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- (73) Patenthaver: **Fritz Egger GmbH & Co. OG, Weiberndorf 20, 6380 St. Johann in Tirol, Østrig**
- (72) Opfinder: **Schneider, Gerold, Fritz Egger GmbH & Co. OG, Badgasse 15, 2371 Hinterbrühl, Østrig**
- (74) Fuldmægtig i Danmark: **Zacco Denmark A/S, Arne Jacobsens Allé 15, 2300 København S, Danmark**
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The invention relates to a folding panel with a visible side and a back side, with a base panel, with a layer that is arranged on the base panel and with at least one groove configured on the back side, wherein the layer is arranged on the visible side of the panel, wherein the layer is configured such that it has a hinge function in the region of the groove and wherein the panel is foldable along the groove.

Folding panels are in particular used as components in furniture kits, wherein both carcass parts and furniture back panels can comprise folding panels. The advantage of the foldability is that the panels in the folded state have small dimensions and can therefore be packed in smaller packaging. In order to pack a furniture kit, the folding panels are normally fully folded together, possibly arranged on or below other furniture parts and packaged with a carton material. The panels normally have one folding, but folding panels are also known which can be folded at two or more points.

Folding panels are known from the state of the art, comprising two panel parts positioned alongside one another, which are joined on the visible side by a PVC layer, having a hinge function in the area where the panel parts meet. These panels have the disadvantage that they are ecologically harmful and only just or inadequately meet requirements concerning fire protection or harmful substance emissions due to gases given off by the PVC and chemical transformation of the PVC during burning. PVC layers also have a surface structure that is unsuitable, undesirable or unsatisfactory for furniture surfaces, so that the optical or haptic impression of the furniture part can be impaired. For these reasons the furniture industry in particular has moved away from using such folding panels and has preferred the use of folding panels in which the hinge function is performed by an adhesive or an adhesive strip on the visible side, the back side or between the panel parts. Thus, for example, DE 20 2005 018 809 U1 discloses a folding panel with two panel sections that are separate from one another, which are held together on the back side by a hinge element consisting of adhesive.

This and comparable panels from the state of the art have the disadvantage that in the unfolded state the folding edge remains visible and the optical impression of the panel is impaired.

Generic folding panels are known from both JP 53064289 A and from US 5,413,834.

JP 53064289 A discloses a folding panel, wherein the layer forming the visible side has
5 an adhesive layer, a decorative layer and two plastic layers.

According to US 5,413,834, the layer arranged on the base panel comprises a saturated paper.

10 The object of the present invention is therefore to provide a folding panel which avoids the abovementioned disadvantages of the folding panels from the state of the art and which is particularly simple and economical to manufacture.

The object is achieved according to the invention by a folding panel with the features of
15 Claim 1. Further advantageous configurations are indicated in the sub-claims.

Because the layer consists of a paint layer which consists of a long-lasting elastic paint, it is achieved that the folding panel has great durability and stiffness, and high ecological compatibility, and an optically and haptically high-quality visible side, which in
20 particular also is not impaired by a visible folding edge. In this way the invention dispels the technical preconception that an adhesive, an adhesive tape or even a PVC layer is required as the hinge element for a folding panel. It has transpired that the layer comprising an elastic paint is suitable both during the folding and unfolding of the panel for performing a hinge function as well as providing the unfolded panel with sufficient
25 stiffness. Here the paint from which the paint layer is made can be any form of paint, which can be applied in liquid or powder form to the panel.

Here the groove arranged on the back side of the panel preferably extends through the full thickness of the base panel, so that the groove base is formed exclusively by the
30 layer or by the paint layer. Alternatively, it is also conceivable for the groove not to extend through the entire base panel. The groove can have an I-shape, V-shape or be configured in a different way. The base panel preferably comprises a wood or wooden

material. For example, chipboard or fibreboard, or a multilayer panel with chipboard and/or fibreboard sections can be used.

