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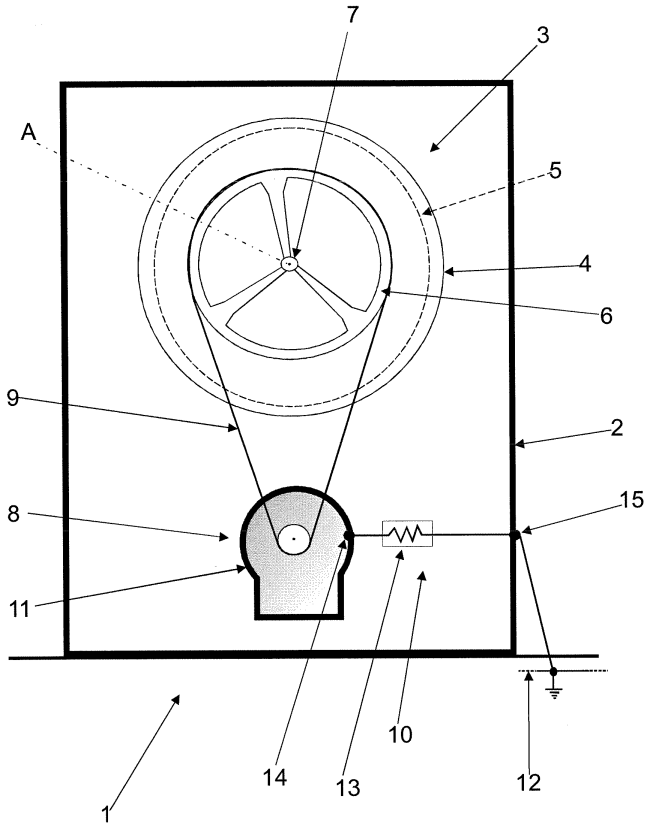
(54) **Electric household appliance**

(57) There is described a electric household appliance (1) having an outer casing (2); a laundry drum (5) housed inside the outer casing (2) and rotating about a predetermined axis (A) of rotation; and an electric motor (8) having an outer frame (11) and for rotating the drum (5) about the axis (A) of rotation; the electric household appliance (1) has an electric protection circuit (10), which in turn has a resistor or an inductor (13) having a first terminal (14) connected to the outer frame (11) of the electric motor (8), and a second terminal (15) connected to the outer casing (2) of the electric household appliance (1).



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Description

[0001] The present invention relates to an electric household appliance.

[0002] More specifically, the present invention relates to an electric household appliance preferably corresponding to a washing machine comprising an electric protection circuit connecting parts of the appliance to a substantially zero reference potential; to which the following description refers purely by way of example.

[0003] As is known, currently marketed washing machines have an outer casing in which is fitted a laundry wash assembly normally comprising a wash tub; a wash drum mounted inside the wash tub to rotate freely about a predetermined axis of rotation; a pulley fitted to the shaft rotating the wash drum; and an electric motor driven by an electric board and connected by a drive belt to the pulley to rotate the wash drum about the axis of rotation.

[0004] The above washing machines are also known to comprise an electric protection circuit connecting the outer casing of the washing machine and the outer frame of the electric motor electrically to an electric ground system, which, as is known, has a conveniently zero reference potential.

[0005] More specifically, in washing machines of the type described above, the electric protection circuit performs at least two functions: firstly, it provides for discharging to the ground system the electrostatic charges accumulating on the electric motor frame as a result of the drive belt rubbing on the motor shaft as the shaft rotates, thus preventing electrostatic discharges on the sensitive circuit parts of the electric motor and/or on the electric control board; and, secondly, it provides for discharging to the ground system any electric noise produced by switching of the brushes on the commutator of the electric motor.

[0006] To prevent conduction of high-frequency electric noise to the ground system, as required by current standards, the above electric protection circuit is also known to normally comprise a low-pass filter connected between the outer casing of the washing machine and the ground system to filter the high-frequency components from the electric signals circulating in the protection circuit before they reach the ground system.

[0007] Though efficient, the presence of the filter in the electric protection circuit has the drawback of greatly increasing the manufacturing cost of the circuit.

