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(54) **Electrical household appliance for washing and/or drying and method for opening a door of the electrical household appliance**

(57) An electrical household appliance for washing and/or drying, comprising:
- a washing and/or drying compartment (2) designed to accommodate the articles to be treated;
- a door (20) giving access to the compartment (2);
- door movement means (21) for moving the access door (20) and which move the access door (20) from a first configuration in which it occludes a passage (22) giving access to the compartment (2) to a second configuration

in which it permits fluid communication between the compartment (2) and the outside of the electrical household appliance (1) through the access passage (22);
- communication means (3) adapted to interact with a remote electronic device (30);
- means (4) for actuating the movement means (21) activated by reception of a signal that coming from the communication means (3) and matching with a prememorized activation signal.

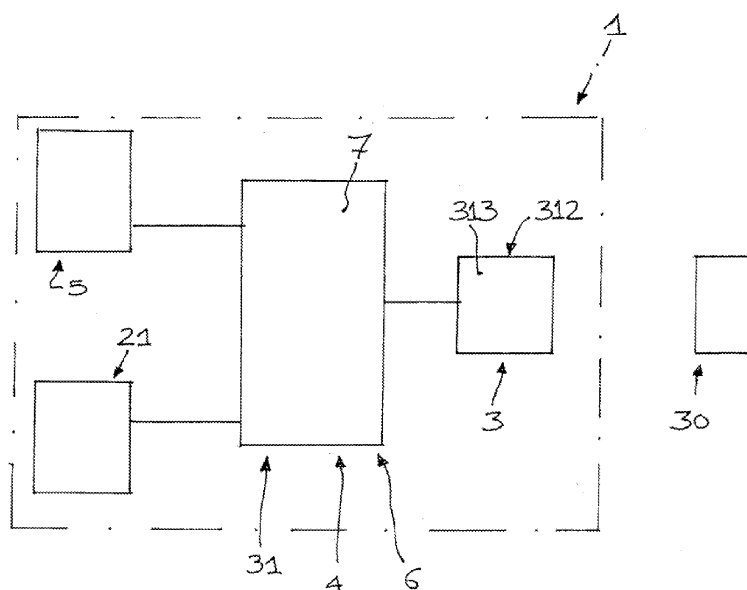


Fig. 2

Description

[0001] This invention relates to an electrical household appliance for washing and/or drying. The invention also relates to a method for opening a door giving access to a washing and/or drying compartment of an electrical household appliance.

[0002] Examples of electrical household appliances for washing are dishwasher and laundry washing machine.

[0003] By electrical household appliance for drying is normally meant a dryer typically used for drying textile items and garments.

[0004] An example of an electrical household appliance for washing and drying is a washer-dryer.

[0005] Known to the prior art are electrical household appliances such as laundry washers, dishwashers and washer-dryers comprising an internal washing compartment for receiving the products which are to undergo a washing and/or drying treatment. These electrical household appliances are capable of issuing a signal telling the user that the washing and/or drying cycle has come to an end. The signal is issued through a display or a dedicated warning light. In the meantime, the electrical household appliance remains on standby for the user to manually open the door and remove the articles washed and/or dried. Items of washing, especially if moist, which remain inside the washing or drying compartment after the end of the cycle may, however, lead to the formation of unpleasant odours.

[0006] In this context, the technical purpose which forms the basis of this invention is to propose an electrical household appliance for washing and/or drying that overcomes the above mentioned drawbacks of the prior art.

[0007] More specifically, this invention has for an aim to provide an electrical household appliance for washing and/or drying that can minimize the risk of unpleasant odours forming in the items of washing.

[0008] Another aim of the invention is to provide an electrical household appliance which is easier for the user to control.

[0009] The technical purpose and aims specified are substantially achieved by an electrical household appliance for washing and/or drying comprising the technical features set out in one or more of the accompanying claims.

[0010] Further features and advantages of the invention are more apparent in the non-limiting description which follows of a preferred non-limiting embodiment of an electrical household appliance for washing and/or drying, as illustrated in the accompanying drawings, in which:

- Figure 1 is a schematic view of an electrical household appliance according to this invention;
- Figure 2 schematically shows an electrical household appliance according to the invention interacting with an additional electronic device.

[0011] In the accompanying drawings, the numeral 1 denotes an electrical household appliance for washing and/or drying. The electrical household appliance 1 comprises:

- a washing and/or drying compartment 2 designed to accommodate articles to be treated (that is, washed or dried);
- a door 20 giving access to the compartment 2.

