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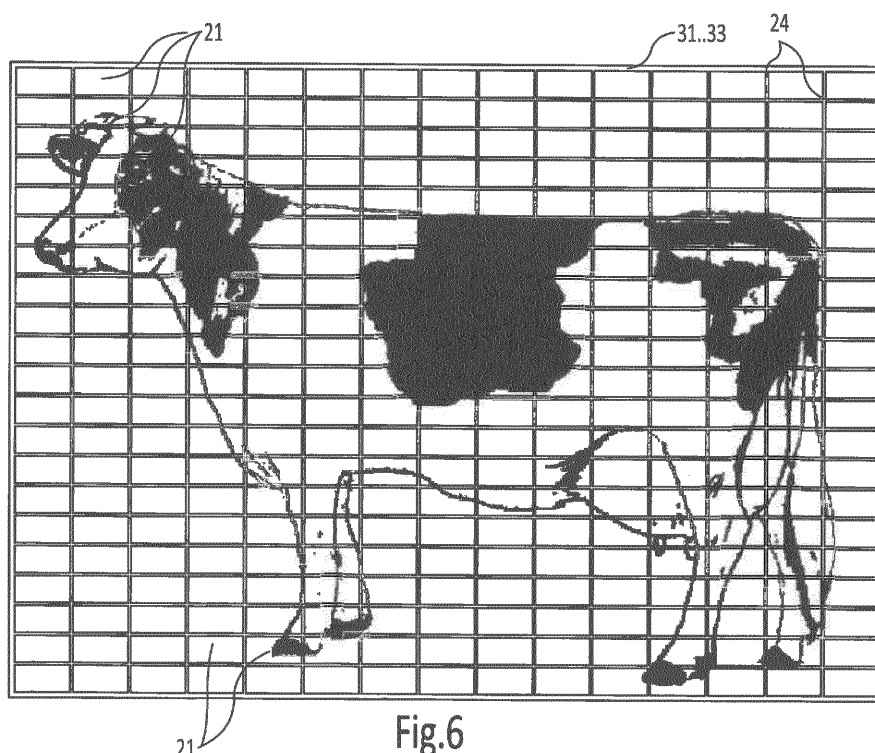
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(54) **METHOD FOR ARRANGING AN IMAGE ON A SUBSTRATE, AND DECORATIVE PANEL**

(57) In a method for arranging an image (20) on a substrate (30) the image is deposited graphically onto a temporary carrier (10). The substrate is covered with a curing adhesive layer (40) and the image (20) is brought into contact therewith and separated from the temporary carrier (10). The image is thus transferred to the substrate (30). Applied for the temporary carrier (10) is a stable

plastic film having a substantially smooth main surface. The image (20) is deposited thereon with a peeling resistance which is lower than an adhesion of the image to the adhesive layer (40) and lower than an adhesion of the adhesive layer to the substrate. A decorative panel, such as what appears to be a tile tableau, can in particular be thus assembled.



**Fig.6**

## Description

**[0001]** The present invention relates to a method for arranging an image on a substrate, wherein the image is deposited graphically onto a temporary carrier, the substrate is covered at least locally with a curing adhesive layer, the image is brought into contact with the adhesive layer, the adhesive layer is subjected to a curing, the carrier is separated from the image and the image is thus transferred to the substrate provided with the adhesive layer. The invention also relates to a decorative panel for which such a method has been applied.

**[0002]** In a known method for transferring an image to a substrate use is made of a porous, at least water-permeable carrier of a non-transparent non-woven membrane of synthetic fibres with a main surface on which a water-soluble release layer is arranged. The image is first deposited onto this release layer making use of a conventional digital printing process. The carrier with the release layer and the image arranged thereon is subsequently brought into contact with the substrate which has been provided at least locally with an adhesive layer to which the image will adhere. The carrier is then saturated from a backside with water so that the release layer soluble therein will dissolve and degrade in order to thus release the image. The image thus separates from the carrier and then remains behind on the substrate, optionally under a transparent lacquer layer.

