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(54) **Suitcase**

(57) The present invention relates to a suitcase (1) comprising a shell (2) glued to a stiffening frame (3) by a first adhesive material (7) interposed between the shell (2) and the frame (3), wherein the suitcase also comprises second attachment means (8) that may reduce the time during which the shell (2) shall be held still with respect to the frame (3) by external means.

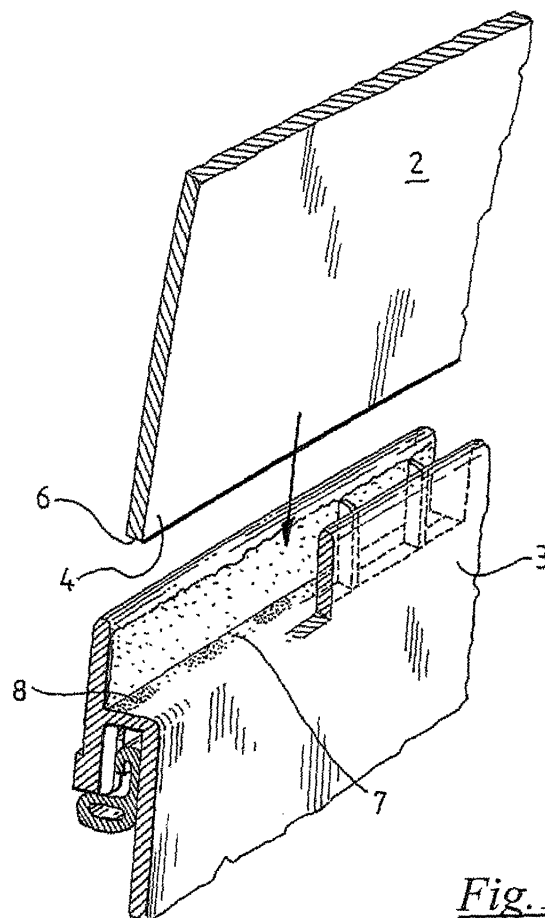


Fig. 1

Description

[0001] The present invention relates to a suitcase and more particularly a suitcase comprising rigid shells fixed to rigid frames hinged together.

[0002] These suitcases typically have two shells that substantially define their usable volume. The perimeter of these shells is fixed to respective stiffening frames, which are hinged together at one side to allow opening and closing of the suitcase.

[0003] In order to minimize the weight of the finished suitcase, EP 1 867 246, by the applicant hereof, teaches to form thin shells glued to corresponding stiffening frames.

[0004] Since the shell is a relatively heavy part of the suitcase, and its extension cannot be reduced for reasons, which are immediately apparent, in order to reduce the overall weight of the shell, it is necessary to minimize its thickness.

[0005] The suitcase weight may be minimized by gluing the shells to the frames. A limiting factor in the manufacturing process is the setting (or curing) time of the adhesive.

[0006] The adhesives that must be used to ensure a mechanical retaining action under any conditions (such as when the suitcase has a strongly compressed load, and is left in very hot or very cold environments), require the surfaces to be glued are kept still relative to each other for a relatively long time, or an insufficient adhesion will be achieved.

[0007] Therefore, there arises the need of providing a light-weight framed suitcase, i.e. comprising a rigid shell glued to a corresponding stiffening frame, which may be quickly manufactured without reducing its mechanical strength.

[0008] The object of the present invention is to at least partially fulfill the above need; this is achieved by a suitcase as defined in claim 1 and/or a method as defined in claim 12.

[0009] Further characteristics and advantages of the suitcase of the present invention will be apparent from the following description of a few preferred embodiments thereof, which are given by way of illustration and without limitation with reference to the accompanying figures, in which:

- Figure 1 shows a detail of a suitcase according to a preferred embodiment of the present invention, during insertion of the shell into its seat on the stiffening frame;
- Figure 2 shows the detail of Figure 1, after insertion;
- Figure 3 is an overall perspective view of a suitcase according to the present invention.

[0010] Referring to the figures, numeral 1 generally designates a suitcase or luggage comprising two shells 2 glued to respective stiffening frames 3 (or more simply frames 3) hinged together.

