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(72) Inventor: **Cimarelli, Marco**
60030 Monteroberto (AN) (IT)

(74) Representative: **Santonicola, Paolo**
Indesit Company S.p.A.
Industrial Property Management Team
Via Lamberto Corsi, 55
60044 Fabriano (AN) (IT)

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

(54) **Method for making a refrigerating cell and refrigerating device comprising the refrigerating cell**

(57) A method for making a refrigerating cell (1) comprising an enclosure (2) whose walls (20) delimit at least partially a zone (200) for storing food products, the method comprising the steps of:
-making the walls (20) of the enclosure (2) by die forming;
-making at least one through hole (21) passing through

at least one of the walls (20) of the enclosure (2).

The step of making the walls (20) of the enclosure (2) by die forming comprises making by die forming visual reference means (3) that identify a first zone (22) where the through hole (21) is made.

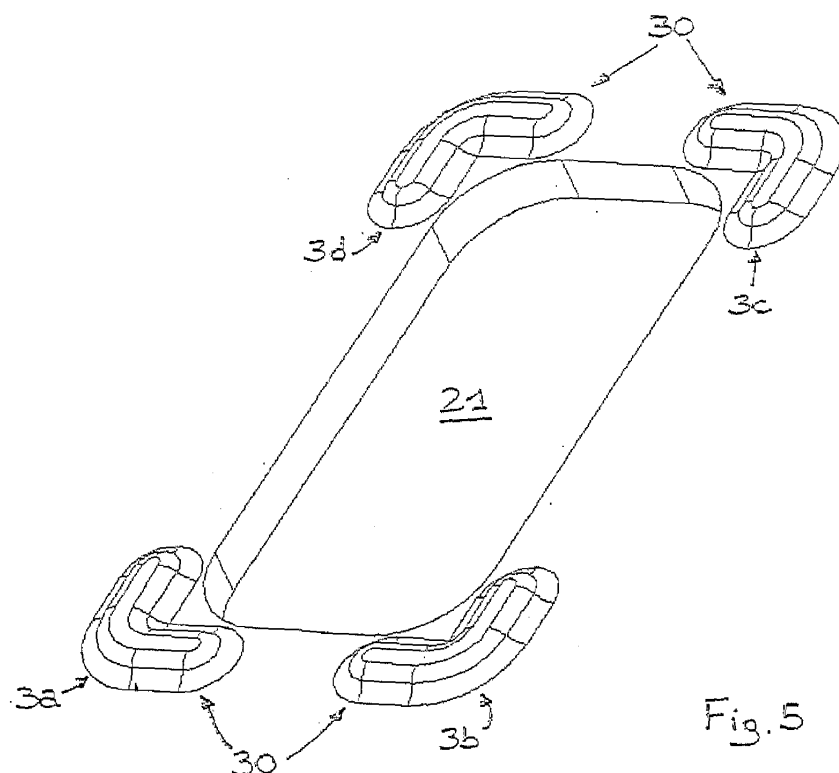


Fig. 5

Description

DESCRIPTION

[0001] This invention relates to a method for making a refrigerating cell and a device for refrigerating and storing food products and comprising the refrigerating cell.

[0002] Refrigerating cells normally comprise a thermoformed enclosure made by die forming and delimiting a zone for storing food products.

[0003] A plurality of openings are then made in the enclosure to allow connection of refrigerated air conduits (for example in the case of a no-frost refrigerator) or for the passage of electrical wiring.

[0004] These openings are holes which are usually made in the die formed enclosure by numerical control machines.

[0005] The enclosure can then be sent to the assembly line. At the assembly line, some of the enclosures are unexpectedly found not to have the openings in the required number or at the required positions (this may be due to errors positioning an enclosure relative to the numerical control machine or to a human error during programming of the numerical control machine). This may make it impossible to assemble the enclosure or create problems connected with the quality of the end product.

[0006] In this context, the technical purpose which forms the basis of this invention is to propose a method for making a refrigerating cell and a refrigerating device for refrigerating and storing food products and comprising the refrigerating cell that overcome the above mentioned disadvantages of the prior art.

[0007] In particular, this invention has for an aim to provide a method and a device which can speed up assembly in the production line.

[0008] Another aim of the invention is to propose method which can improve product quality.

[0009] A further aim of the invention is to propose a method which can facilitate the task of checking the work of a human operator.

