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(54) Title: BUILT-IN DISHWASHER

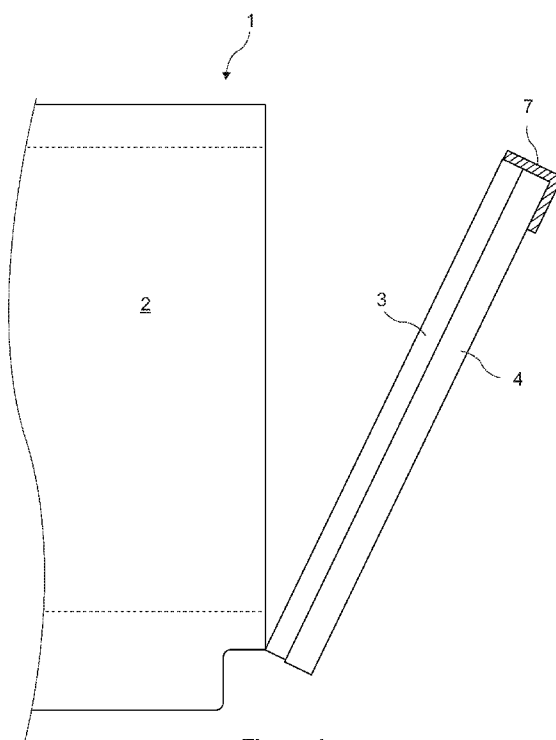


Figure 1

(57) Abstract: The present invention relates to a front-loading built-in dishwasher (1) comprising a washing chamber (2); a door (3) that is opened by the user to access the washing chamber (2); a decorative lid (4) that is mounted to the front surface of the door (3), 5 that moves together with the door (3) and that is produced preferably from wooden material, and a door opening mechanism (5) that enables the door (3) to be opened.



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DESCRIPTION

BUILT-IN DISHWASHER

The present invention relates to a built-in dishwasher comprising a decorative lid that is mounted on the door thereof.

- 5 A built-in dishwasher comprises a door that enables the user to access the washing chamber and a decorative lid that is mounted onto the door and that enables the dishwasher to have a wooden esthetic appearance while the door is closed. A handle may be provided on the decorative lid; however, in some cases the user may prefer that no handle is used so that the decorative lid has a matching appearance with the
10 kitchen furniture.

In the state of the art, the built-in dishwashers comprise mechanisms that automatically open the lid by detecting the user's request of opening the door. In the state of the art various solutions for the detection of the request of opening the door are proposed.

- 15 In the state of the art European Patent No. EP1714604, a dishwasher is disclosed, that has a data entry system controlled in a capacitive manner, that receives the commands entered by the user without opening the door.

The aim of the present invention is the realization of a built-in dishwasher wherein the door thereof is enabled to be opened by detecting the user's request of opening
20 the door without using a handle on the decorative lid.

The built-in dishwasher realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof comprises a capacitive transmitter that has a contact surface arranged on the decorative lid, that extends from the decorative lid onto the door and that transmits the static electrical charge to
25 the door, applied by the user touching the contact surface.

The main control unit disposed inside the door has a capacitive measurement circuit and enables the door opening mechanism to be actuated by detecting the electrical charge transmitted by the capacitive transmitter, thus providing the opening of the door. Thus, the user is enabled to give the command of opening the door only by

touching the capacitive transmitter on the decorative lid, thus providing the opening of the door, and a handle is not required to be used on the decorative lid.

In an embodiment of the present invention, the capacitive transmitter is L-shaped with one end thereof extending towards the front surface of the lid and the other end
5 towards the upper edge of the door.

In another embodiment of the present invention, in the built-in dishwasher of the present invention, the level of the upper edge of the door is lower than the level of the upper edge of the lid and the electrical charge carried by the capacitive transmitter is transmitted to the control unit in the door by means of a spring or an
10 extension.

In another embodiment of the present invention, the capacitive transmitter is placed into a hole or a recess bored on the decorative lid.

In another embodiment of the present invention, the level of the upper edge of the decorative lid is lower than the level of the upper edge of the door and a bar-shaped
15 capacitive transmitter is disposed at the upper edge of the decorative lid which is situated at the lower level.

In another embodiment of the present invention, the telescopic capacitive transmitter suitable to be used in the decorative lids with different thicknesses is placed into the hole or the recess bored on the decorative lid.

20 In another embodiment of the present invention, a casing, that is produced from plastic sheet and that protects the electronic components, is provided at the upper region of the door between the control unit and the capacitive transmitter. The plastic casing improves the transmission of the electrical charge from the capacitive transmitter to the control unit with the dielectric effect.

25 The capacitive transmitter can be produced from metal, plastic or a composite material comprising metal and plastic or from plastic material comprising indium tin oxide (ITO) plate or coating.

In another embodiment of the present invention, a light source, for example a LED, is provided on the control unit and the light emitted by the light source is delivered

to the outside by means of the capacitive transmitter produced from transparent plastic, thus enabling the user to be informed about the completion status of the washing process.

A built-in dishwasher realized in order to attain the aim of the present invention is
5 illustrated in the attached figures, where:

Figure 1 – is the schematic view of a dishwasher.

Figure 2 – is the schematic view of the door, the decorative lid, the capacitive transmitter and the control unit.

Figure 3 – is the schematic view of the capacitive transmitter, the control unit and
10 the spring transmitting the electrical charge.

Figure 4 – is the schematic view of the capacitive transmitter, the control unit and the extension transmitting the electrical charge.

Figure 5 – is the schematic view of the hole arranged on the decorative lid and the capacitive transmitter.

Figure 6 – is the schematic view of the recess arranged on the decorative lid and the
15 capacitive transmitter.

Figure 7 – is the schematic view of the bar-shaped capacitive transmitter disposed on the decorative lid.

Figure 8 – is the schematic view of the door, the capacitive transmitter and the
20 casing disposed at the upper side of the door.

Figure 9 – is the schematic view of the light source disposed at the control unit and the capacitive transmitter.

