

## Bent panel

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The invention relates to a folded panel; and to a method for producing a folded panel.

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The folded panel comprises a front side, a rear side, two panel parts and a bent transition section. The two panel parts are connected to each other at the front side of the panel via the bent transition section and form a single entity.

- 10 Such folded panels may be used in stairs (for example in stair nosings), as a windowsill, in wall coverings (e.g. around columns) and in pieces of furniture.

WO2017/130114 describes a folded panel. The panel is composed of a backing material and a decorative top layer. In the case of the folded panel composed thereof,

- 15 the transition section is supported by the adhesive which also acts as a filler.

WO2021/099886A1 describes folded panels and a method of manufacturing folded panels. With this method, the panel parts are bent with respect to each other and a mold is inserted into the recess. This mold has an end face which is shaped in such a way that, in the folded state, the transition section bears against the end face, and the transition section is bent over the end face during bending of the panel parts, after which the mold is removed and the panel which is folded in this way is held in the folded state and an adhesive is subsequently applied.

- 25 It is an object of the invention to provide improved folded panels which can be produced in a simpler way.

It is a specific object of embodiments of the invention to provide folded panels which form a round stair nosing when used in a stair; and which can be produced in a simple manner.

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The first aspect of the invention relates to a folded panel. This folded panel comprises a front side, a rear side, a first panel part, a second panel part and a bent transition section. The first panel part and the second panel part preferably have the same thickness. The first panel part and the second panel part are connected to each other  
5 at the front side of the folded panel via the bent transition section and form a single entity. The space between the first panel part, the second panel part and the bent transition section comprises an insert. The bent transition section is bent over the insert. The insert is at least attached to one or to both of the first panel part or the second panel part; and/or to the bent transition section.

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The folded panel according to the invention has the advantage that it can be produced in a simple manner. The insert can be used as an element over which the transition section is bent during the production of the folded panel. In particular, material can be removed from the rear of a panel in a simple manner, so that the first panel part,  
15 the second panel part and a transition section are formed. After it has been bent over the insert, this transition section forms the bent transition section.

As the insert functions as a mold which should not be removed, the production is simple and manufacturing defects are prevented.

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The bent transition section is preferably thinner than the first panel part and the second panel part, which preferably have the same thickness.

The folded panel is preferably characterized in that the insert has an end face with a  
25 shape which is such that the transition section bears against the end face of the insert.

This provides satisfactory support to the transition section, resulting in a durable folded panel which can be used, for example, as a stair nosing. On the other hand, the end face of the insert may be used as a mold which imparts the correct bent shape  
30 to the transition section during production of the folded panel.

Preferably, the insert has a shape such that the outer sides of the insert which lie on both sides of the end face lie against opposite side walls of the first panel part and the second panel part.

5 In this embodiment, a dimensionally stable folded panel has been obtained, ideal from the point of view of durability. In addition, this embodiment ensures correct production of the folded panel, since correct positioning of the opposite side walls of the first panel part and the second panel part is ensured.

10 Preferably, the end face has a curvature with a constant radius, more preferably wherein the radius is smaller than 15 mm. These embodiments make it possible to form a round nosing on the folded panel in a correct manner.

Preferably, the end face is situated on a thickened section of the insert. This  
15 embodiment makes it possible to produce a dimensionally stable folded panel in an efficient way.

It is possible to attach the insert to only one of the panel parts, or to the first panel part and the second panel part, or to only one of the first panel part or the second  
20 panel part and to the bent transition section, or to the first panel part, the second panel part and to the bent transition section.

A preferred embodiment is characterized in that the insert is at least adhesively bonded to one or to both of the first panel part or the second panel part and/or to the  
25 bent transition section.

Adhesive connections ensure efficient attachment.

In embodiments which use adhesive bonding, the insert may be adhesively bonded  
30 by means of a thermosetting adhesive or by means of a hot-melt adhesive. A hot-melt adhesive may be applied, for example, as a hot-melt strip.

The use of a hot-melt strip has the advantage that the amount of adhesive can be more easily dosed correctly and positioned correctly.

It is also possible for the insert to be at least adhesively bonded to one or to both of  
5 the first panel part or the second panel part and/or to the bent transition section,  
wherein use is made of a first adhesive and a different second adhesive. A first  
adhesive may be used to adhesively bond the outer sides of the insert to the side walls  
of the first panel part and/or of the second panel part. The second adhesive may be  
used on the contact surface between the insert and the bent transition section and/or  
10 on other contact surfaces between the insert and the first panel part and/or the second  
panel part. Preferably, the first adhesive is a rapidly bonding adhesive. This makes it  
possible to accelerate the production process, as quicker bonding results in the outer  
sides of the insert having to be pressed against the side walls of the first panel part  
and/or the second panel part for a shorter period of time. The second adhesive may  
15 be a more inexpensive adhesive which bonds more slowly.

A preferred embodiment is characterized in that the insert is attached to the first panel  
part – and optionally also to the second panel part – by means of a clamped or tension  
connection.

20 Such an embodiment makes it possible to render the production more efficient. By  
first producing a clamped or tension connection, for example of the insert to the first  
panel part, it is easier to apply adhesive and to perform the folding operation over the  
insert.

25 A preferred embodiment of a folded panel is characterized in that the insert is  
attached to the first panel part – and optionally also to the second panel part - by  
means of a clamped or tension connection; wherein the insert is not adhesively  
bonded to either the first panel part or to the second panel part, nor to the bent  
30 transition section.

This embodiment has the advantage that the production of the folded panel can proceed more quickly, since no adhesive has to be applied and, more importantly, since the period of time to allow the adhesive to set – during which the adhesively bonded components have to be pressed together – can be omitted.

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Preferably, the angle included between the first panel part and the second panel part is less than 100°, more preferably is less than 95°, still more preferably is less than 45°, still more preferably is less than 20°, still more preferably is less than 10°, still more preferably is less than 5°. More preferably, the first panel part and the second panel part are parallel to each other.

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Preferably, the folded panel comprises a substrate and a top layer – preferably made of a different material than the substrate –, wherein the top layer comprises a decor layer, wherein the bent transition section comprises at least the top layer.

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The decor layer may comprise a printed paper layer which is impregnated with a thermosetting resin, for example impregnated with melamine formaldehyde resin or with acrylic resin.

20 The first panel part and the second panel part may comprise a substrate. Preferably, the substrate is wood-based. More preferably, the substrate comprises or is a wood fiberboard – for example an MDF (Medium Density Fiberboard) or an HDF (High Density Fiberboard) board; or the substrate comprises a particle board or a layer which comprises wood chips.

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In a preferred embodiment, the first panel part and the second panel part comprise a substrate which is or comprises a wood fiberboard with a density of more than 750 kg/m<sup>3</sup>, more preferably more than 800 kg/m<sup>3</sup>.

30 The substrate may also be a plastic composite, wherein the plastic composite preferably comprises a thermoplastic and fillers, for example CaCO<sub>3</sub>, talc, wood particles or grass particles.

In the case of a plastic composite, the material of the top layer preferably differs from the material of the substrate at least in that the material of the top layer is free from fillers, or at least in that it comprises fewer fillers than the substrate, whereas the  
5 substrate does comprise fillers. Preferably, the plastic or the plastic composite is selected from the list of polyvinyl chloride (PVC), polyurethane (PU), polyethylene (PE), polypropylene (PP), and polyethylene terephthalate (PET). The top layer preferably comprises the same plastic as the substrate.

10 Preferably, the insert is or comprises a plastic insert, more preferably a thermoplastic insert. Plastic inserts, and in particular thermoplastic inserts, have the advantage that they can be produced easily and quickly.

The insert for use in the invention is preferably an extruded insert or an injection-  
15 molded part.

As the insert preferably has a constant cross section along its length, the insert is preferably manufactured by means of extrusion. This makes it possible to produce an insert of the desired shape in a simple manner. This is of particular importance with  
20 embodiments in which the insert comprises one or more recesses and/or one or more projections.

The insert may be wood-based. Preferably, the insert may comprise a component made of wood fibers bonded with resin or adhesive or may consist thereof, more  
25 preferably the insert has a density smaller than  $720 \text{ kg/m}^3$ .