[0012] In the case of a laundry washer or dryer, the compartment 2 is at least partly defined by a rotating drum. In the case of a dishwasher, the compartment 2 comprises a housing which advantageously accommodates one or more racks for holding the dishes to be washed. Advantageously, the access door 20 contributes to delimiting the compartment 2. Advantageously, the door 20 is hinged to the rest of the electrical household appliance 1. The electrical household appliance 1 also comprises door movement means 21 for moving the access door 20. The door 20 movement means 21 move the access door 20 from a first configuration to a second configuration. In the first configuration, the access door 20 obstructs a passage 22 giving access to the compartment 2. In the second configuration, the access door 20 permits fluid communication between the compartment 2 and the outside of the electrical household appliance 1 through the access passage 22 (in Figure 1, the access door 20 is in the second configuration). The access passage 22 is a passage delimited by the outer enclosure of the electrical household appliance 1.

[0013] In one particular embodiment, the door 20 movement means 21 comprise electromagnetic means. When the door 20 is closed, the electromagnetic means generate a force that keeps the door 20 against a frame 23 that encircles the access passage 22. For example, the electromagnetic means comprise an electromagnet which is mounted on the frame 23 or on the door 20 and which interacts, respectively, with a metal surface of the door 20 or of the frame 23 which, in the first configuration, faces the electromagnet. To allow the door 20 to be opened, the electromagnetic means stop applying their action and suitable elastic means (for example, a spring) are provided to apply a force which pushes the door 20 from the first configuration to the second. Conveniently, the elastic means are compressed when the door 20 is in the first configuration.

[0014] In an alternative embodiment, the movement means 21 comprise:

- elastic means which push the door 20 from the first configuration to the second;
- release means (electrically controlled) for releasing a mechanical hook which can lock the door 20 in the first configuration.

[0015] The door 20, passing from the first configuration to the second, is rotated through an angle greater than

or equal to 30°, preferably 45°.

[0016] If a rotating drum is present, the access passage 22 advantageously faces an opening of the rotating drum.

[0017] The electrical household appliance 1 comprises communication means 3 adapted to interact with a remote electronic device 30.

[0018] The electronic device 30 is remote from the electrical household appliance 1. For example, it might comprise a telephone device, in particular, a portable telephone device, preferably a mobile phone. The remote electronic device 30 might be a server for a dedicated Internet site. The Internet site conveniently presents a user interface for communicating with the communication means 3. The user can thus connect to the Internet site using his personal computer to send instructions to the electrical household appliance 1 through the server and the communication means 3.

[0019] The electrical household appliance 1 also comprises means 4 for actuating the movement means 21. The actuating means 4 are activated by reception of a signal which comes from the communication means 3 and which matches with a prememorized activation signal. Advantageously, the actuating means 4 actuate the movement means 21 immediately after receiving the signal that matches with the prememorized signal. In a different embodiment, the actuating means 4 actuate the movement means 21 a predetermined length of time after receiving the signal that matches with the prememorized signal. Advantageously, the electrical household appliance 1 comprises an electronic control unit 7. Conveniently, the prememorized activation signal is memorized in the electronic control unit 7. Advantageously, the actuating means 4 for actuating the movement means 21 are built into the electronic control unit 7. The control unit 7 is thus able to actuate the movement means 21 upon receiving the signal that matches with the prememorized signal from the communication means 3. Operating that way, the control unit 7 thus acts as actuating means 4 for actuating the movement means 21.

[0020] The user can therefore give a command for opening the door 20 from a remote location. That way, through the remote electronic device 30, the user can firstly be informed by the electrical household appliance 1 as to whether the washing and/or drying cycle has come to an end and can decide whether or not to open the door 20. Opening the door 20 places the items inside the compartment 2 in fluid communication with the outside environment, thus reducing the formation of unpleasant odours, especially in the case of washing items which are still moist. The user may, however, decide at any time not to open the door 20, for example fearing that such an operation at that specific moment might cause the items in the compartment 2 to be contaminated by external agents (for example, the user might know that at that specific moment, work is being done in the room where the electrical household appliance 1 is located and, hence, that the room is likely to be full of dust, or the user

might remember leaving open the windows of the room where the electrical household appliance 1 is and therefore that there is a risk that insects might find their way into the washing and/or drying compartment 2).

[0021] Conveniently, the communication means 3 adapted to interact with a remote electronic device 30 are of a bidirectional type. They may therefore send information to the remote electronic device 30 and/or receive information from the remote electronic device 30.