The elements illustrated in the figures are numbered as follows:

- 1. Dishwasher
- 25 2. Washing chamber
- 3. Door
- 4. Lid

- 5. Door opening mechanism
- 6. Contact surface
- 7. Capacitive transmitter
- 8. Control unit
- 5 9. Spring
- 10. Channel
- 11. Extension
- 12. Hole
- 13. Recess
- 10 14. Casing
- 15. Light source

The built-in dishwasher (1) comprises a washing chamber (2); a door (3) that is opened by the user to access the washing chamber (2); a decorative lid (4) that is mounted to the front surface of the door (3), that moves together with the door (3) and that is produced preferably from wooden material, and a door opening mechanism (5) that enables the door (3) to be opened.

The built-in dishwasher (1) of the present invention comprises

- a capacitive transmitter (7) that has a contact surface (6) arranged on the lid (4), that extends from the lid (4) onto the door (3) and that transmits to the door (3) the electrical charge applied by the user touching the contact surface (6) and
- a control unit that is disposed inside the door (3), that has a capacitive measurement circuit and enables the door opening mechanism (5) to be actuated by detecting the electrical charge transmitted by the capacitive transmitter (7), thus providing the opening of the lid (4) (Figure 1, Figure 2).

In the built-in dishwasher (1) of the present invention, when the user touches the contact surface (6) of the capacitive transmitter (7) arranged on the lid (4), an electrical charge exchange occurs between the capacitive transmitter (7) and the

user. The capacitive transmitter (7) transmits the electrical charge generated by the touch of the user to the control unit (8) disposed in the door (3). The control unit (8) measures the electrical charge by means of the capacitive measurement circuit and according to the measurement, detects the “door (3) opening command”. Upon
5 detecting the door (3) opening command, the control unit (8) actuates the door opening mechanism (5) and thus provides the opening of the door (3). The door (3) is opened only by the user’s touch on the capacitive transmitter (7) on the lid (4), thus eliminating the need for using a handle.

In an embodiment of the present invention, the capacitive transmitter (7) is L-
10 shaped with one end thereof forming contact surface (6) extending on the front surface of the lid (4) and the other end extending towards the upper edge of the door (3). Without making any changes on the door (3) or the lid (4), the capacitive transmitter (7) extending from the lid (4) towards the door (3) is mounted and the contact surface (6) extending towards the front surface of the lid (4) enables the user
15 to give the “door (3) opening command” while the door (3) is closed (Figure 2).

In another embodiment of the present invention, the built-in dishwasher (1) comprises the door (3), the level of the upper edge of which is lower than the level of the upper edge of the lid (4), and a spring (9) with one end connected to the capacitive transmitter (7) and the other end to the upper edge of the door (3), the
20 spring (9) enabling to conduct the electrical charge carried by the capacitive transmitter (7) to the control unit (8). Since the spring (9) can lengthen/shorten between the capacitive transmitter (7) and the door (3), the spring (9) enables the lid (4) to be mounted to the door (3) so that their upper edges are situated at different levels (Figure 3).

25 In another embodiment of the present invention, the built-in dishwasher (1) comprises the door (3), the level of the upper edge of which is lower than the level of the upper edge of the lid (4), a channel (10) that opens in a direction perpendicular to the upper edge of the door (3) and an extension (11) with one end connected to the capacitive transmitter (7) and the other end passing through the
30 channel (10) to extend into the door (3), the extension (11) enabling the electrical

charge carried by the capacitive transmitter (7) to be transmitter to the control unit (8). Since the extension (11) can move inside the channel (10), the extension (11) enables the lid (4) to be mounted to the door (4) so that their upper edges are situated at different levels (Figure 4).

- 5 In another embodiment of the present invention, the built-in dishwasher (1) comprises a hole (12) bored on the lid (4) and the capacitive transmitter (7) that is disposed into the hole (12) to extend towards the door (3) (Figure 5).

In another embodiment of the present invention, the built-in dishwasher (1) comprises a recess (13) bored on the upper edge of the lid (4) and the capacitive
10 transmitter (7) that is disposed into the recess (13) to extend towards the door (3) (Figure 6).

In another embodiment of the present invention, the built-in dishwasher (1) comprises the lid (4), the level of the upper edge of which is lower than the level of the upper edge of the door (3), and the bar-shaped capacitive transmitter (7) that is
15 seated onto the lid (4) and the contact surface (6) extending along the upper edge of the lid (4) (Figure 7).

In another embodiment of the present invention, the built-in dishwasher (1) comprises the telescopic capacitive transmitter (7) that is suitable to be used with the decorative lids (4) in different thicknesses and that is disposed into the hole (12)
20 arranged on the lid (4) or into the recess (13). In this embodiment, the length of the telescopic capacitive transmitter (7) is adjusted by being lengthened/shortened according to the thickness of the lid (4).

In another embodiment of the present invention, the built-in dishwasher (1) comprises a casing (14) that is produced from plastic material and that is disposed at
25 the upper region of the door (3) between the control unit (8) and the capacitive transmitter (7) (Figure 8). Thanks to its electrical and thermal insulation characteristics, the casing (14) protects electronic components that may be affected from the environment conditions such as moisture, temperature, etc. The casing (14) furthermore enables the transmission of the electrical charge carried by the
30 capacitive transmitter (7) to the control unit (8). Being produced from plastic

material, the casing (14) produces dielectric effect between the capacitive transmitter (7) and the control unit (8) and enables the controlled transmission of the electrical charge.

5 In another embodiment of the present invention, the capacitive transmitter (7) is produced from metal material.

In yet another embodiment of the present invention, the capacitive transmitter (7) is produced from plastic material.

In yet another embodiment of the present invention, the capacitive transmitter (7) is produced from a composite material comprising metal and plastic.

10 In yet another embodiment of the present invention, the capacitive transmitter (7) is produced from indium tin oxide (ITO)-coated plastic material improving the electrical charge conductivity.

