



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
02.10.2019 Bulletin 2019/40

(51) Int Cl.:
F25D 21/14 ^(2006.01)

(21) Application number: **19160965.0**

(22) Date of filing: **06.03.2019**

(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: **BSH Hausgeräte GmbH**
81739 München (DE)

(72) Inventors:
• **Altay, ibrahim Levent**
59850 TEKIRDAG (TR)
• **Ergin, Orkun Mert**
59850 TEKIRDAG (TR)
• **Özhan, Tahir**
59850 Tekirdag (TR)

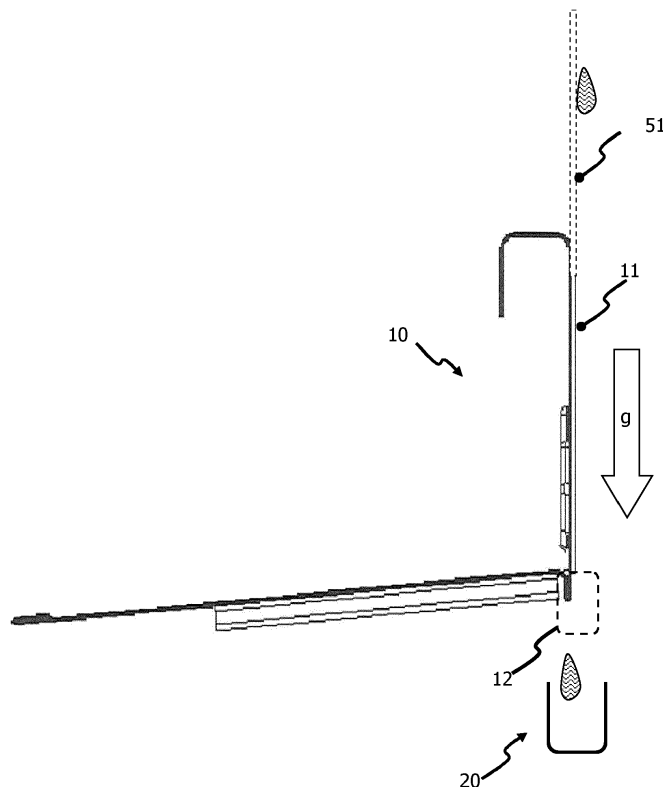
(30) Priority: **27.03.2018 TR 201804275**

(54) **A HOUSEHOLD APPLIANCE WITH A CONDENSATION DRIPPING EDGE**

(57) The present invention proposes a household appliance (100) comprising an outer wall (50) with a condensation surface (51) for formation of condensate from air humidity thereon. The household appliance further comprises a member (10) having a guiding surface (11) adjacent to said condensation surface (51). Said guiding

surface (11) is adapted to receive the condensate from the condensation surface (51) in accordance with gravity (g) (i.e. gravity force applied on the condensate); the member (10) further comprises a dripping edge (12) at a side of the guiding surface (11) distal to the outer wall (50).

FIG. 4



Description

Technical field of the invention

[0001] The present invention relates to a household appliance, in particular to a cooling appliance.

Background of the invention

[0002] Thermal insulation is of vital importance for energy performance of several types of household appliances, in particular cooling appliances. GB 2 258 297 A discloses an exemplary cooling appliance provided with thermal insulation material.

[0003] Usually, inner liner of a cooling appliance is covered from several sides (usually five sides except a door side) with polyurethane (PU) foam which is filled into an insulation volume. The PU foam is obtained from a liquid mixture introduced into the insulation volume and then such liquid mixture reacts to form the PU foam.

[0004] At conversion of the insulation foam from the liquid mixture, a volumetric expansion occurs due to formation of gaseous substances. This phenomenon causes difficulties in distribution of the insulation material in accordance with the design, and a cover is mostly used to define and defend the volumetric limits of the compressor housing against invasion thereof by insulation foam.

[0005] Such cover may be made of cardboard or any other material having a rigidity to a low extent, and its position is usually fixed using a member which can be called "foaming traverse". Such member can be a single piece formed from a plastic material such as polyethylene. The cover is usually fixed to the member using adhesive materials, usually by adhesive tape; which results in an assembly for defining a compressor housing and its position relative to an inner liner of the appliance.

[0006] Household appliances (e.g. cooling appliances) are usually positioned for being operated, in a way such that an outer wall thereof (usually a rear wall of the appliance) is faced a substantially parallel surface in the surroundings (e.g. a kitchen wall), leaving only a small distance therebetween for using the total volume of such surroundings effectively. The compressor housing of a cooling appliance being usually positioned at a lower rear portion of such appliance, results in release of heated air to the region behind the rear wall of the cooling appliance, which further results in increased temperature around the outer surface of the rear wall.

[0007] The temperature difference between the outer surface of the rear wall and the surrounding air is therefore highest when compared to the temperature difference between outer surfaces of other walls of the cooling appliance and air in contact with said surfaces. Thus, a portion of the air humidity may condense on outer surfaces of walls of cooling appliances, in particular on outer surface of the rear wall of a cooling appliance.

[0008] Condensate (i.e. water drops formed on a surface due to condensation of the air humidity) on the outer

surface of the rear wall travels along the rear wall under gravity and a part of such condensate may continue traveling to regions of said surface over the compressor housing, such regions at least partly defining an upper side of the compressor housing where some elements sensitive to water exists.

[0009] Furthermore, the present member design needs to be improved against deflection which generally occurs at the above mentioned conversion into foam.

[0010] Hence, it is desirable to improve household appliances considering the abovementioned shortcomings.

Objects of the invention

[0011] Primary object of the present invention is to overcome the abovementioned shortcomings encountered in the prior art.

[0012] Another object of the present invention is to provide a household appliance with enhanced safety against short circuits.

[0013] Another object of the present invention is to provide a household appliance with minimized mold formation.

[0014] A further object of the present invention is to provide a household appliance with higher form stability at foaming of insulation material.

Summary of the invention

[0015] The present invention proposes a household appliance comprising an outer wall with a condensation surface for formation of condensate from air humidity thereon; wherein the household appliance further comprises a member having a guiding surface adjacent to said condensation surface, adapted to receive the condensate from the condensation surface in accordance with gravity; the member further comprises a dripping edge at a side of the guiding surface distal to the outer wall.

[0016] The household appliance can further comprise a drop receiver adapted by its size, shape and position to receive the condensate when dropped from the dripping edge.

[0017] The drop receiver can have two distal ends substantially along a length of the dripping edge, said length being substantially in a horizontal direction when in use; and the drop receiver can be attached to the member at one or more zone(s) between said distal ends.

[0018] The drop receiver can have a shape and size adapted to direct the condensate towards an evaporation receptacle.

[0019] The drop receiver can have one or more inclined portion(s) adapted to provide a horizontal component to a flow of the condensate thereon when in use, said horizontal component being at least partly directed towards a vertical projection of the evaporation receptacle.

[0020] The household appliance can further comprise a conduit adapted to further guide the condensate from

the drop receiver towards the evaporation receptacle when in use.

[0021] The evaporation receptacle can be adapted to have a greater temperature than the condensation surface when in operation.

[0022] The drop receiver can further include one or more housing(s) to receive respective one or more spacer(s) adapted to, in use, secure a pre-determined distance for the outer wall from a further surface substantially parallel thereto.

[0023] The one or more housing(s) or respective one or more spacer(s) can include multiple engagement positions in a direction substantially perpendicular to the outer wall.

[0024] The member can be substantially formed from a non-flammable material. Thus, it prevents any possible flame to reach the flammable insulation foam inside the wall of the appliance.

[0025] The member can be substantially formed from a metallic material.

[0026] The member can be substantially formed from bent sheet metal.

[0027] The household appliance according to the present invention may be a cooling appliance. The household appliance may be a refrigerator. Alternatively the household appliance may be an air conditioner.

[0028] All features and details explained above may be combined in any technically enabling combination.

Brief description of the figures

[0029] The accompanying drawings are given solely for the purpose of exemplifying the invention whose advantages over prior art were outlined above and will be explained in detail hereinafter:

Fig. 1 is a perspective view of a household appliance including a member according to the present invention, emphasizing an outer wall with a condensation surface thereof.