[0010] A further aim of the invention is to propose a method which can facilitate the performance of some of the steps in the method for making the refrigerating cell.

[0011] The technical purpose and aims specified are substantially achieved by a method for making a refrigerating cell and a refrigerating device for refrigerating and storing food products and comprising the technical features described in one or more of the appended claims.

[0012] Further features and advantages of the invention are more apparent in the non-limiting description which follows of a preferred non-limiting embodiment of a method for making a refrigerating cell and a refrigerating device for refrigerating and storing food products as illustrated in the accompanying drawings, in which:

- Figures 1 and 2 show an enclosure of the type described in this specification, before and after an operation of making holes in it, respectively;

- Figure 3 shows the enclosure of Figure 1 from another perspective;
- Figure 4 shows the enclosure of Figure 2 from another perspective;
- Figure 5 shows a detail of an enclosure described in this specification.

[0013] The object of this invention is a method for making a refrigerating cell 1 comprising an enclosure 2 whose walls 20 delimit at least partially a zone 200 for storing food products. The enclosure 2 has an opening 23 giving access to the zone 200 for storing food products, the opening 23 being designed to be closed by a door.

[0014] Advantageously, the enclosure 2 comprises a lower base 24 and a ceiling 25 opposite the lower base 24. The enclosure 2 also comprises two side walls 26 and an end wall 27 which are interposed between the base 24 and the ceiling 25. The end wall 27 is located opposite the opening 23 which is designed to be closed by a door.

[0015] By refrigerating cell is meant a cell designed to refrigerate and store food products at any temperature. For example, the term "refrigerating cell" may denote both a cell designed to be used as a refrigerator compartment and a cell designed to be used as a freezer compartment. The method comprises the step of making by die forming (preferably by thermoforming) the walls 20 of the enclosure 2. Advantageously, the enclosure 2 is made of plastic material, preferably HIPS.

[0016] The method subsequently comprises a step of making at least one through hole 21 passing through at least one of the walls 20 of the enclosure 2. For example, the hole 21 might be made using a cutting tool such as a routing bit or a die and matrix (in the latter case, the process is known as blanking).

[0017] The step of die forming the walls 20 of the enclosure 2 comprises also making by die forming visual reference means 3 that identify a first zone 22 where the through hole 21 is made (during the step of making at least one through 21 which passes through at least one of the walls 20 of the enclosure 2). The step of making the visual reference means 3 is thus simultaneous with the step of die forming the rest of the walls 20 of the enclosure 2.

[0018] The through hole 21 is not made simultaneously with the step of die forming the rest of the enclosure 2 since that would create problems extracting the enclosure 2 from the mould. The step of making by die forming the visual reference means 3 comprises making the visual reference means 3 as a single part with the rest of the enclosure 2.

[0019] The step of making by die forming the visual reference means 3 comprises making by die forming one or more irregularities on the walls 20 of the enclosure 2.

[0020] The step of making by die forming the visual reference means 3 comprises the step of making by die forming at least one protrusion 30 or one groove forming part of the visual reference means 3 (meaning that the

above mentioned irregularities may comprise the protrusions 30 or the grooves).

[0021] The step of making at least one hole 21 is performed by numerical control machines or manually. In the latter case, advantageously, the step of making at least one through hole 21 is preceded by the step of positioning a cutting tool relative to the first zone 22 with the aid of the visual reference means 3.

[0022] The step of making at least one through hole 21 involves locating the hole 21 at a minimum distance of less than 1 millimetre (advantageously at a minimum distance of between 0.4 and 0.6 millimetres and preferably at a minimum distance of between 0.45 and 0.55 millimetres) from each single visual reference 3a, 3b, 3c, 3d forming part of the visual reference means 3. Conveniently, the step of making by die forming the visual reference means 3 comprises making the visual reference means 3 at least on the end wall 27.

[0023] With reference to the embodiment of Figure 5, the step of making by die forming the visual reference means 3 comprises/coincides with the step of making by die forming at least four protrusions 30 or grooves forming part of the visual reference means 3 (alternatively, at least two protrusions 30 or grooves might be made by die forming - this embodiment not being illustrated). In another embodiment, not illustrated, the step of making by die forming the visual reference means 3 coincides with the step of making by die forming a protrusion 30 or groove which surrounds the entire first zone. In the latter case, the protrusion 30 or groove is advantageously made on the end wall 27.