5 An advantageous configuration of the folding panel consists in that in the base panel a number of grooves are arranged next to one another. As a result, the total angle through which the folding panel is folded is distributed over a number of folding edges, so that the folding angle at each individual groove or folding edge is less than the total angle and the mechanical stress on the layer functioning as the hinge element in this area is reduced. It is therefore possible, to configure the layer to be thinner or to achieve a
10 higher durability of the layer and allow a more frequent folding and unfolding of the panel.

It is conceivable for a decorative layer to also be arranged on the paint layer. This configuration means that the condition of the visible side of the folding panel can be
15 freely selected. Thus for example it is possible to use an elastic paint for the layer functioning as the hinge element, but for the decorative layer a different, decorative, paint. In particular, a very thin paint layer or a paint layer with a textured surface can be used, which in itself would not be suitable as a hinge element. It is of course also possible to configure the paint layer functioning as the hinge directly as a decorative
20 layer, so that the application of an additional layer can be dispensed with and the folding panel manufactured more economically, simply and quickly. It is also conceivable for more than one additional layer to be applied to the paint layer, in order to achieve for example a particular decorative effect.

25 In an advantageous configuration of the folding panel the layer forming the visible side has a reinforcement or an armoring. This armoring can for example be arranged in the paint layer or in a further layer. For the armoring of such a layer, for example, fibres are suitable which are embedded in the layer. The advantage of this configuration is that the stability of the layer increases and thus the hinge function is improved.

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According to the invention the paint layer comprises substantially a paint, having a glass transition temperature in the range of normal room temperatures. A further

- advantageous embodiment of the folding panel consists in that the paint layer has a glass transition temperature between 15°C and 30°C. A glass transition temperature in this connection means the temperature at which the curve of the logarithmic modulus of elasticity has a point of inflection. The range around the glass transition temperature is thus characterised by a strong temperature dependency of the logarithmic modulus of elasticity. The use of a paint with a glass transition temperature in the room temperature range has the advantage that the modulus of elasticity of the paint has an advantageous mean, so that the paint has both sufficient bending capacity and also sufficient resilience. This allows the panel to be easily folded and in the unfolded state to have great stiffness. Furthermore, through just slight heating of the paint in the vicinity of the groove the modulus of elasticity can be significantly reduced, so that folding of the panel is further simplified. As the unfolded panel cools to room temperature the modulus of elasticity increase again, so that the stiffness of the panel rises once more.
- 15 In an advantageous configuration the paint layer has an Erichsen cupping value of at least 5 mm, preferably 8 mm and in particular at least 10 mm and/or passes the mandrel bend test according to EN ISO 6860 with a bending mandrel diameter of a maximum of 10 mm, preferably a maximum of 6 mm, in particular a maximum of 4 mm. The Erichsen cupping value means the depth to which a hardened, polished steel ball with a diameter of 20 mm can be pushed into the paint layer at a constant feed rate of approximately 0.2 mm/s by means of a plunger, before the first cracks appear on the surface of the paint layer. The use of such a paint layer is advantageous, because in this way high durability of the paint layer can be achieved and frequent folding or unfolding of the panel enabled.
- 25 A further advantageous configuration of the folding panel is ensured in that the paint layer is based on solutions and dispersions of elastic chloroprene and/or chlorosulfonated polyethylene products. Such paint layers are characterised by a particularly high and durable elasticity.
- 30 A further advantageous configuration of the folding panel is ensured in that the paint layer is based on solutions and dispersions of silicone resins and/or plastically

structured polyurethanes. These paint layers are also characterised by a particularly high and durable elasticity.

5 A further advantageous configuration of the folding panel consists in that the paint layer has an epoxide or acryl component or mixtures thereof. Such paint layers are similarly characterised by a particularly high and durable elasticity.

10 A further advantageous configuration of the folding panel consists in that the paint layer is formed at least partially from an elastomer. Such paint layers are characterised by a particularly high and durable elasticity.