In another embodiment of the present invention, the capacitive transmitter (7) is produced from plastic sheets that are joined in a sandwiched manner, between
15 which a sheet produced from indium tin oxide (ITO) or any other metal material is placed.

In another embodiment of the present invention, the built-in dishwasher (1) comprises a light source (15), for example LED, disposed on the control unit (8) and a capacitive transmitter (7) that is produced from light guiding material, for
20 example transparent plastic and that extends from the front surface of the lid (4) towards the light source (15) (Figure 9). In this embodiment of the present invention, while the door (3) is closed and the dishwasher (1) is being operated, the light source (15) is active and illuminated and the light emitted thereby is carried to the front surface of the lid (4) by the capacitive transmitter (7) and reaches the outer
25 environment from the contact surface (6). Thus, the user can understand that the dishwasher (1) is being operated without opening the door (3). The light source (15) does not emit any light in the passive position. In this case, the user can understand that the washing process in the dishwasher (1) is completed.

By means of the present invention, in the front-loading built-in dishwasher (1), the user is enabled to give the door (3) opening command by touching the capacitive transmitter (7) on the lid (4), thus providing the opening of the door (3) by means of the door opening mechanism (5). The need for the use of a handle on the decorative
5 lid (4) to open the door (3) is eliminated.

CLAIMS

1 - A built-in dishwasher (1) **comprising** a washing chamber (2); a door (3) that enables the user to access the washing chamber (2); a decorative lid (4) that is mounted to the front surface of the door (3) and that moves together with the door (3), and a door opening mechanism (5) that enables the door (3) to be opened,
5 **characterized in that**

- a capacitive transmitter (7) that has a contact surface (6) arranged on the lid (4), that extends from the lid (4) onto the door (3) and that transmits to the door (3) the electrical charge applied by the user touching the contact surface (6) and

10 - a control unit (8) that is disposed inside the door (3), that has a capacitive measurement circuit and enables the door opening mechanism (5) to be actuated by detecting the electrical charge transmitted by the capacitive transmitter (7).

2 - A built-in dishwasher (1) as in Claim 1, **characterized in that** the capacitive transmitter (7) that is L-shaped with one end thereof extending on the front surface
15 of the lid (4), thus forming the contact surface (6) and the other end extending towards the upper edge of the door (3).

3 - A built-in dishwasher (1) as in Claim 1 or 2, **characterized in that** the door (3), the level of the upper edge of which is lower than the level of the upper edge of the lid (4), and a spring (9) with one end connected to the capacitive transmitter (7) and
20 the other end to the upper edge of the door (3), the spring (9) enabling to conduct the electrical charge carried by the capacitive transmitter (7) to the control unit (8).

4 - A built-in dishwasher (1) as in Claim 1 or 2, **characterized in that** the door (3), the level of the upper edge of which is lower than the level of the upper edge of the lid (4), a channel (10) that opens in a direction perpendicular to the upper edge of
25 the door (3) and an extension (11) with one end connected to the capacitive transmitter (7) and the other end passing through the channel (10) to extend into the door (3), the extension enabling the electrical charge carried by the capacitive transmitter (7) to be transmitter to the control unit (8).

5 - A built-in dishwasher (1) as in Claim 1, **characterized in that** a hole (12) bored on the lid (4) and the capacitive transmitter (7) that is disposed into the hole (12) to extend towards the door (3).

6 - A built-in dishwasher (1) as in Claim 1, **characterized in that** a recess (13) bored on the upper edge of the lid (4) and the capacitive transmitter (7) that is disposed into the recess (13) to extend towards the door (3).

7 - A built-in dishwasher (1) as in Claim 1, **characterized in that** the lid (4), the level of the upper edge of which is lower than the level of the upper edge of the door (3), and the bar-shaped capacitive transmitter (7) that is seated onto the lid (4) and the contact surface (6) extending along the upper edge of the lid (4).

8 - A built-in dishwasher (1) as in Claim 6 or 7, **characterized in that** the telescopic capacitive transmitter (7) that is suitable to be used with the decorative lids (4) in different thicknesses and that is disposed into the hole (12) arranged on the lid (4) or into the recess (13).

9 - A built-in dishwasher (1) as in any one of the above claims, **characterized in that** a casing (14) that is produced from plastic material and that is disposed at the upper region of the door (3) between the control unit (8) and the capacitive transmitter (7).

10 - A built-in dishwasher (1) as in any one of the above claims, **characterized in that** the capacitive transmitter (7) that is produced from metal.

11 - A built-in dishwasher (1) as in any one of the claims 1 to 9, **characterized in that** the capacitive transmitter (7) that is produced from plastic.

12 - A built-in dishwasher (1) as in any one of the claims 1 to 9, **characterized in that** the capacitive transmitter (7) that is produced from a composite material comprising metal and plastic.

13 - A built-in dishwasher (1) as in any one of the claims 1 to 9, **characterized in that** the capacitive transmitter (7) that is produced from indium tin oxide (ITO)-coated plastic material.

- 14 - A built-in dishwasher (1) as in any one of the claims 1 to 9, **characterized in that** the capacitive transmitter (7) that is produced from plastic sheets that are joined in a sandwiched manner, between which a sheet produced from indium tin oxide (ITO) or any other metal material is placed.
- 5 15 - A built-in dishwasher (1) as in any one of the claims 1 to 9, **characterized in that** a light source (15) that is disposed on the control unit (8) and the capacitive transmitter (7) comprises light guiding material and that extends from the front surface of the lid (4) towards the light source (15).

