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(54) **Suitcase and method for making a suitcase frame**

(57) The present invention relates to a suitcase (1) comprising a first shell (4) and a second shell (5) articulated to each other, at least one frame fixedly connected

to the first and second shell (4, 5), in which the frame, formed by injection molding has an overall structural strength which is higher than the prior art frames.

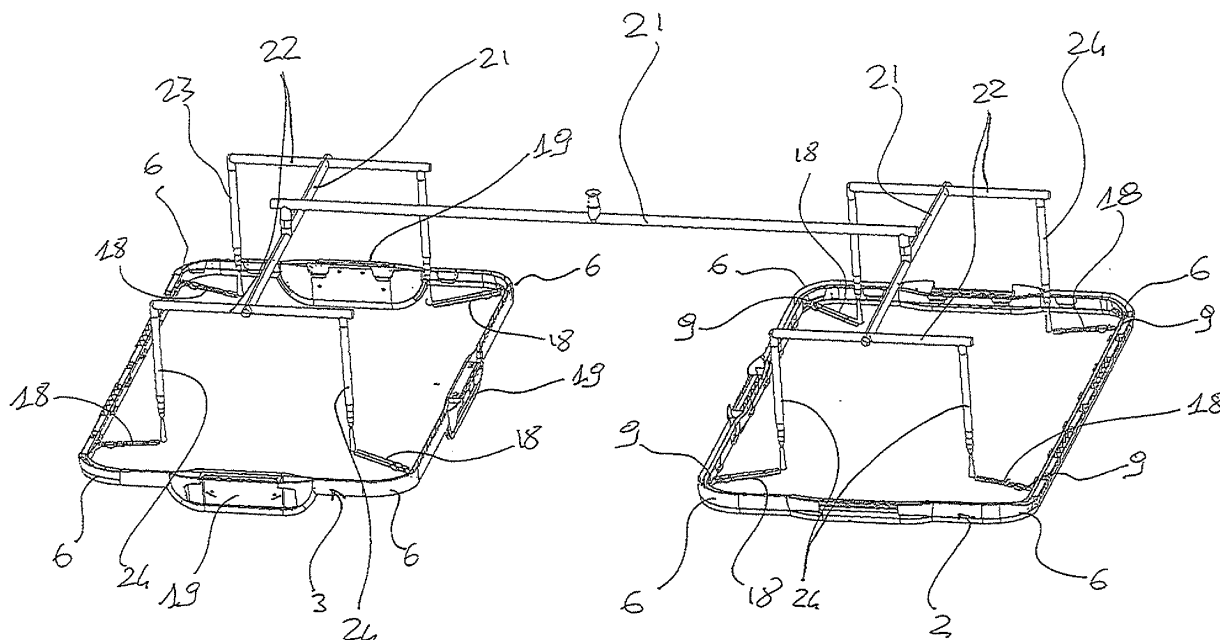


Fig. 2

Description

[0001] This invention relates to a suitcase and to a method for making a frame for a suitcase.

[0002] Suitcases for containing clothes and/or personal items are known in the art. For instance, EP 1 867 246 in the name of the applicant, discloses a suitcase comprising two frames hinged together, having corresponding shells associated thereto and substantially defining the suitcase internal volume.

[0003] As long as the stiffening frames have a constant transversal cross section, they can be made by extrusion, however, injection molding manufacturing methods allow a cheaper product to be made.

[0004] However, any frame made by injection molding necessarily lacks a complete homogeneity, this being reflected by structural weaknesses in the finished product. Such weaknesses can only be overcome by increasing the size of the frame itself, thereby increasing its weight.

[0005] In the light of the above described prior art, aim of this invention is to provide a suitcase having a stiffening frame which does not suffer in such a heavy manner from the lack of homogeneity linked to the injection molding process, so to achieve an improved lightness of the suitcase itself.

[0006] Such an aim is reached by a suitcase according to claim 1 and / or by a method according to claim 11.

[0007] Further characteristics and advantages of the suitcase according to this invention will emerge from the description below of a preferred embodiment, given as purely indicative and without any limiting effect by making reference to the attached figures, in which:

- figure 1 shows an exploded perspective view of a suitcase according to the present invention,
- figure 2 shows a perspective view of the injection ducts and of the frames of the suitcase of figure 1,
- figure 3 shows, schematically, the position of the injection ducts with respect to the frame of the suitcase of figure 1.

