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(54) **FURNITURE FOR GENERATING GREEN ENERGY**

(75) Inventors: **Patricia Jacqueline Huberte Maria Ceysens**, Leuven (BE); **Werner Musenbrock**, Ledeberg-Gent (BE); **Katarina Verhaegen**, Jodoigne (BE)

(73) Assignee: **WEWATT**, Leuven (BE)

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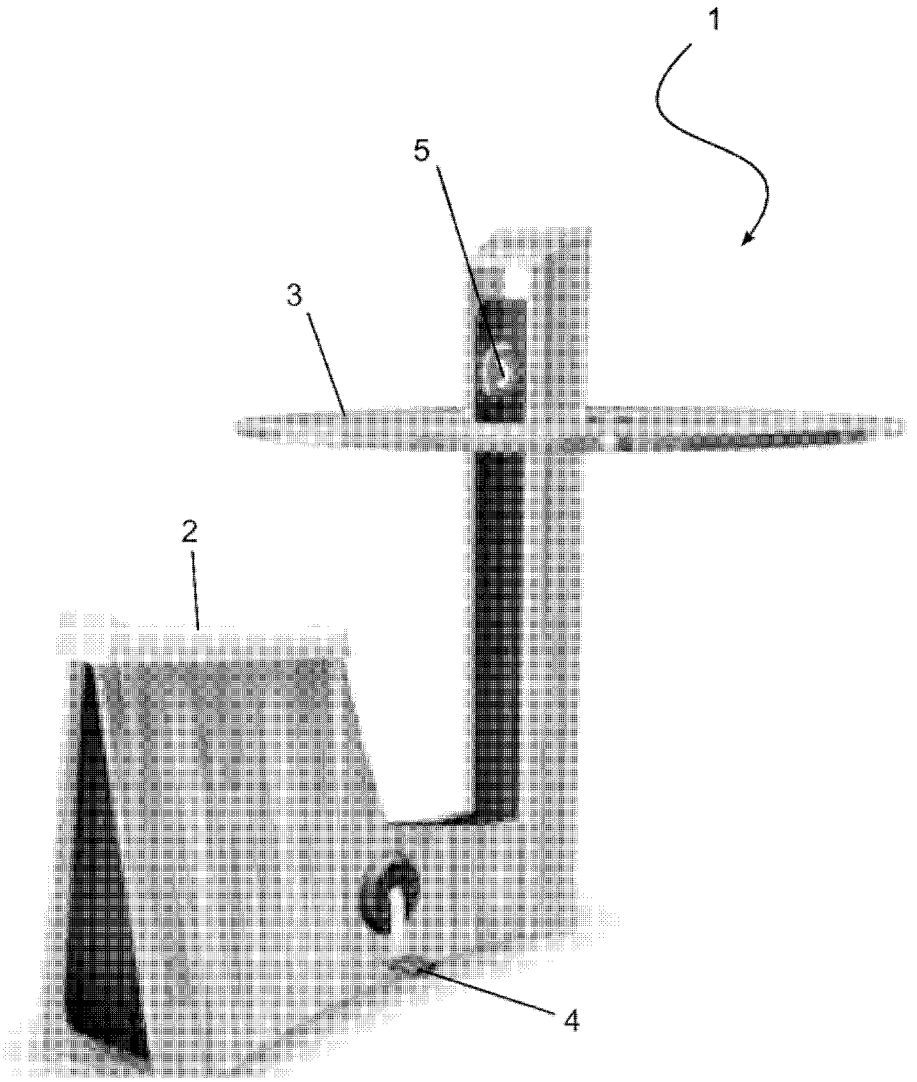
(57) **ABSTRACT**

The application provides items of furniture having a seating portion (**2**), a table surface (**3**) and a set of two pedals (**4**) allowing the user to pedal from a sitting position on the seating portion, whereby this set of pedals are connected to a generator.



