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(54) **Title:** A DOMESTIC APPLIANCE HAVING A CONNECTION DEVICE FOR MAINS POWER AND DATA TRANSMISSION

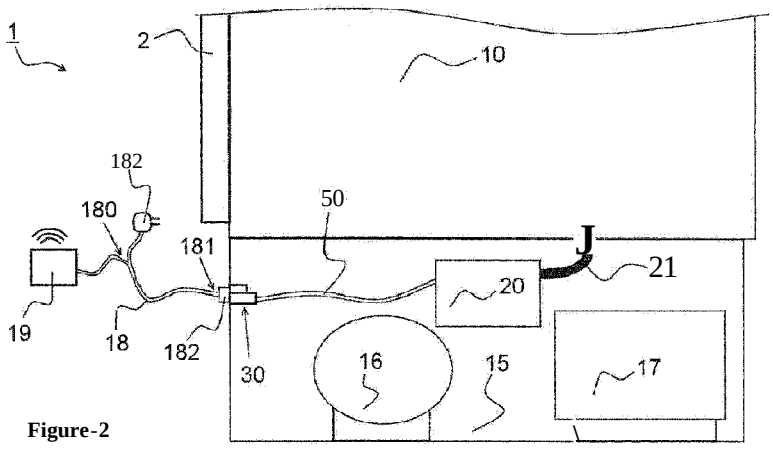

Figure-2

(57) **Abstract:** The invention is a domestic appliance (1) comprising a body (10); an electronic unit (20) disposed inside the body (10); a connection device (30) having a mains connection (300) as configured to supply electrical energy from a domestic mains power supply to the domestic appliance (1); data transmission contacts (340) provided on the mains connection (300) to transfer data to/from the electronic unit (20); and that the connection device (30) and the electronic unit (20) are physically separate; and the domestic appliance (1) has a transferring element (50) for connecting at least the data transmission contacts (340) of the mains connection (300) to the electronic unit (20).

WO 2016/134933 A1

SPECIFICATION

A DOMESTIC APPLIANCE HAVING A CONNECTION DEVICE FOR MAINS POWER AND DATA TRANSMISSION

Field of Invention

The invention is related to a domestic appliance, for example a household refrigerator, having an electronic unit and a mains connection.

Prior Art

Domestic appliances are used to perform various functions in a home such as cooking, washing, cleaning, refrigerating etc. The domestic appliance needs electrical energy to realize its functions. The electrical energy is supplied from domestic mains power supply through a mains connection on the domestic appliance.

Meanwhile, such domestic appliances are operated by programmable control units. Necessary steps of the domestic appliance to perform related functions are controlled by the control unit. The control unit is accessed for different reasons like reprogramming, repair, diagnostic of a problem etc.

The document, numbered US2010267268 A1 is related to a domestic appliance. The appliance includes at least one mains connection for the supply of power to the domestic appliance from building supply mains. The mains connection includes data transfer contacts for making the loading of programs to the domestic appliance easier.

The invention provides an additional improvement, an additional advantage or an alternative to the prior art.

Purpose of the Invention

The purpose of the invention is providing a domestic appliance having an electronic unit inaccessible from outside of the domestic appliance, on which the data transmission to/from the electronic unit is facilitated.

The invention, to achieve the abovementioned purpose, is a domestic appliance comprising a body; an electronic unit disposed inside the body; a connection device having a mains connection as configured to supply electrical energy from a domestic mains power supply to the domestic appliance; data transmission contacts provided on the mains connection to

transfer data to/from the electronic unit; and that the connection device and the electronic unit are physically separate; and the domestic appliance has a transferring element for connecting at least the data transmission contacts of the mains connection to the electronic unit. Thus, when needed, data transmission may be realized without reaching exactly to the electronic unit inside the domestic appliance. As a result, the electronic unit may be re-programmed, checked, updated or fixed easily from outside of the appliance.

The electronic unit may be a control unit of the domestic appliance for controlling the operations of the domestic appliance.

The reason of having the electronic unit inside the domestic appliance as physically inaccessible from outside of the domestic appliance may be design of locating the inner components of the domestic appliance. Due to design, it may be no possible to locate the electronic unit close to outside the domestic appliance as accessible from outside. On the other hand, since the electronic unit may have cable connections, a service man may have problems during demount of the domestic appliance, specifically the electronic unit, to reach and check a component inside the domestic appliance. Moreover, the producer may want only a competent user (service man etc.) to reach the electronic unit.

The domestic appliance can be large appliance or household appliance such as refrigerators, electric cooking ranges, laundry dryers, or water-conducting domestic appliances such as washing machines or dishwashers. Furthermore, the domestic appliances may be small appliances such as, for example, small thermal appliances like toasters, hairdryers, microwave ovens or coffee machines, as well as small motor-driven appliances such as, for example, hand mixers, blenders or handheld vacuum cleaners, etc.

The body may have an outer face on that the mains connection is disposed. The outer face may be a rear outer face of the domestic appliance such that the mains connection is accessible from outside of the domestic appliance. Thus, a cable for connecting to the domestic mains power supply and a data transfer device, for instance a modem, may be concealed behind the domestic appliance. However, the outer face may be any outer face of the domestic appliance like front, right, left, top or maybe in some appliances bottom outer face.

In a possible embodiment of the invention, the transferring element may be a cable between the electronic unit and the connection device. Thus, the connection between the electronic unit and the connection device may be facilitated. Moreover, being flexible, the cable may be

positioned in the domestic appliance as how the other components in the domestic appliance let and without disturbing necessary design or orientation of other components. In a possible embodiment of the invention, the transferring element may have connectors known in the art as electrical connecters and/or data transmission connectors like sockets etc.

By means of data transmission, it may be refer to for instance data communication based on d-bus specifications.

In a possible embodiment of the invention, the data transmission contacts are accessible in an opening of the mains connection. Thus, facilitated reach form outside of the domestic appliance to the data transmission contacts may be realized.

In a possible embodiment of the invention, the connection device has a board having the data transmission contacts. Additionally, in a possible embodiment of the invention, the board extends at least in sections into the opening. Thus, obtaining the connection device having both mains connection and data connection may be facilitated.