[0008] By making reference to the attached figures, suitcase 1 comprises an upper frame 2 and a lower frame 3, fixed to an upper shell 4 and to a lower shell 5, respectively.

[0009] In this description, reference will be made to only one of these frames 2, 3, being in this way meant that, according to a preferred embodiment, both frames 2, 3 of suitcase 1 comprise the features described below.

[0010] As can be seen in figures 2 and 3, frame 2 comprises a plurality of corner areas 6, four in the embodiment.

[0011] Two consecutive corner areas 6 define one side 7 of the suitcase 1. In other words, each corner area 6 is a frame portion having a curvature radius which is quite lower than the curvature radius of the sides adjacent to it (which need not be perfectly straight).

[0012] Frame 2 comprises a seat (not visible in the

figures) being substantially U shaped, the edge 8 of shell 4 being glued in said seat. The seat may also comprise a plurality of elements for guiding the insertion of the edge 8 in the seat itself, while at the same time keeping it at a distance from its walls.

[0013] Making reference to figures 2 and 3, it can be seen that frame 2 comprises a plurality of injection points 9, which can easily be spotted on the frame itself as well, thanks to the typical circular mark that the injection points usually leave on the frame surface.

[0014] The injection points 9, taken along the frame perimeter, are substantially equally spaced, so that when forming the frame 2, all the different fronts of molten polymeric material which is injected through the injection points 9 will join together substantially at the same time. In this way, the mechanical properties of the portions of frame 2 which are comprised between two injection points 9 are as homogeneous as possible.

[0015] Analogously to the injection points, the junctions between the various polymeric material fronts, are visible on the finished product, as the latter comprises a line having a slightly different color, corresponding to the junction line of the fronts.

[0016] Advantageously, at least some injection points 9 are located in the vicinity of corner areas 6, so that corner areas 6, which are more subject to mechanical stresses, are made with the material having the best mechanical properties. In a preferred embodiment, all corner areas 6 have, close by, one injection point 9.

[0017] Clearly, as the size of each corner area 6 also depends on its curvature radius, the words "in the vicinity of" shall be understood as also comprising the case in which injection points 9 are inside the corner areas 6.

[0018] The suitcase 1 shown in the figures comprises one frame 2 substantially quadrangular, having four corner areas 6 defining, two by two, the four sides 7 of frame 2.

[0019] In figure 5 it can be seen that, considering two consecutive sides 7, one of them comprises two injection points 9 and the other one comprises none. Clearly, such an alternation depends on the quadrangular shape of the suitcase, having two short sides 7 and two long sides 7, but it may be present with other shapes as well.

[0020] Injection points 9 divide frame 2 in a plurality of portions 11, 12, 13, 14, partially coinciding with sides 7 of suitcase 1.

[0021] In the middle point of each one of portions 11, 12, 13, 14, the suitcase 1 comprises a reinforcement member 15, 16, 17 which may be selected from the group comprising a luggage handle 15, a luggage lock 16, a luggage hinge 17.

[0022] Such reinforcement members 15, 16, 17 contribute to improve the mechanical resistance to the suitcase 1 in those areas of frame 2 where the polymeric material fronts, which are injected by two consecutive injectors 18 (injectors 18 being visible in figure 2), join, i.e. in that areas of frame 2 where the mechanical properties of the material are worst.

[0023] In other words, a reinforcement member is associated to the frame 2 in correspondence of junction lines 2.

[0024] Advantageously, one of portions 14 coincides (at least partially) with side 8 on which hinges 17 of the suitcase are located.

[0025] Preferably, portions 11, 12 and/or 13 coincide (at least partially) with sides 7 on which handles 15 and/or locks 16 of suitcase 1 are located.

[0026] Advantageously, reinforcement members 15, 16, 17 are in the middle of side 7 on which they are located, i.e. at the center of portion 11, 12, 13, 14 that they reinforce. Hinges 17, however, may also be symmetrically located with respect to the center of the side 7 on which they are located.

[0027] As may be seen in the figures, the transversal cross section of frame 2 is substantially constant along its length, at least in correspondence of injection points 9. On the other hand, close to the middle points of each portion 11, 12, 13, 14, the transversal cross section of frame 2 is substantially different.

[0028] Close to such middle points, frame 2 comprises seats 19 for receiving the reinforcement members 15, 16, 17, which have a higher transversal size.

