Title: A HOUSEHOLD APPLIANCE COMPRISING A KNOB MOUNTED TO THE CONTROL PANEL

Abstract: The present invention relates to a household appliance (1) comprising a control panel (2); a control card (3) that is disposed behind the control panel (2); an encoder (4) that enables the settings determined by the user to be transmitted to the control card (3); a shaft (5) that is connected to the encoder (4); a housing (6) that enables the shaft (5) to extend outwards from the control panel (2); a knob (7) that is disposed on the control panel (2) and that actuates the shaft (5), and an insert (8) that is disposed between the shaft (5) and the knob (7), wherein a longitudinal opening (9) is arranged on the insert (8), through which the shaft (5) passes and that enables the insert (8) to move on the shaft (5) perpendicularly to the axis of the shaft (5), and at least one connection element (10) that is disposed on the insert (8) and the knob (7) and that enables, when the knob (7) is placed on the insert (8), the insert (8) to be movably connected to and engage with the knob (7).
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Description

A HOUSEHOLD APPLIANCE COMPRISING A KNOB MOUNTED TO THE CONTROL PANEL

[0001] The present invention relates to a household appliance comprising a knob that is mounted to the control panel.

[0002] Household appliances such as laundry washing/drying machines, cooking appliances, dishwashers, etc. usually comprise a control panel whereon knobs that enable the operational status to be determined as per the preference of the users are disposed. The knobs are connected by means of a shaft to an encoder on a control card disposed behind the control panel by means of housings on the control panel. The knobs can be attached to the shaft directly or by means of an insert. However, due to production tolerances and displacements occurring during the assembly, deviations may occur in the position of the shaft in the housing, and in this case problems such as erroneous operation of the knob and even failure of the knob to perform its function may occur. These problems result in user dissatisfaction and a decrease in the perceived quality.

[0003] In the state of the art International Patent Application No. WO0046822, a button with facilitated use is disclosed.

[0004] The aim of the present invention is the realization of a household appliance comprising a knob the operational flaws of which are eliminated.

[0005] The household appliance realized in order to attain the aim of the present invention, explicated in the claims, comprises a control panel; a control card that is positioned behind the control panel and that controls the operational status of the household appliance; a knob that is disposed on the control panel and that can be moved by the user; a housing that is disposed on the control panel and whereon the knob is placed; a shaft with one end connected to an encoder on the control card and the other end extending out of the housing, and an insert that is mounted on the shaft and that enables the knob to be connected to the shaft. The shaft moves together with the knob when the knob is rotated and enables the preferences received from the user by means of the knob to be transmitted to the control card.
[0006] The household appliance of the present invention comprises the insert that has an opening wherein the shaft is housed so that the shaft slides along a linear axis, and at least one connection element that is disposed on the insert and the knob and that enables the knob to be movably connected to and engage with the insert. Thus, the insert can move on both the shaft and the knob and enables friction forces acting on the knob due to inclined or eccentric position of the shaft in the opening to be minimized. Thus, the knob is enabled to operate without any errors without being affected from erroneous positioning of the shaft.

[0007] In an embodiment of the present invention, the connection element provides the insert with the freedom of movement on the knob along an axis perpendicular to the longitudinal axis of the opening. Thus, eccentricity of the shaft in both horizontal and vertical directions can be tolerated.

[0008] In an embodiment of the present invention, the connection element comprises at least one extension that extends outwards from the insert perpendicularly to the sliding axis of the shaft in the opening, and at least one slit that is arranged on the knob and wherein the extensions enter when the knob is placed on the insert. The extensions move in the slit during the movement of the insert on the knob. Thus, the movement of the insert on the knob is guided.

[0009] In another embodiment of the present invention, the connection element comprises at least one protrusion that is disposed on the knob, and at least two extensions that are oppositely disposed on the insert and that extend outwards from the insert perpendicularly to the sliding axis of the shaft in the opening. When the knob is placed on the insert, the protrusion enters between the extensions and provides the insert with the freedom of movement in a single axis. By means of the extensions that grab the protrusion on both sides, the rotational movement applied on the knob can be transferred effectively to the shaft.