[0024] The step of making by die forming the visual reference means 3 comprises making at least one, advantageously a plurality, preferably all the protrusions 30 or grooves, with two intersecting sections that meet at a common zone (this makes it easier for the user to identify the first zone 22).

[0025] After obtaining the enclosure 2 it is important, for the quality of the finished cell 1, to select (or more specifically, separate) the enclosures 2 which have imperfections (in order to assess appropriate solutions).

[0026] In this regard, the method comprises the step of selecting the enclosure 2 where the through hole is at least partially outside the first zone 22 identified by the visual reference means 3.

[0027] After selection, the method comprises examining the enclosure 2 to decide whether to reject it, use it without further removal of material or subject it to further removal of material. For example, the enclosure 2 might be rejected if the first zone 22 is well outside the zone delimited by the visual reference means 3. Normally, the enclosure 2 is reused as far as possible, although further machining is sometimes necessary. Thanks to the invention, the user immediately notices any defects in the enclosure 2. This may have the added advantage that defective enclosures 2 are not sent to the assembly line and thus do not slow down the assembly line.

[0028] The step of making the at least one through hole

21 is carried out at a first machining centre. In this regard, the method comprises the steps of:

- selecting an enclosure 2 that has passed through the first machining centre and where there is no hole 21 inside the first zone 22 identified by the visual reference means 3 or where the hole 21 is at least partly outside the first zone 21 identified by the visual reference means 3.
- making a through hole 21 in the first zone 22.

[0029] Advantageously, the step of making at least one through hole 21 passing through at least one of the walls 20 of the enclosure 2 is carried out by a numerical control machine after positioning the enclosure 2 relative to the machine.

[0030] This invention also has for an object a refrigerating device for refrigerating and storing food products and comprising a refrigerating cell 1 comprising an enclosure 2 in turn comprising walls 20 which identify a zone 200 for storing food products. Advantageously, the enclosure 2 is made of plastic material such as, for example, HIPS (high impact polystyrene). At least one of the walls 20 has a hole 21 which goes right through the thickness of it.

[0031] The enclosure 2 has an opening 23 giving access to the zone 200 for storing food products; the opening 23 being closable by a door forming part of the device 1.

[0032] Advantageously, walls 20 of the enclosure 2 comprise a lower base 24 and a ceiling 25 opposite the lower base 24. By way of an example, at least one hole 21 is made in the ceiling 25 of the enclosure 2. The walls 20 of the enclosure 2 also comprise two side walls 26 and an end wall 27 which are interposed between the base 24 and the ceiling 25. The end wall 27 is located opposite the opening 23 which is designed to be closed by a door. Advantageously, at least one hole 21 is made in the end wall 27 of the enclosure 2.

[0033] The device 1 comprises visual reference means 3 which identify a first zone 22 where the hole 21 is made.

[0034] Advantageously, the visual reference means 3 and the hole 21 are made at least in the end wall 27 of the enclosure 2.

[0035] The visual reference means 3 extend along an imaginary line that surrounds the through hole 21. The visual reference means 3 are made as one with the enclosure 2.

[0036] Advantageously, the visual reference means 3 comprise one or more irregularities on the surface of the enclosure 2. More specifically, an irregularity may be a groove or a protrusion. Conveniently, at least one, advantageously a plurality, preferably all the protrusions or grooves comprise two intersecting sections that meet at a common zone, the two sections extending along two corresponding edges of the hole 21 (provided always that the hole 21 has been made correctly). Advantageously, if the hole 21 has an edge whose sides are oriented at

90° to each other, the two sections of the above mentioned grooves are also oriented at 90°.

[0037] Advantageously, the hole 21 is quadrilateral and the visual reference means 3 comprise four protrusions 30 or four grooves located at the four corners of the quadrilateral formed by the hole 21.

[0038] Alternatively, the visual reference means 3 might comprise a single protrusion or groove surrounding the entire hole 22. In another embodiment, the hole 21 might be quadrilateral and the visual reference means 3 might comprise two protrusions or grooves located at two opposite corners of the perimeter of the hole 21.