[0029] Shell 4 thus comprises recesses 20, corresponding to seats 18, so to be correctly coupled with frame 2.

[0030] As shown in figure 2, the injection ducts comprise main ducts 21, secondary ducts 22 and end ducts 23, the latter ones being connected to injectors 18.

[0031] Cross section S1 of main ducts 21 is larger than cross section S2 of secondary ducts 22, which is in turn larger than cross section S3 of end ducts.

[0032] In a preferred embodiment $S1/S2=64/49$ e $S2/S3=49/36$.

[0033] As visible in figure 2, injectors 18, seen from above, are disposed at an angle with respect to the direction of secondary ducts 22. In figure 3 can also be seen angle ALFA, formed by the two injectors 18 which, together, define portion 11, i.e. the one comprising hinges 17 as reinforcement members, and angle BETA, formed by the other injectors 18.

[0034] Injection points 6 are thus not symmetrical to an axis which passes through the center of the shorter suitcase sides 7, while they are symmetrical to an axis which passes through the center of the longer suitcase sides 7.

[0035] Conveniently, ALFA is different from BETA; more particularly ALFA may be comprised between 15° e 35° , while BETA may be comprised between 10° e 35° .

[0036] Frame 2 and/or shell 3 may be made in polymeric material, preferably a thermoplastic material; suitable materials, may for instance be PE, PP, ABS, PC, PC/ABS.

[0037] In a preferred embodiment, the polymeric material is injected at a temperature comprised between 180°C e 260°C , preferably between 220° e 250° , for instance of about 240° .

[0038] Obviously, a person skilled in the art, for satisfying specific and precise needs, may make several variations and changes to the suitcase and to the method for manufacturing suitcase frames according to the invention described above. All these variations and changes will however be comprised in the scope of protection of the invention as defined in the claims below.

Claims

1. A suitcase (1) comprising a first shell (4) integral with a first frame (2) and a second shell (5) integral with a second frame (3), said first and second frames (2, 3) being articulated to each other, **characterized in that** at least one of said first and second frames (2, 3) is formed by injection molding and comprises a plurality of substantially equally spaced injection points (9).
2. A suitcase (1) as claimed in claim 1, wherein said at least one frame (2, 3) has a plurality of corner areas (6) and at least some of said injection points (9) are located in the vicinity of at least some of said corner areas (6).
3. A suitcase (1) as claimed in the preceding claims, wherein one of said injection points (9) is located in the proximity of each of said corner areas (6).
4. A suitcase (1) as claimed in the preceding claims, comprising four corner areas (6) and four respective injection points (9).
5. A suitcase (1) as claimed in any one of claims 2 to 4, wherein two successive corner areas (6) define one of the sides (7) of said suitcase (1), two successive sides (7) comprising two and none of said injection points (9) respectively.
6. A suitcase (1) as claimed in any preceding claim, wherein said injection points (9) divide said at least one frame (2, 4) into a plurality of portions (11, 12, 13, 14), said frame having a reinforcement member (15, 16, 17) at the mean point of at least one of said portions (11, 12, 13, 14).
7. A suitcase (1) as claimed in the preceding claim, wherein said reinforcement member (15, 16, 17) is selected from the group comprising: luggage locks (15), luggage handles (16), luggage hinges (17).
8. A suitcase (1) as claimed in any claim 5 or 6, wherein said at least one frame (2, 4) has a first substantially constant cross section at said injection points (9) and has a cross section substantially different from said first cross section at the mean point of said portions (11, 12, 13, 14).

9. A suitcase as claimed in any preceding claims, wherein said at least one frame (2, 4) has a substantially U-shaped seat in which the edge (8) of at least one of said shells (3, 5) is glued, said seat comprising a plurality of elements for guiding insertion of the edge (8) of said at least one shell (3, 5) and spacing it from the walls of said seat. 5
10. A suitcase (1) as claimed in any preceding claim, wherein said suitcase has two long sides and two short sides (7), said injection points (6) being arranged symmetrically with respect to an axis of symmetry passing through the centers of said long sides (7) and being arranged non-symmetrically with respect to an axis of symmetry passing through the centers of said short sides (7). 10 15
11. A method of making a frame (2, 4) for a suitcase (1) as claimed in any one of claims 1 to 9, including the steps of: 20
- (a) injection molding said frame (2, 4) with a plurality of injection points (9);
- characterized in that** 25
- said plurality of injection points (9) is equally spaced with respect to the profile of said frame (2, 4).
12. A method as claimed in the preceding claim, wherein said polymeric material is injected at a temperature from 180° to 260°. 30

