



(51) International Patent Classification:
B60R 13/02 (2006.01)

(21) International Application Number:
PCT/US2011/041573

(22) International Filing Date:
23 June 2011 (23.06.2011)

(25) Filing Language: English

(26) Publication Language: English

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

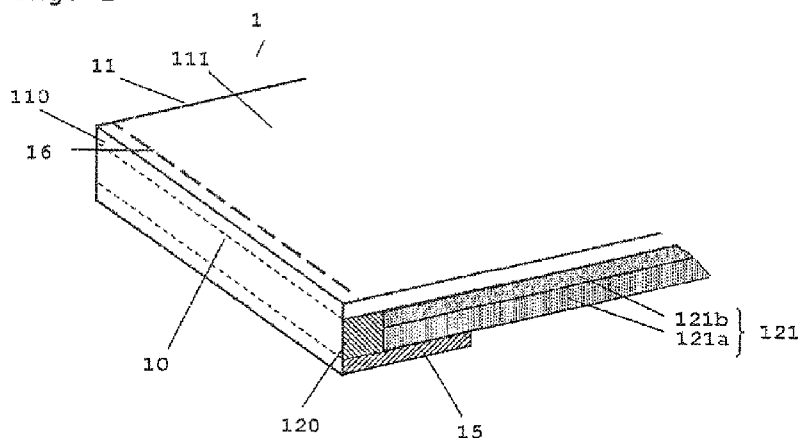
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: INTERIOR COMPONENT HAVING A DECORATIVE CUT EDGE, AND PROCESS FOR THE PRODUCTION THEREOF

Fig. 1



(57) Abstract: The present invention relates to an interior component (1) having a decorative layer (11) which has a visible side (111) and a visible edge (110) arranged in the border region of the visible side at an angle thereto, a support structure (12) being arranged on the back of the decorative layer (11), the decorative layer (11) and the support structure (12) being bonded together, and the support structure (12) having at least a core region (121) and a border region (120), the border region (120) being in such a form that, with the visible edge (110) of the decorative layer (11), it forms a common, visible decorative cut edge (10) of the interior component (1), and to a process suitable for the production of the above-mentioned interior component.



**Interior component having a decorative cut edge,
and process for the production thereof**

TECHNICAL FIELD

The present invention relates to an interior component, especially for fitting in a motor vehicle, having a decorative cut edge (trimming edge) arranged on the interior component, and to a process suitable for the production of the component.

PRIOR ART

It is known to cover interior components for motor vehicles with leather layers in order to achieve a surface design with a high-quality appearance. Generally, a decorative layer in the form of a leather layer or imitation leather is applied via a bonding agent layer to a substrate of plastics material or compressed natural fiber mats. The leather layer has a maximum thickness of about 1.5 mm so that the desired radii can be produced, in particular at the edges of the three-dimensionally shaped interior component. A soft layer of a foam or a textile material can be arranged as a soft-touch layer between the decorative layer and the substrate.

In the interior components known hitherto, the decorative layer has an overlap in the region of the component borders. This overlap is used to form an edgefold in the region of the component borders (component edges) and thus hide the soft-touch layer which may be present, but in particular the substrate layer, from the observer's view. The edgefolding operation can be automated to only a limited extent, depending on the geometry of the component, and can result in wrinkling on the decorative side, depending on the quality of

the execution. Furthermore, it must be ensured that the edgefold region is secured in a manner that satisfies the demands made in the case of motor vehicles, without the decorative layer becoming detached in the region of the component edges during the lifetime of the vehicle.

German utility model DE 20 2008 007 213 U1 discloses a check card case which can consist of two rectangular layers of leather joined together, for example sewn, to form a receiving space. The two layers have at their periphery a so-called smoothed leather cut edge, as is also known, for example, in the production of leather-covered suitcases or bags made of leather.

DESCRIPTION OF THE INVENTION

The object of the present invention is to provide an interior component, in particular for a motor vehicle, which has a decorative cut edge in the border region of the component.

It is the object of the invention in particular to optimize the layer structure of the component for forming the decorative cut edge in such a manner that the conventional decorative and soft-touch layers can continue to be used and the quality and functionality of the interior component in the regions without a decorative cut edge accordingly remain unimpaired. The decorative cut edge according to the invention can impart a craftsman-like nature to the interior component and, depending on the materials used, additional possibilities can be created for providing attractive designs or, where appropriate, for integrating functional components.

The object of the present invention is achieved by a component according to the features of the first claim.

A process for the production of a component according to the invention is to be found in claim 11.

The interior component according to the invention can be a structural component arranged in the interior of a vehicle, such as an instrument panel, a central console or a lining for a vehicle door or for the roof of the vehicle, or it can be a decorative element arranged in one of the above-mentioned structural components.