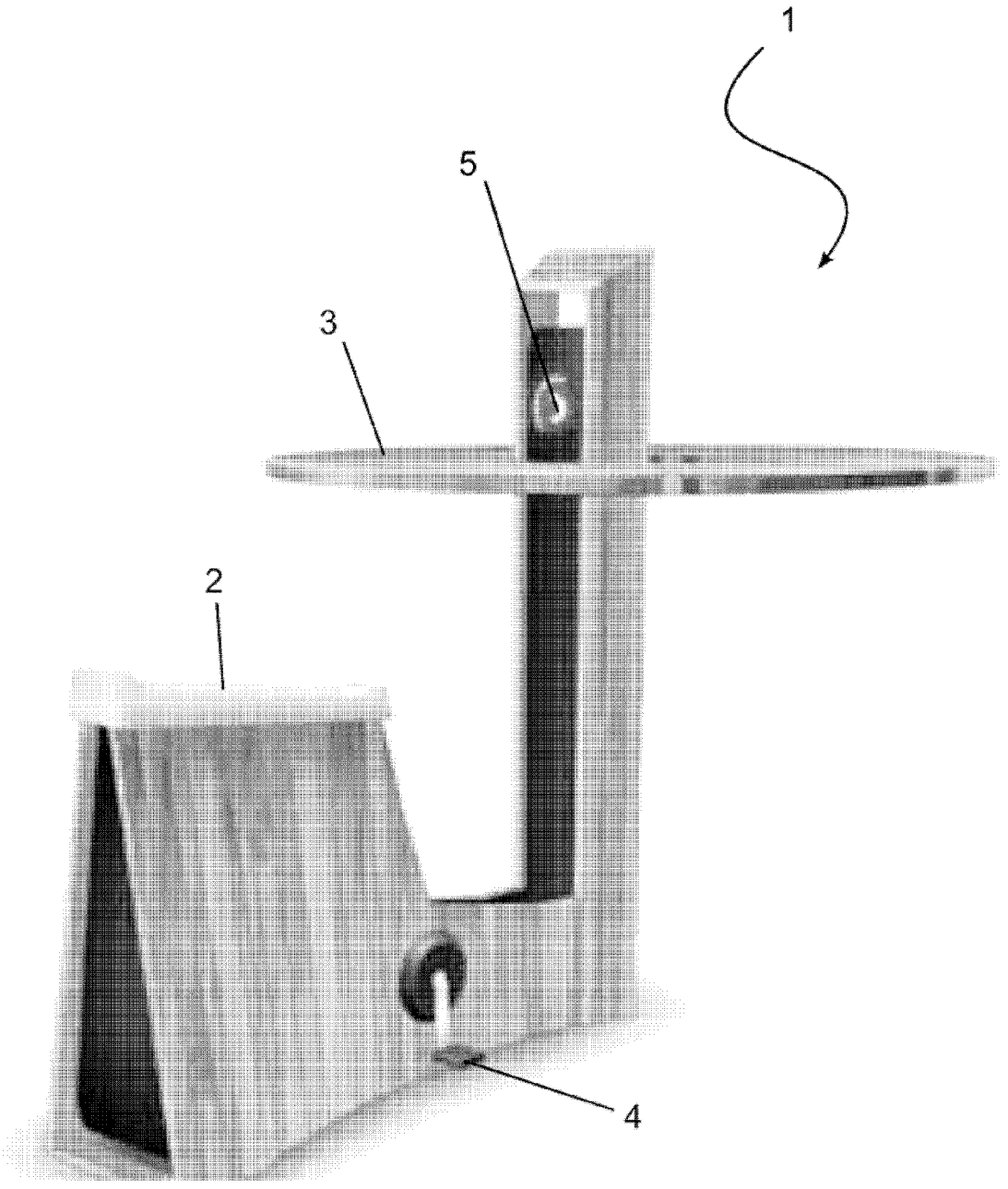


FIG. 1

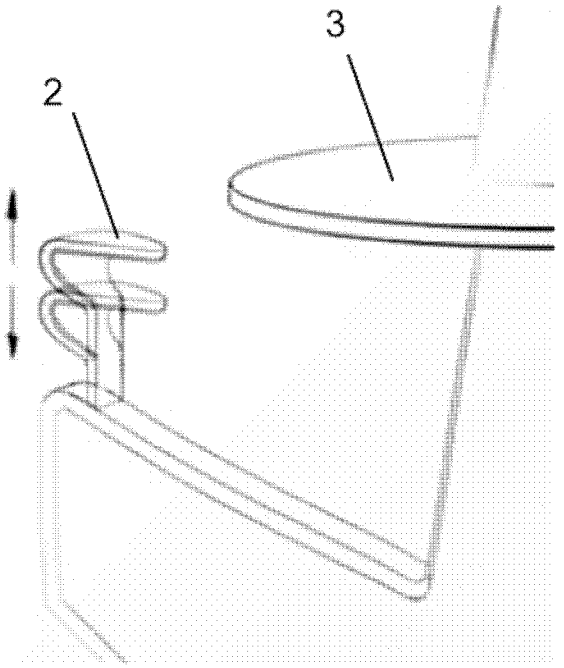


FIG. 2

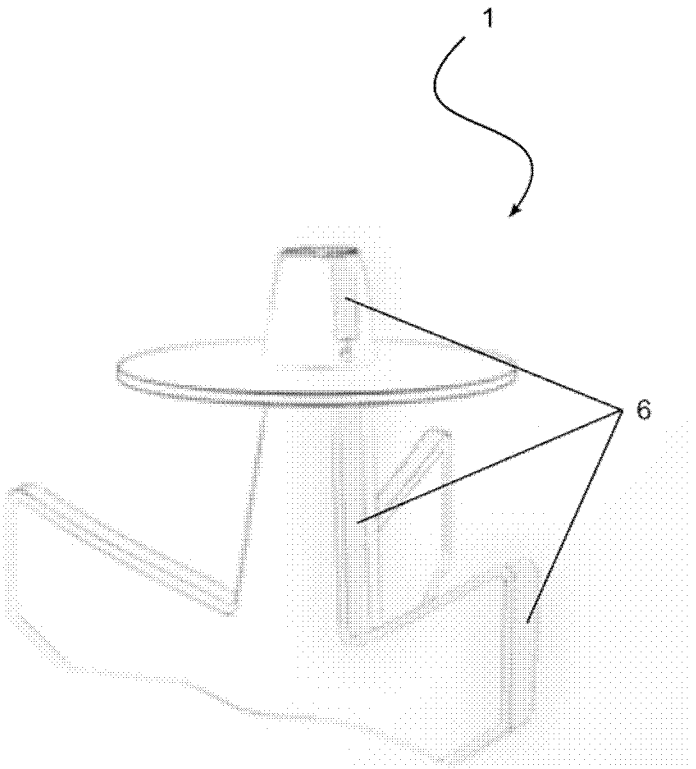


FIG. 3

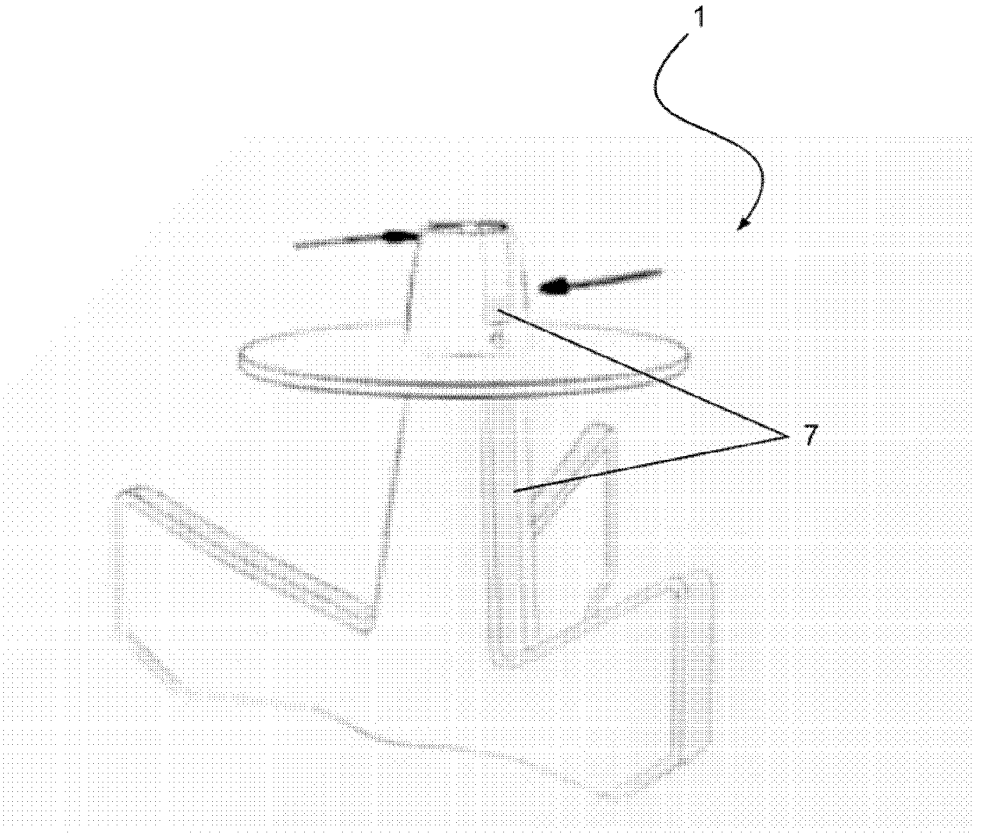


FIG. 4

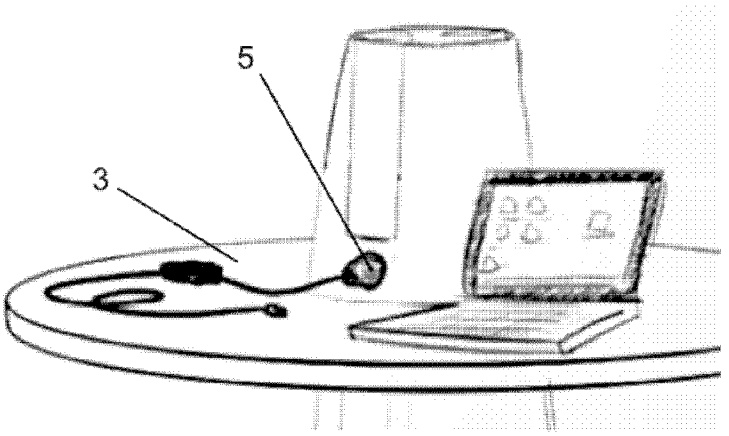


FIG. 5

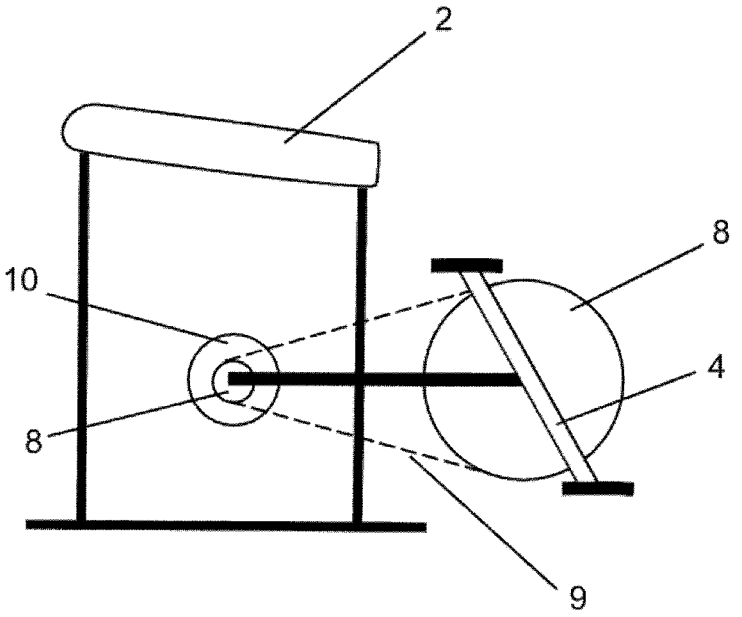


FIG. 6

