Household appliance

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**Description**

**Household appliance comprising an illumination means and method for operating a household appliance**

The present invention relates to a household appliance comprising an illumination means according to the preamble of claim 1. The present invention further relates to a method for operating a household appliance according to the preamble of claim 6.

The use of illumination for display purposes in household appliances has become standard practise. In particular, in cooking hobs it is known, not only to illuminate display elements, but also to indicate cooking zones defined on dark glass plates by backlighting, specifically using LED light sources. Usually, the light sources are switched on with a predefined light intensity at the moment of switching-on the entire cooking hob, so that they are immediately entirely visible.

DE 10 2017 203 080 A1 discloses a kitchen equipment comprising a range and an illumination device separate from the range. A communication unit transmits status information from the range to the illumination device. The illumination device is adapted to illuminate a cooking hob of the range and includes an adjusting device configured to modify the illumination with regard to lighting intensity, colour and/or orientation.

It is an object of the present invention to provide a household appliance with an illumination means and a method for operating a household appliance, which increase a user’s attention and which provide an enriched user experience, when operating the household appliance.
The object is achieved for a household appliance according to the preamble of claim 1 by the features of the characterizing part of claim 1.

A household appliance comprises an illumination means for providing information to a user of the household appliance. A lighting intensity of the illumination means is modifiable. According to the present invention, the illumination means is positioned under or behind a blackened glass plate or window and is invisible, when it is switched off, and it is visible through the glass plate or window, when it is switched on. The household appliance further comprises a control unit, which is configured to gradually modify the lighting intensity upon recognition of a status change of a device or unit of the household appliance, which status change is performed or initiated by the user of the household appliance. Under “gradually modify” may be understood that the modification interval is longer than an infinitesimal time span. In particular, such a gradual modification is associated with a fade-in or fade-out effect. Further, under “glass plate or window” may be understood a respective component produced from any type of glass material, but also transparent plastic material commonly replacing glass for different purposes.

The household appliance is particularly a cooking appliance and may be a cooking hob, in particular an electrically driven cooking hob. A specifically selected appliance is an induction cooking hob.

Preferably, the device or unit of the household appliance is an ON/OFF switch or a program or power level selector, and a status change may be an operation of said switch or selector. The unit may also be a pot detection unit. A status change of such a pot
detection unit is specifically a positioning or removal of e. g. cookware on a cooktop of a cooking hob. In such case of the household appliance being a cooking hob, in particular an induction cooking hob, the cooktop is formed by said glass plate.

The glass window may be at least a section of an operating panel, which includes a user interface for an operation of the household appliance by the user. The user interface is configured to receive inputs for operating the household appliance and/or to provide output signals to the user, in particular status information.

A specific embodiment is characterized by both an illumination means positioned under or behind the glass plate and an illumination means positioned under or behind the glass window, wherein the illumination means related to the glass plate and the illumination means related to the glass window are interdependently illuminatable. This may be realized by a simultaneous fade-in or fade-out of light sources.

The object is achieved for a method for operating a household appliance according to the preamble of claim 6 by the features of the characterizing part of claim 6.

A method for operating a household appliance includes an illumination means of the household appliance providing information to a user of the household appliance. The method according to the invention is characterized in that upon recognition of a status change of a device or unit of the household appliance the lighting intensity of the illumination means, which illuminates a treatment area of the household appliance and/or a user interface zone or element, is modified. The status change is performed by the user of the household appliance. The modification
of the lighting intensity is preferably started from a total invisibility of the illumination means in its inactive status.

Said household appliance is particularly a cooking appliance, more particularly a cooking hob and even more particularly an induction cooking hob. In the case of a cooking hob, the treatment area is a cooking zone.

More specifically, the method is applicable to a household appliance according to anyone of the afore-described embodiments.

The lighting intensity may gradually increase over a predefined period of time, particularly starting from an unlit state, upon switch-on of the household appliance.

One embodiment provides for a method characterized by a modification of the lighting intensity of the illumination means, which illuminates the treatment area and/or the user interface zone or element, wherein the modification is performed upon receipt of a signal from a utensil detection unit of the household appliance, more specifically from a pot detection unit of the cooking hob, notably an induction cooking hob.

