(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 742 090 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
25.11.2020 Bulletin 2020/48

(51) Int Cl.:
F25D 23/02 *(2006.01)*

(21) Application number: **19176049.5**

(22) Date of filing: **22.05.2019**

(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:
KH MA MD TN

(71) Applicant: **Whirlpool Corporation**
Benton Harbor, MI 49022 (US)

(72) Inventor: **Dzik, Kamil**
21024 Cassinetta di Biandronno (VA) (IT)

(74) Representative: **Spina, Alessandro**
Whirlpool EMEA SpA
Via Carlo Pisacane, 1
20016 Pero (MI) (IT)

(54) **DOOR-INTEGRATED HANDLE ASSEMBLY FOR A REFRIGERATOR DOOR**

(57) A door-integrated handle assembly (100) for a refrigerator door comprises a handle element (110) and a cover element (120) configured to be assembled to said handle element (110). Snap-fit connectors (115, 124, 125) and ribs (116, 126) are formed on the handle element (110) and the cover element (120), respectively, to allow their assembly.

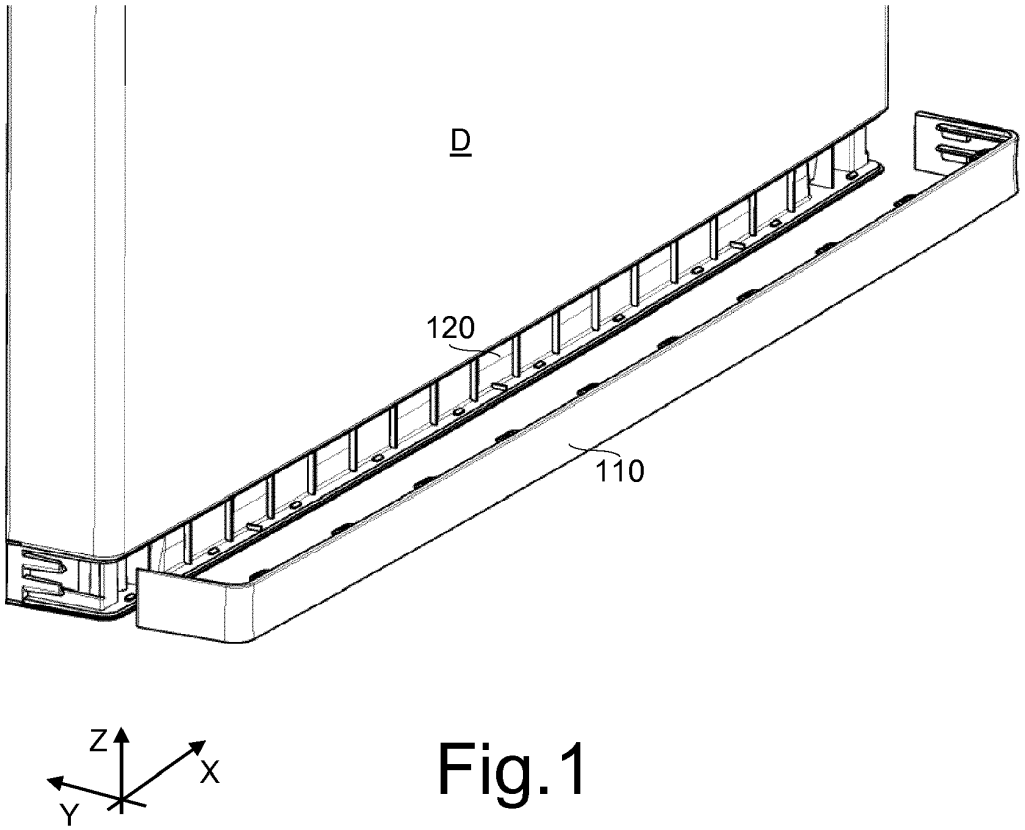


Fig.1

EP 3 742 090 A1

Description

Technical field of the invention

[0001] The present invention generally relates to refrigerator appliances and in particular to a refrigerator appliance with an improved door opening device.