[0011] Shells 2 may be advantageously formed by deforming sheets of rigid material, so that together they define substantially the loading volume of suitcase 1.

[0012] Frames 3 may be advantageously obtained by injection molding and define the outer perimeter of suitcase 1. Seats may be formed on frames 3, for receiving the handles, the closure means and the hinges required for operation of the suitcase.

[0013] Frames 3, joined with shells 2, have the necessary stiffness to reduce the warping movements that would normally occur in the individual components, when taken separately.

[0014] While reference is simply made herein, for simplicity, to one of the frames 3 and one of the shells 2, a preferred embodiment shall be intended to use the same principles on both frames 3 and hence on both shells 2.

[0015] According to a preferred embodiment, shell 2 is fixed to its frame 3 by gluing, possibly after plasma activation, as disclosed in EP 1 867 246 A1, in the name of this applicant as well.

[0016] Shell 1 may be advantageously formed of a polymeric material, such as PE, PP, ABS, PC, PC/ABS, preferably PP, and have a thickness of less than 2.2 mm, advantageously less than 1.9 mm, e.g. about 1.6 mm; frame 3 may be advantageously formed by injection moulding from a polymeric material such as PE, PP, ABS, PC, PC/ABS, preferably PC or PC/ABS.

[0017] Frame 3 includes a seat 5 extending along the whole perimeter of frame 3; seat 5 may advantageously have a U shape and possibly comprise guide means inside, so to favor insertion of shell 2 inside it.

[0018] Shell 2 comprises an end portion 4, comprising the outer edge 6 of shell 2 and the portion of shell 2 immediately adjacent thereto.

[0019] During assembly of suitcase 1, end portion 4 of shell 2 is inserted into seat 5 of frame 3. Before such insertion, a first adhesive material 7 is interposed between frame 3 and shell 2 so that, when assembly is completed, shell 2 is firmly secured to frame 3.

[0020] For example, first adhesive material 7 may be advantageously introduced into seat 5 by a robotic tool. Seat 5 may be advantageously made according to the teachings of the application PCT/IT2008/000575, in the name of this applicant as well.

[0021] The first adhesive material 7 shall be capable of withstanding any stress that suitcase 1 may undergo, both of thermal nature (e.g. when traveling by car or plane) and of mechanical nature (e.g. with a highly compressed load of garments).

[0022] Adhesive materials are defined, amongst other things, by a parameter (the open time) representative of the time during which the two surfaces to be bonded by the adhesive material may be moved relative to each other. After such time, proper setting requires the two surfaces to be held still relative to each other for a second time period, defined as "curing time".

[0023] Among currently available adhesive materials, the curing time of those that have an optimal behavior

for this application in terms of mechanical strength, elasticity and resistance to other aggressive agents, as well as applicability to industrial processes, is above 10 minutes.

[0024] Due to the small thickness of shell 2, the assembly of shell 2 into frame 3, i.e. end portion 4 into seat 5, is performed by means of a robotic system, that can move shell 2 without warping, so that end portion 4 may fit into seat 5 substantially at the same time all along the perimeter.

[0025] For the robotic system to be disengaged from shell 2 as soon as possible, it is then useful to reduce the curing time.

[0026] Shell 2 and frame 3 are not only joined together by the first adhesive material, but also by second attachment means, other than the first adhesive material, which have the purpose of holding still relative to each other the surfaces to be glued during the manufacturing process, at least for a time equal to the curing time of first adhesive material 7.

[0027] The second attachment means may be chemical means, e.g. comprising a second adhesive material 8, advantageously having a curing time below 10 minutes; such second adhesive material may be a one-component glue, such as a hot melt glue.

[0028] In this case, shell 2 may be glued to frame 3 by interposing both first and second adhesive materials 7, 8 therebetween.

[0029] For example, first adhesive material 7 may be placed on at least 70%, preferably at least 80%, more preferably at least 90%, for example on about 95% of the length of seat 5.

[0030] Advantageously, first adhesive material 7 is placed on at most 99%, preferably on less than 97%, e.g. on less than 96% of the length of seat 5.

[0031] Advantageously, second adhesive material 8 is placed on the rest of the length of seat 5, so that either the first 7 or the second 8 adhesive material is placed all over seat 5.