According to a specific embodiment, an illumination with an alternating lighting intensity is carried out in consequence of the user operating an ON/OFF switch or operating a program or power level selector or triggering a pot detection unit by placing cookware on a cooking zone of a cooking hob. The alternating lighting intensity is characterized by an increasing intensity over a predefined first period of time and, subsequently, a decreasing intensity over a predefined second period of time. This alternation of increasing and decreasing intensity is hold up
over a predefined third period of time or over a predefined number of alternation sequences.

One specific embodiment of the present invention provides for a method, in which the modification of the lighting intensity terminates at an intensity level lower than a maximum intensity level. As an example, light sources, e.g. in the area of treatment zones and/or illuminating areas or elements of a user interface, appear by way of a fade-in effect until they reach a predefined high level of brightness and, after having reached this high level, they return to a stage of moderate brightness.

A particularly preferred embodiment of the household appliance comprises at least two treatment areas, in particular two cooking zones, wherein the illumination means belonging to the at least two treatment areas are illuminated with different speeds of modification or different starting times. With such illumination variants associated with different zones on or in the household appliance and/or its user interface, the user’s attention is further increased.

According to embodiments, the method is further developed in that upon selection of a treatment area of the household appliance by the user operating a selector means, the lighting intensity of the illumination means, which indicates said selection, is modified. Preferably, the modification is performed by an intensity increase or by initiating a blinking or pulsing mode. The treatment area is particularly a cooking zone of the cooking hob. Moreover, the illumination means in particular serves the purpose of the illumination of a cooking zone.

Additionally or alternatively, again upon selection of a treatment area of the household appliance by the user operating a se-
lector means, the lighting intensity of a user interface zone or element associated to the selected treatment area is modified. The user interface zone or element in particular is or comprises a power selection means of the user interface. Preferably, the modification is characterized by an intensity increase or by initiating a blinking or pulsing mode. Moreover, the modification may take place in the same or a similar modification mode as that one of the cooking zone illumination, as described above.

Finally, a particularly preferred embodiment of the present invention is characterized by a method, with which upon a selection of a special function of the household appliance the lighting intensity of a user interface zone or element associated to the selected special function is modified. The modification is particularly performed in that a contrast with a user interface zone or element indicating a normal or usual function, in particular with a power selection, is presented. Said special function of the household appliance is particularly one of
- a timer function,
- an assisted treatment function,
- a child lock function,
- a pause function,
- a function of combined operation of a treatment area.

In particular, the lighting intensity of a user interface symbol, being an example of said user interface zone or element, is modified.

Novel and inventive features of the present invention are set forth in the appended claims.

The present invention will be described in further detail with reference to the drawings, in which
Fig. 1 illustrates schematically a top view of an induction cooking hob including four cooking zones.

FIG 1 illustrates a top view on a cooking hob 1 comprising four fixedly arranged cooking zones 3a, 3b, 3c, 3d, which are located on a glass plate 5 forming a cooking surface and supporting cookware to be placed thereon. The cooking zones 3a, 3b, 3c, 3d are indicated on the glass plate 5 by assigned three-spike symbols, which are illuminatable through the glass plate 5, as will be described in more detail further down below. The cooking zones 3a, 3b, 3c, 3d may be heated by radiation heating elements (not shown) located beneath the glass plate 5. Alternatively, the cooking zones 3a, 3b, 3c, 3d may be induction cooking areas, wherein heating power is supplied by means of induction coils, which also may be located beneath the glass plate 5, respectively.

The glass plate 5 further comprises a touch sensitive command input and display area 7 forming a user interface for the cooking hob 1. By means of said user interface, control commands, e.g. a power level setting, can be provided to a control unit (not shown) of the cooking hob 1, which control unit then controls the heating elements accordingly. The user interface comprises an ON/OFF switch 9 and touch sliders 11a, 11b, 11c, 11d enabling a setting of power levels between 0 and 9 as well as a boost level P. Each cooking zone 3a, 3b, 3c, 3d is allocated to a specific touch slider 11a, 11b, 11c, 11d. Seven-segment displays 13a, 13b, 13c, 13c, which are assigned to the touch sliders 11a, 11b, 11c, 11d, illustrate power levels for the cooking zones 3a, 3b, 3c, 3d, which have been activated by the user by respective selections via the touch sliders 11a, 11b, 11c, 11d. Further switches may be included in the touch sensitive command
input and display area 7, e. g. a cooking zone connection switch providing a bridge function between two cooking zones 3a, 3b, 3c, 3d and/or a timer selection symbol for input of a preset time.

