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(71) Applicant: **Indesit Company S.p.A.**
60044 Fabriano (AN) (IT)

(72) Inventors:
• **Palmeto, Stefano**
I-15100 Alessandria (IT)
• **Faraldi, Paolo**
I-18038 Sanremo (IM) (IT)
• **Renedo Illarregi, Erika**
20002 Donostia (ES)

(74) Representative: **Dini, Roberto**
Metroconsult S.r.l.
Via Sestriere 100
10060 None (TO) (IT)

(54) **Expandable refrigerating appliance**

(57) The present invention relates to a refrigerating appliance (1) comprising an insulated rigid cabinet (2), which internally houses at least one refrigerated cell accessible through a door (3,4), wherein at least one door (4) of said refrigerating appliance comprises a telescopic insert (5,50',50''50''') that at least partly defines an expandable-volume refrigerated compartment (V).

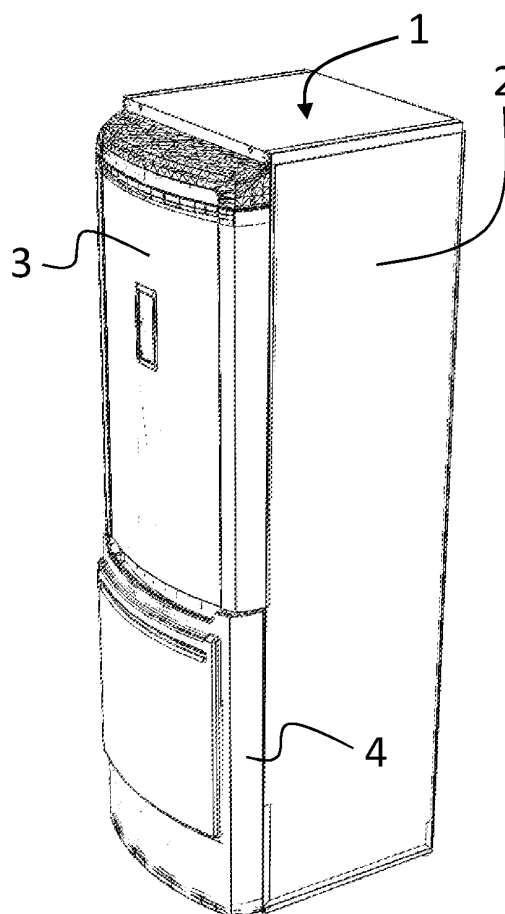


Fig.1

EP 2 402 688 A1

Description

DESCRIPTION

[0001] The present invention relates to an expandable refrigerating appliance.

[0002] In this description and in the appended claims, the term "refrigerating appliance" refers to a refrigerator or a refrigerator-freezer, typically for domestic use, comprising one or more refrigerated cells which can be closed by a door and where foods and drinks to be preserved are placed.

[0003] Changes in the people's habits have caused new needs to arise, which have also affected the field of household appliances, e.g. refrigerating appliances.

[0004] For instance, now the people have less time to go shopping, so that they tend to accumulate large stocks of food which is then consumed a little at a time.

[0005] This implies that they often prefer to buy high-capacity refrigerating appliances, which are filled up on just a few occasions, to be then progressively emptied.

[0006] This results in some wasted energy, used for cooling very large refrigerated cells which are often not totally filled.

[0007] More in particular, this problem arises when bottles or similar liquid containers are to be placed into the refrigerating appliance.

[0008] In this case, in fact, the refrigerated cells normally include racks that keep the bottles in the vertical position and support them to prevent them from moving or falling when the doors are opened or closed.

[0009] Such racks are usually arranged on the inner wall of the door of the refrigerating appliance, and their use is limited to bottles.

[0010] In fact, in addition to having a predetermined size, said racks are also shaped in such a manner as to ensure optimum support for bottles only.

[0011] It follows that the bottle space cannot be easily used for storing other foodstuffs having different shapes, resulting in some wasted room in the refrigerated cells.

[0012] Of course, this problem gets even worse in the situations described above, when it is very important that the whole volume of the refrigerated cells is fully usable.

[0013] The object of the present invention is to overcome this and other drawbacks.

[0014] Said object is achieved through a refrigerating appliance as set forth in the appended claim 1. The present invention is based on the idea of providing a telescopic insert in at least one door of the refrigerating appliance, so as to enlarge the refrigerated compartment defined by the door itself.

[0015] The volume of said compartment can thus be expanded, meaning that it can be enlarged or reduced according to the users' needs.

[0016] Advantageously, the expandable-volume refrigerated compartment defined by the door fitted with such an insert may be separate from the actual refrigerated cells (e.g. it may just be in fluidic communication

therewith), or said compartment may be a part of the refrigerated cell; in this latter case, the door and the telescopic insert will contribute to defining the walls of the refrigerated cell.

[0017] Another advantageous feature relates to the fact that the door fitted with the telescopic insert can be opened by rotating it about a vertical axis, and a movable wing associated with the telescopic insert can be opened by rotating it about a horizontal axis: it is thus possible to open the wing without inadvertently opening the door as well.

[0018] In a particular advantageous solution, the expandable-volume refrigerated compartment houses a swivelling rack and/or shelf for bottles or liquid container.

[0019] These features as well as further advantages of the present invention will become more apparent from the following description of an embodiment thereof as shown in the annexed drawings, which are supplied by way of non-limiting example, wherein:

Figs. 1, 2 and 3 show a refrigerating appliance equipped with an expandable-volume refrigerated compartment according to the present invention, in three operating conditions;

Figs. 4, 5 and 6 are sectional views of the expandable-volume refrigerated compartment of the appliance of Fig. 1, in three different operating conditions; Fig. 7 shows a detail of the slide guides;

Fig. 8 is a sectional view of the expandable-volume refrigerated compartment in the configuration of Fig. 5;

Fig. 9 shows in greater detail the guides of Fig. 7; Figs. 10 and 11 show two variants of the solution of Figs. 4 and 5;

Figs. 12, 13 and 14 show different variants of the telescopic insert of the preceding figures;

Fig. 15 shows a detail of a shelf that can be housed in the expandable volume of the refrigerating appliance of Fig. 1.

[0020] Referring now to Figs. 1-3, there is shown a refrigerating appliance designated as a whole by reference numeral 1.

[0021] It comprises an insulated rigid cabinet 2, wherein refrigerated cells are obtained which are accessible by opening the doors 3 and 4.