In a possible embodiment of the invention, the board forms the inner face of the mains connection. Thus, the complexity of forming a connection device may be decreased. By connecting the board and the mains connection, for example side by side, the connection device having a mains and a data connection may be provided in a facilitated manner.

In a possible embodiment of the invention, the board has only traces. Thus, a non-complex board may be used to transfer data and maybe electrical energy. That provides also decrease on production costs.

In a possible embodiment of the invention, the data transmission contacts may be arranged on the traces of the board remaining in the opening. Thus, obtaining the connection device having both mains connection and data connection may be facilitated. Relating to that, workload and cost to obtain connection device is reduced.

In a possible embodiment of the invention, the mains connection may have at least two contact blades inside and the contact blades are conductively connected to at least two traces of the board. Thus, electrical energy may also be transferred through the connection device. This may be realized by soldering the mains connection to the board. This also may provide the connection of the mains connection and the board.

In a possible embodiment of the invention, the mains connection may have a protrusion and the board has a connection opening for the protrusion for fixing the mains connection on the board. Thus, a mechanical connection may be realized between the mains connection and the board. As a result, a stable and robust connection may be provided. That affects the usage life of the connection device as increasing it.

In a possible embodiment of the invention, the connection device may have a cover for covering both the mains connection and the board. Thus, the sensitive elements of the connection device such as the board and the mains connection may be protected against, for example, water, strike, unwanted contacts of other parts or elements of the domestic appliance.

In a possible embodiment of the invention, the cover may have a guide in that the board is located. Thus, the positioning of the board may be achieved correctly and as being facilitated. The guide also provides stable positioning and prevents undesired movement of the board and/or the cover, particularly the cover.

In a possible embodiment of the invention, the cover may have a latching element being releasable for fixing the cover on the board. Thus, the cover may be fixed on the board. Moreover, unwanted movement or dismantle of the cover may be prevented. By not using an additional fixing element, the connection process may be facilitated and the production cost may be kept low.

In a possible embodiment of the invention, the cover may have a terminal opening for penetration and connection of the transferring element to the board. Thus, the connection between the transferring element and the board may be facilitated. In a possible further embodiment of the invention, the board may have trace ends corresponding the terminal opening of the cover. For instance, the transfer element may be a cable and a connection plug may be connected to an end of the cable. Then the connection plug may be secured to the board by means of the terminal opening and a contact between trace ends and the connection plug may be realized to transfer data.

In a possible embodiment of the invention, the connection device may be arranged on the rear outer wall of the domestic appliance such that the mains connection is accessible from outside of the domestic appliance

Brief Description of the Figures

Figure-1 represents the possible domestic appliance from front-bottom of the appliance that is a refrigerator.

Figure-2 represents a schematic view of possible machine chamber form left.

Figure-3 presents possible mains connection and board as demounted form front-top.

Figure-4 presents possible fastening device to fix the connection device from top-right from inside the domestic appliance.

Figure-5 presents the mains connection and the board as fixed from inside the domestic appliance.

Figure-6 represents the possible cover of the connection device from front-top.

Figure-7 represents the possible cover of the connection device from rear-top.

Figure-8 presents the connection device with the cover from rear-top.

Figure-9 presents the outer face having the connection device thereon.

Detailed Description of the Invention

All directional references such as front, left or bottom are based on reference to the domestic appliance (1) shown in Figure-1, in which the visible side in x direction is the "left" side of the domestic appliance (1), the visible side in y direction is the "rear" side of the domestic appliance (1), and the visible side in z direction is the "bottom" side of the domestic appliance (1). One or more of possible embodiments of the present invention will be described as examples in detail below.

In figure-1, a refrigerator, a possible domestic appliance (1), is presented. The domestic appliance (1) has a cooling chamber (14) defined by a body (10) and a door (2) pivotably connected to the body (10). Under the body (10), a machine chamber (15) is defined. The machine chamber (15) is a chamber where components of a cooling circuit are accommodated. The domestic appliance (1) has a mains connection (300) on an outer face (11) thereof. The outer face (11) is a front face of the machine chamber (15) in figure-1 .

In figure-2, the machine chamber (15) is represented as a schematic drawing. In which, a compressor (16) and a condenser (17) is illustrated. In the domestic appliance (1), the evaporator of the cooling circuit exists behind an evaporator cover (40) shown in figure-1 . The pipe connections of the components of the cooling circuit are not shown in the figure-2. The machine chamber (15) also contains a electronic unit (20) that is inaccessible from outside of the domestic appliance (1).

The electronic unit (20) is connected to other electrical, electronic and/or electro-mechanic elements by a cable or cables (21) like a cable harness. The electronic unit (20) controls the cooling process of the domestic appliance (1). It may also control different features of the domestic appliance (1) like illumination, heating (frame heating etc.).

Electric energy needed by the electronic unit (20) and the domestic appliance (1) is provided by the mains connection (300) from a domestic mains power supply being usually an electric plug of a house. It may also be a generator or any other electric source known in the art.

When needed, for example for re-programming, fixing, diagnostic of a problem, controlling the appliance by a mobile application through internet/local network etc., domestic user or especially a competent user to perform such processes, like a serviceman or a repairman, should reach the electronic unit (20) electronically. The competent user should contact to the electronic unit (20) directly and connect his necessary electronic devices (computer etc.) to the electronic unit (20). For facilitating this process, a connection device (30) is used to reach the electronic unit (20) from outside of the domestic appliance (1) for performing such electronic processes.

The domestic appliance (1) has a connection cable (18) that has more than one connection terminals at the first end (180) and one connection plug (182) at the second end (181). The connection plug (182) on the second end (181) is capable to connect and transfer both mains power and data. One of the connection terminals on the first end (180) is used to connect to the domestic mains power supply. The other one of the connection terminals on the first end (180) may be connectable to the competent user's electronic devices and/or may be connectable to a modem (19) as represented in figure- 2.

The modem may be a wired or a wireless modem so that the competent user may connect to the electronic unit (20) without being close to the domestic appliance (1) and perform necessary processes like diagnostic and/or fixing/repairing.

The data and mains power connection between the connection device (30) and the electronic unit (20) is provided by a transferring element (50), which is one or more cable. In the possible embodiment of the invention, the transferring element (50) is provided as one for mains power transfer and one for data transfer. For easy understanding, the transferring element (50) is presented as one in figure-2. It may also be a single cable having more than one line in it for mains power and data.