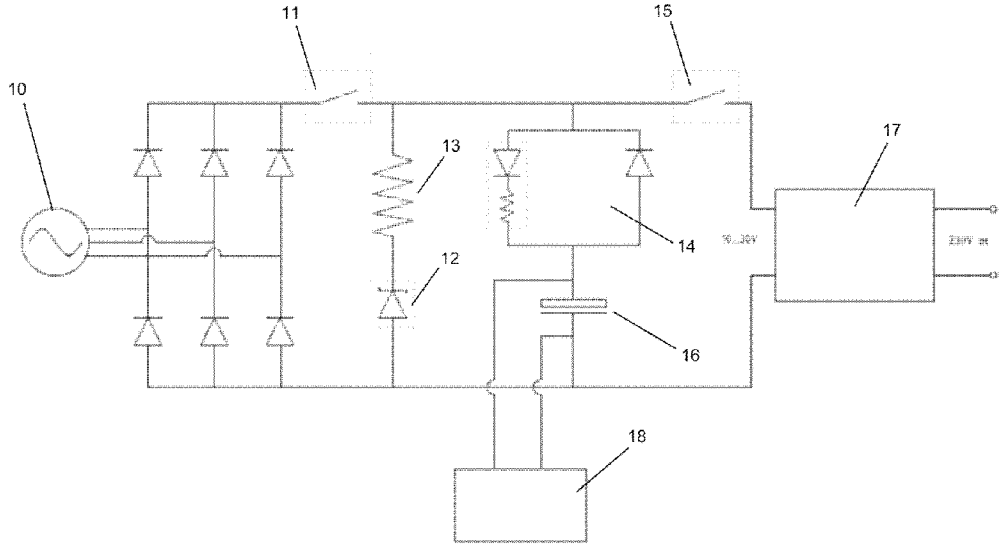


FIG. 7

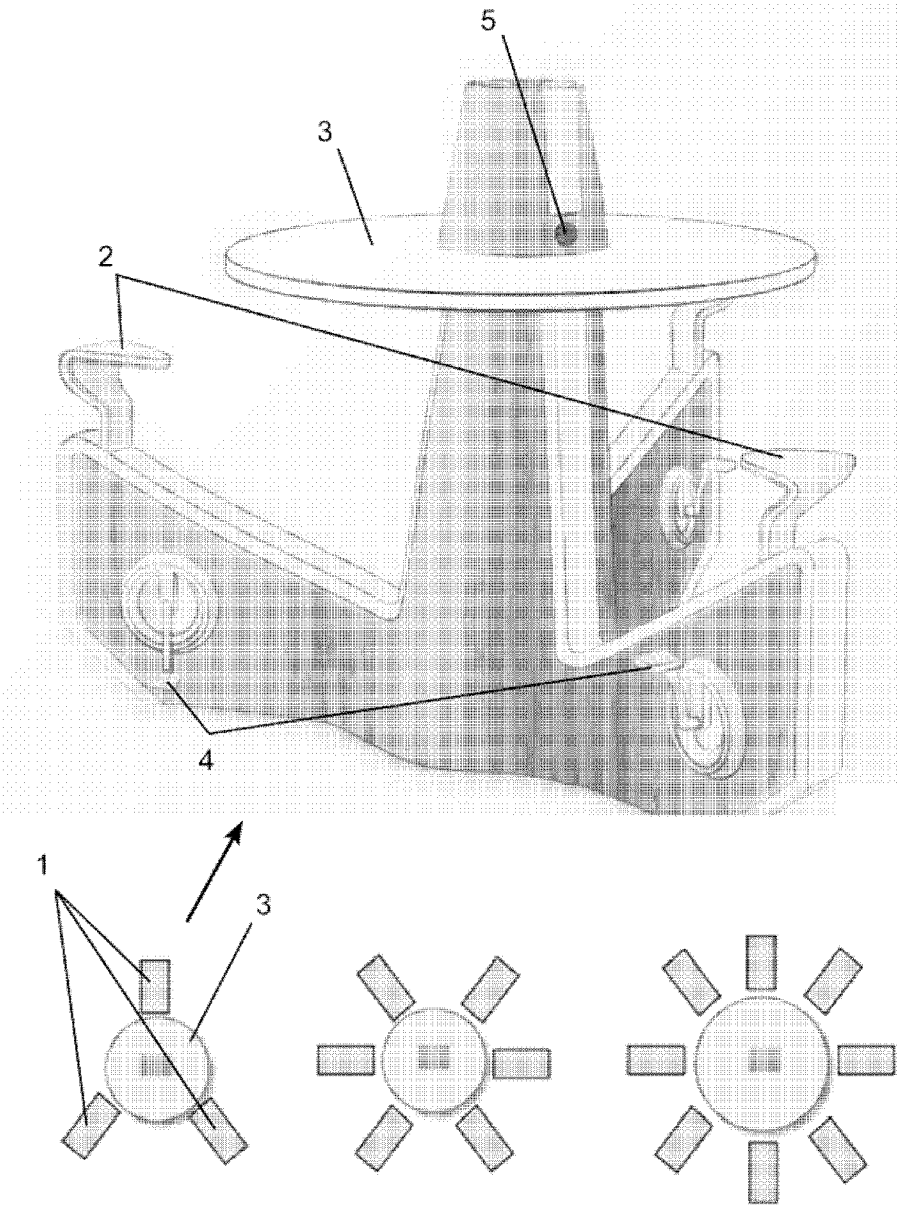


FIG. 8

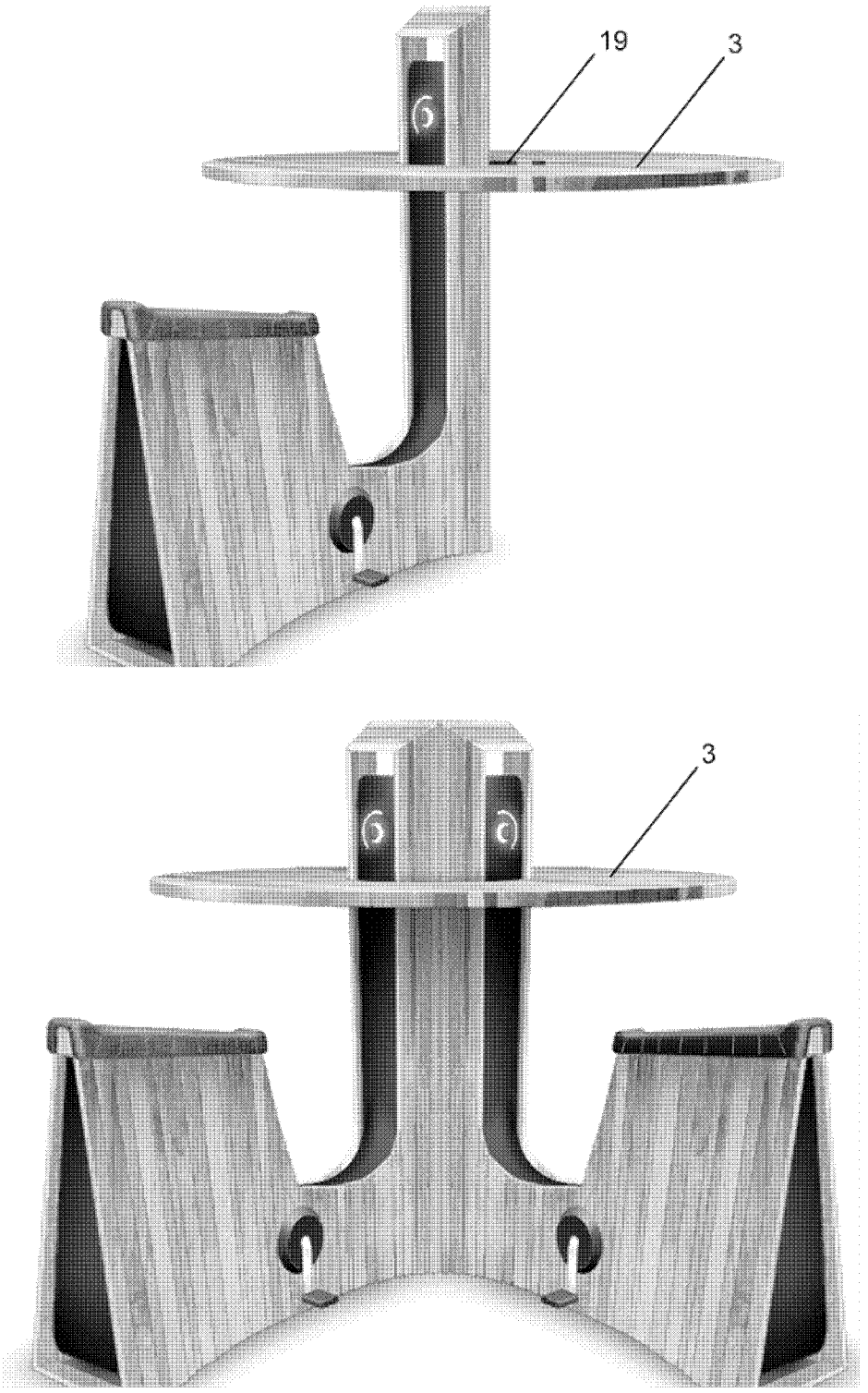


FIG. 9

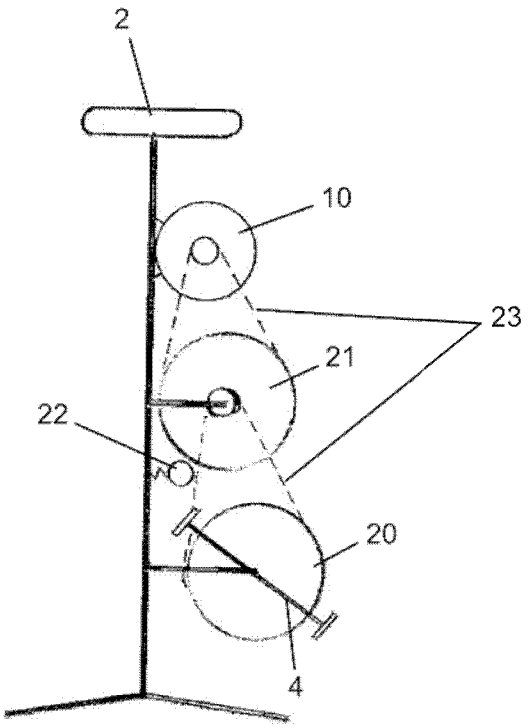
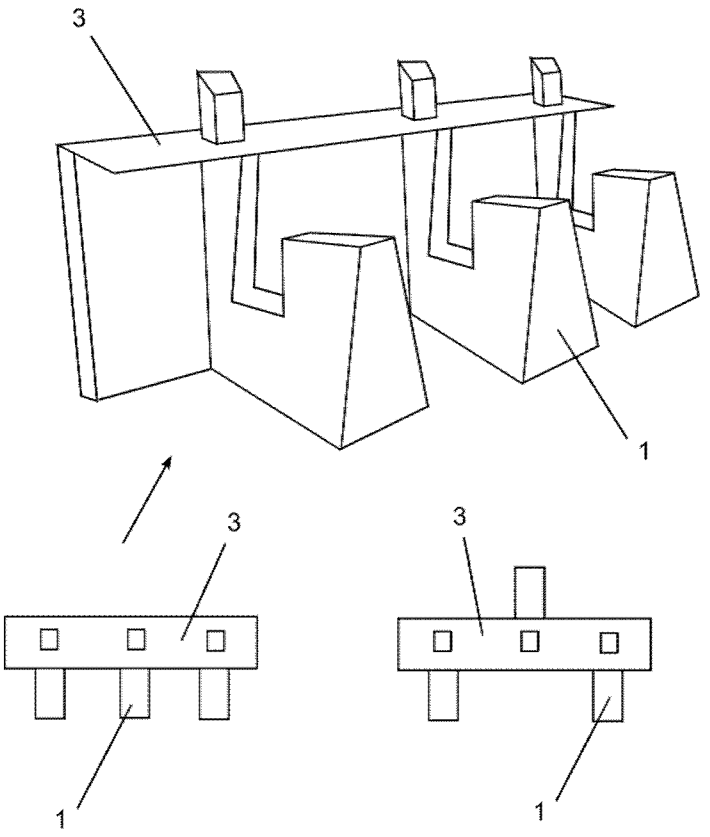


FIG. 10



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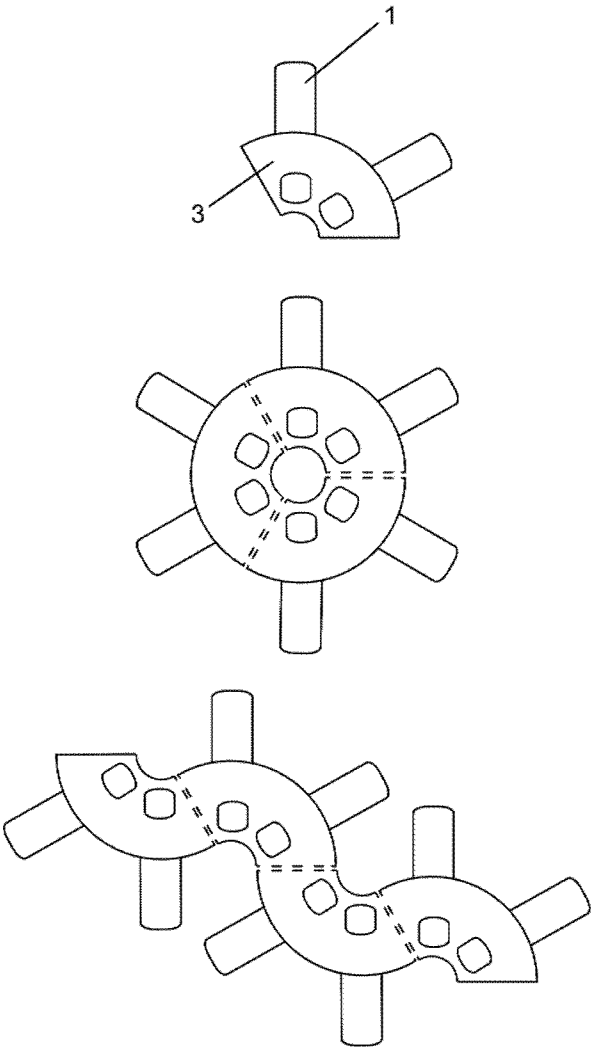