[0022] The rigid cabinet 2 usually also contains all the functional components of the appliance 1, such as the compressor, any fans, the coolant ducts and the like.

[0023] The doors 3 and 4 rotate about a vertical axis to allow or prevent access to the refrigerated cells, in a manner per se known in the art; to this end, they are fitted with known vertical-axis hinges, which will not be described any further herein.

[0024] The doors 3 and 4 are rigid and insulated as well, since they are typically made of plastic or metal and include at least one insulating layer.

[0025] In the example shown, in accordance with the

teachings of the present invention, the lower door 4 features a telescopic insert with rigid sectors, designated as a whole 5.

[0026] In this way, the volume of the refrigerated compartment V, partly defined by the door 4, is made expandable, leading to increased flexibility of use of the refrigerating appliance 1.

[0027] More in detail, it can be seen that the door 4 comprises a frame 4a hinged to the cabinet 2 of the appliance 1, so that it can be rotated about a vertical hinge (not shown) to gain access to the refrigerated cell, much like a traditional unit.

[0028] The door 4 also comprises, within the frame 4a, and substantially in a centred position, the telescopic insert 5, which in turn comprises, in this example, two rigid sectors 5a and 5b and the central wing 5c.

[0029] The two sectors 5a and 5b can be engaged one into the other telescopically, and are slideable.

[0030] In particular, it must be pointed out that the latter are rigid, e.g. made of plastic or metal, and have different dimensions, so that one can slide into the other.

[0031] The central wing 5c, which is also rigid and insulated like the sectors 5a and 5b, can rotate about a horizontal axis, as shown in Fig. 3, to allow access to the expandable-volume refrigerated compartment V.

[0032] Said sectors 5a and 5b and the central wing 5c are telescopically extractable, as shown in Figs. 1-3, so as to advantageously enlarge or reduce the volume of the defined refrigerated compartment V according to the user's needs.

[0033] Therefore, the refrigerated compartment V thus defined by the telescopic insert 5 features an expandable volume.

[0034] Said refrigerated compartment V may have different configurations with respect to the refrigerated cell (adjacent thereto and housed in the cabinet 2): completely separated from the cell, in fluidic communication with the cell, or substantially coinciding with the cell.

[0035] In the first case, a wall having low thermal insulation is arranged between the volume of the expandable compartment and the adjacent refrigerated cell (preferably the freezer cell), so that the compartment V is indirectly cooled by the freezer compartment.

[0036] As an alternative, heat exchangers may be installed in the compartment V in order to cool it.

[0037] In the example shown, however, said refrigerated compartment V is separate from the cell and is cooled by means of air channels 21, as will be discussed later on with reference to Fig. 8.

[0038] In the example shown, the compartment V further contains a tilting support shelf 11 and possibly also a bottle rack 10, which will be described with reference to Fig. 15.

[0039] In order to maintain the food preservation temperature and prevent any cold air leaks, the sectors 5a and 5b and the central wing 5c are provided with suitable sealing means, such as gaskets or the like.

[0040] Referring now to Figs. 4, 5 and 6, there is shown

the door 4 with the telescopic insert 5 viewed as a section in three different conditions: inserted (Fig. 4), partially extracted (Fig. 5), and fully extracted (Fig. 6).

[0041] In Fig. 4, the telescopic insert 5 is in the inserted condition, with the telescopic sectors 5a, 5b inserted one into the other and the door 5c abutting against the frame 4a of the door 4.

[0042] In this condition, the refrigerated compartment V has the smallest volume.

[0043] Inside the compartment V a tilting shelf 11 can be noticed, which can be used for supporting foodstuffs to be preserved.

[0044] Said shelf 11 is hinged to the wing 5c by means of controlled horizontal-axis hinges, which allow the shelf 11 to fold towards the wing 5c or to arrange itself substantially perpendicularly thereto (as can be inferred by comparing Figs. 4 and 5).

[0045] When folded against the wing 5c, the shelf 11 can also arrange itself parallel to and/or leaning against the wing 5c, so as to take much less room.

[0046] When the telescopic insert is inserted, the shelf 11 is folded against the wing 5c in order to not require much room.

[0047] When the telescopic insert 5 is extracted, as shown in Fig. 5, the shelf 11 rotates and arranges itself perpendicularly to the wing 5c, ready for use.

[0048] It should be noted that the controlled hinge that couples the shelf 11 to the wing 5c is secured to the latter, with the result that, when the wing is rotated about its horizontal-axis hinge 12 that couples it to the frame 4a, the shelf will rotate accordingly as well.

[0049] As can be seen in these drawings, the tilting support shelf 11 is secured perpendicularly to the wing 5c, which is rotatable about a horizontal axis defined by the pins of the hinges 12: thus, when the wing 5c is brought into the open condition, as shown in Figs. 4 and 5, the support shelf 11 will rotate integrally with the wing 5c to conveniently expose the foods or drinks contained therein to the user.

[0050] Likewise, a rack 10 coupled to the bottle shelf 11 is rotated integrally with the wing 5c to expose the bottles, which can then be comfortably picked up.

[0051] Slide guides 14, visible in Fig. 7, are used for guiding the relative sliding motion between the telescopic sectors 5a and 5b, said guides being provided, for example, as a per se known coupling between a rail and a cavity, which will not be discussed any further.

[0052] The guides 14, also visible in the detail of Fig. 9, allow the two sectors 5a and 5b to translate telescopically; in particular, they allow the first sector 5a to translate relative to the frame 4a, and the second sector 5b to translate relative to the first sector 5a.

[0053] Referring back to Figs. 4, 5 and 6, they also show the retaining means that limit the extraction travel of the telescopic insert 5: in this solution, said retaining means comprise housings containing balls 13a, which are held within the housing but can protrude outwards under the thrust of a spring, and a corresponding groove

13b for each ball.

[0054] More in particular, the frame 4a has one ball 13a to be coupled to, when the insert 5 is extracted, a seat 13b provided on the sector 5a; the latter also comprises one ball 13a to be coupled to a matching groove 13b provided on the sector 5b.

[0055] In practice, when the telescopic insert 5 is extracted, as in Fig. 5, the balls 13a, pushed outwards by the springs, meet the grooves 13b and settle therein, thereby stopping the sliding insert. When the telescopic insert 5 is inserted (as in Fig. 4), the balls 13a are pushed into their housing again, thus compressing the springs; the movement of the insert stops when the various parts abut on each other.

[0056] A few alternatives for these retaining means are shown in Figs. 10 and 11.

