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(71) Applicant: **ARCELIK ANONIM SIRKETI** [TR/TR]; E5 Ankara Asfalti Uzeri, Tuzla, 34950 Istanbul (TR).

(72) Inventor: **SERABATIR, Davut Ayhan**; E5 Ankara Asfalti Uzeri, Tuzla, 34950 Istanbul (TR).

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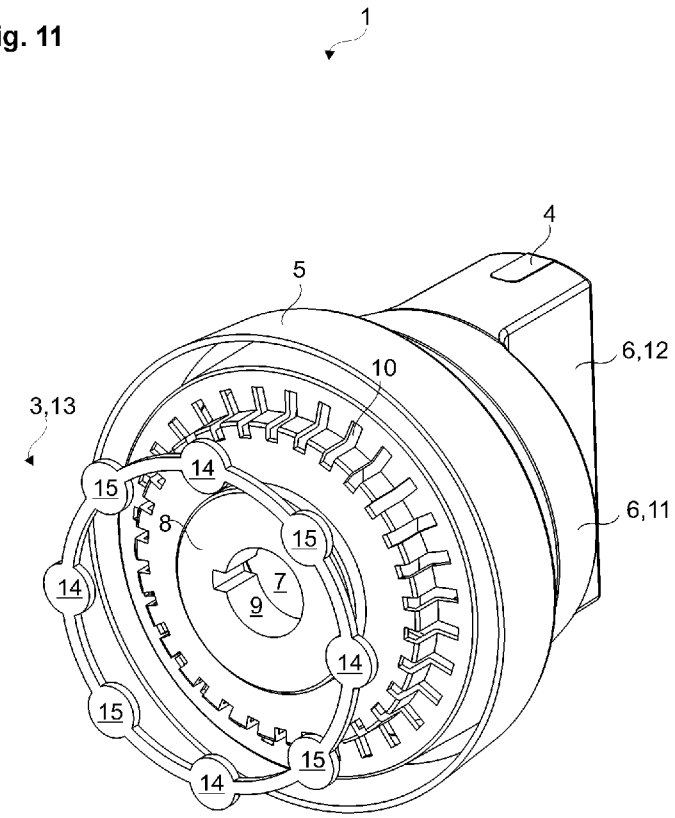
(54) Title: ILLUMINATED ROTARY KNOB FOR USE IN A HOUSEHOLD APPLIANCE

Fig. 11



(57) Abstract: The present invention relates to a rotary knob (1) for use in a household appliance comprising a panel (2) which has a regulator shaft for releasably holding the rotary knob (1) and an illuminating device (3) for illuminating the rotary knob (1). The rotary knob (1) comprises a transparent indicator (4) whose outer side is adapted to face a user in front of the panel (2), a transparent collar (5) whose inner side and outer side are adapted to respectively face the illuminating device (3) and the user in front of the panel (2) and non-transparent body (6) which is interposed between the collar (5) and the indicator (4).

Description

ILLUMINATED ROTARY KNOB FOR USE IN A HOUSEHOLD APPLIANCE

[0001] The present invention relates to an illuminated rotary knob for use in a household appliance, in particular a domestic oven.

[0002] A household appliance, in particular an oven generally has a panel and a rotary knob which is disposed onto the panel. The user manipulates the rotary knob in order to turn the appliance on or off and to regulate the heating level of the heat source. The rotary knob generally has a hub which is mountable onto the regulator shaft of the gas valve or the regulator shaft of the electrical switch depending on the type of the oven, and a pointer which indicates the operative state of the oven which is set by the user.

[0003] For improving the intelligibility of a household appliance, a rotary knob is frequently provided with an illuminated transparent indicator. US 2005/0236263 A1 discloses a control knob with a multi-color indicator.

[0004] In general, it is of utmost importance that the user can reliably ascertain by means of the illuminated indicator the current operative state of the household appliance. However, there is generally a risk that the indicator escapes from the eye of the user, for example when the user stays at a particularly unfavorable position and/or the indicator is soiled. Moreover, in the event of a malfunctioning of the illuminating device, the user cannot reliably recognize the actual operative state of the household appliance. In such case there is a risk of fire and explosion.

[0005] An objective of the present invention is to provide a rotary knob for use in a household appliance, in particular an oven which overcomes the aforementioned drawbacks of the prior art in a cost effective way and which enables the user to operate the household appliance more reliably and safely.

[0006] This objective has been achieved by the rotary knob as defined in claim 1 and the oven as defined in claim 4. Further achievements have been attained by the subject-matters respectively defined in the dependent claims.

[0007] The rotary knob of the present invention comprises a transparent collar

whose inner side faces an illuminating device of the household appliance and outer side faces a user who is located in front of the panel, a non-transparent body which is interposed between the transparent collar and the transparent indicator and a cavity inside the non-transparent body for transmitting the light from the transparent collar to the inner side of the transparent indicator.

[0008] With the present invention, both the collar and the indicator of the rotary knob can be entirely illuminated by the illuminating device of the household appliance. Thereby the user can more easily and reliably ascertain the current operative state of the household appliance. For example if the user fails to see the illuminated indicator due to an unfavorable view point or a reduced sight, then the illuminated collar will easily attract the attention of the user. Thereby, the user can be protected from being misled and is prompted to take a closer look at the position of the indicator. In addition, the rotary knob of the present invention is physically separate from the stationary illuminating device of the household appliance, and thus can be entirely removed from the panel, in particular from the regulator shaft for cleaning or replacement. Thereby, the customer satisfaction can be increased.

[0009] In an embodiment, the inner side of the transparent collar has a plurality of apertures which let the light emitted from the illuminating device to pass into the cavity, and therefrom to the indicator. Thereby, the drop in the light intensity which reaches the user can be comparatively reduced, and the visibility of the collar and the indicator can be accordingly increased. In a version of this embodiment, the apertures are radially formed around a central bore of the transparent collar which defines a transparent hub for releasably receiving the regulator shaft.