[0008] It is an object of the present invention to provide an electric household appliance featuring a highly straightforward, low-cost electric protection circuit designed to discharge to the ground system the electrostatic charges accumulated by various component parts of the washing machine, and at the same time to reduce high-frequency noise produced by various electric components of the appliance and supplied to the ground system.

[0009] According to the present invention, there is provided an electric household appliance as claimed in Claim 1 and, preferably, in any one of the following Claims depending directly or indirectly on Claim 1.

[0010] The present invention will be described with reference to the attached drawing, which shows a nonlimiting embodiment of an electric household appliance featuring an electric protection circuit in accordance with the teachings of the present invention.

[0011] Number 1 in the attached drawing indicates as a whole an electric household appliance preferably corresponding to a washing machine comprising an outer casing 2 made of metal and in which is fitted a laundry wash assembly 3, which comprises a wash tub 4 connected appropriately to outer casing 2, and a wash drum 5 mounted inside wash tub 4 to rotate freely about an axis of rotation A.

[0012] Washing machine 1 also comprises a pulley 6 fitted to the shaft 7 rotating wash drum 5; and an electric motor 8 driven by an electric board (not shown) and connected by a drive belt 9 to pulley 6 to rotate wash drum 5.

[0013] Washing machine 1 also comprises an electric protection circuit 10 electrically connecting outer casing 2 of the washing machine and the outer frame 11 of electric motor 8 to an electric ground system 12 at zero reference potential.

[0014] Electric protection circuit 10 substantially comprises a passive electrical device 13 having a first terminal 14 connected to outer frame 11 of electric motor 8, and a second terminal 15 connected to outer casing 2 of the washing machine. Electric protection circuit 10 also comprises an electric conductor connecting second terminal 15 of the passive electrical device 13 to electric ground system 12.

[0015] The passive electrical device 13 comprises a resistor or an inductor having an impedance which ranges between $470*10^3$ and 10^7 ohms. Tests show that a resistor or an inductor having an impedance approximately 10^6 ohms provides for effectively grounding the electrostatic charges accumulated by electric motor 8, while at the same time providing electric protection circuit 10 with sufficient impedance to reduce the high-frequency noise generated by electric motor 8.

[0016] The electric household appliance described above is extremely advantageous, in that the resistor or the inductor is an electric component extremely cheap, ensures electrostatic charge flow to the ground system, and at the same time has an extremely high electric circuit impedance at high frequencies, capable of suppressing the high-frequency noise generated by the electric motor.

[0017] Clearly, changes may be made to the electric household appliance as described and illustrated herein without, however, departing from the scope of the present invention as defined in the accompanying Claims.

Claims

1. An electric household appliance (1) comprising an outer casing (2); a laundry drum (5) housed inside

said outer casing (2) and rotating about a predetermined axis (A) of rotation; and an electric motor (8) having an outer frame (11) and for rotating said drum (5) about said axis (A) of rotation; said electric household appliance (1) being **characterized by** comprising an electric protection circuit (10), in turn comprising at least one resistor or at least one inductor (13) having a first terminal (14) connected to the outer frame (11) of said electric motor (8), and a second terminal (15) connected to said outer casing (2) of the electric household appliance (1).

