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(54) **A SHELF FOR A CLIMATIZATION CONTAINER**

(57) A shelf (10) for use in a climatization container. The shelf comprises a sheet comprising a shelf surface (13) and a first folded portion (17) at a front edge of the shelf. The first folded portion is folded relative the shelf

surface such that an acute angle is formed between the shelf surface and the first folded portion. A climatization container including the shelf within a storage compartment (2) is also disclosed.

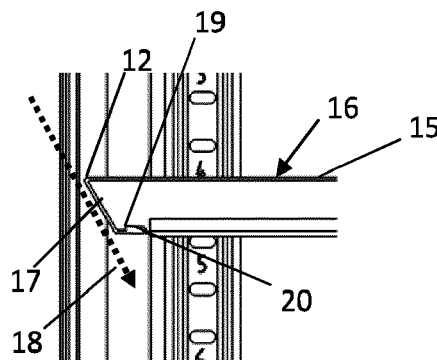


Fig. 6

Description

[0001] This invention relates generally to a shelf for use in a climatization container, for instance a refrigerator.

[0002] A climatization container comprises a container suitable for keeping contents stored therein under particular climatic conditions, for instance within a predetermined temperature or humidity range. Climatization containers are commonly used for storing products such as food and beverages. Particular examples include refrigerators and freezers where the primary requirement is to store food and beverages within a predetermined temperature range. Where in the present document reference is made to a particular example of a climatization container, for instance a refrigerator, this should be understood to include all types of climatization containers unless the context requires that it is limited to the particular example.

[0003] A climatization container may comprise a compartment defined by walls and closable by a door. Within the compartment is a shelf support, or series of shelf supports, supporting one or more shelves. On each shelf products, for instance food and beverage products, may be stored. The dimensions, particularly the thickness, of a shelf may be determined in part based on the weight of the products to be supported. It is known to form a shelf from a sheet of metal or plastic and then fold the outer edges of the shelf to increase the rigidity of the sheet and thus allow a thinner sheet material to be used. Particularly, the edges of the sheet may be bent downwards approximately at 90° to the main part of the shelf. However, it will be appreciated that folding over the edges of a sheet increases the apparent thickness of the shelf.

[0004] Products stored within a climatization container may be typically viewed from a first direction, a side of the container which is closed by a door. The door may be opened to view products, or the door may be transparent. Where multiple shelves are positioned within the compartment the products and the shelves may be closely packed. In such a situation when a user of the climatization container looks into the container, particularly when looking downwards at an angle into a container with a vertical door, each shelf may partially occlude the view of products on the shelf below. This restriction of the field of view of the user is proportional to the thickness of the shelf: a thicker shelf restricts the field of view for products below the shelf more than a thin shelf.

[0005] It would be advantageous to provide an alternative form of shelf that improves the view of products positioned on the shelves.

[0006] According to a first aspect of the present invention there is provided a shelf for use in a climatization container, the shelf comprising: a sheet comprising a shelf surface and a first folded portion at a front edge of the shelf; wherein the first folded portion is folded relative the shelf surface such that an acute angle is formed between the shelf surface and the first folded portion.

[0007] Advantageously, because the front edge of each shelf is folded underneath such that it forms an acute angle with the shelf surface, the shelf appears thinner and improves the visibility of products positioned below the shelf. Thus, the field of view of a user looking into the container for products is increased without any significant reduction in strength or rigidity of the shelf. The angle between the shelf surface and the first folded portion may be between 45° and 80°, preferably 60°. Advantageously, an angle of 60° (or close thereto) has been found to give a suitable balance between optimum viewing angle when looking into the fridge and required rigidity.

[0008] According to a second aspect of the present invention there may be provided a climatization container comprising: a compartment for storage of products, the compartment being defined by walls and closable by a door; at least one shelf as described above to support the products; and a shelf support to support each shelf in the compartment such that in use the first folded portion extends downwards from the shelf surface and the front edge of each shelf is proximal to the door.

[0009] For the avoidance of doubt, any of the features described herein apply equally to any aspect of the invention.