The connection device (30) basically has a mains connection (300) and a circuit board (330) without any electronic component except traces (341). The mains connection (300) is a plastic socket. It may be obtained from any nonconductor material known in the art as a material used for an electric socket. The mains connection (300) is fixed to the board (330) by two protrusions (303) on the mains connection (300) and two corresponding connection openings (343) on the board (330). The protrusions (303) are formed integrally on a bottom face (302) of the mains connection (300) that faces the board (330). That means the protrusions (303) are also plastic or made from a nonconductive material. The protrusions (303), and thus the mains connection (300), is fixed to the board (330) by force-fit. However, the protrusions (303) or the mains connection (300) itself may be glued to the board (330) by using compatible adhesives known in the art. On the other hand, fixations by form-fit solutions may also be used to secure the mains connection (300) on the board (330).

The mains connection (300) has three conductive blades (320) for line, neutral and earth of the mains power supply. The blades (320) are accessible from a front opening of the socket-type mains connection (300). The blades (320) penetrate into housings provided on the connection plug (182) connected to the mains connection (300). The mains connection (300) also has two facing tabs (421) to secure the connection plug (182) inside the mains connection (300).

The each one of blades (320) also have two extensions (321) to be soldered to the board (330). The extensions (321), similar to the protrusions (303), extends from the bottom face (302) of the mains connection (300). The board (330) has corresponding traces (341) for each of line, neutral and earth blades (320). By soldering, the blades (320) are conductively connected to the board (330).

On an inner face (310) of the mains connection (300), particularly bottom inner face (310), there is an opening (31 1). When the mains connection (300) is fixed to the board (330), a section of the board (330) disposed just next to the opening (31 1) as forming the missing inner face (310) of the mains connection (300) due to the opening (31 1). On the stated section of the board (330), there are three data transmission contacts (340). As a result, as in figure-9, the data transmission contacts (340) are accessible through the opening (31 1), and thus through the mains connection (300). The connection plug (182) contains corresponding data transmission contacts (not shown in figures) and these contact to the data transmission contacts (340) on the board (330). The data transmission contacts (340) are provided on traces (341) of the board (330) that are traces (341) other than the traces (341) for the blades (320).

The board (330) remains almost parallel to the bottom face (302) of the mains connection (300), when the mains connection (300) is secured to the board (330). As a result, a front face (301) of the mains connection (300) rises vertically above a front edge (331) of the board (330). On a section close to a rear edge (332) of the board (330), the board (330) has trace ends (342) as exemplified in figure-3. There are six trace ends (342). Three of them are connected to the blades (320) by the corresponding traces (341). The remaining three of them are connected to the data transmission contacts (340) by the corresponding traces (341). These trace ends (342) are used to connect the transferring element (50) to the connection device (30). The connection may be realized by using cable terminals known in the art. The rear edge (332) has slits (333) between at least two trace ends (342) of each group of three trace ends (342) to prevent wrong connection of the cable terminals.

For fastening the connection device (30), a fastening device (60) is provided as shown in a perspective view in figure-4 as embodiment. In figure-4, a view of an inner face (13) of the body (10), which thus faces the interior of the domestic appliance (1), is shown. The fastening device (60) is formed directly at a hole (12) on the outer face (11) and comprises two opposing rails (61) to guide and retain the connection device (30). The rails (61) are formed at opposing edges, which delimit the hole (12). The rails (61) are formed in one piece from the inner face (13) and formed accordingly. They are both rectilinear and comprise side walls (62) raised above or protruding from the plane of the inner face (13) and thus from the plane of the hole (12).

In the present case the side walls (62) extend as it were into the interior.

On the sides of these side walls (62), which face away from the hole (12), top walls (63) are formed, which are oriented at an angle, in particular between 80° and 100°, preferably 90°, towards the side walls (62). The two rails (61) are thus L-shaped as it were, when viewed in cross section.

Moreover it is to be seen that only one of the two rails (61) has a stop ridge (64), which is formed on the top wall (63). The stop ridge (64) is arranged at one end of the top wall (63) and extends perpendicularly to the longitudinal direction A of the rail (61) and thus of the top wall (63) in the direction of the opposite top wall (63). By means of this stop ridge (64), which extends in the plane of the top wall (63) and is formed plate-like, an assembly coding is generated. This means that the connection device (30) can be positioned and fixed between the rails (61) only in a certain position. Incorrect mounting is thus prevented.

The fastening device (60) moreover comprises two fixing elements (65) formed and arranged separately from the rails (61). The fixing elements (65) are formed at opposing edges other than ones where the rails (61) exist. The fixing elements (65) are plate-like tabs, which are oriented at an angle and thus likewise protrude from the plane of the inner face (13) and thus of the hole (12).

The board (330) having the mains connection (300) thereon is disposed on the inner face (13) of the body (10) as represented in figure-5 by the fastening device (60).

The connection device (30) has a cover (40) to protect the board (330) and the mains connection (300) inside the body (10) against water possibly existing in the domestic appliance (1) like a dishwasher, a refrigerator or a washing machine etc. The cover (40) of the embodiment is presented in figure-6. The cover (40) is made of plastic or plastic based material. The cover (40) has a wide section (400) for the board (330) and a narrow upper section (440) for the mains connection (300). It has a front opening (450) to allow penetration of the board (330) and the mains connection (300) inside the cover (40). On the inner side walls (401) of the wide section (400), it has guides (410) to slide the board (330) into the cover (40). At the rear end of the each guide (410), the cover (40) has a latching element (420).

The latching element (420) is formed by creating cut between side wall of the wide section (400) of the cover (40) and the wide section (400) of the cover (40). As a result, the latching element (420) has a plate forming the side wall of the wide section (400) connected to the cover (40) integrally only by its front edge. Therefore, the plate may be bended or spring around an axis provided by the front edge of the plate. The latching element (420) also has a tab (421) for latching the cover (40) on the board (330). Corresponding to that, the board (330) has a recess (335) at each of rear section of its side edges (334). The recess (335) is substantially in form of a rectangle. The tab (421) of the cover (40) has substantially a form of a right triangle or a right trapezium in a sectional view (Figure-7). As a result, the tab (421) has a locking wall (422) vertical to the plate of the latching element (420) to contact a wall of the recess (335) and prevent the cover (40) from leaving the board (330).