Background

[0002] It is known that modern refrigerator appliances are characterized by a generally flat design of the outer walls, which allows to better integrate them in a kitchen environment. Recessed door handles are more and more often used in these appliances. Since no grip parts, nor door opening devices, if any, are visible from the front and/or side of the refrigerator, an improved aesthetic appearance is achieved.

[0003] Moreover, manufacturing and assembly costs can be remarkably reduced by integrating and thus hiding inside doors the handles and door opening devices.

[0004] US 7984955 discloses a refrigerator with a recessed handle of the type above. A recess is formed in any one of an upper portion and lower portion of a door and a shield is mounted at a front surface of the door, thus defining a handle. The shield also has an aesthetic function in that it contributes to the aesthetic appearance of the door. A door opening device is mounted in the recessed handle and is hidden by the shield. The shield may either be made as a separate component mounted to the door, or integrally formed with the front wall of the door.

[0005] Also known are door-integrated handles comprising a sheet-metal member formed by bending starting from a flat plate in order to obtain a U-shaped profile to be fitted in a door cavity.

[0006] The availability of different solutions to make recessed handles notwithstanding, there is still a need to find improved solutions in particular as far as aesthetics and assembly are concerned.

Summary of the invention

[0007] The technical problem underlying and solved by the present invention is therefore to provide a refrigerator appliance with a recessed door handle that allows to overcome the drawbacks mentioned above with reference to the prior art.

[0008] This problem is solved by a refrigerator appliance according to the independent claim 1. Preferred features of the present invention are set forth in the dependent claims.

[0009] An idea of solution underlying the invention is to provide a door-integrated handle assembly comprising a handle element and a cover element configured to be assembled to one another by way of a combination of snap-fit connectors, as well as guiding ribs.

[0010] Thanks to this configuration, a precise and stable assembly can be achieved.

[0011] According to an embodiment of the invention, the snap-fit connectors comprise a plurality of tabs with respective slots formed on one between the cover element and the handle element, as well as a plurality of teeth formed on the other one between the handle element and the cover element. The teeth are received in the slots in an assembled configuration of the door-integrated handle element. The guiding ribs are formed on side portions of the handle element and the cover element and behave as rails easing assembly of the cover element onto the handle element and restraining the side portions of the former.

[0012] This configuration allows to easily and precisely fit the cover element onto the handle element and snap it to the latter only when assembly is substantially complete.

[0013] Further advantages, features and operation modes of the present invention will become clear from the following detailed description of embodiments thereof, which are given for illustrative and not-limiting purposes.

Brief description of the drawings

[0014] Reference will be made to the figures of the accompanying drawings, in which:

- figure 1 is a perspective, partially exploded view showing a refrigerator door featuring a door-integrated handle assembly according to the present invention;
- figure 2 is an exploded view of the door-integrated handle assembly of figure 1;
- figure 3 is a bottom perspective view of a handle element of the door-integrated handle assembly according to the present invention;
- figure 4 shows a detail of figure 3;
- figure 5 is a top perspective view of a cover element of the door-integrated handle assembly according to the present invention;
- figure 6 shows a detail of figure 5;
- figure 7 is a partial cross-sectional view of the handle element taken along a plane passing from line VII-VII of figure 3;
- figure 8 is a rear view of the cover element of figure 5.

Detailed description of preferred embodiments

[0015] With reference to the figures, a door-integrated handle assembly according to the invention is generally

indicated by reference number 100. In the schematic drawing of figure 1 the door-integrated handle assembly 100 is shown mounted on a refrigerator door D of a refrigerator appliance (not shown), e.g. a bottom-mount refrigerator type, and is associated with the lower edge of the door.

[0016] In the figures, the door-integrated handle assembly 100 is shown with reference to a three-dimensional coordinate system. A first axis X and a second axis Y that are mutually perpendicular define a horizontal plane, while a third axis Z defines a vertical axis along which the force of gravity acts.