[0010] Within the scope of this application it is expressly intended that the various aspects, embodiments, examples and alternatives set out in the preceding paragraphs, in the claims and/or in the following description and drawings, and in particular the individual features thereof, may be taken independently or in any combination. That is, all embodiments and/or features of any embodiment can be combined in any way and/or combination, unless such features are incompatible.

[0011] For the avoidance of doubt, the terms "may", "and/or", "e.g.", "for example" and any similar term as used herein should be interpreted as non-limiting such that any feature so-described need not be present. Indeed, any combination of optional features is expressly envisaged without departing from the scope of the invention, whether or not these are expressly claimed. The applicant reserves the right to change any originally filed claim or file any new claim accordingly, including the right to amend any originally filed claim to depend from and/or incorporate any feature of any other claim although not originally claimed in that manner.

[0012] Embodiments of the invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a refrigerator including a shelf according to the prior art;

Figure 2 is a perspective view of a refrigerator including a shelf according to an example of the present invention;

Figure 3 is a cross section view of a refrigerator in-

cluding a shelf according to the prior art;

Figure 4 is an enlargement of a portion of the view of figure 3;

Figure 5 is a cross section view of a refrigerator including a shelf according to an example of the present invention;

Figure 6 is an enlargement of a portion of the view of figure 3;

Figure 7 is a perspective view of an example of the present invention; and

Figure 8 comprises engineering drawings for the manufacture of a shelf according to an example of the present invention.

[0013] Referring to figures 1 and 2, these illustrate respectively a refrigerator 1 according to the prior art and a refrigerator 1 according to an example of the present invention by inclusion of a shelf according to the present invention. The following description refers to refrigerators as examples of climatization containers including shelves according to the present invention. The invention is not limited only to refrigerators.

[0014] The refrigerator 1 in each of figures 1 and 2 comprises a compartment 2 defined by side walls 3, 4, top wall 5, rear wall 6 and bottom wall 7. The compartment 2 is closable at the front by doors 8. The refrigerator 1 in each figure is viewed in perspective showing the doors 8, top 5 and side 3.

[0015] In figures 1 and 2 the doors 8 comprise sliding doors that may slide along rails 9 at the front of the top and bottom walls 5, 7. It will be appreciated that the shape and configuration of the refrigerator 1 may vary, including by the position and arrangement of doors 8. As an example, the or each door 8 may be hinged.

[0016] Within each refrigerator 1 there is provide one or more shelves 10. In each of figures 1 and 2 there is illustrated two shelves 10, but there may be more or fewer. Each shelf 10 is supported by shelf supports 11. The shelf supports 11 comprise vertical rails attached to the side walls 2, 3 within the compartment defining a series of locating holes within which may be positioned clips (not visible in figures 1 and 2) to support the shelves 10.

[0017] Shelves 10 differ between the prior art of figure 1 and the example of the present invention of figure 2 according to the shape of front edge 12. In figure 1 the front edge 12 of the prior art shelf is bent downwards at approximately 90°, whereas in figure 2 the front edge 12 of the shelf is bent downwards and backwards such that it forms an acute angle with the shelf surface 13, for instance approximately 60°.

[0018] The doors 8 are transparent, for instance glass or plastic, so that a user can see into the refrigerator 1. As an example, the refrigerator 1 may comprise an under

counter refrigerator for use in a cafe, restaurant, pub or bar for storing beverage containers, for instance bottles. The perspective view of figures 1 and 2 thus comprises a typical viewing angle for someone looking into the refrigerator. It can be seen that the acute fold in the front edge 12 of the shelves 10 in figure 2 has the effect of causing the shelf to appear thinner (despite the body of the shelves 10 retaining the same thickness throughout) and thus increases the field of view of products on lower shelves 10.

[0019] Referring now to figures 3 to 6, cross sectional views of the refrigerators of figures 1 and 2 are presented such that the features of a shelf 10 according to an example of the present invention may be more clearly seen.