According to the invention, the interior component comprises a decorative layer which has a visible side and a visible edge arranged in the border region (edge region) of the visible side at an angle thereto. On the back of the decorative layer there is arranged a support structure, which is bonded to the decorative layer. The support structure has at least a core region and a border region, wherein the border region is such that it forms with the visible edge of the decorative layer a common, visible decorative cut edge of the interior component.

The decorative layer can preferably be a layer of leather or an imitation leather. However, other decorative layers used in the production of interior components for vehicles can also be employed, for example textiles or foils of plastics materials, such as polyolefin or PVC foils. The thickness of the decorative layer is a maximum of 1.4 mm.

The decorative layer can also be a so-called "sewn covering". The sewn covering is produced from a plurality of pieces of one or more decorative materials. The result is a sewn covering having a three-dimensional shape which already has the shape, or approximately the shape, of the interior component to be produced.

Bonding of the pieces to form a sewn covering is carried out by joining processes, such as, for example, sewing, fusion bonding, adhesive bonding, compression, stapling, force-fitting, material-bonded and form-fitting processes. In other

words, the production of a "sewn covering" is here not intended to be limited to joining processes which comprise a sewing process in the conventional sense.

Such sewn coverings are suitable in particular when the decorative layer is to be applied to a support structure with a complex geometry.

In an alternative embodiment variant, the decorative layer can also be pre-shaped three-dimensionally by other means, for example by a deep-drawing process or by high-pressure forming.

All or part of the decorative layer can be colored or printed in one or more colors or can consist of pieces of different colors. For bonding to the support structure, a layer of a bonding agent, for example a hot-melt adhesive or a water-based adhesive, can be provided on the back of the decorative layer.

The core region of the support structure has at least one substrate layer. The substrate layer can consist of a plastics material, such as, for example, polypropylene (PP), which can additionally be reinforced by fibers, for example glass fibers (PP-GF). Other suitable plastics materials, such as acrylonitrile-butadiene-styrenes (ABS), polycarbonates (PC) or polyacryls (PA), and mixtures thereof, likewise come into consideration. Alternatively, the core region of the support structure can also be formed of compressed natural fibers (for example hemp, kenaf, bulrush, etc.), which are embedded in a plastics matrix (for example acrylates, polyolefins, etc.).

The core region can additionally have a soft-touch layer, which is arranged adjacent to the decorative layer. The soft-touch layer can be a foam, for example of a polymer. In order to form the soft-touch layer from a foam, a material can be

applied in liquid form to the substrate layer, which material subsequently expands and forms the soft-touch layer.

Preference is given to a low-energy foam. Alternatively, it is, of course, also possible to use a layer of a cut foam or a foam layer which has been produced beforehand by other means in a separate tool.

The soft-touch layer is preferably a textile layer, for example of a knitted fabric, woven fabric, fabric complex, lattice or nonwoven.

The soft-touch layer can be bonded to the substrate layer by an adhesive bonding process. Alternatively, the soft-touch layer has fastening elements on the back with which it can be bonded in a form-fitting manner to the substrate layer.

In a particularly preferred embodiment variant, part of the back of the soft-touch layer is impregnated with a polymer as stiffening material. The stiffening material is introduced into the soft-touch layer in such a manner that the soft-touch layer is at least partially stiffened, the depth of introduction of the stiffening material always being such that a soft-touch zone is maintained on the side of the soft-touch layer facing the decorative layer. In this embodiment variant, an additional substrate layer can be omitted.

The border region of the support structure surrounds the core region at least in regions. The border region can be provided on one or more sides of the core region or, preferably, can surround the core region completely in the form of a frame. The border region can consist of one or more parts. Preferably, it is a single component, in order to avoid visually disadvantageous cut edges in the regions in which several parts are bonded together.

The border region preferably consists of a material having a density distribution that is anisotropic, in particular that

increases constantly, relative to the layer thickness, preferably of a leather and particularly preferably of an unsplit full-grain leather with grain side and flesh side. It has been found to be particularly advantageous to arrange the grain side of the leather, i.e. the side with the greatest density, adjacent to the decorative layer. By means of such an embodiment, sinking of the decorative layer in the border region of the component can permanently be avoided in a simple manner.

Alternatively, the border region can also be formed of an imitation leather or a plastics material which has been given a decorative form by other means.

In an alternative embodiment of the invention, the border region consists of a layer structure comprising a plurality of layers. It is thereby possible for the individual layers to consist of almost any suitable material (leather, plastics materials, compressed natural fiber mats, papers and cardboards, etc.). Special design effects of the decorative edge can thereby be achieved by the structure and coloring of the individual layers. Preferably at least one of the layers is in the form of a functional layer and serves, for example, to illuminate the vehicle interior, for example to form a so-called night design.