The use of an insert which is wood-based is particularly advantageous if the substrate of the folded panel (which forms the substrate of the first panel part and the second panel part) is also wood-based. This combination makes recycling of the folded panel  
30 easier.

An example of a folded panel according to the invention comprises the combination of a substrate which comprises a wood fiberboard or consists thereof; and an insert which also comprises wood fibers. Such an insert may be made, for example, from a wood fiberboard.

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The insert may comprise a component made of wood fibers bonded with resin or adhesive or consist thereof, wherein the wood fibers in the component are, on average, parallel with the front side of the first panel part and/or of the second panel part.

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An insert for use in this embodiment can easily be obtained by cutting the insert from a wood fiberboard (for example from an MDF – Medium Density Fiberboard – board) via mechanical processing steps, in which the direction of the insert which will be at right angles to the first panel part in the folded panel is equal to the thickness of the wood fiberboard. This facilitates production of the insert made of a wood fiberboard.

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A preferred embodiment is characterized in that the insert is made of a wood fiberboard, wherein the chord of the component of the insert which determines the chord of the bent transition section is perpendicular to the plane of the wood fiberboard from which the insert is made.

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According to this embodiment, the insert may be made from a wood fiberboard (for example from an MDF – Medium Density Fiberboard – board) in a simple manner.

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A preferred embodiment is characterized in that the insert comprises one or more open recesses – e.g. which are in the shape of the negative of a dovetail – or protruding parts which are situated in the open space between the first panel part and the second panel part in the folded panel.

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This embodiment has the advantage that the folded panel can be manufactured more easily, since a tool can be inserted in the open recess(es) or can grasp the protruding

part (or protruding parts). This tool can then fold over the insert – which is already attached to the first panel part (or to the second panel part) – with the insert causing the transition section to bend to form a bent transition section. Alternatively, the insert may be pushed away by means of this tool, so that the bent transition section can easily be formed.

An example of such an open recess which may be used in the context of the invention, has the shape of the negative of a dovetail. A tool having an end in the shape of a dovetail can be pushed into the insert laterally. This tool can be used as an aid for producing the folded panel according to the invention.

A preferred embodiment is characterized in that the insert comprises a continuous groove or a continuous protruding part which is situated in the open space between the first panel part and the second panel part in the folded panel.

These embodiments have the advantage that the folded panel can be manufactured more easily, since a tool can be inserted in the continuous groove or can grasp the continuous protruding part. This tool can then fold over the insert – which is already attached to the first panel part (or to the second panel part) – with the insert causing the transition section to bend to form a bent transition section. The production of such inserts is easier.

A preferred embodiment is characterized in that the insert comprises a hole at one or at both linear ends. It is an advantage of this embodiment that the hole or the holes can be used for inserting a tool. This tool can then be used to rotate the insert during the production process of the folded panel.

Preferably, this hole is or these holes are not circular in cross section. This facilitates the use of a tool which is inserted into this hole or into these holes to rotate the insert during the production process of the folded panel.

A preferred embodiment is characterized in that the insert comprises a fully continuous hole along its length, preferably having a non-circular cross section.

5 This embodiment means that the insert can be made lighter while using less material, for example via extrusion of a thermoplastic material. Since the opening runs along the entire length of the insert, a tool can be inserted into these openings at one or at both ends, so that the insert can be rotated during the production process of the folded panel.

10 In a folded panel according to the invention which is preferred, the chord of the bent transition section is smaller than 30 mm and greater than 20 mm. This embodiment has the advantage that the insert can be made from an MDF (Medium Density Fiberboard) board having a thickness of 30 mm. Such boards are readily available.

15 An embodiment of the invention is characterized in that, in the cross section of the folded panel, the bent transition section has a circumference of less than 47 mm and of more than 30 mm. This embodiment has the advantage that the folded panel can be provided with a round nosing, wherein the insert can be made from an MDF (Medium Density Fiberboard) board having a thickness of 30 mm. Such boards are  
20 readily available.

A preferred embodiment is characterized in that the insert comprises a projection, wherein the projection is introduced in an opening which is provided for the purpose on the rear side of the first panel part.

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This embodiment facilitates the production of folded panels of good and constant quality.

The projection may be clamped, tensioned and/or glued in the opening of the first  
30 panel part provided for the purpose.

By clamping and/or tensioning the projection in the opening, attachment may be achieved without the use of adhesive. This renders the production of the folded panel significantly easier and quicker, since no adhesive has to be applied and no time has to be set aside to allow for the adhesive to set.

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On the other hand, it is also possible to combine clamping or tensioning of the projection in the opening with adhesive bonding. In such embodiments, the clamping or tensioning serves as an aid to ensure that the adhesive bond can be achieved correctly and more quickly. The mechanical connection provided by clamping or  
10 tensioning ensures that pressure is automatically applied to the adhesive connection, so that no separate pressing together is required.

The opening in the first panel part may be a groove. This facilitates the production of the opening in the first panel part.

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Preferably, the projection extends along the entire length of the insert. This facilitates the production of the insert. The insert may be manufactured, for example, by extrusion, more preferably of a thermoplastic.

20 Preferably, the projection has the same cross section along its entire length. This facilitates the production of the insert. The insert may be manufactured, for example, by extrusion, more preferably of a thermoplastic.

Preferably, the opening extends along the entire length of the folded panel. This  
25 makes the production of this opening in the first panel part easier.

Preferably, the opening has the same cross section along its entire length. This makes the production of this opening in the first panel part easier.

30 Embodiments in which the insert comprises a projection, wherein the projection is introduced in an opening which is provided for the purpose on the rear side of the first panel part, are preferably characterized in that the insert comprises a second

projection, wherein the second projection is introduced in a second opening which is provided for the purpose on the rear side of the second panel part.

Such embodiments have the advantage that the second panel part can also be attached  
5 more quickly and easily to the insert in the correct manner.

Preferably, the second projection is clamped, tensioned and/or glued in the second opening.

10 By clamping and/or tensioning the second projection in the second opening which is provided for the purpose, attachment may be achieved without the use of adhesive. This renders the production of the folded panel significantly easier and quicker, since no adhesive has to be applied and no time has to be set aside to allow for the adhesive to set.

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On the other hand, it is also possible to combine clamping or tensioning of the second projection in the second opening provided for the purpose with adhesive bonding. In such embodiments, the clamping or tensioning serves as an aid to ensure that the adhesive bond can be achieved correctly and more quickly. The mechanical  
20 connection provided by clamping or tensioning ensures that pressure is automatically applied to the adhesive connection, so that no separate pressing together is required.

Preferably, the second opening is a groove. This facilitates the production of the opening in the second panel part.

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Preferably, the second projection extends along the entire length of the insert. This facilitates the production of the insert. The insert may be manufactured, for example, by extrusion, more preferably of a thermoplastic.

30 Preferably, the second projection has the same cross section along its entire length. This facilitates the production of the insert. The insert may be manufactured, for example, by extrusion, more preferably of a thermoplastic.

Preferably, the second opening extends along the entire length of the folded panel. This makes the production of this second opening in the second panel part easier.

- 5     Preferably, the second opening has the same cross section along its entire length. This facilitates the production of this second opening in the second panel part.

A preferred embodiment is characterized in that the first panel part or the second panel part is provided, on the edge opposite the bent transition section, with a  
10     coupling part in the form of a groove delimited by a front lip and a rear lip, wherein the rear lip projects further with respect to the edge of this panel part than the front lip, wherein the rear lip comprises a locking part facing the groove; wherein the coupling part is configured to produce a coupling with a panel which comprises a tongue on its edge and a recess on the rear side of the tongue; wherein, in the coupled  
15     state of the tongue in the groove, this tongue and groove produce a locking in the direction perpendicular to the plane of the panel coupled to the respective panel part, and wherein the locking part and the recess produce the locking in the direction perpendicular to the coupled edges and in the plane of the panel.

- 20     Such embodiments are advantageous, because the combination of the folded panel comprising such panels can quickly be fitted as a stair covering, with the folded panel forming a stair nosing. Depending on the form of the bent transition section, this may, for example, be a round stair nosing or a square stair nosing.