Figure 1

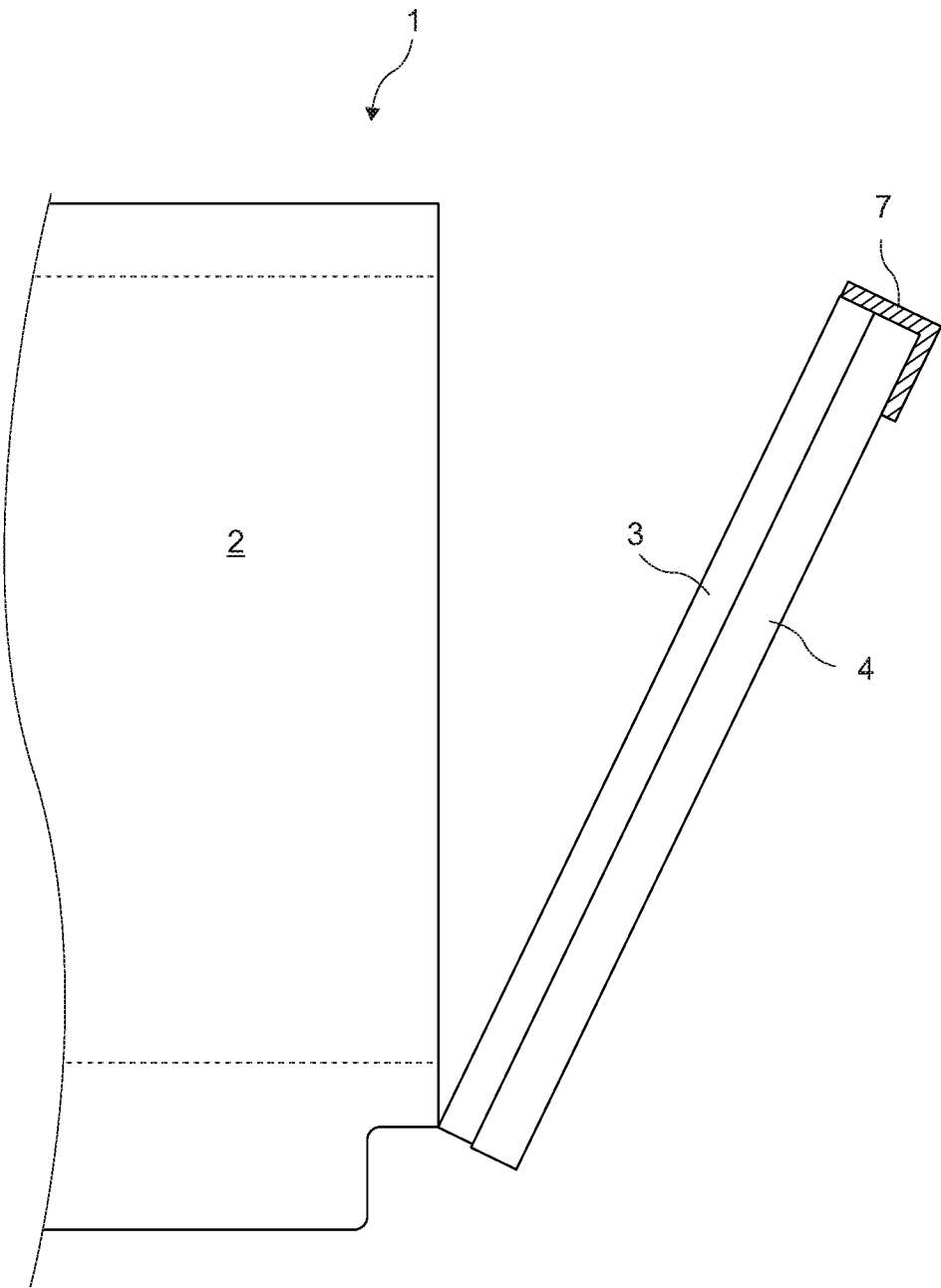


Figure 2