On the rear wall (430) of the cover (40), there are two terminal openings (431) corresponding to the trace ends (342) at the rear edge (332) of the board (330). One of the terminal openings (431) is for data transmission and the other one of the terminal openings (431) is for mains power transmission. The one group of three trace ends (342) is accessible through

one terminal opening (431). The other one group of three trace ends (342) are accessible through other terminal opening (431). On the bottom edge of the each terminal opening (431), there is a platform (432) integrally formed on the same plane of bottom wall of the wide section (400). The platform (432) is in form of a rectangle plate. On vicinity of the rear edge of the each platform (432), there is a retainer (433) on the upper face of the platform (432). The retainer (433) is used to retain a cable terminal of the transferring element (50) on the platform (432), thus on the cover (40). The retainer (433) has substantially a right triangle form in sectional view. The right edge of the right triangle faces the terminal opening (431).

When the connection device (30) is wanted to be mounted on the domestic appliance (1), the board (330) having the mains connection (300) thereon is slid on the inner wall (13) and secured on the fastening device (60). After that, the cover (40) is pushed by sliding it on the board (330) by locating the edges of the board (330) inside the guides (410) of the cover (40). The board (330) and the mains connection (300) are got into the cover (40) through the front opening (450) of the cover (40). During the slide of the cover (40), the latching element (420) is bent away from the wide section (400). When the tab (421) of the latching element (420) is arrived to the recess (335) on the board (330), the tab (421) goes into the recess (335) and locks the cover (40) on the board (330). Lastly, the cable terminals of the transferring element (50) are connected to the board (330) through the terminal openings (431). As a result, connection between the electronic unit (20) and the connection device (30) is realized.

Reference Signs

1. Domestic appliance
2. Door

10. Body
11. Outer face
12. Hole
13. Inner face
14. Cooling chamber
15. Machine chamber
16. Compressor
17. Condenser
18. Connection cable
180. First end
181. Second end
182. Connection plug
19. Modem

20. Electronic unit
21. Cable

30. Connection device
300. Mains connection
301. Front face
302. Bottom face
303. Protrusion
310. Inner face
311. Opening
320. Blade
321. Extension
330. Board
331. Front edge
332. Rear edge
333. Slit
334. Side edge
335. Recess
340. Data transmission contacts
341. Trace
342. Trace end
343. Connection opening

40. Cover
400. Wide section
401. Inner side wall
410. Guide
420. Latching element
421. Tab
422. Locking wall
430. Rear wall
431. Terminal opening
432. Platform
433. Retainer
440. Upper section
450. Front opening

50. Transferring element

60. Fastening device
61. Rail
62. Side wall
63. Top wall
64. Stop ridge
65. Fixing element

CLAIMS

1. A domestic appliance (1) comprising a body (10); an electronic unit (20) disposed inside the body (10); a connection device (30) having a mains connection (300) as configured to supply electrical energy from a domestic mains power supply to the domestic appliance (1); data transmission contacts (340) provided on the mains connection (300) to transfer data to/from the electronic unit (20); characterized in **that** the connection device (30) and the electronic unit (20) are physically separate; and the domestic appliance (1) has a transferring element (50) for connecting at least the data transmission contacts (340) of the mains connection (300) to the electronic unit (20).

2. The domestic appliance (1) according to claim 1; wherein the transferring element (50) is a cable between the electronic unit (20) and the connection device (30).

3. The domestic appliance (1) according to anyone of the preceding claims; wherein the data transmission contacts (340) are accessible in an opening (31 1) of the mains connection (300).

4. The domestic appliance (1) according to anyone of the preceding claims; wherein the connection device (30) has a board (330) having the data transmission contacts (340).

5. The domestic appliance (1) according to claim 3 and 4; wherein the board (330) extends at least in sections into the opening (31 1).

6. The domestic appliance (1) according to claim 4 or 5; wherein the board (330) forms the inner face (310) of the mains connection (300).

7. The domestic appliance (1) according to claim 4, 5 or 6; wherein the board (330) has only traces (341) and the data transmission contacts (340) arranged on the traces (341) of the board (330) remaining in the opening (31 1).

8. The domestic appliance (1) according to claim 7; wherein the mains connection (300) has at least two blades (320) inside and the blades (320) are conductively connected to at least two traces (341) of the board (330).

9. The domestic appliance (1) according to anyone of the claim 4-8; wherein the mains connection (300) has a protrusion (303) and the board (330) has a connection opening (343) for the protrusion (303) for fixing the mains connection (300) on the board (330).

10. The domestic appliance (1) according to anyone of the claim 4-9; wherein the connection device (30) has a cover (40) for covering both the mains connection (300) and the board (330).

11. The domestic appliance (1) according to claim 10; wherein the cover (40) has a guide (410) in that the board (330) is located.

12. The domestic appliance (1) according to claim 10 or 11; wherein the cover (40) has a latching element (420) being releasable for fixing the cover (40) on the board (330).

13. The domestic appliance (1) according to anyone of claim 10, 11 or 12; wherein the cover (40) has a terminal opening (431) for penetration and connection of the transferring element (50) to the board (330).

14. The domestic appliance (1) according to claim 13; wherein the board (330) has trace ends (342) corresponding the terminal opening (431) of the cover (40).