[0017] The door-integrated handle assembly 100 comprises a handle element 110 and a cover element 120 that is configured to be attached to the handle element 110.

[0018] Depending on the configuration of a refrigerator door D and on its position on the appliance, the handle element 110 may be configured as a top or bottom closing element of the door D, defining a cavity to be filled with an insulating foam together with a front wall, a rear wall and a further closing element arranged at the opposite end of the door in the vertical direction Z.

[0019] According to the invention the handle element 110 extends from the end of the appliance door in the vertical direction Z and includes a cavity 111 where a user can put his/her hand to pull the door open and/or to close it.

[0020] The cavity 111 extends in a longitudinal direction X for almost the whole length of the handle element 110, thus offering a user a wide space to put a hand without any specific space or position restriction.

[0021] The cavity 111 is formed in a body 112 of the handle element 110. An end portion 113 of the body 112 in the vertical direction Z forms an appendix configured to be coupled to a front wall and a rear wall of the refrigerator door D to define the cavity intended to receive the insulating foam. To this aim a plurality of guiding ribs 114 are formed along the periphery of the body 112.

[0022] The cover element 120 is configured as a fascia having a front portion 121 extending in the longitudinal direction X and side portions 122, 123 extending at the ends of the front portion 121 in a transverse direction Y perpendicular to the longitudinal direction X and to the vertical direction Z.

[0023] While the handle element 110 has a structural function within the door D, because it closes the insulating cavity and provides a grip to open and close the door itself, the cover element 120 has an aesthetic function in that it is meant to be mounted on the periphery of the handle element 110 to provide a smooth surface substantially flush with the surface of the front wall of the refrigerator door D.

[0024] In order to assemble the cover element 120 to the handle element 110 two anchoring solutions synergistically cooperating with each other have been devised.

[0025] Particularly referring to figure 3 to 6, first and second snap-fit connectors having matching shapes are formed along the front sides of the handle element 110 and of the cover element 120. The first snap-fit connectors may e.g. comprise a plurality of tabs 124 with respective slots 125 formed on the surface of the front portion 121 intended to face the handle element 110. The second snap-fit connectors may e.g. comprise teeth 115 formed on the handle element 110 in the vertical direction at positions corresponding to the positions of the tabs 124. In an assembled configuration of the door-integrated handle element 100, the teeth 115 are received in the slots 125.

[0026] According to an embodiment of the invention, two rows of tabs may advantageously be formed on the cover element 120 at its top and bottom edges in the vertical direction Z. Two rows of teeth are correspondingly formed in the top and bottom edges of the handle element 110.

[0027] It will be appreciated that in order to achieve an equivalent snap-fit assembly the tabs might alternatively be formed on the handle element 110 and that the teeth might be formed on the cover element 120.

[0028] It will also be appreciated that snap-fit connectors do not only encompass slotted tabs and teeth described above, but also equivalent components such as e.g. hooks, latches and the like.

[0029] In addition to the snap-fit connectors described above, further anchoring means are associated with side portions 122, 123 of the cover element 120 as well as with side portions of the handle element 110.

[0030] Particularly referring to figure 4 and 6, first guiding ribs 116 are formed along the sides of the handle element 110 in the transverse direction Y and second guiding ribs 126 are correspondingly formed along each side portion of the cover element 120.

[0031] The first guiding ribs 116 of the handle element 110 are spaced apart from the body 112 in the longitudinal direction X so as to define rails adapted to receive the second guiding ribs 126 of the cover element 120 during assembly. This allows to keep the side portions 122, 123 of the cover element 120 flush with the door sides and to compensate possible deformations of the cover element 120 deriving from its manufacturing process.

[0032] According to an embodiment shown in the figures, the guiding ribs 116 of the handle portion 110 and those of the cover portion 120 may advantageously feature an L-shaped cross-section, which improves their robustness and ensures a higher assembly precision.