[0022] The communication means 3 comprise a telephone interface 312 with the outside. In one embodiment, the telephone interface 312 might comprise a socket connector for a cable designed to put the electrical household appliance 1 in communication with a telephone line. Conveniently, the communication means 3 (in particular the telephone interface 312) are of the wireless type. In that case, they may use a radiofrequency communication system or a telephone communication system. For example, the communication means 3 (in particular the telephone interface 312) may comprise an antenna 313. The antenna 313 is advantageously a two-way antenna.

[0023] The antenna 313 may interact through radio frequency directly with the remote electronic device 30. Alternatively, the antenna 313 may interact through radio frequency with an external telephone device which in turn communicates with the electronic device 30 through the telephone network.

[0024] For example, the telephone interface 312 with the outside may comprise and/or coincide with the antenna 313.

[0025] Advantageously, the electrical household appliance 1 comprises:

- means 5 for washing and/or drying the articles placed in the compartment 2 (for example, pipes for conveying a washing fluid or hot air);
- means 31 for generating an information item addressed through the communication means 3 to the remote electronic device 30. Conveniently, the means 31 for generating an information item are activated by the stopping of the washing and/or drying means 5. More specifically, the means 31 for generating an information item are activated immediately or with a predetermined delay time after the stopping of the washing and/or drying means 5.

[0026] The means 31 for generating an information item are built into the electronic control unit 7.

[0027] The control unit 7 is thus able to generate an item of information addressed through the communication means 3 to the remote electronic device 30, (operating that way, the control unit 7 thus acts as means 31 for generating an item of information addressed through the communication means 3 to the remote electronic device 30). This item of information tells the remote electronic device 30 that the washing and/or drying cycle has come to an end.

[0028] In one particular embodiment, the electrical

household appliance 1 comprises a SIM card which allows an identifier to be associated with an output signal from the electrical household appliance 1. This identifier identifies the origin of the signal and therefore allows a remote electronic device 30, if provided, to know that the signal comes from a specific SIM card and therefore from a specific electrical household appliance. Conveniently, the SIM card can interact with the electronic control unit 7 for generating an information item addressed through the communication means 3 to the remote electronic device 30. Conveniently, the electrical household appliance 1 comprises means 6 for comparing the characteristics of the prememorized signal for actuating the movement means 21 with the signal from the communication means 3.

[0029] For example, the comparing means 6 comprise identification means for identifying the remote electronic device 30 that is communicating with the electrical household appliance 1. These identification means may be built into the electronic control unit 7 and, for example, make it possible to know that the signal which has reached the communication means 3 comes from a remote electronic device 30 which is preset and therefore authorized to communicate with the electrical household appliance 1.

[0030] For example, when the electrical household appliance 1 communicates with the server for a dedicated Internet site, the comparison means 6 check whether the signal that reaches the communication means 3 identifies a prememorized entity authorized to enable activation of the movement means 21.

[0031] The invention also relates to a method for opening a door 20 giving access to a washing and/or drying compartment 2 of an electrical household appliance 1 for washing and/or drying. Conveniently, the method can be implemented by an electrical household appliance 1 having one or more of the technical features set out above. The method comprises the step of activating the door 20 movement means 21. The door 20 movement means 21 form part of the electrical household appliance 1. The movement means 21 move the door 20 from a first configuration to a second configuration. In the first configuration, the door 20 obstructs a passage 22 giving access to the compartment 2. In the second configuration, the door 20 permits fluid communication between the compartment 2 and the outside of the electrical household appliance 1 through the access passage 22. According to the method, the step of activating the movement means 21 is performed as a result of receiving a signal that matches with a prememorized signal. The signal that matches with a prememorized signal comes from an electronic device 30 which is remote from the electrical household appliance 1. The signal that matches with a prememorized signal reaches the electrical household appliance through communication means 3 of the electrical household appliance 1 adapted to interact with a remote electronic device 30. The possible embodiments of the remote electronic device 30 and of the communication means 3 are described above.

[0032] The method thus entails activating the movement means 21 when the signal from the remote electronic device 30 has the characteristics of the prememorized signal. Thus, according to the method, the step of actuating the movement means 21 is preceded by the step of comparing the signal from the remote electronic device 30 with preset characteristics of the prememorized signal able to activate the movement means 21. The comparing step is advantageously performed by an electronic control unit 7 of the electrical household appliance 1. The step of activating the door 20 movement means 21 is triggered by a predetermined command from the electronic control unit 7 of the electrical household appliance 1. This command is subject to the comparing step giving a positive result.

[0033] At the end of a washing or drying cycle, the electrical household appliance 1 (conveniently through the communication means 3) sends to the remote electronic device 30 a signal indicating the end of the washing and/or drying cycle and remains on standby to receive the prememorized signal from the remote electronic device 30. The user thus has the possibility of sending to the electrical household appliance 1 an activation signal for actuating the door 20 movement means 21. The user is, however, free to choose not to send the signal if he thinks it is not a good idea to open the door 20 in order to avoid contaminating the items of washing with elements (dust, insects and so on) from outside the electrical household appliance 1.