[0010] The present invention also provides an oven. The oven comprises at least one rotary knob which is releasably held by the regulator shaft, and an illuminating device for illuminating the rotary knob. The illuminating device emits light in response to the rotational position and/or movement of the regulator shaft. The rotational position and/or movement of the shaft are detected by a detection unit. The illuminating device is fixed behind the

panel at a location which faces the transparent collar of the rotary knob. Thus, when the illuminating device emits light, then the transparent collar and the transparent indicator are both illuminated.

[0011] In another embodiment, the detection unit comprises a rotary encoder. Alternatively a switch can be used.

[0012] In another embodiment, the illuminating device emits solely green light when the rotatory knob is at the rest position. Thus, the transparent collar and the transparent indicator are both illuminated with green light at the rest position. Thereby, the user is informed that the corresponding heat source is currently not operated or its operation has been already terminated. In this embodiment, the illuminating device emits solely red light when the rotatory knob is moved from the rest position to any operative position. Thus, the transparent collar and the indicator are both illuminated with red light. Thereby, the user is alerted that the corresponding heat source is in operation. With the present invention, the user can also easily become aware that the illumination device is malfunctioning when the collar of the rotary knob emits neither green light nor red light. Thereby, the user can be protected from misidentifying the actual operative state, when he or she fails to see the position of the transparent indicator.

[0013] In another embodiment, the illuminating device has a plurality of red light sources and a plurality green light sources which are alternately arrayed around the rotational axis of the regulator shaft so as to uniformly illuminate the transparent collar and the transparent indicator. The red light sources and the green light sources can be separately activated in response to the rotational position of the regulator shaft. Alternatively an array of color changing light sources is used to emit either red light or green light. The light sources comprise light emitting diodes (LEDs). Alternatively colored lamps can be sued.

[0014] In another embodiment, the light sources of the illuminating device are immovably disposed onto the surface of a plate located behind the panel.

[0015] Additional advantages of the rotary knob and the oven of the present invention will become apparent with the detailed description of the

embodiments with reference to the accompanying drawings in which:

[0016] Figure 1 – is a schematic partial perspective view of an oven panel which has a rotary knob according to an embodiment of the present invention;

[0017] Figure 2 – is a schematic partial top view of the oven panel which has the rotary knob according to an embodiment of the present invention;

[0018] Figure 3 – is a schematic partial front view of the oven panel which has the rotary knob according to an embodiment of the present invention;

[0019] Figure 4 – is a schematic partial front view of the oven panel according to an embodiment of the present invention, wherein the rotary knob has been removed;

[0020] Figure 5 – is a schematic sectional view of the oven panel which has the rotary knob according to an embodiment of the present invention, taken along the line A-A of Fig. 2;

[0021] Figure 6 – is a schematic sectional view of the oven panel which has the rotary knob according to an embodiment of the present invention, taken along the line B-B of Fig. 3;

[0022] Figure 7 – is a schematic sectional view of the oven panel which has the rotary knob according to an embodiment of the present invention, taken along the line C-C of Fig. 3;

[0023] Figure 8 – is a schematic partial sectional view of the oven panel according to an embodiment of the present invention, taken along the line D-D of Fig. 4, wherein the rotary knob has been removed;

[0024] Figure 9 – is a schematic partial sectional view of the oven panel according to an embodiment of the present invention, taken along the line E-E of Fig. 4, wherein the rotary knob has been removed;

[0025] Figure 10 – is a schematic perspective view of the rotary knob and the light emitting unit according to an embodiment of the present invention;

[0026] Figure 11 – is another schematic perspective view of the rotary knob and the light emitting unit according to an embodiment of the present invention;

[0027] Figure 12 – is a schematic side view of the rotary knob and the light emitting unit according to an embodiment of the present invention;

[0028] Figure 13 – is a schematic front view of the rotary knob according to an embodiment of the present invention;

[0029] Figure 14 – is a schematic rear view of the rotary knob and the light emitting unit according to an embodiment of the present invention.

[0030] The reference signs appearing on the drawings relate to the following technical features.

1. Knob
2. Panel
3. Device
4. Indicator
5. Collar
6. Body
7. Cavity
8. Hub
9. Bore
10. Aperture
11. Base
12. Grip
13. Light emitting unit
14. Light source (LED)
15. Light source (LED)
16. Surface
17. Recess
18. Surface

[0031] The rotary knob (1) is suitable for use in a household appliance (not shown), in particular an oven (not shown).

[0032] The oven comprises a panel (2) which has one or more than one rotatable regulator shaft (not shown) for releasably holding a corresponding rotary knob (1) and regulating the heating level of a corresponding heat source (not shown), and one or more than one illuminating device (3) for illuminating the corresponding rotary knob (1) (Fig. 1 to 14).

[0033] The rotary knob (1) comprises a transparent indicator (4) whose outer side is adapted to face a user who is located in front of the panel (2).

[0034] The rotary knob (1) of the present invention further comprises a transparent collar (5) whose inner side and outer side are adapted to

respectively face the illuminating device (3) and the user located in front of the panel (2), a non-transparent body (6) which is interposed between the transparent collar (5) and the transparent indicator (4), and a cavity (7) inside the non-transparent body (6) for transmitting the light from the transparent collar (5) to the inner side of the transparent indicator (4).

[0035] In an embodiment, the rotary knob (1), including the transparent indicator (4), the transparent collar (5), and the non-transparent body (6) are respectively made from plastic materials and are firmly joined together to constitute an integral piece.

