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(54) Title: HOUSEHOLD APPLIANCE INCLUDING A POWER SUPPLY MODULE AND A POWER CONSUMPTION MODULE

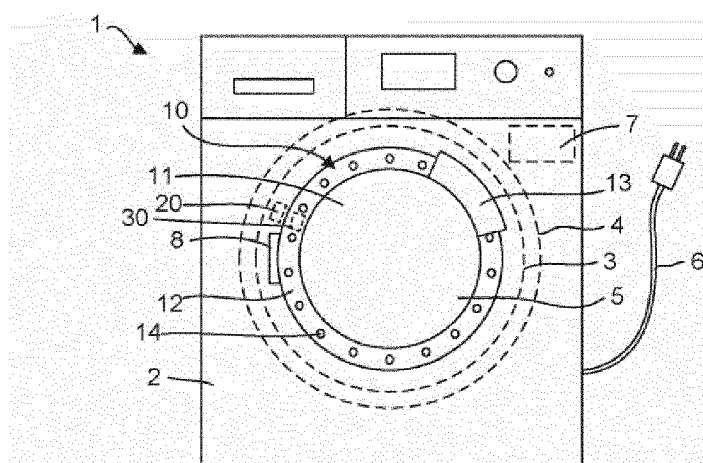


FIG. 1

(57) Abstract: The invention relates to a household appliance (1), including a first member (2) and a second member (10) which are mutually independent and capable of moving relative to each other. A power supply module (7) is disposed on the first member (2), and a power consumption module (14, 40) is disposed on the second member (10); the power supply module (7) is connected to a wireless power transmission device (20), the power consumption module (14, 40) is connected to a wireless power receiving device (30), and the wireless power transmission device (20) and the wireless power receiving device (30) are disposed in pair to fulfil contactless power transmission. Thanks to the contactless power transmission between the power consumption module (14, 40) and the power supply module (7), possible intertwining and abrasion of the electric wire connection are avoided.

HOUSEHOLD APPLIANCE INCLUDING A POWER SUPPLY MODULE AND A POWER CONSUMPTION MODULE

The present invention relates to a household appliance, including a first member and
5 a second member which are mutually independent and capable of moving relative to each
other, where a power supply module is disposed on the first member, and a power con-
sumption module is disposed on the second member, and in particular, to a water-carrying
household appliance.

10 A household appliance usually includes multiple power consumption elements, and
the power consumption elements are connected to a power supply module through elec-
tric wires. When the power consumption elements and the power supply module are
located on two independent members, the electric wires need to fulfill a connection across
the space between the two. When a large number of electric wires are used, identification
15 becomes difficult during after-sales repair. Particularly, when two members disposed with
the power consumption elements and the power supply module respectively are capable
of moving relative to each other, an electric wire connection between the power consump-
tion elements and the power supply module becomes difficult, and the electric wires for
connection is easy to be intertwined and abraded. Even in some cases, the electric wire
20 connection between the power consumption elements and the power supply module
capable of moving relative to each other is absolutely impossible, for example, when the
two members are rotatable relative to each other.

A household appliance, such as a washing machine, dish-washing machine, refrig-
25 erator, oven, microwave oven, and sterilizer cabinet, which has a body and a door hinged
to the body, is taken as an example. Some power consumption modules, such as a dis-
play module, a control module, and a sound module, are usually disposed on the door of
the household appliance, and the household appliance is usually connected to an external
power supply through the body, a power supply module is disposed on the body, and an
30 electric wire for connecting the power supply module and the power consumption module
usually passes through an electric wire channel disposed adjacent to a door hinge. This
structure requires a long electric wire, and requires an electric wire channel disposed
adjacent to the hinge to protect and hide the electric wire. Moreover, in use, a user opens

and closes the door very frequently. Frequent opening and closing of the door might snap or abrade the electric wire. The snap and abrasion of the electric wire may cause that the bare electric wire contacts the box body, and further cause an electric leakage.

5 In addition, for a water-carrying household appliance such as the washing machine and dish-washing machine, water might contact the electric wire for connection easily. This also causes a safety hazard to the electric wire for connecting the power consumption element and the power supply module which move relative to each other, especially when the electric wire becomes aged and abraded.

10 An objective of the present invention is to dispose a feasible and safe power supply device between an power consumption module and a power supply module which are mutually independent and move relative to each other, so as to solve the foregoing defects in the prior art.

15 For the foregoing objective, the present invention adopts a technical solution as defined in the independent claim attached. Preferred embodiments of the invention are subjects of the dependent claims attached, the subsequent disclosure and the attached drawing.