The border region and the core region of the support structure are preferably bonded together by means of bonding agent layers. The core region can have a projecting portion adjacent to the decorative layer and/or on its back. The border region is correspondingly L- or U-shaped, in the form of a tongue-and-groove connection, and the limbs of the border region enclose the core region in a form-fitting manner. As a result, bonding of the border region and the core region can be made more intimate.

In a particularly preferred embodiment variant, the border region and the core region are bonded together in a form- and force-fitting manner in the form of a dovetail connection. Such an embodiment is particularly suitable when the border region is to be located on only one side of the core region and the interior component according to the invention consequently has a decorative cut edge on only a part of its periphery.

In a further preferred embodiment, both the border region and the core region of the support structure consist of compressed natural fiber mats. The border region and the core region are preferably in integral form, the border region of the support structure being colored, preferably in a shade matched to the decorative layer.

The maximum thickness of the border region is 6 mm. The width of the border region is a maximum of 15 mm, preferably a maximum of 10 mm.

A strip-like fixing element is preferably provided on the back of the support structure for additionally stabilizing and bonding the border and core regions. The fixing element is bonded to both the border region and the core region by an adhesive layer. The support structure can have a projecting portion on the back for receiving the fixing element.

The maximum thickness of the fixing element is 2 mm. The maximum width of the fixing element corresponds approximately to twice the width of the border region of the support structure. The fixing element is preferably made of a leather.

An edge of the fixing element together with an edge of the border region and the visible edge of the decorative layer preferably forms the decorative cut edge.

The decorative cut edge can have any suitable geometry in cross-section. In a very simple embodiment, the contour of the decorative edge is formed by a punching operation carried out perpendicularly to the decorative layer. However, the decorative cut edge can also extend at a different angle, preferably greater than 90°, relative to the decorative layer. Alternatively, it is possible by means of suitable trimming, for example with a milling cutter, to provide the decorative cut edge with a contour that is concave or convex in cross-section.

In a preferred embodiment variant, the decorative layer and the support structure can additionally be bonded together in a force-fitting manner by means of a seam. The seam thereby bonds the decorative layer at least to the border region of the support structure. Preferably, the seam bonds the decorative layer to the border region and to the core region of the support structure. If a fixing element is provided on the back of the support structure, the seam can additionally pass through the fixing element. The seam not only serves to bond the individual elements together but additionally gives the interior component a high-quality appearance.

The process suitable for the production of an interior component according to the invention having a decorative cut edge has the following steps:

- a) inserting a border region of a support structure into a mold half of a laminating tool;
- b) inserting a core region of a support structure into the border region arranged in the mold half of a laminating tool;
- c) inserting a decorative layer for covering the support structure in the laminating tool;

- d) compressing the above-mentioned elements in the laminating tool;
- e) bonding the above-mentioned elements in the laminating tool, in particular by means of bonding agent layers arranged between the elements;
- f) trimming the composite produced in step e) at the border to form the decorative cut edge.

Trimming of the border can be carried out, for example, using a punching tool arranged in the device. Alternatively, trimming can be carried out outside the device, after removal of the composite, by means of a separate cutting, milling, punching or grinding process.

In a subsequent step, the decorative cut edge can be sealed, for example with a suitable polymer.

In a subsequent step, the composite can further be provided with a seam which is arranged at a distance from the border of the composite. When the interior component is to be provided with a fixing element arranged on the back of the support structure, the fixing element is positioned in the mold half of the laminating tool prior to step a).

In an embodiment variant of the invention in which the decorative layer is in the form of a sewn covering, a modified production process is used. In this case, the individual pieces that form the sewn covering are each bonded to the border region of a support structure according to the process steps described above. However, the core region of the support structure that is used is a spacer, which in a subsequent process step can be removed again from the piece provided with a (partial) decorative cut edge. A plurality of pieces of the decorative layer with or without a decorative cut edge are subsequently bonded together (e.g. sewn) to form

a sewn covering. The pieces having a decorative cut edge are thereby so positioned that the decorative cut edges are arranged in border regions of the sewn covering, for example at the outer periphery of the sewn covering or adjacent to cut-outs in the sewn covering. The sewn covering so produced is then applied to a core region of a support structure which largely has the final contour of the interior component to be produced.

By means of the above-described process a novel interior component according to the invention having a decorative cut edge can be produced in a simple manner using means known to the person skilled in the art.