[0036] In an embodiment, the transparent collar (5) comprises a transparent hub (8), a centered bore (9) which is formed into the transparent hub (8) for releasably receiving the rotatable regulator shaft, and a plurality of apertures (10) which are circumferentially formed around the transparent hub (8) for transmitting the light from the illuminating device (3) into the cavity (7).

[0037] In another embodiment, the non-transparent body (6) has a round non-transparent base (11) and an elongated non-transparent grip (12) which is diametrically disposed on the non-transparent body (6). The transparent indicator (4) is embedded into one of the opposing ends of the non-transparent grip (12).

[0038] The present invention also provides an oven (not shown). The oven comprises one or more than one rotary knob (1). Each rotary knob (1) is releasably held by a corresponding regulator shaft. The oven further comprises one or more than one an illuminating device (3) for illuminating a corresponding rotary knob (1). The illuminating device (3) comprises a detection unit (not shown) which is adapted to detect a rotational position of the corresponding regulator shaft, and a light emitting unit (13) which is adapted to emit light based on the detection result. The light emitting unit (13) is fixed behind the panel (2) at a location which faces the transparent collar (5) of the corresponding rotary knob (1).

[0039] In another embodiment, the light emitting unit (13) comprises two or more than two red light sources (14) and two or more than two green light sources (15) which are alternately arrayed around the rotational axis of the

corresponding regulator shaft.

[0040] In another embodiment, the light emitting unit (13) is adapted to emit solely green light when the rotatory knob (1) is at the rest position, and to emit solely red light when the rotary knob (1) is at any operative position.

[0041] In another embodiment, the panel (2) comprises a front mounting surface (16) which has one or more than one recess (17) for receiving one or more than one rotary knob (1) respectively. The front mounting surface (16) is exposed to the front. In this embodiment, the panel (2) further comprises a rear mounting surface (18) for supporting each light emitting unit (13). The rear mounting surface (18) is disposed behind the front mounting surface (16). The detection units are respectively disposed at least partly onto the regulator shafts.

[0042] With the rotary knob (1) of the present invention, the user is enabled to operate the household appliance more reliably and safely. The user is particularly enabled to easily and precisely ascertain the operative state of the household appliance. Thereby, a consumer satisfaction can be increased.

Claims

1. A rotary knob (1) for use in a household appliance comprising a panel (2) which has a rotatable regulator shaft for releasably holding the rotary knob (1) and an illuminating device (3) for illuminating the rotary knob (1), the rotary knob (1) comprising a transparent indicator (4) whose outer side is adapted to face a user who is located in front of the panel (2), **characterized in that** a transparent collar (5) whose inner side and outer side are adapted to respectively face the illuminating device (3) and the user located in front of the panel (2), a non-transparent body (6) which is interposed between the transparent collar (5) and the transparent indicator (4) and a cavity (7) inside the non-transparent body (6) for transmitting the light from the transparent collar (5) to the inner side of the transparent indicator (4).
2. The rotary knob (1) according to claim 1, **characterized in that** the transparent collar (5) comprising a transparent hub (8), a centered bore (9) which is formed into the transparent hub (8) for releasably receiving the rotatable regulator shaft and a plurality of apertures (10) which are circumferentially formed around the transparent hub (8) for transmitting the light from the illuminating device (3) into the cavity (7).
3. The rotary knob (1) according to claim 1or 2, **characterized in that** the non-transparent body (6) has a round non-transparent base (11) and an elongated non-transparent grip (12) which is diametrically disposed on the non-transparent body (6), wherein the transparent indicator (4) is embedded into one of the opposing ends of the non-transparent grip (12).
4. An oven comprising a panel (2) which has one or more than one regulator shaft for regulating the heating level of a corresponding heat source, **characterized in that** one or more than one rotary knob (1) as defined in any one of claims 1 to 3, wherein each rotary knob (1) is releasably held by a corresponding regulator shaft and one or more than one illuminating device (3) for illuminating a corresponding rotary knob (1), wherein the illuminating device (3) comprising a detection unit which is adapted to detect a rotational position of the corresponding regulator shaft and a light emitting unit (13) which is adapted to emit light based on the detection result, and wherein the light emitting unit (13) is fixed behind the panel (2) at a location which faces the

transparent collar (5) of the corresponding rotary knob (1).

5. The oven according to claim 4, **characterized in that** the light emitting unit (13) comprising two or more than two red light sources (14) and two or more than two green light sources (15) which are alternately disposed around the rotational axis of the corresponding shaft.
6. The oven according to claim 4 or 5, **characterized in that** the light emitting unit (13) is adapted to emit solely green light when the rotatory knob (1) is at the rest position, and to emit solely red light when the rotary knob (1) is at any operative position.
7. The oven according to any one of claims 4 to 6, **characterized in that** the panel (2) comprising a front mounting surface (16) which has one or more than one recess (17) for receiving one or more than one rotary knob (1) respectively, wherein the front mounting surface (16) is exposed to the front and a rear mounting surface (18) for supporting each light emitting unit (13), wherein the rear mounting surface (18) is disposed behind the front mounting surface (16).

