plate with a sealed substance that is parted due to pressure created by the sit bones. The consumer is asked to approximate the position that they might adopt when on a bicycle and the lateral distance 'd' between the two center points 2 of impression 3 on the memory foam (or other means that shows pressure points) is then measured as the sit bone width. The preferred saddle width is then prescribed.

[0022] There are numerous fundamental flaws with this approach -

[0023] Firstly, the user is sat on a bench with both feet symmetrically positioned. However, when cycling one leg is always out of synchronisation with the other creating a different asymmetric pressure on the saddle.

[0024] Secondly, the user is asked to lean forward to the degree that the do when cycling but is asked to do so whilst not being on their bike and so has no familiar frame of reference as to what their normal riding position is.

[0025] Thirdly, the plate 1 the user sits on is flat and is not shaped like a bicycle saddle. It therefore creates a completely different pressure profile than what would be created if the same person were to sit on a bicycle saddle. The distances between the peak pressure points created by sit bones on a saddle are substantially different from those generated by the same user when sat on a flat measurement plate.

[0026] Finally, the actual peak pressure point generated by each sit bone on the saddle typically does not lie at the center of the pressure depression in the memory foam. Instead it lies off center from the center of the depression. This means that the distance measured between the centers of the two recorded depressions as used in the method described above provide sit bone widths that are substantially different from the distance measured between the real peak pressure points of each sit bone. This difference is typically of the order 8 to 10 % which is materially incorrect.

[0027] The process described above could also be used for prescribing the correct width of cycle pad for a user. However, due to the shortcomings of the method described above the method would be inaccurate.

[0028] Shown in figure 2 is an apparatus for selecting a cycle short pad according to the invention. A cycle short pad is a pad worn in cycle shorts or which is an integral part of cycle shorts. The apparatus comprises a saddle 4 comprising a plurality of pressure sensors 5 at spaced apart points in its upper surface. The pressure sensors measure the pressure exerted by user on the upper surface of the saddle 4. In this embodiment the pressure sensors 5 are an integral part of the saddle 4. In an alternative embodiment the saddle 4 comprises a removable sleeve, and the pressure sensors 5 are contained in the sleeve 4.

[0029] Connected to the pressure sensors 5 is a processor 6. This may be a wired connection or alternatively may be a wireless connection such as Bluetooth®.

[0030] Further connected to the processor 6 is a database 7. The database 7 contains a plurality of stored pressure data sets 8. Each stored pressure data set 8 comprises a plurality of pressure readings, each pressure reading corresponding to one of the pressure sensors in the saddle 4. Associated with each stored pressure data set 8 is a cycle short pad 9.

[0031] In use a user is arranged on the saddle 4. The user wears an unlined cycle short, typically a Lycra® skin fit short or the like. The user then cycles in their normal cycling position whilst the pressure sensors 5 record pressure data.. This pressure data is then passed to the processor 6 where is it processed into a user pressure data set. The user pressure data set comprises a plurality of pressure readings, one corresponding to each pressure sensor 5. In this embodiment the user pressure data set is the user's natural peak dynamic saddle pressure

profile ('NPDSP') This is the map of the peak pressures generated across the saddle 4 whilst the user cycles (or in other words, each pressure point in the user pressure data set is the peak pressure measured at the point on the saddle 4 corresponding to that pressure point in the user pressure data set). Differences in absolute pressure caused by differences in user weight can be normalised. This is typically done by using pressure variation across the pressure sensors 5 as percentages measured against a base pressure rather than using absolute pressures.

[0032] Each stored pressure data set 8 in the database 7 is also a (normalised) natural peak dynamic pressure profile. The processor 6 compares the user pressure data set to each of the stored pressure data sets 8 using a best fit algorithm to determine which stored pressure data set 8 is the best fit to the user pressure data set. The processor 6 then identifies the cycle short pad associated with the best fit stored pressure data set 8 and returns this as the preferred cycle short pad 9.

[0033] In this embodiment the best fit algorithm operates as follows. The best fit algorithm calculates a pressure variation score for each stored pressure data set 8. The cycle short pad associated with the stored pressure data set 8 having the smallest pressure variation score is the preferred cycle short pad returned by the processor 6 to the operator. The pressure variation score for a pressure data set is calculated by a two step process. Firstly, for each point in the stored pressure data set 8 the difference between the stored pressure at that point and the pressure at the corresponding point in the user data set is calculated. Then, the modulus of these differences is summed over the whole pressure data set to produce the pressure variation score.