FIG. 12

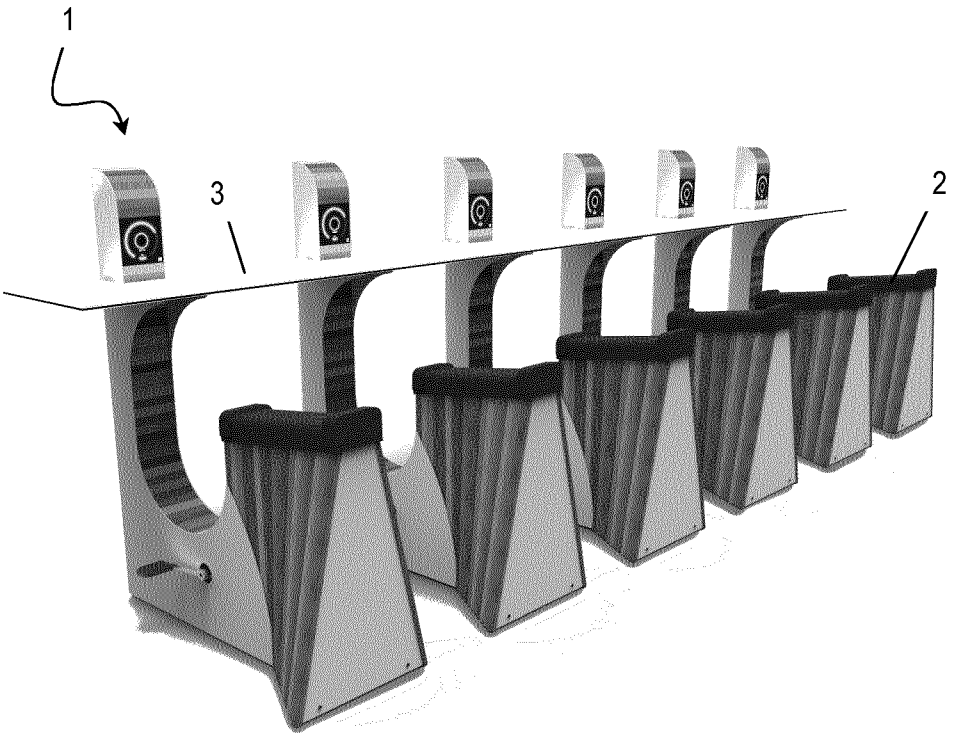

FIG. 13

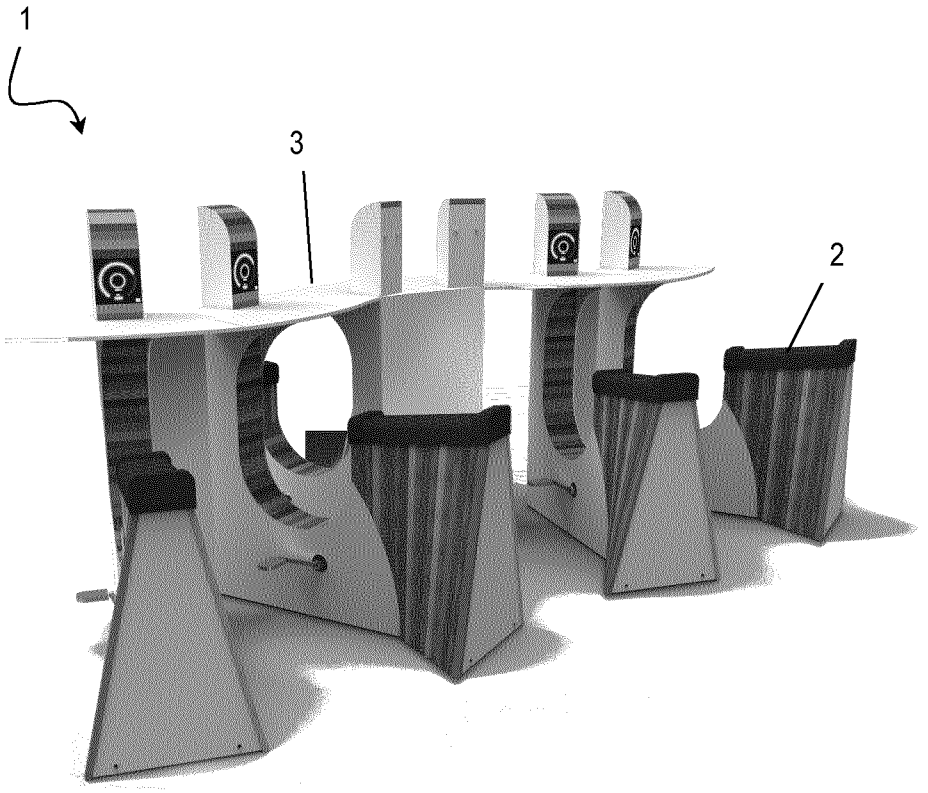

FIG. 14

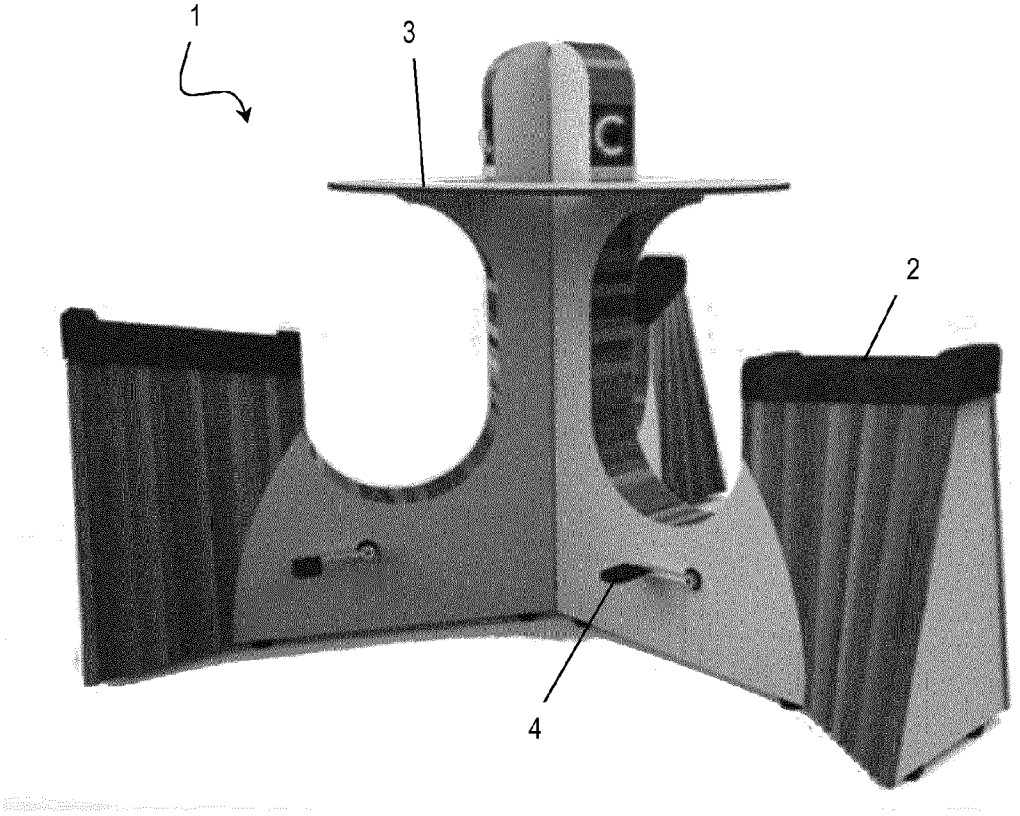

FIG. 15

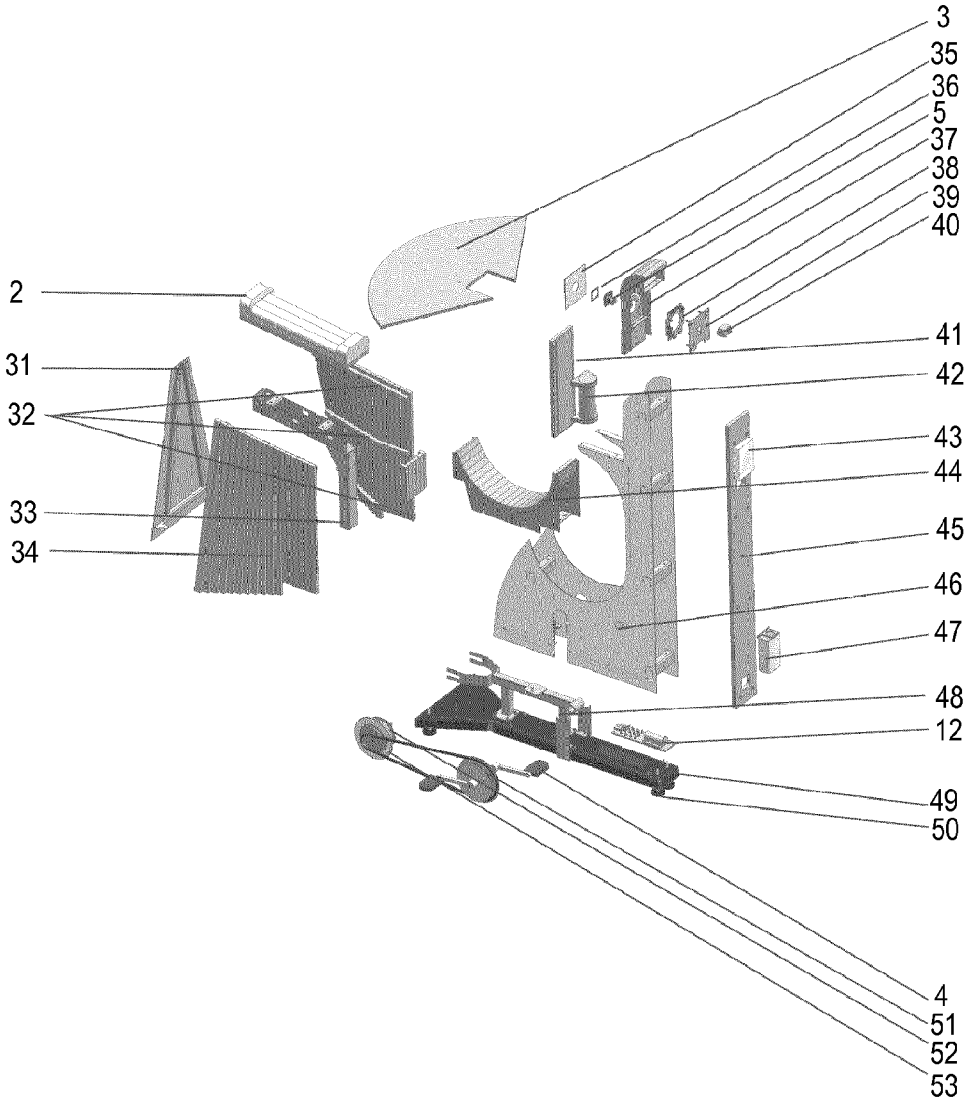
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FIG. 16

FURNITURE FOR GENERATING GREEN ENERGY

FIELD OF THE INVENTION

[0001] The present invention relates to furniture that on the one hand allows green electrical energy to be generated through human movement and to be used, and, on the other, enables the user to remain fit and to perform regular physical activity. The furniture may also allow the user's performance in terms of energy creation and movement to be automatically displayed on a display on the furniture or on an electronic device that the user carries along and eventually also forwarded to e.g. social networking sites.

BACKGROUND

[0002] The number of people whose occupation involves working at a computer for extended periods of time is rapidly increasing. One adverse side-effect of this situation is that this typically implies an essentially sedentary (seated) working day.

[0003] Even in the evenings and during weekends, these people often relax in a seated position, for example watching television sitting down or, again, sitting in front of their computers. There is a growing concern that sitting still for long periods at a time is not healthy. Current health standards emphasize that adults should perform at least 30 minutes of gentle physical activity every day.

[0004] Regrettably only a small percentage of adults in Belgium follow this health standard. The government and employers, both large and small, are supporting employers initiatives such as cycling incentives, corporate fitness schemes and the reimbursement of subscriptions for the membership of a sports club.

[0005] On the other hand, there is a constant need to find possible ways of reducing the consumption of centrally generated energy and to promote green energy. In this context, it is important that people are encouraged to use energy more sparingly. It is considered that by offering citizens the possibility of generating energy themselves (such as by roof solar panels), they become more aware of the fact that energy is not simply "always there" and that a certain amount of energy is always necessary in order to ensure adequate supplies of electricity.

[0006] The state of the art contains information on various initiatives illustrating how human movement can be used to generate electricity for operating electrical systems, such as televisions or computers.

[0007] U.S. Pat. No. 6,244,988 describes an interactive movement system, in which a conventional home trainer system is paired with a computer. The speed at which information can be shown on the screen is dependent upon the speed of pedalling.

[0008] U.S. Pat. No. 6,179,746 describes a system whereby the user's pedalling movements can be converted into a stimulus to continue pedalling. The module is connected to a switchbox, which via sensors detects whether the user is pedalling or not. If a pedalling movement is detected, a signal is transmitted via the switchbox to a TV, video or audio system and the respective system is activated, encouraging the user to continue moving. DE 20008998U1 goes further in the same direction in order to power a computer (or a similar system).

SUMMARY OF THE INVENTION

[0009] Different embodiments of an item of furniture and its applications are described herein. While all being characterized by the ability to combine physical movement, generating energy and performing office work or other activities, different embodiments are envisaged which address either one or more additional aims as will be set out below. The aim of particular embodiments of the devices described herein is to propose an item of furniture that enables movement activities to be carried out while working or performing other activities. More specifically, in some embodiments the aim is to propose an item of furniture that allows a movement activity to be carried out while performing an activity that requires or is facilitated by the use of a table, such as, but not restricted to, computer working, ironing etc. The aim of particular embodiments of the devices described herein, is to propose an item of furniture that allows a movement activity to be carried out during other activities, such as watching television or eating. The aim of further particular embodiments of the devices described herein is to propose an item of furniture that makes people aware of the value of energy. In particular embodiments, the aim is to propose an item of furniture that enables green energy to be created during the activities described above. More particularly, a further aim of at least some of the embodiments is to propose an item of furniture that enables green energy to be proposed while another activity is being carried out, such as watching television or eating. Most particularly, the aim of particular embodiments is to propose an item of furniture that can be used while performing office work. In further embodiments, an item of furniture is proposed that can be used during a relaxation activity. The aim of particular embodiments is to propose an item of furniture that can be used while waiting, for example in a railway station, an airport or a shopping centre. The aim of particular embodiments of the device described herein is to propose an item of furniture that can be used by a passenger travelling in a motor vehicle. The aim of particular embodiments is to propose an item of furniture that can be assembled in a modular manner and be combined with other items, preferably similar items of furniture. The aim of further particular embodiments is also to propose an item of furniture that can calculate how much electrical energy is being generated. In particular embodiments it is aimed to propose an item of furniture that can calculate how much electrical energy is being consumed. For particular embodiments, it is the aim to provide an item of furniture that can calculate how much generated electrical energy remains to be used by electrical devices of the consumer.

[0010] As detailed above, one or more of the above aims is achieved by the different embodiments described herein.

[0011] In order to achieve one or more of the above aims, an item of furniture is provided comprising a seating portion, whereby the item of furniture can be further characterised by the presence of:

[0012] a set of two pedals, which enable the user to pedal from a sitting position, whereby the said set of pedals is connected to a generator; and

[0013] an energy buffer connected to the generator;

[0014] In particular embodiments, the energy accumulated in the energy buffer is intended for local use, by the user of the furniture item. Accordingly, in particular embodiments, the item of furniture further comprises:

[0015] one or more plug sockets connected to the generator and/or the energy buffer.

[0016] The present invention proposes in particular embodiments an item of furniture such as described above, further comprising a table surface. In such an embodiment the present invention also proposes an item of furniture comprising a seating portion, whereby the said item of furniture is further characterised by the presence of:

[0017] a set of two pedals, which enable the user to pedal while sitting on the seating portion, whereby the said set of pedals is connected to a generator;

[0018] optionally, an energy buffer connected to the generator;

[0019] optionally, one or more plug sockets connected to the generator and/or the energy buffer; and

[0020] a table surface.

[0021] In particular embodiments the said table surface is physically connected to the seating portion. More particularly, the item comprises a central structure which extends from the seating portion into the leg of the table.

[0022] Thus, in particular embodiments, furniture items are provided comprising a seating portion, whereby the said item of furniture is further characterised by the presence of:

[0023] a set of two pedals, which enable the user to pedal while sitting on the seating portion, whereby the said set of pedals is connected to a generator; and

[0024] a table surface, whereby table surface is physically connected to the seating portion.

[0025] Such a system allows the user to generate energy by performing moderate exercise in a seated position, while at the same time allowing the user to perform a manual or visual task in an ergonomic position, which is ensured by the relative position of the seating portion, set of two pedals and the table surface.

[0026] The present invention proposes in particular embodiments an item of furniture such as described above, characterised in that the said item of furniture comprises a modular coupling mechanism so that two or more items of furniture can be joined together in a modular manner, preferably by the same table surface.

[0027] The present invention proposes in particular embodiments an item of furniture such as those described above, further comprising a mains connection enabling the energy produced to be relayed preferably to a network.

[0028] The present invention proposes in particular embodiments an item of furniture such as those described above, further comprising a charging module enabling the energy produced to be transferred to a linked electrical and/or electronic system.

[0029] The present invention proposes in specific embodiments an item of furniture such as those described above that in addition comprises a central processing unit, which receives data from the generator and/or from sensors that are coupled to the (movement of the) pedals. Preferably, the central processing unit can transmit data via a wireless connection. Preferably, the item of furniture comprises a display that is connected to the central processing unit.

[0030] The present invention proposes in specific embodiments an item of furniture such as those described above, further comprising a connection to the mains or to a network. Preferably, this connection is wireless. Preferably, this connection is connected to social networking media.

[0031] The present invention proposes in specific embodiments an item of furniture such as described above, whereby a central structure extends from the seating portion down to the pedals and optionally further to form the leg of the table surface. In particular embodiments, the seating portion is at an angle of at least 1°, and more preferably at an angle of at least 5° and even more preferably at an angle of at least 10°.

[0032] In further particular embodiments, the furniture item comprises multiple seating portions such that the furniture allows comfortable seating for a large number of individuals.

[0033] The application provides, in particular embodiments an item of furniture such as described above, whereby the set of pedals is connected to a generator by means of a transmission system, which optionally comprises a belt transmission, whereby this transmission this transmission is selected from a double stage or a single stage system. Preferably, the said transmission comprises a single stage.

[0034] In particular embodiments an item of furniture such as described above is provided, whereby the energy buffer comprises a means for the storage and release of electrical energy. The energy buffer may comprise a rechargeable battery or capacitor, preferably chosen from a list containing a rechargeable lead-acid battery, a rechargeable lithium ion battery, an ultra-capacitor and an electrolytic capacitor. Preferably, the energy buffer comprises an ultra-capacitor and a switched current limiter. Typically, the energy buffer contains the rechargeable battery of an electric bicycle.

[0035] The application provides, in particular embodiments an item of furniture such as described above, whereby the generator is selected from a list consisting of: a DC generator, an AC generator and a hub dynamo. Preferably the generator comprises an AC generator.

[0036] The present invention further envisages in exemplary embodiments an item of furniture such as described above, further comprising an indicator indicating how much energy is being consumed and/or an indicator indicating how much energy is being generated.

[0037] Preferably, this indicator comprises a light-emitting strip, such as for example, an LED strip.

[0038] The present invention proposes in particular embodiments an item of furniture such as described above, further comprising an indicator indicating the amount of energy left in the energy buffer.

[0039] The present invention proposes in particular embodiments an item of furniture such as described above, whereby the indicator comprises a light-emitting element with a variable lighting intensity. In this respect, in particular embodiments an item of furniture as described above is provided, whereby the indicator comprises a number of light sources, whereby a variable number of these light sources can be switched on or switched off.