[0039] The visual reference means 3 comprise a first and a second reference 3a, 3b, separate from each other, the minimum distance of the first and the second reference 3a, 3b from the hole 21 being less than 1 millimetre. Advantageously, the first and second references 3a, 3b form part of the protrusions 30 or grooves. Preferably, the visual reference means 3 comprise a plurality of separate references 3a, 3b, 3c, 3d, the minimum distance of each of the references 3a, 3b from the hole 21 being less than 1 millimetre (advantageously, the minimum distance being between 0.4 and 0.6 millimetres and preferably the minimum distance being between 0.45 and 0.55 millimetres).

[0040] This invention has important advantages. In particular, it allows product quality to be improved. Also, it allows assembly in the production line to be speeded up since only enclosures suitable for assembly reach the production line or, in any case, any unsuitable enclosures can be identified immediately and immediately rejected even in the assembly line.

[0041] It shall be understood that the invention described above may be modified and adapted in several ways without departing from the scope of the inventive concept. Moreover, all the details of the invention may be substituted by other technically equivalent elements. Further, the embodiments of the invention may be made in any size, depending on requirements.

Claims

1. A method for making a refrigerating cell (1) comprising an enclosure (2) whose walls (20) delimit at least partially a zone (200) for storing food products, the method comprising the steps of:

- making the walls (20) of the enclosure (2) by die forming;
- making at least one through hole (21) passing through at least one of the walls (20) of the enclosure (2);

characterized in that the step of making the walls (20) of the enclosure (2) by die forming comprises making by die forming visual reference means (3) that identify a first zone (22) where the through hole

(21) is made.

2. The method according to claim 1, **characterized in that** the step of making by die forming the visual reference means (3) comprises making the visual reference means (3) as a single part with the remaining parts of the enclosure (2).
3. The method according to claim 1 or 2, **characterized in that** the step of making by die forming the visual reference means (3) comprises the step of making by die forming at least one protrusion (30) or one groove forming part of the visual reference means (3).
4. The method according to any of the foregoing claims, **characterized in that** the step of making by die forming the visual reference means (3) coincides with the step of making by die forming four protrusions (30) or grooves forming part of the visual reference means (3).
5. The method according to any of the foregoing claims, **characterized in that** the step of making at least one through hole (21) is preceded by the step of positioning a cutting tool relative to the first zone (22) with the aid of the visual reference means (3).
6. The method according to any of the foregoing claims, **characterized by**:
 - selecting the enclosure (2) where the through hole is at least partially outside the first zone (22) identified by the visual reference means (3);
 - examining the enclosure (2) to decide whether to reject it, use it without further removal of material or subject it to further removal of material.
7. The method according to any of the foregoing claims, **characterized in that** the step of making the at least one through hole (21) is carried out at a first machining centre, the method comprising the steps of:

- selecting an enclosure (2) that has passed through the first machining centre and where there is no hole (21) inside the first zone (22) identified by the visual reference means (3) or where the hole (21) is at least partly outside the first zone (22) identified by the visual reference means (3);
- making a through hole (21) in the first zone (22).