[0010] In another embodiment of the present invention, the shaft has a D-shaped cross-section. The flat side of the shaft bears against the surface of the insert surrounding the opening and thus the shaft is prevented from being
rotated independently of the knob.

[0011] In another embodiment of the present invention, the knob has a wall that, when the knob is placed on the insert, extends toward the control panel so as to surround the insert, and the wall is provided with more than one claw that extends outwards from the edge of the wall perpendicularly to the wall. The knob is fixed on the control panel by passing the claws through the housing so that the claws contact the control panel from the rear side thereof. Thus, the knob is prevented from detaching from the control panel.

[0012] By means of the present invention, the knob is enabled to perform its function without any errors in the cases where the shaft is not positioned properly in the opening due to production tolerances and any displacement occurring during the assembly. Moreover, by means of the present invention, the knob is prevented from inclining during the operation in the case when the shaft is mounted in an inclined manner.

[0013] The household appliance realized in order to attain the aim of the present invention is illustrated in the attached figures where

[0014] Figure 1 - is the view of the control panel and the knob related to an embodiment of the present invention.

[0015] Figure 2 - is the partial perspective view of the control panel and the knob related to an embodiment of the present invention.

[0016] Figure 3 - is the perspective view of the shaft and the insert related to an embodiment of the present invention.

[0017] Figure 4 - is the rear perspective view of the knob related to an embodiment of the present invention.

[0018] Figure 5 - is the partial schematic view of the knob, the shaft and the insert related to an embodiment of the present invention.

[0019] Figure 6 - is the perspective view of the shaft and the insert related to another embodiment of the present invention.

[0020] Figure 7 - is the rear perspective view of the know related to another embodiment of the present invention.

[0021] Figure 8 - is the partial perspective view of the control panel, the knob, the shaft and the insert related to another embodiment of the present
invention.

[0022] The elements illustrated in the figures are numbered as follows:
1. Household appliance
2. Control panel
3. Control card
4. Encoder
5. Shaft
6. Housing
7. Knob
8. Insert
9. Opening
10. Connection element
11. Extension
12. Slit
13. Protrusion
14. Wall
15. Claw

[0023] The household appliance (1) comprises a control panel (2); a control card (3) that is disposed behind the control panel (2); an encoder (4) that enables the settings determined by the user to be transmitted to the control card (3); a shaft (5) that is connected to the encoder (4); a housing (6) that enables the shaft (5) to extend outwards from the control panel (2); a knob (7) that is disposed on the control panel (2) and that actuates the shaft (5), and an insert (8) that is disposed between the shaft (5) and the knob (7). While the knob (7) is rotated, the shaft (5) that is connected by means of the insert (8) to the knob (7) also moves, and the encoder (4) disposed at the other end of the shaft (5) enables the user preferences such as washing program, washing temperature, etc. located at predetermined positions to be transmitted to the control card (3).

[0024] The household appliance (1) of the present invention comprises a longitudinal opening (9) that is arranged on the insert (8), through which the shaft (5) passes and that enables the insert (8) to move on the shaft (5) perpendicularly to the axis of the shaft (5), and at least one connection
element (10) that is disposed on the insert (8) and the knob (7) and that enables, when the knob (7) is placed on the insert (8), the insert (8) to be movably connected to and engage with the knob (7). The insert (8) is placed on the shaft (5) by passing the end of the shaft (5) extending outwards from the housing (6) through the opening (9). The opening (9) has a longitudinal form so as to provide the shaft (5) with freedom of movement perpendicularly to the axis of the shaft (5). The knob (7) is connected to the insert (8) by means of the connection element (10), and the connection element (10) enables the insert (8) to move on the knob (7). Thus, in the cases where the shaft (5) is positioned erroneously or in an inclined manner, the insert (8) moves by sliding on both the shaft (5) and the knob (7) while the knob (7) is rotated and enables the effects of any assembly defects of the shaft (5) on the movement of the knob (7) to be eliminated. Thus, the knob (7) is enabled to be always rotated in full circle.