[0040] In particular embodiments, an item of furniture such as described above is provided which further comprises a seating portion and a table surface which are interconnected, and more specifically joined at/by a central structure. In specific embodiments, the table surface is orientated towards the edge of the seating portion. In other embodiments, a larger table surface is provided that also extends in other directions.

[0041] The present invention proposes in particular embodiments an item of furniture such as described above, further comprising a table surface with a hole and optionally a central structure comprising a column extending through this hole, whereby the hole is larger than the width of the column of the central structure and whereby the said hole is suitable for connecting with other items of furniture having a central structure with a vertically extending column.

[0042] The present invention arose from the desire to offer a solution to persons needing to be able to move freely because they carry out sedentary work or, because of circumstances, having to spend a long time sitting down. The present invention gives people the possibility of moving with a significant degree of intensity, while they are working. Consequently, it gives the opportunity on the one hand of creating (green) energy from movement and on the other, the opportunity to electrical current locally, to places where for practical reasons this is not possible or only possible with difficulty. The present invention constitutes an item of furniture that can convert human energy into usable electrical energy.

DESCRIPTION OF THE DRAWINGS

[0043] The following description of the drawings of specific embodiments of the present invention is only intended to be indicative and is not intended to limit the present exposition, its application or its usage. In the drawings, the same reference numbers are used for the same parts and features. A list of the reference numbers is given below:

[0044] **1**—Item of furniture
[0045] **2**—seating portion
[0046] **3**—table surface
[0047] **4**—pedals
[0048] **5**—plug socket
[0049] **6**—lighting strip with variable intensity
[0050] **7**—lighting strip with a variable number of lighting points
[0051] **8**—toothed wheel
[0052] **9**—chain conveyor
[0053] **10**—generator
[0054] **11**—safety relay
[0055] **12**—Zener circuit
[0056] **13**—dump load resistor
[0057] **14**—load current limiter circuit
[0058] **15**—'green light switch' circuit
[0059] **16**—ultra-capacitor
[0060] **17**—DC/AC inverter
[0061] **18**—temperature display
[0062] **19**—hole in the table surface
[0063] **20**—belt pulley
[0064] **21**—intermediate belt pulley
[0065] **22** pressure roll
[0066] **23**—belt transfer
[0067] **31**—seat back plate
[0068] **32**—wooden supporting slats
[0069] **33**—seat stand
[0070] **34**—wooden panels seat **3**×
[0071] **35**—plexi user interface
[0072] **36**—led ring print
[0073] **37**—aluminium structure+wood
[0074] **38**—head print
[0075] **39**—mounting plate prints
[0076] **40**—relay
[0077] **41**—wooden front
[0078] **42**—elco
[0079] **43**—wifi router
[0080] **44**—wooden arch
[0081] **45**—back plate
[0082] **46**—pillar
[0083] **47**—converter
[0084] **48**—bicycle frame+crankshaft
[0085] **49**—foot plate
[0086] **50**—adjustable feet
[0087] **51**—crankshaft extension
[0088] **52**—bicycle motor
[0089] **53**—flywheel

[0090] FIG. **1** contains a schematic representation of an embodiment of the present invention, whereby the item of furniture (**1**) comprises a seating portion (**2**) and a table surface (**3**), a set of two pedals (**4**) and a plug socket (**5**).

[0091] FIG. **2** contains a schematic representation of an embodiment of the present invention, whereby the seating portion (**2**) is adjustable in height in relation to the table surface (**3**).

[0092] FIG. **3** contains a schematic representation of an embodiment of the present invention, whereby an incorporated lighting strip (**6**) is connected to the current generator and the intensity is connected to the strength of the generated current.

[0093] FIG. **4** contains a schematic representation of an embodiment of the present invention, whereby an incorporated lighting strip (**7**) is connected to the current generator and the number of lights that illuminate are related to the strength of the generated current.

[0094] FIG. **5** contains a schematic representation of an embodiment of the present invention, whereby the plug socket (**5**) is used to power a laptop.

[0095] FIG. **6** contains a schematic representation of an embodiment of the present invention, whereby the seating portion (**2**) slopes downwards towards the set of two pedals (**4**). Moreover, the item of furniture comprises two toothed wheels (**8**), a chain conveyor (**9**) and a generator (**10**). Optionally, the seating portion is not height adjustable.

[0096] FIG. **7** contains a schematic representation of an electrical connection between the generator and the plug socket according to an embodiment of the present invention, including a generator (**10**), a safety relay (**11**), a Zener circuit (**12**) of preferably 30V, a dump load resistor (**13**), a load current limiter circuit (**14**), a 'green light switch' circuit, an ultra-capacitor of preferably 10.7F and 30V, a DC/AC inverter (**17**) of preferably 300 W and a temperature display (**18**).

[0097] FIG. **8** contains a schematic representation of different arrangements, whereby a number of items of furniture (**1**) according to an embodiment of the present invention are joined together around the same table surface (**3**). The arrangement in which 3 items of furniture are joined together, is shown in greater detail, including a common table surface (**3**), a number of seating portions (**2**), several sets of pedals (**4**) and a plug socket (**5**).

[0098] FIG. **9** contains a schematic representation of how an item of furniture with a table surface (**3**) can be combined in a modular manner by means of a hole (**19**) in the said table surface with a second item of furniture, whereby each item of furniture comprises a central column that fits into the said hole.

[0099] FIG. **10** contains a schematic representation of an embodiment of the present invention in a central vertical structure, such as a bar stool, comprising a seating portion (**2**), a generator (**10**), a belt pulley (**20**), an intermediary belt pulley (**21**), a set of pedals (**4**), a pressure roller (**22**), and a belt conveyor (**23**).

[0100] FIG. **11** contains a schematic representation of different arrangements, whereby a number of items of furniture (**1**) are combined together according to an embodiment of the present invention around the same table surface (**3**), forming in this case a linear arrangement.

[0101] FIG. **12** contains a schematic representation of different arrangements, whereby a number of items of furniture (**1**) are combined together according to an embodiment of the present invention around the same table surface (**3**), forming in this case a circular or a snake-like formation.

[0102] FIG. **13** provides a schematic view of an embodiment of the invention, whereby multiple items of furniture (**1**) are coupled through a single table surface (**3**) to form a linear arrangement.

[0103] FIG. **14** provides a schematic view of an embodiment of the invention, whereby multiple items of furniture (**1**) are coupled through a single table surface (**3**) (check with rest of translation) to form a snake-like arrangement.

[0104] FIG. **15** illustrates an embodiment of the invention, whereby three items of furniture (**1**) are coupled through a single common table surface (**3**) to form a circular arrangement.

[0105] FIG. **16** provides an exploded view of an item of furniture (**1**) according to an embodiment of the invention.

DETAILED DESCRIPTION

[0106] When, in the present text, the singular terms "a" or "an" and the singular verb forms are used, it is understood that, unless the context clearly implies the contrary, these shall also embrace the plural forms.

[0107] The terms "comprise", "comprises" are also understood to be synonymous with the terms "include", "includes" or "embrace", "embraces" and are intended to be inclusive or open and do not exclude accompanying, unspecified terms, elements, methods or stages. This also includes forms of expression, which only contain the specified terms, elements, methods or stages.

[0108] The enumeration of numerical values using sequences of figures is understood to include all values and fractions within these sequences and those values at the end points cited.

[0109] Where used in reference to a measurable value such as a parameter, a quantity, a period of time and so on, the term "approximate/ly" is understood to signify variations of +/−10% or less, preferably +/−5% or less and more preferably +/−1% or less of and with effect from the value so specified insofar as the variations apply to the invention that is being described. It must be understood that the value to which the term "approximate/ly" relates, must also be stated.

[0110] All documents cited in the present description are fully incorporated by reference. Unless otherwise stated, all terms used within the context of the present invention, including technical and scientific terms, are understood to have the usual significance that would be expected by a person skilled in the art. For further guidance, definitions are included for the further clarification of terms that are used in the description of the invention.

[0111] In an initial aspect, different embodiments of an item of furniture are provided. In a particular embodiment, an item of furniture is provided, which item of furniture includes a seating portion, whereby the said item of furniture is further characterised by the presence of:

[0112] a set of two pedals enabling the user to pedal from a sitting position, whereby the said set of pedals is connected to a generator.

[0113] In particular embodiments, the item of furniture further comprises

[0114] an energy buffer connected to the generator;

[0115] In particular embodiments, the generated energy is intended for use at least in part by a removable electrical device which can be connected to the item of furniture. In particular embodiments, the item of furniture comprises:

[0116] one or more plug sockets connected to the generator and/or to the energy buffer.

[0117] In further particular embodiments, the item is furniture is further characterized that it comprises a table surface, more particularly a table surface which is physically connected to the seating portion.

[0118] In particular embodiments of the item of furniture envisaged herein all of the elements indicated above are present. However, other embodiments are also envisaged herein. For instance, embodiments are envisaged in which the seating portion is optional. In these embodiments, the pedals can be operated from a separate, freestanding seating portion. For a person skilled in the art therefore, it should be clear that the relative positions of the different elements in relation to each other can vary from one embodiment to the next. Particular embodiments in this respect will be detailed below. Further, in other aspects, the present invention proposes certain embodiments in which the energy buffer is optional. According to a further aspect, the present invention proposes embodiments in which the generator is optional and additionally certain embodiments in which the plug socket and/or energy buffer is optional. In certain embodiments, the electrical current that is created is not or not only available through one or more plug sockets connected to the generator and/or energy buffer but can be used to power e.g. a system or device that is incorporated in the item of furniture or is collected for other purposes.

[0119] According to the present invention, the item of furniture is so designed that the seating portion that is to be used (regardless of whether it is incorporated into the item of furniture) and the pedals are so laid out, or can be so laid out, in relation to each other that the user can pedal in an intensive and ergonomically effective manner. The module enables the user to move (i.e. to pedal) in a moderately intensive manner from a sitting position while he carries out his work, uses the computer, reads, eats or just relaxes. Within the context of the present invention, it has been established that a moderately intensive pedalling equates to a speed of approximately 12 km/h. Preferably, the user should expend energy that equates to a speed of between 1 km/h and 60 km/h and more preferably a speed of between 5 km/h and 20 km/h and even more particularly a speed of between 10 km/h and 15 km/h. It has also been proved that performance in terms of contextual/cognitive tasks improves significantly if a person pedals at a moderately intensive rate.

[0120] In particular embodiments, the maximum noise level emitted by the item of furniture is lower than 60 dB, more preferably lower than 50 dB, even more preferably lower than 40 dB and most preferably lower than 30 dB.

[0121] In particular embodiments, the pedals have treadles that are shorter than 170 mm, more preferably shorter than 160 mm and most preferably shorter than 150 mm.

[0122] In particular embodiments, the output capacity of the user lies between 50 W and 150 W. More particularly, the output voltage of the consumer is 220V/110V and the output voltage of the generator is 12V/24V. However, in specific embodiments of the item of furniture according to the present invention, it is stipulated that the generated energy is (also) used (at least in part) locally. In such an embodiment, it is

stipulated that energy output generated by pedalling at a moderate speed (20 W-200 W) is close to the level consumer by a modern laptop (75 W).

[0123] In specific embodiments, the item of furniture according to the present invention is provided with a plug socket for obtaining a supply of local energy. This enables the user to power a system locally via a power cable. More specifically, considerate is envisaged for use in powering a portable system, such as a gsm, a smartphone, a laptop, an electronic book, an i-pod, a cd player, and mp3 player or an i-pad etc.

[0124] As used in this context, the term "plug socket" signifies any electrical contact and/or connection that allows the user to take electrical current from the generator and/or the energy buffer. The term "plug socket" includes a classical contact plug that can be connected to a plug from an electrical or electronic system. The term "plug socket" also includes electronic ports, such as USB ports and firewire ports. The term "plug socket" also includes wireless electrical contacts, which, by means of an inductive coupling, for example by means of coils, can supply the necessary electrical current to a system or a battery. Such wireless power systems are already known in the state of the art and are used, for example, in electric toothbrushes. This has the advantage that there are no open contacts and no risk of electrocution. The term "plug socket" also includes a grid connection.

[0125] In a particular embodiment of the items of furniture envisaged herein, the plug socket comprises an inductive coupling. In one particular embodiment, the plug socket is a USB port. In another embodiment, the plug socket is a micro-USB port. In a further embodiment, the plug socket is a contact plug. In a further embodiment of the items of furniture envisaged herein, the plug socket is a grid connection.