Fig. 2 is a detail from the Fig. 1, emphasizing an exemplary positioning of an exemplary embodiment of the member.

Fig. 3 is an exploded view partly showing an exemplary embodiment according to the present invention.

Fig. 4 is a side view showing the relative positioning of several features in an exemplary embodiment according to the present invention.

Fig. 5 is a perspective view exemplifying several features around a member according to the present invention.

Fig. 6 is another perspective view showing the posi-

tioning of several parts around an exemplary member according to the present invention.

Fig. 7 is a perspective view of an exemplary drop receiver to be used with a member according to the present invention.

Fig. 8 is another perspective view of an exemplary drop receiver to be used with a member according to the present invention, emphasizing an exemplary montage of spacer(s) to respective housing(s) thereon.

Fig. 9 is a detailed perspective view from the Fig. 8, emphasizing an exemplary direction for mounting a spacer to an exemplary housing on a drop receiver.

Fig. 10 is a detailed perspective view showing a first engagement position between the spacer and the housing shown in the Fig. 9.

Fig. 11 is a detailed perspective view showing a further engagement position between the spacer and the housing shown in the Fig. 9.

Fig. 12 is a perspective view showing an exemplary drop receiver for use with the member according to the present invention.

Fig. 13 is a perspective detailed view showing an exemplary housing providing multiple engagement positions for assembly with a spacer.

Detailed description of the invention

[0030] Referring to the figures summarized above, the present invention proposes a household appliance (100) comprising an outer wall (50) with a condensation surface (51) for formation of condensate from air humidity thereon. The household appliance further comprises a member (10) having a guiding surface (11) adjacent to said condensation surface (51). Said guiding surface (11) is adapted to receive the condensate from the condensation surface (51) in accordance with gravity (g) (i.e. gravity force applied on the condensate); the member (10) further comprises a dripping edge (12) at a side of the guiding surface (11) distal to the outer wall (50). Such dripping edge (12) provides that the member (10) is adapted to allow the condensate drop from the member (10). The condensation may also occur on the guiding surface (11) when the household appliance (100) is in operation.

[0031] Fig. 1 shows a perspective view of a household appliance (100) including the member (10) according to the present invention, emphasizing an outer wall (50) with a condensation surface (51). The item "A" in Fig. 1 corresponds to a portion of the household appliance (100) around its compressor housing (90) for being shown in a close-up view in Fig. 2; and "g" represents the gravity

as a vector quantity. With regard to the operational state of the household appliance (100), the compressor housing (90) is positioned substantially at a lower portion of the household appliance (100). In other words, the compressor housing (90) remains below an outer wall (50, here: rear wall) which has an outer surface (51) substantially parallel to the gravity (g), such that any condensate appeared on the outer surface (51) tend to be guided on the outer surface (51) mainly parallel to the gravity (g).

[0032] Fig. 2 shows a detail from the Fig. 1, emphasizing an exemplary positioning of an exemplary embodiment of the member (10), wherein the member (10) is positioned adjacent to an outer wall (50) (e.g. a rear wall), along their respective edges to directly receive condensate from the condensation surface (51). Fig. 5 is a perspective view from another angle without side walls, insulation, inner lining and front section of the appliance (100).

[0033] The member (10) can be considered as a constructional detail which can be named as e.g. "foaming traverse".

[0034] The household appliance (100) can further comprise a drop receiver (20) adapted by its size, shape and position to receive the condensate when dropped from the dripping edge (12). Fig. 3 shows is an exploded view partly showing an exemplary embodiment according to the present invention, wherein the drop receiver (20) is arranged to remain below the member (10) when in operation to receive condensate therefrom. The shaded items on the Fig. 3 represent drops of condensate.

[0035] Fig. 4 shows a side view showing an exemplary positioning between a member (10) and an outer surface (51) of an outer wall (50) in an exemplary embodiment of the household appliance (100) according to the present invention, emphasizing a dripping edge (12), and a drop receiver (20) which is arranged to remain below (at a vertical projection of) the dripping edge (12) when the household appliance is in operation. Due to the gravitation, any condensate formed on the condensation surface (51) is to flow to the guiding surface (11) of the member (10), and to continue towards the dripping edge (12), then to leave the member (10) by dropping onto or being conducted to the drop receiver (20).

[0036] The drop receiver (20) can have two distal ends substantially along a length (L) of the dripping edge (12), said length being substantially in a horizontal direction (H) (which is perpendicular to the direction of gravity "g" as emphasized in the Fig. 3) when in use; and the drop receiver (20) can be attached to the member (10) at one or more zone(s) between said distal ends. This embodiment provides secure relative positioning between the dripping edge (12) and the drop receiver (20) against bending of the drop receiver (20) e.g. at assembly of the household appliance (100), which would potentially result in dripping of condensate to any location other than the drop receiver (20). This embodiment is exemplified in Fig. 7 and Fig. 8, with two (as an example for one or more) connecting means (28) each corresponding to one

of such zones.

[0037] The drop receiver (20) can have a shape and size adapted to direct condensate towards an evaporation receptacle (30). Fig. 6 shows a perspective view showing detail of an exemplary embodiment including an evaporation receptacle (30) for receiving condensate from the drop receiver (20).

[0038] In an embodiment to achieve this function, the drop receiver can have one or more inclined portion(s) (21) adapted to provide a horizontal component to a flow of the condensate thereon when in use, said horizontal component being partly or completely directed towards a vertical projection of the evaporation receptacle (30), as schematically exemplified in the Fig. 3.

[0039] The household appliance can further comprise a conduit adapted to further guide the condensate from the drop receiver (20) towards the evaporation receptacle (30) when in use. Schematics of such embodiment is exemplified in the Fig. 3.

[0040] The evaporation receptacle (30) can be adapted to have a greater temperature than the condensation surface (51) when in operation. This embodiment facilitates and expedite the evaporation of condensate on the evaporation receptacle (30), said evaporation being symbolized over curved, dashed arrows on Fig. 3. Accordingly, the evaporation receptacle (30) can be configured to be in heat transfer communication with e.g. a compressor which readily generates heat when in operation thereby having a higher temperature when compared to its surroundings.

[0041] The drop receiver (20) can further include one or more housing(s) (23) configured to partly receive respective one or more spacer(s) (24). Such housings (23) are exemplified in Fig. 6, Fig. 7, Fig. 12 and Fig. 13 before installation of respective spacers (24).

[0042] A spacer (24) is configured to, in use, be only partly received by a respective housing (23) thereby leaving a portion thereof extending out of a plane to an extent corresponding to a distance (D, D1 or D2), which plane being substantially defined by the condensation surface (51) of the outer wall (50). As it is available with such nonlimiting design, the spacer(s) (24) are configured to secure one or more pre-determined distance(s) (exemplified as one or more of D, D1, D2) for the outer wall (50) from a further surface substantially parallel to said outer wall (50). Spacer(s) (24) being or to be received by such housing(s) (23) are exemplified in Fig. 8, Fig. 9 (including an exemplary montage direction of a spacer to a housing, symbolized over a thick arrow), Fig. 10 (with a first pre-determined distance $D=D1$), Fig. 11 (with a further pre-determined distance $D=D2$ different from D1).

[0043] The housing(s) (23) may be formed integral to the drop receiver (20), thereby providing an enhanced mechanical stability for the respective positioning between the housing(s) (23) and the drop receiver (20), e.g. at assembling of the household appliance (100).

[0044] A housing (23) may include one or more lug(s) (26) as exemplified in the Fig. 13 configured to limit the

penetration of a respective spacer (24) at introduction thereof into the housing (23), thereby preventing the spacer (24) being completely received by the housing (23), and further securing that the extent to which the spacer (24) extends out-of said plane is greater than zero.

[0045] The one or more housing(s) (23) or respective one or more spacer(s) (24) can include multiple engagement positions (251, 252) in a direction substantially perpendicular to the outer wall (50). This embodiment enables selection of such distance from multiple options, such that a more suitable distance between the outer wall (50) and the further surface can be selected from other option(s) in accordance with the climatic requirements (and psychrometric values including air humidity, temperature and pressure) determining a tendency for condensation and a condensation rate on the condensation surface (51) when the household appliance (100) is in operation. Fig. 10 exemplifies provision of a first pre-determined distance ($D=D1$) by fixing a spacer (24) to a respective housing (23) at a first engagement position (251); whereas Fig. 11 exemplifies provision of a further pre-determined distance ($D=D2$ which is different from $D1$) by fixing the spacer (24) to the respective housing (23) at a further engagement position (252, which is different from the first engagement position 251).