[0057] In Fig. 10, as an alternative to or in combination with the balls 13a and the respective grooves 13b, there are steps 13' protruding from each free edge of the sectors 5a and 5b and of the frame 4a, so that, when the sectors are in the extracted condition, the steps 13' abut against each other, thereby stopping the extraction movement of the telescopic insert 5.

[0058] Advantageously, the steps 13' are provided with a perimetric rubber sealing lip or a gasket to ensure optimal airtightness, so as to prevent any cold air leaks and improve the thermal insulation.

[0059] In another variant shown in Fig. 11, the telescopic insert 5 comprises converging sectors 5a' and 5b', i.e. with differently sized edges circumscribing the mouth and the rear opening; more in particular, the rear edge of the sector 5a', closest to the frame 4a, is bigger than the opening provided on the frame 4a itself, and the rear edge of the sector 5b' is bigger than the edge around the mouth of the sector 5a', so that, when the telescopic insert is extracted, its travel is stopped by the mutual interference between the parts, as shown in Fig. 11.

[0060] The volume of the refrigerated compartment V defined by the telescopic insert 5 is in fluidic communication with the cell C or with a cold air channel, so that the internal temperature can be kept at preferred food preservation levels.

[0061] This can be attained by not fitting a dividing septum between the cell and the telescopic insert 5, or the door 4; in this case, the volume of the compartment V extends inside the cabinet 2 and is a part of the cell of the appliance 1.

[0062] Alternatively, as shown in Fig. 8 in the present example, it is conceivable to provide a wall 20 having at least one communication hole 21, preferably two holes, one for delivery and one for return, opening onto corresponding air channels provided on the door, behind the compartment V.

[0063] The air channels run through the space 70, which in the operating condition is filled with a thermally insulating material, such as foam polyurethane or the like.

[0064] In this condition, the compartment V extends from the door 4 outside the cabinet 2, and therefore it is

not a part of the cell contained in the latter.

[0065] In practice, in this solution the compartment V defined by the door 4, the telescopic insert 5 and the wall 20 facing the wing 5c is associated with the door 4 and is closed, except for the communication hole(s) 21 for the air channels, resulting in the advantage that when the user opens said compartment V there are no significant cold air leaks from the cell, which in this case is only accessible by opening the door 4 by rotating it about a vertical axis.

[0066] It can therefore be easily understood from the above description that this solution ensures an extremely versatile use of the refrigerating appliance.

[0067] In fact, the user can decide to place bottles or foodstuffs into the compartment V of the door 4, equipped with the telescopic insert, so as to adapt the useful volume of the refrigerating appliance as a function of the contents thereof, thus wasting no energy to cool unused volumes of the appliance 1.

[0068] Furthermore, said appliance 1 offers the advantage that it includes a rigid-sector telescopic insert 5, which improves the thermal insulation in comparison with a fabric-type or soft telescopic insert.

[0069] In this respect, it must be pointed out that the telescopic sectors 5a and 5b can be so designed as to include an insulation layer interposed at least between two perimetric walls. Moreover, when using a telescopic insert with rigid sectors 5a, 5b, the sealing gaskets can be arranged in a more stable and secure way, with no risk of ineffective sealing: this is because they operate between rigid surfaces interfaced to each other.

[0070] Referring to Fig. 15, there is shown a particularly advantageous solution for the shelf 11, which in this case also comprises a bottle rack element 10.

[0071] Said rack element 10 can be engaged onto the shelf 11, e.g. by snapping thereon or by interference fit, so as to arrange itself at a certain distance from the shelf 11 and allow the assembly to support bottles or the like.

[0072] Of course, the rack element 10 can be removed when the compartment V is smallest, i.e. when the telescopic insert 5 is fully inserted as in Fig. 4.

[0073] As for controlling the cooling of the compartment V, different solutions may be adopted when it is separate from the refrigerated cell and when air channels and holes 21 are provided.

[0074] For example, there may be blowers and ducts fitted with shutter valves, operating to deliver into the compartment V a cold air flow taken, for example, from the refrigerated cells.

[0075] Said ducts may be throttled to vary the quantity of cold air delivered into the compartment V, thus adjusting the temperature of the latter.

[0076] In this case, a temperature sensor may optionally be employed to detect the temperature inside the compartment V, along with a control unit adapted to control the partialization of the cold air ducts in order to adjust the temperature and maintain it at values different from those of the refrigerated cells.

[0077] For example, with advantages in terms of flexibility of use, the appliance 1 may comprise two cells, i.e. a refrigerator cell kept at a temperature between 3°C and 6°C, and a freezer cell kept at a temperature lower than -18°C, while the compartment V may be kept at a temperature around 12°C, which is optimal for wine preservation.

[0078] Thus, the appliance 1 of the present invention advantageously includes a compartment where wine can be preserved at an optimal temperature, while still providing the usual refrigerator and freezer cells and offering high flexibility of use, also in terms of outside dimensions: in fact, if there are no wine bottles, the telescopic insert 5 can be fully inserted to attain a substantial advantage in terms of outside dimensions and energy consumption, since its volume will not have to be cooled.

[0079] Of course, many variations of the invention as described above may be conceived by those skilled in the art.

[0080] For example, Figs. 12, 13 and 14 show a few solutions wherein the rigid-sector telescopic insert 5 is replaced by a soft extensible insert 50', 50''; in these drawings, the same reference numerals designate the same parts already discussed above and having the same functions, which will not therefore be described any further.

[0081] Figs. 12 and 13 show the same extensible insert 50' in two different operating conditions: with the compartment open and closed, respectively.

[0082] Although in principle said extensible insert 50', 50'' does not offer the same advantages, in terms of strength and sealing, as those provided by the rigid-sector telescopic insert 5, it is however less expensive and lighter, so that it can be installed on low-end refrigerating appliances.

[0083] Also, although in the example described so far the telescopic insert 5 comprises just two rigid telescopic sectors 5a and 5b, it may however comprise one, three, four or more rigid sectors, likewise connected to each other.

[0084] According to further variants, both doors of the refrigerating appliance are designed as described above for the door 4.

[0085] In other solutions there are three or more doors, at least one of which is designed in accordance with the teachings of the present invention.

[0086] According to further variants, said expandable compartment is associated, as an alternative to or in combination with the one described above, with one of the side walls of the cabinet 2.

[0087] In another alternative solution, the door 4 is slideably coupled to the cabinet 2; in this case, the refrigerated cell houses a drawer whose front portion is the door 4.