[0034] In order to work the invention the database 7 needs to be populated with stored pressure data sets 8 and associated choices of cycle short pads 9. In order to do this a plurality of test users with varying sit bone geometries are employed to create a wide range of NPDSPs. Each test user cycles on the saddle 4 in unpadded shorts and their natural peak dynamic saddle pressure profile stored as a stored pressure data set 8. The test user then cycles on the apparatus again wearing shorts or other legwear containing each of the available cycle short pads. The results of these further tests are then analysed (typically by hand or by use of the apparatus to identify the pad option that results the lowest peak pressures for the test rider in the riding position that corresponds to each NPDSP) to determine which is the best cycle short pad for that particular user. That cycle short pad is then associates with the original natural peak dynamic saddle pressure profile stored in the database 7.

[0035] In an alternative embodiment the data provided by the pressure sensors 5 is already in a form suitable for use as a user pressure data set. For example each pressure sensor 5 may only provide the peak pressure recorded by that pressure sensor to the processor 6. This array of data is suitable for use as a user pressure data set 8 by the processor 6 without the need for any preprocessing.

[0036] In alternative embodiments the pressure data sets may be other than the natural peak dynamic saddle pressure profile. Each point in the pressure data set could for example correspond to the variation in pressure recorded at the corresponding point on the saddle 4.

[0037] Similarly, in alternative embodiments a variety of different best fit algorithms could be employed. As an example the best fit algorithm may calculate the root mean square difference between each data point in the user data set and stored data set 8 to produce a variation score.

Claims

1. An apparatus for selecting a cycle short pad comprising
   a saddle (4) comprising a plurality of pressure sensors (5) adapted to measure the pressure applied to the saddle (4) by a user at a plurality of spaced apart points on the saddle (4);
   a processor (6) connected to the pressure sensors (5) adapted to receive the data generated by the pressure sensors (5) and produce a user pressure data set; and,
   a database (7) connected to the processor (6);
   characterised in that
   the database (7) comprises a plurality of stored pressure data sets (8) and a cycle short pad (9) associated with each stored pressure data set (8); and,
   the processor (6) is adapted to compare the user pressure data set to each of the stored pressure data sets (8) of the database (7) to identify a preferred cycle short pad (9).

2. An apparatus as claimed in claim 1, wherein the saddle (4) comprises a covering sleeve, the pressure sensors (5) being arranged in the covering sleeve.

3. An apparatus as claimed in either of claims 1 or 2, wherein the processor (6) is wirelessly connected to the pressure sensors (5), preferably by Bluetooth.

4. An apparatus as claimed in any one of claims 1 to 3, wherein the user pressure data set and each of the stored pressure data sets (8) is a map of peak pressure as a function of position on the saddle (4).

5. An apparatus as claimed in any one of claims 1 to 4, wherein the processor (6) employs a best fit algorithm to compare the user pressure data set to each of the stored pressure data sets (8).

6. An apparatus as claimed in claim 5, wherein the best fit algorithm calculates a pressure variation score for each stored pressure data set (8), the cycle short

pad (9) associated with the stored pressure data set (8) having the smallest pressure variation score being the preferred cycle short pad (9), the pressure variation score for a stored pressure data set (8) being calculated by

(i) determining for each point in the stored pressure data set (8) the difference between the stored pressure at that point and the pressure at the corresponding point in the user data set; and,
(ii) summing the modulus of the differences over the whole stored pressure data set (8) to produce the pressure variation score.

7. A method of selecting a cycle short pad (9) comprising the steps of
arranging a user on a saddle (4), the saddle (4) comprising a plurality of pressure sensors (5) arranged at a plurality of spaced apart points on the saddle (4);
receiving data from the pressure sensors (5) whilst the user cycles to produce a user pressure data set;
characterised in that
the method further comprises the step of comparing the user data set to each of a plurality of stored pressure data sets (8), each stored pressure data set (8) having a cycle short pad (9) associated therewith, to identify a preferred cycle short pad (9).

8. A method as claimed in claim 7, wherein the user pressure data set and each of the stored pressure data sets (8) is a map of peak pressure as a function of position on the saddle (4).

9. A method as claimed in either of claims 7 or 8, wherein the comparison step comprises employing a best fit algorithm to compare the user pressure data set to each of the stored pressure data sets (8).