[0046] As exemplified over detailed views in the Fig. 9, Fig. 10 and Fig. 11, a housing (23) and spacer (24) may be configured to be engaged over snap-fit connection therebetween. To this end, a housing (23) may be provided with one or more slit(s) determining respective engagement position(s) (251, 252); and a respective spacer (24) may be provided with a flexible protrusion (27) configured to engage with either one of said slit(s) thereby securing a respective distance (D , e.g. $D1$ or $D2$).

[0047] The member (10) can be substantially formed from a non-flammable material. Such non-flammable material can be selected in accordance with the international standard IEC 60235-2-24 (e.g. the version thereof valid as of the date of filing of the present application), such that the material meets the requirements of said standard. This embodiment can correspond to that the member (10) can be substantially formed from a thermally stable, inflammable material, for example from a non-flammable polymeric material or from a metallic material, for example steel or aluminum.

[0048] Accordingly, the member (10) can be substantially formed from a metallic material. As a result, also the dripping edge (12) in this embodiment, can be substantially formed from metallic material, and thereby provide an increased resistance and rigidity against any deflexion of the member (10), especially against deflection caused by volumetric expansion of insulation material at conversion thereof into a foam.

[0049] In an embodiment, the member (10) may be substantially formed from bent sheet metal. The exemplary member (10) side section view of which is shown in the Fig. 4 can be obtained from a sheet metal. In this example, the dripping edge (12) can be formed by bend-

ing the sheet metal to about 180° (taking 360° as full angle) with respect to zone to be corresponding to a guiding surface (11) thereon; and then further bending the sheet metal around a line mainly parallel to the dripping edge (12) in opposite direction to about $90-100^\circ$, the dripping edge (12) remaining between said line and the guiding surface (11).

[0050] The household appliance (100) according to the present invention may be a cooling appliance. Accordingly the household appliance (100) may be a refrigerator; or alternatively, the household appliance (100) may be an air conditioner.

[0051] The present invention provides management of condensation by conducting the condensate away from delicate electronics in the compressor housing (90), such that condensate cannot reach to the electronics. The present invention further provides elimination of mold formation on outer walls (50) of the household appliance (100) by conducting the condensate away. Thus, the above mentioned problems are solved, with the cooling appliance (100) according to the present invention.

List of reference signs

[0052]

10	member
11	guiding surface
12	dripping edge
20	drop receiver
21	inclined portion
22	conduit
23	housing
24	spacer
251, 252	engagement position(s)
26	lug
27	protrusion
28	connecting means
30	evaporation receptacle
50	outer wall
51	condensation surface
90	compressor housing
100	household appliance
g	gravity

Claims

1. A household appliance (100) comprising an outer wall (50) with a condensation surface (51) for formation of condensate from air humidity thereon; **wherein** the household appliance further comprises a member (10) having a guiding surface (11) adjacent to said condensation surface (51), adapted to receive the condensate from the condensation surface (51) in accordance with gravity (g); the member (10) further comprises a dripping edge (12) at a side of the guiding surface (11) distal to the outer wall (50).

2. The household appliance according to the claim 1, further comprising a drop receiver (20) adapted by its size, shape and position to receive the condensate when dropped from the dripping edge (12).
3. The household appliance according to the claim 2, wherein the drop receiver (20) has two distal ends substantially along a length (L) of the dripping edge (12), said length being substantially in a horizontal direction when in use; and wherein the drop receiver (20) is attached to the member (10) at one or more zone(s) between said distal ends.
4. The household appliance according to any one of the claims 2 or 3, wherein the drop receiver (20) has a shape and size adapted to direct the condensate towards an evaporation receptacle (30).
5. The household appliance according to the claim 4, wherein the drop receiver (20) has one or more inclined portion(s) (21) adapted to provide a horizontal component to a flow of the condensate thereon when in use, said horizontal component being at least partly directed towards a vertical projection of the evaporation receptacle (30).
6. The household appliance according to any one of the claims 5, further comprising a conduit (22) adapted to further guide the condensate from the drop receiver (20) towards the evaporation receptacle (30) when in use.
7. The household appliance according to any one of the claims 4 to 6, wherein the evaporation receptacle (30) is adapted to have a greater temperature than the condensation surface (51) when in operation.
8. The household appliance according to any one of the claims 2 to 7, wherein the drop receiver (20) further includes one or more housing(s) (23) configured to partly receive respective one or more spacer(s) (24) configured to, in use, secure one or more predetermined distance(s) for the outer wall (50) from a further surface substantially parallel thereto.
9. The household appliance according to the claim 8, wherein the one or more housing(s) (23) or respective one or more spacer(s) (24) include multiple engagement positions (251, 252) in a direction substantially perpendicular to the outer wall (50).
10. The household appliance according to any one of the claims 1 to 9, wherein the member (10) is substantially formed from a non-flammable material.
11. The household appliance according to the claim 10, wherein the member (10) is substantially formed from a metallic material.
12. The household appliance according to the claim 11, wherein the member (10) is substantially formed from bent sheet metal.
13. The household appliance according to any one of the claims 1 to 12, being a cooling appliance.
14. The household appliance according to the claim 13, being a refrigerator.
15. The household appliance according to the claim 13, being an air conditioner.