- 25     Folded panels according to the invention may also be provided with coupling parts on the opposite end edges, so that they can also be coupled to similar abutting folded panels. This is of interest, for example, in case the folded panels are used to cover a wide step, namely a step which is wider than the length of one folded panel.

- 30     In a preferred embodiment, the bent transition section forms a round nosing in the folded panel. Such a folded panel may be used, for example, in a stair to form a round stair nosing.

A preferred embodiment is characterized in that the bent transition section comprises an arch, wherein the radius in the center of the arch is smaller than the radii in the arch on both sides to the center of the arch. This embodiment produces a round stair  
5 nosing of satisfactory dimensions.

The bent transition section may describe a part of an ellipse over at least a part thereof and preferably over the largest part thereof. This embodiment produces a beautifully shaped stair nosing which is robust and has suitable dimensions.

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In a preferred embodiment, the front side of the bent transition section describes a segment of a circle. Such a folded panel may be used, for example, in a stair to form a round stair nosing.

15 In a preferred embodiment, the bent transition section forms a square nosing in the folded panel. Such a folded panel may be used, for example, in a stair to form a square stair nosing. Such a square stair nosing is known in English as a “bull nose”.

A preferred embodiment is characterized in that the bent transition section comprises  
20 a first arch and a second arch, with a flat section between the first arch and the second arch. This embodiment has the advantage that a square stair nosing is formed in an elegant manner, with rounded edges at the top and at the bottom.

Preferably, the first arch and/or the second arch enclose an angle of between 85° and  
25 95° – and preferably an angle of 90°. This embodiment has the advantage that a square stair nosing is formed in an elegant manner, with rounded edges at the top and at the bottom.

A preferred embodiment is characterized in that the length of the flat section of the  
30 bent transition section is greater than – and preferably is at least double, and more preferably at least triple – the thickness of the first panel part. This makes it possible to obtain a suitable square stair nosing.

Preferably, the bent transition section comprises a rib, wherein the rib is formed by a local thickening in the bent transition section, wherein the insert comprises a slot, wherein the rib is introduced in the slot. This embodiment has the advantage that the folded panel can easily be produced. The rib and the matching groove make it possible to position the insert correctly with respect to the transition section during production. More preferably, the rib and the slot have dimensions which are such that the rib fits precisely in the slot and/or the rib tapers.

- 10 Preferably, the slot is provided in the end face of the insert.  
Preferably, the rib is provided in the center of the bent transition section.

Preferably, the bent transition section comprises a slot, wherein the slot is formed by a local thinning in the bent transition section, wherein the insert comprises a rib, wherein the rib is introduced in the slot. This embodiment has the advantage that the folded panel can easily be produced. The rib and the matching groove make it possible to position the insert correctly with respect to the transition section during production. More preferably, the rib and the slot have dimensions which are such that the rib fits precisely into the slot and/or the rib tapers.

20 Preferably, the bent transition section has a smaller thickness than either the first panel part or the second panel part.

25 A preferred embodiment of the first aspect of the invention is a folded panel which is characterized in that the first panel part is thinner than the second panel part.

This embodiment has the advantage that the location where milling has to be performed in the panel in order to produce the folded panel can be chosen more freely. This milling operation may be performed using a simpler – and thus less expensive – milling machine. The folding process to form the folded panel is simpler, because the permissible tolerances are greater when folding.

In such embodiments, the first panel part preferably has a thickness of at most 30% – and more preferably of at most 25% – of the thickness of the second panel part.

5 In a preferred embodiment, the first panel part has the same thickness as the bent transition section. This facilitates the production of the folded panel.

A preferred embodiment in which the first panel part is thinner than the second panel part is characterized in that the first panel part is thicker than the bent transition section. This ensures that the end of the folded panel on the side which comprises the  
10 first panel part is sufficiently strong. More preferably, the thickness of the first panel is at least twice that of the bent transition section.

A folded panel in which the first panel part is thinner than the second panel part is preferably characterized in that the first panel part at least partly bears against a flat  
15 section of the insert. This significantly facilitates the folding process of the panel over the insert.

Preferably, at least the distal part of the first panel part bears against a flat section of the insert.

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A preferred embodiment is characterized in that the lateral end of the folded panel on the side which comprises the first panel part is partly formed by the insert. This ensures that this end of the folded panel is sufficiently strong, in particular when the first panel part is thinner than the second panel part.

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A preferred embodiment of the folded panel is characterized in that the folded panel comprises a substrate and a top layer – more preferably made of a different material than the substrate –, wherein the top layer comprises a decor layer, wherein the bent transition section comprises at least the top layer and a layer of the substrate; and  
30 wherein the first panel part comprises at least the top layer and a layer of the substrate.

Preferably, the folded panel has a maximum thickness which is thicker than the thickness of the second panel part.

5 A folded panel which is preferred is characterized in that the insert, measured at right angles to the surface of the bent transition section, is thicker than the thickness of the second panel part.

Preferably, the end of the insert opposite the bent transition section is situated in an open space.

10 A preferred embodiment of the folded panel of the invention is characterized in that the thickness of the transition section is less than 20% – and more preferably is less than 15%, and more preferably is less than 10% – of the thickness of the second panel part. Such embodiments have the advantage that the transition section can be bent  
15 more easily during production of the folded panel.

One aspect of the invention is a stair nosing. The stair nosing is characterized in that the stair nosing comprises a folded panel as in any embodiment of the first aspect of the invention.

20 One aspect of the invention is a stair. The stair is characterized in that the stair comprises at least one stair nosing as in the invention.

The second aspect of the invention is a method for producing a folded panel as in any  
25 embodiment of the folded panel according to the first aspect of the invention. The method is characterized in that the method comprises the steps  
- providing a panel, wherein the panel comprises a front side, a rear side, a first panel part, a second panel part and a transition section; wherein the first panel part and the second panel part preferably have the same thickness; wherein the first panel part and  
30 the second panel part are connected to each other at the front side of the panel via the transition section and form a single entity;  
- attaching an insert to the first panel part;

- bending the transition section over the insert so that a bent transition section is obtained between the first panel part and the second panel part; and
- attaching the insert to the second panel part and/or to the bent transition section.

5 This production method ensures a quick and efficient production of the folded panel.

The attachment of an insert to the first panel part may be effected, for example, by means of adhesive and/or by means of a mechanical connection. This mechanical connection may be a tension or clamped connection.

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The insert may be attached to the second panel part and/or to the bent transition section by means of an adhesive connection.

The insert may be attached to the second panel part by means of a mechanical  
15 connection. This may be a tension or clamped connection.

It is also possible to connect the insert to the second panel part mechanically in combination with an adhesive connection of the insert to the second panel part and/or to the bent transition section.

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It is possible to connect the insert to the second panel part mechanically without an adhesive connection of the insert to the second panel part nor to the bent transition section.

25 The transition section is preferably thinner than the first panel part and the second panel part, which preferably have the same thickness.

In order to facilitate bending of the transition section, the transition section may be heated up before and/or during the bending, for example by means of an infrared  
30 lamp. This has the advantage that the transition section is more flexible and can be bent more easily.

Preferably, the bending of the transition section over the insert is performed at least by a rotary movement of the insert to which the first panel part has already been attached.

- 5 This embodiment ensures a quick and efficient production of the folded panel.

The third aspect of the invention relates to a method for producing a folded panel as in any embodiment of the first aspect of the invention. The method comprises the steps

- 10 - providing a panel, wherein the panel comprises a front side, a rear side, a first panel part, a second panel part and a transition section; wherein the first panel part and the second panel part preferably have the same thickness; wherein the first panel part and the second panel part are connected to each other at the front side of the panel via the transition section and form a single entity;
- 15 - pushing an insert in the direction perpendicular to the panel, wherein the insert makes contact with the transition section during the pushing operation and wherein the transition section is bent to form a bent transition section as a result of this pushing operation, wherein both the first panel part and the second panel part perform an angular rotation with respect to the insert; and
- 20 - attaching the insert to one or to both of the first panel part or the second panel part and/or to the bent transition section.

