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(71) Applicant: **ARCELIK ANONIM SIRKETI** [TR/TR]; Sutluce Karaagac Caddesi No: 2/6 Beyoglu, 34445 ISTANBUL (TR).

(72) Inventors: **KAHRAMAN, Osman**; E5 Ankara Asfalti Uzeri, Tuzla, 34950 ISTANBUL (TR). **YILDIZ, Izzet**; E5 Ankara Asfalti Uzeri, Tuzla, 34950 ISTANBUL (TR). **KASAP, Fatih**; E5 Ankara Asfalti Uzeri, Tuzla, 34950 Istanbul (TR). **ULGER, Zehra**; E5 Ankara Asfalti Uzeri, Tuzla, 34950 ISTANBUL (TR). **SERT, Abdullah**; E5 Ankara asfalti uzeri, 34950 ISTANBUL (TR).

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(54) Title: A TEXTILE TREATMENT APPLIANCE

(57) Abstract: The present invention relates to a textile treatment device comprising a sensor used for measuring the parameters related to the functions thereof.

Description

A TEXTILE TREATMENT APPLIANCE

[0001] The present invention relates to a textile treatment device comprising a sensor used for measuring the parameters related to the functions thereof.

[0002] In household appliances, sensors are used for determining whether the functions can be carried out or for measuring the parameters required for carrying out the functions. Power required for the operation of the sensors is generally provided by the mains electricity. In most of the cases, said parameters must be dynamically measured, and for a proper and error-free performance of the functions, the sensor must be continuously energized during the entire operation time. While some of the parameters can be measured remotely, in other words in a contact-free manner in the household appliances, for measuring some of the parameters the sensor must contact the region where the parameter to be measured is present. In cases where the contact is necessary, if the region to be measured is moving or wet, problems of delivering energy to the sensor and transmitting data from the sensor arise. In the state of the art, in order to solve this problem, the sensors and circuit components such as data transmission means are energized by means of a battery. The users do not prefer solutions requiring batteries since the charging level of the battery must be continuously checked and the battery must be replaced when the charge is used up.

[0003] In the state of the art United States Patent Application No. US20150061460, it is disclosed that energy is generated by using the textile-based triboelectric effect.

[0004] In the state of the art United States Patent Application No. US20140338458, it is disclosed that a battery is charged by using the triboelectric effect.

[0005] The aim of the present invention is the realization of a textile treatment appliance wherein the sensor and other electronic circuit components which have similar power requirements are energized without using a battery.

[0006] The textile treatment appliance realized in order to attain the aim of the

present invention, explicated in the first claim and the respective claims thereof, comprises a generator circuit connected to the sensor and having at least one electrode which continuously moves and which is coated with a non-conducting material. The electrode in the generator circuit continuously moves, in other words intermittently contacts a surface or rubs against a surface so as to continuously move such that energy is obtained from load change/transfer occurring when different types of materials contact each other. By increasing the amount of load change/movement by coating the electrode with different non-conducting materials depending on the surface that the electrode intermittently contacts, the amount of triboelectric energy is increased. By using the energy obtained by means of the generator circuit, the sensor and/or other electronic circuit components such as data transmission means can be energized.

[0007] In another embodiment of the present invention, the generator circuit comprises at least two electrodes which periodically contact each other, and the coatings on the electrodes are selected from materials which are away from each other in the triboelectric series. The distance between the coating materials in the positive/negative scale plays a fundamental role in the amount of energy obtained.

[0008] In different embodiments of the present invention, the textile treatment appliance comprises a moving drum which rotates around itself and the sensor is disposed in the drum. In a version of this embodiment, energy is obtained by using balls which are free to move in the drum and which move in the drum with the movement of the drum. In another version, energy is obtained as the electrode provided on a protrusion on the outer surface of the drum periodically contacts a surface with the movement of the drum. In yet another version, energy is obtained by enabling an electrode at the rear surface of the drum which moves together with the drum to periodically contact an electrode positioned in alignment of the first electrode as a result of the rotation of the drum.

[0009] Detailed Description of the Invention

[0010] The textile treatment appliance comprises at least one sensor for

measuring the parameters related to the functions thereof. In the textile treatment appliance, the sensor measures the parameters related to the functions of the textile treatment appliance. For example, in laundry dryers, the dryness level of the laundry is measured by the sensors. The textile treatment appliance can be a household appliance such as laundry washing machine, laundry dryer, etc. or an appliance used for industrial purposes.

[0011] The textile treatment appliance of the present invention comprises a generator circuit which has at least one electrode moving in a continuous manner and coated with an insulating material, and which enables the sensor or other electronic circuit components to be energized. The sensors or other electronic components such as data transmission means, etc. used in the household appliances generally require very low power. In the textile treatment appliance of the present invention, energy is harvested from the load transfer originating from the triboelectric effect by the generator circuit. The electrode is coated with a non-conducting material in order to increase the amount of load transfer originating from the triboelectric effect. Thus, the sensors can be energized by using the triboelectric effect even in the household appliances where there is very low contact or rubbing. As the electrode in the generator circuit intermittently/periodically contacts any surface or rubs any surface on the textile treatment appliance by continuously moving, energy is generated due to the triboelectric effect between the electrode and the surface, which is then harvested. The energy harvested by the electrode is converted to the direct current or alternating current by means of circuit components such as capacitor, etc. for the sensor or other electronic circuit components in the generator circuit, and then transferred to the sensor such that the sensor and/or the electronic circuit components are energized. For example, in a laundry washing machine, a sensor which is positioned in the drum and a data transmission means which can receive/transmit Bluetooth or Wi-Fi signals can be energized by means of a generator circuit which is also positioned on the drum and which generates energy from the movement of the drum.