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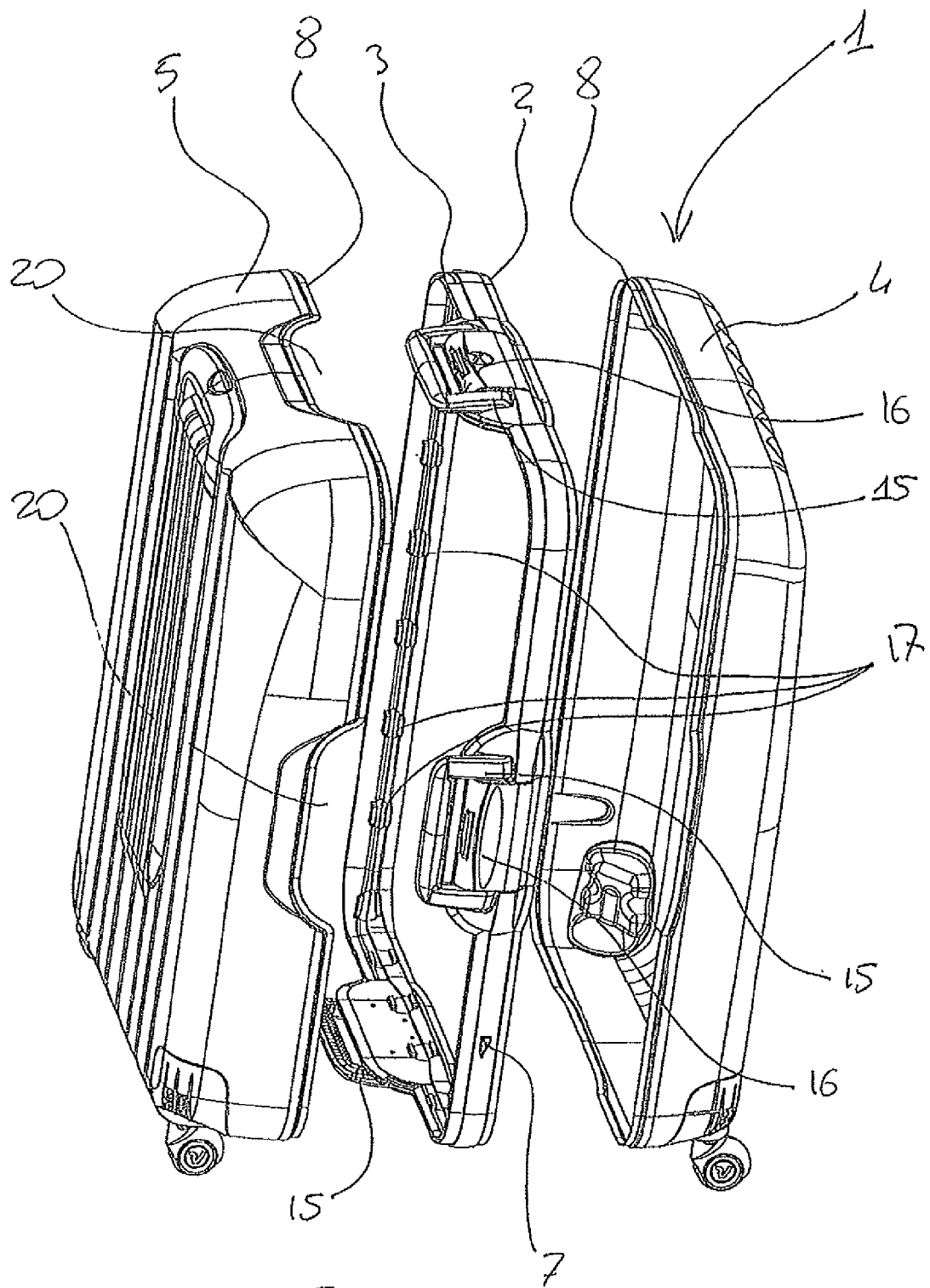