5

The four cooking zones 3a, 3b, 3c, 3d represented by the three-spike symbols may be of circular shape with different diameters, whereas the length of the spikes represents the dimension of the respective cooking zone. Each three-spike symbol is illuminated by light sources, which may be based on LED technology and which are arranged below the glass plate 5. Due to a dark colouring of said glass plate 5, components arranged underneath, like the heating elements and electronic boards including said light sources, are visually hidden. Only when switched on, the light sources become visible through the glass plate 5. Opaque foils forming back layers and including specific cutouts allow a presentation of respective symbols, images or inscriptions. The only one symbol that is permanently visible is the ON/OFF switch 9, which is imprinted in the top surface of the glass plate 5.

On the other hand, the touch sliders 11a, 11b, 11c, 11d, the seven-segment displays 13a, 13b, 13c, 13d as well as the three-spike symbols for the cooking zones 3a, 3b, 3c, 3d are not visible in the OFF-state of the cooking hob 1, but will be visible, when the cooking hob 1 is switched on.

In order to cause an increased user’s attention compared with an improved welcome experience for the user, a start-up sequence is created by using the above-described light sources. Rather than simply switching on said illumination elements with turning them from unlit directly to a predefined brightness, a smooth start-up is executed after the user has pressed the ON/OFF switch, thereby activating the cooking hob 1.
Upon switch-on, the light sources of the cooking zones 3a, 3b, 3c, 3d and of the command input and display area 7 are illuminated by a fade-in effect, i.e. the light sources are operated with increasing intensity, so that the level of brightness rises over a short period of time, which, however, is longer than an infinitesimal time span as it is with an immediate turn from “off” to “on”. Said fade-in effect is terminated, when the light sources reach a predefined high level. Alternatively, the light sources may return to a stage of reduced, particularly moderate, brightness after having reached said high level.

Another or more advanced effect may be achieved, when the light sources of the three-spike symbols for the cooking zones 3a, 3b, 3c, 3d and/or for the touch slider units 11a, 11b, 11c, 11d are illuminated in a sequence, what may mean that all are illuminated at the same time or one after the other until all light sources have reached a predefined intensity level.

Further alternatively or even additionally using a mixing effect with the above-described effects, the light sources may be lighted by way of a pulse effect, during which all light sources are turned on, notably using a fade-in function over a first time interval, followed by all light sources being turned off, notably using a fade-out function over a second time interval. The first and second time intervals may be identical or different in accordance with the manufacturer’s or the user’s preference. The pulse effect is repeated either over a predefined or a definable third time interval. The light sources of the three-spike symbols for the cooking zones 3a, 3b, 3c, 3d and for the touch slider units 11a, 11b, 11c, 11d may be illuminated with this pulse effect either simultaneously or alternatingly.
The cooking hob 1 further includes a pot detection unit, which is configured to provide a signal to the control unit after detection that cookware has been placed on one of the cooking zones 3a, 3b, 3c, 3d. Accordingly, a detection of a respectively occupied cooking zone 3a, 3b, 3c, 3d is illustrated to the user through the related light source by illuminating the allocated three-spike symbol, or additionally or alternatively by illuminating the allocated touch slider unit 11a, 11b, 11c, 11d. This illumination may be executed by either activating the light source or by a modification of its lighting intensity, or brightness, respectively.

The other way round, if the user selects a cooking zone 3a, 3b, 3c, 3d before placing any cookware thereon, which selection is performed by an input of a desired power level, a zone indication function is triggered. Said zone indication function is executed by modification of the lighting intensity of the light source of the three-spike symbol for the related cooking zone 3a, 3b, 3c, 3d. The same effect may be executed at the associated touch slider unit 11a, 11b, 11c, 11d. Said modification may include anyone of the above-described functions, namely fading, dimming, increase or decrease of brightness, blinking or pulsation. With such intensity modification, the user is informed about the cooking hob 1 awaiting the placement of the cookware on the concerned cooking zone 3a, 3b, 3c, 3d.