Claims

1. A refrigerating appliance (1) comprising an insulated rigid cabinet (2) which internally houses at least one refrigerated cell accessible through a door (3,4),
characterized in that
at least one door (4) of said refrigerating appliance comprises a telescopic insert (5,50',50'') that at least partly defines an expandable-volume refrigerated compartment (V).
2. A refrigerating appliance (1) according to claim 1, wherein said door (4) comprises a frame (4a) coupled to said cabinet (2), said telescopic insert (5,50',50'') being secured to said frame (4a), and wherein said door (4) also comprises a wing (5c) hinged to said telescopic insert (5,50',50'') to allow access to said expandable-volume refrigerated compartment (V).
3. A refrigerating appliance (1) according to claim 1 or 2, wherein said door (4) is rotatable about a vertical axis to allow access to said refrigerated cell.
4. A refrigerating appliance (1) according to claim 1 or 2, wherein said door (4) is linearly slideable relative to said cabinet (2).
5. A refrigerating appliance (1) according to one of claims 1 to 4, wherein said wing (5c) is hinged to said telescopic insert (5,50',50'') by means of horizontal-axis hinges (12).
6. A refrigerating appliance (1) according to one or more of claims 1 to 5, wherein said telescopic insert (5) comprises at least one rigid telescopic sector (5a, 5b, 5a', 5b') which is linearly movable relative to said frame (4a).
7. A refrigerating appliance (1) according to one or more of claims 1 to 6, wherein said expandable-volume refrigerated compartment (V) contains a tilting support shelf (11) preferably hinged to said wing (5c) through controlled horizontal-axis hinges to allow said shelf (11) to either fold towards the wing (5c) or to arrange itself substantially perpendicular thereto.
8. A refrigerating appliance (1) according to one or more of claims 1 to 7, wherein said telescopic insert (5) comprises retaining means (13a, 13b, 13') which stop its movement when it is extracted.
9. A refrigerating appliance (1) according to claim 8, wherein said retaining means comprise steps (13') and sealing means, such as sealing lips, gaskets or the like.
10. A refrigerating appliance (1) according to one or

more of claims 1 to 9, wherein said expandable-volume refrigerated compartment (V) is in fluidic communication with at least one cold air channel (21).

11. A refrigerating appliance (1) according to one or more of claims 1 to 9, wherein said expandable-volume refrigerated compartment (V) is defined by at least one wall having low thermal insulation arranged between said compartment (V) and a refrigerated cell adjacent thereto, thus cooling said compartment (V). 5 10
12. A refrigerating appliance (1) according to claim 10, comprising means for generating a cold air flow and ducts for conveying said cold air towards said expandable-volume refrigerated compartment (V), and wherein said expandable-volume refrigerated compartment (V) is preferably kept at a desired temperature by means of a variable flow of cold air taken from said refrigerated cell. 15 20

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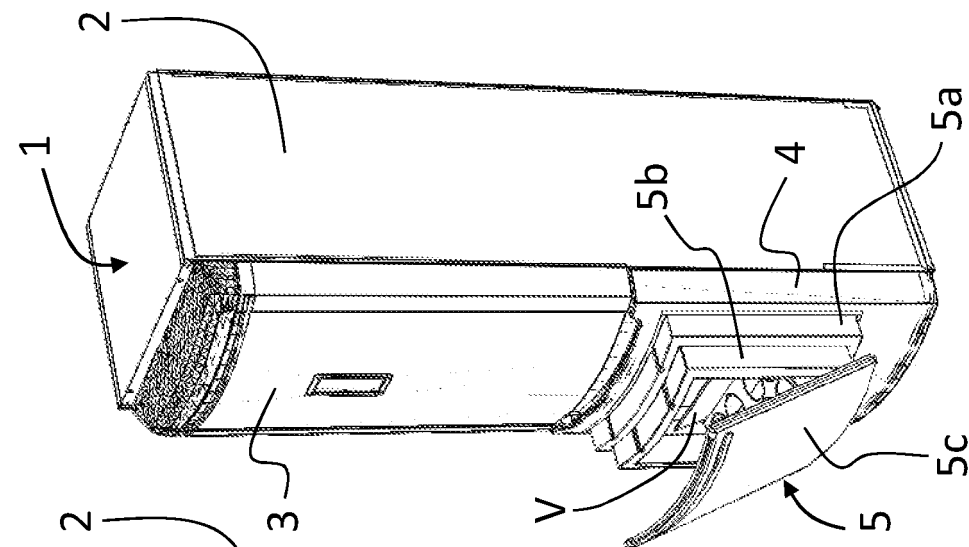