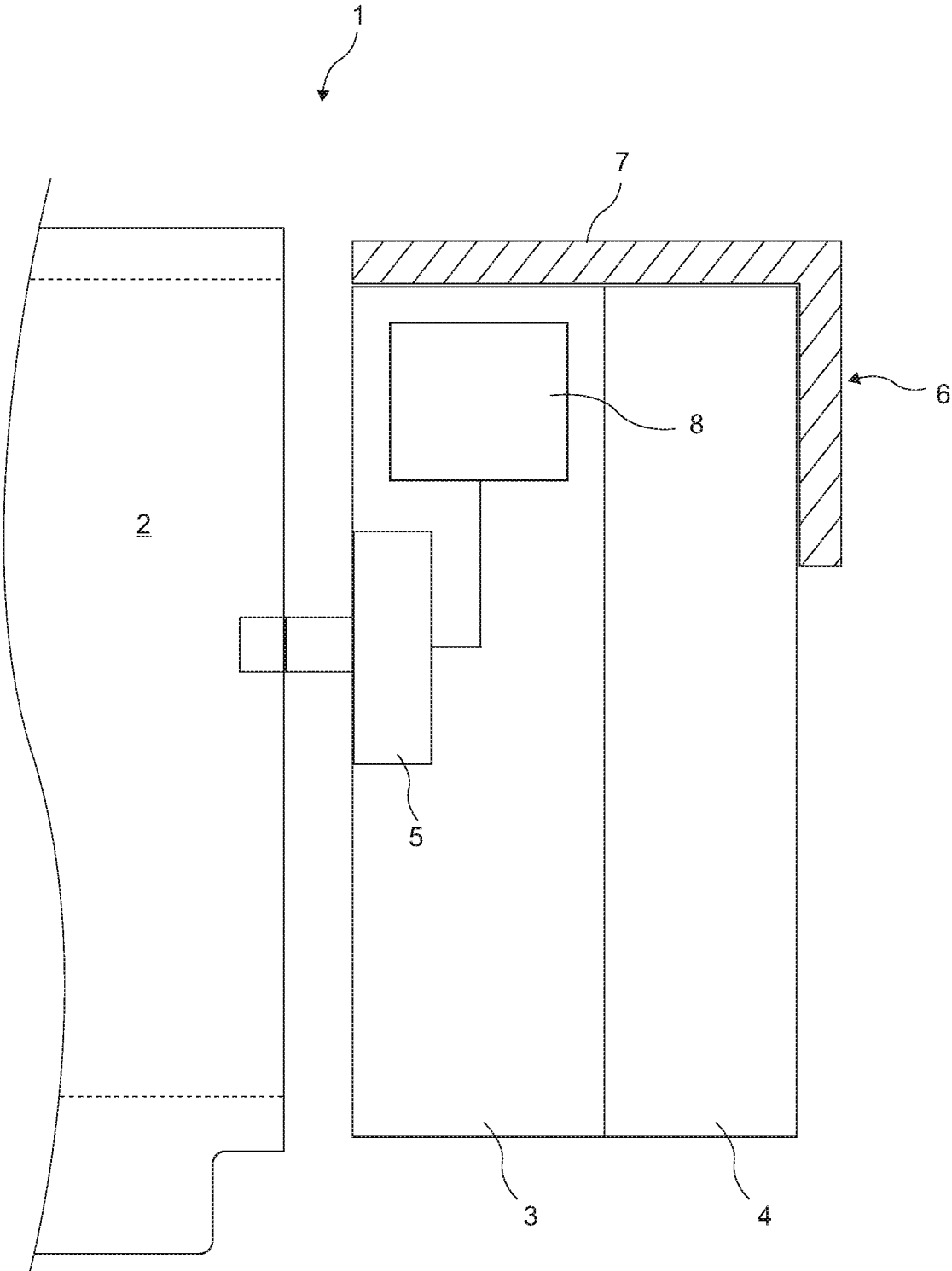


Figure 3

