



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
08.02.2017 Bulletin 2017/06

(51) Int Cl.:
F25D 23/06 (2006.01) F25D 23/08 (2006.01)

(21) Application number: **16182770.4**

(22) Date of filing: **04.08.2016**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
MA MD

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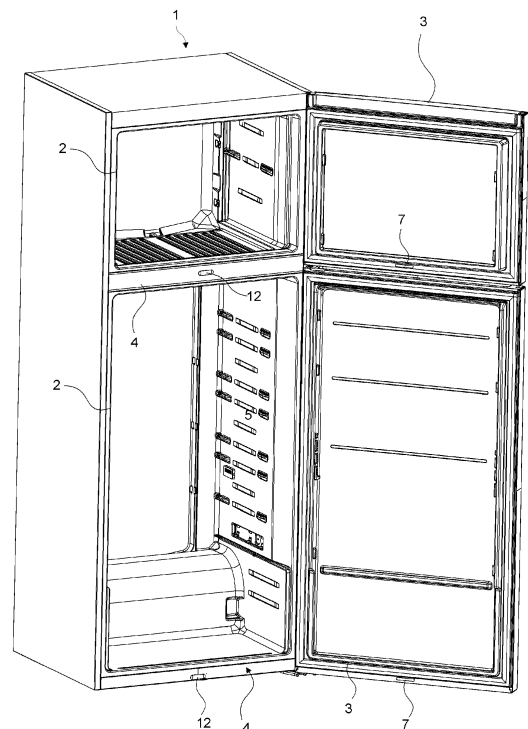
(30) Priority: **07.08.2015 TR 201509804**

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(54) **A REFRIGERATOR COMPRISING A REED SENSOR PROTECTOR**

(57) The present invention relates to a refrigerator (1) comprising a body; one or more than one cooling or freezing compartment (2) wherein the items to be cooled are placed; one or more than one door (3); a frame (4) that surrounds the front side of the compartments (2) and whereon the door (3) is seated when closed; a reed sensor (5) that is fixed on the frame (4) and that detects whether the door (3) is closed or not; a control card (6) whereon the reed sensor (5) is placed; an actuator (7) that is fixed on the door (3) and that activates the reed sensor (5); a cable (8) and a connector (9) that provide electrical connection of the reed sensor (5) and the control card (6); an opening (11) that is arranged on the frame (4) and that enables the reed sensor (5) to be placed, and a cover (12) that closes the opening (11).

Figure 1



Description

[0001] The present invention relates to a refrigerator comprising a protector that protects the reed sensor, detecting the open/closed state of the door, from polyurethane leakage during production.

[0002] In refrigerators, whether the door is open or closed is determined by a reed sensor which is actuated by applying magnetic field and an actuator that are oppositely placed on the frame and the door. During the production of the refrigerator, first, the reed sensor and the control card are disposed on the frame of the refrigerator and then the thermal insulation of the refrigerator body and the doors is provided by injecting polyurethane into the body. Since the control card corresponding to the reed sensor cannot be suitably installed before the polyurethane is injected into the body, polyurethane leakage occurs at the part where the control card is placed on the frame, the reed sensor malfunctions and whether the door is open or not cannot be determined.

[0003] In the state of the art International Patent Application No. WO2005106362, a refrigerator is disclosed, comprising a electrical connection member that is placed into the insulation volume.

[0004] The aim of the present invention is the realization of a refrigerator wherein the reed sensor is protected from polyurethane leakage.

[0005] The refrigerator realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof comprises a protector that is produced from silicone, that encapsulates the reed sensor and the control card of the reed sensor and that is mounted on the frame (also referred to as the flange) surrounding the entrance to the cooling or the freezing compartment whereon the door is closed.

[0006] By means of the protector, the reed sensor and the control card of the reed sensor can be grouped into a single piece and mounted into the frame easily, and in the case polyurethane leaks while injecting polyurethane to the body and the walls of the door, the polyurethane is prevented from contacting the reed sensor and the control card and the reed sensor is prevented from malfunctioning.

[0007] The refrigerator realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

Figure 1 - is the perspective view of a refrigerator when the doors are in the open position.

Figure 2 - is the exploded view of the protector, wherein the reed sensor is placed, the connection box, the frame and the cover.