This production method ensures quick and efficient production of the folded panel.

- 25 A preferred embodiment of the third aspect of the invention is characterized in that the method comprises the step in which the transition section is heated up before it is bent, preferably by means of IR radiation.

- This embodiment facilitates the production of the folded panel, as the transition section can be bent more easily and quicker to form the bent transition section by heating it.
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A preferred embodiment of the third aspect of the invention is characterized in that the method comprises the step of applying adhesive to the transition section or to the insert before the bending of the transition section, so that the insert is attached to the transition section by means of an adhesive connection.

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This embodiment facilitates the production of the folded panel due to the fact that the adhesive is applied beforehand.

A preferred embodiment of the third aspect of the invention is characterized in that,  
10 when pushing the insert, the transition section is pushed into a mold which, together with the form of the insert, determines the form of the bent transition section.

This embodiment facilitates the production of the folded panel due to the fact that the mold partly ensures that the bending of the transition section results in the correct  
15 bent transition section.

A preferred embodiment of the third aspect of the invention is characterized in that pushing is performed by means of a tool, wherein the tool engages in one or more open recesses – e.g. in the form of the negative of a dovetail – or protruding parts  
20 which are situated in the open space between the first panel part and the second panel part in the folded panel.

This embodiment facilitates the production of the folded panel due to the fact that the pushing operation is performed more easily and with a high degree of accuracy.

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A preferred embodiment of the third aspect of the invention is characterized in that the transition section comprises a rib, wherein the rib is formed by a local thickening in the bent transition section, wherein the insert comprises a slot, wherein the rib is introduced in the slot during the pushing operation, preferably wherein the rib and  
30 the slot have dimensions which are such that the rib fits precisely in the slot and/or the rib tapers.

This embodiment facilitates the production of the folded panel by correctly positioning the insert with respect to the transition section with greater accuracy.

5 The fourth aspect of the invention relates to a device for carrying out the method of the third aspect of the invention.

In order to show the features of the invention in more detail, some preferred embodiments are described below by way of example and without being limited thereto, with reference to the accompanying drawings, in which:

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figure 1 shows a folded panel according to the invention;

figure 2 shows a panel which can be used for producing a folded panel according to the invention;

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figure 3 shows the panel from figure 2, processed to be transformed into a folded panel according to the invention;

figures 4a – 4d show examples of inserts which can be used in folded panels according to the invention;

figures 5a – 5c illustrate a production process according to the invention for producing a folded panel according to the invention;

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figure 6 shows an example of a folded panel according to the invention;

figure 7 shows an example of a folded panel according to the invention;

figure 8 shows an example of a folded panel according to the invention;

figure 9 shows an example of a folded panel according to the invention;

figures 10a-c illustrate a method according to the third aspect of the invention;

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figures 11 and 12 illustrate folded panels according to embodiments of the invention;

figure 13 shows a stair which comprises a stair nosing which comprises a folded panel according to the invention;

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figure 14 shows a step in a method for the production of a folded panel according to the invention; and

figure 15 shows the folded panel made using the production step shown in figure 14.

Identical reference numerals in the various figures have the same meaning.

Figure 1 shows an example of a folded panel 1 according to the invention. The folded  
5 panel 1 has a front side 2, a rear side 3, a first panel part 1a, a second panel part 1b  
and a bent transition section 7. In the illustrated example, the first panel part 1a and  
the second panel part 1b have the same thickness. The first panel part 1a and the  
second panel part 1b are connected to each other at the front side of the folded panel  
via the bent transition section 7 and form a single entity. In the example, the bent  
10 transition section 7 forms a round nosing in the folded panel, with the bent transition  
section 7 describing a segment of a circle. In the example, the first panel part 1a and  
the second panel part 1b are parallel to each other.

The space between the first panel part 1a, the second panel part 1b and the bent  
15 transition section 7 comprises an insert 8. The bent transition section 7 is bent over  
the insert. The insert 8 is at least attached to one or to both of the first panel part 1a  
or the second panel part 1b and/or to the bent transition section 7.

The insert 8 may be attached to both the first panel part 1a, the second panel part 1b  
20 and the bent transition section 7 by means of adhesive.

It is also possible for the insert 8 to be attached to the first panel part 1a and/or to the  
second panel part 1b by means of adhesive, and not to the transition section 7.

25 The insert 8 has an end face 26 which has a shape which is such that the transition  
section 7 bears against the end face 26 of the insert and is bent over it.

On both sides of the end face 26, the insert comprises outer sides 27 which lie against  
opposite side walls 29 of the first panel part 1a and the second panel part 1b.  
30

The insert 8 from figure 1 comprises a projection 21. The projection 21 is introduced  
in the opening 23 which is provided for the purpose on the rear side 3 of the first

panel part 1a. This projection 21 may be clamped or tensioned in the opening 23. This may be done with or without additional adhesive bonding of the projection 21 into the opening 23 which is provided for the purpose on the rear side 3 of the first panel part 1a.

5

The opening 23 on the rear side 3 of the first panel part 1a may be, for example, a groove, running continuously along the entire first panel part and having a constant cross section.

- 10 The projection 21 may also extend along the entire length of the insert 8 and may have the same cross section along its entire length.

- 15 The insert 8 from the example in figure 1 comprises a second projection 22, introduced in the second opening 24 which is provided for the purpose on the rear side 3 of the second panel part 1b. This second projection 22 may be clamped or tensioned in the second opening 24. This may be done with or without additional adhesive bonding of the second projection 22 in the second opening 24 which is provided for the purpose on the rear side 3 of the second panel part 1b.

- 20 The second opening 24 on the rear side 3 of the second panel part 1b may be, for example, a groove, running continuously along the entire second panel part and having a constant cross section.

- 25 The second projection 22 may extend along the entire length of the insert 8 and may have the same cross section along its entire length.

- The insert 8 used in the folded panel 1 from figure 1 comprises an open recess 15 – which is continuous along the length of the insert – which is situated in the open space between the first panel part 1a and the second panel part 1b in the folded panel.
- 30 This recess 15 may advantageously be used when forming the folded panel 1.

The insert 8 from the example in figure 1 comprises a continuous hole 19 along its entire length having a non-circular cross section. Alternatively, a hole may be formed at both ends of the insert.

- 5 On the edge opposite the transition section 7 of the folded panel, the second panel part 1b comprises a coupling part in the form of a groove 40 delimited by a front lip 41 and a rear lip 42. The rear lip 42 projects further with respect to the edge of this second panel part 1b than the front lip 41. The rear lip 42 comprises a locking part 43 facing the groove 40.

10

This coupling part may be used to couple the folded panel to the tongue 44 of a panel, as is illustrated in figure 2. The folded panel may in this case form a stair nosing and the panel furthermore forms the covering of the step. In this case, the part of the panel from figure 2 which comprises the tongue 44 has been removed.

15

The first panel part 1a, the second panel part 1b and the bent transition section 7 may be made from a laminate floor panel.

- 20 The insert 8 may, for example, be made from a wood fiberboard – preferably from a wood fiberboard having a density smaller than  $720 \text{ kg/m}^3$  –, wherein the chord K of the component of the insert 8 which determines the chord of the bent transition section 7 is positioned at right angles to the plane of the wood fiberboard from which the insert 8 is made. Consequently, the wood fibers in the insert are, on average, parallel with the front side of the first panel part 1a and/or the second panel part 1b; and to both if the first panel part 1a and the second panel part 1b are parallel to each other in the folded panel, as is the case in the folded panel from figure 1.

- 30 The folded panel 1 from figure 1 may be made, for example, with an insert 8 having an end face 26 which has a constant radius, preferably a radius smaller than 15 mm. Such an insert 8 may advantageously be made from a wood fiberboard having a thickness of 30 mm. In this example, the chord K of the bent transition section 7 is smaller than 30 mm.

The insert 8 may also be a plastic insert, for example made by extruding a thermoplastic.