Patentansprüche

1. Vorrichtung zum Auswählen eines Polsters für eine Radhose, umfassend:

einen Sattel (4), der eine Vielzahl von Drucksensoren (5) umfasst, die ausgebildet sind, den Druck zu messen, der von einem Benutzer an einer Vielzahl von beabstandeten Punkten des Sattels (4) auf den Sattel (4) ausgeübt wird;
einen Prozessor (6), der mit den Drucksensoren (5) verbunden ist und ausgebildet ist, die von den Drucksensoren (5) generierten Daten zu empfangen und einen Benutzerdruckdatensatz zu erstellen; und
eine Datenbank (7), die mit dem Prozessor (6) verbunden ist;
dadurch gekennzeichnet, dass
die Datenbank (7) eine Vielzahl von gespeicherten Druckdatensätzen (8) und ein Polster (9) für eine Radhose umfasst, das mit jedem gespeicherten Druckdatensatz (8) verknüpft ist; und
der Prozessor (6) ausgebildet ist, den Benutzerdruckdatensatz mit jedem der gespeicherten Druckdatensätze (8) der Datenbank (7) zu vergleichen, um ein bevorzugtes Polster (9) für eine Radhose zu identifizieren.

2. Vorrichtung nach Anspruch 1, wobei der Sattel (4) einen Schutzüberzug umfasst und die Drucksensoren (5) in dem Schutzüberzug angeordnet sind.

3. Vorrichtung nach Anspruch 1 oder 2, wobei der Prozessor (6) drahtlos mit den Drucksensoren (5) verbunden ist, vorzugsweise über Bluetooth.

4. Vorrichtung nach einem der Ansprüche 1 bis 3, wobei der Benutzerdruckdatensatz und jeder der gespeicherten Druckdatensätze (8) eine Karte des Maximaldrucks als eine Funktion der Position auf dem Sattel (4) ist.

5. Vorrichtung nach einem der Ansprüche 1 bis 4, wobei der Prozessor (6) einen Best-Fit-Algorithmus verwendet, um den Benutzerdruckdatensatz mit jedem der gespeicherten Druckdatensätze (8) zu vergleichen.

6. Vorrichtung nach Anspruch 5, wobei der Best-Fit-Algorithmus ein Druckvariationsergebnis für jeden gespeicherten Druckdatensatz (8) berechnet, wobei das Polster (9) für eine Radhose, das mit dem gespeicherten Druckdatensatz (8) verknüpft ist, der das niedrigste Druckvariationsergebnis aufweist, das bevorzugte Polster (9) für eine Radhose ist, wobei das Druckvariationsergebnis für einen gespeicherten Druckdatensatz (8) berechnet wird durch

(i) Bestimmen für jeden Punkt des gespeicherten Druckdatensatzes (8) der Differenz zwischen dem gespeicherten Druck an diesem Punkt und dem Druck an dem entsprechenden Punkt in dem Benutzerdatensatz; und
(ii) Summieren des Modulus der Differenzen über den gesamten gespeicherten Druckdatensatz (8), um das Druckvariationsergebnis zu erzeugen.

7. Verfahren zum Auswählen eines Polsters (9) für eine Radhose, umfassend die folgenden Schritte:

Anordnen eines Benutzers auf einem Sattel (4), wobei der Sattel (4) eine Vielzahl von Drucksensoren (5) umfasst, die an einer Vielzahl von beabstandeten Punkten auf dem Sattel (4) angeordnet sind;

Empfangen von Daten von den Drucksensoren (5), während der Benutzer Fahrrad fährt, um einen Benutzerdruckdatensatz zu erzeugen;
dadurch gekennzeichnet, dass
das Verfahren ferner den Schritt des Vergleichens des Benutzerdatensatzes mit jedem Druckdatensatz einer Vielzahl von gespeicherten Druckdatensätzen (8) umfasst, wobei jeder gespeicherte Druckdatensatz (8) mit einem Polster (9) für eine Radhose verknüpft ist, um ein bevorzugtes Polster (9) für eine Radhose zu bestimmen.

8. Verfahren nach Anspruch 7, wobei der Benutzerdruckdatensatz und jeder der gespeicherten Druckdatensätze (8) eine Karte des Maximaldrucks als eine Funktion der Position auf dem Sattel (4) ist.

9. Verfahren nach Anspruch 7 oder 8, wobei der Schritt des Vergleichens das Verwenden eines Best-Fit-Algorithmus umfasst, um den Benutzerdruckdatensatz mit jedem der gespeicherten Druckdatensätze (8) zu vergleichen.