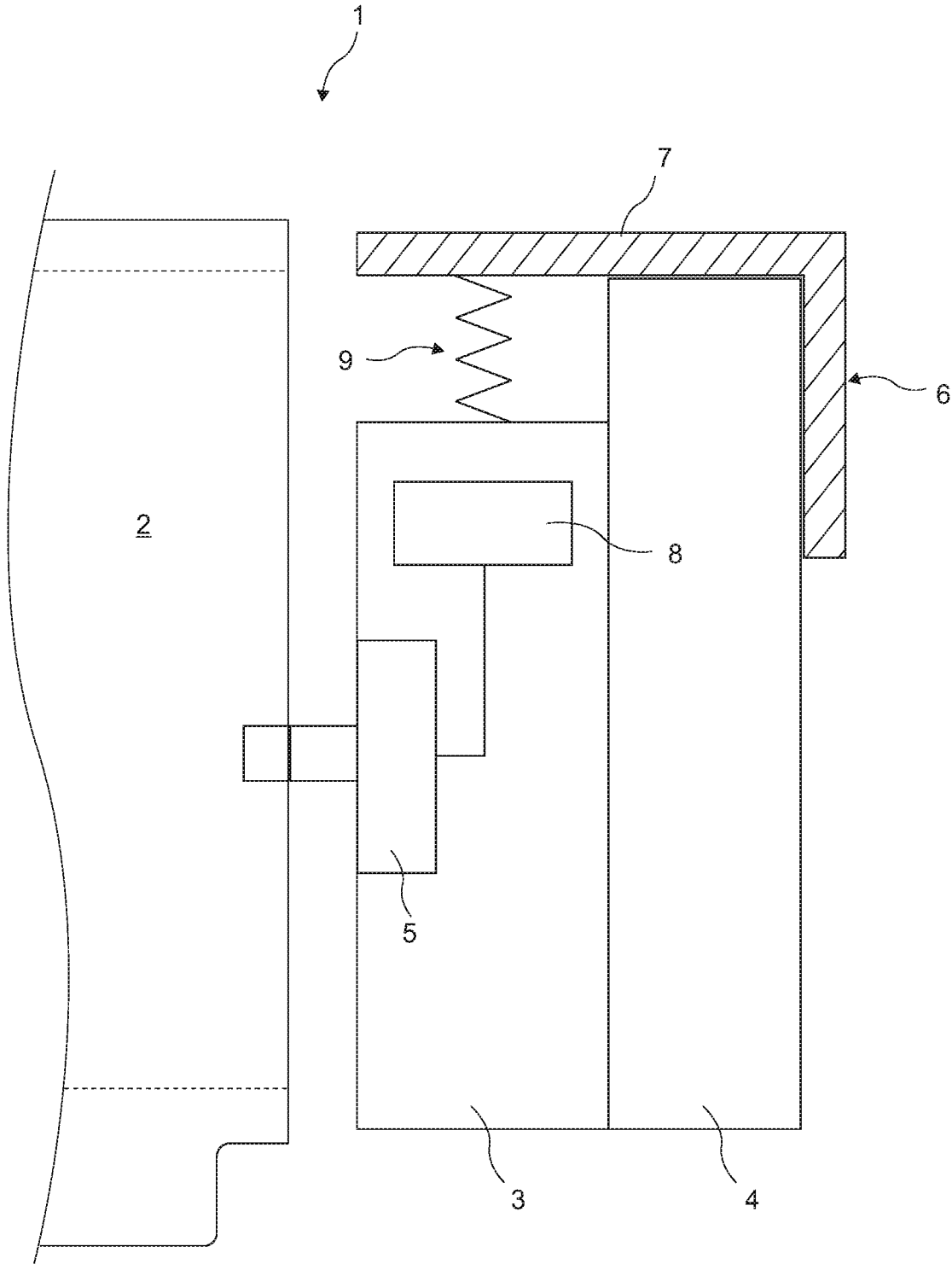
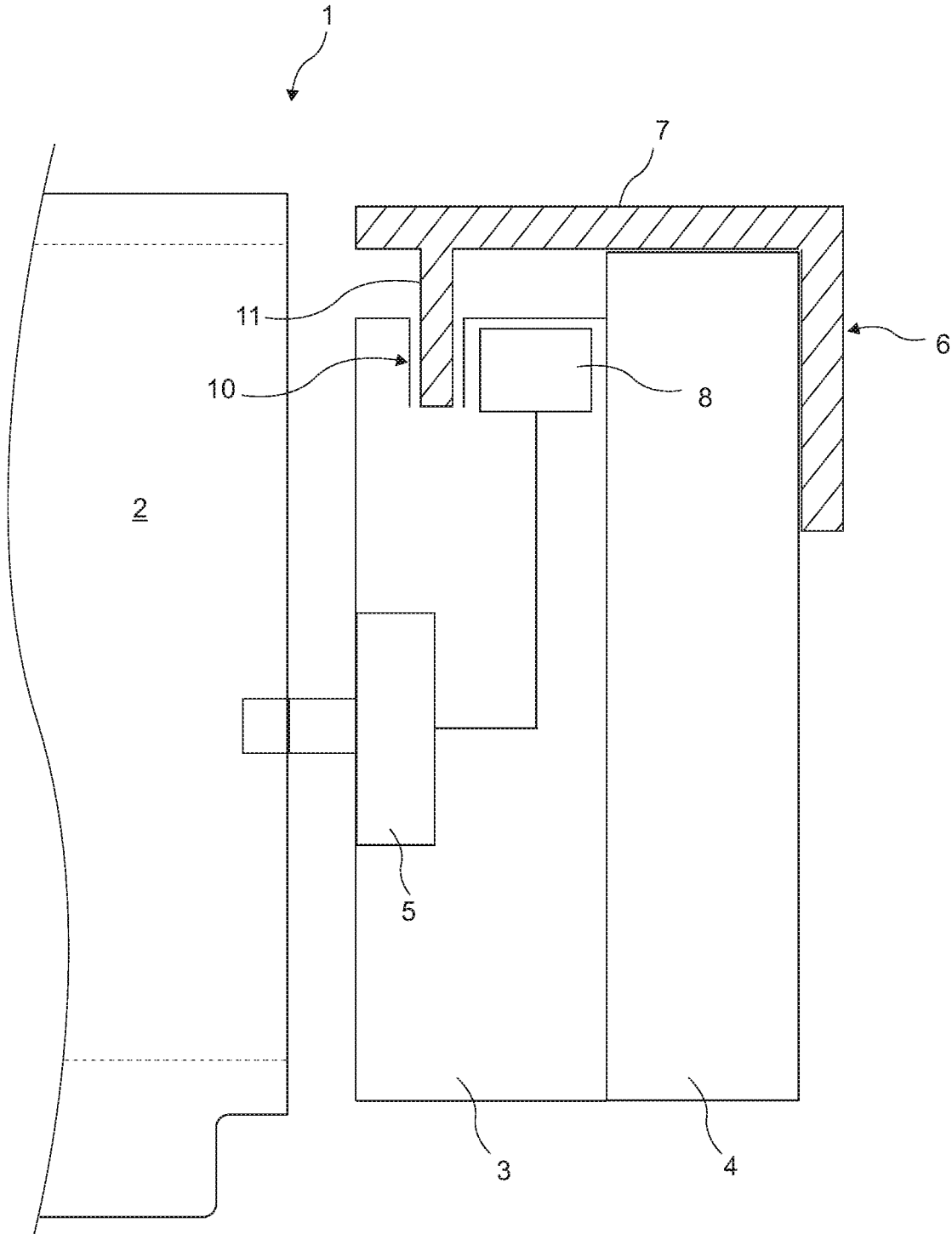