20 According to the invention, in a household appliance, including a first member and a second member which are mutually independent and capable of moving relative to each other, a power supply module is disposed on the first member, and a power consumption module is disposed on the second member, the power supply module is connected to a
25 wireless power transmission device, the power consumption module is connected to a wireless power receiving device, and the wireless power transmission device and the wireless power receiving device are disposed in pair to perform contactless power transmission.

30 Preferably, the household appliance is a water-carrying electrical equipment.

Preferably, the wireless power transmission device and the wireless power receiving device are respectively disposed in a waterproof manner in the first member and the second member.

Preferably, the wireless power transmission device and the wireless power receiving device implement power transmission through electromagnetic induction or magnetic resonance coupling.

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Preferably, the wireless power transmission device includes an electromagnetic conversion coil, and the wireless power receiving device includes a magneto-electric conversion coil.

10 Preferably, the first member is a body, and the second member is a door assembly hinged to the body.

Preferably, the door assembly includes a first end adjacent to the body and connected to the body and a second end far away from the first end, the wireless power receiving device is disposed adjacent to the first end of the door assembly, and the wireless power transmission device is disposed at a position adjacent to the wireless power receiving device on the body.

20 Preferably, the door assembly is connected to the body through a hinge, and the wireless power transmission device and the wireless power receiving device are adjacent to the hinge. This may comprise an embodiment wherein the said devices are disposed within or adjacent to the hinge itself, or adjacent to a hinge axis of the hinge so as to allow movement of the devices in accordance with the movement of the hinge.

25 Compared with the prior art, the present invention includes beneficial effects as follows: Thanks to the contactless power transmission between the power consumption module and the power supply module, possible intertwining and abrasion for an electric wire connection are avoided, and even in the case that the power consumption module and the power supply module are located on two members rotatable relative to each other, the power transmission can be implemented. In addition, when the power supply module and the power consumption module are disposed on the body and the door assembly of the house appliance respectively, the contactless power transmission manner avoids a complex electric wire installation and protection structure, and also avoids a possible electric leakage. For a water-carrying household appliance, thanks to the contactless

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power transmission between the power consumption module and the power supply module, a possible electric leakage resulted from an electric wire easily wetted by water in the prior art is avoided. The wireless power transmission device and the wireless power receiving device which are disposed in a waterproof manner almost avoid a possible electric leakage caused by the power transmission between the power consumption module and the power supply module.

The present invention may be applied to proper household appliances. A specific implementation manner of the present invention is described in the following by only using the washing machine as an example, and by reference to the Figures of the attached drawing. In the drawing,

FIG. 1 is a simplified schematic diagram of a washing machine; and

FIG. 2 is a power supply block diagram of an LED light.

As shown in FIG. 1, a washing machine 1 has a box body 2. A drum 3 for receiving clothes to wash and/or dry the clothes is installed in the box body 2. The drum 3 is driven by a motor (not shown) and is installed in a water holding bucket 4 in a rotatable manner. The washing machine 1 obtains power through connecting a power supply wire 6 connected to the washing machine to an external power supply, so as to supply power for power consumption elements in the washing machine 1. A power supply module 7 is further disposed in the box body 2 of the washing machine 1, and is connected to the power supply wire 6, and after adjustment, the power supply introduced from outside supplies power for the power consumption elements in the washing machine.

An opening 5 which is in communication with the drum 3 for putting in or taking out clothes from the drum 3 is disposed on the box body 2. To close the opening 5, a door assembly 10 is installed at a position corresponding to the opening 5 on the box body 2. The door assembly is hinged to the box body 2 through a hinge 8.

The door assembly 10 includes a transparent view window 11 disposed for a user to view a processing situation of clothes in the drum 3, a frame 12 disposed along the periphery of the view window 11, and a handle 13 disposed on the frame 12. The frame

12 is connected to the hinge 8. For the purpose of decoration or indication of a washing state, several LED lights 14 are installed on the frame 12.

5 In other implementation manners, a display device for displaying current information or other information of the washing machine 1 in the form of an image or a number or any other independent or combined power consumption devices may also be installed on the frame 12 or view window 11.

10 To supply power for the LED lights 14 (and/or other power consumption devices) on the door assembly 10, a wireless power transmission device 20 connected to the power supply module 7 is disposed at a position adjacent to the door hinge 8 on the box body 2, and correspondingly, a wireless power receiving device 30 connected to the LED lights 14 (and/or other power consumption devices) is disposed at a position adjacent to the door hinge 8 on the frame 12 of the door assembly 10. The wireless power transmission device 15 20 and the wireless power receiving device 30 are disposed in pair to perform contactless power transmission. In this way, the power on the power supply module 7 is transmitted to the LED lights 14 (and/or other power consumption devices) through the wireless power transmission device 20 and the wireless power receiving device 30.