[0126] In a particular embodiment, an item of furniture is provided as described above, which further comprises a table surface. More particularly it is envisaged that this table surface may be physically connected to the seating portion. More particularly, it is envisaged that a central structure extends from the seating portion into the leg of the table. Typically, the pedals are also connected to this central structure. A physical connection of the seating portion, pedals and table surface ensures that optimal ergonomic conditions can be ensured for the user. In this regard it is noted that it is envisaged that (as will be detailed below) the height of the seating portion and/or the table surface may still be adjustable. In this regard it is envisaged that, in embodiments characterized by a physical connection (e.g. by way of a central structure), the vertical distance between the pedals and the seating portion and/or the table surface may also be adjustable. In an alternative exemplary embodiment of the furniture item envisaged, this table surface is not physically connected to the seating portion, and e.g. a separate seating element is used. In particular embodiment of the items of furniture envisaged herein, the table surface is circular. In a further particular embodiment of the present invention, the table surface has the shape of a circle segment, e.g. spanning between 20° and 90°. In further particular embodiments the table surface is semi-circular. In a further embodiment of the present invention, the table surface is right-angled. In particular embodiments the furniture item comprises a central structure supporting the seating portion and extending to form the support for the table surface. The table surface can be supported centrally (such that the central structure forms a central leg of the table surface) or the table surface can be attached sideways to the central structure. In particular embodiments, this central structure extends significantly (i.e. at least 10 cm) above the table surface so to allow certain functionalities of interest to the user to be incorporated therein (e.g. socket, light, controls etc).

[0127] In a particular embodiment of the present invention, the table surface is circular and has a central hole fitting multiple central structures as described above, such that one item of furniture as envisaged herein can be combined with other, similar items of furniture whereby the circular table surface is common to the different items. In specific embodiments, the an item of furniture is envisaged which comprises a circular table surface with a central opening and different seating portions are supported by a central structure which extends vertically, whereby the opening in the table surface is larger than the central structure and whereby the opening can be used for combining the item of furniture with other items of furniture comprising a central structure.

[0128] In the following, the terms "table" and "table surface" are used as synonyms for each other. In particular embodiments, the table surface is made in a non-scratch material. Preferably the table surface is child-friendly. In further particular embodiments, the table surface is waterproof. In one embodiment, the table is made out of glass. In a further embodiment, the table surface is made out of Trespa and in a further embodiment it is made out of Corian.

[0129] The design of the seating portion and the table surface are not critical for the item of furniture according to the present invention. They can be combined by means of a basic structure or by an electricity cable if the plug socket is situated in the table. In an alternative embodiment, they can also be set up independently of each other, if, for example, the plug socket is located in the seating portion. In specific embodiments, the seating portion comprises a seating surface and also a backrest. It is important that the orientation of the seating surface and the table surface in the item of furniture are such that the user can carry out activities in an ergonomically balanced way (for example, working at a computer) at the table surface once he sits on the seating portion. Optionally, the seating portion and/or the table surface (or part of it) is height-adjustable by the user. Optionally, the seating portion and/or the table surface (or part of it) is adjustable in the width and/or the length by the user. Preferably, the chair height can be adjusted for people in the height range of between 1 m40 and 2 m. Preferably, the chair height of the seating portion does not have to be adjusted by mechanical means (adjusted/adapted) for users with a height of between 1 m55 and 1 m93.

[0130] In particular embodiments, the combination of a seating portion, pedals and table surface allows for at least three different types of support. A first support is provided by the table surface. This provides support to the arms and/or wrists and/or elbows during a sedentary activity. This support assists in keeping the upper body stable during movement of the lower body. A second support is provided by the seating portion. This seating portion takes on a large portion of the weight of the user, thereby neutralizing the movement of the lower body. A third support is provided by the axis of the pedals, which directs the forces of motion.

[0131] The combination of these three types of support maintains stabilization of the upper body, while the lower body is in movement of the lower body. Such stabilization allows for the user to work or play, while cycling at the same time. More particularly this allows the user to perform an activity involving placing one or more hands (directly or

indirectly) on a table surface. In particular embodiments, the three types of support are positioned relative to each other in order to allow the required stability. More particularly, the table surface is positioned above the seating portion, which itself is positioned above the pedals, such that the user can comfortably perform an activity with the hands on or near the table in an upright seated position.

[0132] In a further embodiment items of furniture as described above are provided, whereby the seating portion slopes down towards the pedals. In particular embodiments, the seating portion slopes down at an angle of at least 1°, more particularly at any angle of at least 5° and most particularly at an angle of at least 10°.

[0133] This enables a seating portion to be provided that does not need to be height adjusted and allows working to be carried out on the item of furniture in an ergonomically balanced manner.

[0134] In particular embodiments, the item of furniture comprises an extended structure which connects the seating portion and the pedals and which further extends to form the leg of the table surface. In particular embodiments, the table leg comprises a plug socket, more particularly above the table surface. In further particular embodiments, the table surface forms a circle around the leg, which extends vertically through a central hole in the table surface. This allows the part of the table surface extending away from the area of the seating portion to be used by another user and/or allows the combination of different units which share one circular table surface, as will be described more in detail below.

[0135] In a particular embodiment, the an item of furniture as described above is provided, which is characterised in that the item of furniture comprises a modular combination system, so that two or more units can be joined together, preferably such that the table surface becomes a common table surface.

[0136] The modular system of combination can comprise a central axis. In a particular embodiment of the devices described herein, two or more for example three, four, six, eight or twelve units can be joined together around a central axis. In a particular embodiment, the modular system of combination comprises different units whereby the seating portion of each unit is oriented towards and optionally connected to a central axis, enabling two or more units to be combined with a common table surface. In particular embodiments, the central axis extends vertically through the table surface.

[0137] In further embodiments, the modular system of combination can comprise a lateral system of combination of the two or more items of furniture. In a particular embodiment of the present invention, two or more, for example three, four, six, eight or ten items of furniture can be joined together in a row. This type of lateral combination can result in a linear arrangement or an arrangement at a certain angle, producing for example a snake-like layout. Also for these embodiments it is envisaged that the different items can be positioned such that they can form a common table surface. The common table surface in these embodiments can be made in one piece or can be formed by joining of the different table surfaces of the individual units.

[0138] Because of the different possibilities of combining the items of furniture with each other, the final result can be adapted to match the dimensions and the orientation of the room in which the item of furniture is to be installed.

[0139] Thus, in specific embodiments, the item of furniture as described herein comprises two or more seating portions and also two or more accompanying sets of pedals arranged around a single table surface. In further embodiments, the table surface is circular and the two or more seating portions are arranged at an equal distance from each other around the table surface. In other specific embodiments, the different seating portions are joined together and the basic structure has a central column (onto which optionally the table surface is secured) with projections in the direction of the different seating portions. In specific embodiments, the central axis is conical in shape. In one specific embodiment, an item of furniture is envisaged which comprises three sets of pedals and accompanying seating portions, which are arranged at the same distance from each other around a central circular table. In a particular embodiment, the height of the central column is lower than eye-level.

[0140] In a further embodiment, the application provides an item of furniture such as those described above that further comprises a grid connection, which enables the energy that is produced to be connected to a grid. In this way, the current that is generated can be transferred to other consumers.

[0141] In a further embodiment, the application provides an item of furniture as described above that comprises additionally a charging module that enables the energy produced to be transferred to a connected electrical or electronic system. Charging modules are known in the state of the art and the actual type of these is not critical for the present invention. More precisely, one or more charging modules are envisaged which are suitable for electronic devices such as a gsm, a smartphone, a laptop, an electronic book, an i-pod, a cd player, an mp3 player or an i-pad etc.

[0142] The one or more plug sockets and/or charging modules are preferably incorporated into the item of furniture at a point where they are easily accessible for the user, more specifically in the vicinity of the table surface, for example in the table surface itself, in a basic structure (i.e. supporting the table surface and/or seating portion, such as in a central column) or in any other structure. In particular embodiments, the one or more plug sockets and/or charging modules are incorporated in a structure that projects above the top of the table surface. Indeed this is of particular interest in those embodiments where the furniture item is to be used with varying electrical devices, e.g. devices which are maintained on the table surface only during actual use by the user (e.g. portable phone, laptop owned by the user).

[0143] However, it can be envisaged that the one or more plug sockets and/or charging modules are positioned below the table surface in cases where it is of interest to save as much space as possible on the table surface and/or where the furniture item is envisaged for use of an electrical device for which access to the plug socket and/or charging module is not required. This can be the case e.g. where the electrical device is to be maintained on the table surface, e.g. because it is not owned by the user but provided for use by the user of the furniture item by a commercial or government institution (e.g. computer or tablet comprising information of interest to the user).

[0144] In a particular embodiment of the furniture item provided herein, the charging module also comprises a wireless charging system, for example, an inductive coupling, for example by means of coils. Such wireless charging systems are known in the state of the art and are used in particular in electric toothbrushes. In such cases, it can be envisaged that the electronic device to be charged has to lie, for example, flat

on the table surface so that it can be charged. In a particular embodiment the charging module comprises a USB port or a micro-USB port.

[0145] The present application further provides an item of furniture such as those described above, which in particular embodiments, additionally comprise a central processing unit that receives data from the generator and/or from sensors connected to the pedals. Such sensors may be but need not be positioned on the pedals. Particularly, the central processing unit can be controlled through a wireless connection. More particularly, the item of furniture comprises a display that is connected to the central processing unit.

[0146] In specific embodiments, the item of furniture according to the present invention comprises a central processing unit that receives data from the generator or from sensors capable of detecting movement of the pedals. These data may relate to the amount of movement that is being/has been carried out. This can optionally be given at intervals (for example, equivalent to the distance covered if the pedalling movement is carried out on a standard bicycle) or in the form of time performance (distance/time).

[0147] Additionally or alternatively the data can relate to the amount of capacity (W) or energy (joules, kcal) produced. This can be expressed quantitatively or qualitatively (schematically of pictorially). At the same time, these data can optionally also be relayed to a data receiver, such as a gsm, a pc or a laptop, where the data can be consulted.

[0148] Specific embodiments of the item of furniture as envisaged herein provide that these data can be relayed via a wireless or non-wireless connection. In this way, for example, the data can be transferred to a local display. This local display may or may not be physically connected to the item of furniture. In exemplary embodiments, the central processing unit comprises a memory for the storage of data. As indicated above, the item of furniture as envisaged herein can be optionally provided with a display, on which information concerning the movement activities of the user can be presented. Thus, in particular embodiments, the display allows the user to access information on time and/or intensity of movement of pedals by said user.

[0149] In an exemplary embodiment, the display is arranged on or above the table. In an exemplary embodiment an item of furniture as described above is provided that comprises a connection to the internet or to a network. In particular embodiments, this connection allows wireless access to the internet by devices located in the vicinity (e.g. on the table surface) of the item of furniture. In an exemplary embodiment, this connection allows such devices to be connected to social networking media.

[0150] In particular embodiments it is envisaged that the data, received by the processor from the generator or from sensors detecting the movement of the pedals, are relayed to a mobile network. In this respect, the data (whether restricted and/or protected or not) can be made accessible via the internet. The availability of these data through a mobile network enables access to be given to these data to different commercial and/or non-commercial services. In this way, it is possible for products to be offered by certain commercial services that have access to said information (optionally in exchange for the supply of generated current). Thus, for example it can be envisaged that the telecommunications industry could offer the following products: telephone or SMS credit, internet connection time etc.

[0151] In an exemplary embodiment envisaged herein, this information is available via social networking media, so that users can follow up and possibly compare their services. The term "social networking media" comprises on-line platforms where the users, with or without minimum intervention of a professional editor, provide the content. At the same time, it is known that there is mutual interaction and dialogue between the users. Examples of social networking media are: Facebook, Blogger, Google Buzz, Google+, Twitter, Myspace, Hyves, Linkedln, Google Docs, Dropbox.com, Flickr, Picasa, Youtube, and Vimeo. Preferably the social networking sites comprise blogs, such as for example Blogger, and/or social networking sites, such as for example Facebook or Twitter. In one particular embodiment of the furniture items envisaged herein, the data obtained by the processor from the generator or from sensors detecting the movement of the pedals is provided to and/or used by healthcare services and healthcare providers, such as home care services and general medical practitioners. This makes it possible for patients, more particularly certain types of patients in need thereof, such as for example, patients with heart problems or diabetes, to be monitored.

[0152] In a particular embodiment, the present invention relates to an item of furniture as described above, whereby the set of pedals is connected to a generator by means of a transmission system, which optionally comprises a toothed wheel transmission comprising either a single pedalling stage or a double pedalling stage. In further particular embodiments, a direct drive generator/motor is used which does not use internal gears. This ensures a minimal mechanical loss.