Fig. 3

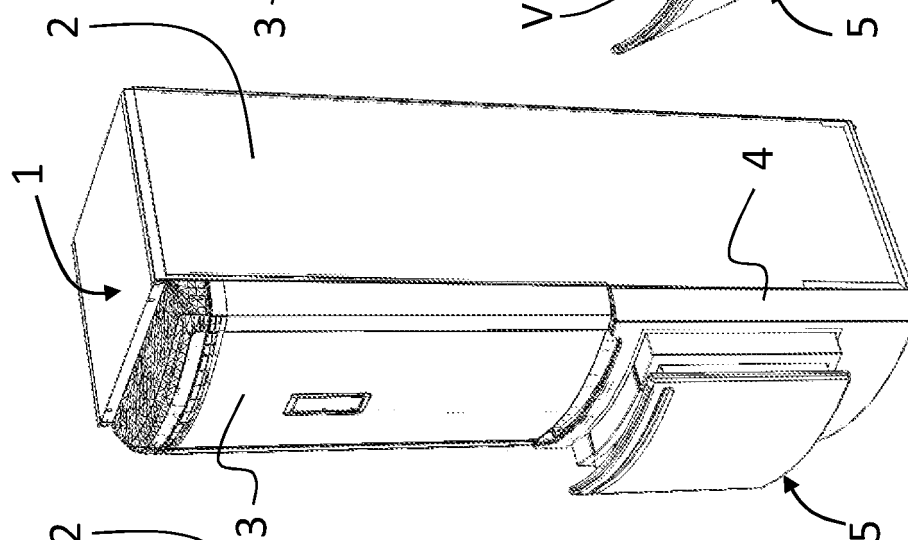


Fig. 2

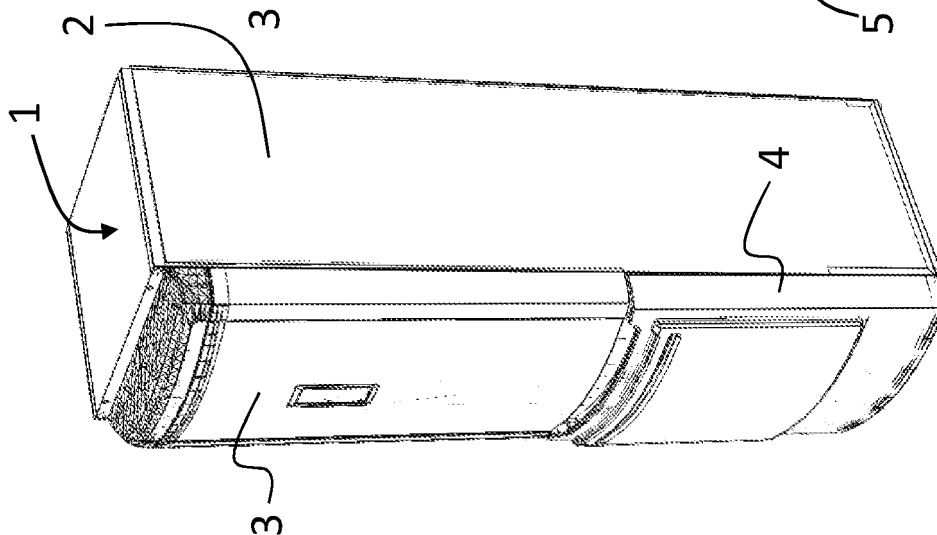


Fig. 1

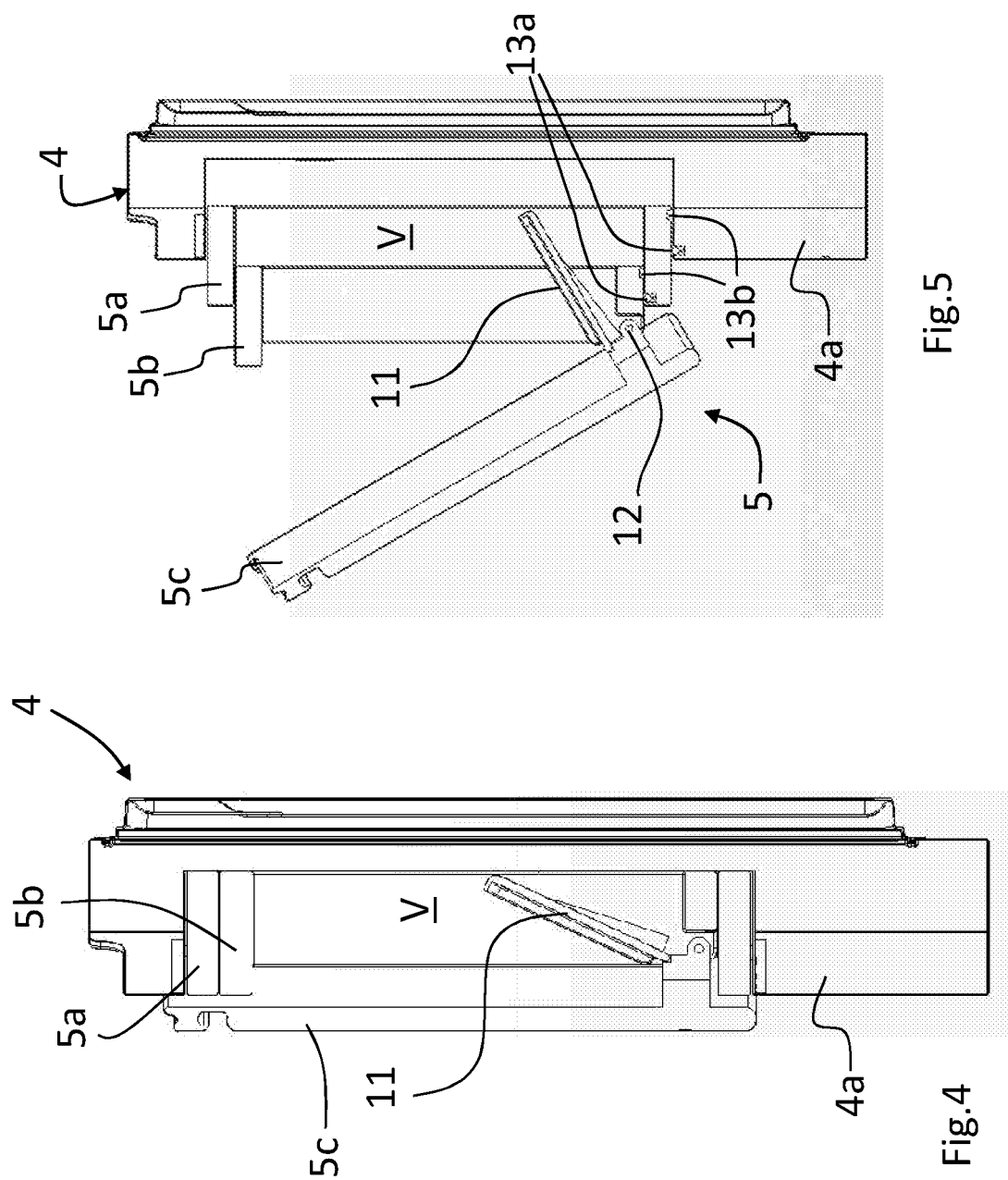


Fig.5

Fig.4

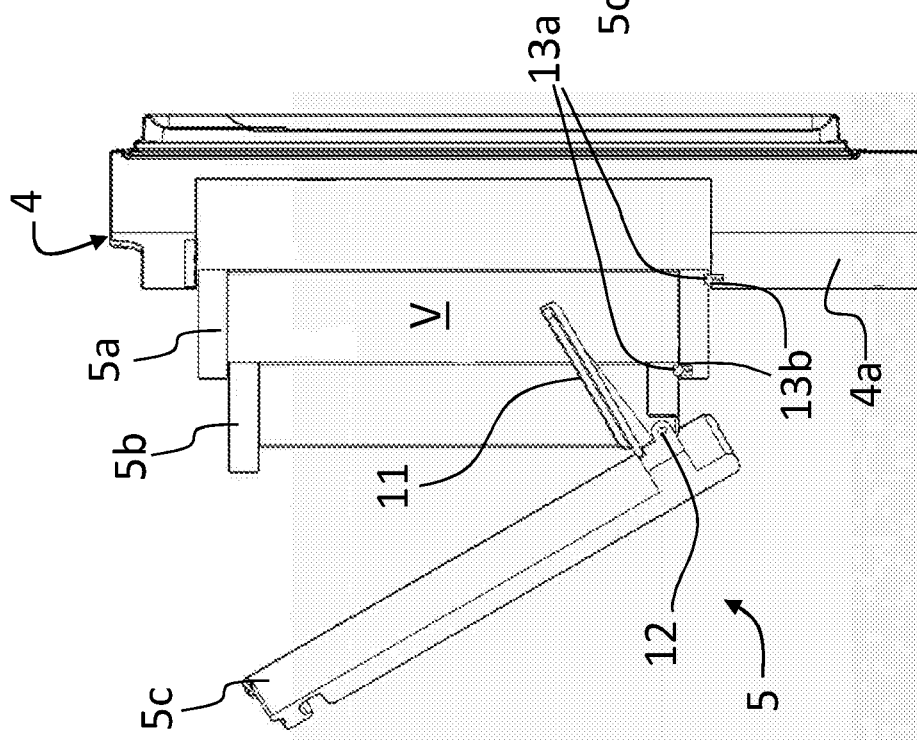


Fig. 6

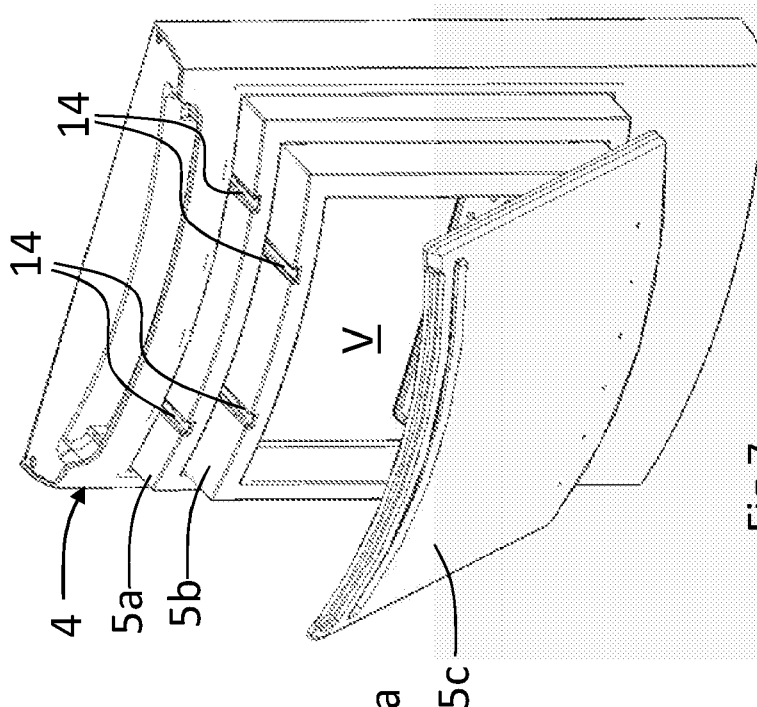


Fig. 7

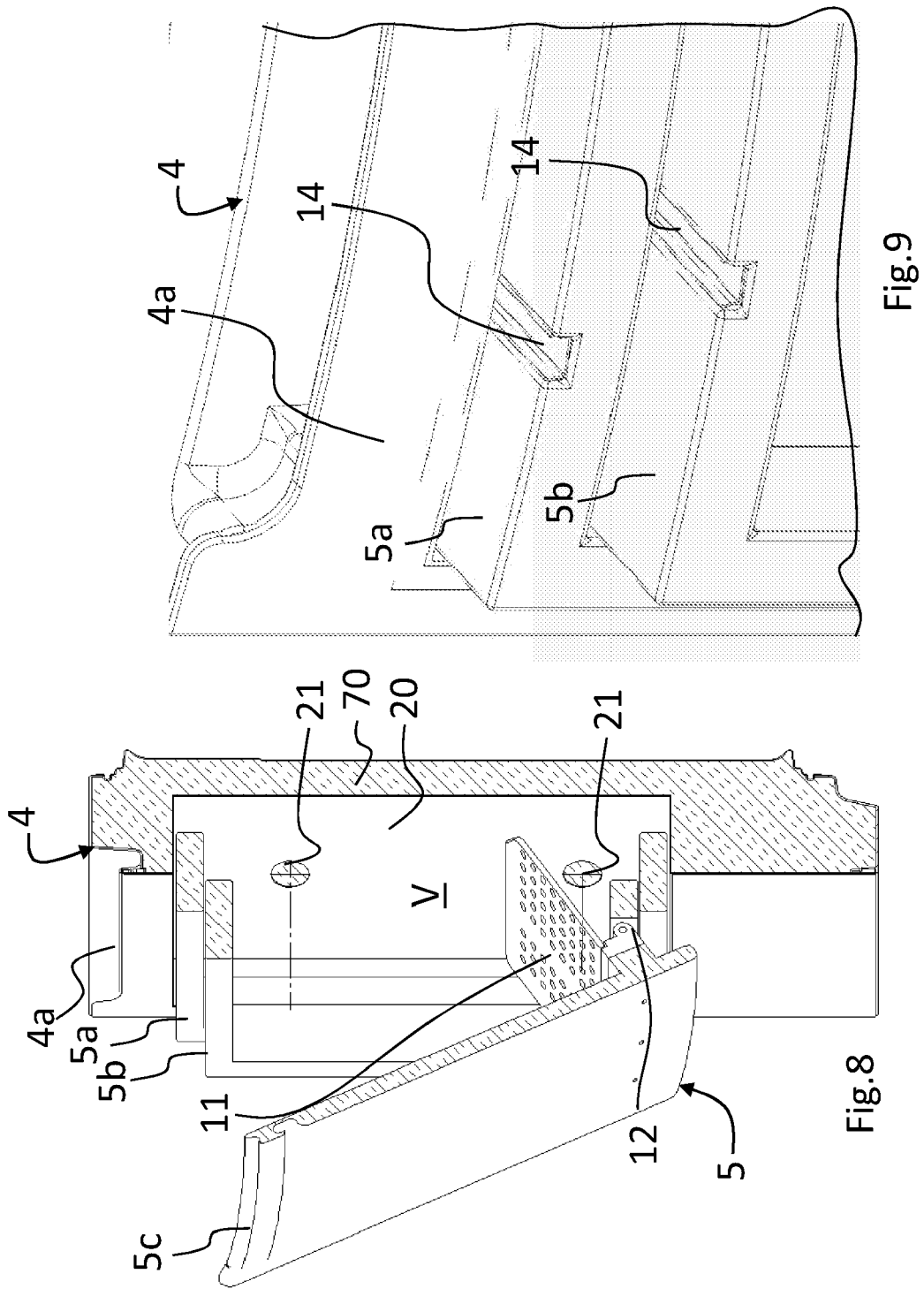


Fig.9

Fig.8

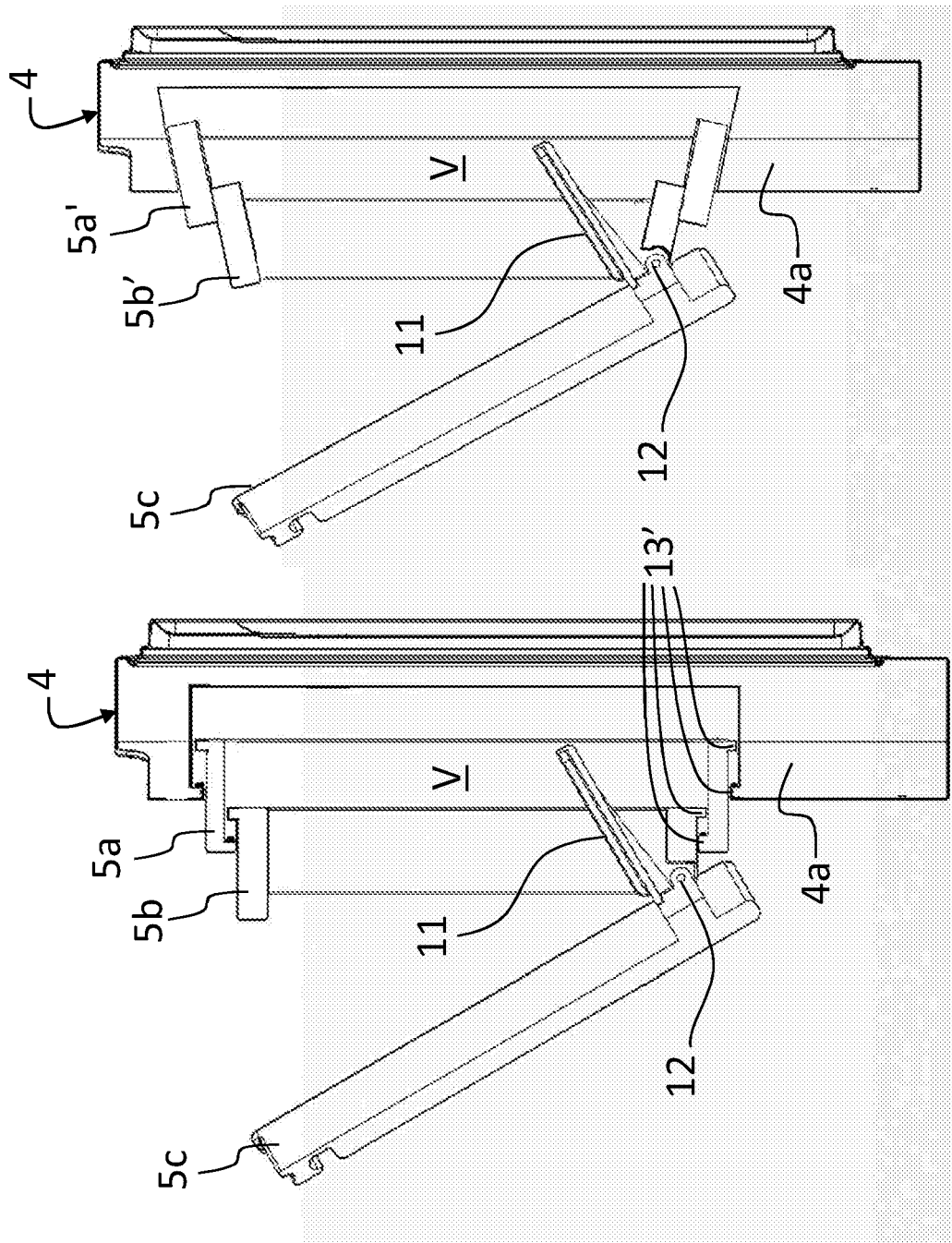


Fig.11