20 As the wireless power transmission device 20 and the wireless power receiving device 30 are disposed adjacent to the door hinge 8, and the distance between the two is short, the transmission efficiency of power signal is high. For other implementation manners, preferably, the wireless power transmission device and wireless power receiving device are disposed at positions with a short relative distance. For example, for a house- 25 hold appliance such as a dish-washing machine or refrigerator whose door assembly is usually rectangular, the wireless power transmission device and wireless power receiving device can be disposed adjacent to a hinge axis to achieve a short relative distance. The foregoing wireless power transmission device and wireless power receiving device may be summarized as follows: The door assembly includes a first end adjacent to the box body and connected to the box body and a second end far away from the first end, the 30 wireless power receiving device is disposed adjacent to the first end of the door assembly, and the wireless power transmission device is disposed at a position adjacent to the wireless power receiving device on the body.

The operating environment of the washing machine is relatively wet, and the water-carrying feature may cause that water contacts components of the washing machine. Therefore, to avoid an electric leakage caused by the contact of the water and a safety accident further caused, the wireless power transmission device 20 and the wireless power receiving device 30 are respectively disposed in a waterproof manner in the box body 2 and the door assembly 10.

The wireless power transmission device 20 and the wireless power receiving device 30 implement the power transmission through electromagnetic induction or magnetic resonance coupling. FIG. 2 illustrates a power supply circuit of the LED lights 14 by taking electromagnetic induction power supply as an example.

As shown in FIG. 2, the wireless power transmission device 20 includes an electromagnetic conversion coil 21, and the wireless power receiving device 30 includes a magneto-electric conversion coil 31 coupled with the electromagnetic conversion coil 21. In this way, the power supply module 7, the wireless power transmission device 20, the wireless power receiving device 30, and the power consumption module 40 are electrically connected. A rectification circuit 71 performs rectification on the input utility power, then converts the power into a high-frequency signal through a high-frequency transmission circuit 22, and transmits the high-frequency signal through the electromagnetic conversion coil 21. The magneto-electric conversion coil 31 receives the high-frequency signal transmitted by the electromagnetic conversion coil 21, performs adjustment through a receiving and rectification circuit 32, and outputs a voltage and current required for the LED lights 14.

CLAIMS

- 5 1. A household appliance (1), comprising a first member (2) and a second member (10) which are mutually independent and capable of moving relative to each other, wherein a power supply module (7) is disposed on the first member, and a power consumption module (14, 40) is disposed on the second member, **characterized in that** the power supply module (7) is connected to a wireless power transmission device (20), the power consumption module (14, 40) is connected to a wireless power receiving device (30), and the wireless power transmission device (20) and the wireless power receiving device (30) are disposed in pair to perform contactless power transmission.
- 10
- 15 2. The household appliance (1) according to claim 1, characterized by being a water-carrying electrical equipment (1).
3. The household appliance (1) according to claim 2, characterized in that the wireless power transmission device (20) and the wireless power receiving device (30) are respectively disposed in a waterproof manner in the first member (2) and the second member (10).
- 20
4. The household appliance (1) according to any preceding claim, characterized in that the wireless power transmission device (20) and the wireless power receiving device (30) implement power transmission through electromagnetic induction or magnetic resonance coupling.
- 25
5. The household appliance (1) according to claim 4, characterized in that the wireless power transmission device (20) comprises an electromagnetic conversion coil (21), and the wireless power receiving device (30) comprises a magneto-electric conversion coil (31).
- 30

6. The household appliance (1) according to any preceding claim, characterized in that the first member is a body (2), and the second member is a door assembly (10) hinged to the body (2).

5 7. The household appliance (1) according to claim 6, characterized in that the door assembly (10) comprises a first end adjacent to the body (2) and connected to the body (2) and a second end away from the first end, the wireless power receiving device (30) is disposed adjacent to the first end of the door assembly (10), and the wireless power transmission device (20) is disposed on the body (2) at a position
10 adjacent to the wireless power receiving device (30).

8. The household appliance (1) according to claim 6, characterized in that the door assembly (10) is connected to the body (2) through a hinge (8), and the wireless power transmission device (20) and the wireless power receiving device (30) are
15 adjacent to the hinge (8).