In an embodiment of the present invention, the connection element (10) enables the insert (8) to move on the knob (7) perpendicularly to the movement direction of the shaft (5) in the opening (9). The insert (8) can move on the knob (7) along an axis perpendicular to the longitudinal axis of the opening (9). Thus, the insert (8) can move along both horizontal and vertical axes.

In another embodiment of the present invention, the insert (8) comprises at least one extension (11) that is disposed thereon and that extends outwards from the insert (8) perpendicularly to the longitudinal axis of the opening (9), and the knob (7) comprises at least one slit (12) wherein the extension (11) enters when the knob (7) is placed on the insert (8), that guides the movement of the insert (8) that is perpendicular to the movement of the shaft (5) in the opening (9). Two extensions (11) that extend in opposite directions are provided on the insert (8). The knob (7) is placed on the insert (8) by fitting the extensions (11) into the slits (12). In the position where the longitudinal axis of the opening (8) is horizontal, the extensions (11) extend on the vertical axis. In this case, eccentricity of the shaft (5) in the horizontal axis is compensated by the shaft (5) sliding to
left or right in the opening (9), and in the case that the shaft (5) is in a position that is lower or higher than the correct position, the eccentricity of the shaft (5) in the vertical axis can be tolerated by means of the movement of the insert (8) on the knob (7) in vertical direction. As the knob (7) is rotated, the shaft (5) moves in the opening (9) and pushes the insert (8) so as to enable the extensions (11) to move in the slits (12). When the knob (7) is rotated by 90 degrees, the longitudinal axis of the opening (9) extends in the vertical direction so as to correct the positioning error of the shaft (5) in the vertical direction and the slits (12) enable the insert (8) to move to left and right on the knob (7) so as to tolerate the eccentricity of the shaft (5) in the horizontal axis.

[0027] In another embodiment of the present invention, the insert (8) comprises at least one pair of extensions (11) that are oppositely disposed thereon and that extend outwards from the insert (8) perpendicularly to the longitudinal axis of the opening (9), and the knob (7) comprises at least one protrusion (13) that enters between the extensions (11) when the knob (7) is placed on the insert (8). Two pairs of extensions (11) are disposed on the insert (8) so as to be symmetrical with respect to the longitudinal axis of the opening (9). Two protrusions (13) are oppositely disposed on the surface of the knob (7) facing the control panel (2) and the protrusions (13) are seated between the extensions (11) when the knob (7) is placed on the insert (8). The protrusions (13) limit the movement of the insert (8) and enable the same to move in a single axis on the knob (7). Thus, in the case where the shaft (5) is located off the correct position in the housing (6), the insert (8) is pushed by the shaft (5) while the knob (7) is rotated, and the extensions (11) move perpendicularly to the longitudinal axis of the opening (9) so as to slide over the protrusions (13).

[0028] In another embodiment of the present invention, the shaft (5) has at least one flat surface that bears against the insert (8) so as to prevent the shaft (5) from rotating in the opening (9). The flat surface of the shaft (5) bears against the wall of the insert (8) that surrounds the opening (9) and thus the shaft (5) is prevented from rotating independently of the insert (8).

[0029] In another embodiment of the present invention, the knob (7) has at least
one wall (14) that extends toward the control panel (2), and the wall (14) is provided with at least one claw (15) that extends outwards from the edge of the wall (14) and that, when passed through the housing (6), bears against the rear surface of the control panel (2) so as to enable the knob (7) to be fixed on the control panel (2). The wall (14) extends toward the control panel (2) from the side of the knob (7) facing the control panel (2) so as to surround the insert (8) when the knob (7) is placed on the insert (8). The claws (15) each extend outwards from the edge of the wall (14) in a different direction so as to be perpendicular to the wall (14). When passed through housing (6), the claws (15) bear against the control panel (2) from the rear side thereof and prevent the knob (7) from detaching from the control panel (2).