[0153] Where the pedals are connected to the generator by means of a transmission system in particular embodiments, the transmission system comprises a single pedalling stage. The transmission system may not comprise a toothed wheel. In a particular embodiment of the furniture items envisaged herein, the transmission system comprises a chain, a belt or a cycle belt.

[0154] The transmission ratio is dependent upon the type of generator. Commercially available generators (AC or DC) usually only function efficiently at levels above 200 rpm, in some cases above 500 rpm or even 1500 rpm. At comfortable pedalling, the level is around 50 to 60 rpm. Consequently, in particular embodiments, the transmission ratio is between ¼ and 1/30. In a further particular embodiment of the items of furniture envisaged herein, the transmission system has a transmission ratio of between 1/4 and 1/30 . In further particular embodiments, the transmission system has a transmission ratio between 1/17 and 1/30.

[0155] A double pedalling stage with two chains or belts (or a combination thereof) has a number of disadvantages, namely that it is complicated technically, it has a low level of efficiency because of the high speed of the belt and/or the chain in the second stage (with problems occurring mainly with chains), a high level of generated noise because of the high speed of the belt and/or chain in the second stage (with problems occurring mainly with chains) and the high cost of custom pulleys. This last problem can be resolved by using standard pulleys.

[0156] A single pedalling stage with a chain or a belt has the disadvantage that the transmission ratio is too low for standard generators. On the other hand, this is a cheaper and technically a more simple solution.

[0157] A double pedalling stage with a chain and/or a belt followed by a toothed wheel transmission system has the

following disadvantages: a high noise level generated by the toothed wheel transmission system, a higher cost than a single pedalling stage with a chain or a belt and a lower level of efficiency that is comparable with the double pedalling stage system with two chains or belts. A double pedalling stage with a chain and/or a belt, followed by a toothed wheel gearing has the advantage that a standard (planetary) gearing system can be used.

[0158] A single pedalling stage with a gearing system has a number of disadvantages, namely that the coupling to the stages is technically very complicated (for example, shaft with bevel gear), it is a very costly solution, the bevel gear generates a high level of noise and the efficiency of the coupling is low. However, this is the most compact solution and a standard generator can be used.

[0159] In a particular embodiment of the furniture items described herein, the transmission system comprises a single pedalling stage with a chain or a belt, without a bevel gear arrangement.

[0160] In a particular embodiment, the application provides an item of furniture as described above, whereby the energy buffer comprises a rechargeable battery or a capacitor, preferably selected from the following list: a lead acid rechargeable battery, a lithium ion rechargeable battery, an ultra-capacitor and an electrolytic capacitor. Preferably, the energy buffer comprises an ultra-capacitor and a switched current limiter.

[0161] In specific embodiments, the generator is also coupled to a converter. This enables the energy that has been produced to be converted into a useful format. An energy buffer is advantageous as it levels out the voltage that has been generated, and the manner in which this is effected is determined by the requirements of the transformer. An energy buffer is also advantageous as it can absorb any brief pauses or variations in the pedalling speed. The buffer capacity determines the permitted pause and also the depth and the duration of each variation. An energy buffer is also advantageous as it can provide a current peak to enable the converter to be started.

[0162] The item of furniture envisaged herein also comprises a rechargeable battery. This enables the generated energy to be stored and its distribution to be controlled. Rechargeable batteries that are suitable for in this context are known in the state of the art. However, as the item of furniture envisaged herein includes specific designs, the rechargeable battery will in some embodiments be a custom dimensioned battery with an optimum service life.

[0163] A rechargeable lead-acid battery is heavy, has a polluting life-cycle, contains a corrosive acid and requires ventilation. Furthermore, its charging time is usually not less than 5 hours, regardless of the capacity and it has a limited number of charging/discharging cycles (typically 500 to 1000). There is a risk of 'overcharging' the battery with the possibility of permanent damage and a charging circuit is required. However, a rechargeable lead-acid battery has the advantage of providing a good price/capacity ratio.

[0164] A rechargeable lithium ion battery has an environmentally polluting life cycle, a limited number of charging and discharging cycles (typically 1000 to 2000) and a higher cost price per KWh than a lead-acid battery. In addition, there is also a risk of overcharging the battery with the possibility of permanent damage and a charging circuit is also required. For 12V systems, a BMS (Battery Management System) is necessary. The advantages of a rechargeable lithium ion battery include a faster charging time (min. 30 minutes) and a higher energy and power rating than a lead-acid battery. Consequently, the rechargeable lithium ion battery is lighter and more compact per kWh.

[0165] An ultra-capacitor has a higher energy rating and a higher price per capacity unit than the batteries indicated above. The voltage generated is directly proportional to the stored energy, therefore a converter with a wide input voltage range is necessary. The advantages of the ultra-capacitor include the fact that there is no risk of overcharging, it has a very high number charging/discharging cycles (+1,000,000) and no BMS or charging circuit is necessary. Furthermore, the capacity rating is higher than that of the other batteries referred to above and an ultra-capacitor has a much lower environmentally polluting life cycle than the other batteries. In a particular embodiment of the item of furniture envisaged herein, the energy buffer comprises an ultra-capacitor.

[0166] An electrolytic capacitor (or 'elco') has a lower energy rating and a higher price per capacity in relation to the energy buffers indicated above. The generated voltage is directly proportional to the stored energy so that a converter with a very wide input voltage range is necessary. The advantages of an electrolytic capacitor include the facts that there is no risk of overcharging, there is a very high number of charging and discharging cycles and no BMS or charging circuit is necessary. Furthermore, the capacity rating is higher than that of the other batteries and an ultra-capacitor has a much lower environmentally polluting life-cycle than the other batteries. In a particular embodiment of the present invention the energy buffer comprises an electrolytic capacitor.

[0167] In a particular embodiment, the present invention relates to an item of furniture as described above, whereby the energy buffer is wirelessly charged by the generator. Optionally this is done by means of a coil. The coil receives energy by inductance from a reciprocating coil.

[0168] In a particular embodiment, an item of furniture is provided as described above, whereby the generator is chosen from a list containing: a DC generator, an AC generator and a hub dynamo. Preferably the generator comprises an AC generator.

[0169] In the present description, the terms "generator", "current generator" and "voltage generator" are interchangeable.

[0170] Each of the sets of pedals in the item of furniture according to the present invention is coupled to a generator. The generator used within the framework of the present invention ensures that the energy from the pedals (i.e. mechanical energy) is converted into electrical energy. In specific embodiments, the generator is a dynamo or a DC generator, which converts the mechanical energy generated by the rotating shaft of the pedals into electrical DC energy. In specific embodiments, the generator is also connected to a converter, which enables the energy that is produced to be efficiently converted into a usable format.

[0171] In specific embodiments of the present invention, the generator is integrated into the item of furniture. It can be located in the vicinity of the seating portion or below the table surface. In specific embodiments, the generator is an efficient, compact and low-noise generator.

[0172] A DC generator comprises carbon brushes for switching and produces a generated DC current with the result that a rectifier is not needed. Although DC generators are relatively inexpensive, these brushes can be an undesir-

able source of noise and they are subject to wear. In another embodiment, brushless DC generators can be used.

[0173] An AC generator has no brushes, is quieter, less likely to wear and is more robust and compact. However, it does require a rectifier. In a particular embodiment of the present invention, the generator comprises an AC generator.

[0174] In a particular embodiment, the application provides an item of furniture as described above which further comprises an indicator that indicates how much energy is being consumed and/or how much energy is being generated. Preferably, this indicator comprises a light-emitting element, such as an LED strip.

[0175] In a particular embodiment, an item of furniture as described above is provided which further comprises an indicator that indicates how much energy there is remaining in the energy buffer. Preferably, this indicator comprises a light emitting element, such as a LED strip.

[0176] Indicators of this type are most particularly arranged on the item of furniture such that they are noticeable to the user during use. In a particular embodiment, indicators of this type are visual indicators and are arranged e.g. along the central column. In a further embodiment, indicators of this type are visible above or on the table surface. Additionally or alternatively, the indicator may comprise an acoustic signal, such as for example, an alarm. In a further embodiment of the present invention, the indicator also or alternatively comprises a motion signal, such as for example, a vibration.

[0177] In a particular embodiment the application provides an item of furniture as described above comprising an indicator, whereby the indicator comprises a light-emitting element with a variable lighting intensity. In a particular embodiment, an item of furniture is provided as described above, whereby the indicator comprises a number of light sources, whereby a variable number of these light sources can be switched on or switched off. In a further embodiment, the indicator comprises a light-emitting element having a variable lighting colour, whereby the colour of the lighting serves as an indication.

[0178] In particular embodiments of the items of furniture envisaged herein, an excess of, or too much energy in the energy buffer, or an excess of produced energy is indicated by a bright light, a number of illuminated light spots or a green coloured light. Similarly, a shortfall of energy in the energy buffer or an excess in the consumption of energy can be indicated by a faint light, fewer illuminated light spots or a red coloured light. A combination of the above is also possible.

[0179] In specific embodiments, the item of furniture envisaged herein is provided with one or more accompanying functions, which can be powered or not by the current generated in the generator. In this way, functions such as lighting, ventilation, heating, limited cooling or heating functions (e.g. in beverage containers), music installations, data display and the like can be incorporated into the item of furniture envisaged herein. In specific embodiments, provision is made for certain functions to be incorporated that are directly coupled to the current generator, whereby these are indicative of how much current is generated locally. In this way, for example, a lighting function (e.g. an LED light) is incorporated, whereby the strength of the light or the number of lighting points indicates how much current has been generated.

[0180] In specific embodiments a display can be integrated into the furniture item (e.g. into the table surface or the central structure) whereby different types of information can be accessed by the user, such as, for example, telephone directories, commercial information, tourist information and the like. In specific embodiments the display can be in the form of a touch screen where certain types of information can be selected.

[0181] The material from which the outer surfaces of the item of furniture according to the present invention are made is not critical. Preferably, this material is to be robust on the one hand and, visually attractive for the user on the other hand. The materials that come into consideration for this purpose are wood, PVC and other forms of plastic. It goes without saying that there are parts of the item of furniture may also be produced in other materials (e.g. metal), such as for example, moving parts, connecting parts, pedals etc. It will be obvious to the person skilled in the art that there are a great many specific embodiments that are possible.

[0182] In a further aspect, the present disclosure proposes applications for the item of furniture as described herein. For instance, the inventors propose the application of the item of furniture in different public and commercial environments. The item of furniture can be of particular use in semi-public places, e.g. in airports. There is certainly a need for passengers to be able to perform physical activity before boarding an aircraft. There is also an increasing need for additional plug sockets and charging capacity for electrical equipment in such places. The item of furniture that is described herein provides a perfect answer to both of these needs. It is also possible that certain features of the item of furniture provide an additional stimulus for the user to make use of the item of furniture, more particularly to generate electricity by moving the pedals (i.e. cycling on the device), namely free access to the internet or a greater bandwidth for mobile telephony and data communications.

[0183] The item of furniture envisaged herein could also be used as street furniture and/or garden furniture and in this case the emphasis is placed on energy pedalling. The item of furniture could also be used as school furniture, where stimulating physical activity is very important. Children are very mobile (i.e. active) by nature and the item of furniture described herein can contribute in the new tendency in schools to steer this mobility in good directions.

[0184] The item of furniture described herein can also be located in the home, which accords perfectly with the new social tendency of homeworking (or working from home). With this item of furniture, it is also possible to look after children or watch television while ensuring physical activity and generating electricity. It can also be used during creative activities, whether at home or in a workshop.

[0185] In specific applications, the item of furniture described herein can be regarded as being ideal office furniture. While working in an office, it is possible for the user to perform strenuous movements, which have a positive effect on both the user's health and on his intellectual performance. Furthermore, the item of furniture could be used in call centres or at check-out tills where operators are required to sit still for long periods of time, to allow physical movement during work.

[0186] In particular embodiments, the item of furniture as described herein can be used for displaying commercial or informal messages. This can be envisaged in different ways. In particular embodiments, the energy generated by the movement of the pedals (by the user) is used to power a display (optionally integrated in the furniture item as described above) displaying the commercial or informal information.

EXAMPLES

Example 1

The Green Table

[0187] FIG. **1** contains a schematic representation of an embodiment of the present invention, in which the item of furniture (**1**) comprises a seating portion (**2**) and a table surface (**3**), which are connected together. The item of furniture is further characterised by having a set of two pedals (**4**), which enable the user to pedal while in a sitting position, whereby the said pedals generate electrical current via a generator. This electrical current can be utilised via a plug socket (**5**) that can be accessed by the user in the area of the table surface.