BRIEF DESCRIPTION OF THE FIGURES

Fig. 1 shows a schematic top view of a portion of an interior component (1) according to the invention having a decorative cut edge (10)

Fig. 2 to Fig. 6 show schematic sectional views of alternative embodiments of the interior component (1) according to the invention

Fig. 7 to Fig. 10 show schematic sectional views of selected process steps in the production of an interior component (1) according to the invention in a device suitable for that purpose having a first and a second mold half (20, 30)

WAYS OF CARRYING OUT THE INVENTION

The interior component (1) having a decorative cut edge (10) shown in Fig. 1 consists of a decorative layer (11), for example a leather layer, which has a visible side (111) facing an observer, for example an occupant of a vehicle. The decorative layer (11) additionally has a visible edge (110) which likewise lies in the field of vision of the observer.

The thickness of the decorative layer (11) is a maximum of 1.4 mm. The decorative layer (11) is supported by a support structure (12).

The support structure (12) consists of a core region (121) and a border region (120).

The border region (120) has a side which, together with the visible edge (110) of the decorative layer (11), forms the decorative cut edge (10). The layer thickness of the border region (120) is a maximum of 6 mm. The width of the border region (120) is from 1 to 10 mm, preferably from 2 to 5 mm.

In the exemplary embodiment shown, the core region (121) of the support structure (12) consists of a dimensionally stable, preferably rigid, substrate layer (121a) and a soft-touch layer (121b) arranged adjacent to the decorative layer (11). The substrate layer (121a) can consist of a plastics material, such as, for example, polypropylene (PP), which can additionally be reinforced by fibers, for example glass fibers (so-called PP-GF). Fastening elements (not shown) for connecting the interior component (1) to the vehicle bodywork or for the mounting of additional components (for example an airbag module) can be formed on the substrate layer (121a). The soft-touch layer consists of a foam layer, preferably of a low-energy foam applied to the substrate layer. A fixing element (15) is arranged on the side of the support structure (12) that is remote from the decorative layer (11). The fixing element is a flat strip of material having a maximum thickness of 2 mm and a width which corresponds approximately to twice the width of the border region (120). In the exemplary embodiment shown here, the edge of the fixing element (15) that extends parallel to the visible edge (110) of the decorative layer (11) is so arranged that that edge likewise forms part of the decorative cut edge (10). In order to achieve a uniform design of the decorative cut edge (10),

the fixing element (15) is produced from the same material as the decorative layer (11).

The decorative layer (11), the individual elements of the support structure (12) and the fixing element (15) are each bonded together by layers of an adhesive arranged on the contact surfaces.

In addition, a seam (16) is provided at the border of the interior component (1) in the region of the decorative cut edge (10), which seam (16) bonds the decorative layer (11) to the border region (120) of the support structure (12) and to the fixing element (15).

Fig. 2 shows a schematic sectional view of an alternative embodiment of the interior component (1) according to the invention having a decorative cut edge (10). In contrast to the exemplary embodiment described above, the support structure (12) has a core region (121) which consists solely of a dimensionally stable substrate layer (121a). The core region (121) has on its back, on the side facing the border region (120), a cut-out which serves to receive the fixing element (15). Between the fixing element (15) and the decorative layer (11) there is the border region (120) of the support structure (12), the size of which corresponds to the cut-out. In the exemplary embodiment shown here, the support structure (12) consists of compressed natural fiber mats which are embedded in a plastics matrix. At least the border region (120) is matched in terms of color to the decorative layer (11) and/or the fixing element (15). Coloring can be achieved by dyeing the natural fibers or alternatively by means of a colored matrix material. The color corresponds to the color of the decorative layer (11) and/or of the fixing element (15) or, alternatively, forms a contrast with the colors thereof that is harmonious to the observer. The edges of the above-mentioned elements that are visible to the

observer when the interior component (1) is in the fitted state from the decorative cut edge (10).

Fig. 3 shows a further alternative embodiment of the interior component (1) having a decorative cut edge (10). The core region (121) and the border region (120) are bonded together in a form-fitting manner by a tongue-and-groove connection. In this embodiment, the support layer consists of a blend of acrylonitrile-butadiene-styrene with polycarbonate (ABS-PC). The border region (120) consists of a transparent or translucent material. In the border region, light is coupled in, for example at the end, via a light source (not shown), at least some of which light can be emitted via the decorative cut edge (10). The individual elements are bonded together by bonding agent layers.

The alternative embodiment variant of the invention shown schematically in section in Fig. 4 shows a support structure (12) in which the core region (121) is bonded to the border region (120) in a form- and force-fitting manner by a so-called dovetail connection. The decorative layer (11) is bonded to the support structure by a bonding agent layer and is additionally connected to the border region (120) of the support structure (12) by a seam (16). The embodiment shown in this figure is particularly suitable when the decorative cut edge (10) is to be arranged only on a part of the periphery of the interior component.