**[0003]** Although an almost perfectly smooth result can thus be obtained per se on substrates of diverse nature, such as particularly on walls and floors of a room onto which the image appears to have been directly printed, this known method has the drawback that residues of the dissolved release layer remain visible in the print, and particularly around the image. This is undesirable as it ultimately has the effect of impairing the overall result. Wetting of the carrier moreover results in the known method in a certain lateral expansion of the carrier with the image thereon, whereby registration errors can occur therein between different image elements. Because in the known system the carrier obscures the view of the image to at least significant extent, there is moreover no visual feedback of a mutual alignment of individual image elements in an underlying image when it is assembled from individual parts.

**[0004]** The present invention has for its object, among others, to provide a method with which an image can be transferred to a substrate and with which such unsightly layer residues and/or registration errors can be avoided.

**[0005]** In order to achieve the stated object a method of the type described in the preamble has the feature according to the invention that for the carrier a stable plastic film is applied having a substantially smooth main surface onto which the image is deposited by means of a printing process with a peeling resistance which is lower than an adhesion of the image to the adhesive layer and lower than an adhesion of the adhesive layer to the substrate. According to the invention the image is thus first

deposited onto a stable carrier, i.e. a carrier which will not degrade and fall apart during the further course of the process. As a result of a relatively limited peeling resistance of the image on such a smooth surface this peeling resistance can be overcome relatively easily by the adhesion of the image to the adhesive layer. Surprisingly, it has been found that no further means are required for a separation of the image from the carrier and the image can thus be transferred integrally and unimpaired onto the adhesive layer once this has optionally cured to some extent.

**[0006]** A preferred embodiment of the method has the feature here that the image on the substrate is covered with a wear-resistant, transparent, at least translucent lacquer layer which, after having cured, imparts an attractive gloss finish to the whole and provides for a sufficient measure of wear-resistance. The same, or at least a similar, lacquer layer is advantageously also applied for the adhesive layer. A particular embodiment of the method has the feature here according to the invention that the adhesive layer comprises a lacquer layer, in particular a transparent, at least translucent, multi-component polyurethane lacquer/adhesive. Exceptionally good results have been achieved in practice with such a lacquer layer as adhesive layer and optionally also as finishing layer.

**[0007]** In a further preferred embodiment of the method the multi-component polyurethane lacquer comprises an aspartic ester component and an accelerator component. The mixing ratio of these components can be determined subject to the substrate and application, wherein for instance smoothness, porosity and orientation relative to the gravitational force are factors which can influence this mixing ratio. Examples which work well have been achieved with mixing ratios of aspartic ester component to accelerator of between 1:1 and 1:100, in particular between 1:1 and 1:10. This multi-component polyurethane lacquer comprising an aspartic ester component can be applied very advantageously in a method according to the invention since the transfer of the image to this lacquer layer can already be performed very efficiently at room temperature, i.e. without increase in temperature being necessary. It will be apparent that this provides great advantages in respect of energy-saving, environmental aspects and the complexity of the process. This method can further be favourably applied on diverse substrates, both smooth and structured with relief, such as for instance glass, concrete, wood, plastic and metal, can be applied both horizontally and vertically and results on practically all substrates in a smooth resulting surface. It will be apparent to the skilled person that the drying time can vary per substrate and/or per applied mixing ratio.

**[0008]** In a particular preferred embodiment for a glass, epoxy or polyurethane cast floor, aspartic ester type 1 and a polyurethane accelerator are applied in a mixing ratio of 100:65. In another particular preferred embodiment for a concrete floor or porous vertical wall, aspartic

ester type 2 and a polyurethane accelerator are applied in a mixing ratio of 100:100.

**[0009]** Many plastics are per se suitable as material for the film. Good results have been achieved thus far with a particular embodiment of the method according to the invention which is characterized in that the film comprises a plastic film of a plastic from a group comprising polyester and polyethylene.

**[0010]** For the purpose of a complete release of the image from the carrier without it breaking, use can optionally be made of a further particular embodiment of the method according to the invention which is characterized in that the film is subjected to a surface modification, at least on the main surface thereof, which affects an adhesion to the image, and is particularly provided for this purpose with an adhesion-reducing coating, in particular a silicone coating, or undergoes an adhesion-increasing surface treatment. The coating serves here as release layer in that it brings about less of an adhesion to the image than an adhesion of the image directly to the film. If on the other hand use is made of a material to which the image does not adhere, or hardly so, such a naturally non-adhering material can nevertheless be made to adhere to a correct degree by means of a suitable surface treatment, wherein a balance is preserved between such a (temporary) adhesion on the one hand and a later breakage-free transfer of the image on the other.