[0033] According to an embodiment of the invention, two parallel guiding ribs, preferably featuring an L-shaped cross-section, are formed on each side of the handle element 110 as well as of the cover element 120. This configuration offers the advantage of a more precise assembly in the vertical direction Z.

[0034] The cover element 120 may be made of the same or a different material compared to the front wall of the refrigerator door and may have the same or a different finishing and/or texture.

[0035] According to an embodiment of the invention, a door opening device may be associated with in the door-integrated handle element 100 and housed in the handle element 110.

[0036] The present invention has hereto been disclosed with reference to preferred embodiments thereof. It will be appreciated that there may be other embodiments relating to the same inventive idea, all of which are included in the scope of protection defined by the claims set out below.

Claims

1. A door-integrated handle assembly (100) for a refrigerator door, said door-integrated handle assembly (100) comprising:

   • a handle element (110);
   • a cover element (120) configured to be assembled to said handle element (110);
   wherein first snap-fit connectors (115) are formed on the handle element (110) and second snap-fit connectors (124, 125) configured to be coupled with said first snap-fit connectors (115) are formed on the cover element (120),
   and wherein first guiding ribs (116) are formed on the handle element (110) and second guiding ribs (126) are formed on the cover element (120), said first and second guiding ribs (116, 126) being configured to be fitted with each other.

2. The door-integrated handle assembly of claim 1, wherein said first snap-fit connectors comprise a plurality of tabs (124) with respective slots (125) formed on one between the cover element (120) and the handle element (110), wherein said second snap-fit connectors comprise teeth (115) formed on the other one between the handle element (110) and the cover element (120), and wherein said teeth (115) are received in said slots (125) in an assembled configuration of the door-integrated handle element (100).

3. The door-integrated handle assembly of claim 1 or 2, wherein said guiding ribs (116, 126) are formed on side portions of the handle element (110) and of the cover element (120).

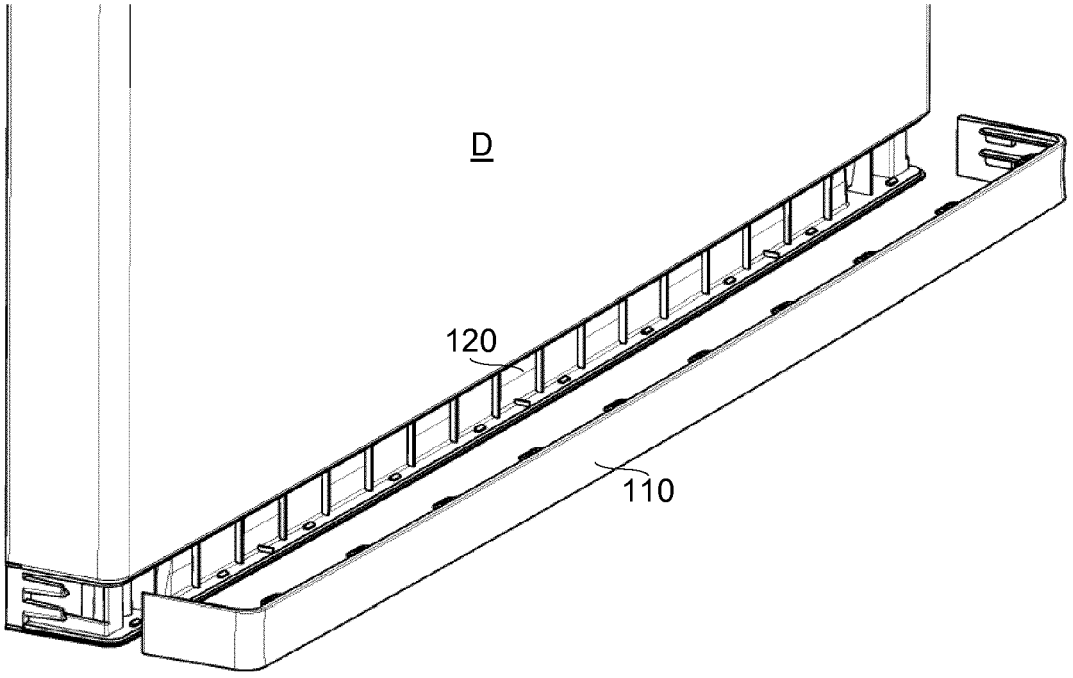
4. The door-integrated handle assembly of claim 3, wherein the guiding ribs (116) of the handle element (110) are spaced apart from a body (112) thereof in a longitudinal direction (X), thereby defining rails adapted to receive the guiding ribs (126) of the cover element (120) during assembly.