Fig. 1

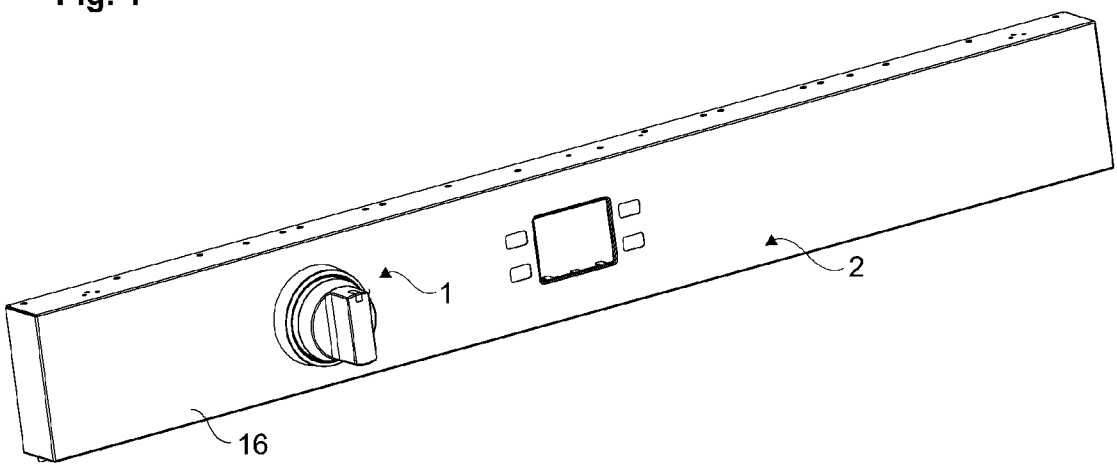


Fig. 2

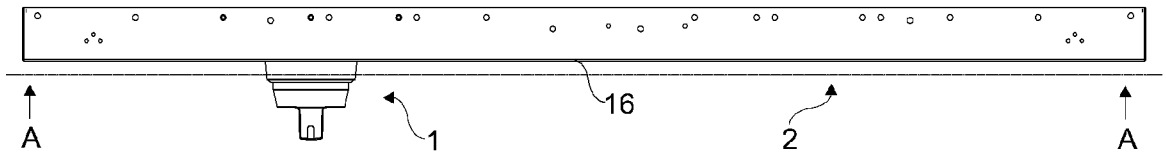


Fig. 3

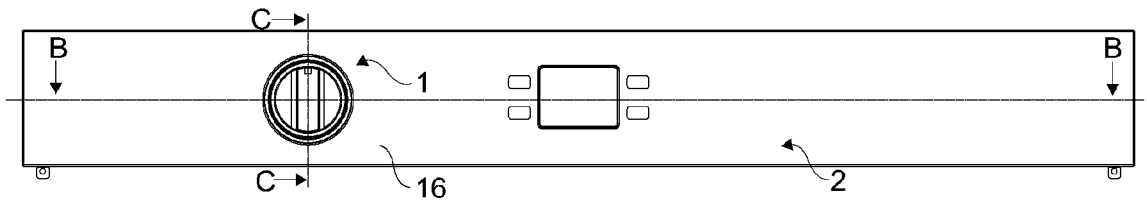


Fig. 4

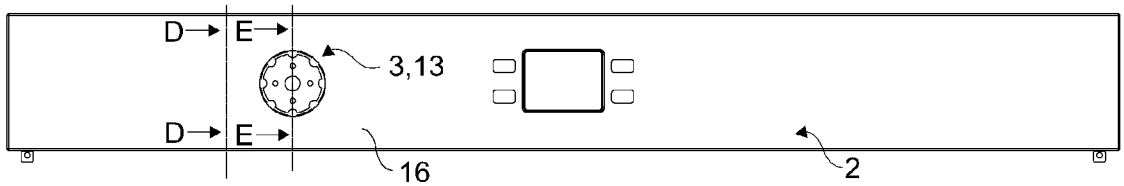


Fig. 5

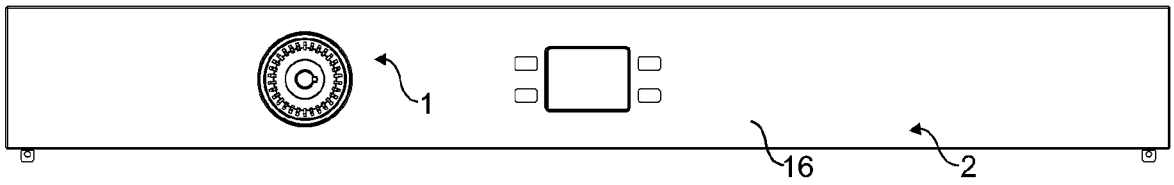


Fig. 6

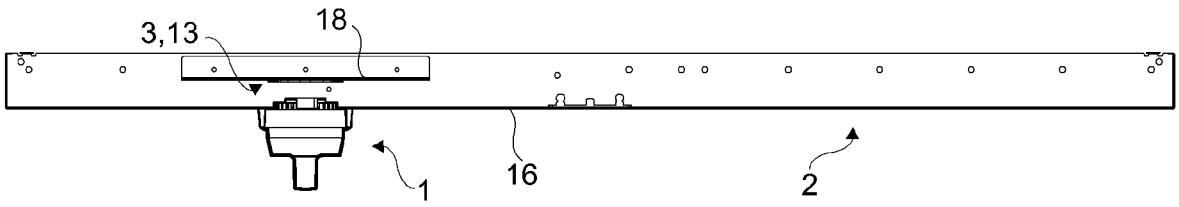


Fig. 7

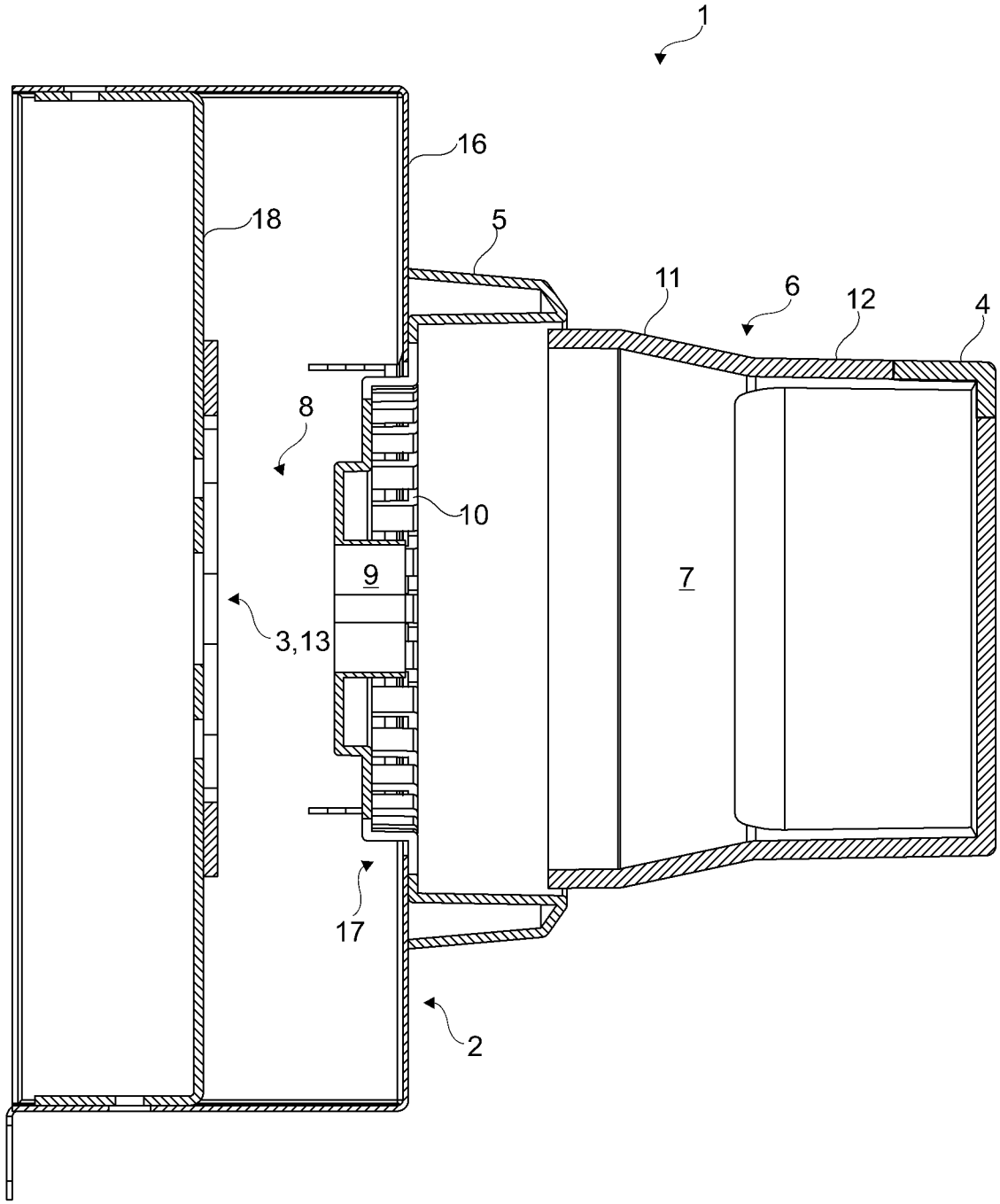