[0030] In another embodiment of the present invention, the household appliance (1) is a laundry washing and/or drying machine.

[0031] In the household appliance (1) of the present invention, any operational defects, such as the knob (7) inclining, getting stuck, rubbing or rotating eccentrically with respect to the center of the slot (6) due to erroneous assembly of the shaft (5), that cause a decrease in the quality perception of the users, are eliminated. Moreover, by means of the present invention, thanks to higher production and assembly tolerances, the production costs of the components are reduced and the quantity of scrap is reduced.
Claims

1. A household appliance (1) comprising a control panel (2); a control card (3) that is disposed behind the control panel (2); an encoder (4) that enables the settings determined by the user to be transmitted to the control card (3); a shaft (5) that is connected to the encoder (4); a housing (6) that enables the shaft (5) to extend outwards from the control panel (2); a knob (7) that is disposed on the control panel (2) and that actuates the shaft (5), and an insert (8) that is disposed between the shaft (5) and the knob (7), characterized by a longitudinal opening (9) that is arranged on the insert (8), through which the shaft (5) passes and that enables the insert (8) to move on the shaft (5) perpendicularly to the axis of the shaft (5), and at least one connection element (10) that is disposed on the insert (8) and the knob (7) and that enables, when the knob (7) is placed on the insert (8), the insert (8) to be movably connected to and engage with the knob (7).

2. A household appliance (1) as in Claim 1, characterized by the connection element (10) that enables the insert (8) to move on the knob (7) perpendicularly to the movement direction of the shaft (5) in the opening (9).

3. A household appliance (1) as in Claim 2, characterized by at least one extension (11) that is disposed on the insert (8) and that extends outwards from the insert (8) perpendicularly to the longitudinal axis of the opening (9), and at least one slit (12) that is disposed on the knob (7), wherein the extension (11) enters when the knob (7) is placed on the insert (8) and that guides the movement of the insert (8) on the knob (7).

4. A household appliance (1) as in Claim 2, characterized by at least one pair of extensions (11) that are oppositely disposed on the insert (8) and that extend outwards from the insert (8) perpendicularly to the longitudinal axis of the opening (9), and at least one protrusion (13) that is disposed on the knob (7) and that enters between the extensions (11) when the knob (7) is placed on the insert (8).

5. A household appliance (1) as in any one of the above claims, characterized by the shaft (5) that has at least one flat surface that bears against the insert (8) so as to prevent the shaft (5) from rotating in the opening (9).

6. A household appliance (1) as in any one of the above claims, characterized by
at least one wall (14) that is disposed on the knob (7) and that extends toward the control panel (2), and at least one claw (15) that extends outwards from the edge of the wall (14) and that, when passed through the housing (6), bears against the rear surface of the control panel (2) so as to enable the knob (7) to be fixed on the control panel (2).

7. A household appliance (1) as in any one of the above claims, that is a laundry washing and/or drying machine.
INTERNATIONAL SEARCH REPORT

PCT/EP2017/061057

A. CLASSIFICATION OF SUBJECT MATTER

INV. D06F39/00
ADD. A47L15/42 F24C7/08 G05G1/10 H01H3/10

According to International Patent Classification (IPC) and to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D06F A47L F24C G05G H01H F16D

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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>A</td>
<td>DE 199 43 902 AI (VALEO ELECTRONIQUE CRETEIL [FR])&lt;br&gt;20 April 1 2000 (2000-04-20)&lt;br&gt;column 2, line 21 - column 3, line 7&lt;br&gt;figure 1</td>
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[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents :

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Name and mailing address of the ISA

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