15 It is also conceivable for the layer to have an intermediate layer arranged between the paint layer and the visible side. Here an intermediate layer means a layer that as a result of its composition and/or its structure is suitable for relieving the paint layer during folding and unfolding of the panel and partially or completely taking on the hinge function of the paint layer. Basically any fabric that can be bonded to the panel is suitable for this. Such a design is particularly advantageous since in this way a very thin paint layer or a paint layer with a textured surface can be used, which in itself would not be suitable as a hinge element. The additional layer also leads to increased stiffness of the folding panel in the unfolded state. Particular preference is for the use of an intermediate layer, which can be coated with a paint layer without further pre-treatment, since in this way the work required, in particular substrate preparation such as grinding and priming the panel surface, can be dispensed with, resulting in a reduction in the manufacturing costs.

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It is also conceivable for the intermediate layer to have a priming film. Particularly advantageous here is the use of pure cellulose-based priming films. These can further be impregnated with a synthetic resin. The advantage of this configuration consists in that due to the priming film, the paint layer has better adherence to the folding panel.

30 Furthermore, for example, by corresponding colouring of the base plate, particular colour schemes of the visible side of the folding panel can be achieved.

Also conceivable is for the intermediate layer to have a colour that substantially corresponds to the intended appearance of the visible side. This configuration has the advantage that the paint layer can have a particularly thin design, without the external appearance of the visible side being impaired by a different colouring of the intermediate layer showing through. It is even possible to use a transparent paint layer.

For example, the intermediate layer can thereby be printed without further pre-treatment. On the intermediate layer, therefore, a pattern, for example a vein pattern, can be printed, so that the coloured intermediate layer and the print in conjunction can create the intended optical appearance. A paint layer applied to the print, in particular a transparent paint layer, can enhance the optical appearance and seal the printed surface thereby protecting it from damage.

It is conceivable for the intermediate layer to be pressed with the panel. This configuration has the advantage that as a result of the special intimate bonding between the intermediate layer and the panel a high durability of the folding panel is achieved. The pressing of the intermediate layer with the panel can take place directly, in that the intermediate layer is applied to the panel blank immediately prior to the pressing of the panel. This has the advantage that the intermediate layer does not have to be subsequently bonded with the panel and thus leads to a simplification of the manufacturing process of the panel and thus to a reduction in costs. For this configuration fabrics are particularly suitable that have a temperature- and moisture-resistance that are appropriate for the pressing conditions.

The intermediate layer can also have a structure that is not completely closed, in particular a meshed or fabric structure. Through such a structure of the intermediate layer, a high elasticity is achieved with simultaneously high durability of the intermediate layer and thus an improvement in the hinge effect of the intermediate layer. Such an intermediate layer is also advantageous in the direct pressing of the layer with the panel according to the abovementioned configuration, since in this way higher production speeds can be achieved. Thus the vapour that is generated during pressing of the panel blank and which must be dissipated can reach the layer that is not completely

closed, so that an extension to the pressing time can be avoided, unlike the pressing of continuous layers.

5 It is furthermore possible for the intermediate layer to comprise a pressed non-woven material. Because of its long fibres, a non-woven fabric has a high elasticity and durability and is thus highly suitable as a hinge element. This configuration has the further advantage that the non-woven fabric can be applied to the panel blank even before pressing, so that through the combined pressing firstly an internal bond between the panel and the non-woven fabric can be achieved and secondly the manufacturing
10 process can be kept simple and economical.

In the following an arrangement is described for packing a furniture kit, with a furniture kit and with a packaging material, wherein the furniture kit comprises a folding panel, in particular a folding panel according to one of the abovementioned configurations,
15 wherein the furniture kit has at least one further furniture component and wherein the folding panel has at least two grooves arranged next to one another, wherein the folding panel is folded at least partially along at least two of the grooves and wherein the folding panel is arranged so that the visible side of the folding panel points in the direction of the furniture component and the back side of the folding panel points in the direction of
20 the packaging material.

Because the folding panel is at least partially folded along at least two grooves and because the folding panel is arranged in a packaging of a furniture kit so that the visible side of the folding panel points towards the inside of the packaging and that the back
25 side of the folding panel points towards the outside of the packaging, it is ensured that the further furniture components of the furniture kit at least partially do not rest directly on the packaging and therefore are protected from mechanical damage, for example during transport. Thus a mechanical force impinging on the packaging is weakened by the folding panel and can only impinge in a weakened manner on furniture
30 components positioned inside. The folding panel itself is arranged so that the more delicate visible side points inwards, so that under a certain mechanical force it is not directly damaged.