**[0011]** For a broad application of the method a further particular embodiment of the method according to the invention is characterized in that the image is deposited dot-wise onto the carrier with at least one printing ink or toner, in particular with a digital ink jet printer or laser printer. Conventional printing equipment can thus be utilized and the method does not require a modified printing technique in order to deposit the image onto the carrier. A further particular embodiment of the method according to the invention has the feature here that the image comprises a multilayer printing, a top layer of which is applied with the same printing ink in image covering manner. After being transferred to the substrate, the top layer of the printing will form a background which, irrespective of the substrate, will impart more colour depth and contrast to the image because the substrate is covered thereby.

**[0012]** In order to enhance transport of the carrier through a conventional printer a further particular embodiment of the method according to the invention has the feature that the temporary carrier comprises the plastic film and a sheet of paper or membrane which is at least substantially congruent therewith and to which the film is adhered with a backside remote from the main surface. The paper or membrane thus provides sufficient grip and purchase on the backside for transport rollers in the printer which could otherwise certainly slip on the smooth film.

**[0013]** The method according to the invention can be applied to diverse substrates. The method can particularly be performed on-site, in situ, wherein a wall, ceiling or floor of a room is applied as the substrate. Not only

can the appearance of such a floor or wall be hereby embellished, promotional and/or commercial messages, such as advertising texts, company logos and similar images which will attract the attention of the public can thus also be transferred to a floor or wall.

**[0014]** In a particular application the method according to the invention is otherwise characterized in that a plate body with an at least substantially completely smooth surface is applied for the substrate, in particular a plate body with at least a top layer of glass or metal, more particularly a laminate with an aluminium top layer. After being provided with one or more images according to the invention, the plate body can thus be utilized as decorative panel. A particular application hereof is for instance that of plaque commemorating an event or deceased person. A glass sheet is advantageously glued onto a substrate here after the image has been arranged on the substrate or the glass sheet.

**[0015]** In a further particular embodiment the method according to the invention has the feature that the image comprises a pattern of tiles, in particular a fitting tile pattern of a whole number of tiles with intermediate joints which has been adapted to lateral dimensions of the plate body. A decorative tiled wall can thus be simulated, wherein use has been made for the tiles of a graphic image which has been transferred onto the plate body.

**[0016]** In order to further approximate the appearance of a real tiled wall, a further particular embodiment of the method according to the invention has the feature that the plate body is subjected between individual tiles of the tile pattern to a material-removing operation in order to form a system of grooves between the tiles, that a curing transparent lacquer layer is arranged over the printing and in the grooves, and that the grooves are subsequently at least partially filled with a grout once the lacquer layer has cured sufficiently. The plate body thus also acquires the relief provided in a real tiled wall by the deeper-lying joints, and the joints cannot be distinguished from real joints once the grooves have been at least partially filled with a grout, in particular with a cement-bound grouting mortar. The lacquer layer is arranged as cast layer in order to simulate a glaze layer usually present on fired tiles.

**[0017]** Such a plate body ultimately cannot be distinguished, or hardly so, from a real tiled wall but can be manufactured considerably more easily, quickly and at lower cost. In terms of dimensioning a tiled wall of one or more such plate bodies can moreover be adapted to a specific situation and be assembled in fitting manner. The invention therefore also relates to such a unique decorative panel, in particular tile tableau, which can be utilized as such.

**[0018]** The invention will be further elucidated hereinbelow on the basis of several exemplary embodiments and an associated drawing. In the drawing:

fig. 1 shows a first exemplary embodiment of a temporary image carrier for use in the

- fig. 2 method according to the invention;  
shows a second exemplary embodiment of a temporary image carrier for use in the method according to the invention;
- fig. 3 shows a third exemplary embodiment of a temporary image carrier for use in the method according to the invention;
- fig. 4A-4F show an exemplary embodiment of the method according to the invention;
- fig. 5A-5C show a first exemplary embodiment of the method according to the invention;
- fig. 6 shows an exemplary embodiment of a decorative panel according to the invention.