Fig. 8

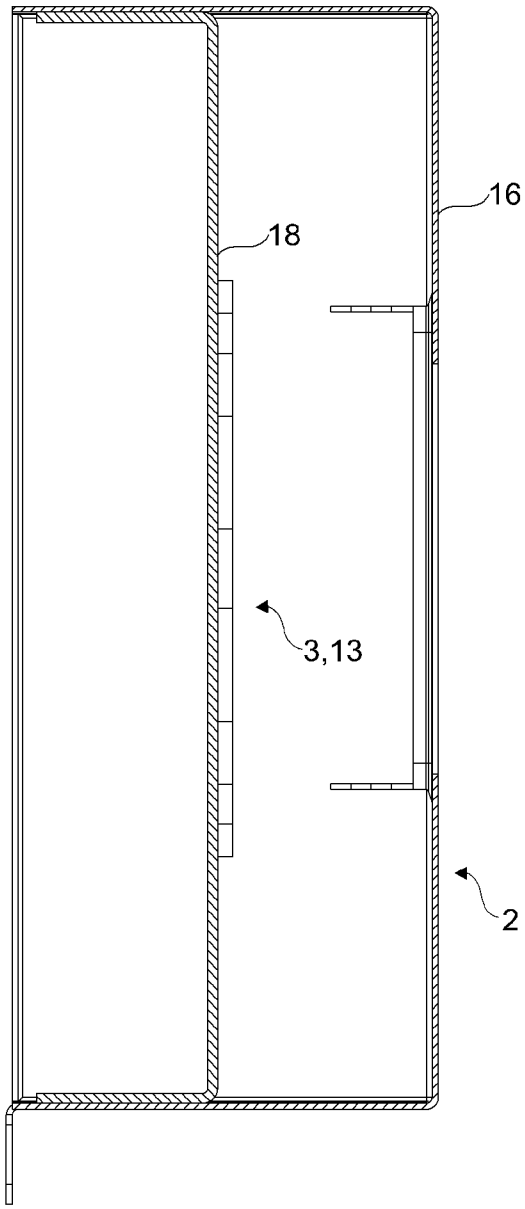


Fig. 9

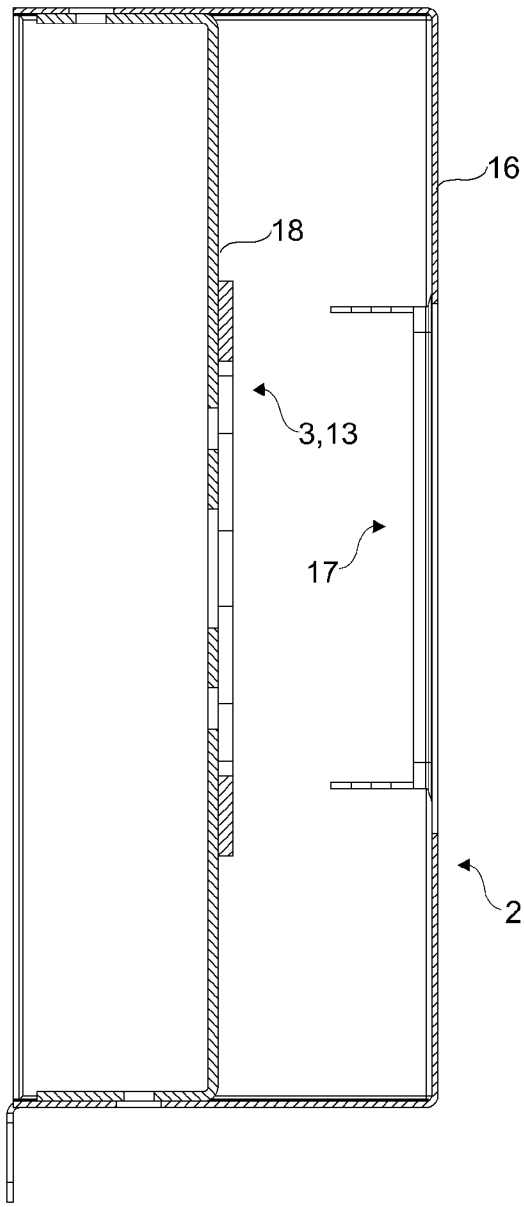


Fig. 10

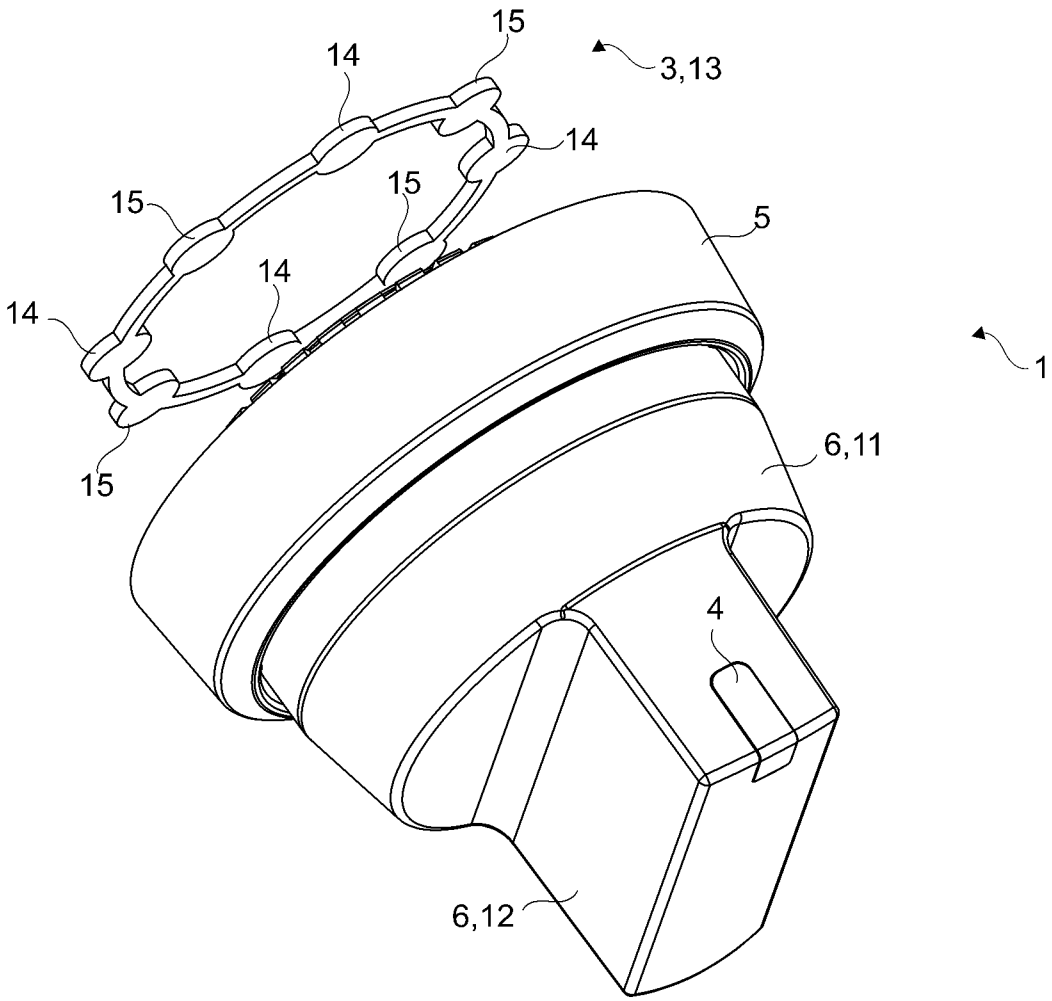


Fig. 11

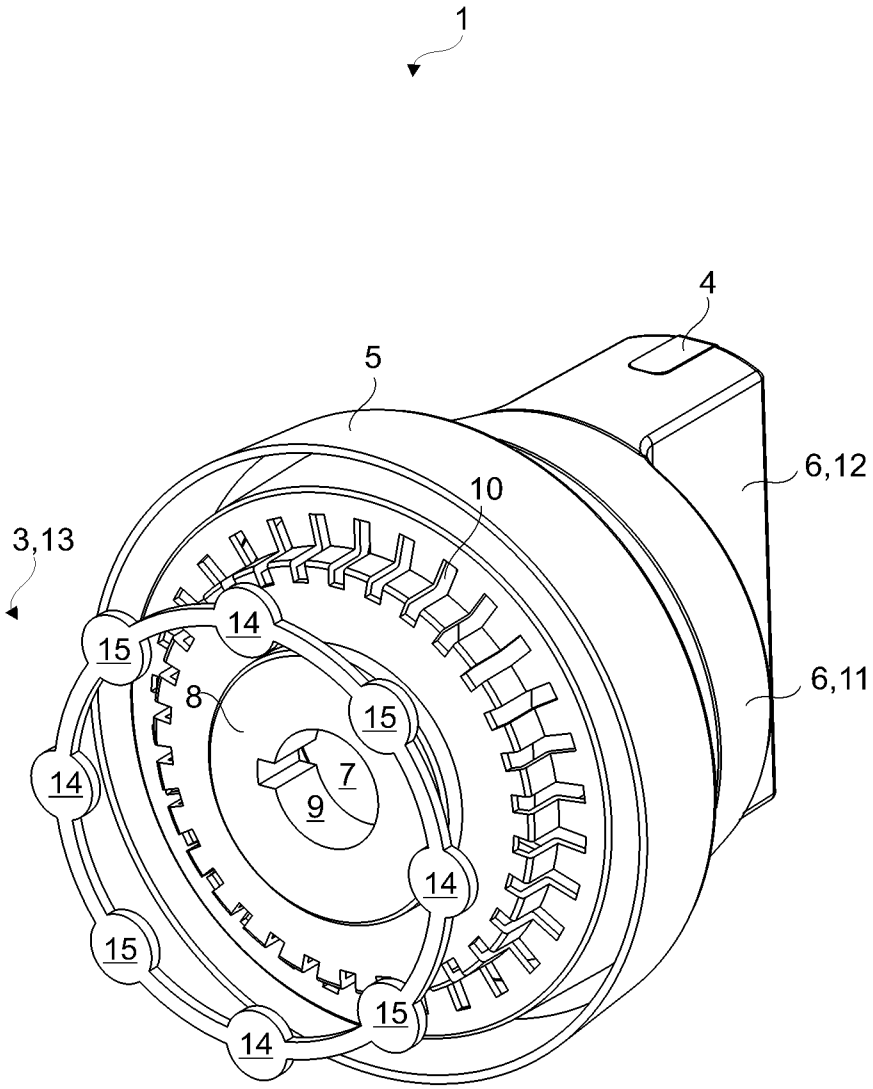


Fig. 12

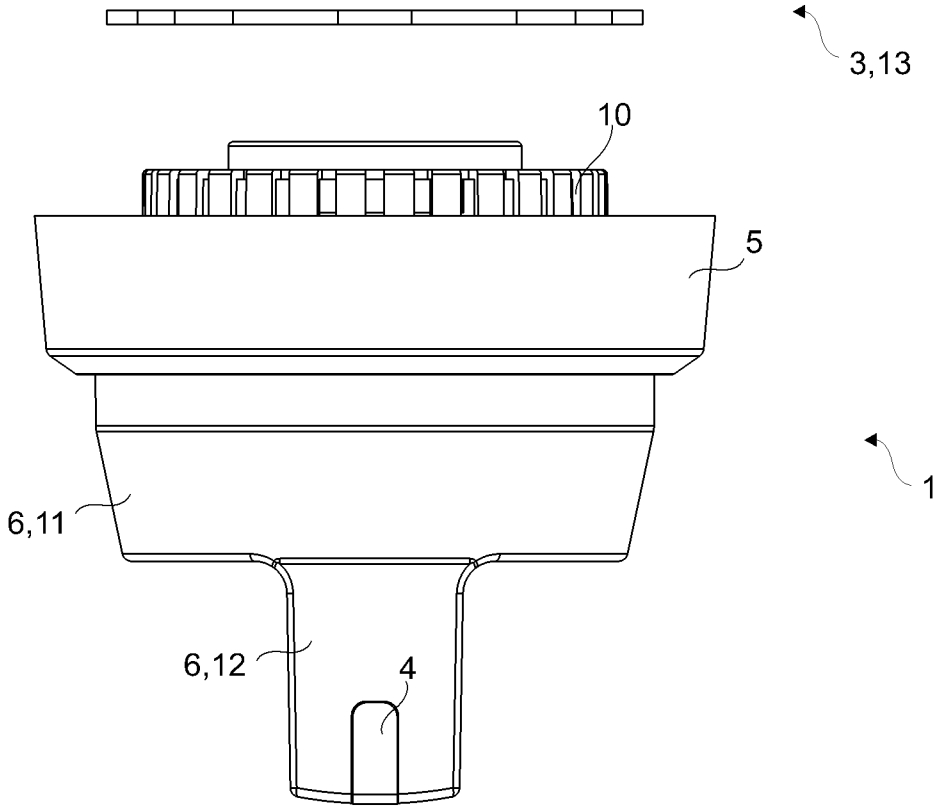


Fig. 13

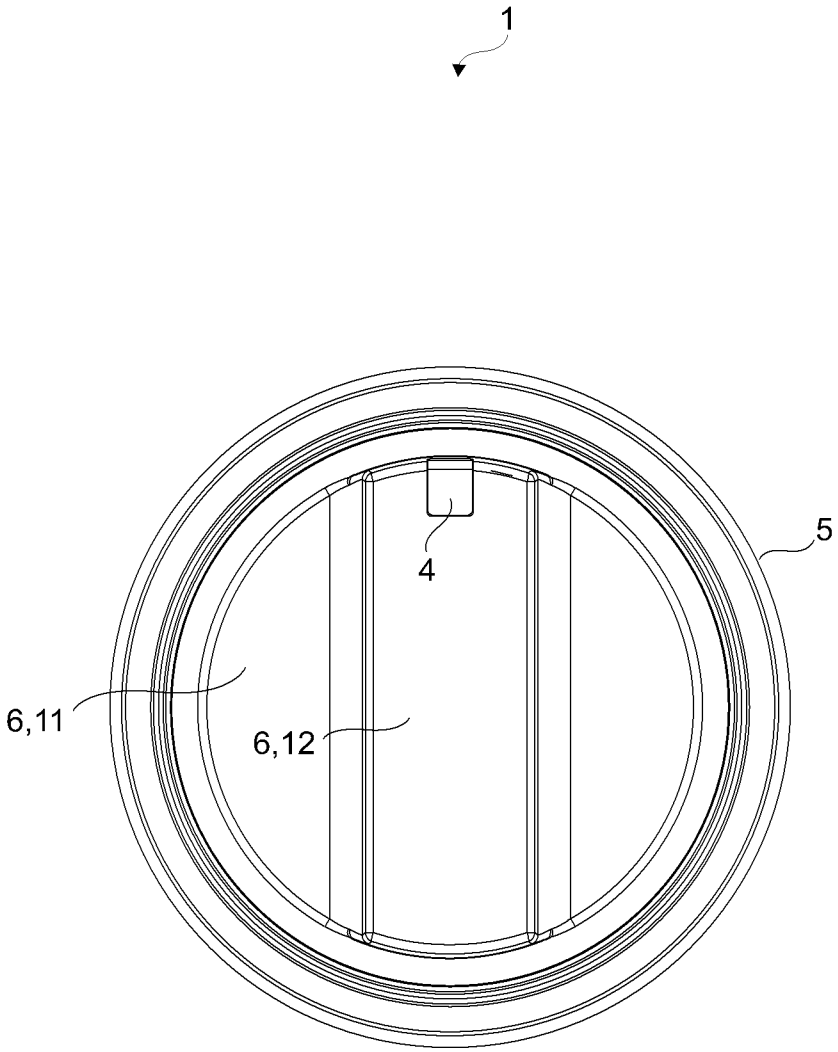
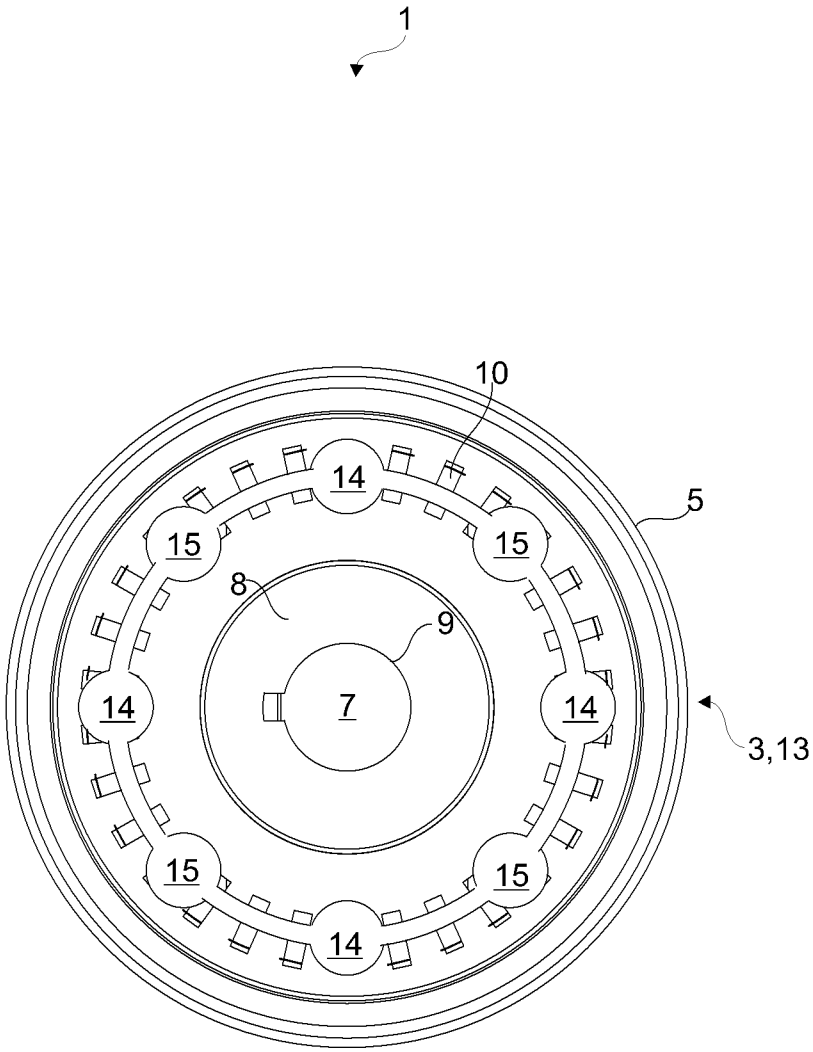


Fig. 14



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/075970

A. CLASSIFICATION OF SUBJECT MATTER
INV. F24C7/08 G05G1/10
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)
F24C G05G

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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A	the whole document	2-7

X	DE 10 2013 210124 A1 (E G O ELEKTRO GERÄTEBAU GMBH [DE]) 8 May 2014 (2014-05-08)	1,2,5,6
Y	the whole document	3,4,7

X	EP 2 701 031 A2 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 26 February 2014 (2014-02-26)	1
A	the whole document	2-7

A	US 2 887 086 A (BOLDT MELVIN H ET AL) 19 May 1959 (1959-05-19) the whole document	5,6

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
28 July 2015	05/08/2015

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Makúch, Milan

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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/075970

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2014/075970

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