[0012] In another embodiment of the present invention, the generator circuit comprises the electrodes which contact each other and which are coated with non-conducting materials selected so as to be away from each other in the triboelectric series. The movements of the electrons on the electrodes contacting each other increase as the electrodes are coated with materials selected so as to be away from each other in the triboelectric series similar to the above-described embodiment, and thus the amount of load change originating from the triboelectric effect also increases, which in turn results in a larger amount of power generation.

[0013] In another embodiment of the present invention, the textile treatment appliance comprises a drum which rotates around itself and the sensor which is disposed in the drum. The textile treatment appliance comprises a preferably cylindrical drum which rotates around itself like a laundry washing machine or laundry dryer. By energizing the sensors in the drum which rotates around itself by means of the generator circuit, difficulty in transferring energy into the drum is eliminated. For example, in the laundry washing machines, the sensors used for taking measurements in the drum are enabled to be energized by means of the generator circuit which is also disposed on the drum.

[0014] In another embodiment of the present invention, the generator circuit comprises a channel which is arranged in the drum and which has the electrodes, and the ball-shaped electrodes which can move inside the channel. The electrodes are placed into the channel arranged in the drum. By placing the ball-shaped electrodes into the channel, the balls are enabled to move inside the channel with the rotation of the drum. By means of the electrodes on the inner surface of the channel, the energy originating from the movement of the balls is harvested.

[0015] In another embodiment of the present invention, the generator circuit comprises at least one protrusion which is provided on the outer surface of the drum and the electrode which is disposed on the protrusion. The protrusion on the drum periodically contacts the inner surface of the textile treatment appliance with the rotation of the drum around itself, and the energy originating from the triboelectric effect is harvested by means of the

electrode disposed on the protrusion. In an example of this embodiment, in the textile treatment appliance which is a laundry washing machine, the electrode on the protrusion on the outer surface of the drum goes in and out of water in the tub with the rotation of the drum, and the energy required for the sensor is obtained thanks to the triboelectric effect occurring on the electrode as the electrode contacts the water and goes in and out of the water.

[0016] In another embodiment of the present invention, the generator circuit comprises two electrodes which are connected to the drum shaft, with one rotating together with the drum shaft and the other rotating independent of the drum shaft. In this embodiment, the electrodes on the drum shaft behind the drum are arranged at the same level. As the drum rotates around itself, the electrode rotating together with the drum shaft also rotates around itself and periodically contacts the electrode moving freely on the shaft, and thus energy is obtained thanks to the triboelectric effect. For example, as an electrode in the form of a propeller arranged on the rear surface of the drum contacts another oppositely-positioned propeller-shaped electrode, energy originating from the triboelectric effect is harvested.

[0017] By means of the present invention, energy is generated by using the triboelectric effect originating from the contact of two different materials, and the sensors used in the textile treatment appliance are energized in situ without using a battery. Thus, the sensors can continuously take measurements, and the problem of installing a power transmission line on a moving component in the household appliances which contain moving components such as drum, etc. is eliminated.

Claims

1. A textile treatment appliance **comprising** at least one sensor for measuring the parameters related to the functions thereof, **characterized by** a generator circuit which has at least one electrode moving in a continuous manner and coated with an insulating material, and which enables the sensor or other electronic circuit components to be energized.
2. A textile treatment appliance as in Claim 1, **characterized by** the electrodes which contact each other and which are coated with non-conducting materials selected so as to be away from each other in the triboelectric series.
3. A textile treatment appliance as in any one of the above claims, **characterized by** a drum which rotates around itself and the sensor which is disposed in the drum.
4. A textile treatment appliance as in Claim 3, **characterized by** a channel which is arranged in the drum and which has the electrodes, and the ball-shaped electrodes which can move inside the channel.
5. A textile treatment appliance as in Claim 3, **characterized by** at least one protrusion which is provided on the outer surface of the drum and the electrode which is disposed on the protrusion.
6. A textile treatment appliance as in Claim 3, **characterized by** two electrodes which are connected to the drum shaft, with one rotating together with the drum shaft and the other rotating independent of the drum shaft.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
INV. H02N1/04
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H02N

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 997 951 A1 (ELECTROLUX HOME PROD CORP [BE]) 3 December 2008 (2008-12-03)	1-3
A	paragraphs [0005], [0013], [0017], [0018] figure 1	4-6

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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

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"&" document member of the same patent family

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

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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1997951 A1	03-12-2008	AT 501300 T	15-03-2011
		EP 1997951 A1	03-12-2008
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		PL 1997951 T3	30-11-2011