**[0019]** The figures are otherwise purely schematic and not drawn to scale. Some dimensions in particular may be exaggerated to greater or lesser extent for the sake of clarity. Corresponding parts are generally designated with the same reference numeral.

**[0020]** For the purpose of arranging an image on a substrate use is made according to the invention of a stable temporary carrier on which the image is first deposited in mirror image. An example of such a carrier is shown in figure 1. The shown carrier comprises a smooth plastic film 10 with a thickness in the order of 20-300 micrometre. Diverse plastics are per se suitable herefor provided an image 20 can be deposited thereon with a peeling resistance which is lower than an adhesion of the image to an adhesive layer provided on the substrate later in the process. Good results have been achieved as such with a plastic film of polyester of about 125 micrometre and a plastic film of HD (high density) polyethylene (HDPE), although the invention is certainly not limited to these plastics.

**[0021]** If too high a peeling resistance were to be reached here, the main surface can optionally be provided with a resistance-decreasing coating 15, see figure 2, for instance a silicone coating. For the purpose of a correct, non-slip transport of carrier 10 in a printing device, such as a laser printer or inkjet printer, it can be advantageous in respect of the carrier to make use of a plastic film 10 which has been glued or otherwise adhered beforehand on a backside to a sheet 17 of paper or an optionally woven membrane 17 of synthetic fibres and which provides the desired slip resistance in the transport mechanism of such printing means. The embodiment of figure 3 is an example hereof, wherein an about 35 micrometre thick HDPE film 10 has been glued to an underlying sheet of plastic or paper 17 congruent therewith. An example will be given below of a method according to the invention wherein use is made of the carrier of figure 1, although the carrier of figure 2 or 3 could equally well be used here.

**[0022]** In order to arrange an image on a substrate use is made according to the invention of a transfer process wherein the image is first deposited onto a temporary carrier 10, see figures 4A and 4B. Substrate 10 here comprises an about 150 micrometre thick polyester film and

a polychromatic image is arranged thereon in dot-wise manner making use of a conventional, commercially available inkjet printer, which is therefore not further shown. Using desktop (DTP) software or other graphic computer applications the image 20 can be assembled and designed more or less freely beforehand before the image is deposited on film 10 using a digital printer. Polyester film 10 is characterized by an extremely smooth and stable surface on which image 20 is carried with a relatively low peeling resistance.

**[0023]** In order to then deposit the image on a substrate 30, the substrate is primed with an adhesive layer 40 at least at the location where the image has to be placed, see figure 4C. Applied here as adhesive layer 40 is a transparent two-component polyurethane lacquer which is dried in air for a certain period of time. This lacquer is characterized by a high clarity in combination with a high wear resistance, which are also guaranteed in the longer term and will not degrade. The transfer process described here is found to be relatively insensitive to the material and the application of substrate 30. This can be a wall or floor of a room, wherein the method is applied in situ, i.e. on-site, but can also comprise for instance a plate body provided with the image in a controlled processing space. An example of such a plate body is for instance a sheet of glass, a metal sheet, a natural stone tile or a laminate with a smooth top layer, for instance a (wood) fibreboard with a top layer of aluminium. Nor does substrate 30 have to be completely flat.

**[0024]** After a certain drying time wherein the adhesive layer 40 becomes tacky, the temporary carrier 10 with image 20 is brought into contact with lacquer layer 40, see figure 4D. Drying of lacquer layer 40 is now continued until it is at least substantially fully cured and will have an adhesion to image 20 which is significantly greater than the above-mentioned peeling resistance of image 20 with film 10. At this stage, see figure 4E, film 10 can be taken hold of manually and carefully pulled away from image 20 while the image remains wholly on adhesive layer 40. In order to protect the image the whole is finally covered with a second lacquer layer 50 as further finishing, see figure 4F, for which purpose the same or a similar transparent, at least translucent polyurethane layer is applied in this example as for adhesive layer 40. Once this layer has also cured sufficiently in air or under the influence of actinic light (UV), the result shown in figure 4F is obtained wherein the just transferred image 20 is covered with a layer of polyurethane with a thickness of about 30 to 250 micrometre. In addition to providing gloss and colour depth, this lacquer layer 50 also provides for the desired wear resistance, wherein the described method, in addition to being applied to walls and ceilings, can likewise be applied to a floor of a room, which can be walked on without the danger of premature wear and tear.