5 Figure 2 shows an example of a panel which may be used in the production of a folded panel according to the invention, for example in the production of the folded panel illustrated in figure 1. The panel comprises a front side 2 and a rear side 3. The panel comprises a substrate 10 and a top layer 12 which comprises a decor layer 14. The panel may be a laminate panel which comprises an HDF (High Density  
10 Fiberboard) as substrate 10 and a top layer 12 which comprises a decor layer and a wear layer. The decor layer 14 may be a paper sheet which is impregnated with melamine resin. The wear layer may comprise a paper sheet impregnated with a melamine resin, which may also incorporate wear-resistant particles (such as for example corundum).

15

The panel may be a standard laminate floor panel.

On one of the edges, the panel comprises a coupling part in the form of a groove 40 delimited by a front lip 41 and a rear lip 42. The rear lip 42 projects further with  
20 respect to this edge than the front lip 41. The rear lip 42 comprises a locking part 43 facing the groove 40.

On the opposite edge, the panel comprises a tongue 44; and a recess 46 on the rear side of the tongue 44.

25

Two such panels may be coupled to each other via the tongue and the groove, wherein this tongue and groove, in the coupled state of the tongue 44 and the groove 40, ensure a locking in the direction at right angles to the plane of the panel coupled to the respective panel part, and wherein the locking part 43 and the recess 46 ensure  
30 the locking in the direction at right angles to the coupled edges and in the plane of the panel.

Figure 3 shows the panel from figure 2 in which material has been removed at the rear of the panel so that the panel can be used in the production of a folded panel according to the invention. As a result thereof, two panel parts are formed, namely a first panel part 1a – which will form the first panel part in the folded panel – and a second panel part 1b – which will form the second panel part in the folded panel. The first panel part 1a and the second panel part 1b have inwardly facing side walls 29. The first panel part 1a and the second panel part 1b have the same thickness.

Between the first panel part 1a and the second panel part 1b, there is a transition section 37 which will form the bent transition section 7 in the folded panel. The bent transition section 37 comprises at least the top layer.

In the example from figure 3, an opening 23 is provided at the rear of the first panel part 1a which is preferably a continuous opening in the form of a groove.

In the example from figure 3, the second panel part 1b – which will form the second panel part in the folded panel – comprises a coupling part on the edge opposite the transition section 37 in the form of a groove 40 delimited by a front lip 41 and a rear lip 42. The rear lip 42 projects further with respect to the edge of this panel part 1a than the front lip 41. The rear lip 42 comprises a locking part 43 facing the groove 40. This coupling part was already present in the panel, as is illustrated in figure 2.

In the folded panel, this coupling part can be used for coupling with the tongue 44 of a panel, as is illustrated in figure 2. In this case, the folded panel may form a stair nosing and the panel furthermore forms the covering of the step.

In figure 3, the first edge 1a comprises a tongue 44 with the recess 46 on the rear side of the tongue. The tongue may be removed during the production of the folded panel according to the invention, as is illustrated in figure 1; or may be retained.

Figures 4a – 4d illustrate examples of inserts 8 which may be used in folded panels according to the invention.

The inserts 8 of each of the figures 4a – 4d have an end face 26. These end faces 26 are provided so that the bent transition section 7 of the folded panel can bear against the end face 26 of the insert 8 and is folded over it. The end face 26 is situated on a thickened section of the insert 8. The insert comprises outer sides 27 on both sides of the end face 26.

The inserts from figures 4a and 4c comprise an open recess 15. This open recess 15 is positioned in such a way that, in folded panels made with such inserts 8, it is situated in the open space between the first panel part 1a and the second panel part 1b, as can be seen in figure 1. These open recesses 15 can advantageously be used when producing folded panels, because tools can rotate the insert via these open recesses 15.

The open recess 15 may be a groove and may run continuously along the entire length of the insert 8.

The insert from figure 4b comprises a protruding part 16. This protruding part 16 is positioned in such a way that, in folded panels made with such inserts 8, it is situated in the open space between the first panel part 1a and the second panel part 1b. This protruding part 16 can advantageously be used when producing folded panels, because tools can rotate the insert via this protruding part 16.

At one or at both linear ends, the inserts of the figures 4a, 4b and 4d comprise a hole 19 which is not circular in cross section. This hole 19 or these holes are useful because a tool can be introduced therein which may be used to rotate the insert when forming the folded panel.

The hole 19 may be configured to run continuously along the entire length of the insert 8. However, this is not necessarily the case.

The inserts from figures 4c and 4d comprise a projection 21. The projection 21 is configured to be introduced in an opening which is provided for the purpose on the rear side of the first panel part. In this case, the projection 21 may be clamped, tensioned and/or glued in the opening of the first panel part provided for the purpose.

5

Optionally, this projection 21 may extend along the entire length of the insert. Optionally, the projection 21 may have the same cross section along its entire length.

The insert from figure 4d comprises a second projection 22. The second projection 22 is configured to be introduced in an opening which is provided for the purpose on the rear side of the second panel part. In this case, the projection 22 may be clamped, tensioned and/or glued in the opening of the second panel part provided for the purpose.

15 The inserts 8 shown in figures 4a – 4d may be manufactured by means of extrusion of a thermoplastic. Other production methods are also possible. For example, these inserts may be produced from a wood fiberboard by means of mechanical processing steps.

20 Figures 5a – 5c illustrate a method according to the invention for producing a folded panel according to the invention.

A panel is provided. This may be a panel as illustrated in figure 2. At the rear 3 of this panel, material is removed, so that a processed panel is obtained, as is illustrated in figure 3.

This processed panel (see figure 2) comprises a front side 2, a rear side 3, a first panel part 1a, a second panel part 1b and a transition section 37. The first panel part 1a and the second panel part 1b are connected to each other at the front side of the panel via the transition section 37 and form a single entity.

30

The first panel part 1a comprises an opening 23 at the rear side 3.

As is illustrated in figure 5a, an insert 8 is attached to the first panel part 1a.

5 The projection 21 of the insert 8 is introduced in an opening 23 which is provided for the purpose on the rear side 3 of the first panel part 1a. This projection 21 may be clamped or tensioned in the opening 23. This may be done with or without additional adhesive bonding of the projection 21 into the opening 23 which is provided for the purpose on the rear side 3 of the first panel part 1a. An outer side 27 of the end face 26 of the insert 8 lies against the side wall 29 of the first panel part 1a.

10

Subsequently, the insert 8 – with the first panel part 1a attached thereto – is rotated by means of a rotary movement W. During this rotary movement, the transition section 37 is bent over the end face 26 of the insert to form a bent transition section 7 between the first panel part 1a and the second panel part 1b. Figure 5b shows a phase during this rotary movement W. This rotary movement may be performed by a tool engaging in the open recess 15 in the insert 8; or by a tool engaging in a hole 19 at one or at both sides of the insert 8. This hole 19 may also run continuously along the entire length of the insert 8.

20 In order to facilitate this bending of the transition section, the transition section may be heated up before and/or during the bending, for example by means of an infrared lamp.

Figure 5c shows the result of the rotary movement. The second outer side 27 of the end face 26 of the insert 8 lies against the side wall 29 of the second panel part 1 and the bent transition section 7 is bent over the end face 26 of the insert 8 and is continuously in contact with it.

30 The insert 8 is attached to the second panel part 1b and/or to the bent transition section 7. This may be done by means of adhesive which was applied before bending of the transition section. The adhesive may be a thermosetting adhesive. The adhesive may be a hot-melt adhesive which is applied, for example, as a hot-melt strip.

It is also possible to attach the insert to the second panel part in a mechanical way – with or without additional adhesive connection. To this end, for example, an insert as illustrated in figure 4d may be used. A folded panel as illustrated in figure 1 can  
5 then be obtained.

Figure 6 shows an example of a folded panel according to the invention. The reference numerals have the same meaning as in the other figures. In the example from figure 6, the included angle A between the first panel part 1a and the second  
10 panel part 1b is 90°. This folded panel may be used to form a square stair nosing. The reference numerals in figure 6 have the same meaning as in the other figures.

Figure 7 shows an example of a folded panel 1 according to the invention. The folded panel 1 has a front side 2, a rear side 3, a first panel part 1a, a second panel part 1b  
15 and a bent transition section 7. In the example from figure 7, the first panel part 1a and the second panel part 1b have the same thickness. The first panel part 1a and the second panel part 1b are connected to each other at the front side of the folded panel via the bent transition section 7 and form a single entity.