Fig. 5 shows a schematic sectional view of a further embodiment variant of the interior component (1) according to the invention having a decorative cut edge (10). The decorative layer (11) is again arranged on the support structure (12). This consists according to the invention of a core region (121) and a border region (120), the border region (120) in the variant shown constituting an L-shaped profile in cross-section. Adjacent to the decorative layer (11), the core region (121) has a cut-out in which at least

one limb of the L-shaped profile of the border region (120) is arranged. Of course, it is in principle also conceivable for the cut-out in the core region (121) to be arranged according to Fig. 2 on the side that is remote from the decorative layer (11). In this example, the border region is composed of a plurality of layers, for example of leather, which are bonded together, the width of the layers in the first limb being smaller than the width of the layers in the second limb perpendicular thereto. Owing to the layer structure of the border region (120), special design effects can be achieved or functional layers can be integrated. A fixing element (15), which can likewise be made of leather, is arranged on the back of the support structure (12). The above-mentioned elements are bonded together by means of bonding agent layers. In addition, a seam (16) is provided, which seam (16) bonds the decorative layer (11) and the fixing element (15) to the support structure (12) in such a manner that the seam passes through both the border region (120) and the core region (121) of the support structure (12). The sides of the border region (120) and of the fixing element (15) that are parallel to the visible edge (111) of the decorative layer (11) form the decorative cut edge (10).

A further embodiment variant of the invention is shown in Fig. 6. In the embodiment variant shown, the border region (120) of the support structure (12) has a T-shaped profile. The outside edge of the cross-piece of the T-shaped profile, together with the visible edge (111) of the decorative layer (11) and the side of the fixing element that extends parallel thereto, forms the decorative cut edge (10) of the interior component (1). The core region (121) of the support structure (12) consists of a substrate layer (121a) and a soft-touch layer (121b) which enclose the portion of the T-shaped profile of the border region (120) that projects perpendicularly to the cross-piece. To that end, the substrate layer has a correspondingly shaped cut-out at the border. The decorative layer (11), the soft-touch layer

(121b), the border region (120), the substrate layer (121a) and the fixing element (15) are bonded together by a seam (16).

Fig. 7 to Fig. 10 show schematic sectional views of selected process steps in the production of an interior component (1) according to the invention in a device suitable for that purpose, for example a laminating device, having a first and a second mold half (20, 30). Fig. 7 shows a lower mold half (20) of a laminating tool with centering pins (21) arranged therein. A fixing element (15), the position of which is determined by means of the centering pins (21), is arranged in the mold half (20). In the exemplary embodiment shown, the mold half (20) has a cut-out at the border, in which the fixing element (15) is arranged. Fig. 8 shows a state in which, in addition to the fixing element (15), the remaining layers of the interior component (1) are inserted in the mold half. The border region (120) of the support structure (12) is positioned adjacent to the fixing element (15) with the aid of the centering pins (21). The core region (121) of the support structure (12) is then introduced into the mold half. In the exemplary embodiment shown, the border region (120) forms a frame-like structure and the core region (121) is fitted inside the frame. The core region (121) consists of a substrate layer (121a) arranged adjacent to the fixing element (15), and a soft-touch layer (121b) positioned above it. The layer structure is completed by the decorative layer (11). Some of the above-mentioned elements have been coated with a hot-melt adhesive beforehand. At least at each contact surface between two elements, one of the elements has an adhesive coating.

Fig. 9 additionally shows an upper mold half (30) with the aid of which the layer structure is compressed by displacement of the mold half (30) in the direction towards the layer structure. In addition, the hot-melt adhesive arranged between the elements of the layer structure is then

activated by energy sources (not shown) arranged in the mold halves. In the exemplary embodiment shown, the upper mold half (30) has a cutting device (31) which, after bonding of the elements and opening of the device, can be displaced relative to the layer structure and trims the layer structure at the border to form the decorative cut edge (10) (Fig. 10). The interior component (1) having a decorative cut edge (10) can then be removed from the device.

Patent Claims

1. Interior component (1) having a decorative layer (11) which has a visible side (111) and a visible edge (110) arranged in the border region of the visible side at an angle thereto,

wherein a support structure (12) is arranged on the back of the decorative layer (11),

the decorative layer (11) and the support structure (12) are bonded together,

characterized in that

the support structure (12) has at least a core region (121) and a border region (120), wherein the border region (120) is such that it forms with the visible edge (110) of the decorative layer (11) a common, visible decorative cut edge (10) of the interior component (1).

2. Interior component (1) according to claim 1, characterized in that the decorative layer (11) and the support structure (12) are bonded in a force-fitting manner, in particular by means of a seam (16).

3. Interior component (1) according to any one of the preceding claims, characterized in that the core region (121) of the support structure (12) is formed of at least one dimensionally stable substrate layer (121a) and a soft-touch layer (121b) arranged adjacent to the decorative layer (11).