**[0025]** The invention is suitable for a wide range of applications. An example hereof is further shown in figures 5A-5C and in figure 6. Use is made here of a plate body in the form of a laminate with a top layer 33 and backing

layer 31 of aluminium on either side of a core layer 32 of wood fibre such as MDF, multiply or hardboard. Both aluminium layers are for instance in the order of 1-2 millimetres thick, while the intermediate core layer has a thickness from in the order of 4-6 mm. The overall thickness of the plate material will normally be in the order of 6 to 18 millimetres. On the basis hereof one or more such panels are used as substrate onto which an image 20

will be transferred with the above described process according to the invention or in other manner, see figure 5A. **[0026]** In the present example this image specifically comprises a tile motif or pattern of individual tiles 21 which are separated from each other by what appear to be joints 22. This tile pattern can be assembled and processed in fully digital manner beforehand making use of conventional image processing software and computer hardware adapted for the purpose, wherein a free choice is available in respect of for instance colour, texture and nature of the image. The whole-number tile pattern can thus be wholly adapted particularly to the specific size of the panel or the set of panels, which in turn can be adapted in respect of dimensions to a rear wall to be covered therewith. The dimensions per tile and the joint width are for instance freely adjustable using the software so that a wall can hereby be completely filled with only whole tiles, see figure 6.

**[0027]** So that the appearance of a thus displayed tiled wall cannot be distinguished from a real one, or at least minimally so, panel 31-33 is subjected in this example to a material-removing process between the tiles. This is for instance a milling process wherein continuous grooves 20, which in this example extend through top layer 33, are created between the tiles, see figure 6.

**[0028]** A wear-resistant lacquer layer 50 is subsequently applied, such as the above described two-component polyurethane lacquer, by coating the whole therewith. This can for instance be carried out manually with a suitable paint roller or be sprayed on with an atomizer (paint spray gun). Owing to an inherent viscosity which will already occur initially or following a certain curing (drying) of the layer, lacquer layer 50 forms at the corners to joints 22 of tile pattern 21 a certain curvature and rounding as is also characteristic for the glazing of fired glazed tiles. Lacquer layer 50 is wholly clear (transparent) or of a translucent colour so that the underlying tile pattern 21 remains visible but does acquire what appears to be a glazed exterior. A crackle effect can if desired be arranged mechanically or chemically in lacquer layer 50, although it can also be digitally incorporated into the image, by way of artificial ageing of the whole.

**[0029]** Joints 22 are now filled with a suitable filler 24, for which in this example a usual cement-bound grouting mortar is applied. Thus obtained is the result of figure 5C of a tile pattern with what appear to be real tiles separated by conventional grouted joints 24. Because the whole can be prepared and assembled remotely in a controlled processing space, a tile tableau as for instance shown in figure 6 can thus be assembled to the size of a wall to