Finally, the cooking hob 1 also includes an increasing lighting intensity of symbols related to special functions, such as
- a bridge function connecting two or more cooking zones 3a, 3b, 3c, 3d for their joint controlling,
- a timer selection function configured for selection of e. g. a starting time or program duration,
- an assisted cooking function like a detection of boiling fluids in a pot on a cooking zone 3a, 3b, 3c, 3d,
- a lock function, e.g. operating as a child lock safety system, and
- a pause function for a temporary power-off of the cooking zones 3a, 3b, 3c, 3d.

According to the defined intensity modulation, the brightness of the symbol related to a selected function increases upon its activation, so that it will be brighter than other symbols, images or inscriptions.

Although illustrative embodiments of the present invention have been described herein with reference to the accompanying drawings, it is to be understood that the present invention is not limited to these precise embodiments, and that various other changes and modifications may be affected therein by one skilled in the art without departing from the scope or spirit of the invention. All such changes and modifications are intended to be included within the scope of the invention as defined by the appended claims.
**List of reference numerals**

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<th>Reference</th>
<th>Component</th>
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<tbody>
<tr>
<td>1</td>
<td>cooking hob</td>
</tr>
<tr>
<td>3a, 3b, 3c, 3d</td>
<td>cooking zones</td>
</tr>
<tr>
<td>5</td>
<td>glass plate</td>
</tr>
<tr>
<td>7</td>
<td>command input and display area</td>
</tr>
<tr>
<td>9</td>
<td>ON/OFF switch</td>
</tr>
<tr>
<td>11a, 11b, 11c, 11d</td>
<td>touch slider</td>
</tr>
<tr>
<td>13a, 13b, 13c, 13c</td>
<td>seven-segment displays</td>
</tr>
</tbody>
</table>
Claims

1. A household appliance (1), particularly a cooking appliance, more particularly a cooking hob, even more particularly an induction cooking hob, comprising an illumination means for providing information to a user of the household appliance (1), wherein a lighting intensity of the illumination means is modifiable, characterized in that the illumination means is positioned under or behind a blackened or dark glass plate (5) or window and invisible when switched off and visible through the glass plate (5) or window when switched on, wherein a control unit is included, which is configured to gradually modify the lighting intensity upon recognition of a status change of a device or unit of the household appliance (1) performed or initiated by the user of the household appliance (1).

2. The household appliance (1) according to claim 1, characterized in that the device or unit is an ON/OFF switch (9) or a program or power level selector or a pot detection unit.

3. The household appliance (1) according to claim 1 or 2, characterized in that the glass plate (5) is a cooktop of a cooking hob (1), in particular of an induction cooking hob.

4. The household appliance (1) according to anyone of the preceding claims, characterized in that
the glass window is at least a section of an operating panel (7) including a user interface for an operation of the household appliance (1) by the user.

5. The household appliance (1) according to anyone of the preceding claims, characterized by both an illumination means positioned under or behind the glass plate (5) and an illumination means positioned under or behind the glass window, wherein the illumination means related to the glass plate (5) and to the glass window are interdependently illuminatable.

6. A method for operating a household appliance (1), particularly a cooking appliance, more particularly a cooking hob, even more particularly an induction cooking hob, wherein an illumination means of the household appliance (1) provides information to a user of the household appliance (1), in particular a method for operating a household appliance (1) according to anyone of the preceding claims, characterized in that upon recognition of a status change of a device or unit of the household appliance (1) initiated by the user of the household appliance (1), the lighting intensity of the illumination means is modified, the illumination means illuminating a treatment area of the household appliance (1), in particular a cooking zone (3a, 3b, 3c, 3d) of the cooking hob (1), and/or illuminating a user interface zone or element (11a, 11b, 11c, 11d, 13a, 13b, 13c, 13d), the modification preferably starting from total invisibility of the illumination means in an inactive status thereof.