Figure 3 - is the perspective view of the protector that encapsulates the reed sensor and the control card.

Figure 4 - is the cross-sectional view of the connection box, the protector, the control card, the connector, the frame and the cover in the assembled state.

Figure 5 - is the perspective view of the protector.

Figure 6 - is the view of the protector and the control card from the side of the connector.

Figure 7 - is the cross-sectional view of the protector, the reed sensor and the control card.

Figure 8 - is the perspective view of the control card and the reed sensor.

[0008] The elements illustrated in the figures are numbered as follows:

1. Refrigerator
2. Compartment
3. Door
4. Frame
5. Reed sensor
6. Control card
7. Actuator
8. Cable
9. Connector
10. Connection box
11. Opening
12. Cover
13. Protector
14. Pin housing
15. Barrier
16. Claw
17. Reed sensor housing
18. Control card housing
19. Connector housing

[0009] The refrigerator (1) comprises a body; one or more than one cooling or freezing compartment (2) wherein the items to be cooled are placed; one or more than one door (3); a frame (4) that surrounds the front side of the compartments (2) and whereon the door (3) is seated when closed; a reed sensor (5), also known as the reed switch, that is fixed on the frame (4) and that detects whether the door (3) is closed or not; a control card (6) whereon the reed sensor (5) is placed and that evaluates the data of the reed sensor (5); an actuator (7) that is fixed on the door (3) and that activates the reed sensor (5); a cable (8) and a connector (9) that provide electrical connection among the reed sensor (5), the control card (6), the refrigerator main control unit (not shown in the figures) and the door open alarm (not shown in the figures); a connection box (10) that enables the cable (8) and the connector (9) to be fixed on the rear side of the frame (4); an opening (11) that is arranged on the frame (4) and that enables the reed sensor (5) to be placed, and a cover (12) that closes the opening (11) after the reed sensor (5) is mounted.

[0010] The refrigerator (1) of the present invention comprises a protector (13) wherein the reed sensor (5) is placed, that encapsulates and thus groups the reed sensor (5) and the control card (6), that has the dimensions to pass through the opening (11), that is placed into the connection box (10) at the rear side of the frame

(4) by being passed through the opening (11) at the front side of the frame (4) before the process of polyurethane injection into the walls of the body during the production of the refrigerator (1).

[0011] The protector (13) enables the reed sensor (5) and the control card (6) to be passed through the opening (11) as a single piece and to be placed into the connection box (10) and the control card (6) to be easily mounted to the connector (9), and the protector (13) prevents polyurethane leakage into the reed sensor (5) and the control card (6) in the next phase of the refrigerator (1) production where the thermal insulation of the body and the doors (3) is performed.

[0012] In the production of the refrigerator (1), the reed sensor (5) and the control card (6) are placed into the protector (13) and after the protector (13) is passed through the opening (11), the electrical connection is provided by attaching the connector (9) fixed in the connection box (10) to the control card (6). The opening (11) is closed by mounting the cover (12) and afterwards the process of injecting polyurethane to the door (3) and the walls of the body is performed. The polyurethane injected to the inner side of the frame (4) reaches the protector (13) in case of a leakage, however cannot reach the reed sensor (5) and the control card (6) that are encapsulated by the protector (13). Accordingly, the reed sensor (5) and the control card (6) are prevented from being damaged due to polyurethane leakage.

[0013] The control card (6) comprises more than one pin housing (14) wherein the connector (9) pins are fitted when the protector (13) is placed into the connection box (10) (Figure 7 and Figure 8).

[0014] The connection box (10) comprises one or more than one barrier (15) that is disposed at its rear side and that does not allow polyurethane to pass by bearing against the protector (13) when the protector (13) is placed into the connection box (10), and at least one claw (16) that is disposed on its base and that prevents dislodging of the cover (12) and the protector (13) unless there is an outside intervention (Figure 2). The claw (16) holds the protector (13) and prevents the same from dislodging. The protector (13) holds the cover (12) by known snap-fit connection members like the claw (16).

[0015] In an embodiment of the present invention, the protector (13) comprises a reed sensor housing (17) wherein the reed sensor (5) is placed, a control card housing (18) wherein the control card (6) is disposed, and a connector housing (19) that surrounds the part of the control card (6) corresponding to the pin housings (14) and the connector (9) and that prevents polyurethane from reaching the connector (9) region (Figure 4 and Figure 5).