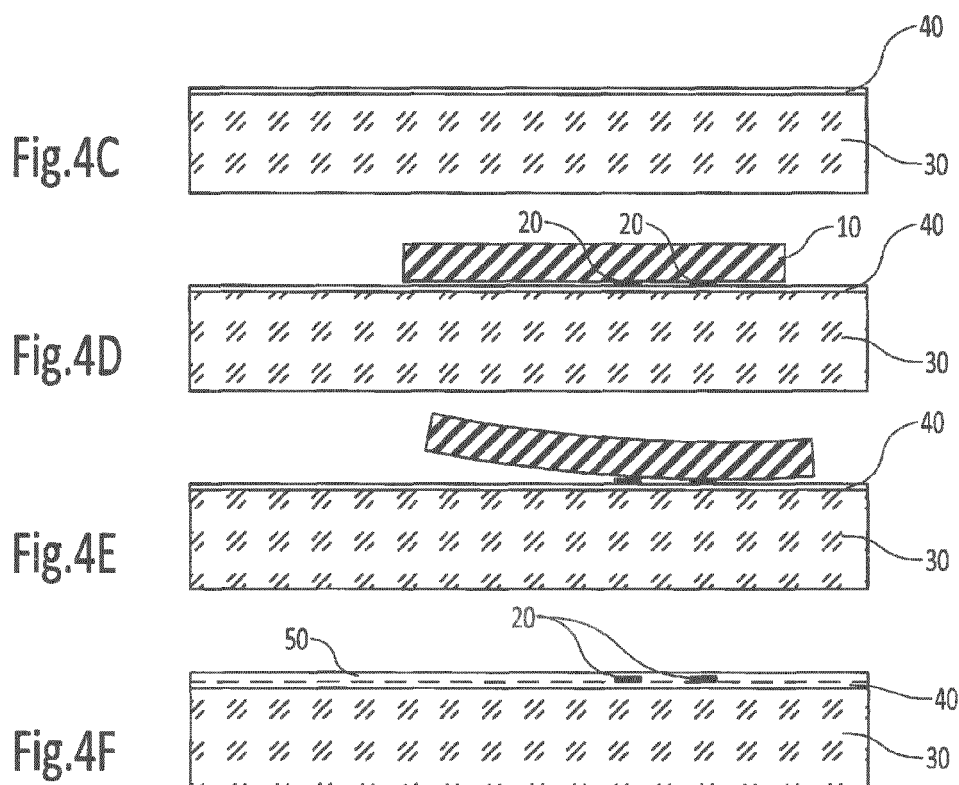
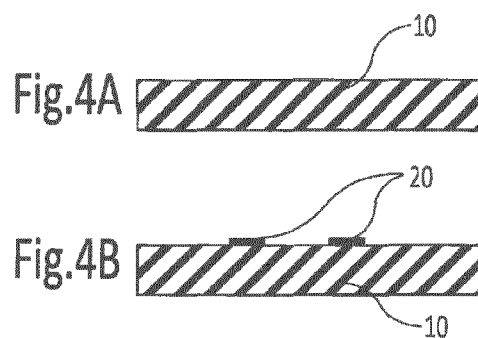
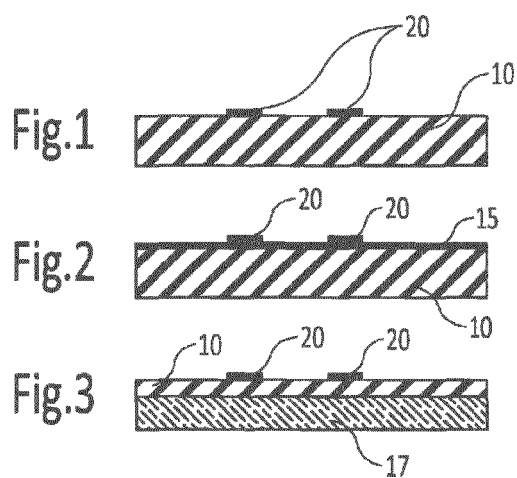
be eventually covered therewith and can be arranged on-site exceptionally quickly and at relatively low cost price and provides an exceptionally high degree of flexibility compared to a real tiled wall. The flexibility is manifest not only in the specific lateral dimensions but also in the nature of the image and the desired effect and apparent texture of the tiles which at least from a distance cannot be distinguished afterwards from real, or hardly so.

**[0030]** Although the invention has been further elucidated above with reference to only a few embodiments, it will be apparent that the invention is by no means limited thereto. On the contrary, many variations and embodiments are still possible within the scope of the invention for the person with ordinary skill in the art, as will become apparent from the following claims.