FIG. 1

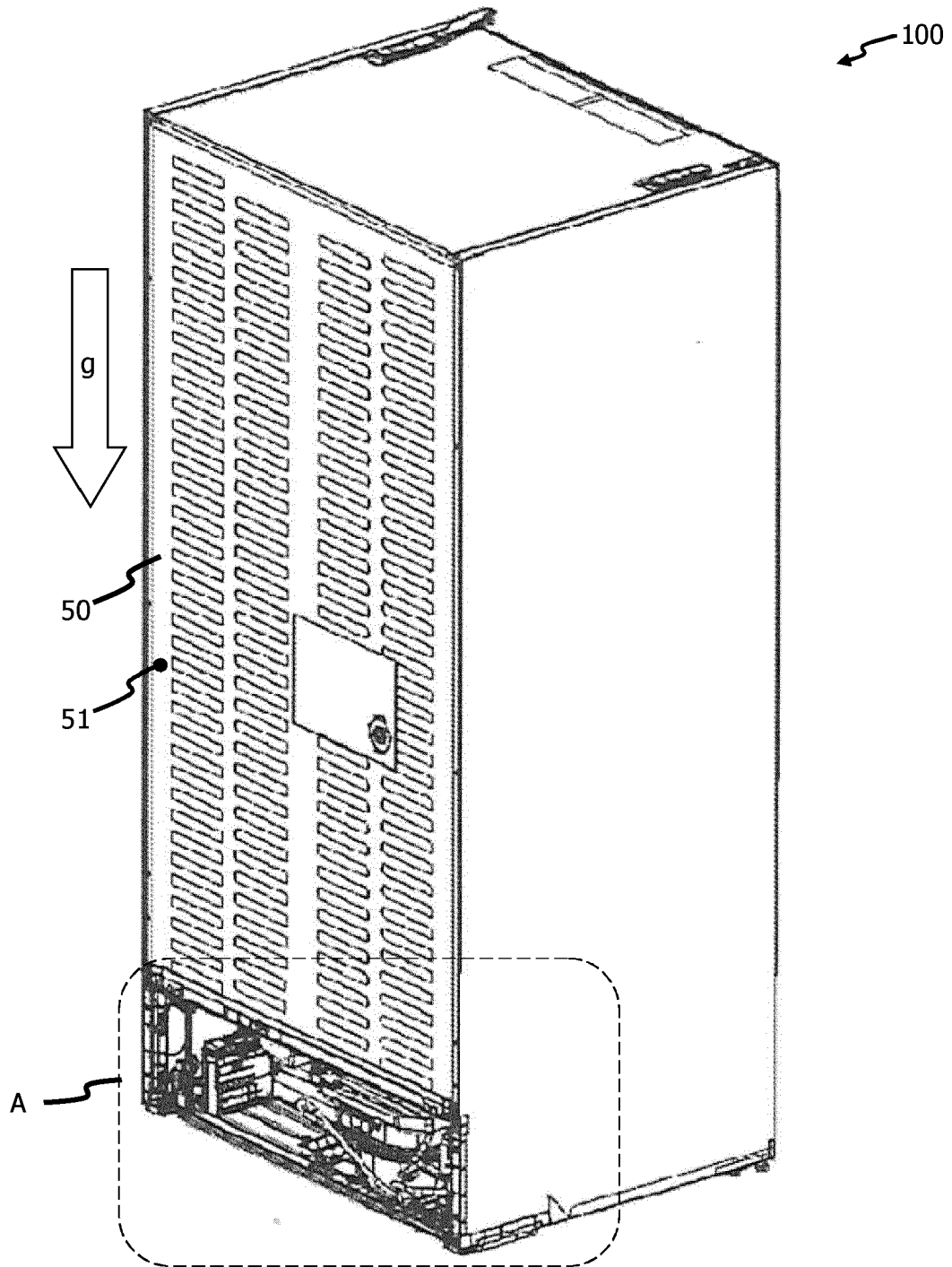


FIG. 2

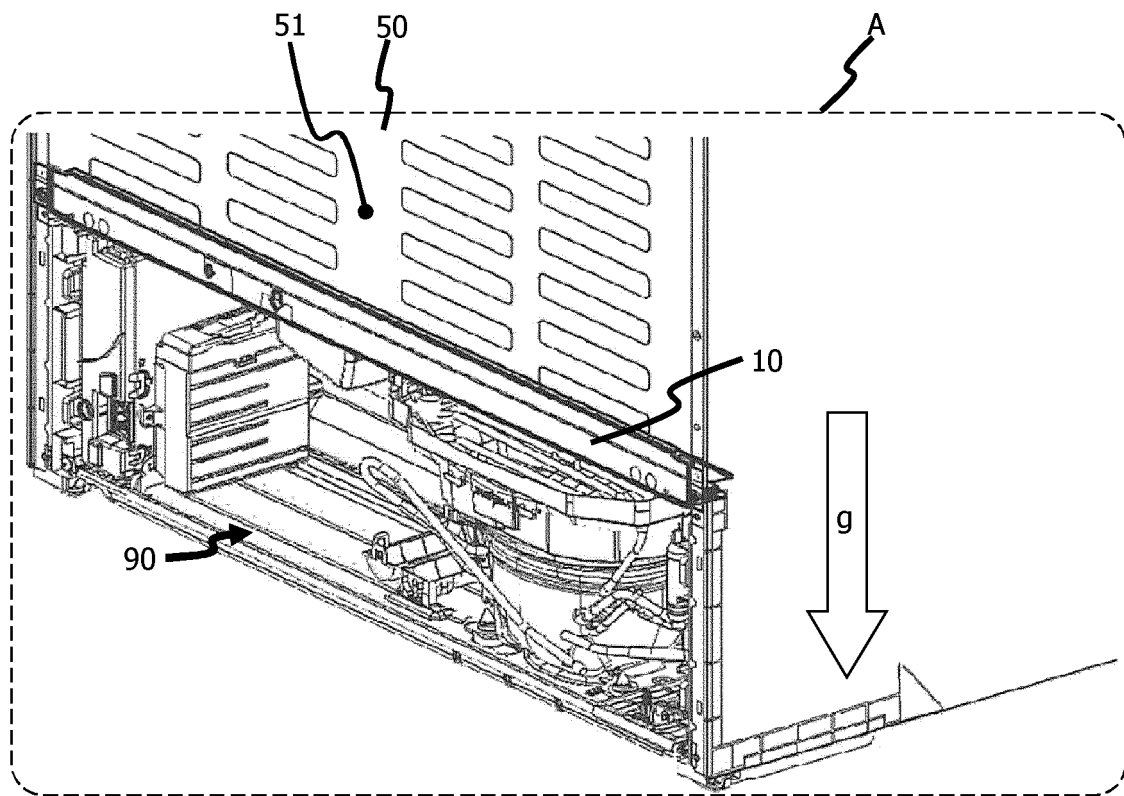


FIG. 3

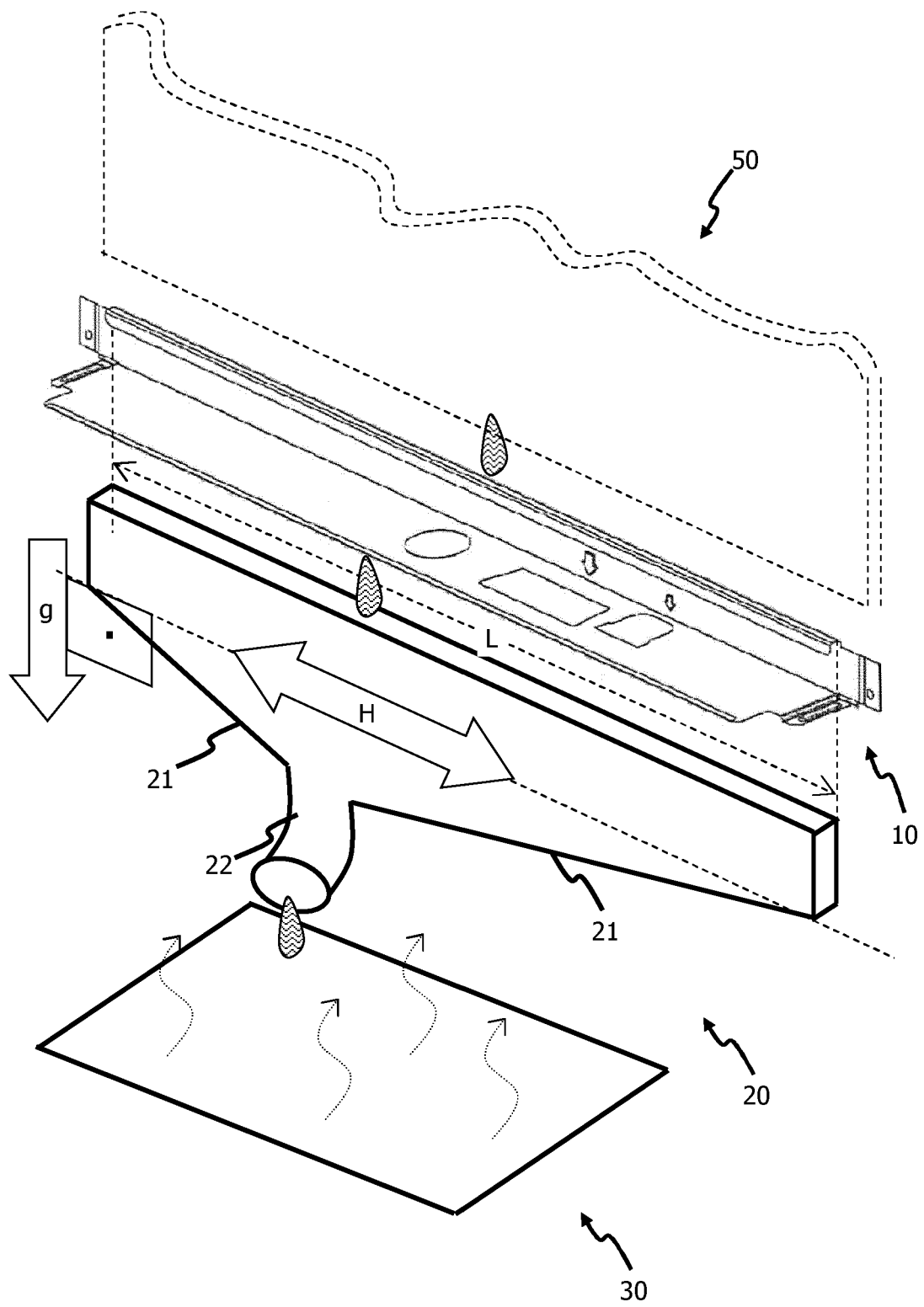


FIG. 4

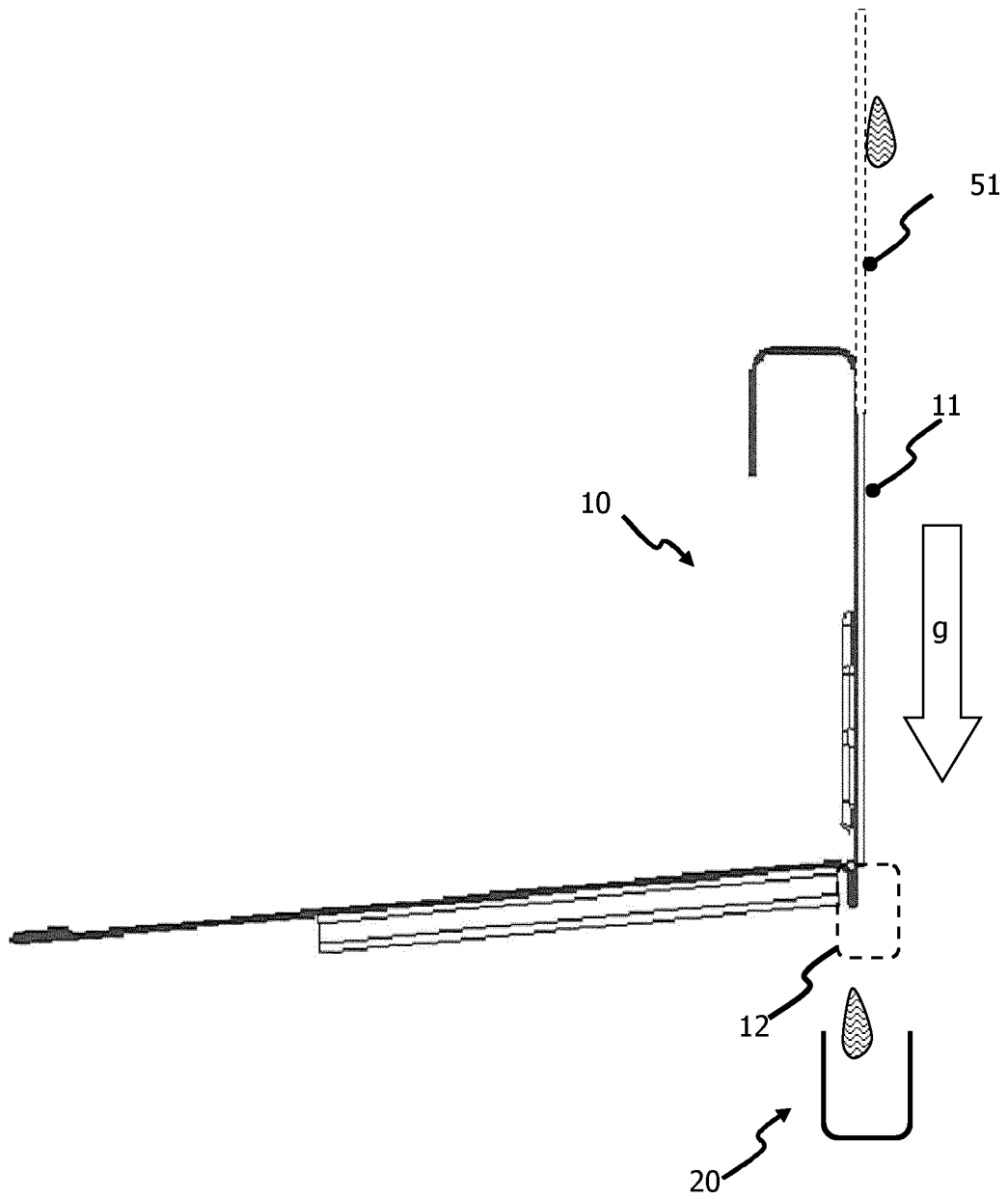


FIG. 5

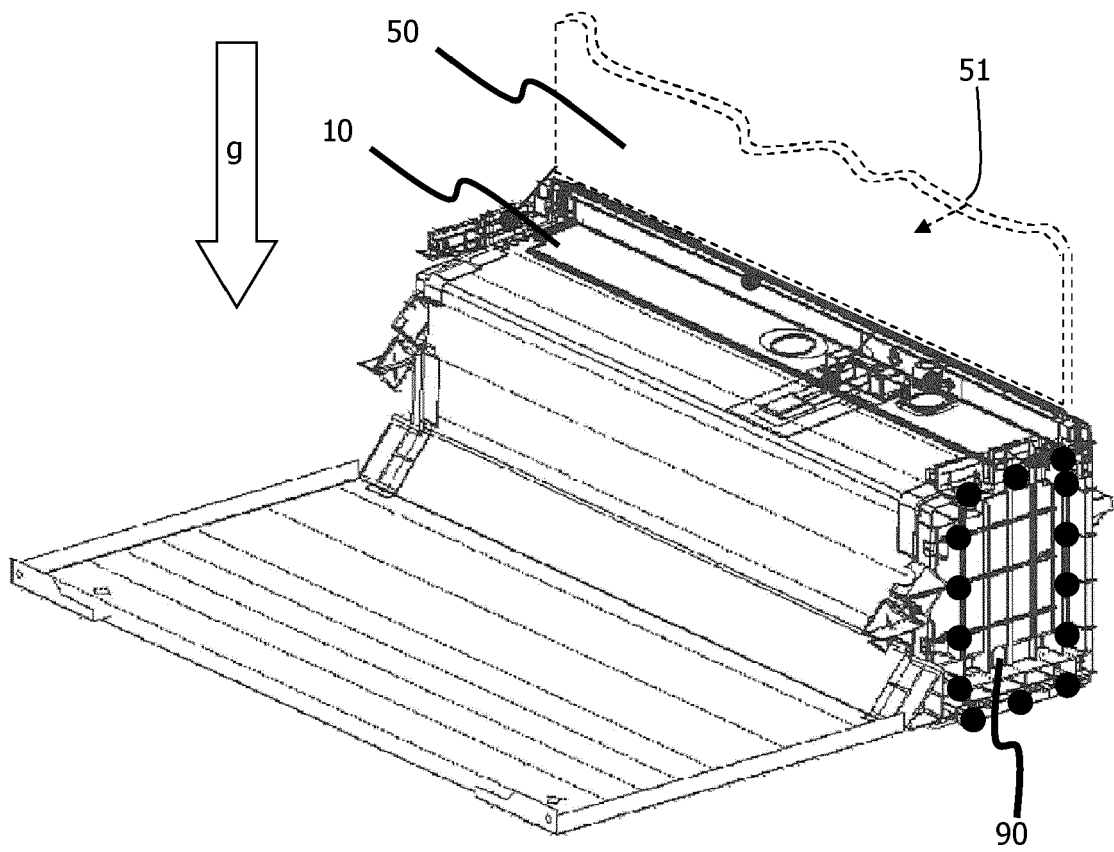


FIG. 6

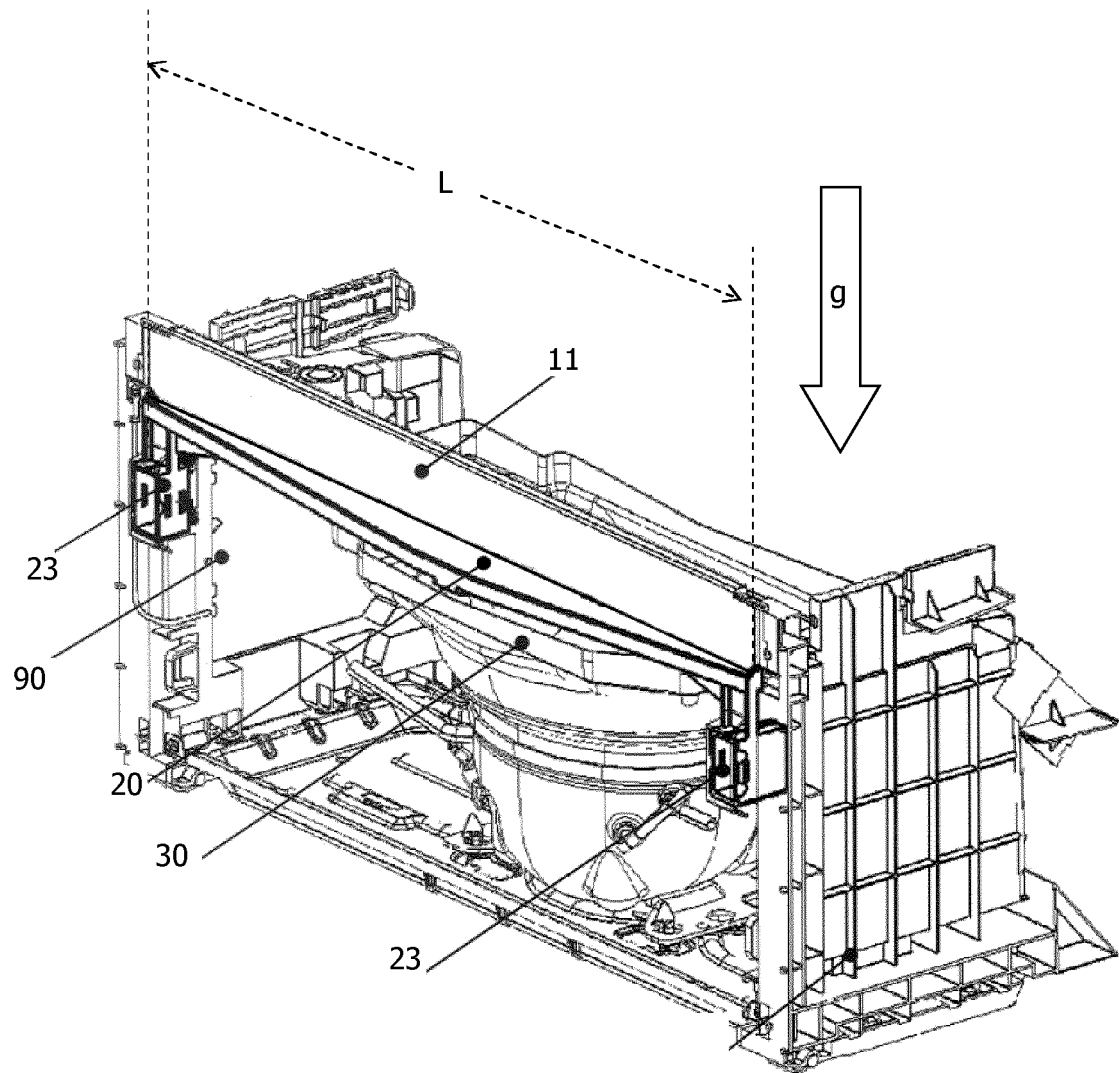


FIG. 7

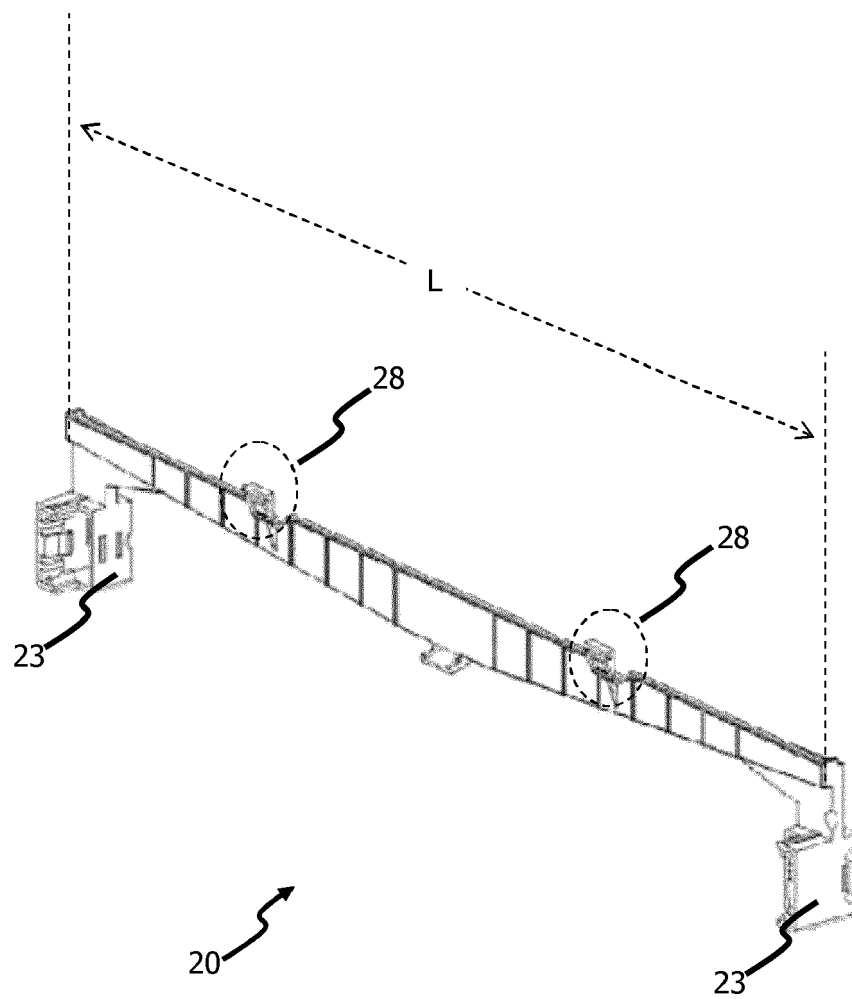


FIG. 8

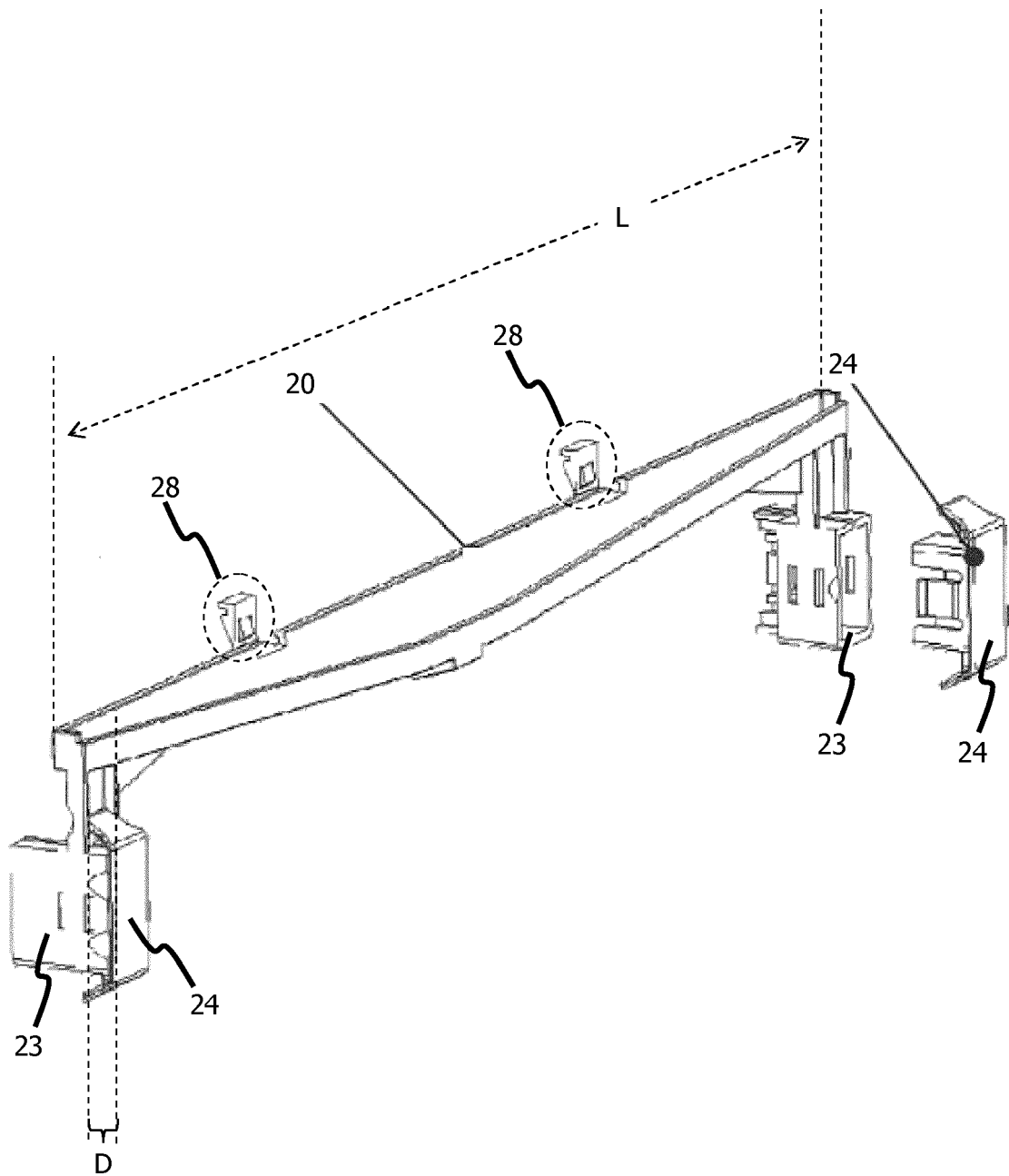


FIG. 9

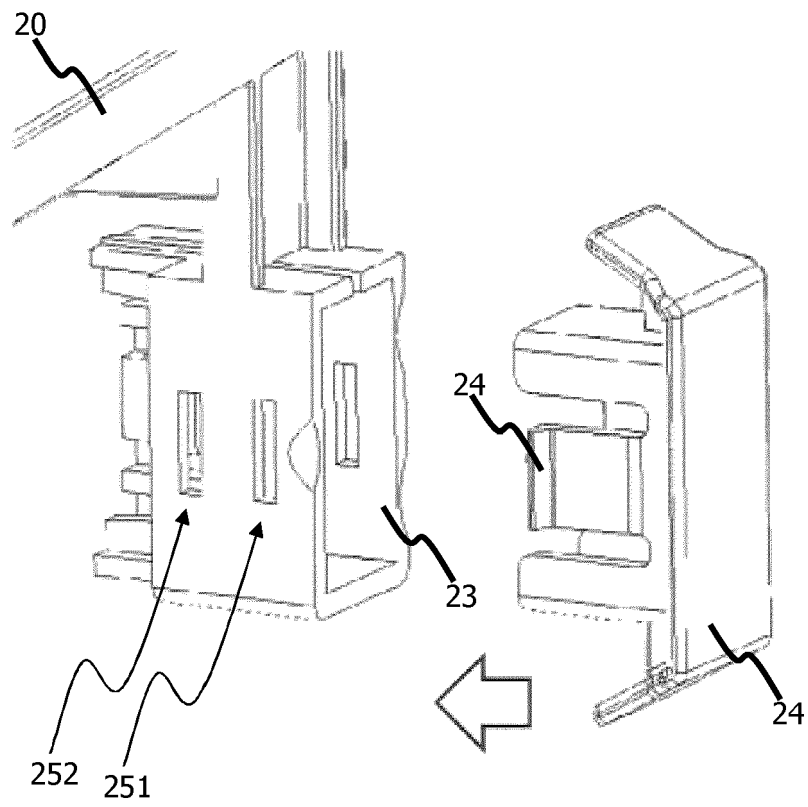


FIG. 10

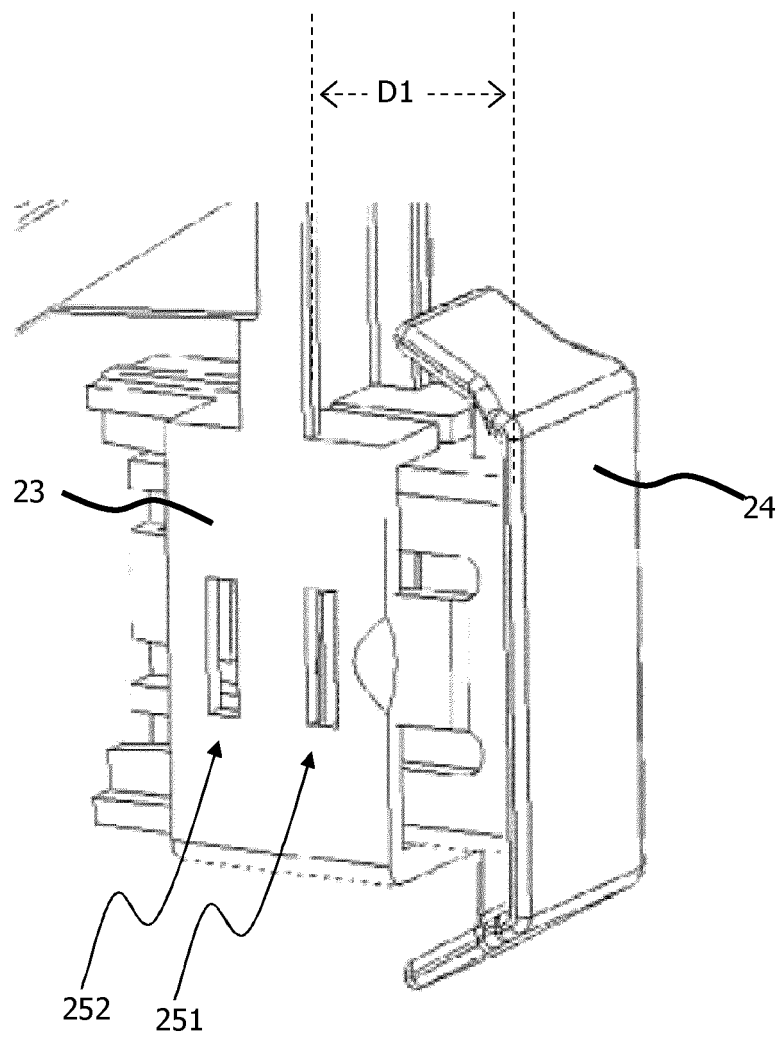


FIG. 11

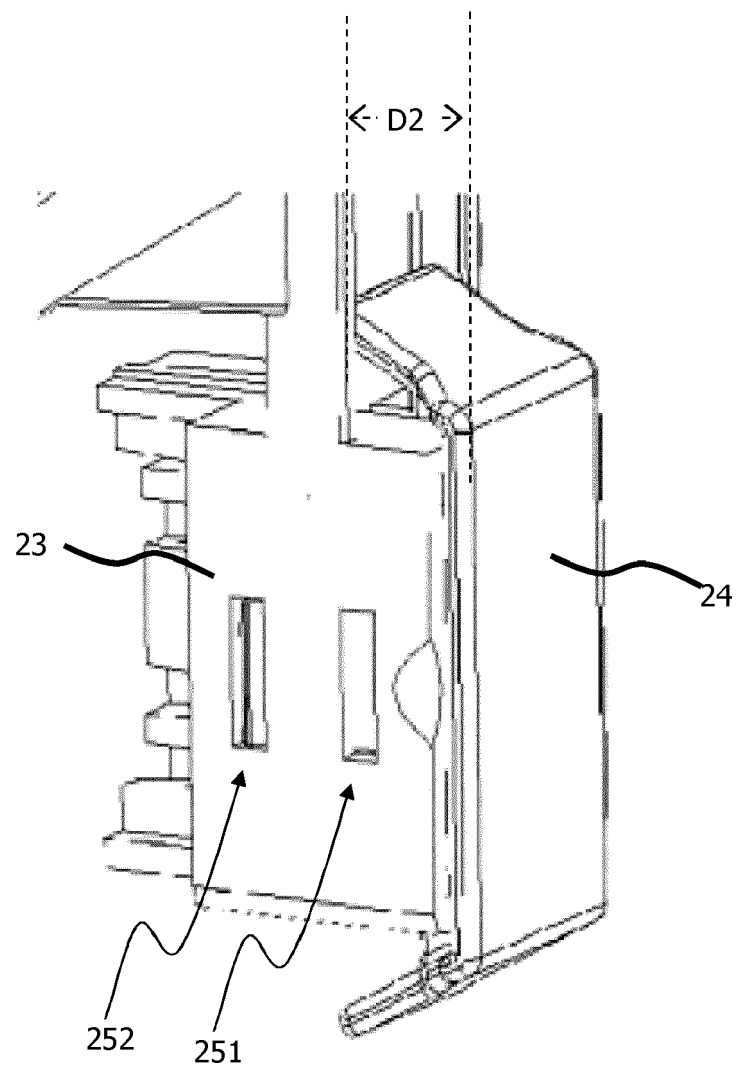


FIG. 12

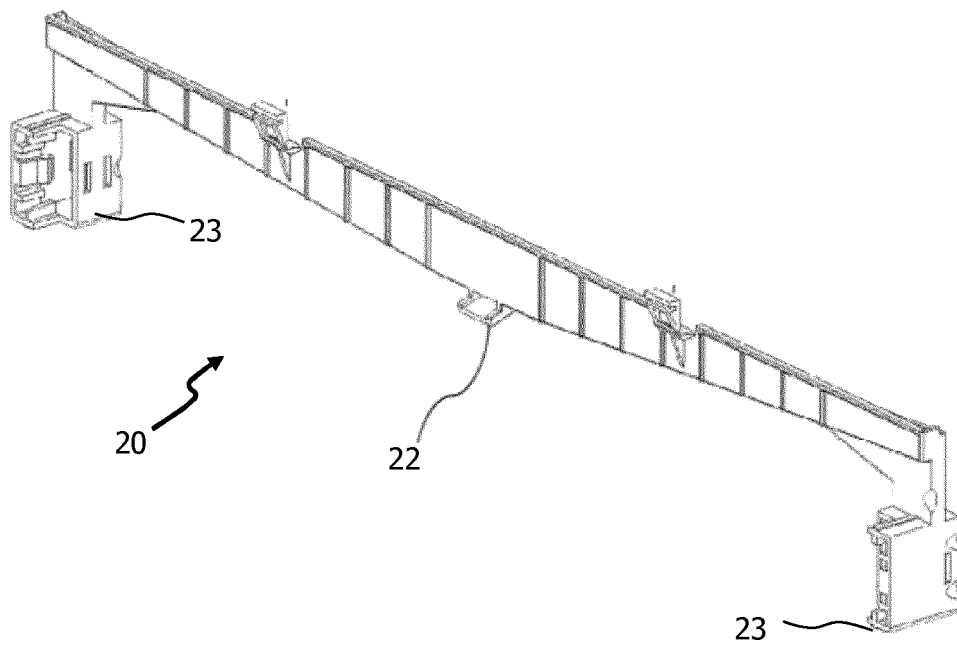
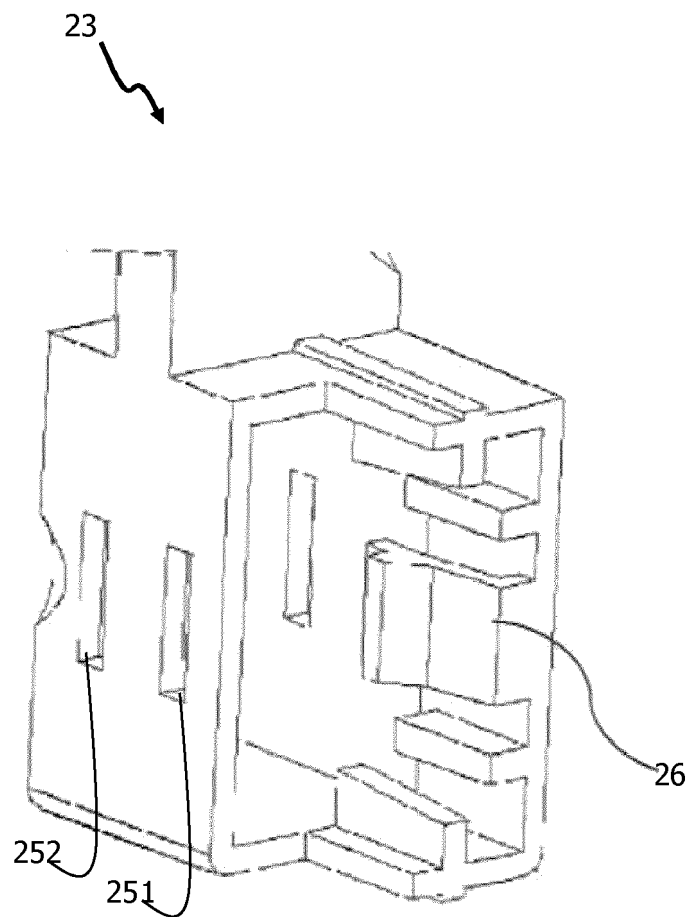


FIG. 13





EUROPEAN SEARCH REPORT

Application Number
EP 19 16 0965

5

10

15

20

25

30