4. Interior component (1) according to any one of the preceding claims, characterized in that the core region (121) and the border region (120) of the support structure (12) are bonded together in a form- and/or force-fitting manner.

5. Interior component (1) according to claim 4, characterized in that the core region (121) has a groove or a tongue on its side facing the border region (120), and the

border region (120) has a shape corresponding thereto on its side facing the core region (121).

6. Interior component (1) according to claim 5, characterized in that the core region (121) is bonded to the border region (120) in a force-fitting manner, in particular by means of a correspondingly shaped undercut in the core region (121) and/or border region (120) and/or a seam (16) that bonds the core region (121) and the border region (120).

7. Interior component (1) according to any one of the preceding claims, characterized in that a fixing element (15) is arranged, preferably adhesively bonded, on the side of the support structure (12) that is remote from the decorative layer (11), which fixing element (15) bonds together the core region (121) and the border region (120) of the support structure (12).

8. Interior component (1) according to any one of the preceding claims, characterized in that the decorative layer (11) is a natural leather layer or an imitation leather made of plastics material.

9. Interior component (1) according to any one of the preceding claims, characterized in that the border region (120) of the support structure (12) consists of a material having a density distribution that is anisotropic, in particular that increases constantly, relative to the layer thickness, preferably of a leather or an imitation leather material made of plastics material.

10. Interior component (1) according to claim 9, characterized in that the side of the border region (120) having the greatest density is arranged adjacent to the decorative layer (11).

11. Process for the production of an interior component (1) having a decorative cut edge (10), comprising the following steps

- a) inserting a border region (120) of a support structure (12) into a mold half (20) of a laminating tool;
- b) inserting a core region (121) of a support structure (12) into the border region (120) arranged in the mold half (20) of a laminating tool;
- c) inserting a piece or a sewn covering of a decorative layer (11) for covering the support structure (12) in the laminating tool;
- d) compressing the above-mentioned elements in the laminating tool;
- e) bonding at least the border region (120) with the piece or with the sewn covering of a decorative layer (11) in the laminating tool, in particular by means of bonding agent layers;
- f) trimming the composite produced in step e) at the border to form the decorative cut edge (10).

12. Process according to claim 11, characterized in that the composite is sealed in the region of the decorative cut edge (10).

13. Process according to either claim 11 or claim 12, characterized in that the composite produced in step e) is provided with a seam (16) located at a distance from the border of the composite.

14. Process according to any one of claims 11 to 13, characterized in that, prior to step a), a fixing element (15) is inserted into one mold half of the laminating tool.

15. Process according to any one of claims 11 to 14, characterized in that the core region (121) of the support structure (12) used in step b) is a spacer which is removed from the composite following step e).

16. Process according to claim 15, characterized in that a plurality of pieces of a decorative layer (11) are bonded to form a sewn covering, the pieces having a decorative cut edge being so positioned that the decorative cut edges are arranged in border regions of the sewn covering.

17. Process according to claim 16, characterized in that the sewn covering is applied to a core region (121) of a support structure (12) and is bonded thereto, which core region (121) largely has the final contour of the interior component.

