

(19)



(11)

EP 1 950 337 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
26.10.2011 Bulletin 2011/43

(51) Int Cl.:
D06F 37/30 ^(2006.01) **D06F 39/00** ^(2006.01)

(21) Application number: **07101137.3**

(22) Date of filing: **25.01.2007**

(54) **Electric household appliance**

Elektrisches Haushaltsgerät

Appareil ménager électrique

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI
SK TR**

(43) Date of publication of application:
30.07.2008 Bulletin 2008/31

(73) Proprietor: **Electrolux Home Products
Corporation N.V.
1130 Brussel (BE)**

(72) Inventor: **Casagrande, Stefano
33091 Vito d'Asio (IT)**

(74) Representative: **Nardoni, Andrea et al
Electrolux Italia S.p.A.
Corso Lino Zanussi, 30
33080 Porcia (PN) (IT)**

(56) References cited:
GB-A- 650 601 JP-A- 9 131 494

EP 1 950 337 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

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] JP 09 131494 discloses a motor covered with a mold resin that is installed on the outer bottom of an outer drum via a motor mount. An anchor bolt is inserted and fixed through a location hole of a stator core of the motor, and an earth connecting plate is fixed by the bolt as well. An earthing line is connected to the plate. The line is earthed via the mount.

[0006] 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.

[0007] 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.

[0008] Though efficient, the presence of the filter in the electric protection circuit has the drawback of greatly increasing the manufacturing cost of the circuit.

[0009] 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 electrostat-

ic 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.

[0010] 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.

[0011] 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.

[0012] 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.

[0013] 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.

[0014] 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.

[0015] 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.

[0016] The passive electrical device 13 comprises a resistor or an inductor having an impedance which ranges between $470 \cdot 10^3$ 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.

[0017] 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.

[0018] 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; an electric motor (8) having an outer frame (11) and for rotating said drum (5) about said axis (A) of rotation; and 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), **characterized in that** said resistor or said inductor (13) has an impedance ranging between approximately $470 \cdot 10^3$ and 10^7 ohms.
2. An electric household appliance as claimed in Claim 1, wherein said resistor or said inductor (13) has a impedance of approximately 10^6 ohms.
3. 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.
4. An electric household appliance as claimed in any one of the foregoing Claims and corresponding to a washing machine.
5. 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).

Patentansprüche

1. Elektrisches Haushaltsgerät (1), das ein Außengehäuse (2); eine Wäschetrommel (5), die innerhalb des Außengehäuses (2) untergebracht ist und sich um eine festgelegte Drehachse (A) dreht; einen Elektromotor (8) mit einem Außenrahmen (11) zum Drehen der Trommel (5) um die Drehachse (A); und einen elektrischen Schutzschaltkreis (10) aufweist, der seinerseits mindestens einen Widerstand oder mindestens eine Drossel (13) mit einem ersten Anschluss (14), der mit dem Außenrahmen (11) des Elektromotors (8) verbunden ist, und mit einem zweiten Anschluss (15), der mit dem Außengehäuse (2) des elektrischen Haushaltsgeräts (1) verbunden ist, aufweist, **dadurch gekennzeichnet, dass** der Widerstand oder die Drossel (13) eine Impedanz im Bereich von annähernd $470 \cdot 10^3$ und 10^7 Ohm auf-

weisen.

2. Elektrisches Haushaltsgerät gemäß Anspruch 1, wobei der Widerstand oder die Drossel (13) eine Impedanz von annähernd 10^6 Ohm aufweisen.
3. Elektrisches Haushaltsgerät gemäß einem der vorangehenden Ansprüche, wobei der zweite Anschluss (15) des Widerstands oder der Drossel (13) mit einem elektrischen Erdungssystem (12) mit elektrischem Nullpotenzial verbunden ist.
4. Elektrisches Haushaltsgerät gemäß einem der vorangehenden Ansprüche und in Entsprechung zu einer Waschmaschine.
5. Elektrisches Haushaltsgerät gemäß Anspruch 5, wobei die Trommel (5) einer Waschtrommel entspricht, die mit einer Welle (7) ausgerüstet ist, an der eine Umlenkrolle (6) angebracht ist, die mit dem Elektromotor (8) über einen Antriebsriemen (9) verbunden ist.