Figure 4



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Figure 5

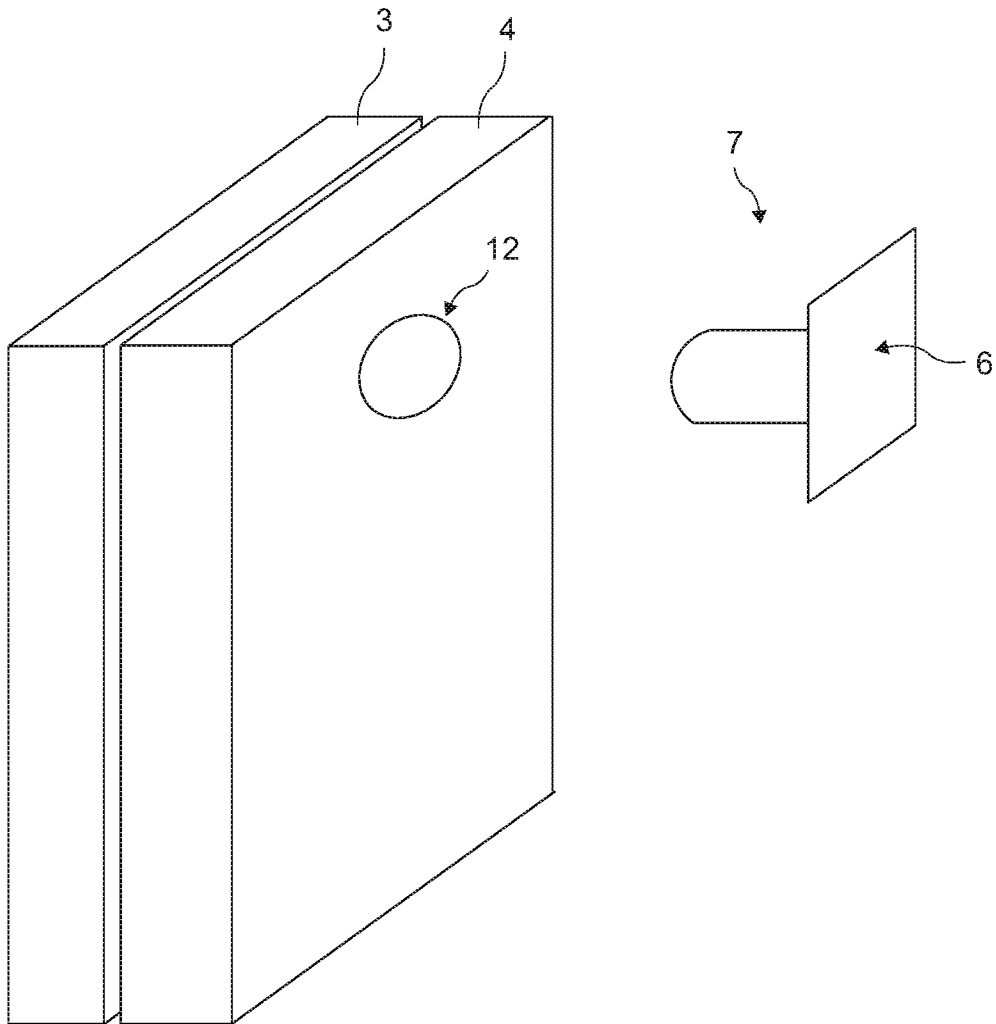
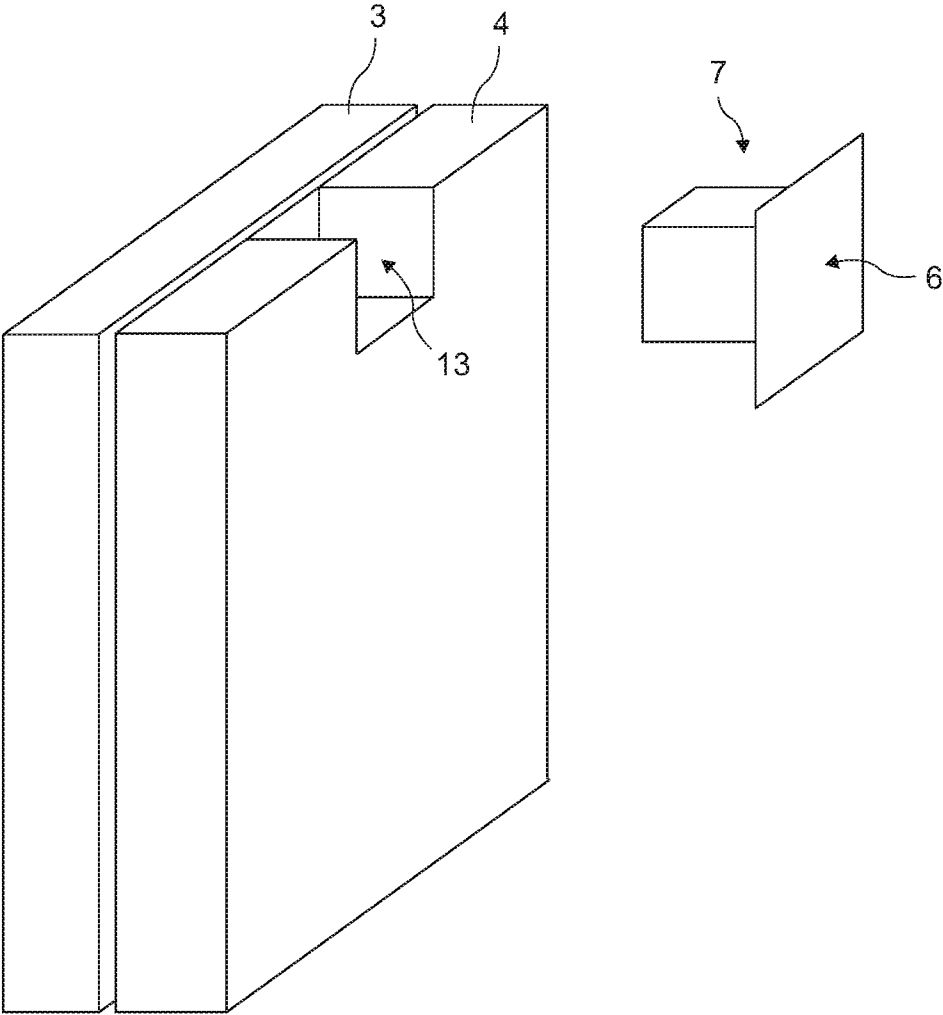