## Claims

1. Method for arranging an image on a substrate, wherein the image is deposited graphically onto a temporary carrier, the substrate is covered at least locally with a curing adhesive layer, the image is brought into contact with the adhesive layer, the adhesive layer is subjected to a curing, the carrier is separated from the image and the image is thus transferred to the substrate provided with the adhesive layer, **characterized in that** for the carrier a stable plastic film is applied having a substantially smooth main surface onto which the image is deposited by means of a printing process with a peeling resistance which is lower than an adhesion of the image to the adhesive layer and lower than an adhesion of the adhesive layer to the substrate.
2. Method as claimed in claim 1, **characterized in that** the film comprises a plastic film of a plastic from a group comprising polyester and polyethylene.
3. Method as claimed in claim 1 or 2, **characterized in that** the film is subjected to a surface modification, at least on the main surface thereof, which affects an adhesion to the image, and is particularly provided for this purpose with an adhesion-reducing coating, in particular a silicone coating, or an adhesion-increasing surface treatment.
4. Method as claimed in one or more of the foregoing claims, **characterized in that** the adhesive layer comprises a lacquer layer, in particular a transparent, at least translucent, multi-component polyurethane lacquer/adhesive.
5. Method as claimed in claim 4, **characterized in that** the multi-component polyurethane lacquer comprises an A component comprising an aspartic ester and a B component comprising a polyurethane accelerator.

6. Method as claimed in one or more of the foregoing claims, **characterized in that** the method is substantially performed at room temperature.
7. Method as claimed in one or more of the foregoing claims, **characterized in that** the image on the substrate is covered with a wear-resistant, transparent, at least translucent lacquer layer. 5
8. Method as claimed in one or more of the foregoing claims, **characterized in that** the image is deposited dot-wise onto the carrier with at least one printing ink or toner, in particular with a digital ink jet printer or laser printer. 10
9. Method as claimed in claim 8, **characterized in that** the image comprises a multilayer printing, a top layer of which is applied with the same printing ink in image covering manner. 15
10. Method as claimed in one or more of the foregoing claims, **characterized in that** the temporary carrier comprises the plastic film and a sheet of paper or membrane which is at least substantially congruent therewith and to which the film is adhered with a backside remote from the main surface. 20
11. Method as claimed in one or more of the foregoing claims, **characterized in that** a wall, ceiling or floor of a room is applied as the substrate. 25
12. Method as claimed in one or more of the foregoing claims 1 to 10, **characterized in that** a plate body with an at least substantially completely smooth surface is applied for the substrate, in particular a plate body with at least a top layer of glass or metal, more particularly a laminate with an aluminium top layer. 30
13. Method as claimed in claim 12, **characterized in that** the image comprises a pattern of tiles, in particular a fitting tile pattern of a whole number of tiles with intermediate joints which has been adapted to lateral dimensions of the plate body. 35
14. Method as claimed in claim 13, **characterized in that** the plate body is subjected between individual tiles of the tile pattern to a material-removing operation in order to form a system of grooves between the tiles, that a curing transparent lacquer layer is arranged over the printing and in the grooves, and that the grooves are subsequently at least partially filled with a grout once the lacquer layer has cured sufficiently. 40
15. Method as claimed in claim 14, **characterized in that** the grout comprises a cement-bound grouting mortar. 45
16. Decorative panel, in particular tile tableau, comprising a plate body obtained with the method as claimed in one or more of the claims 13 to 15. 50