Further features and advantages of the present invention are explained in more detail in the description of a number of exemplary embodiments, wherein reference is made to the attached drawing. The drawing shows as follows:

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Fig. 1 a first exemplary embodiment of a folding panel according to the invention in the unfolded state;

Fig. 2 the first exemplary embodiment from Fig. 1 in the folded state;

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Fig. 3 a folding panel in an unfolded state;

Fig. 4 a second exemplary embodiment of a folding panel according to the invention in the unfolded state;

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Fig. 5 the second exemplary embodiment from Figure 4, in the folded state;

Fig. 6 a folding panel in the unfolded state;

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Fig. 7 a first exemplary embodiment of an arrangement for packing a furniture kit;

Fig. 8 a second exemplary embodiment of an arrangement for packing a furniture kit.

Fig. 1 shows a first exemplary embodiment of a folding panel according to the invention in the unfolded state. The folding panel 2 with a visible side 4 and a back side 6 has a base panel 8 and a layer 10 arranged on the base panel. The layer 10 is configured as a paint layer, wherein the paint layer consists of a long-lasting elastic paint, for example a paint based on elastic chloroprene or chlorosulfonated polyethylene products. The back side of the folding panel 2 has a sunken groove 12 which extends through the entire thickness of the base panel 8, so that the groove base is formed solely by the layer 10. It is also conceivable that the groove 12 does not extend fully through the base panel 8, so that the groove base is formed by a remaining part of the base panel 8. Through the

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position of the groove 12 a folding edge 14 of the folding panel 2 is defined. The folding panel 2 can be folded on the folding edge 14.

Fig. 2 shows the folding panel 2 from Fig.1, after folding on the folding edge 14 so that the areas of the panel separated by the folding edge 14 lie flat against each other with their respective layer 10. In this folded state the folding panel 2 has a substantially smaller spatial dimension and can advantageously be packed in a smaller packaging.

Fig. 3 shows a folding panel in an unfolded state. The folding panel 16 differs from the folding panel 2 from Fig. 1 in that the layer 10, in addition to the paint layer 18, has a further decorative layer 20 applied on the paint layer 18. The groove 22 is also configured with a V-shape. This is advantageous since in this way overstretching of the folding panel 16 at the groove 22 is prevented. The decorative layer 20 can for example have a colour and/or texture, through which the optical impression of the visible side 24 of the folding panel 16 is determined. This can in particular be a layer, wherein the composition and texture of which does not allow the sole use of said layer as a hinge element.

Fig. 4 shows a second exemplary embodiment of a folding panel according to the invention in the unfolded state. The folding panel 26 has on its back side 28 a number of grooves 30 arranged next to one another. These grooves 30 are preferably positioned in parallel. The grooves 30 are V-shaped, but could have an I-shape, or a different shape, or even different shapes in comparison to each other. The distances between two adjacent grooves 30 can, as in shown Fig. 4, be of the same or also of different sizes. Through the plurality of grooves a corresponding number of folding edges 32 is defined.

The folding panel 26 is shown in Fig. 5 in the folded state. Through the plurality of grooves 30 and the plurality of folding edges 32 it is achieved that the total folding angle, for example a folding angle of 180° shown in Fig. 5, is distributed among the particular folding edges. Thus with the roughly even distribution of the angle in the folded folding panel 26 shown in Fig. 5 each folding edge 32 has a folding angle of approximately 30°. The layer 34 functioning as a hinge element, which for example similarly to the layer 10

shown in Fig. 1 can comprise a paint layer, is therefore exposed in the area of the folding edges 32 to lower loads and as a result has higher durability.