Figure 3 comprises a vertical cross section from front to back of the refrigerator of figure 1. Figure 5 comprises a vertical cross section from front to back of the refrigerator of figure 1. Figures 3 and 5 are identical except for the features of the shelves. Doors 8 are at the left-hand side of each figure. Each of figures 3 and 5 further illustrates a refrigeration system 14, the details of which may be entirely conventional and will not be described here. Shelf supports 11 comprise a pair of vertical rails upon the inner of each sidewall 2, 3. Details of the clips supporting the shelves are occluded by the shelves themselves. The clips may be configured to engage slots within the vertical rails and to present a bracket to support the weight of the shelf 10 and include a pin to engage a corresponding hole within the shelf 10 to limit movement of the shelf front and back.

[0020] Figures 4 and 6 comprise enlarged views of the front edge 12 of an upper shelf in figures 3 and 5 respectively: figure 6 shows the detail of the front edge 12 of a shelf according to an embodiment of the present invention. Each shelf 10 comprises a sheet 15 comprising a shelf surface 16. Each sheet 15 further comprises a first folded portion 17. Folds provided along the sides of sheet 15 serves to increase the rigidity of the sheet 15 and thus allow a thinner sheet material to be used.

[0021] Comparison of figures 3 and 5 reveals that for the prior art shelf 10 of figure 4 the first folded portion 17 is bent downwards from the plane of the shelf surface by approximately 90°, whereas the first folded portion 17 for the prior art shelf 10 of figure 6 is bent downwards and backwards (towards the middle of sheet 15) such that the angle between the shelf surface 16 and the first folded portion 17 is approximately 60°. In certain examples the angle between the shelf surface 16 and the first folded portion 17 may be between 45° and 80°, for instance between 50° and 70° or between 55° and 65°. In some situations a fold angle greater than or equal to 45° is beneficial to give the required degree of strength and rigidity to the shelf. This difference in fold angle provides the improvement in field of view discussed above. Each of figures 3 to 6 further includes line 18 which indicates the viewing angle of someone looking into the refrigerator from above. Comparison of figures 3 and 4 with figures 5 and 6 reveals how the proportion of a lower shelf 10

that can be viewed is increased through use of an upper shelf 10 according to a present invention. Advantageously, an angle of 60° (or close thereto) has been found to give a suitable balance between optimum viewing angle when looking into the fridge and required rigidity. For an example application of the present invention, when the shelf is used in a fridge storing beverage bottles, the maximum shelf rating may be 50 kg. An angle of 60° has been found to suffice to support such a load. Another factor that may affect shelf strength is the number of and arrangement of shelf supports. Another factor affecting shelf strength is the length of the front edge of the shelf.

[0022] The front edge 12 of the shelf 10 in figures 5 and 6 according to the present invention can be seen to further comprise a second folded portion 19 which is bent from the first folded portion so that it returns underneath the shelf surface 16 approximately parallel to the plane of the shelf surface 16. The edge of the sheet 15 is turned back on itself at the edge of the second folded portion 19 such that the sheet edge 20 is between the shelf surface 16 and the second folded portion 19.

[0023] Also visible, particularly in figure 6, the side edges of sheet 15 are bent downwards at approximately 90° to the plane of the shelf surface 16 and then turned inwards. This may take the same form as the front edge 12 in figure 4. Although not visible in figures 5 and 6, the shelf 10 may be generally rectangular and the rear edge may take the same form as the side edges.

[0024] Turning to figure 7, this illustrates a perspective view of part of a shelf 10 according to the example of the present invention illustrated in figures 5 and 6. Front edge 12, and particularly first folded portion 17 can be seen folded back underneath the shelf surface 16. Also visible is a first side edge 21 and a rear edge 22 which comprise folded portions folded down from the shelf surface at approximately 90°. At corner 23 it can be seen that the folded portions of the front edge 12 and the side edge 21 come together to form a corner seam where portions of the sheet 15 abut one another.

[0025] Referring now to figure 8 this illustrates engineering drawings for production of a shelf 10 according to an example of the present invention. The upper part illustrates the shape required to be cut to form sheet 15 prior to folding, viewed from underneath. The lower left part illustrates shelf 10 once sheet 15 is folded. Cross sections and detailed views are also provided. Measurements given are in millimetres. The sheet 15 may be cut from 0.8 mm PVC coated steel sheet. Other materials may be selected as required to meet strength and aesthetic requirements.