5. The door-integrated handle assembly of claim any one of claims 1 to 4, wherein the guiding ribs (116) of the handle portion (110) and the guiding ribs (126) of the cover portion (120) feature an L-shaped cross-section.

6. The door-integrated handle assembly of claim any one of claims 1 to 5, wherein two parallel guiding ribs (116) are formed on each side of the handle element (110) and two parallel guiding ribs (126) are formed on the side portions of the cover element (120).

7. A refrigerator door (D) comprising a front wall, a rear wall, a top closing element and a bottom closing element defining a cavity intended to receive an insulating foam, said refrigerator door (D) further comprising a door-integrated handle assembly (100) according to any one of the preceding claims, wherein the handle element (110) of said door-integrated handle assembly (100) forms the top closing element or the bottom closing element of the door (D).

8. A refrigerator appliance comprising a refrigerator door (D) according to the previous claim.



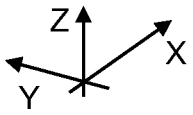


Fig.1

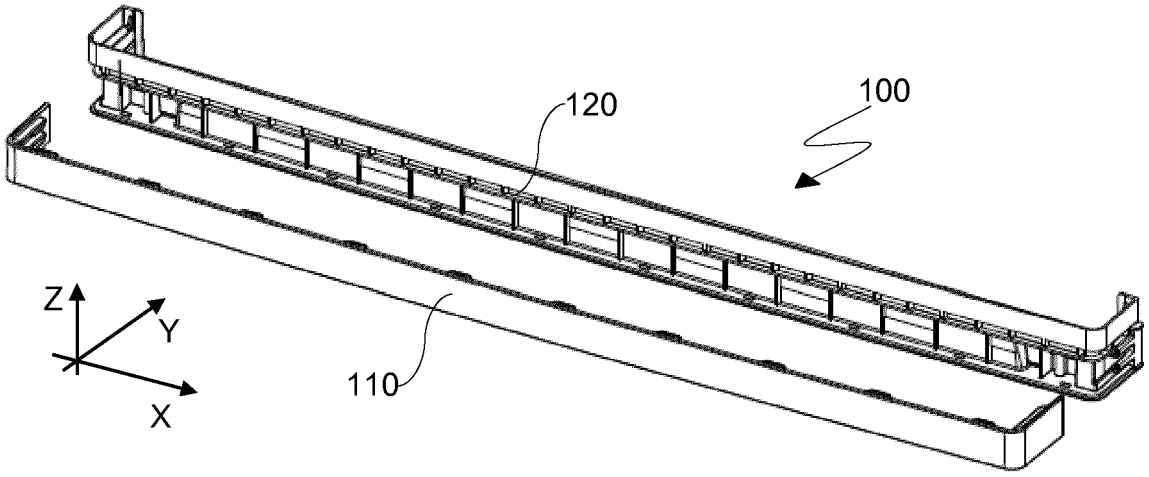


Fig.2

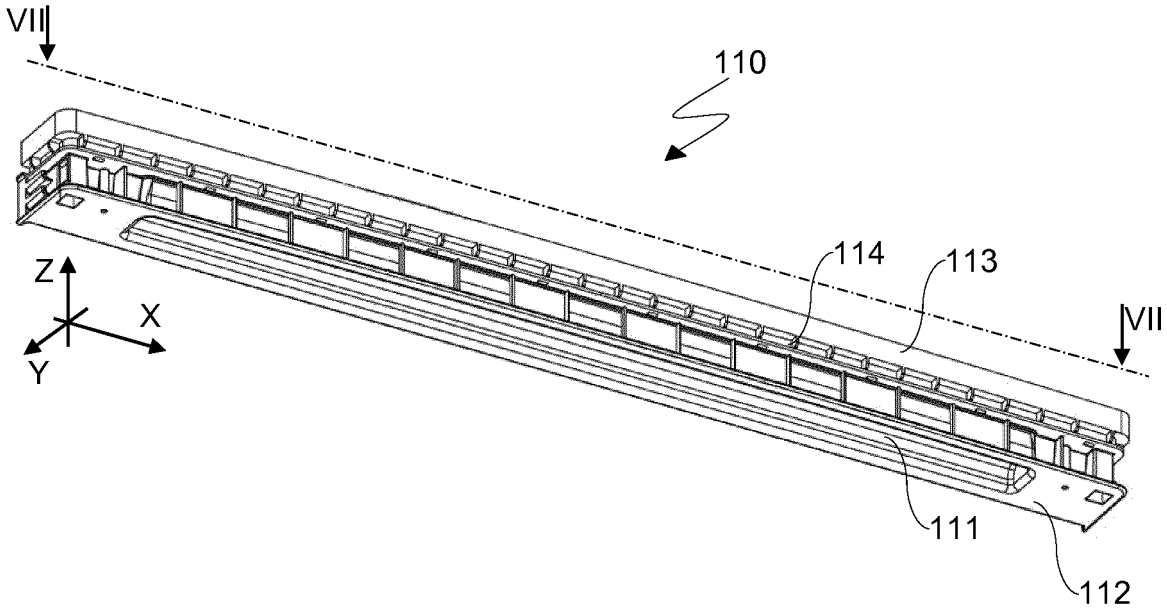


Fig.3

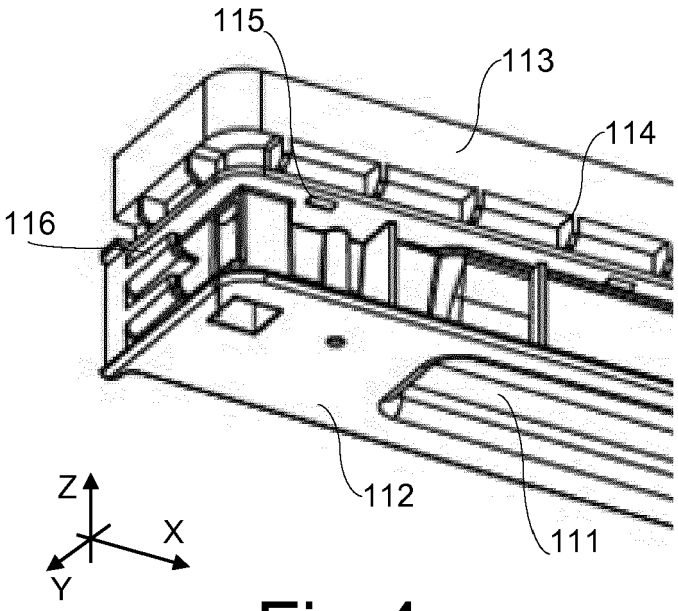


Fig.4

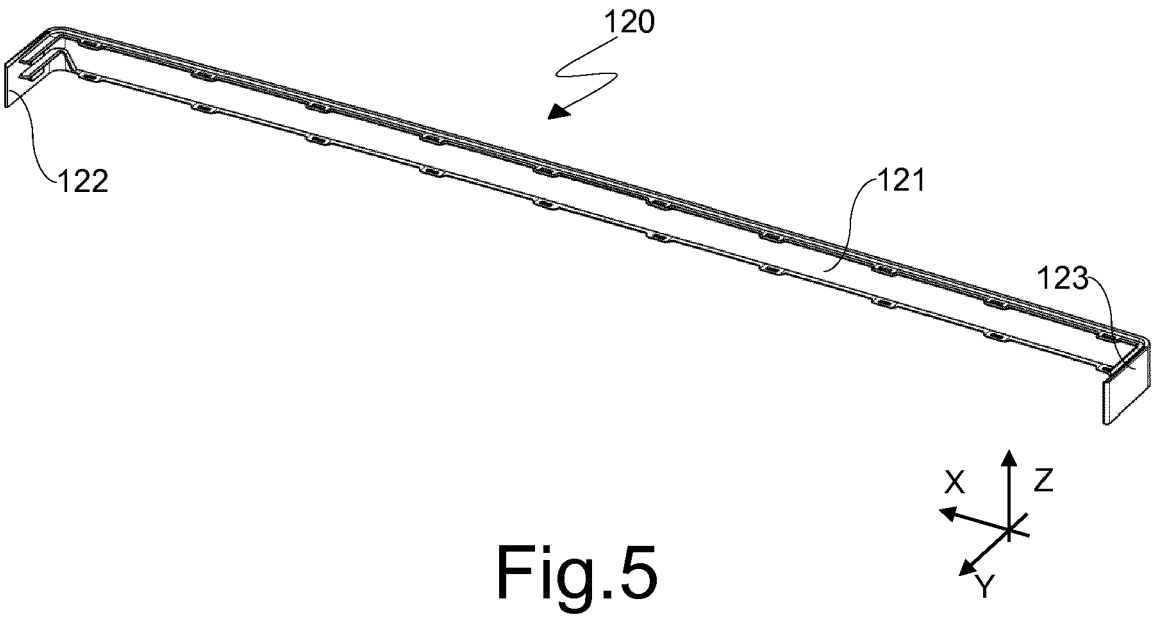


Fig.5

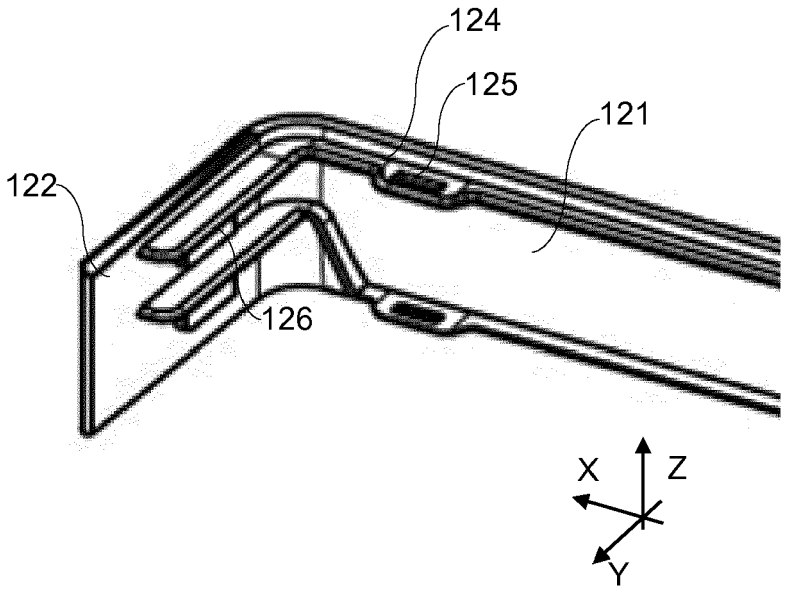


Fig.6