35

40

45

50

55

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	EP 2 295 899 A1 (BSH BOSCH SIEMENS HAUSGERÄTE [DE]) 16 March 2011 (2011-03-16) * figures 1-5 *	1-14	INV. F25D21/14
X	EP 3 147 604 A1 (BSH HAUSGERÄTE GMBH [DE]) 29 March 2017 (2017-03-29) * figures 1-10 *	1-14	
X	JP 2017 003143 A (TOSHIBA LIFESTYLE PRODUCTS & SERVICES CORP) 5 January 2017 (2017-01-05) * figures 1-7 * * paragraphs [0009], [0029] *	1,10-14	
X	JP S60 11031 A (MATSUSHITA ELECTRIC IND CO LTD) 21 January 1985 (1985-01-21) * figures 1-4 * * abstract *	1,15	
X	JP S61 49284 U (N.N.) 2 April 1986 (1986-04-02) * figure 16 *	1,13,14	TECHNICAL FIELDS SEARCHED (IPC) F25D
X	JP H02 287081 A (SANYO ELECTRIC CO) 27 November 1990 (1990-11-27) * figures 1-5 *	1,13,14	
X	JP 2004 239474 A (HOSHIZAKI ELECTRIC CO LTD) 26 August 2004 (2004-08-26) * figures 1-7 *	1,13,14	
X	EP 1 880 644 A1 (SANYO ELECTRIC CO [JP]) 23 January 2008 (2008-01-23) * figures 1-10 *	1,13,14	
		-/--	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 19 July 2019	Examiner Dezso, Gabor
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)



EUROPEAN SEARCH REPORT

 Application Number
 EP 19 16 0965

5

10

15

20

25

30

35

40

45

50

55

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 2008 173375 A (OKAMURA CORP) 31 July 2008 (2008-07-31) * figures 1-7 *	1,13,14	
X	JP 2001 201240 A (SANYO ELECTRIC CO) 27 July 2001 (2001-07-27) * figures 1-6 *	1,13,14	
X	JP H06 50651 A (SANYO ELECTRIC CO) 25 February 1994 (1994-02-25) * figures 1-6 *	1,13,14	