[0016] In another embodiment of the present invention, the protector (13) is produced from silicone. Thus, when placed into the connection box (10), the protector (13) is compressed by the walls of the connection box (10) and the cover (12), and the contact points of the connection box (10) and the cover (12) with the protector (13) are

partially embedded into the silicone material. Therefore, a probable polyurethane leakage through contact points to the reed sensor (5) and the control card (6) region is prevented.

[0017] By means of the protector (13) of the present invention, malfunctioning of the reed sensor (5) and the control card (6) is prevented in case of a probable polyurethane leakage in the refrigerator (1) production.

Claims

1. A refrigerator (1) comprising one or more than one cooling or freezing compartment (2) wherein the items to be cooled are placed; one or more than one door (3); a frame (4) that surrounds the front side of the compartments (2) and whereon the door (3) is seated when closed; a reed sensor (5) that is fixed on the frame (4) and that detects whether the door (3) is closed or not; a control card (6) whereon the reed sensor (5) is placed; an actuator (7) that is fixed on the door (3) and that activates the reed sensor (5); a cable (8) and a connector (9) that provide electrical connection of the reed sensor (5) and the control card (6); a connection box (10) that enables the cable (8) and the connector (9) to be fixed on the rear side of the frame (4); an opening (11) that is arranged on the frame (4) and that enables the reed sensor (5) to be placed, and a cover (12) that closes the opening (11), **characterized by** a protector (13) wherein the reed sensor (5) is placed, that encapsulates the reed sensor (5) together with the control card (6), that has the dimensions to pass through the opening (11) and that is placed into the connection box (10) at the rear side of the frame (4) by being passed through the opening (11) at the front side of the frame (4).
2. A refrigerator (1) as in Claim 1, **characterized by** the control card (6) comprising more than one pin housing (14) wherein the connector (9) pins are inserted.
3. A refrigerator (1) as in Claim 1 or 2, **characterized by** the protector (13) comprising a reed sensor housing (17) wherein the reed sensor (5) is placed, a control card housing (18) wherein the control card (6) is disposed and a connector housing (19) that surrounds the part of the control card (6) corresponding to the pin housings (14) and the connector (9).
4. A refrigerator (1) as in Claim 3, **characterized by** the protector (13) that is produced from silicone.
5. A refrigerator (1) as in Claim 1 or 2, **characterized by** the connection box (10) wherein the protector (13) is placed, comprising one or more than one barrier (15) disposed at its rear side bearing against the pro-

tector (13) and at least one claw (16) that is disposed on its base and that prevents the dislodging of the cover (12) and the protector (13).