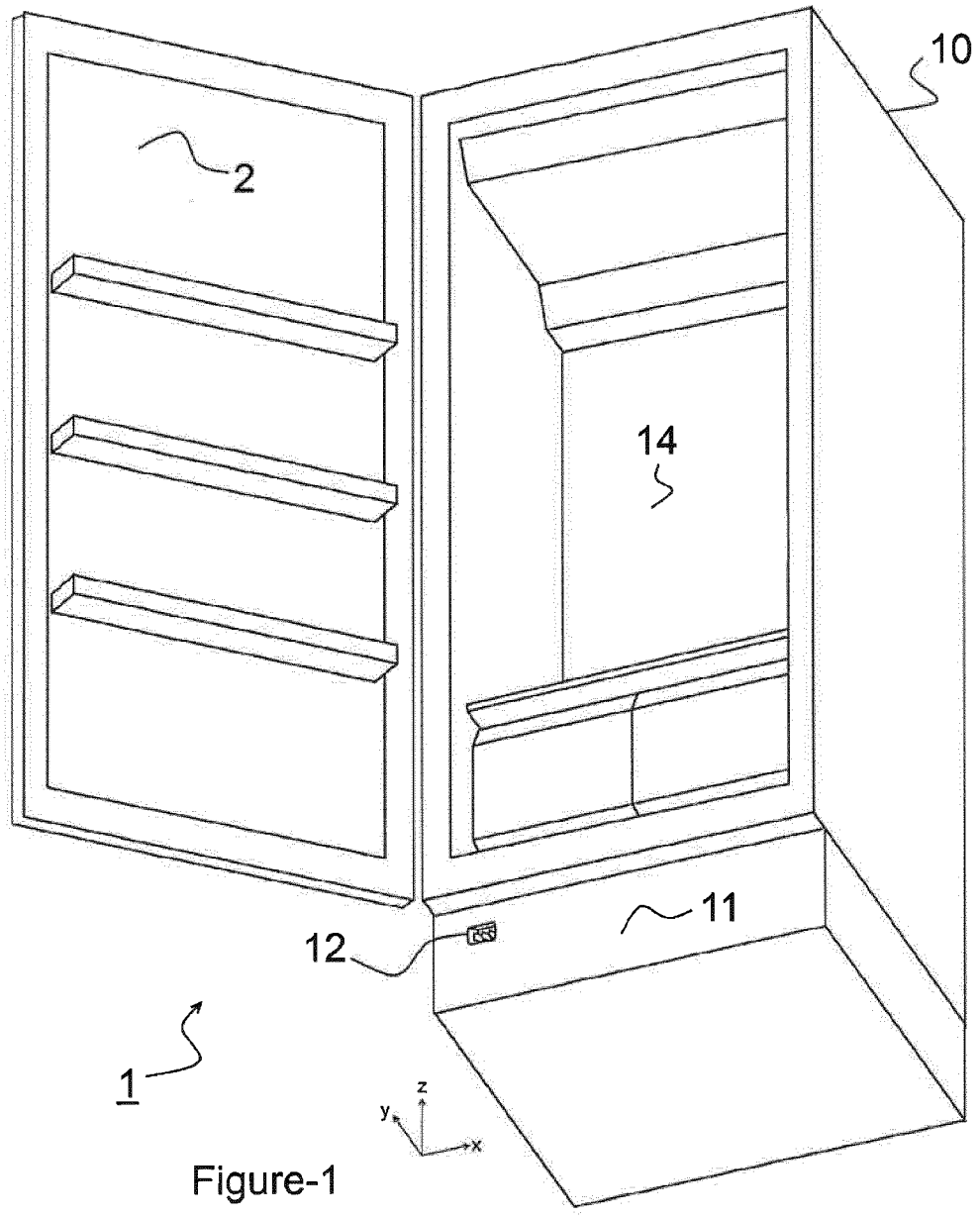

Figure-1

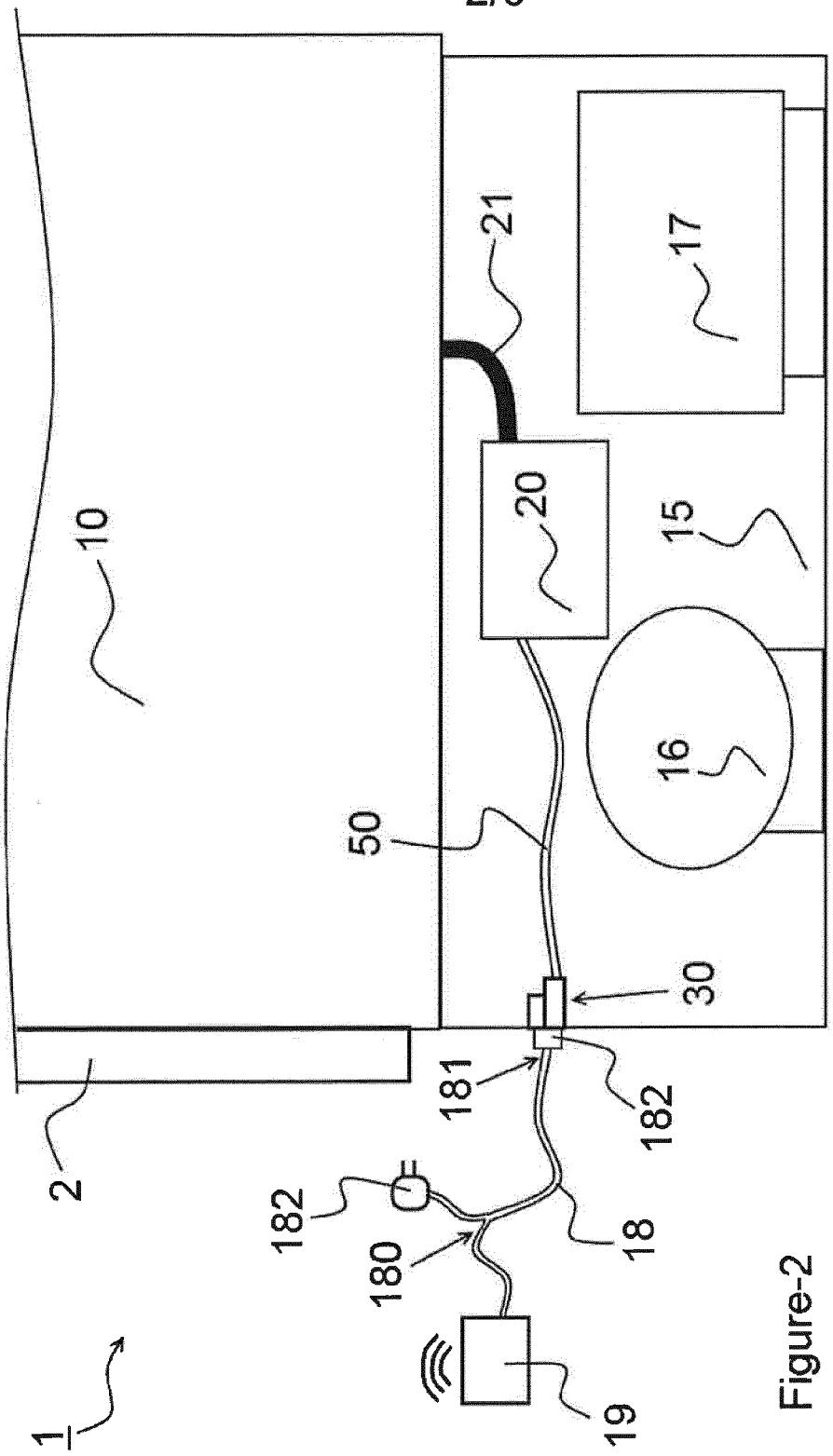

Figure-2