[0026] Figure 8 reveals front edge 12 formed from first folded portion 17 and second folded portion 19, along with portion 20 where the second folded portion is turned back on itself (Detail F). Figure 8 further reveals the form of each side edge 21 and rear edge 22 (Detail G). Figure 8 further reveals holes 24 formed in side edges 21 to receive shelf support pins (not illustrated). Figure 8 further reveals side edges 21 and rear edges being formed

from third folded portions 25 and second folded portions 26.

[0027] It will be appreciated by those skilled in the art that several variations to the aforementioned embodiments are envisaged without departing from the scope of the invention. It will also be appreciated by those skilled in the art that any number of combinations of the aforementioned features and/or those shown in the appended drawings provide clear advantages over the prior art and are therefore within the scope of the invention described herein.

Claims

1. A shelf for use in a climatization container, the shelf comprising:

a sheet comprising a shelf surface and a first folded portion at a front edge of the shelf; wherein the first folded portion is folded relative the shelf surface such that an acute angle is formed between the shelf surface and the first folded portion.

2. A shelf according to claim 1, wherein the angle between the shelf surface and the first folded portion is between 45° and 80°.

3. A shelf according to claim 2, wherein the angle between the shelf surface and the first folded portion is approximately 60°.

4. A shelf according to any one of the preceding claims, wherein the sheet further comprises a second folded portion extending from the first folded portion, wherein the second folded portion is folded relative the first folded portion such that a plane of the second folded portion is approximately parallel to a plane of the shelf surface.

5. A shelf according to claim 4, wherein the second folded portion terminates at a seam where an edge of the sheet is turned back on itself such that the sheet edge is between the shelf surface and the second folded portion.

6. A shelf according to any one of the preceding claims, wherein the shelf is rectangular and further defined by side edges and a rear edge; wherein at each side or rear edge the sheet further comprises a third folded portion and a fourth folded portion; wherein each third folded portion is folded relative to the shelf surface in the same direction as the first folded portion such that the angle between the shelf surface and the third folded portion is approximately 90°; and

wherein each fourth folded portion is folded relative to the third folded portion such that a plane of the fourth folded portion is approximately parallel to a plane of the shelf surface.

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7. A shelf according to claim 6, wherein each side edge incorporates one or more mounting portions configured to engage a shelf support of the climatization container.

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8. A shelf according to any one of the preceding claims, wherein the sheet is formed from metal or plastic.

9. A climatization container comprising:

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a compartment for storage of products, the compartment being defined by walls and closable by a door;

at least one shelf according to any one of the preceding claims to support the products; and

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a shelf support to support each shelf in the compartment such that in use the first folded portion extends downwards from the shelf surface and the front edge of each shelf is proximal to the door.

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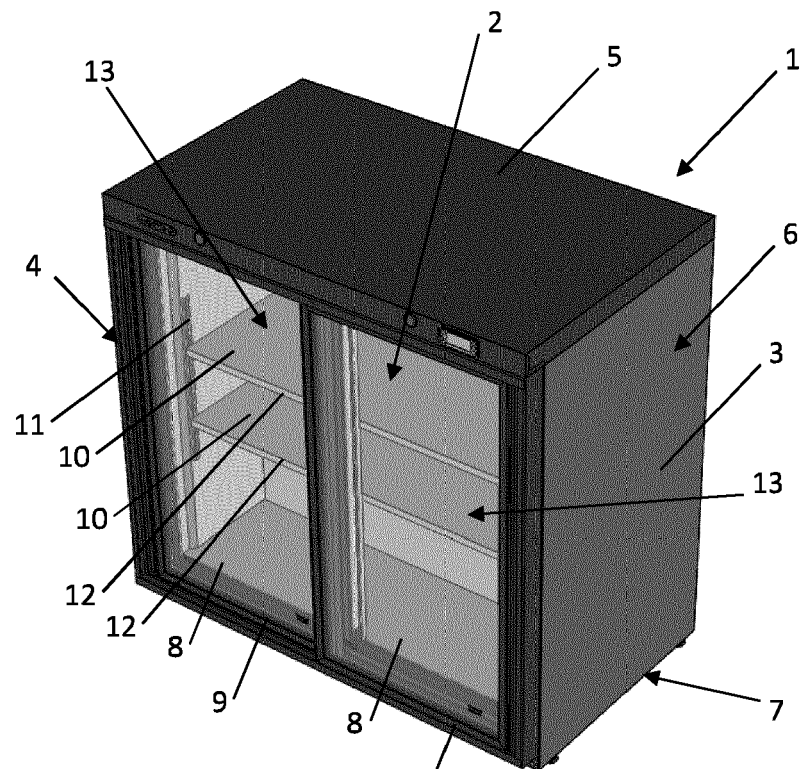