X	JP 2000 258043 A (HOSHIZAKI ELECTRIC CO LTD) 22 September 2000 (2000-09-22) * figures 1-13 *	1,13,14	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
Place of search The Hague		Date of completion of the search 19 July 2019	Examiner Dezso, Gabor
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			

 2
 EPO FORM 1503 03.82 (P04C01)

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

EP 19 16 0965

5

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.

19-07-2019

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2295899 A1	16-03-2011	DE 102009028781 A1 EP 2295899 A1	24-02-2011 16-03-2011
EP 3147604 A1	29-03-2017	DE 102015218449 A1 EP 3147604 A1	30-03-2017 29-03-2017
JP 2017003143 A	05-01-2017	NONE	
JP S6011031 A	21-01-1985	JP S6011031 A KR 850001405 A	21-01-1985 18-03-1985
JP S6149284 U	02-04-1986	NONE	
JP H02287081 A	27-11-1990	JP 2557707 B2 JP H02287081 A	27-11-1996 27-11-1990
JP 2004239474 A	26-08-2004	NONE	
EP 1880644 A1	23-01-2008	AU 2007203255 A1 CN 101108056 A EP 1880644 A1 JP 2008025888 A TW 200809154 A US 2008016893 A1	07-02-2008 23-01-2008 23-01-2008 07-02-2008 16-02-2008 24-01-2008
JP 2008173375 A	31-07-2008	JP 5111871 B2 JP 2008173375 A	09-01-2013 31-07-2008
JP 2001201240 A	27-07-2001	NONE	
JP H0650651 A	25-02-1994	JP 2840506 B2 JP H0650651 A	24-12-1998 25-02-1994
JP 2000258043 A	22-09-2000	JP 3689251 B2 JP 2000258043 A	31-08-2005 22-09-2000

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

- GB 2258297 A [0002]