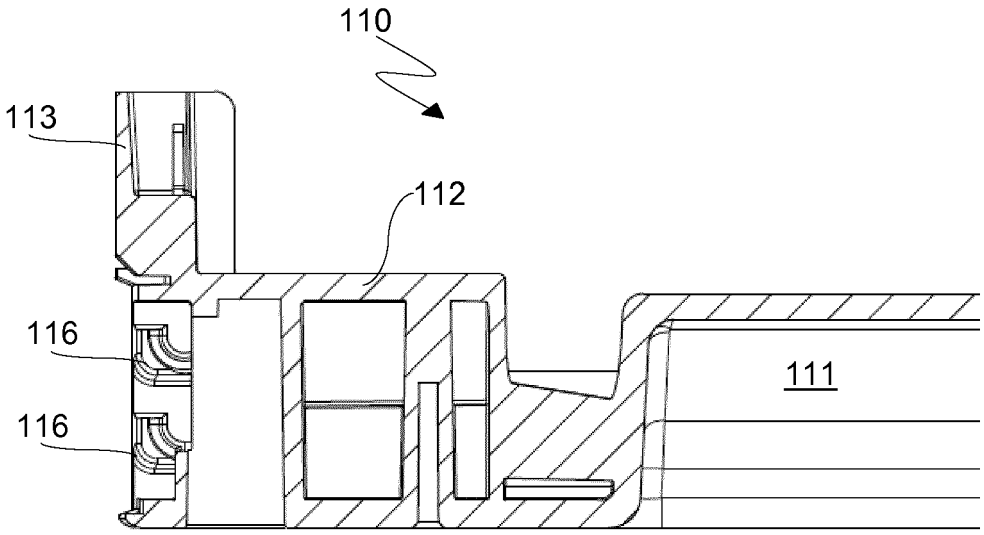


Fig.7

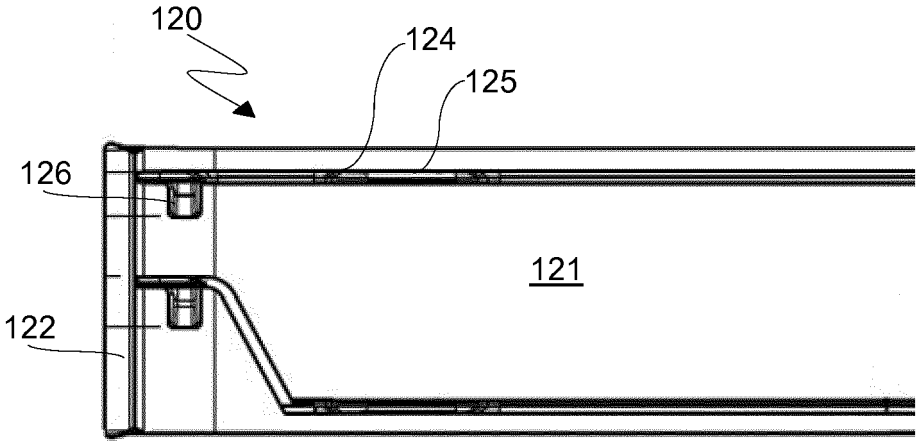


Fig.8

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 19 17 6049

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 2006 194545 A (TOKYO SHIBAURA ELECTRIC CO) 27 July 2006 (2006-07-27) * paragraphs [0014], [0015]; figures 2,3,6 * -----	1-8	INV. F25D23/02
X	US 2004/094560 A1 (GOSE THOMAS E [US] ET AL) 20 May 2004 (2004-05-20) * paragraph [0028]; figures 2,3,5 * -----	1-3,5,6	
X	DE 10 2010 028414 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 3 November 2011 (2011-11-03) * paragraphs [0030], [0031]; figures 2,3,4,7 * -----	1,3-5	

TECHNICAL FIELDS SEARCHED (IPC)

F25D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	28 October 2019	Canköy, Necdet

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 17 6049

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-10-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2006194545 A	27-07-2006	CN 1804523 A	19-07-2006
		JP 4229914 B2	25-02-2009
		JP 2006194545 A	27-07-2006
US 2004094560 A1	20-05-2004	CA 2446851 A1	18-05-2004
		US 2004094560 A1	20-05-2004
DE 102010028414 A1	03-11-2011	CN 102869936 A	09-01-2013
		DE 102010028414 A1	03-11-2011
		EP 2564137 A2	06-03-2013
		WO 2011134738 A2	03-11-2011

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 7984955 B **[0004]**