Revendications

1. Appareil électroménager (1) comprenant un boîtier externe (2) ; un tambour à linge (5) logé à l'intérieur dudit boîtier externe (2) et tournant autour d'un axe (A) de rotation prédéterminé ; un moteur électrique (8) ayant un cadre externe (11) et destiné à faire tourner ledit tambour (5) autour dudit axe (A) de rotation ; et un circuit de protection électrique (10), comprenant lui-même au moins une résistance ou au moins une bobine d'induction (13) ayant une première broche (14) connectée au cadre externe (11) dudit moteur électrique (8), et une seconde broche (15) connectée audit boîtier externe (2) de l'appareil électroménager (1), **caractérisé en ce que** ladite résistance ou ladite bobine d'induction (13) présente une impédance comprise dans une plage entre approximativement $470 \cdot 10^3$ et 10^7 ohms.
2. Appareil électroménager selon la revendication 1, dans lequel ladite résistance ou ladite bobine d'induction (13) présente une impédance d'approximativement 10^6 ohms.
3. Appareil électroménager selon l'une quelconque des revendications précédentes, dans lequel ladite seconde broche (15) de ladite résistance ou de ladite bobine d'induction (13) est connectée à un système de masse électrique (12) à un potentiel électrique nul.
4. Appareil électroménager selon l'une quelconque des revendications précédentes, et correspondant à une machine à laver.

5. Appareil électroménager selon la revendication 4, dans lequel ledit tambour (5) correspond à un tambour de lavage ayant un arbre (7) équipé d'une poulie (6) raccordée audit moteur électrique (8) par une courroie d'entraînement (9).

5

10

15

20

25

30

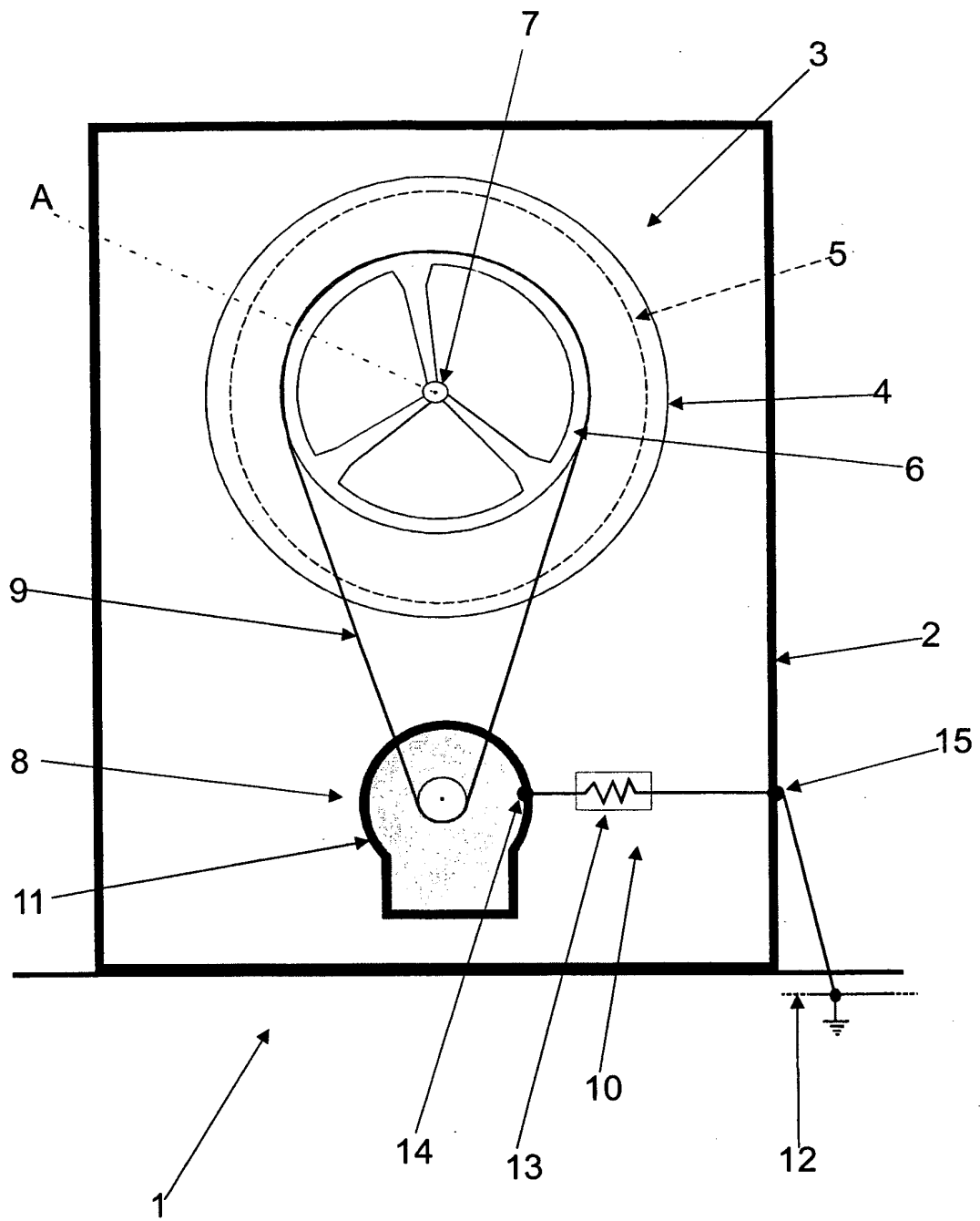
35

40

45

50

55



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 9131494 A [0005]