[0034] Conveniently, the signal from the remote electronic device 30 is transmitted through an SMS (for example if the remote electronic device 30 is a mobile phone).

[0035] If the remote electronic device 30 is a portable telephone, the electrical household appliance 1, at the end of a washing and/or drying cycle, sends an end-of-treatment signal to the portable telephone through an SMS, the step of activating the movement means 21 occurring upon receiving a signal that matches with a prememorized signal through an SMS from the portable telephone.

[0036] In a different embodiment, the signal that matches with a prememorized signal from the remote electronic device 30 is transmitted through the Internet. Advantageously, this occurs when the remote electronic device 30 is a server for an Internet site with a user interface for communicating with the electrical household appliance 1. When the remote electronic device 30 is such a server, the electrical household appliance 1, at the end of a washing and/or drying cycle, sends an end-of-treatment signal through the Internet. The step of activating the movement means 21 occurs when the server receives a precoded signal through the Internet.

[0037] A remote door opening system might also be applied to the door of an oven for cooking food (though outside the scope of protection of this invention).

[0038] This invention has important advantages.

[0039] First of all, it allows maximum operating versa-

tility and flexibility. In particular, it allows the user to decide whether or not to open the door of the electrical household appliance at the end of the washing and/or drying cycle.

[0040] It shall be understood that the invention described above may be modified and adapted in several ways without departing from the scope of the inventive concept. Moreover, all the details of the invention may be substituted by other technically equivalent elements. In practice, all the materials used, as well as the dimensions, may vary according to requirements.

Claims

1. An electrical household appliance for washing and/or drying, comprising:

- a washing and/or drying compartment (2) designed to accommodate the articles to be treated;
- a door (20) giving access to the compartment (2);
- door movement means (21) for moving the access door (20) and which move the access door (20) from a first configuration in which it occludes a passage (22) giving access to the compartment (2) to a second configuration in which it permits fluid communication between the compartment (2) and the outside of the electrical household appliance (1) through the access passage (22);

characterized in that it comprises:

- communication means (3) adapted to interact with a remote electronic device (30);
- means (4) for actuating the movement means (21) activated by reception of a signal that must come from the communication means (3) and must match with a prememorized activation signal.

2. The electrical household appliance according to claim 1, **characterized in that** the communication means (3) adapted to interact with a remote electronic device (30) are of the bidirectional type.

3. The electrical household appliance according to claim 1 or 2, **characterised in that** it comprises:

- means (5) for washing and/or drying the articles placed in the compartment (2);
- means (31) for generating an information item addressed through the communication means (3) to the remote electronic device (30), said means (31) for generating an information item being activated by the stopping of the washing and/or drying means (5).

4. The electric household appliance according to any of the foregoing claims, **characterised in that** the communication means (3) comprise a telephone interface (312) with the outside.

5. The electric household appliance according to claim 4, **characterized in that** the telephone interface (312) with the outside comprises and/or coincides with an antenna (313) for communicating with the remote electronic device (30).

6. The electric household appliance according to any of the foregoing claims, **characterized in that** it comprises means (6) for comparing the characteristics of the prememorized activation signal with the signal from the communication means (3).

7. A method for opening a door (20) giving access to a washing and/or drying compartment (2) of an electrical household appliance (1) for washing and/or drying, comprising the step of activating door (20) movement means (21) forming part of the electrical household appliance (1), said movement means (21) moving the door (20) from a first configuration in which it obstructs a passage (22) giving access to the compartment (2) to a second configuration in which it permits fluid communication between the compartment (2) and the outside of the electrical household appliance (1) through the access passage (22); the method being **characterized in that** the step of activating the movement means (21) occurs after receiving a signal that matches a prememorized activation signal and that comes from a remote electronic device (30) located remotely from the electrical household appliance (1).

8. The method according to claim 7, **characterized in that** the signal from the remote electronic device (30) is transmitted through an SMS or through the Internet.

9. The method according to claim 7 or 8, **characterized in that** at the end of a washing cycle, the electrical household appliance sends an end-of-wash signal to the remote electronic device (30) and waits for said signal to match a prememorized activation signal that comes from the remote electronic device (30).