Fig.10

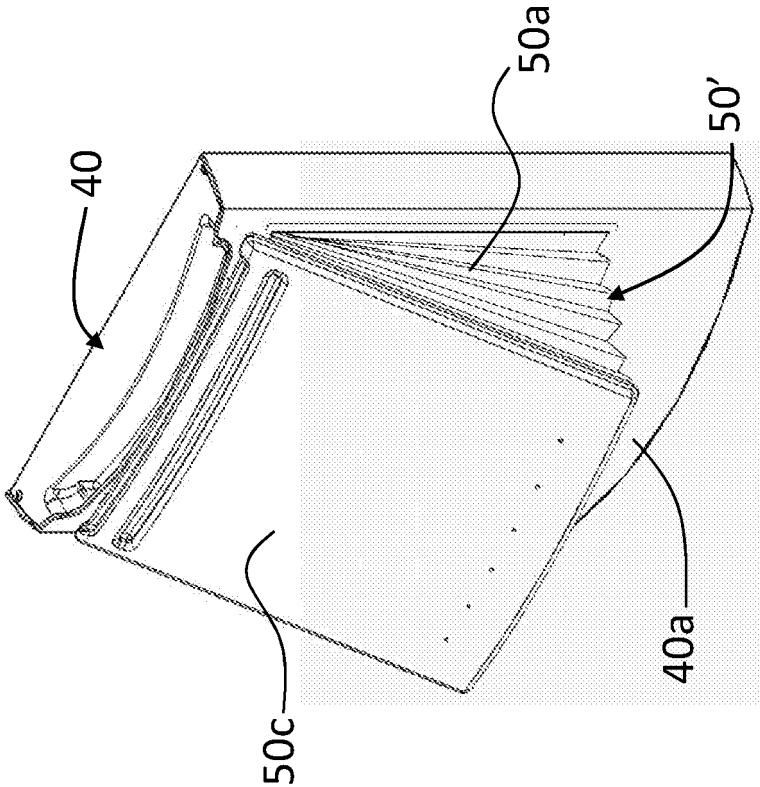


Fig. 13

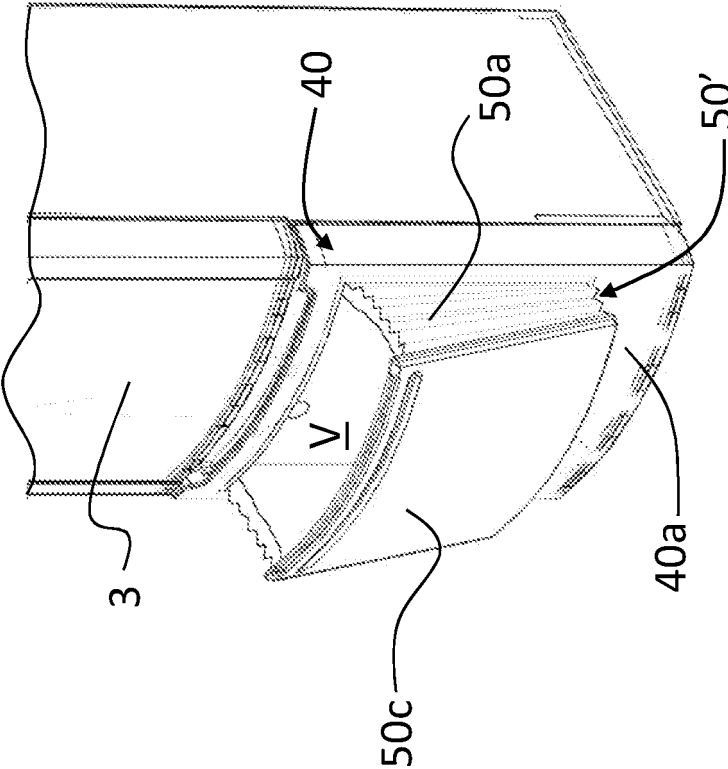
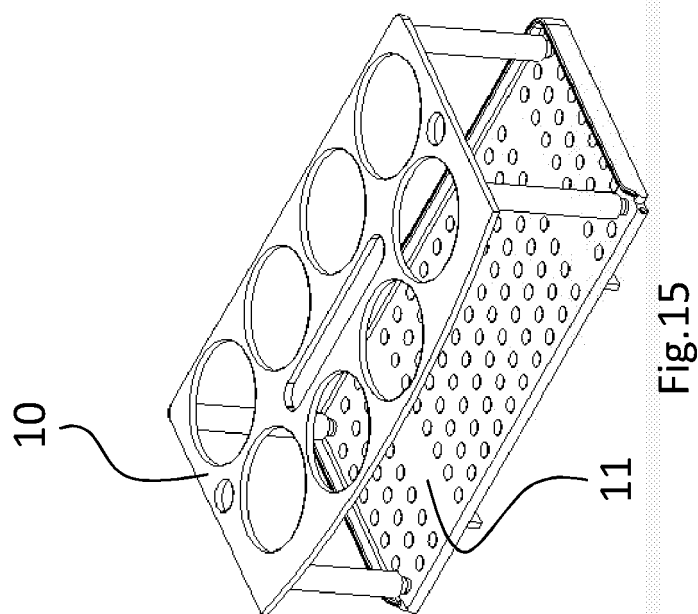
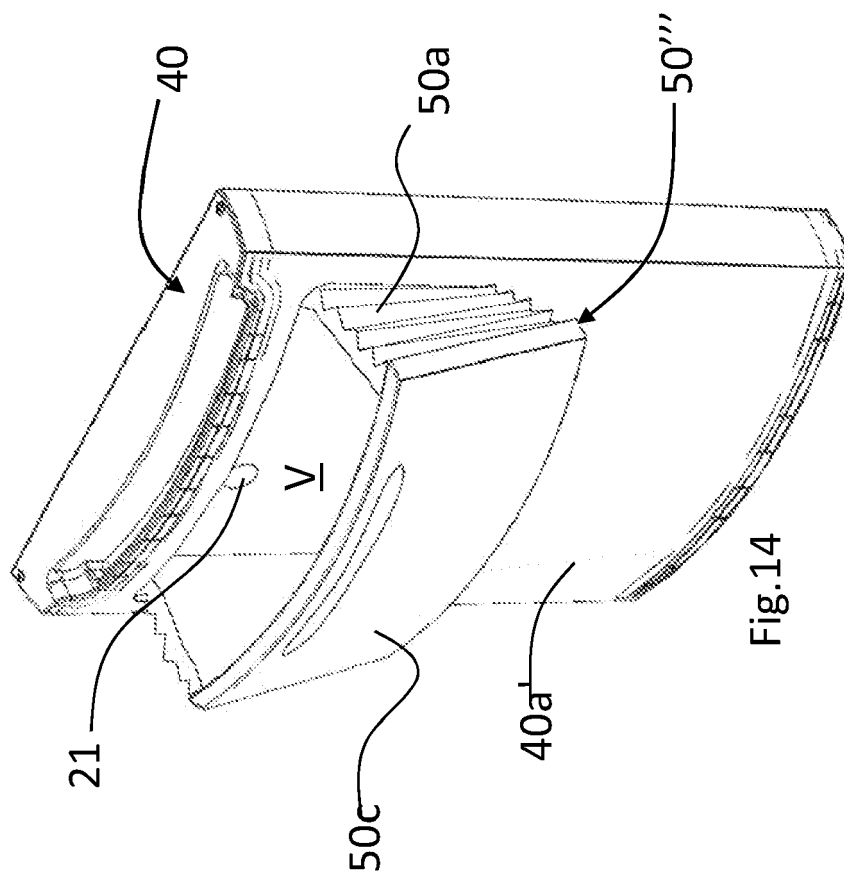


Fig. 12





EUROPEAN SEARCH REPORT

Application Number
EP 11 17 1554

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	WO 2006/067505 A1 (PIPONIDES CHRIS [GB]) 29 June 2006 (2006-06-29) * the whole document *	1-4,6	INV. F25D23/02
X	US 2 713 776 A (SMITH HELEN E) 26 July 1955 (1955-07-26) * the whole document *	1,2,4-6	
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A	WO 2007/095779 A1 (ZHANG QINGYANG [CN]) 30 August 2007 (2007-08-30) * abstract; figures 1-3 *	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			F25D
Place of search		Date of completion of the search	Examiner
Munich		24 October 2011	Jessen, Flemming
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 03.82 (P04C01)

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

EP 11 17 1554

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
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24-10-2011

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