Figure 6



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Figure 7

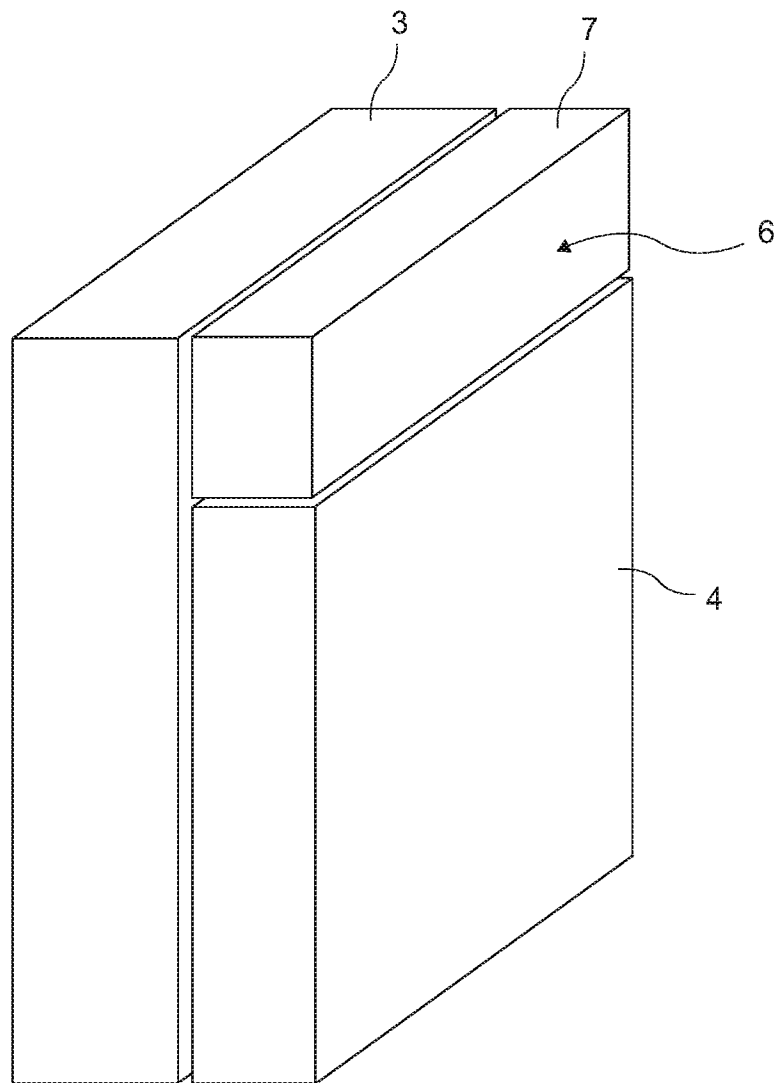


Figure 8

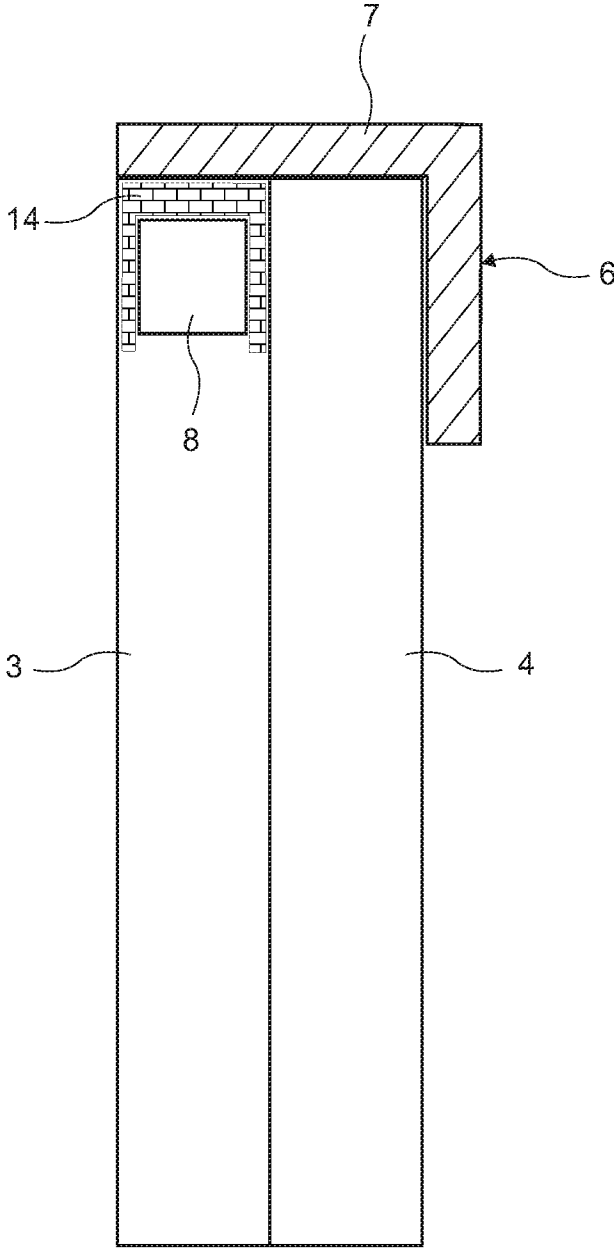
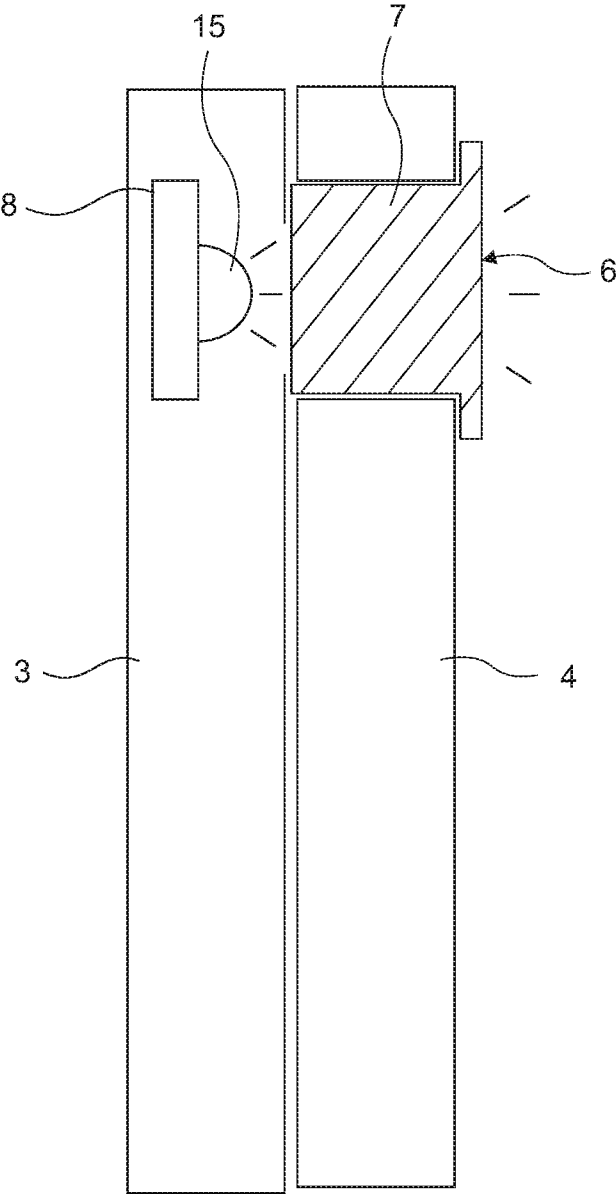


Figure 9



INTERNATIONAL SEARCH REPORT

International application No

PCT/TR2015/050198

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47L15/42
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47L

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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X	DE 10 2008 021496 A1 (MIELE & CIE [DE]) 5 November 2009 (2009-11-05) page 2, paragraphs 4-6,12 page 3, paragraphs 14-16,18; figure -----	1-15
X	DE 10 2011 081822 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 4 October 2012 (2012-10-04) page 2, paragraph 6 - page 4, paragraph 40; figures 1-6 -----	1-15
A	EP 2 428 153 A1 (MIELE & CIE [DE]) 14 March 2012 (2012-03-14) the whole document ----- -/--	1-15



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See patent family annex.

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Date of the actual completion of the international search

19 February 2016

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01/03/2016

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INTERNATIONAL SEARCH REPORT

International application No

PCT/TR2015/050198

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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