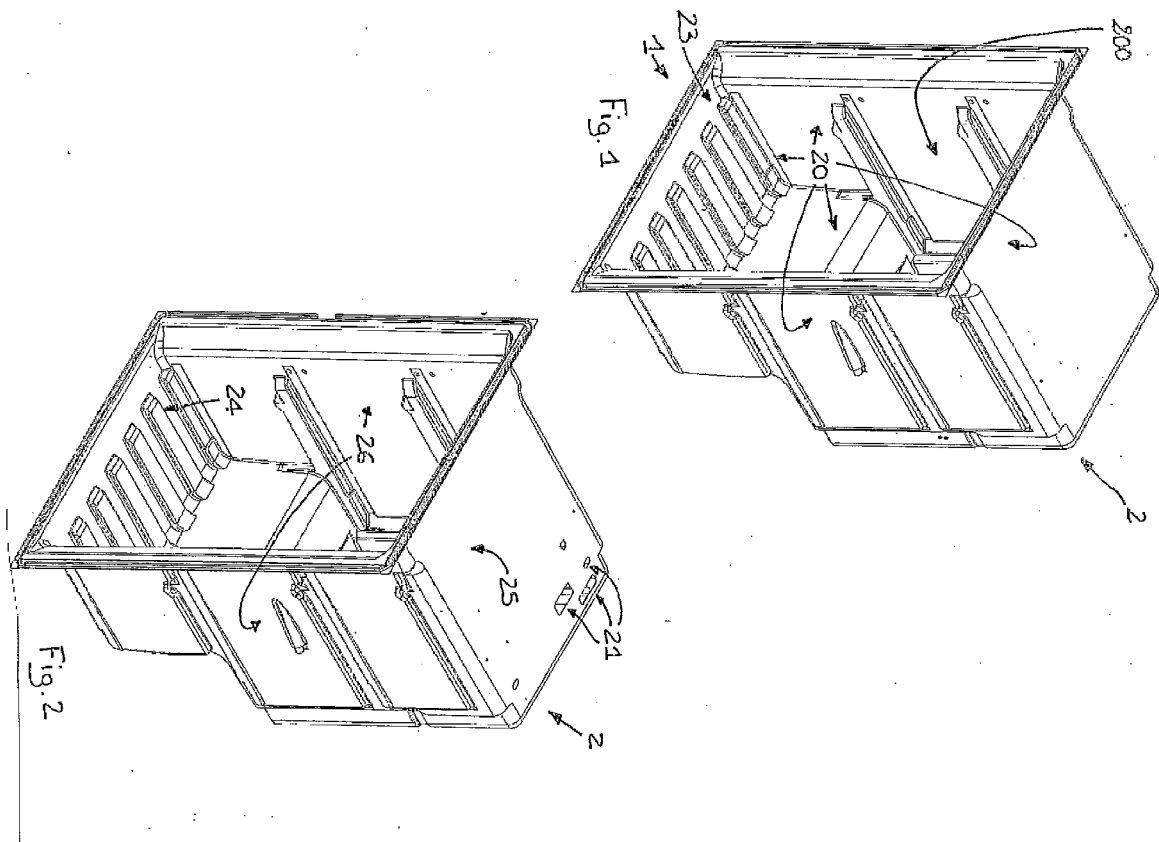
8. The method according to any of the foregoing claims, **characterized in that** the step of making at least one through hole (21) passing through at least one of the walls (20) of the enclosure (2) is carried out by a numeric control machine after positioning the enclosure (2) relative to the machine.

9. A device for refrigerating and storing food products comprising a refrigerating cell (1) comprising an enclosure (2) in turn comprising walls (20) which delimit a zone (200) for storing food products, at least one of the walls (20) having a hole (21) passing through it all the way, **characterized in that** it comprises visual reference means (3) which identify a first zone (22) where the hole (21) is made, the visual reference means (3) being made as a single part with the enclosure (2). 5 10
10. The device according to claim 9, **characterized in that** the hole (21) is quadrilateral and the visual reference means (3) comprise four protrusions (30) or grooves located at the four corners of the quadrilateral formed by the hole (21). 15
11. The device according to claim 9 or 10, **characterized in that** the visual reference means (3) comprise at least a first and a second reference (3a, 3b), the minimum distance of the first and the second reference (3a, 3b) from the hole (21) being less than 1 millimetre. 20
12. The device according to claim 9 or 10 or 11, **characterised in that** the walls (20) of the enclosure (2) comprise: 25
- a lower base (24);
 - a ceiling (25) opposite the lower base (24); 30
 - two side walls (26) and an end wall (27) which are interposed between the base (24) and the ceiling (25), the end wall (27) being opposite an opening (23) giving access to the zone (200) for storing food products, the opening (23) being closable by a door forming part of the device (1); 35
- the visual reference means (3) and the hole (21) being made at least on the end wall (27). 40

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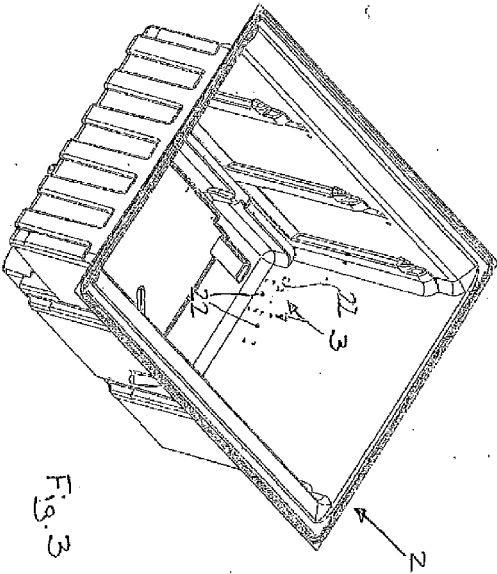