Revendications

1. Dispositif pour choisir un coussin de short à vélo comprenant :

une selle (4) comprenant une pluralité de capteurs de pression (5) adaptés à mesurer la pression appliquée à la selle (4) par un utilisateur à une pluralité de points espacés les uns des autres sur la selle (4) ;
un processeur (6) connecté aux capteurs de pression (5) adapté à recevoir les données générées par les capteurs de pression (5) et à produire un jeu de données de pression utilisateur ; et
une base de données (7) connectée au processeur (6) ;
caractérisé en ce que :

la base de données (7) comprend une pluralité de jeu de données de pression stockée (8) et un coussin de short à vélo (9) associé à chaque jeu de données de pression stocké (8) ; et
le processeur (6) est configuré pour comparer le jeu de données de pression utilisateur à chacun des jeux de données de pression stockés (8) de la base de données pour identifier un coussin de short à vélo préféré (9).

2. Dispositif selon la revendication 1, selon lequel la selle (4) comprend un manchon de recouvrement, les capteurs de pression (5) étant disposés dans le manchon de recouvrement.

3. Dispositif selon l'une quelconque des revendications 1 ou 2, selon lequel le processeur (6) est connecté de manière sans fil aux capteurs de pression (5), de préférence par Bluetooth.

4. Dispositif selon l'une quelconque des revendications 1 à 3, selon lequel le jeu de données de pression utilisateur et chacun des jeux de données de pression stockés (8) est une carte de pression maximale en fonction de la position de la selle (4).

5. Dispositif selon l'une quelconque des revendications 1 à 4, selon lequel le processeur (6) met en oeuvre un algorithme de meilleur rapprochement pour comparer le jeu de données de pression utilisateur à chacun des jeux de données de pression stockées (8).

6. Dispositif selon la revendication 5, selon lequel l'algorithme de meilleur rapprochement calcule un score de variation de pression pour chaque jeu de données de pression stocké (8), le coussin de short à vélo (9) associé au jeu de données de pression stocké (8) qui présente le score de variation de pression le plus petit étant retenu comme coussin de short à vélo (9) préféré, le score de variation de pression d'un jeu de données de pression stocké (8) étant calculé par :

(i) la détermination, pour chaque point dans le jeu de données de pression stocké (8), de la différence entre la pression stockée à ce point et la pression au point correspondant dans le jeu de données de pression utilisateur ; et
(ii) la somme du module des différences sur l'ensemble du jeu de données de pression utilisateur (8) pour produire le score de variation de pression.

7. Méthode pour choisir un coussin de short à vélo comprenant les étapes de :

positionnement d'un utilisateur sur une selle (4), la selle (4) comprenant une pluralité de capteurs de pression (5) disposés à une pluralité de points espacés les uns des autres sur la selle (4) ;
réception de données en provenance des capteurs de pression (5) pendant que l'utilisateur pédale pour produire un jeu de données de pression utilisateur ;
caractérisée en ce que :

la méthode comprend en outre l'étape de comparaison du jeu de données de pression utilisateur à chacun des jeux de don-

nées de pression stockés (8), chaque jeu de données de pression stocké (8) présentant un coussin de short à vélo (9) qui lui est associé, pour identifier un coussin de short à vélo préféré.

8. Méthode selon la revendication 7, selon laquelle le jeu de données de pression utilisateur et chacun des jeux de données de pression stockées (8) est une carte de pression maximale en fonction de la position de la selle (4).

9. Méthode selon l'une quelconque des revendications 7 ou 8, selon laquelle l'étape de comparaison comprend la mise en oeuvre d'un algorithme de meilleur rapprochement pour comparer le jeu de données de pression utilisateur avec chacun des jeux de données de pression stockés.