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Figure 1

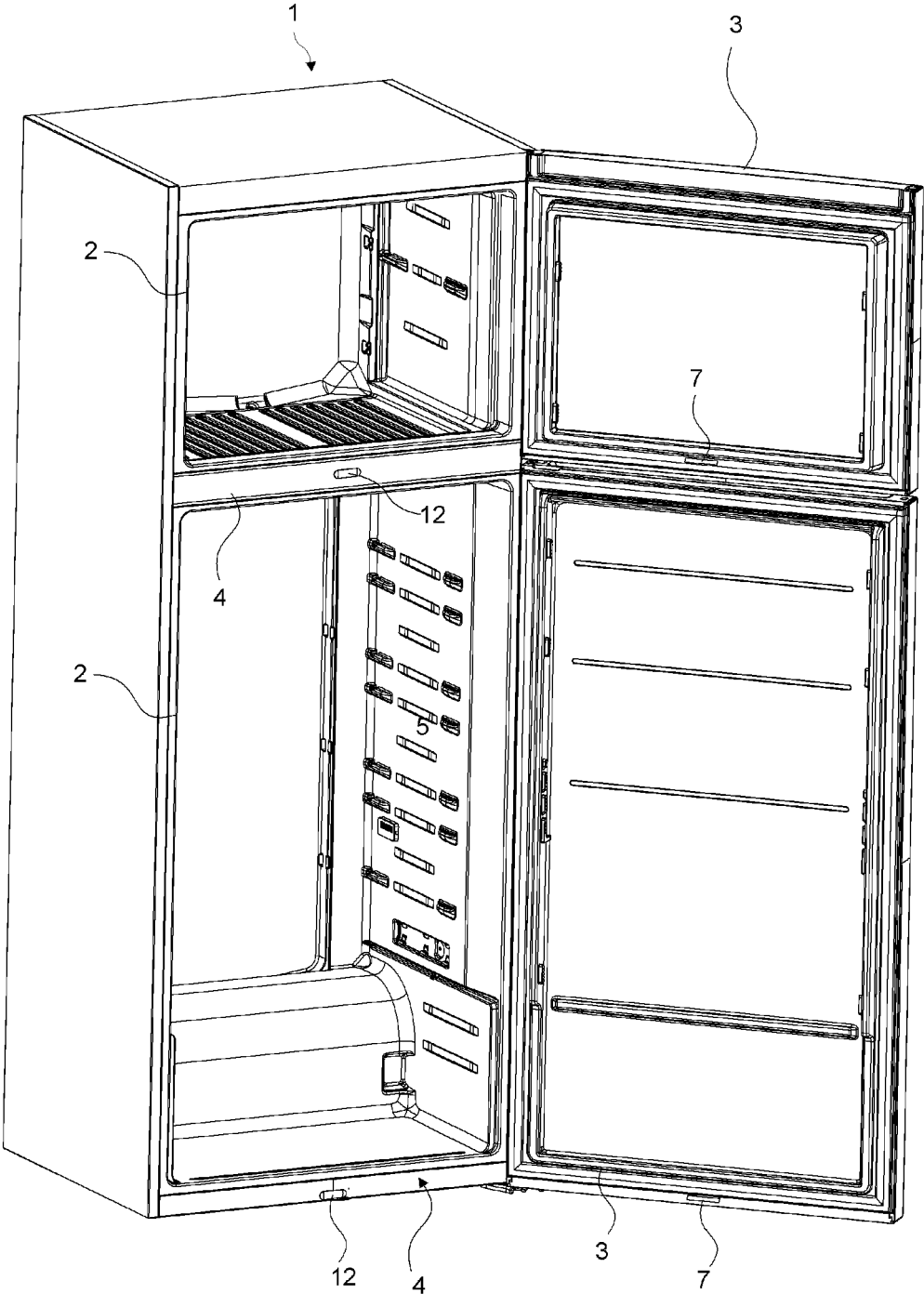


Figure 2

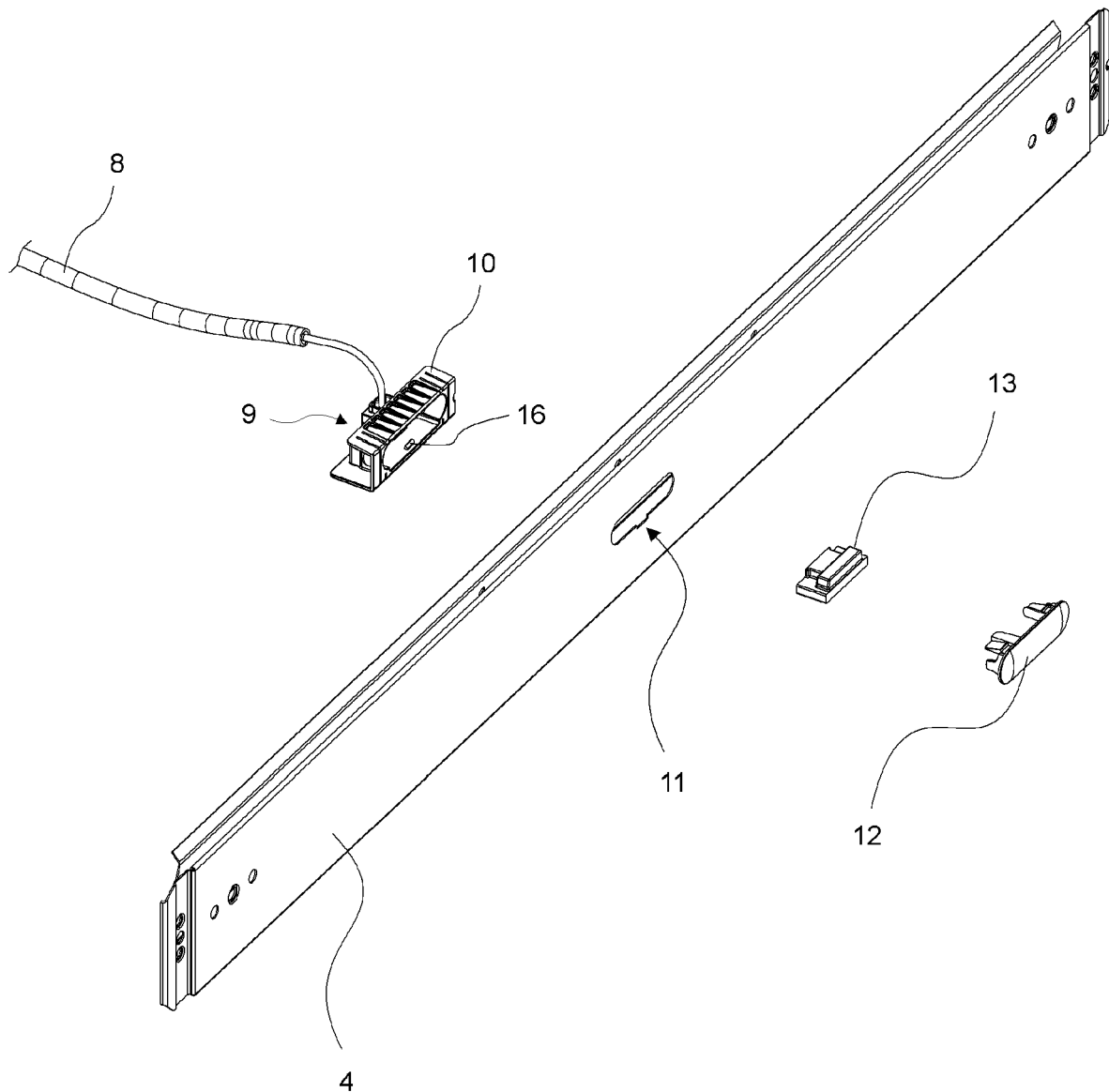


Figure 3

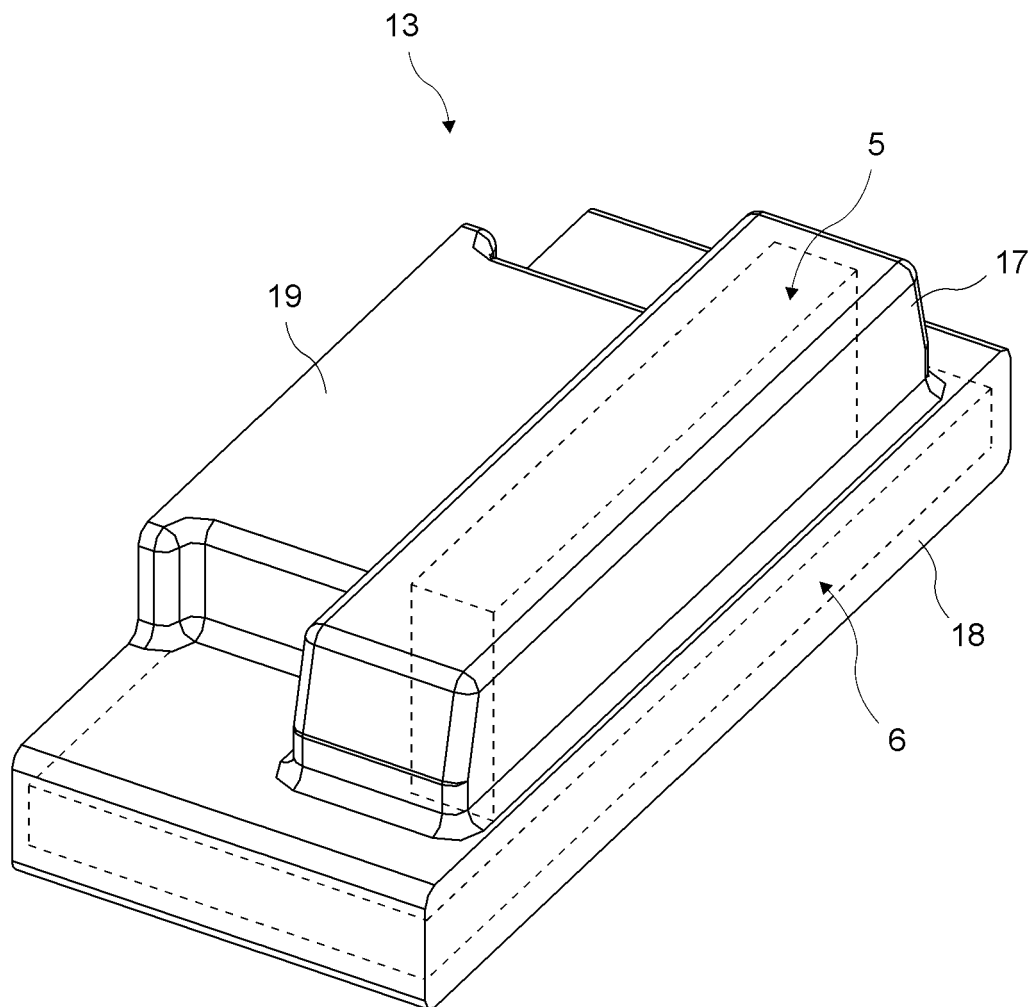


Figure 4