[0188] FIG. **2** shows that the height of the seating portion (**2**) can be adjusted.

[0189] FIG. **3** contains a schematic representation of the item of furniture in accordance with a specific embodiment of the present invention, in which an incorporated strip of light (**6**) is coupled to the current generator. The intensity of the light is proportional to the strength of the generated current, with the result that the harder the user pedals, the brighter the generated light will be.

[0190] FIG. **4** contains a schematic representation of an embodiment of the present invention, in which an incorporated strip of light (**7**) is coupled to the current generator. The number of lights that illuminate is related to the strength of the generated current, so that the harder the user pedals, the higher will be the path of the strip of light.

[0191] FIG. **5** contains a schematic representation of an embodiment of the present invention, in which the plug socket (**5**) is used in a central column to power a laptop.

[0192] FIG. **6** contains a schematic representation of an embodiment of the present invention, in which the seating portion (**2**) is not height-adjustable, but slopes downwards towards the set of two pedals (**4**). This ensures an ergonomically balanced position. In the arrangement of FIG. **6**, a large gear wheel (**8**) with **44** gear teeth is used, which is coupled to a hub motor (24/36 Volts, three-phase) (**10**) via a chain transmission (**9**) system and a small gear wheel.

Example 2

Electrical Switching between the Generator and the Plug Socket

[0193] An electrical switching system between the generator and the plug socket in accordance with a non-limiting embodiment of the present invention, as illustrated in

[0194] FIG. **7**, is illustrated below.

[0195] The greatest challenge comes from the fact that the capacity delivered by the generator has a strongly variable voltage, which is in direct proportion to the pedalling speed. To be able to convert this into a constant mains voltage, the inverter must have an input voltage range that is as wide as possible. One inverter with a similarly wide range is the SM 4081 by 'Custom PSU Design'. This has a useful voltage window of 10.6 to 30V.

[0196] Preferably the buffer that is chosen is an ultra-capacitor. An interesting example in terms of capacity/cost price in this case is a 2.5V version, supplied by 'RS Components', with a capacity of 150F. If the system is based on a maximum system voltage of 35V, a series switching of 14 units will be necessary. The total capacity will then be 150 F/14=10.71 F. This implies a total storage capacity (at 30V) of (10.71 F×(30V)^2)/2=4819.5 J. But since a voltage level of less than 10.6V is not usable for the inverter, the following 'residual capacity' cannot be used: (10.71 F×(10.6V)^2)/2=1203.4J. The total useful buffer capacity is therefore 4819.5 J−1203.4 J=3616.1 J. In principle, the residual capacity remains at all times in the buffer and will only 'leak away' as a result of self-discharge of the capacitors after a period of several weeks. If the systems are used frequently, the user will not find this a disadvantage. Only after a prolonged period of disuse, will the first user find that he has to pedal longer than usual in order to recharge the empty buffer.

[0197] The useful buffer capacity of approximately 3600 J accords with a capacity of 360 W over a period of 10 seconds, or 180 W over 20 seconds, and so on. The size of the buffer capacity is a balancing exercise: if the buffer is chosen to be too large, the user will have to pedal far too long (starting with an empty buffer) until the buffer is sufficiently full to emit a 'green light'. If the buffer is too small, the level of energy will fall very sharply during pauses or slow pedalling, as a result of which the inverter will be more frequently switched on and off again.

[0198] One feature of (ultra-)capacitors is that they have a very low internal resistance. The result of this is that the loading of the generator will be at its maximum when the buffer is being charged (because of the high current strength), so that the user will encounter a very high level of pedalling resistance (although this period will be very brief, because the buffer refills very quickly). This can be compared with the extra effort required when pedalling up a steep gradient. It will be possible to achieve with a few revolutions of the pedals, but it will take a lot of effort. As this is not likely to be pleasant for most users, the use of a 'load current limiter' is recommended with the ultra-capacitor. This can be achieved with the use of a simple resistance, but in this case too much efficiency is lost. For this reason, the preference is to include a switched current limiter. In a particular embodiment of the present invention, the item of furniture comprises a load current limiter.

[0199] One advantage obtained from the use of ultra-capacitors is the characteristic that the voltage is in direct proportion to the charge. Consequently, it is very easy to measure the amount of energy that is stored in the buffer. The 'green light switch' in the system, switches the inverter on at a certain voltage level at the buffer and thereby when a certain quantity of energy has been stored in the buffer. This switch is advantageous because otherwise the inverter would switch itself on at a lower level (10.6V), thereby producing a peak current with the result that the buffer voltage immediately falls back to below 10.6V, so that the inverter is switched back off and so on. (A possible hysteresis has not been taken into account here). In a particular embodiment of the present invention, the item of furniture comprises a green light switch. In further particular embodiments, this switch is switched at approximately one half of the (usable) capacity. This gives the user the possibility of pedalling harder than necessary, even when the light is green, so as to provide the energy needed for the user and thereby replenish the buffer.

[0200] As feedback, the user will be able to see a kind of 'thermometer' of LED's, in which the voltage in the buffer is shown as the temperature. ('temperature display' in the drawing). As the user starts to pedal, more and more red LED lights illuminate (the temperature starts to rise), until the inverter is switched on and the section with the green lights is reached.

As the buffer continues to refill, (by pedalling faster than necessary in order to provide the consumer with energy) more green LEDs will be illuminated until the buffer has been completely filled. If the user takes a break, or pedals more slowly, the temperature will be seen to fall back (the speed at which it falls will depend upon the consumer's capacity) until all green, and then all red lights are extinguished and the inverter is switched on. In terms of electronics, the above principle is simple to implement.

[0201] In one embodiment, a system is proposed that allows the user to pedal even faster, even after all the LEDs are green indicating that the buffer is full. This can quickly be the case if only a low-lever consumer has been plugged in or if the user intends to pedal without having plugged in a consumer. This system will in particular embodiments also ensure that the system voltage can never exceed a certain maximal voltage (the voltage supplied by the generator is directly proportional to the speed of pedalling, which, in principle, is not limited), because otherwise the components will fail. In particular embodiments, the system will ensure that the voltage never exceeds 35V.

[0202] In order to achieve the above, the scheme includes a so-called 'dump load', which is connected to a Zener circuit. This circuit ensures that from a system voltage of 30V a progressive current passes through the 'dump load resistor', as a result of which the redundant capacity is converted into heat. The effect of this is that, once the buffer has been completely filled, the consumer perceives a progressively increasing resistance if the pedalling speed is increased. In a particular embodiment of the present invention, the item of furniture comprises a dump load.

[0203] It is envisaged that in particular embodiments the system may also comprise a safety relay that will cut off the generator completely from the electrical circuit in the event of the pedalling capacity becoming so high that that it can no longer be dissipated by the dump load. The effect of switching on this relay can be compared with a bicycle chain breaking while cycling: all pedalling resistance suddenly disappears. This is an unpleasant experience for the consumer and therefore to be avoided wherever possible. In a particular embodiment of the present invention, the item of furniture comprises a safety relay.

Example 3

Combining Different Modules

[0204] FIG. **8** contains a schematic representation of different attangements, in which a number of items of furniture (**1**) according to an embodiment of the present invention are connected to each other around a single table surface (**3**). In this example, three, six or eight items of furniture are combined around a single table surface. In a particular embodiment of the present invention, the indicators are visible for all consumers.

[0205] FIG. **9** contains a schematic representation of how an item of furniture comprising a table surface (**3**) can be combined in a modular manner by means of a hole (**19**) in the said table surface with a second item of furniture (not having a table surface). Both items of furniture comprise a central column that fits into the hole (**19**) of the table surface (**3**).

Example 4

Shape of the Stool

[0206] FIG. **10** contains a schematic representation of an embodiment of the present invention in a central vertical structure, typically in the form of, but not necessarily limited to, a bar stool. The seating portion (**2**) is height-adjustable and is supported by a tubular profile of 30/30/2 mm. The generator (**10**) is a 12V DC 1000 rpm, 150 W generator. The generator is height-adjustable for the purpose of adjusting the belt tension. The item of furniture also comprises a pulley (**20**) mounted on bearings on the pedals (**4**) and an intermediary pulley (**21**) mounted on the central structure with an acceleration of ⅕. The set of pedals (**4**) comprises a crank set of 150 mm with pedals and is mounted on bearings. The item of furniture also comprises a pressure roll (**22**) and a belt transmission system (**8**) comprising plastic ribbing strips. The thickness of the belt is 4.6 mm, the distance between the teeth is 3.56 mm and the width is 5 ribs. When the user sits on the item of furniture, he can set the system in motion by pedalling. The system combines two transmission systems, each having an acceleration of at least ×5. The energy supplied by the generator is fed via an electronic charging regulator to a buffer battery. This buffer supplies usable energy to the consumer via a DC/AC converter.

Example 5

Alternative Arrangements

[0207] FIG. **11** contains a schematic representation of different arrangements, in which a number of items of furniture (**1**) according to an embodiment of the present invention are connected together around a single table surface (**3**), forming in this case a linear arrangement.

[0208] FIG. **12** contains a schematic representation of different arrangements, in which a number of items of furniture (**1**) according to an embodiment of the present invention are connected together around a single table surface (**3**), forming in this case a circular and a snake-like arrangement.

1. An item of furniture comprising

a seating portion;

a set of two pedals enabling the user to pedal from a sitting position on the seating portion, whereby this set of pedals is connected to a generator;

a table surface; whereby the table surface is physically connected to the seating portion;

whereby the item of furniture is further characterized in that said item of furniture comprises a modular system of combination enabling two or more items of furniture to be connected together in a modular manner.

2. The item of furniture according to claim **1**, wherein said modular system of combination enables two or more items of furniture to be connected together in a modular manner, thereby generating a common table surface.

3. The item of furniture according to claim **1**, which further comprise an energy buffer which is connected to the generator.

4. The item of furniture according to claim **1**, which further comprises one or more plug sockets, preferably comprising a USB port or a micro-USB port, connected to the generator and/or to the energy buffer.

5. The item of furniture according to claim **1**, further comprising a grid connection enabling the energy that is produced to be connected to an electricity grid.

6. The item of furniture according to claim **1**, further comprising a charging module enabling the energy produced to be supplied to an electrical or electronic system connected thereto, preferably by means of an inductive coupling.

7. The item of furniture according to claim 1, that also comprises a central processing unit that receives data from the generator and/or from sensors coupled with the pedals, whereby the said central processing unit can optionally transmit data via a wireless connection and whereby the item of furniture optionally comprises a display that is coupled to the central processing unit.

8. The item of furniture according to claim 1, which further comprises a connection to the internet or to a network.

9. The item of furniture according to claim 8 above, in which the connection to the internet or to a network includes connection to social networking sites.

10. The item of furniture according to claim 1, in which the seating portion slopes downwards towards the pedals, preferably at an angle of at least 1°, more preferably at an angle of at least 5°, and most preferably at an angle of at least 10°.

11. The item of furniture according to claim 1, in which the set of pedals is connected to a direct drive motor or to a generator by means of a transmission system optionally comprising a gear system, whereby this gear system is either a double stage or a single stage system, preferably a single stage system.

12. The item of furniture according to claim 1, in which the energy buffer comprises a rechargeable battery or a capacitor, for example the rechargeable battery of an electric bicycle, preferably selected from a list containing a rechargeable lead-acid battery, a rechargeable lithium ion battery, an ultra-capacitor and an electrolytic capacitor and preferably in which the energy buffer comprises an ultra-capacitor and a switched current limiter.

13. The item of furniture according to claim 1, in which the generator is selected from a list containing a DC generator, an AC generator and a hub dynamo, preferably whereby the generator comprises an AC generator.

14. The item of furniture according to claim 1, further comprising an indicator that indicates one or more of the following:

how much energy is being consumed and/or

how much energy is being generated and/or

where applicable, how much energy there is remaining in the energy buffer, whereby said indicator comprises a light-emitting element, for example an LED strip.

15. The item of furniture according to claim 14 above, whereby the indicator comprises a light-emitting element with a variable lighting intensity and/or whereby the said indicator comprises a number of light sources, whereby a variable number of these light sources can be illuminated.

16. The item of furniture according to claim 1, further comprising an integrated display, said display provides one or more of the following information:

information on time and/or intensity of movement of pedals, optionally converted into information of calorie consumption.

17. An item of furniture according to claim 1, whereby the table surface is circular and comprises a central hole, whereby the item comprises a vertical structure extending through the central hole and said hole optionally allows the introduction of additional vertical structures so as to generate a combination of furniture items with a common table surface.

18. Use of an item of furniture according to claim 1 for displaying commercial or informal messages.

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