20 The bent transition section 7 forms a round nosing in the folded panel. The bent transition section 7 comprises an arch, wherein the radius R1 in the center of the arch is smaller than the radii R2, R3 in the arch on both sides of the center of the arch. In the example from figure 7, the bent transition section describes a part of an ellipse. In the example, the first panel part 1a and the second panel part 1b are parallel to  
25 each other.

The space between the first panel part 1a, the second panel part 1b and the bent transition section 7 comprises an insert 8. The bent transition section 7 is bent over the insert. The insert 8 is at least attached to one or to both of the first panel part 1a  
30 or the second panel part 1b and/or to the bent transition section 7. The insert 8 may be attached with adhesive to the first panel part 1a, the second panel part 1b and the bent transition section 7. It is also possible for the insert 8 to be attached with

adhesive to the first panel part 1a and/or to the second panel part 1b, and not to the transition section 7.

The insert 8 has an end face 26 with a shape which is such that the transition section  
5 7 bears against the end face 26 of the insert, and is bent over it.

On both sides of the end face 26, the insert comprises outer sides 27 which lie against opposite side walls 29 of the first panel part 1a and the second panel part 1b.

10 The insert 8 comprises an open recess 15 which is continuous along the length of the insert and which, in the folded panel, is situated in the open space between the first panel part 1a and the second panel part 1b. In the example from figure 7, this recess has the form of the negative of a dovetail. As a result thereof, a tool with a dovetail can be pushed into the insert 8 via this dovetail. This is useful during the production  
15 of the folded panel.

The bent transition section 7 comprises a rib 50. The rib 50 is formed by a local thickening in the bent transition section 7. The insert 8 comprises a slot 51, the rib being introduced in the slot. The rib 50 and the slot 51 have dimensions which are  
20 such that the rib fits precisely in the slot. The rib 50 tapers.

Figure 8 shows another example of a folded panel 1 according to the invention. This folded panel 1 is to a large degree similar to the folded panel of figure 7. The reference numerals in figure 8 have the same meaning as the reference numerals in  
25 figure 7. Instead of describing a part of an ellipse, the front side of the bent transition section 7 of the folded panel 1 from figure 8 describes a segment of a circle.

Figure 9 shows another example of a folded panel 1 according to the invention. The reference numerals have the same meaning as in the other figures. In the example  
30 from figure 9, the bent transition section 7 forms a square nosing in the folded panel 1.

To this end, the bent transition section 7 comprises a first arch 53 and a second arch 54, with a flat section 55 between the first arch and the second arch. Both the first arch 53 and the second arch enclose an angle  $A$  equal to  $90^\circ$ .

- 5    The length of the flat section 55 of the bent transition section 7 is greater than more than triple the thickness of the first panel part 1a. The first panel part 1a has the same thickness as the second panel part 1b.

- 10   The bent transition section 7 comprises a rib 50. The rib 50 is formed by a local thickening in the bent transition section 7. The insert 8 comprises a slot 51, with the rib being introduced in the slot. The rib 50 and the slot 51 have dimensions which are such that the rib fits precisely in the slot.

- 15   The rib 50 may run along the entire length of the flat section 55 of the bent transition section 7. However, this is not the case in the example shown in figure 9.

- 20   Figures 10a-c illustrate a method according to the third aspect of the invention for producing folded panels according to the first aspect of the invention. In addition, figures 10a-c illustrate a device for carrying out the method according to the third aspect of the invention.

- 25   A panel 1 is provided. This panel comprises a front side 2, a rear side 3, a first panel part 1a, a second panel part 1b and a transition section 37. In the example, the first panel part 1a and the second panel part 1b have the same thickness. The first panel part 1a and the second panel part 1b are connected to each other at the front side of the panel via the transition section 37 and form a single entity. In this example, the first panel part 1a and the second panel part 1b have the same thickness.

- 30   The transition section 37 is heated up, in the example by means of infrared (IR) radiation produced by an IR lamp 60.

Subsequently, adhesive 61 is applied to the transition section 37 by means of an adhesive applicator 62. This is done to attach the insert 8 to the transition section by means of an adhesive connection.

- 5 An insert 8 is pushed in the direction at right angles to the panel by means of a tool 65 which is inserted in an opening 15 of the insert 8 by means of a dovetail connection. The opening 15 forms the negative of a dovetail, so that the tool can easily be attached to the insert 8 and can easily be removed therefrom afterwards. Figures 10a, 10b and 10c show the state just before the pushing operation, during the pushing operation and in the final state.

- By pushing the insert 8 in the direction at right angles to the panel, the insert 8 makes contact with the transition section 37. In the example, positioning insert 8 with respect to the transition section 37 is facilitated by the fact that the transition section 15 37 comprises a rib 50 and the insert has a slot 51 which fits precisely. The rib 50 is formed by a local thickening in the bent transition section 37. The rib 50 tapers. The rib 50 is introduced in the slot 51 during pushing.

- As a result of the pushing operation, the transition section 37 is bent to form a bent transition section 7, with the first panel part 1a and the second panel part 1b both making an angular rotation with respect to the insert 8.

- During pushing of the insert 8, the transition section 37 is pushed into a mold 67 which, together with the shape of the insert 8, determines the shape of the bent transition section 7. The use of a mold is optional.

The adhesive 61 ensures the connection of the insert 8 to one or to both of the first panel part 1a or the second panel part 1b, and to the bent transition section 7.

- 30 Figure 11 illustrates a folded panel according to an embodiment of the invention. The reference numerals have the same meaning as in the other figures. With this folded panel, the first panel part 1a is thinner than the second panel part 1b. In the example,

the first panel part 1a has the same thickness as the bent transition section 7. The distal part of the first panel part 1a bears against a flat section 63 of the insert 8. The lateral end 65 of the folded panel on the side which comprises the first panel part 1a is partly formed by the insert 8.

5

The folded panel 1 from figure 11 comprises a substrate 10 and a top layer 12. The bent transition section 7 and the first panel part 1a comprise the top layer 12 and a layer of the substrate 10.

- 10 Figure 12 illustrates a folded panel according to an embodiment of the invention. The reference numerals have the same meaning as in the other figures. With this folded panel, the first panel part 1a is thinner than the second panel part 1b. In this example, the second panel part 1b has a thickness T1 of 11.7 mm. The bent transition section 7 has a thickness T2 of 0.9 mm. The first panel part 1a has a thickness T3 of 2.4 mm.
- 15 Both the bent transition section 7 and the first panel part 1a consist of the top layer 12 and a layer of the substrate 10.

- Figure 13 shows a stair 70 which comprises a stair nosing 72 which comprises a folded panel 1 according to the invention. In the example from figure 13, this is a
- 20 folded panel 1 as in figure 11.

- Figure 14 shows a step in a method for the production of a folded panel according to the invention. Figure 15 shows the folded panel manufactured using the production step shown in figure 14. The reference numerals in figures 14 and 15 have the same
- 25 meaning as in the preceding figures. During the production of the folded panel shown in figures 14 and 15, use is made of two different adhesives 80, 82. A first adhesive 80 is used for adhesively bonding the outer sides 27 of the insert 8 to the side walls 29 of the first panel part 1a and the second panel part 1b. The second adhesive 82 may be used on other contact surfaces. Preferably, the first adhesive 80 is a quickly
- 30 bonding adhesive. This makes it possible to accelerate the production process, as quicker bonding results in the outer sides 27 of the insert 8 having to be pressed against the side walls 29 of the first panel part 1a and/or the second panel part 1b for

a shorter period of time. The second adhesive 82 may be an inexpensive adhesive which bonds more slowly. The use of a first adhesive 80 and a second adhesive 82 is not limited to the configurations illustrated in figures 14 and 15.

- 5 The invention is not limited to the exemplary embodiments which are shown in the drawings and described above, and which may be varied in various ways without departing from the scope of the invention.