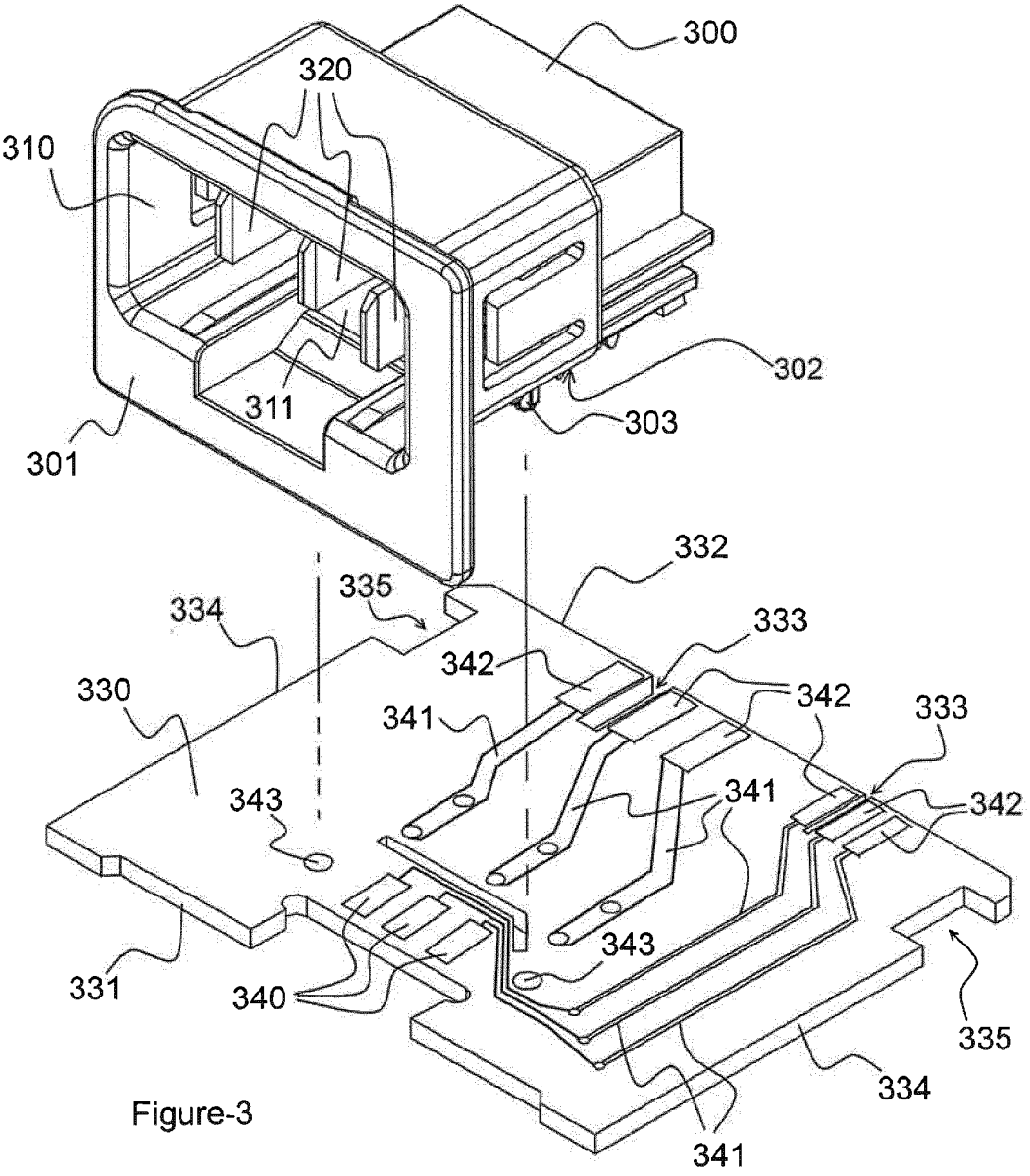
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Figure-3