5 The folding panel 36 shown in Fig. 6 in the unfolded state differs from the folding panel 2 shown in Fig. 1 in that the layer 10 has an additional intermediate layer 42 arranged between the base panel 38 and the paint layer 40. The groove 44 is also V-shaped. The intermediate layer 42 can for example have a priming film and/or a colour corresponding to the intended appearance of the visible side. The intermediate layer 42 can further comprise a pressed non-woven material. It can be configured as a completely
10 closed layer or a not completely closed layer, for example with a meshed or fabric structure. The intermediate layer 42 can also be glued, pressed or bonded in another way to the base panel 38.

Fig. 7 shows a first exemplary embodiment of an arrangement for packing a furniture
15 kit. The arrangement 46 comprises a packaging material 50 and a furniture kit 48. The furniture kit 48 in turn comprises a folding panel 52 and a further furniture component 54, for example a side wall of a cabinet. The furniture kit 48 can of course comprise further furniture components and other parts such as screws, nails or assembly instructions. The packaging material 50 comprises a carton 56 and a packaging tape 58.
20 Other packaging materials are also conceivable, of course. In particular, the carton can be fully dispensed with and the furniture kit 48 packed with just one or more packaging tapes. The folding panel 52 has a visible side 60, a back side 62 and two folding edges 64. The folding panel 52 is folded about two folding edges 64 so that the back side 62 points outwards. In the intermediate area enclosed by the folding panel 52, the furniture
25 component 54 is arranged. Here the furniture component 54 rests on the visible side 60 of the folding panel 52. The furniture kit 48 is arranged in the carton 56 so that the back side 62 of the folding panel 52 rests on the carton 56. Alternatively, the back side 62 can also rest on further furniture components or other parts of the furniture kit 48. The packaging tape 58 runs around the carton 56 to further secure and stabilise the
30 packaging. As a result of the folding panel 52 partially enclosing the furniture component 54, the size of the packaging is reduced and the furniture component 54 is also protected by the folding panel 52 from mechanical damage, for example during

transport. The delicate visible side 60 of the folding panel 52 is protected here in that it points inwards and at least partially rests against the furniture component 54.

Fig. 8 shows a second exemplary embodiment of an arrangement for packing a furniture
5 kit. The arrangement comprises a furniture kit 68 and a packaging material 70. The furniture kit 68 comprises a folding panel 26 similar to the folding panel shown in Fig. 5 and a furniture component 72. Similarly to the first exemplary embodiment shown in Fig. 7, the folding panel 26 is folded about the folding edges 30 so that the folding panel 26 at least partially encloses the furniture component 72. The back side 74 of the folding
10 panel 26 is enclosed by the packaging material 70 comprising a carton 76. For further stabilisation of the packaging and for further protection of the furniture kit 68 the packaging material 70 can also comprise packaging filling materials, such as for example what are known as peanuts 78, which can be arranged in the spaces between the furniture kit 68 and the carton 76. The folding panel 68 is advantageous for the
15 arrangement, because as a result of the plurality of edges 30 a larger space enclosed by the visible side 80 of the folding panel 26 results for arrangement of the furniture component 72.

P a t e n t k r a v

1. Foldbar plade (2, 16, 26, 36, 52),
- med en synlig side (4, 24, 60, 80) og en bagside (6, 62, 74),
5 - med en grundplade (8, 38),
- med et lag (10), der er anbragt på basispladen (8) og danner den synlige side (4, 24, 60, 80), og
- med mindst en not (12, 22, 30, 44), der er udformet i basispladen (8, 38),
- hvor laget (10) er udformet således, at det i området af noten (12) har en
10 hængselfunktion og
- hvor pladen kan foldes langs med noten (12),
kendetegnet ved,
- **at** laget (10) består af et laklag (18, 40), som består af en langtidsholdbar
elastisk lak.
15
2. Foldbar plade ifølge krav 1, **kendetegnet ved, at** der i grund siden (8, 38) er udformet flere ved siden af hinanden anbragte noter (12, 22, 30, 44).
3. Foldbar plade ifølge et af kravene 1 eller 2, **kendetegnet ved, at** laklaget
20 (18, 40) har en glasovergangstemperatur på mellem 15 °C og 30 °C.
4. Foldbar plade ifølge et af kravene 1 til 3, **kendetegnet ved, at** laklaget (18, 40) er baseret på opløsninger og dispersioner af elastiske chloroprener og/eller chloresulfonerede polyethylenprodukter.
25
5. Foldbar plade ifølge et af kravene 1 til 4, **kendetegnet ved, at** laklaget (18, 40) er baseret på opløsninger og dispersioner af silikoneharpikser og/eller elastisk indstillede polyurethaner.
- 30 6. Foldbar plade ifølge et af kravene 1 til 5, **kendetegnet ved, at** laklaget (18, 40) har en epoxid- eller acrylkomponent eller blandinger deraf.
7. Foldbar plade ifølge et af kravene 1 til 6, **kendetegnet ved, at** laklaget (18, 40) dannes i det mindste delvist af en elastomer.