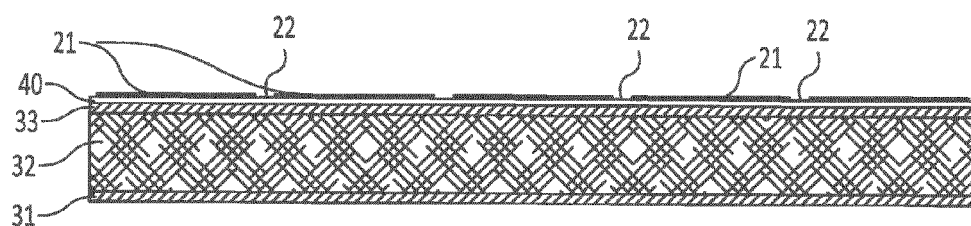


Fig.5A

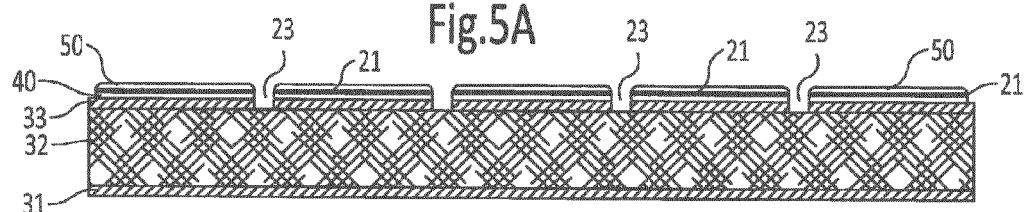


Fig.5B

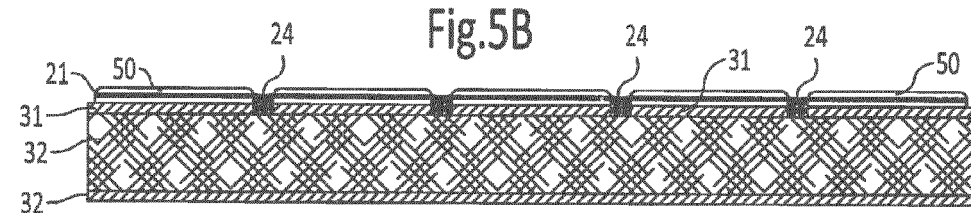


Fig.5C

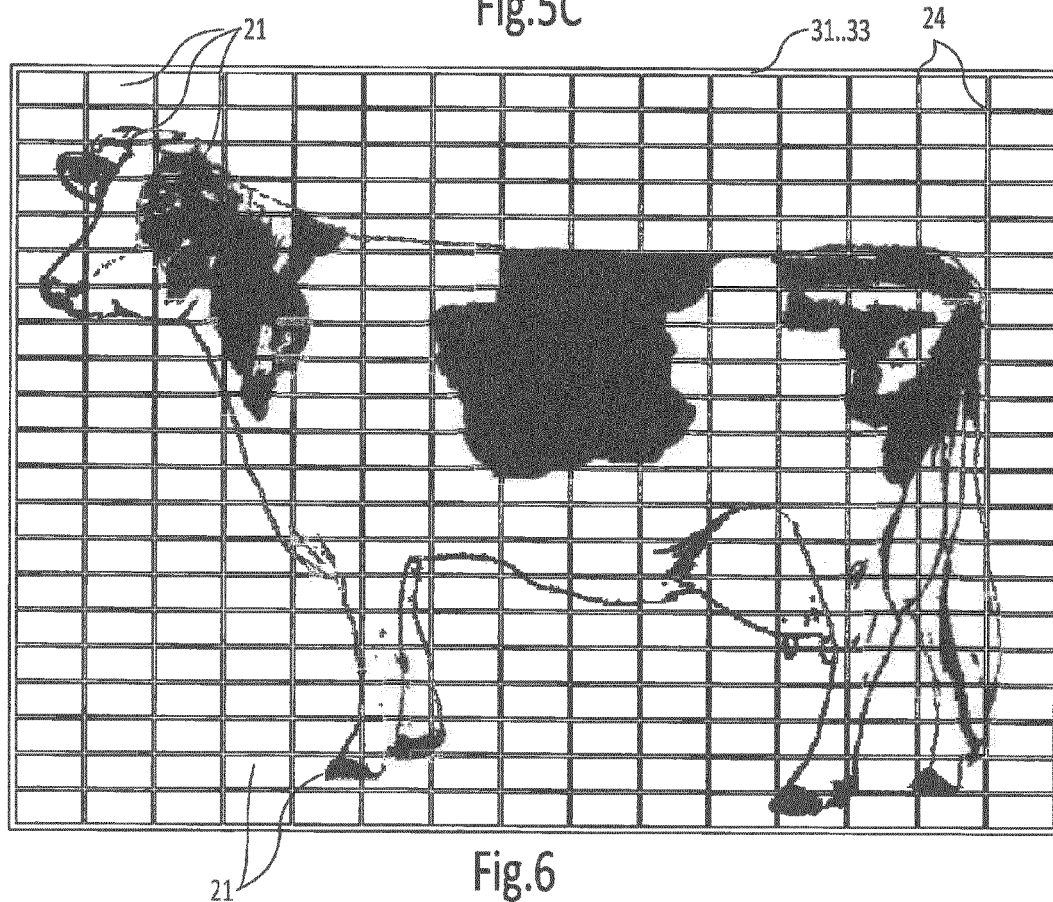


Fig.6





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Application Number  
EP 15 18 1034

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