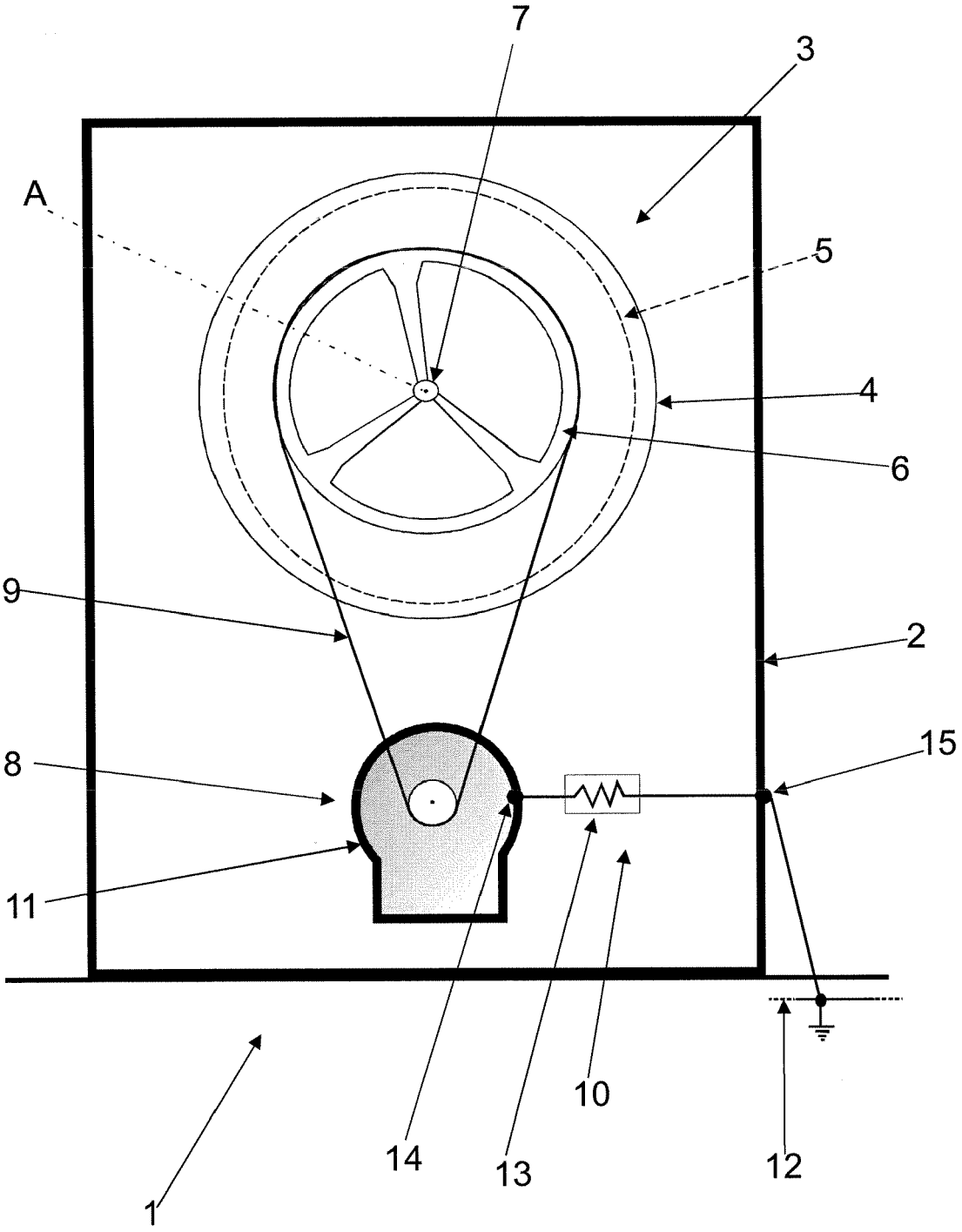
2. An electric household appliance as claimed in Claim 1, wherein said resistor or said inductor (13) has an impedance ranging between approximately $470*10^3$ and 10^7 ohms.

3. An electric household appliance as claimed in Claim 1, wherein said resistor or said inductor (13) has a impedance of approximately 10^6 ohms.

4. An electric household appliance as claimed in any one of the foregoing Claims, wherein said second terminal (15) of said resistor or said inductor (13) is connected to an electric ground system (12) at zero electric potential.

5. An electric household appliance as claimed in any one of the foregoing Claims and corresponding to a washing machine.

6. An electric household appliance as claimed in Claim 5, wherein said drum (5) corresponds to a wash drum having a shaft (7) fitted with a pulley (6) connected to said electric motor (8) by a drive belt (9).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EUROPEAN SEARCH REPORT

Application Number
EP 07 10 1137

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 09 131494 A (TOKYO SHIBAURA ELECTRIC CO) 20 May 1997 (1997-05-20) * abstract; figures * -----	1,4,5	INV. D06F37/30 D06F39/00
A	GB 650 601 A (ROBERTSHAW FULTON CONTROLS CO) 28 February 1951 (1951-02-28) * page 5, line 76 - line 80; figure 8 * -----	1-6	

TECHNICAL FIELDS SEARCHED (IPC)

D06F

1 The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	22 June 2007	DIAZ, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 10 1137

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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22-06-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 9131494 A	20-05-1997	NONE	
GB 650601 A	28-02-1951	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82