Fig. 1

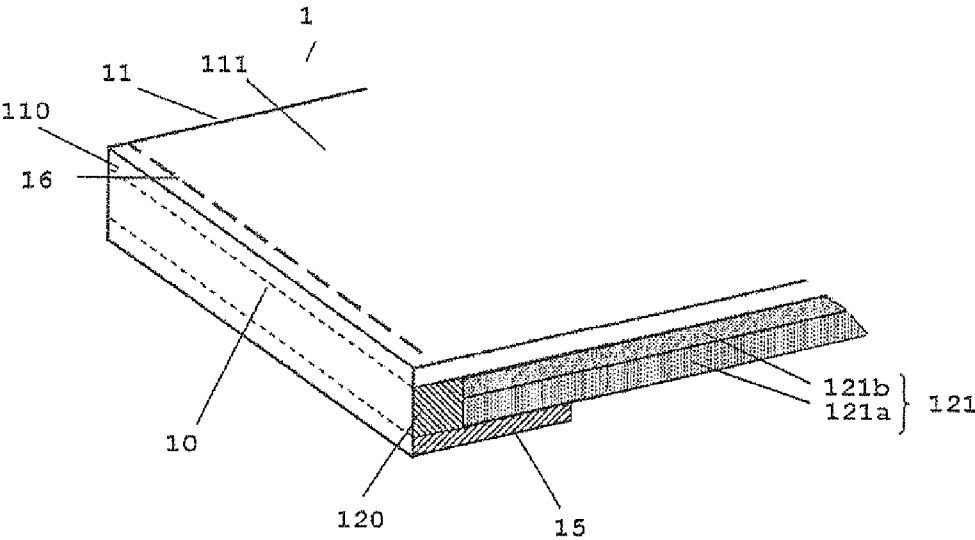


Fig. 2

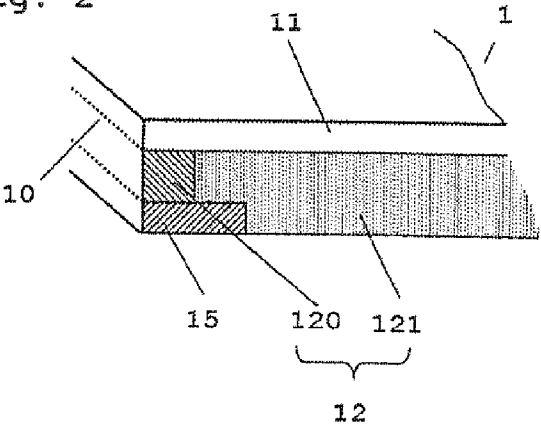


Fig. 3

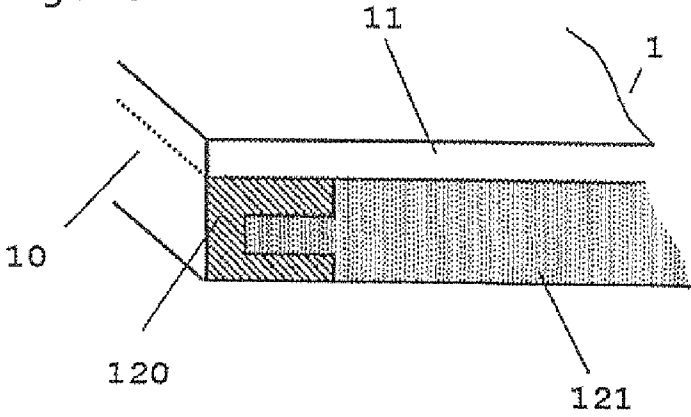


Fig. 4

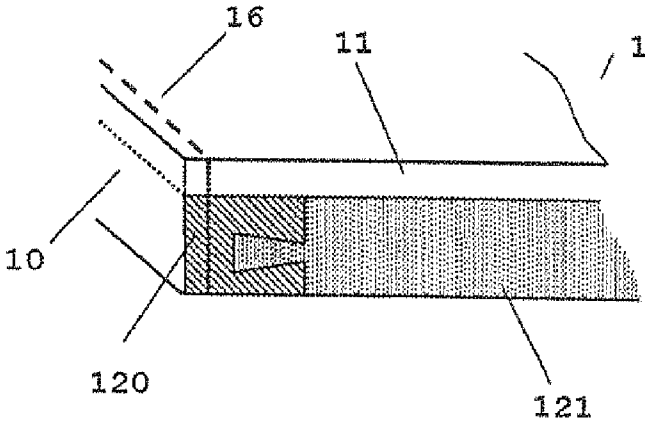


Fig. 5

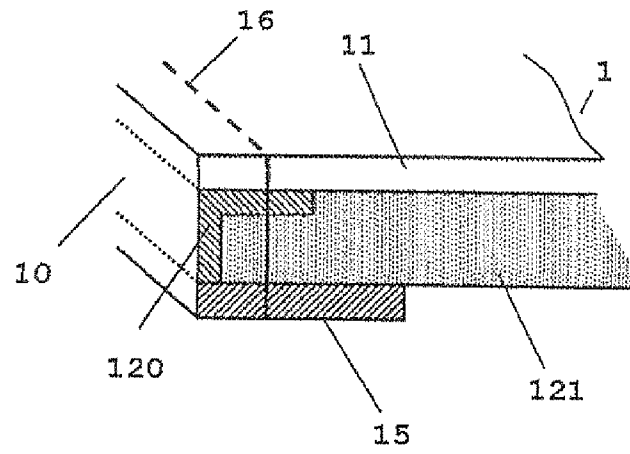


Fig. 6

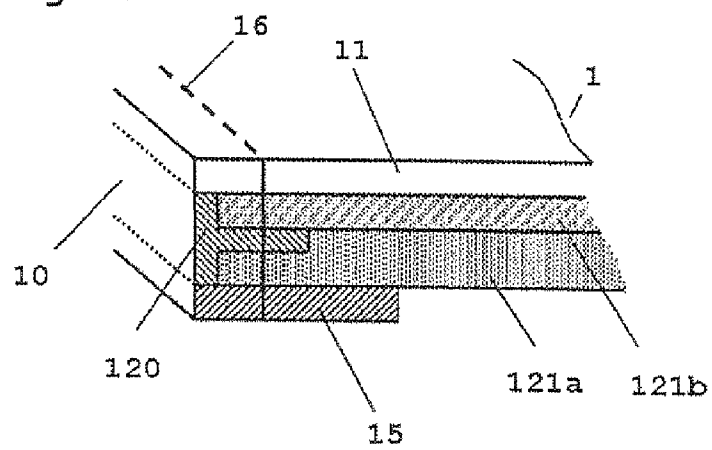


Fig. 7

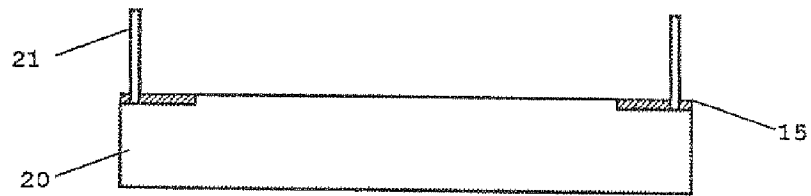


Fig. 8

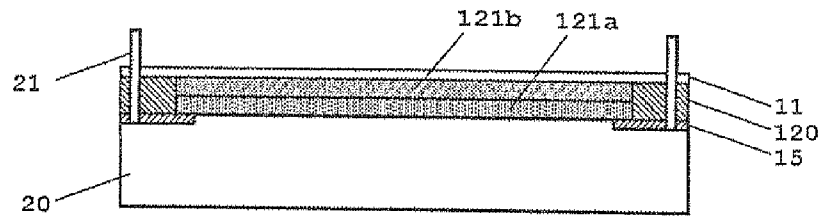


Fig. 9

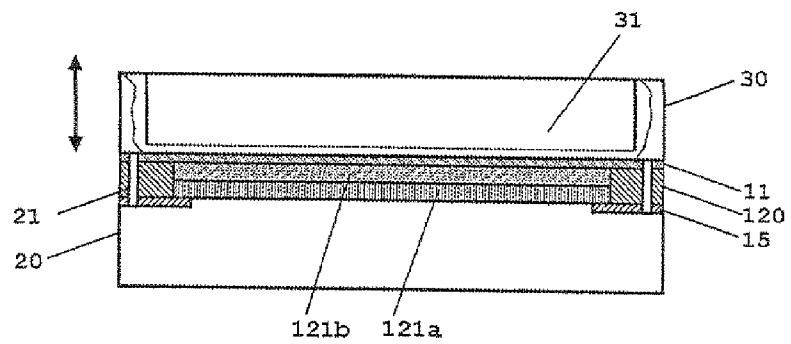
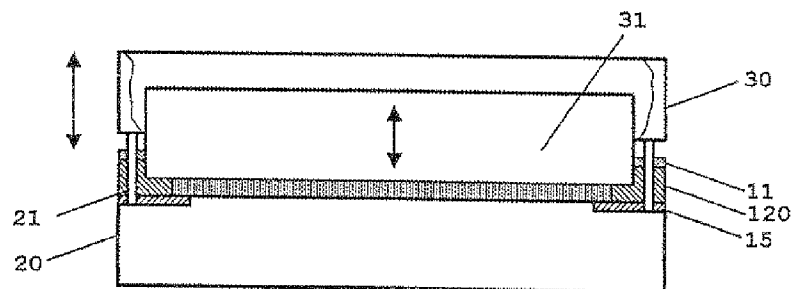


Fig. 10



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/041573

A. CLASSIFICATION OF SUBJECT MATTER
INV. B60R13/02
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B60R B23B B32B B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2008/145372 A1 (HERBERT OLBRICH GMBH & CO KG [DE]; SPENGLER GERHARD [DE]) 4 December 2008 (2008-12-04)	1-3,8
A	page 6, paragraph 3; figure 9 -----	11-17
X	DE 10 2004 025570 A1 (OPEL ADAM AG [DE]) 15 December 2005 (2005-12-15)	1-3,8
A	paragraphs [0022] - [0025] -----	11-17
X	DE 101 43 883 A1 (MAGNA EYBL GES M B H [AT]) 27 March 2003 (2003-03-27)	1-3,8
A	paragraphs [0020], [0021]; figures 1-5 -----	11-17
X	DE 10 2007 059233 A1 (NOVEM CAR INTERIOR DESIGN GMBH [DE]) 25 June 2009 (2009-06-25)	1-3,8
A	paragraph [0047]; claim 1; figures 1,2 -----	11-17



Further documents are listed in the continuation of Box C.



See patent family annex.

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

16 February 2012

Date of mailing of the international search report

24/02/2012

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2011/041573

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2008145372 A1	04-12-2008	DE 202007007832 U1 WO 2008145372 A1	23-08-2007 04-12-2008
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