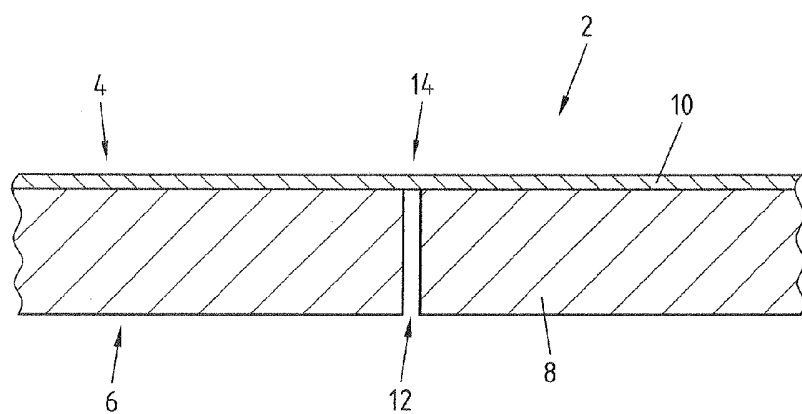


Fig.1

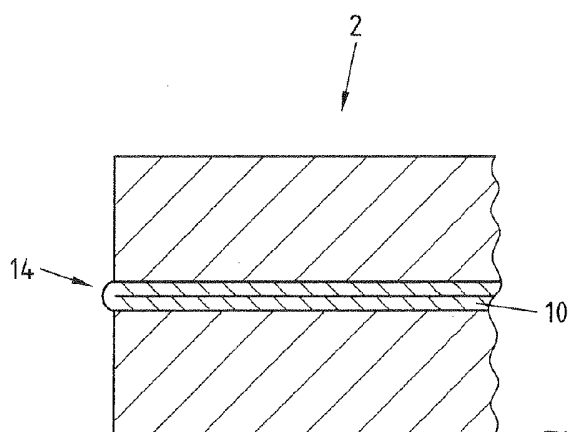


Fig.2

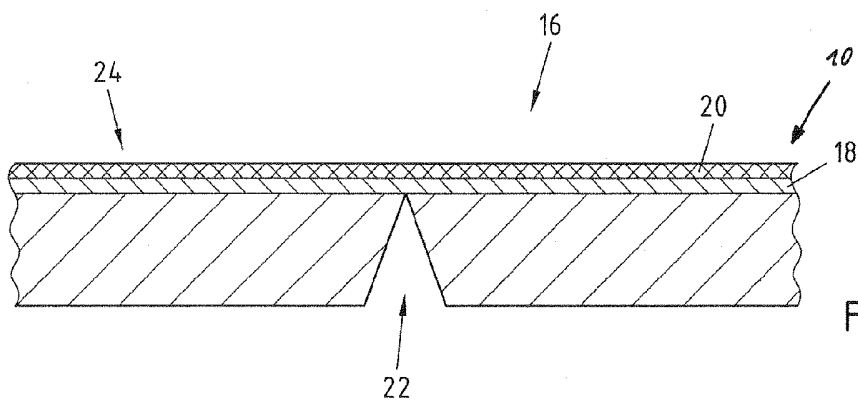


Fig.3