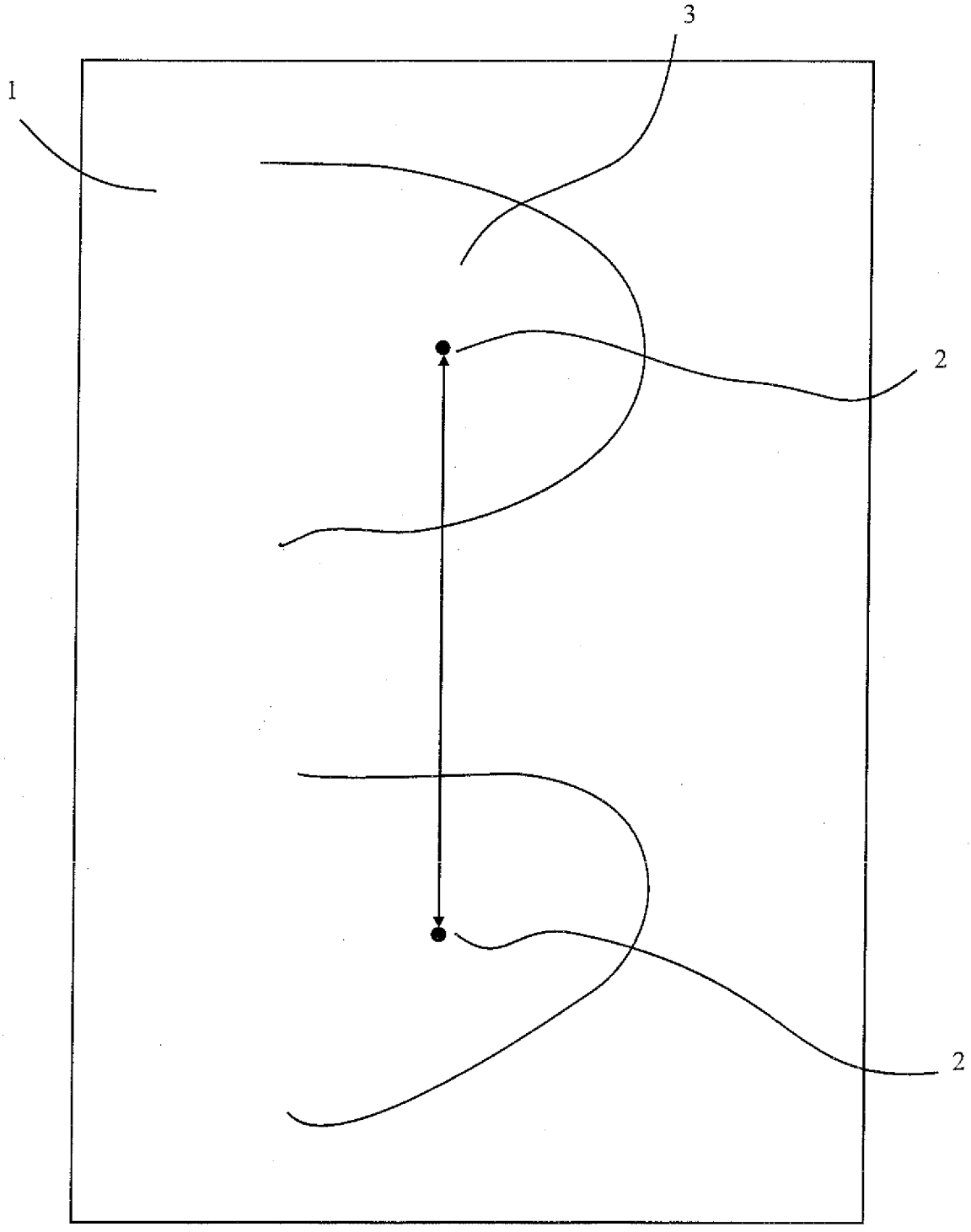

Figure 1

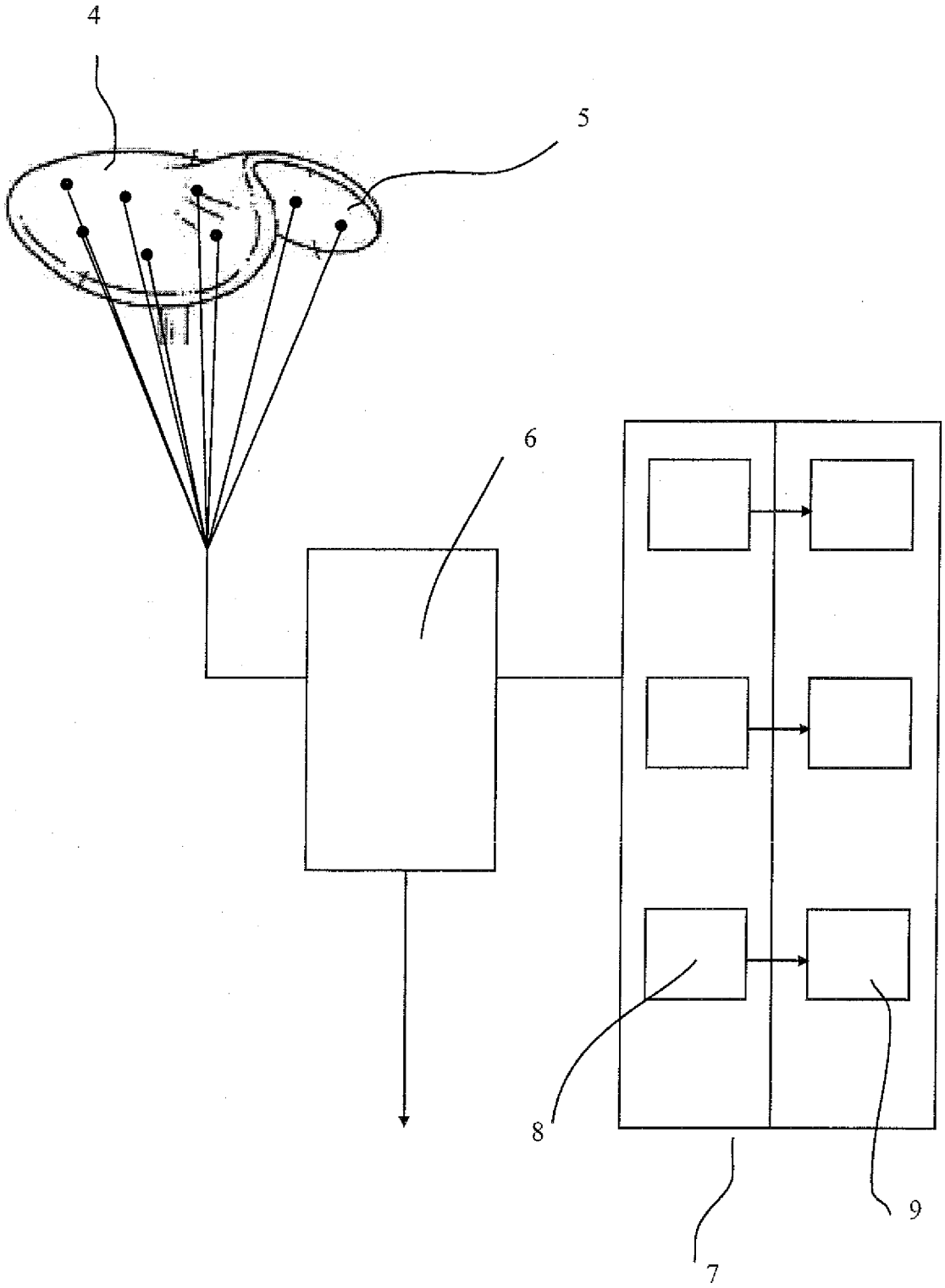

Figure 2

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 202010008146 U1 **[0004]**
- DE 102009045829 A1 **[0005]**
- DE 20112013 U1 **[0006]**

专利名称(译)	一种用于选择循环短路焊盘的装置和一种选择循环短路焊盘的方法		
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[标]申请(专利权)人(译)	恩德拉(共同)股份公司		
申请(专利权)人(译)	ENDURA LIMITED		
当前申请(专利权)人(译)	ENDURA LIMITED		
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发明人	MCFARLANE, JAMES BROWN		
IPC分类号	A61B5/00 A61B5/103 B62J1/00 B62J1/10 B62J99/00		
CPC分类号	A61B5/1036 A61B5/6895 B62J1/00 B62J1/28 B62J45/00 B62J45/40 B62J50/20 B62J50/25 B62J99/00 A41D1/084		
优先权	2013018563 2013-10-21 GB		
其他公开文献	EP2862503A1 EP2862503A8		
外部链接	Espacenet		

摘要(译)

一种用于选择自行车短垫的装置，包括：鞍座，包括多个压力传感器，适于测量用户在鞍座上的多个间隔开的点处施加到鞍座的压力;连接到压力传感器的处理器，适于接收由压力传感器产生的数据并产生用户压力数据组;连接到处理器的数据库，该数据库包括多个存储的压力数据组和与每个存储的压力数据组相关的循环短路垫;处理器适于将用户压力数据集与数据库的每个存储的压力数据集进行比较，以识别优选的循环短垫。


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(54) An apparatus for selecting a cycle short pad and a method of selecting a cycle short pad

Vorrichtung zur Auswahl eines Sitzpolsters für eine Radhose und Verfahren zur Auswahl desselben Sitzpolsters

Appareil permettant de sélectionner un coussin d'assise de cuissard de cycliste, et procédé de sélection du même coussin d'assise

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