7. The method according to claim 6,
characterized in that
the lighting intensity gradually increases over a predefined period of time, particularly starting from an unlit state, upon switch-on of the household appliance (1).

8. The method according to claim 6 or 7, characterized by
the lighting intensity of the illumination means illuminating the treatment area (3a, 3b, 3c, 3d) and/or the user interface zone or element (11a, 11b, 11c, 11d, 13a, 13b, 13c, 13d) is modified upon receipt of a signal from a utensil detection unit of the household appliance (1), specifically from a pot detection unit of the cooking hob (1).

9. The method according to anyone of the claims 6 to 8, characterized by
an alternating lighting intensity upon the user
- operating an ON/OFF switch (9), or
- operating a program or power level selector (11a, 11b, 11c, 11d), or
- triggering a pot detection unit by placing cookware on a cooking zone (3a, 3b, 3c, 3d) of a cooking hob (1), wherein the alternating lighting intensity is characterized by an increasing intensity over a predefined first period of time and, subsequently, a decreasing intensity over a predefined second period of time, which alternation is hold up over a predefined third period of time or over a predefined number of sequences.

10. The method according to anyone of the claims 6 to 9, characterized in that
the modification of the lighting intensity terminates at an intensity level lower than a maximum intensity level.
11. The method according to anyone of the claims 6 to 10, characterized in that
the household appliance (1) comprises at least two treatment areas (3a, 3b, 3c, 3d), in particular two cooking zones, wherein the illumination means belonging to the two treatment areas (3a, 3b, 3c, 3d) are illuminated with different speeds of modification or different starting times.

12. The method according to anyone of the claims 6 to 11, characterized in that
upon selection of a treatment area of the household appliance, in particular of a cooking zone (3a, 3b, 3c, 3d) of the cooking hob (1), by the user operating a selector means, the lighting intensity of the illumination means, in particular of a cooking zone illumination, which indicates said selection, is modified, preferably by an intensity increase or by initiating a blinking or pulsing mode.

13. The method according to anyone of the claims 6 to 12, characterized in that
upon selection of a treatment area of the household appliance, in particular of a cooking zone (3a, 3b, 3c, 3d) of the cooking hob (1), by the user operating a selector means, the lighting intensity of a user interface zone or element (11a, 11b, 11c, 11d, 13a, 13b, 13c, 13d) associated to the selected treatment area (3a, 3b, 3c, 3d), in particular the lighting intensity of a power selection means (11a, 11b, 11c, 11d) of the user interface, is modified, preferably
- by an intensity increase or by initiating a blinking or pulsing mode, and/or
- in the same or a similar modification mode as that one of the cooking zone illumination.
14. The method according to anyone of the claims 6 to 13, characterized in that upon a selection of a special function of the household appliance (1), in particular one of
- a timer function,
- an assisted treatment function,
- a child lock function,
- a pause function,
- a function of combined operation of a treatment area, the lighting intensity of a user interface zone or element (11a, 11b, 11c, 11d), 13a, 13b, 13c, 13d), particularly a user interface symbol, associated to the selected special function is modified, in particular by contrasting with a user interface zone or element indicating a normal or usual function, in particular with a power selection (11a, 11b, 11c, 11d).
Abstract

The present invention is related to a household appliance (1) comprising an illumination means for providing information to a user of the household appliance (1). A lighting intensity of the illumination means of the household appliance (1) is modifiable.

According to the invention, the illumination means is positioned under or behind a blackened or dark glass plate (5) or window and invisible when switched off and visible through the glass plate (5) or window when switched on. Further, a control unit is included, which is configured to gradually modify the lighting intensity upon recognition of a status change of a device or unit of the household appliance (1) performed or initiated by the user of the household appliance (1).

Moreover, a method for operating a household appliance (1) is disclosed. Upon recognition of a status change of a device or unit of the household appliance (1) performed by the user, the lighting intensity of the illumination means illuminating a treatment area (3a, 3b, 3c, 3d) of the household appliance (1) and/or illuminating a user interface zone or element (11a, 11b, 11c, 11d, 13a, 13b, 13c, 13d) is modified.

Fig. 1
Fig.1