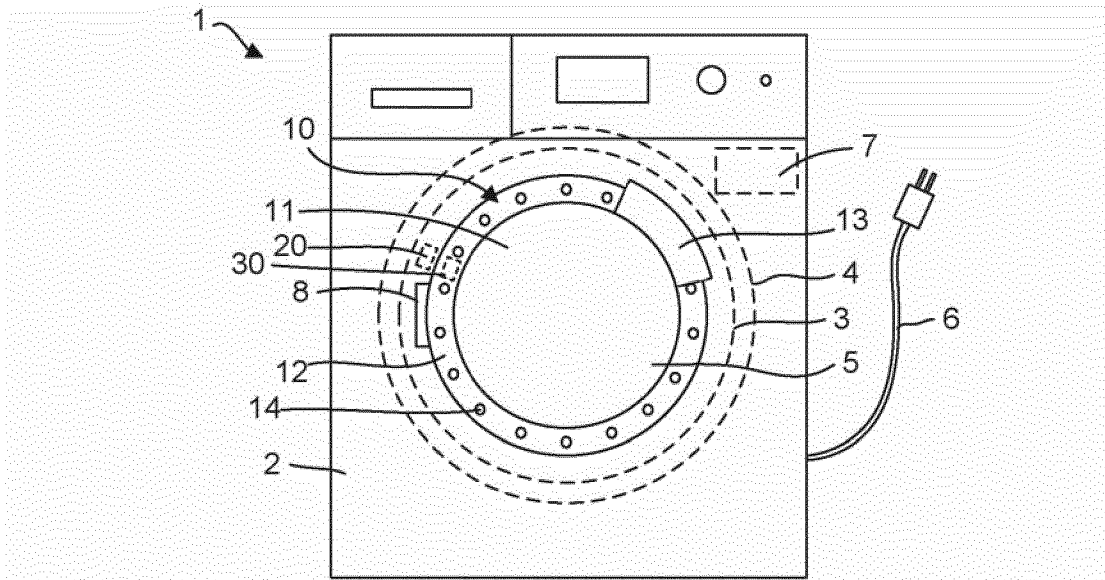


FIG. 1

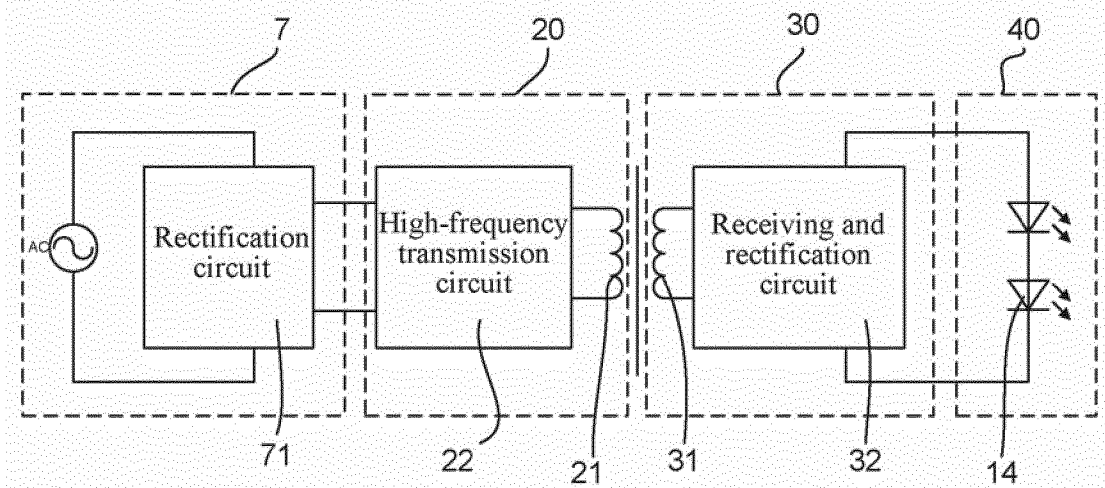


FIG. 2

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2012/075391

A. CLASSIFICATION OF SUBJECT MATTER
 INV. A47L15/42 D06F39/14 F25D23/02
 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)

A47L D06F F25D

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	wo 2011/045108 AI (HENKEL AG & CO KGAA [DE] ; DITZE ALEXANDER [DE] ; NICKEL DIETER [DE] ; EI) 21 April 2011 (2011-04-21) page 3, line 5 - line 9 page 20, line 5 - line 7 -----	1-8
X	wo 2009/146691 A2 (HENKEL AG & CO KGAA [DE] ; SCHRÖTT HARALD [DE]) 10 December 2009 (2009-12-10) page 2, paragraph 3 -----	1-8
X	wo 2011/003755 A2 (BSH BOSCH SIEMENS HAUSGERÄTE [DE] ; DUMKOW IRENE [DE] ; KELLER HANS GER) 13 January 2011 (2011-01-13) the whole document ----- -/-	1-8



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

18 February 2013

Date of mailing of the international search report

26/02/2013

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INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/075391

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	the whol e document -----	6-8

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2012/075391

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