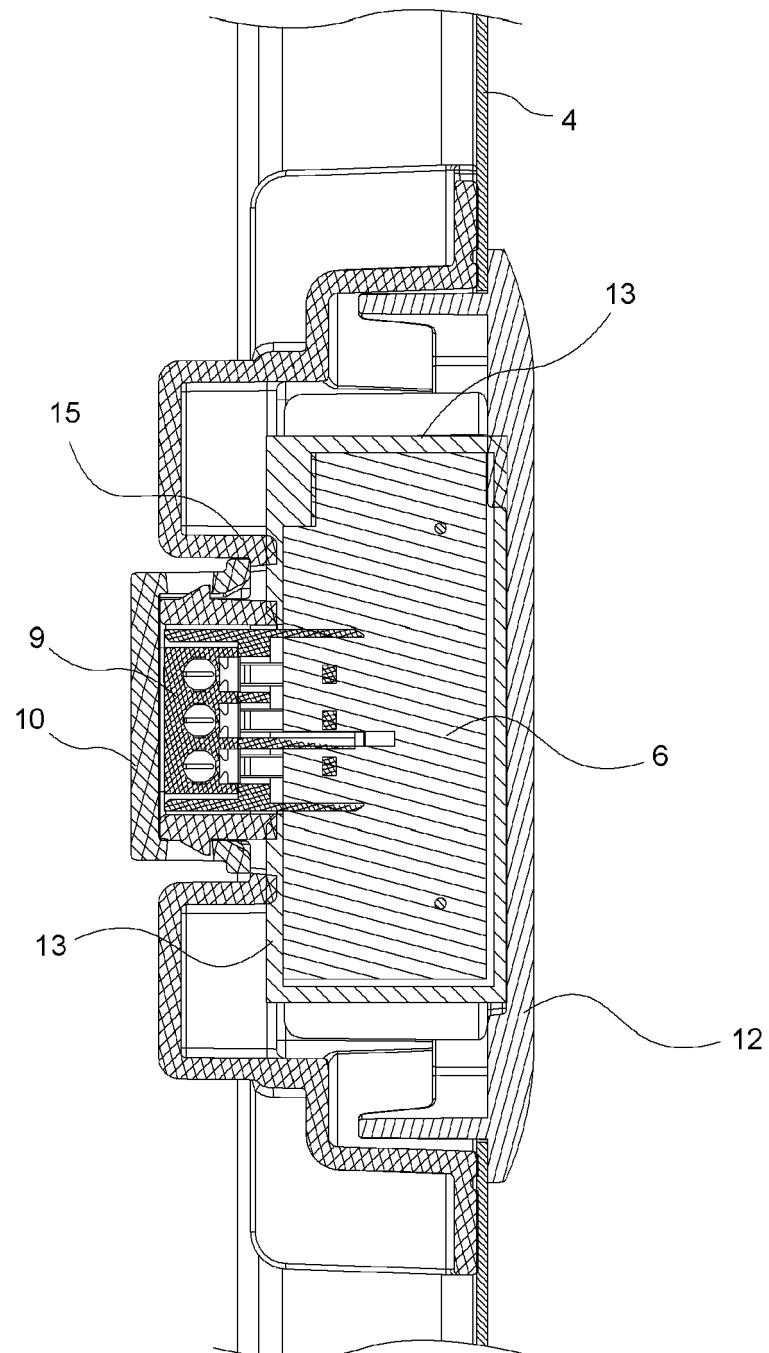


Figure 5

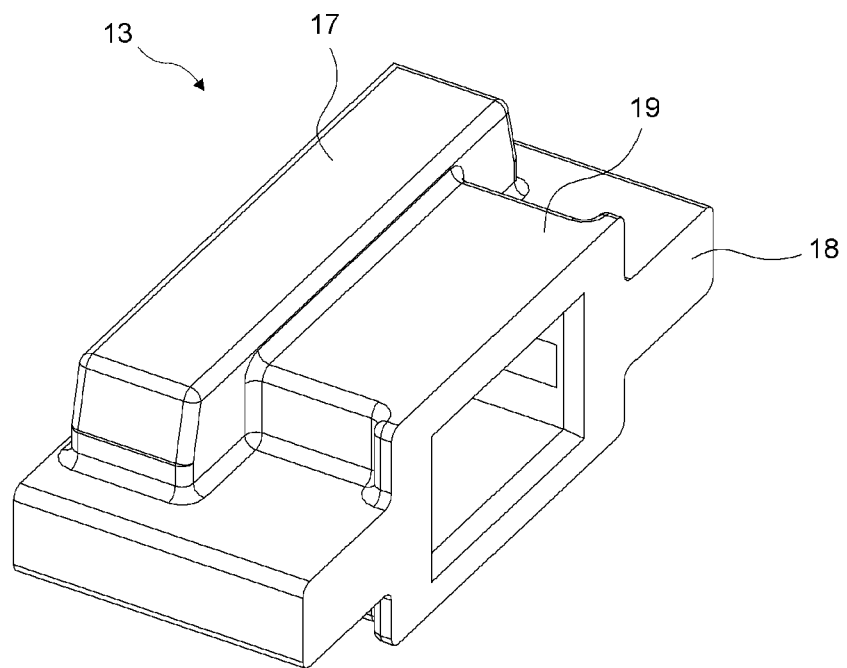


Figure 6

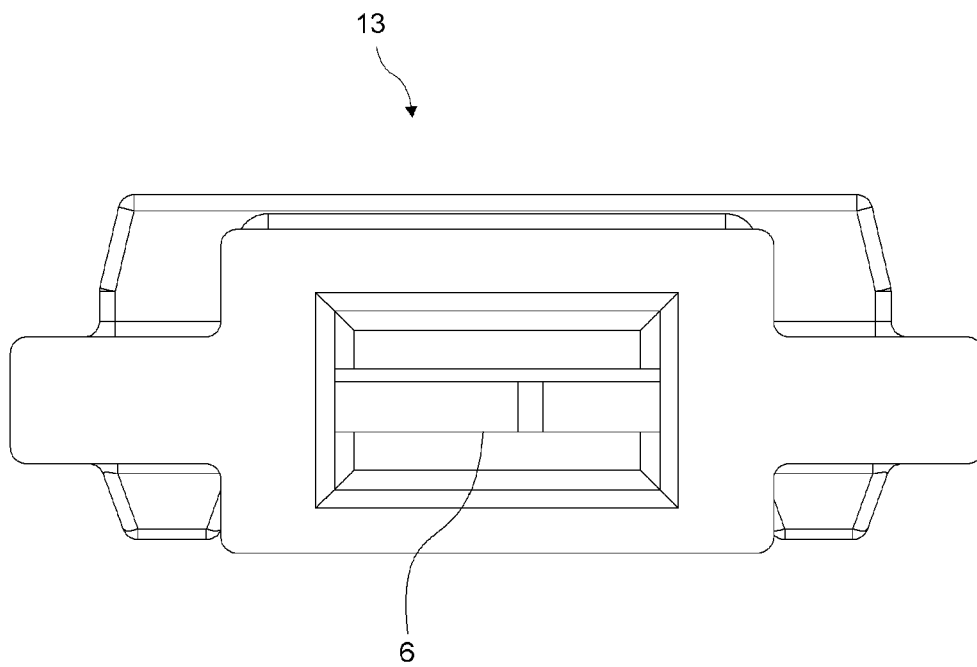


Figure 7

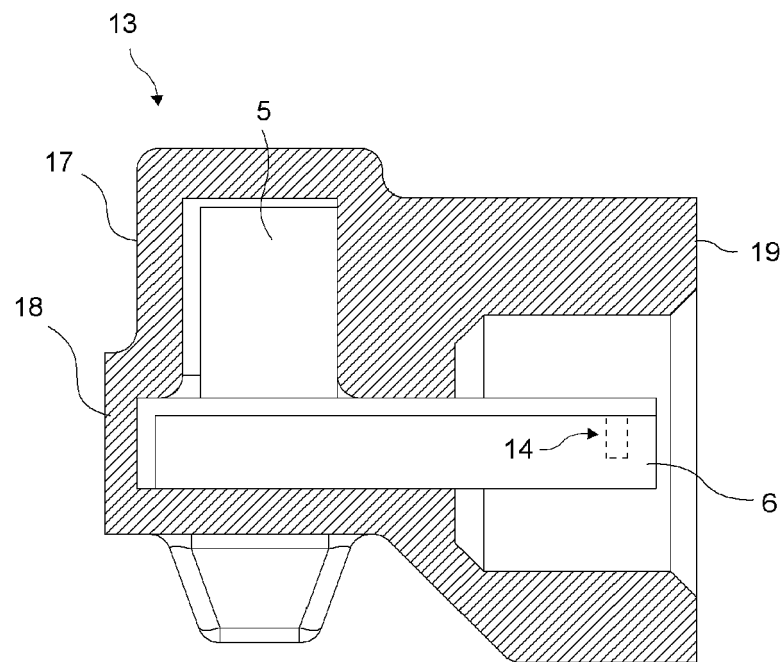
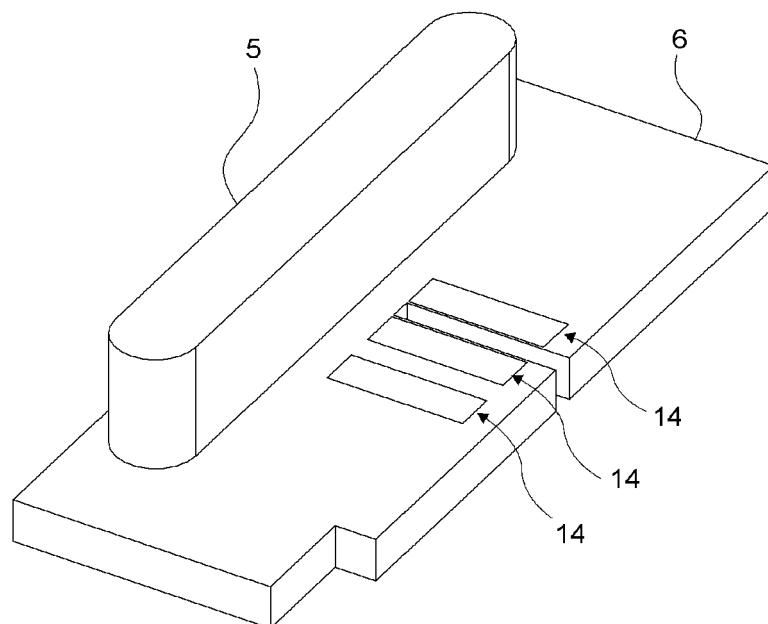


Figure 8





EUROPEAN SEARCH REPORT

Application Number
EP 16 18 2770

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 03/071209 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]; RUPP CLAUDIA [DE]) 28 August 2003 (2003-08-28) * page 5, line 15 - page 8, line 19; figures 1-7 *	1-5	INV. F25D23/06 F25D23/08
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			TECHNICAL FIELDS SEARCHED (IPC)
			F25D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 7 December 2016	Examiner Kolev, Ivelin
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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REFERENCES CITED IN THE DESCRIPTION

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