[0032] Advantageously, second adhesive material 8 is placed on less than 10%, e.g. on 5% of the length of seat 5.

[0033] As a rule, the ratio (by volume, mass and/or length of the bead) of the first to second adhesive material quantities in the suitcase is more than 8.

[0034] Preferably, second adhesive material 8 is divided into a plurality of substantially identical portions, substantially equally spaced along seat 5, e.g. four, six, eight, ten or twelve portions.

[0035] Since both adhesive materials 7, 8 may be applied on the surfaces by means of special robotic dispensers, it is possible to apply first adhesive material 7 first and second adhesive material 8 immediately thereafter.

[0036] Advantageously, first adhesive material 7 (having a longer curing time) is applied by a single nozzle, which is displaced along the perimeter of seat 5, whereas second adhesive material 8 (having a shorter curing time)

may be simultaneously applied into the plurality of portions by a corresponding number of nozzles.

[0037] Thus, the robotic system that puts shell 2 onto frame 3 is only required to keep the relative position of shell 2 and frame 3 for a time corresponding to the curing time of second adhesive material 8 only.

[0038] Advantageously, first adhesive material 7 is a two-component glue, such as a polyurethane or preferably silicone glue.

[0039] Alternatively, the second attachment means may be mechanical means, for instance comprising a plurality of substantially one-dimensional fastening members (not shown) which extend through at least part of both the end portion 4 and one of the walls of frame 3 that define seat 5.

[0040] Advantageously, these second means include staples, each comprising in turn one or two of such fastening members.

[0041] For example, there may be four, six, eight, ten or twelve staples in total and/or they may be inserted from within the suitcase 1.

[0042] In this way, the fastening member will extend through at least the whole inner wall of frame 3, that defines seat 5.

[0043] Advantageously, the axis of each fastening member may be transverse but not perpendicular to the plane of end portion 4.

[0044] Those skilled in the art will obviously appreciate that a number of changes and variants may be made to the suitcase of the invention as described hereinbefore to meet specific needs, without departure from the scope of the invention, as defined in the following claims.

35 Claims

1. A suitcase (1) comprising:

- a stiffening frame (3) having a seat (5);
- a shell (2) having an end portion (4);
- said end portion (4) being received in said seat (5), a first adhesive material (7) being interposed between said end portion (4) and said seat (5) for mechanically attaching said shell (2) to said stiffening frame (3);

characterized in that

said suitcase (1) further has second attachment means, other than said first adhesive material (7) for attaching said end portion (4) to said seat (5).

2. A suitcase (1) as claimed in the preceding claim, wherein said second attachment means are chemical means.

3. A suitcase (1) as claimed in the preceding claim, wherein said second attachment means include a second adhesive material (8) other than said first

adhesive material (7).

4. A suitcase (1) as claimed in the preceding claim, wherein said first adhesive material (7) is a silicone glue and/or said second adhesive material (8) is a hot melt glue. 5
5. A suitcase (1) as claimed in any one of claims 3 and 4, wherein said second adhesive material (8) is applied along a portion of said seat (5) which has an overall length which is less than 10%, preferably less than 5% the length of said seat (5). 10
6. A suitcase (1) as claimed in any claim from 3 to 5, wherein said second adhesive material (8) is applied to a plurality of substantially equal and/or substantially equally spaced portions along said seat (5). 15
7. A suitcase (1) as claimed in claim 1, wherein said second attachment means are mechanical means. 20
8. A suitcase (1) as claimed in the preceding claim, wherein said second attachment means comprise substantially one-dimensional fastener members which at least partially extend through one of the walls of said frame (3) that define said seat (5) as well as at least partially extend through said end portion (4), so as to prevent said end portion (4) from sliding with respect to said seat (5). 25
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9. A suitcase (1) as claimed in the preceding claim, wherein said fastener members extend through the inner wall of said frame (3).
10. A suitcase (1) as claimed in any preceding claim, wherein the thickness of said shell (2) is less than 2.5 mm. 35
11. A suitcase (1) as claimed in any preceding claim, wherein said shell (2) is formed from a polymeric material, preferably selected from the group comprising: PE, PP, ABS, PC, PC/ABS. 40
12. A method of making a suitcase (1) as claimed in any preceding claim, including the steps of: 45
 - (a) forming said shell (2) comprising said end portion (4);
 - (b) forming a stiffening frame (3) comprising said seat (5); 50
 - (c) applying a first adhesive material (7) between said seat (5) and said end portion (4).
 - (d) introducing said end portion (4) into said seat (5); 55

characterized in that

said method further includes the step of:

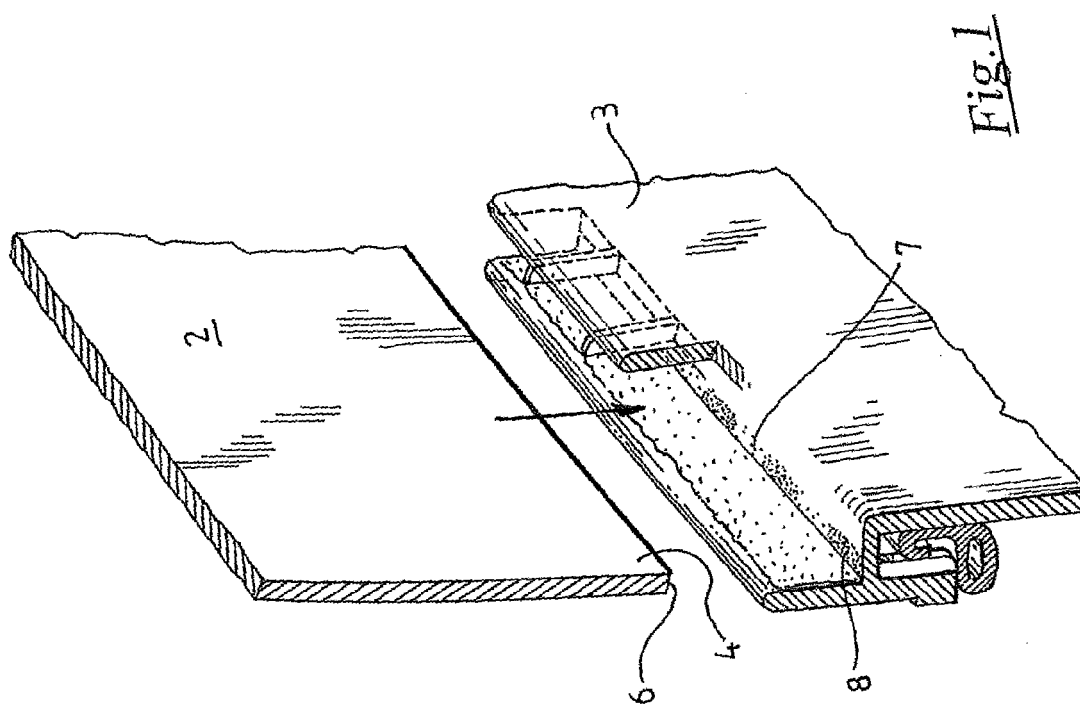
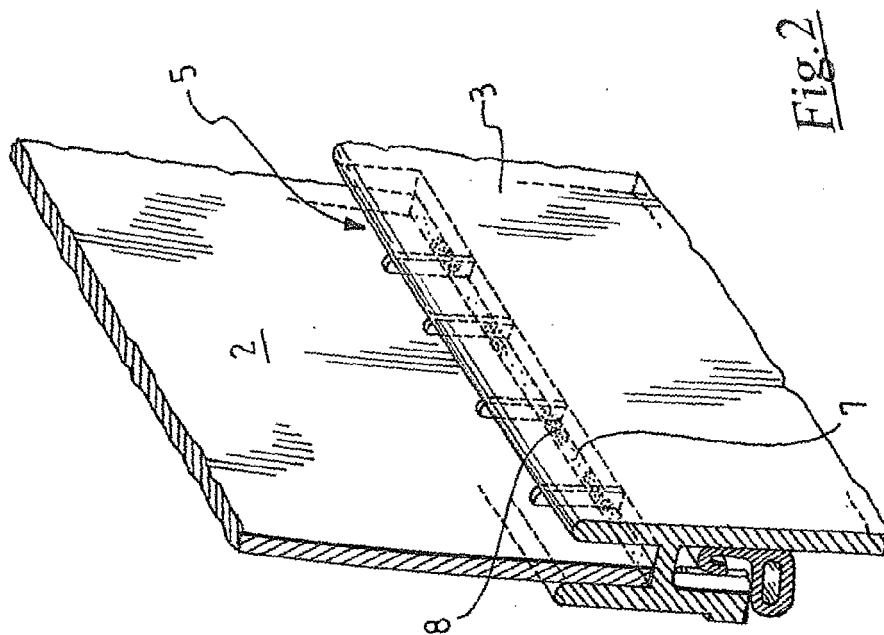
(e) attaching said end portion (4) to said seat (5) by second attachment means, other than said first adhesive material (7).