Fig. 1

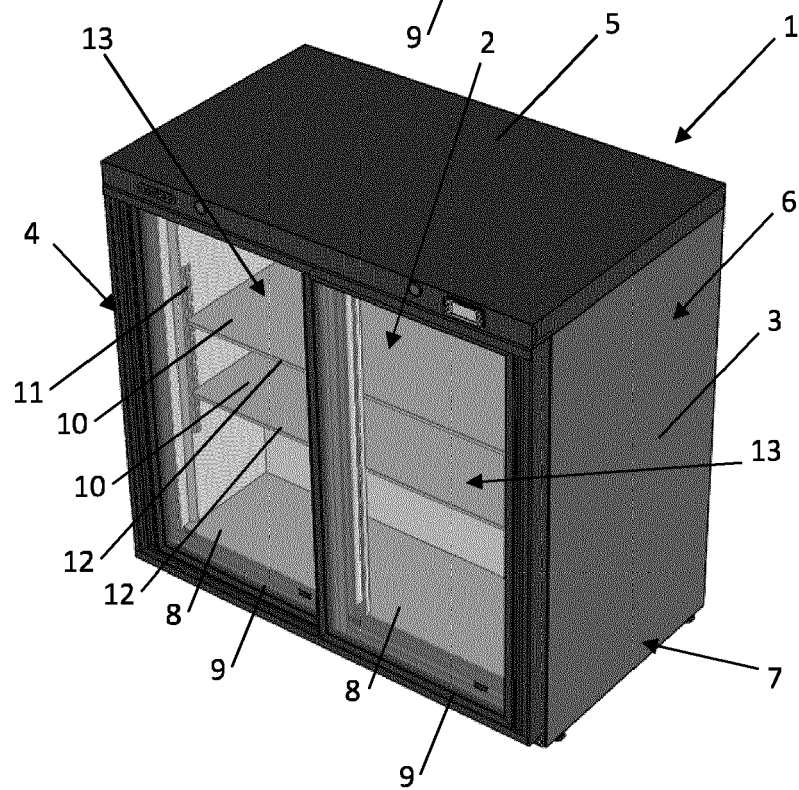


Fig. 2

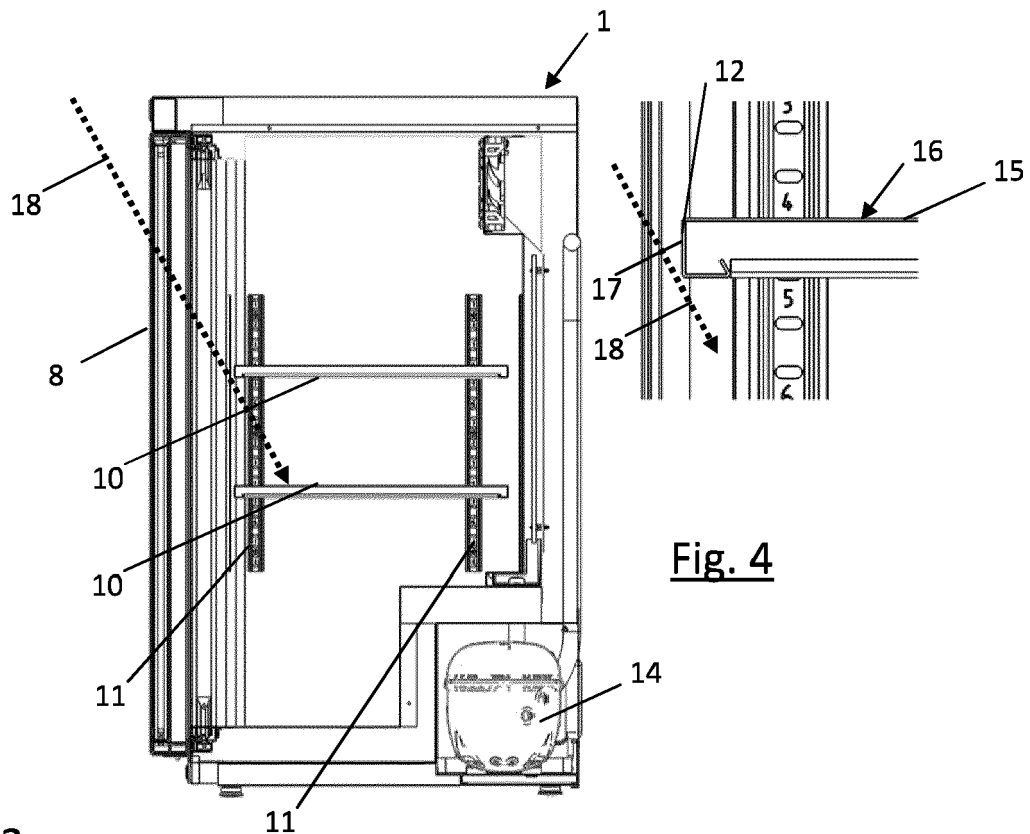


Fig. 3

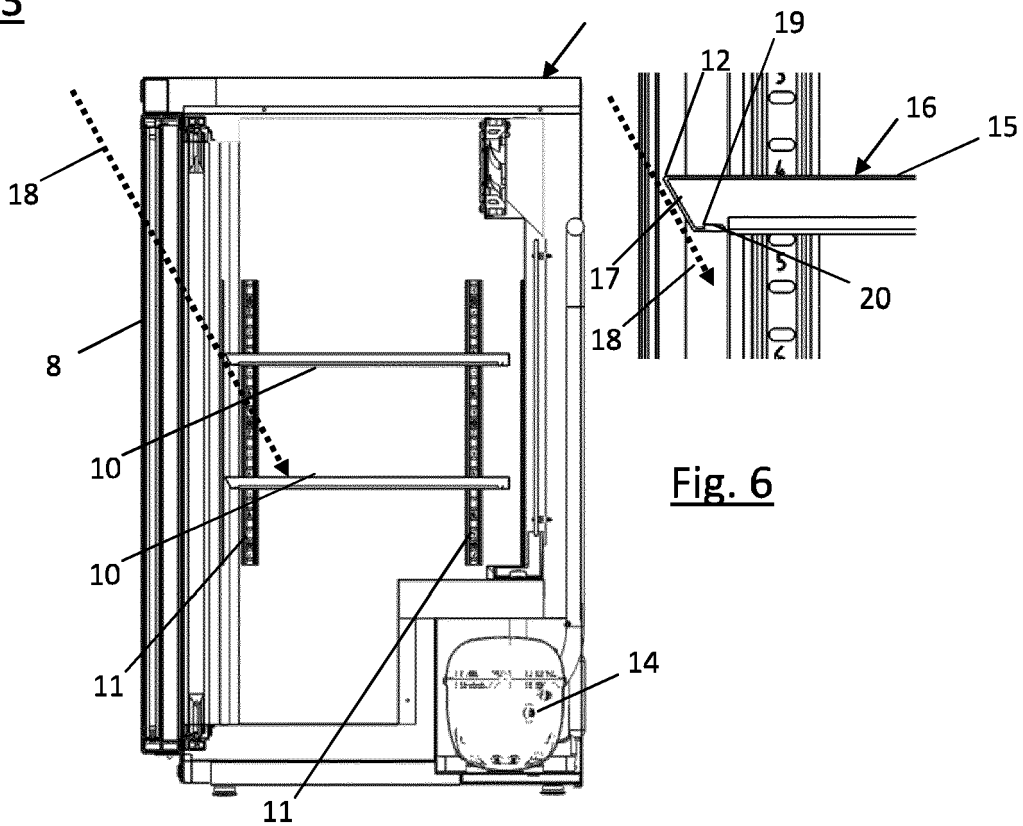


Fig. 5