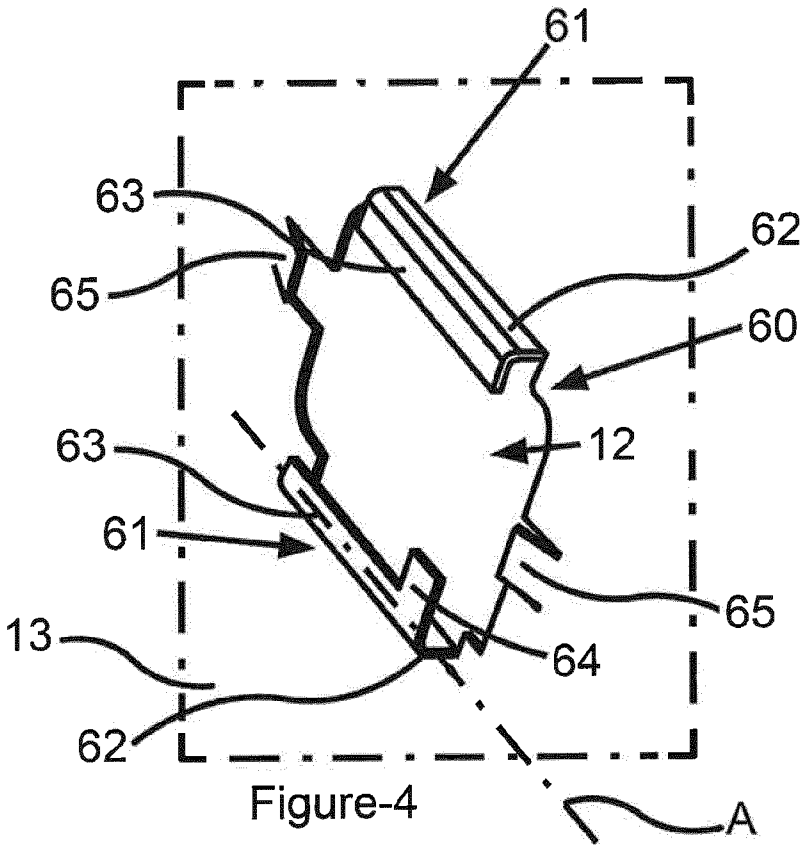

Figure-4

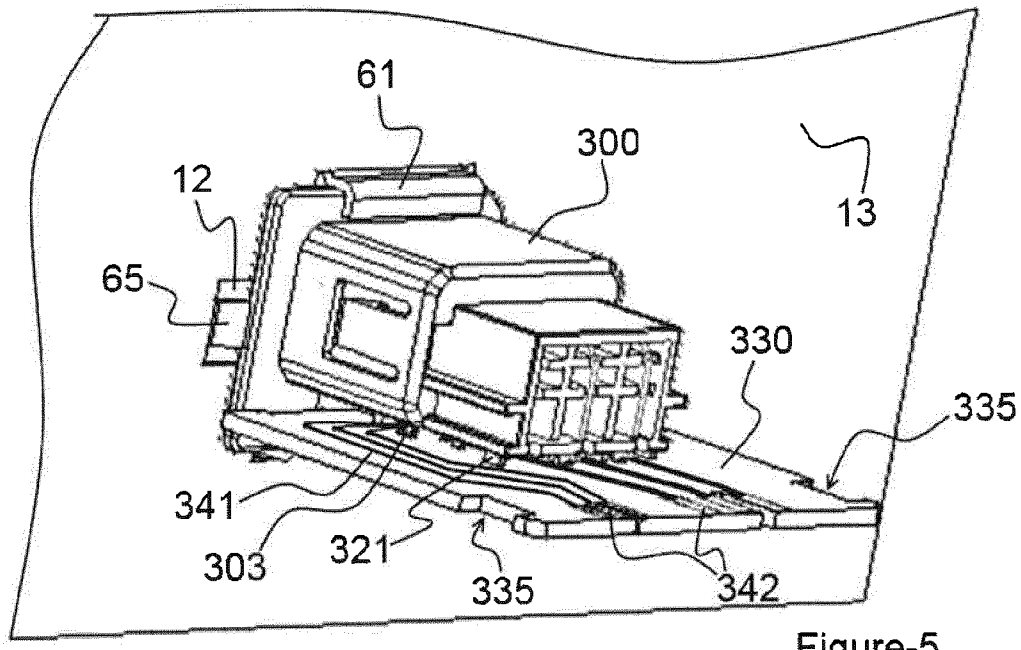

Figure-5

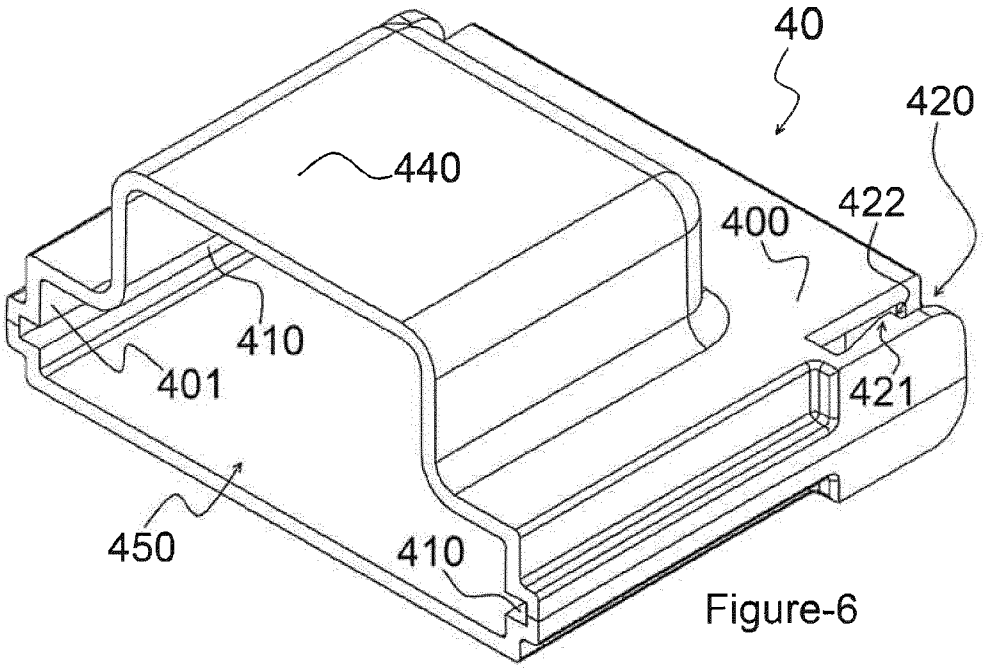

Figure-6

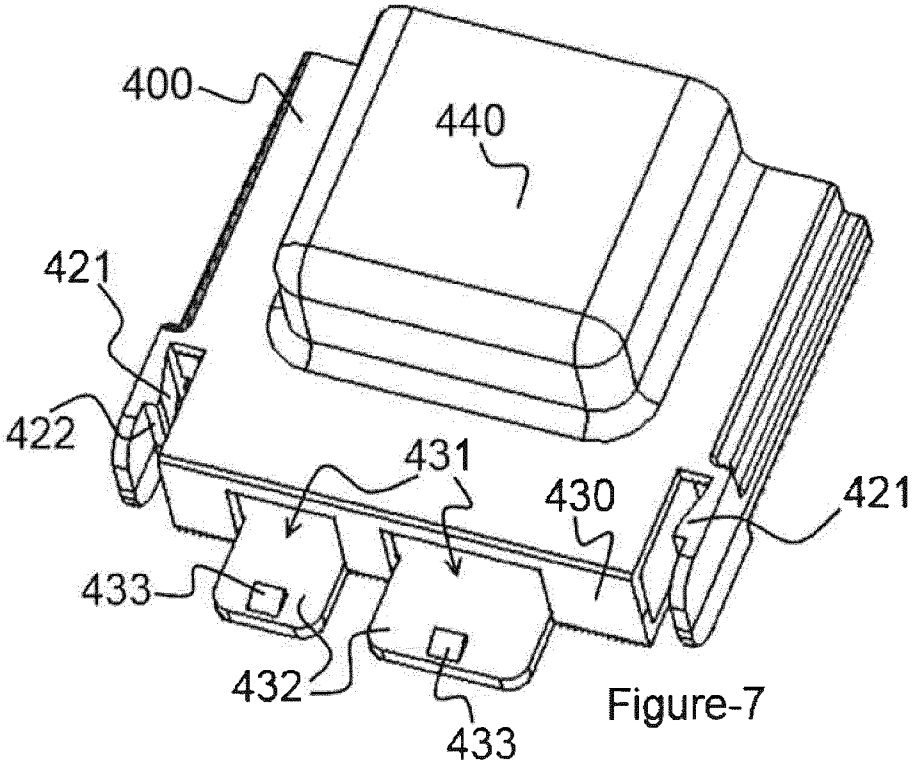

Figure-7

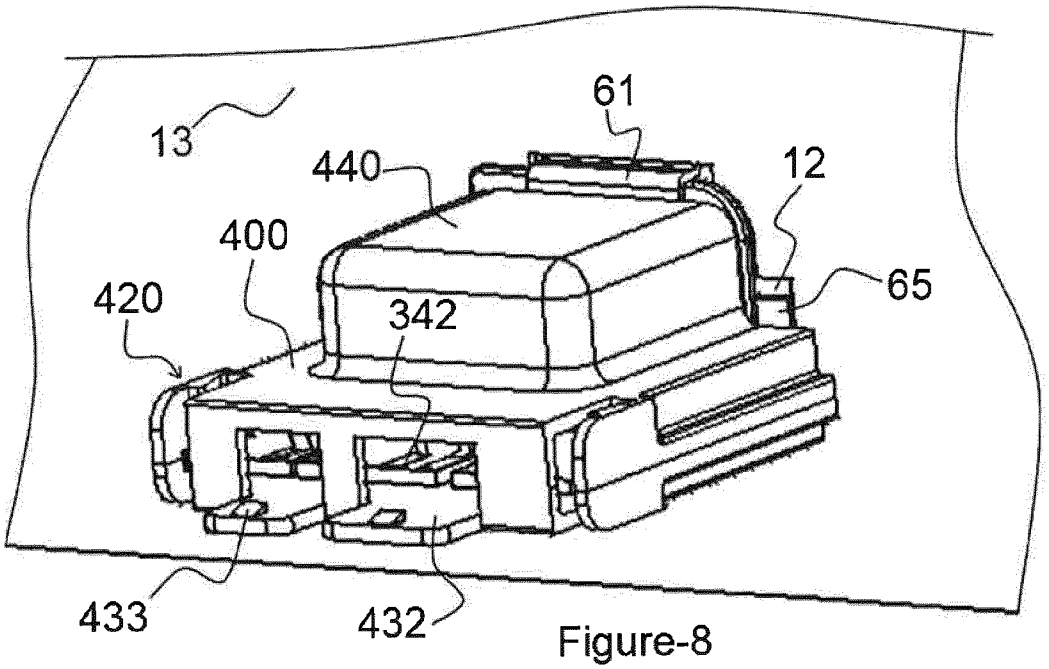

Figure-8

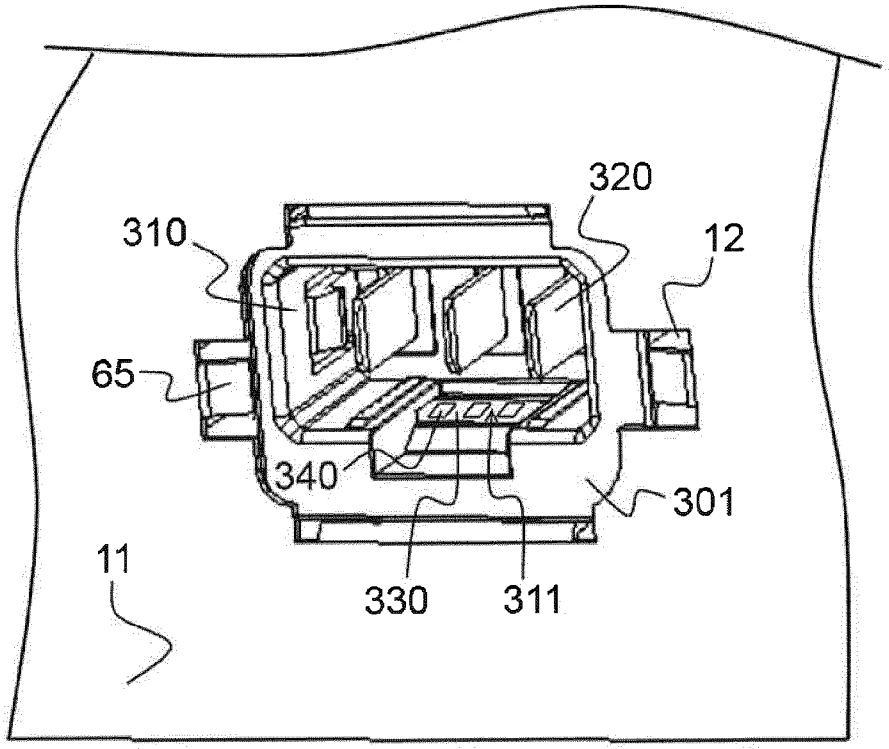

Figure-9

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/052252

A. CLASSIFICATION OF SUBJECT MATTER
INV. F25D29/00 H04B3/54
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)
F25D H04B

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

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	W0 2006/070481 Al (ALPS ELECTRIC CO LTD [JP] ; INAGAKI KAZUYA [JP]) 6 July 2006 (2006-07-06) f i gures 1-5 abstract	1-4
X	KR 2007 0100529 A (SAMSUNG ELECTRONICS CO LTD [KR]) 11 October 2007 (2007-10-11) f i gures 1-4	1,2

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

X See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 March 2016	14/04/2016

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	Dezso, Gabor

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INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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