Claims

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- 1.- Folded panel, wherein the folded panel (1) comprises a front side (2), a rear  
5 side (3), a first panel part (1a), a second panel part (1b) and a bent transition section  
(7);  
wherein the first panel part (1a) and the second panel part (1b) preferably have the  
same thickness;  
wherein the first panel part (1a) and the second panel part (1b) are connected to each  
10 other at the front side of the folded panel via the bent transition section (7) and form  
a single entity;  
wherein the space between the first panel part (1a), the second panel part (1b) and  
the bent transition section (7) comprises an insert (8),  
wherein the bent transition section (7) is bent over the insert,  
15 wherein the insert is at least attached to one or to both of the first panel part (1a) or  
the second panel part (1b) and/or to the bent transition section (7).
- 2.- Folded panel as in any of the preceding claims, characterized in that the insert  
(8) has an end face (26) with a shape which is such that that the transition section (7)  
20 bears against the end face (26).
- 3.- Folded panel as in claim 2, characterized in that the insert (8) has a shape such  
that the outer sides (27) of the insert (8) which lie on both sides of the end face (26)  
lie against opposite side walls (29) of the first panel part (1a) and the second panel  
25 part (1b).
- 4.- Folded panel as in any of the preceding claims 2 - 3, characterized in that the  
end face (26) has a curvature with a constant radius, preferably wherein the radius is  
smaller than 15 mm.  
30
- 5.- Folded panel as in any of the preceding claims 2 - 4, characterized in that the  
end face (26) is situated on a thickened section of the insert (8).

6.- Folded panel as in any of the preceding claims 1 - 5, characterized in that the insert is at least adhesively bonded to one or to both of the first panel part (1a) or the second panel part (1b) and/or to the bent transition section (7).

5

7.- Folded panel as in claim 6, characterized in that the insert (8) is adhesively bonded by means of a thermosetting adhesive or by means of a hot-melt adhesive, for example applied as a hot-melt strip.

10 8.- Folded panel as in any of the preceding claims, characterized in that the insert (8) is attached to the first panel part (1a) – and optionally also to the second panel part (1b) – by means of a clamped or tension connection.

15 9.- Folded panel as in any of the preceding claims 1 - 5, characterized in that the insert (8) is attached to the first panel part (1a) – and optionally also to the second panel part (1b) – by means of a clamped or tension connection; wherein the insert is not adhesively bonded to either the first panel part (1a) or to the second panel part (1b), nor to the bent transition section (7).

20 10.- Folded panel as in any of the preceding claims, characterized in that the angle (A) included between the first panel part (1a) and the second panel part (1b) is less than 100°, preferably is less than 95°, more preferably is less than 45°, more preferably is less than 20°, more preferably is less than 10°, more preferably is less than 5°, more preferably the first panel part (1a) and the second panel part (1b) are  
25 parallel to each other.

11.- Folded panel as in any of the preceding claims, characterized in that the folded panel (1) comprises a substrate (10) and a top layer (12) – preferably made of a different material than the substrate –, wherein the top layer (12) comprises a decor  
30 layer (14), wherein the bent transition section (7) comprises at least the top layer (12).

12.- Folded panel as in claim 11, characterized in that the decor layer (14) comprises a printed paper layer which is impregnated with a thermosetting resin, for example impregnated with melamine formaldehyde resin or with acrylic resin.

5 13.- Folded panel as in any of the preceding claims, characterized in that the first panel part (1a) and the second panel part (1b) comprise a substrate (10), preferably wherein the substrate is wood-based, more preferably the substrate comprises or is a wood fiberboard – for example an MDF or an HDF board; or the substrate comprises a particle board or a layer which comprises wood chips.

10

14.- Folded panel as in any of the preceding claims, characterized in that the first panel part (1a) and the second panel part (1b) comprise a substrate (10), wherein the substrate is or comprises a wood fiberboard with a density of more than  $750 \text{ kg/m}^3$ , preferably more than  $800 \text{ kg/m}^3$ .

15

15.- Folded panel as in any of the preceding claims, characterized in that the insert (8) is or comprises a plastic insert, preferably a thermoplastic insert.

20

16.- Folded panel as in claim 15, characterized in that the insert (8) is an extruded insert or an injection-molded part.

25

17.- Folded panel as in any of the preceding claims 1 - 14, characterized in that the insert (8) is wood-based, preferably wherein the insert (8) comprises a component made of wood fibers bonded with resin or adhesive or consists thereof, preferably wherein the insert has a density smaller than  $720 \text{ kg/m}^3$ .

30

18.- Folded panel as in any of the preceding claims 1 - 14, characterized in that the insert (8) comprises a component made of wood fibers bonded with resin or adhesive or consists thereof, wherein the wood fibers in the component are, on average, parallel with the front side of the first panel part (1a) and/or the second panel part (1b).

19.- Folded panel as in any of the preceding claims 17 or 18, characterized in that the insert (8) is made of a wood fiberboard, wherein the chord of the component of the insert (8) which determines the chord of the bent transition section (7) is perpendicular to the plane of the wood fiberboard from which the insert (8) is made.

5

20.- Folded panel such as in any of the preceding claims, characterized in that the insert (8) comprises one or more open recesses (15) – e.g. which are in the shape of the negative of a dovetail – or protruding parts (16) which are situated in the open space between the first panel part (1a) and the second panel part (1b) in the folded panel.

10

21.- Folded panel as in any of the claims, characterized in that the insert comprises a continuous groove or a continuous protruding part which is situated in the open space between the first panel part (1a) and the second panel part (1b) in the folded panel.

15

22.- Folded panel as in any of the preceding claims, characterized in that the insert (8) comprises a hole (19) at one or at both linear ends, preferably this hole is not circular in cross section.

20

23.- Folded panel as in any of the preceding claims, characterized in that the insert comprises a fully continuous hole along its length, preferably having a non-circular cross section.

24.- Folded panel as in any of the preceding claims, characterized in that the chord (K) of the bent transition section (7) is smaller than 30 mm and greater than 20 mm.

25

25.- Folded panel as in any of the preceding claims, characterized in that, in the cross section of the folded panel, the bent transition section (7) has a circumference of less than 47 mm and of more than 30 mm.

30

26.- Folded panel as in any of the preceding claims, characterized in that the insert (8) comprises a projection (21), wherein the projection (21) is introduced in an opening (23) which is provided for the purpose on the rear side (3) of the first panel part (1a), preferably wherein the projection is clamped, tensioned and/or glued in the opening of the first panel part (1a) provided for the purpose.

27.- Folded panel as in claim 26, characterized in that the opening (23) is a groove.

28.- Folded panel as in any of the preceding claims 26 - 27, characterized in that the projection (21) extends along the entire length of the insert (8) and/or in that the projection (21) has the same cross section along its entire length.

29.- Folded panel as in any of the preceding claims 26 - 28, characterized in that the opening (23) extends along the entire length of the folded panel and/or in that the opening (23) has the same cross section along its entire length.

30.- Folded panel as in any of the preceding claims 26 - 29, characterized in that the insert (8) comprises a second projection (22), wherein the second projection (22) is introduced in a second opening (24) which is provided for the purpose on the rear side of the second panel part (1b), preferably wherein the second projection (22) is clamped, tensioned and/or glued in the second opening (24).

31.- Folded panel as in claim 30, characterized in that the second opening (24) is a groove.

32.- Folded panel as in any of the preceding claims 30 - 31, characterized in that the second projection (22) extends along the entire length of the insert (8) and/or in that the second projection (22) has the same cross section along its entire length.

33.- Folded panel as in any of the preceding claims 30 - 32, characterized in that the second opening (24) extends along the entire length of the folded panel and/or in that the second opening (24) has the same cross section along its entire length.

34.- Folded panel as in any of the preceding claims, characterized in that the first panel part (1a) or the second panel part (1b) is provided, on the edge opposite the bent transition section (7), with a coupling part in the form of a groove (40) delimited by a front lip (41) and a rear lip (42), wherein the rear lip projects further with respect to the edge of this panel part than the front lip, wherein the rear lip comprises a locking part (43) facing the groove;

wherein the coupling part is configured to produce a coupling with a panel which comprises a tongue (44) on its edge and a recess (46) on the rear side of the tongue (44);

wherein, in the coupled state of the tongue in the groove, this tongue and groove produce a locking in the direction perpendicular to the plane of the panel coupled to the respective panel part, and wherein the locking part and the recess produce the locking in the direction perpendicular to the coupled edges and in the plane of the panel.