Fig. 1

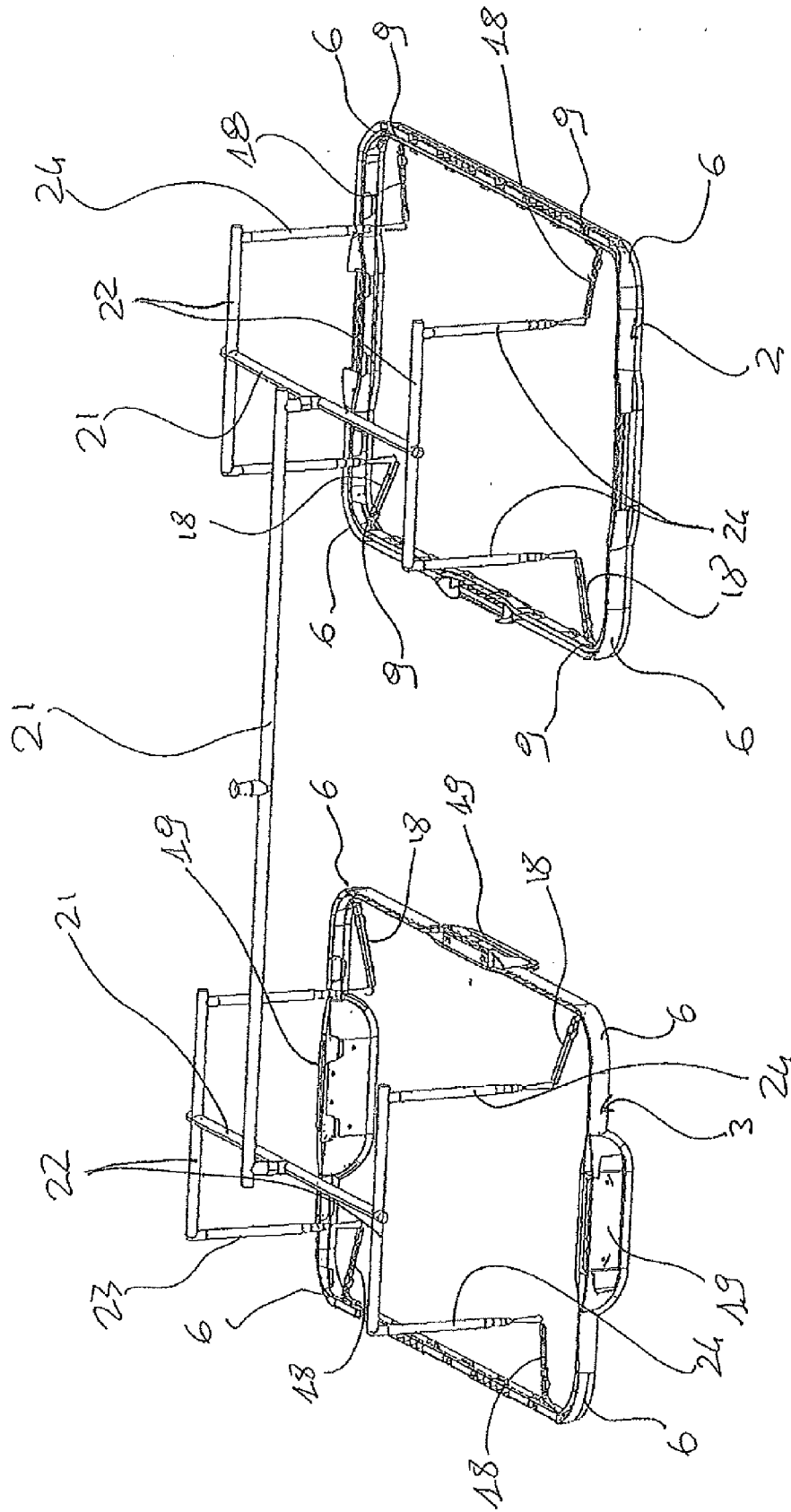
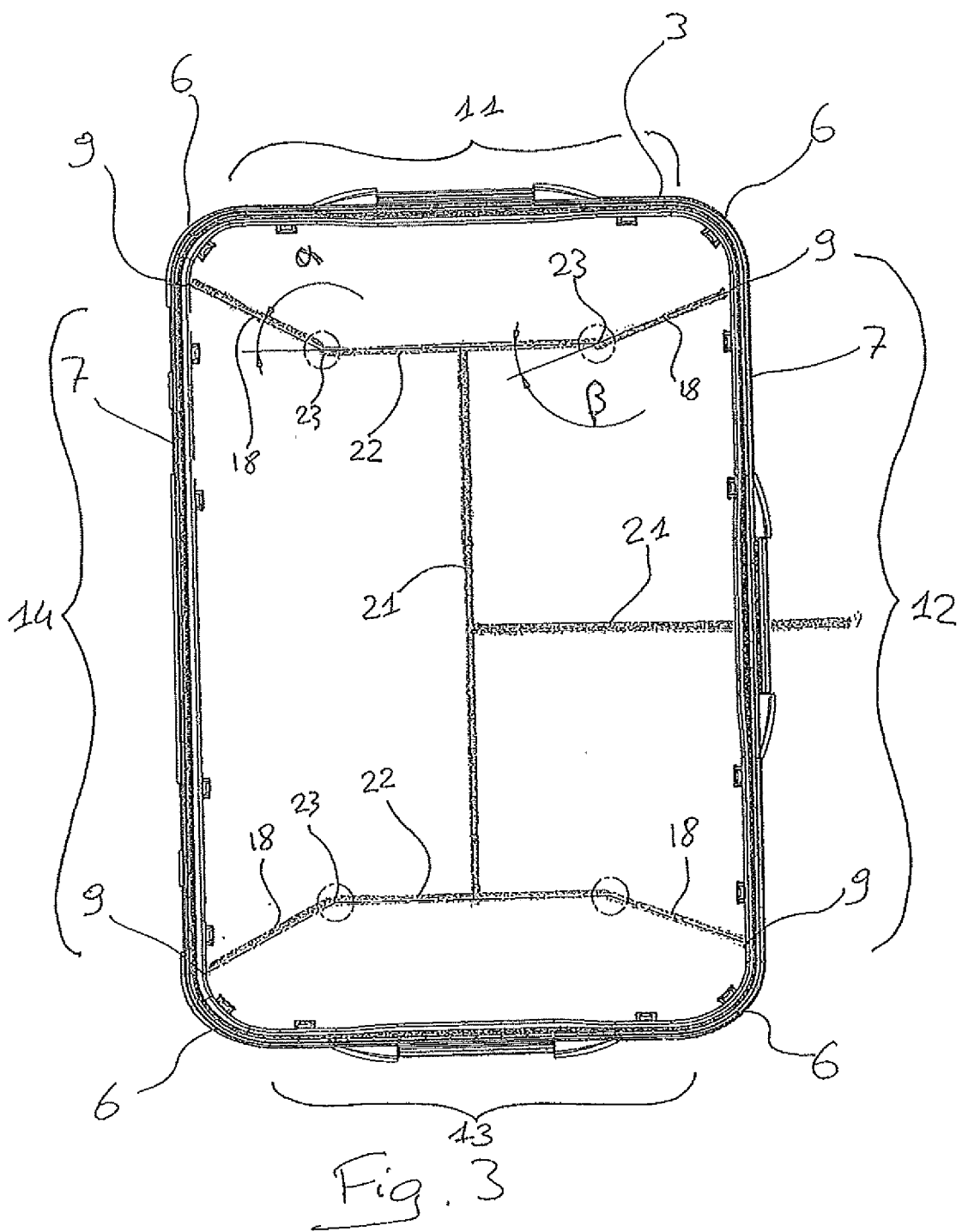


Fig. 2





EUROPEAN SEARCH REPORT

Application Number
EP 09 16 9843

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	EP 1 867 246 A1 (VALIGERIA RONCATO SPA [IT]) 19 December 2007 (2007-12-19) * paragraphs [0001], [0014] - [0026]; claims; figures *	1-12	INV. A45C13/04
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A	US 5 849 344 A (ETO YOSHINARI [JP] ET AL) 15 December 1998 (1998-12-15) * column 1, line 4 - line 12 * * column 2, line 66 - column 3, line 34; claims; figures *	1-12	
A	US 3 544 418 A (HOLTZMAN SAMUEL J) 1 December 1970 (1970-12-01) * column 1, line 14 - line 24 * * column 5, line 3 - line 70; claims; figures *	1-12	TECHNICAL FIELDS SEARCHED (IPC) A45C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 28 January 2010	Examiner Acerbis, Giorgio
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
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 16 9843

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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