13. A method as claimed in the preceding claim, wherein said second attachment means are chemical means and the method includes the step of:

(c2) applying a second adhesive material (8) between said seat (5) and said end portion (4)

before the step (d) but after the steps (a) and (b).

14. A method as claimed in claim 12, wherein said second attachment means are mechanical means and the step (e) occurs after the step (d).



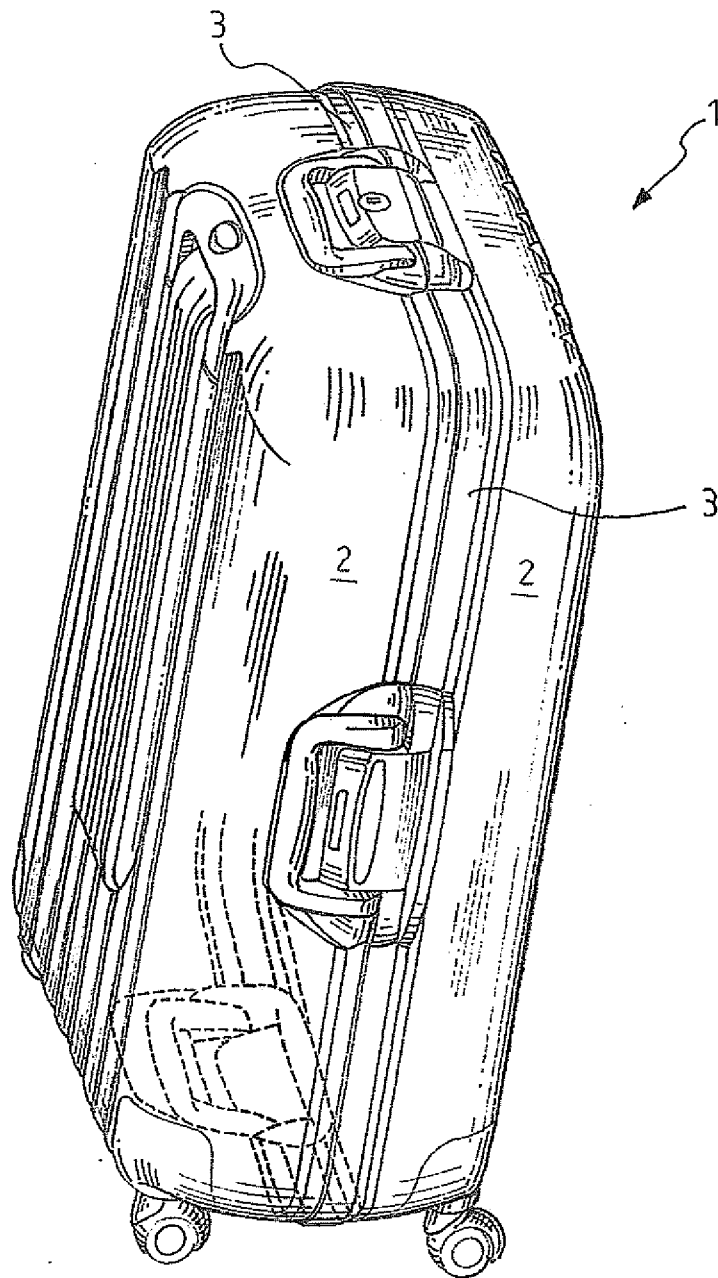


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 09 17 1281

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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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			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 3 February 2010	Examiner Nicolás, Carlos
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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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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