35.- Folded panel as in any of the preceding claims, characterized in that the bent transition section forms a round nosing in the folded panel.

36.- Folded panel as in any of the preceding claims 1 – 35, characterized in that the bent transition section (7) comprises an arch, wherein the radius (R1) in the center of the arch is smaller than the radii (R2, R3) in the arch on both sides of the center of the arch.

37.- Folded panel as in any of the preceding claims 35 - 36, characterized in that the bent transition section (7) describes a part of an ellipse over at least a part thereof – and preferably over the largest part thereof.

38.- Folded panel as in any of the preceding claims 1 - 35, characterized in that the front side of the bent transition section (7) describes a segment of a circle.

39.- Folded panel as in any of the preceding claims 1 – 34, characterized in that the bent transition section (7) forms a square nosing in the folded panel.

40.- Folded panel as in any of the preceding claims 1-34 or as in claim 39,  
5 characterized in that the bent transition section (7) comprises a first arch (53) and a second arch (54), with a flat section (55) between the first arch and the second arch.

41.- Folded panel as in claim 40, characterized in that the first arch (53) and/or the second arch (54) enclose an angle of between 85° and 95° – and preferably an angle  
10 of 90°.

42.- Folded panel as in claim 40 or 41, characterized in that the length of the flat section (55) of the bent transition section (7) is greater than – and preferably is at least double, and more preferably at least triple – the thickness of the first panel part  
15 (1a).

43.- Folded panel as in any of the preceding claims, characterized in that the bent transition section (7) comprises a rib (50), wherein the rib is formed by a local thickening in the bent transition section (7), wherein the insert (8) comprises a slot  
20 (51), wherein the rib is introduced in the slot, preferably wherein the rib and the slot have dimensions which are such that the rib fits precisely in the slot and/or preferably wherein the rib tapers.

44.- Folded panel as in any of the preceding claims 1 - 42, characterized in that  
25 the bent transition section (7) comprises a slot, wherein the slot is formed by a local thinning in the bent transition section (7), wherein the insert (8) comprises a rib, wherein the rib is introduced in the slot, preferably wherein the rib and the slot have dimensions which are such that the rib fits precisely in the slot and/or preferably wherein the rib tapers.

30

45.- Folded panel as in any of the preceding claims, characterized in that the bent transition section (7) has a smaller thickness than either the first panel part (1a) or the second panel part (1b).

5 46.- Folded panel as in any of the preceding claims, characterized in that the first panel part (1a) is thinner than the second panel part (1b), preferably wherein the first panel part has a thickness of at most 30% – and more preferably of at most 25% – of the thickness of the second panel part.

10 47.- Folded panel as in claim 46, characterized in that the first panel part (1a) has the same thickness as the bent transition section (7); or in that the first panel part (1a) is thicker than the bent transition section (7).

48.- Folded panel as in any of claims 46 – 47, characterized in that the first panel  
15 part (1a) at least partly bears against a flat section (63) of the insert (8).

49.- Folded panel as in claim 48, characterized in that at least the distal part of the first panel part (1a) bears against a flat section (63) of the insert (8).

20 50.- Folded panel as in any of the preceding claims 46 - 49, characterized in that the lateral end (65) of the folded panel on the side which comprises the first panel part (1a) is partly formed by the insert (8).

51.- Folded panel as in any of the preceding claims 46 – 50, characterized in that  
25 the folded panel (1) comprises a substrate (10) and a top layer (12) – preferably made of a different material than the substrate –, wherein the top layer (12) comprises a decor layer (14), wherein the bent transition section (7) comprises at least the top layer (12) and a layer of the substrate, wherein the first panel part (1a) comprises at least the top layer (12) and a layer of the substrate (10).

30

- 52.- Folded panel as in any of the preceding claims, characterized in that the folded panel has a maximum thickness which is thicker than the thickness of the second panel part (1b).
- 5 53.- Folded panel as in any of the preceding claims, characterized in that the insert (8), measured at right angles to the surface of the bent transition section, is thicker than the thickness of the second panel part (1b).
- 54.- Folded panel as in any of the preceding claims, characterized in that the end  
10 of the insert (8) opposite the bent transition section (7) is situated in an open space.
- 55.- Folded panel as in any of the preceding claims, characterized in that the thickness of the transition section (7) is less than 20% – and preferably less than 15%, and more preferably is less than 10% – of the thickness of the second panel part (1b).  
15
- 56.- Stair nosing, characterized in that the stair nosing comprises a folded panel as in any of the preceding claims.
- 57.- Stair, characterized in that the stair comprises at least one stair nosing as in  
20 claim 56.
- 58.- Method for producing a folded panel (1) as in any of the preceding claims 1 - 55, characterized in that the method comprises the steps
- 25 - providing a panel, wherein the panel comprises a front side (2), a rear side (3), a first panel part (1a), a second panel part (1b) and a transition section (37); wherein the first panel part (1a) and the second panel part (1b) preferably have the same thickness; wherein the first panel part (1a) and the second panel part (1b) are connected to each other at the front side of the panel via the transition section (37) and form a single entity;
- 30 - attaching an insert (8) to the first panel part (1a), for example by means of adhesive and/or by means of a mechanical connection;
- bending the transition section (37) over the insert (8) so that a bent transition section

(7) is obtained between the first panel part (1a) and the second panel part (1b); and  
- attaching the insert (8) to the second panel part (1b) and/or to the bent transition section (7).

5 59.- Method as in claim 58, characterized in that bending of the transition section over the insert (8) is performed at least by a rotary movement of the insert to which the first panel part (1a) has already been attached.

60.- Method for producing a folded panel (1) as in any of the preceding claims  
10 1 - 55, characterized in that the method comprises the steps  
- providing a panel, wherein the panel comprises a front side (2), a rear side (3), a first panel part (1a), a second panel part (1b) and a transition section (37); wherein the first panel part (1a) and the second panel part (1b) preferably have the same thickness; wherein the first panel part (1a) and the second panel part (1b) are  
15 connected to each other at the front side of the panel via the transition section (37) and form a single entity;  
- pushing an insert (8) in the direction perpendicular to the panel, wherein the insert (8) makes contact with the transition section (37) during the pushing operation and wherein the transition section is bent to form a bent transition section (7) as a result  
20 of this pushing operation, wherein both the first panel part (1a) and the second panel part (1b) perform an angular rotation with respect to the insert (8); and  
- attaching the insert (8) to one or to both of the first panel part (1a) or the second panel part (1b) and/or to the bent transition section (7).

25 61.- Method as in claim 60, characterized in that the method comprises the step in which the transition section (37) is heated up before it is bent, preferably by means of IR radiation.

62.- Method as in claim 60 or 61, characterized in that the method comprises the  
30 step of applying adhesive to the transition section (37) or to the insert (8) before the bending of the transition section (37), so that the insert is attached to the transition section by means of an adhesive connection.

63.- Method as in any of the preceding claims 60 – 62, characterized in that, when pushing the insert (8), the transition section (37) is pushed into a mold (67) which, together with the form of the insert (8), determines the form of the bent transition  
5 section (7).

64.- Method as in any of the preceding claims 60 – 63, characterized in that pushing is performed by means of a tool, wherein the tool engages in one or more open recesses (15) – e.g. in the form of the negative of a dovetail – or protruding  
10 parts which are situated in the open space between the first panel part and the second panel part in the folded panel.

65.- Method as in any of the preceding claims 60 – 64, characterized in that the transition section (37) comprises a rib (50), wherein the rib is formed by a local  
15 thickening in the bent transition section (37), wherein the insert (8) comprises a slot (51), wherein the rib is introduced in the slot during the pushing operation, preferably wherein the rib and the slot have dimensions which are such that the rib fits precisely in the slot and/or preferably wherein the rib (50) tapers.

20 66.- Device, characterized in that the device is configured to carry out a method as in any of the preceding claims 60 – 65.