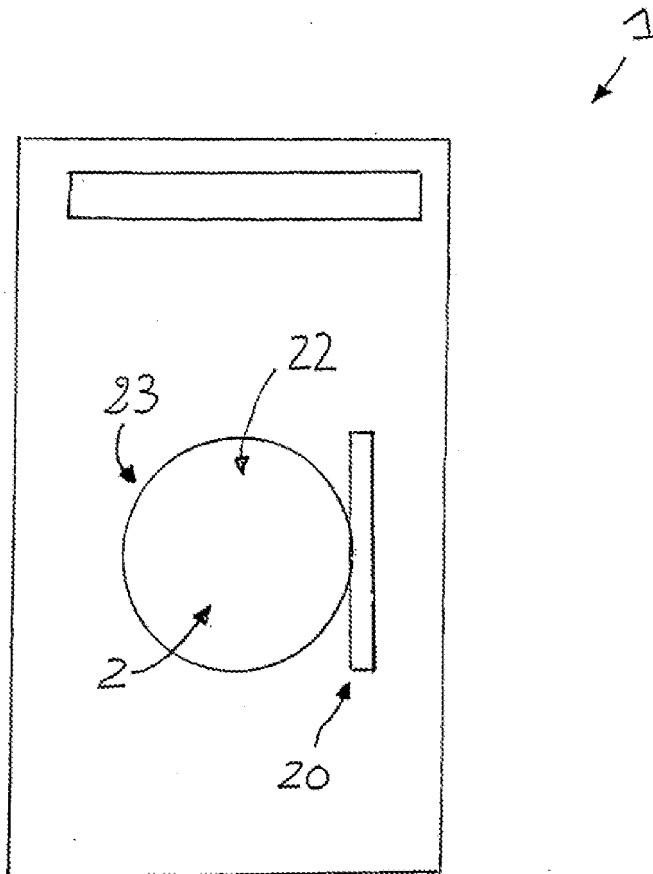


Fig. 1

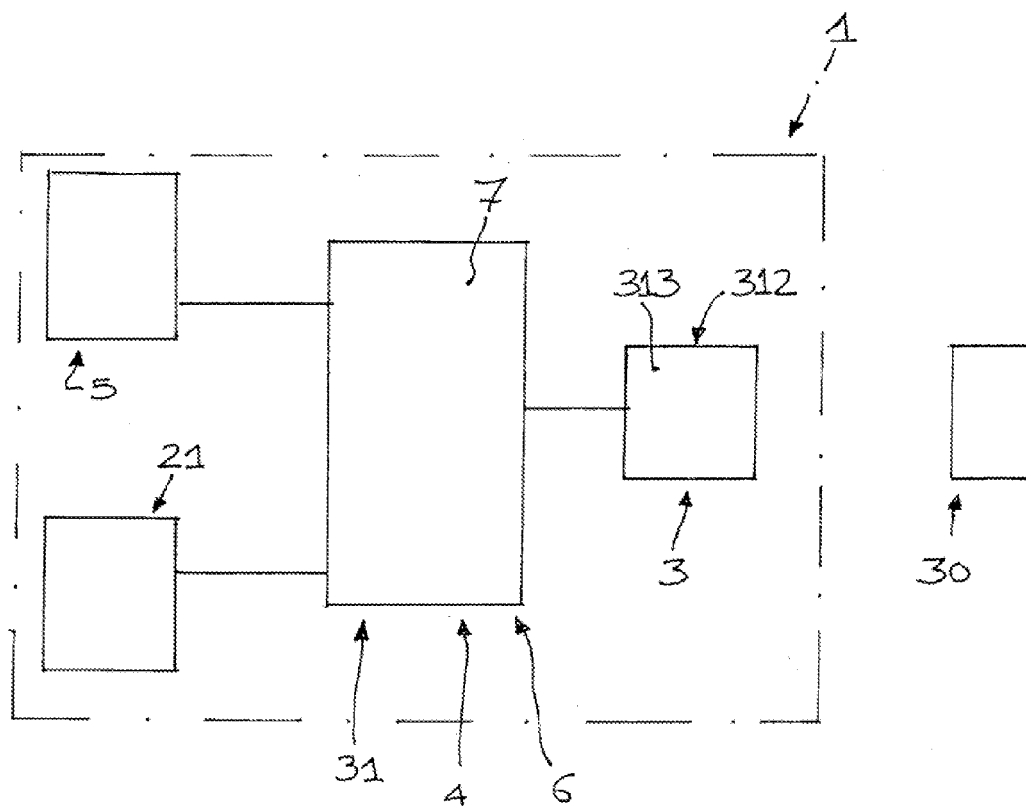


Fig. 2



EUROPEAN SEARCH REPORT

Application Number
EP 10 19 3669

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 19 April 2011	Examiner Clivio, Eugenio
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 10 19 3669

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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