Fig. 3

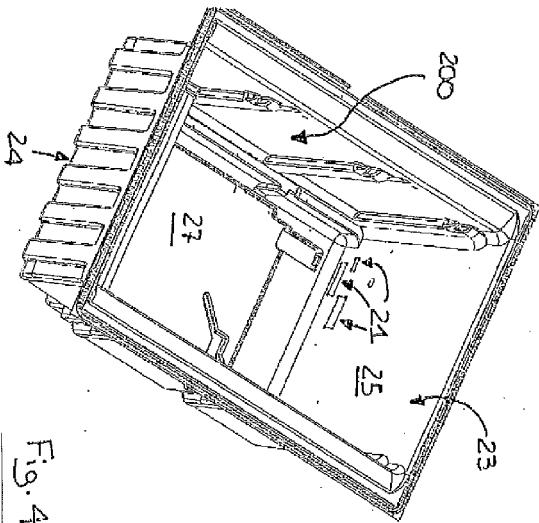


Fig. 4

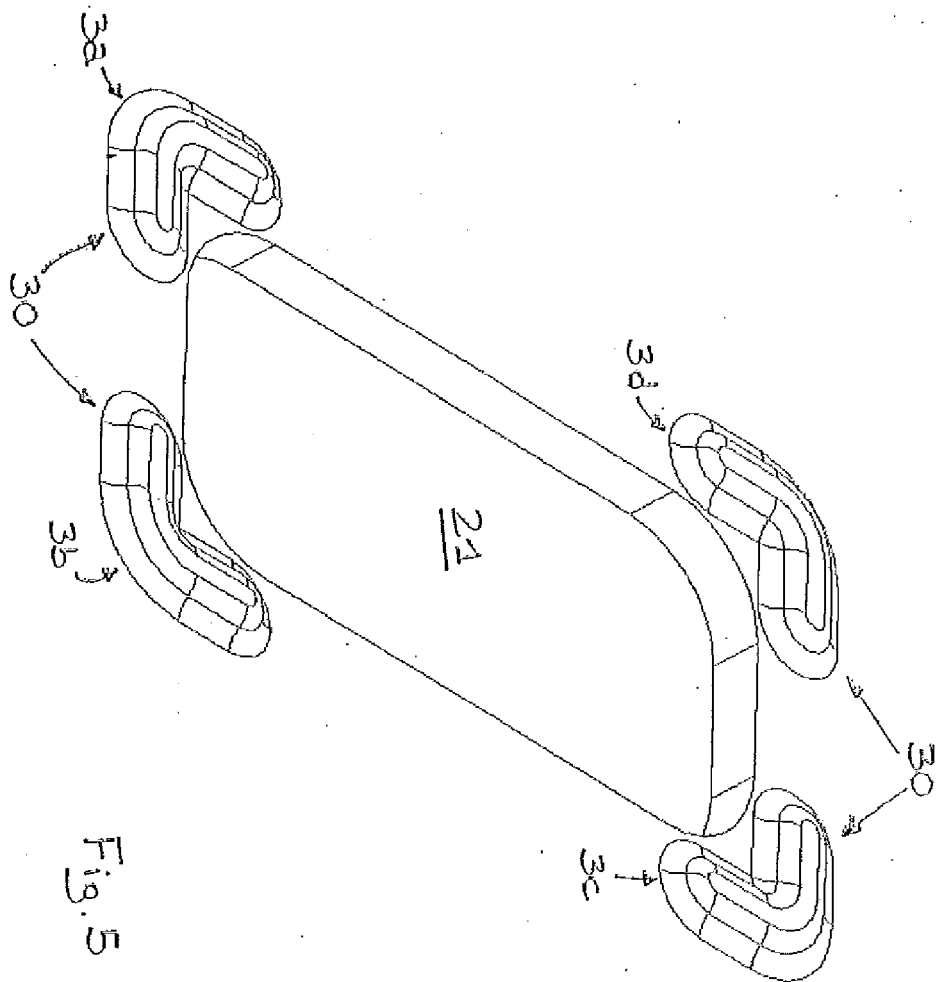


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 11 16 1376

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 16 June 2011	Examiner Lucic, Anita
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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EP 11 16 1376

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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