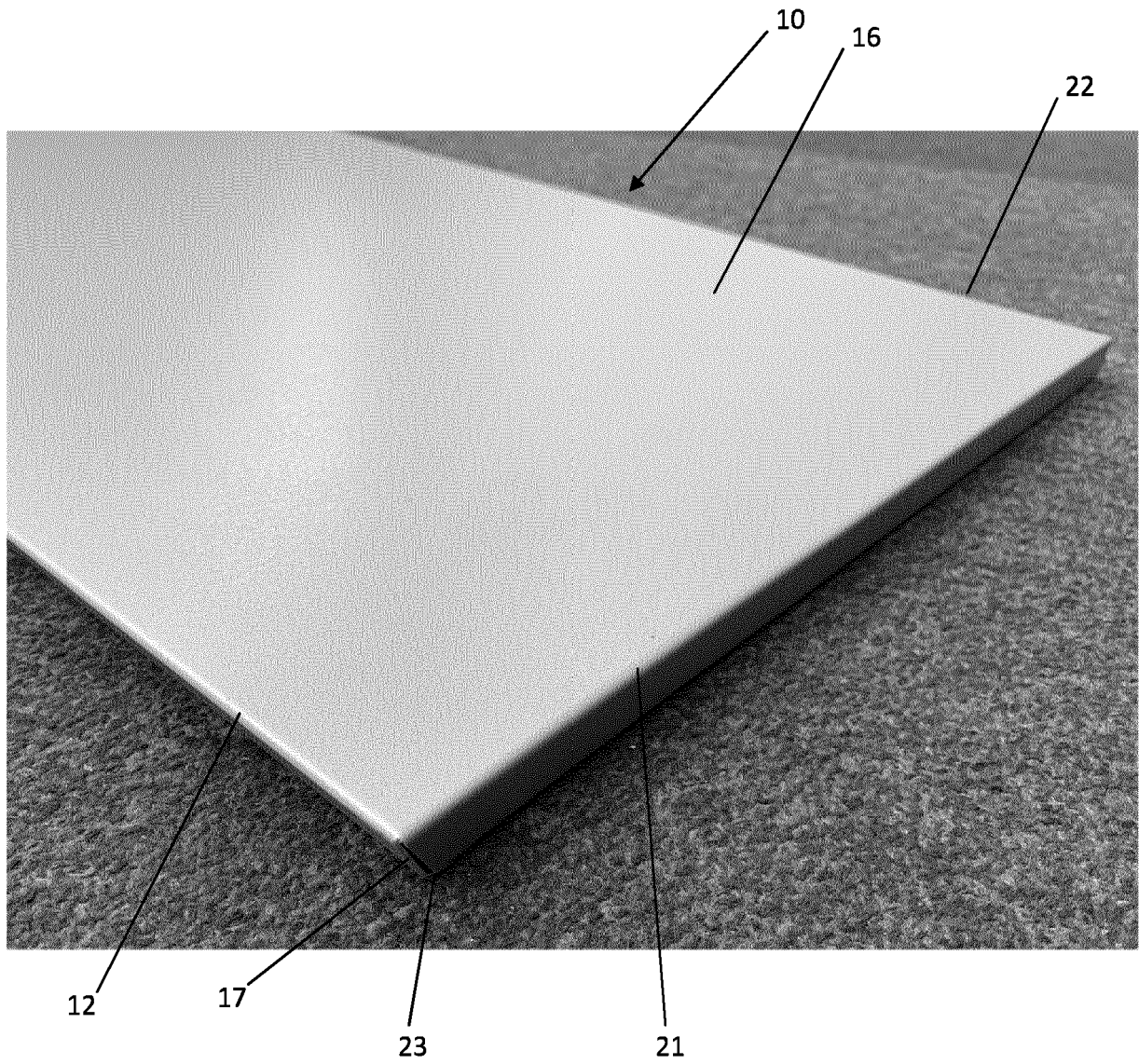


Fig. 7

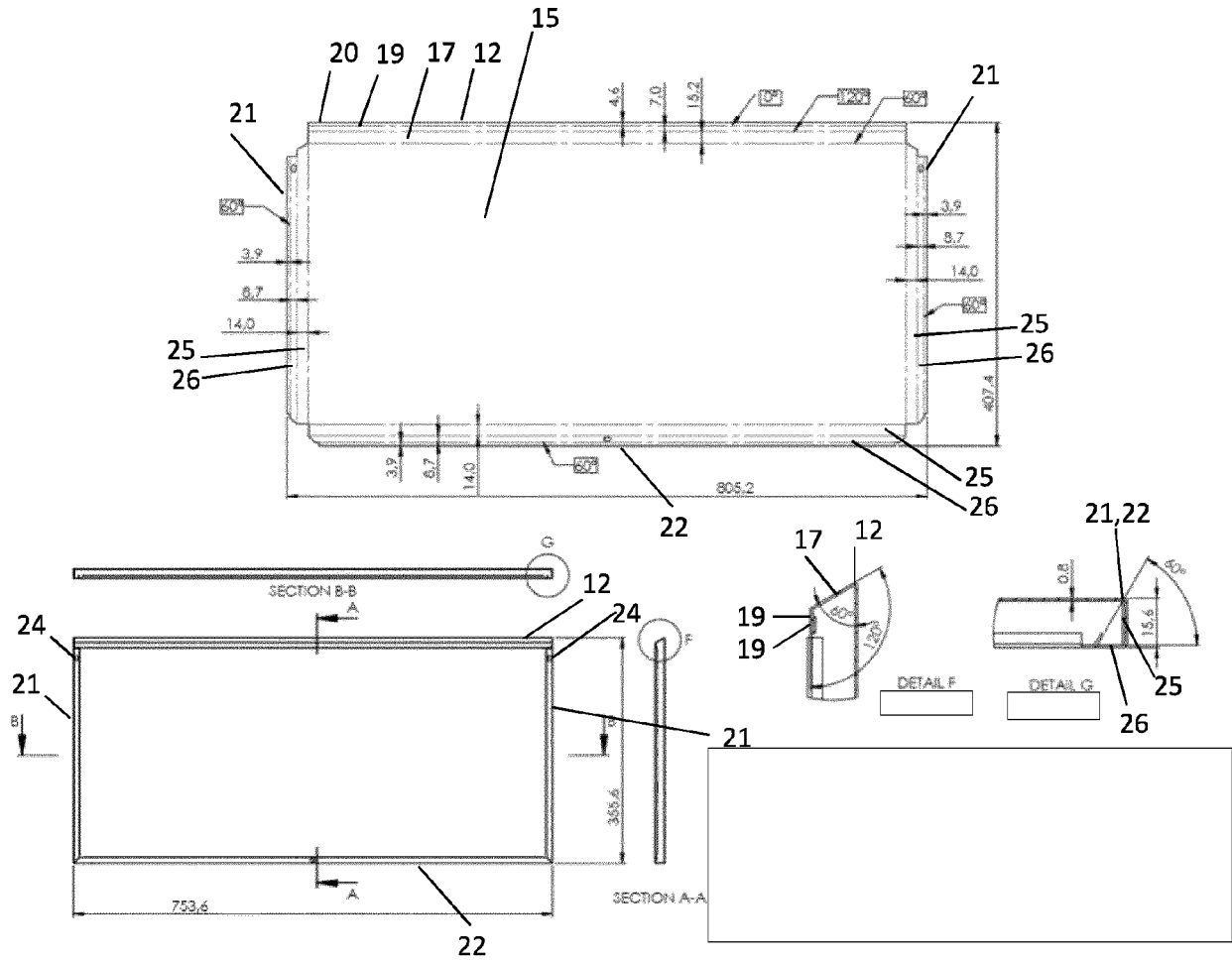


Fig. 8



EUROPEAN SEARCH REPORT

Application Number
EP 21 16 1818

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 30 July 2021	Examiner Yousufi, Stefanie
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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ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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