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(71) Applicant: **Polisac metal Makina Petrol Ürünleri**
Sanayi ve
Ticaret Anonim Sirketi
35640 Izmir (TR)

(72) Inventor: **Susuz, Mehmet**
35640 Izmir (TR)

(74) Representative: **Iskender, Ibrahim**
Destek Patent Inc.
Patent Department
Osmangazi Mah.
Tophane Ortapazar Cad.
Zindankapi Sok. No: 10
Osmangazi
16040 Bursa (TR)

(54) **Decorative glass having metal plate with stained glass appearance and its production method**

(57) The invention is a method for processing a metal plate (1) in order to obtain a stained glass pattern from the said metal plate, which is applied between glass plates, the method comprising the process steps of cutting the said metal plate with laser in order to provide the desired pattern, following the said laser cutting operation, if present, rounding the corner parts with a smoothing operation and removing the burrs left from the laser cut-

ting operation, abrading (sanding) the surface of the said metal plate by appropriate surface abrasive chemical for metal material, and staining the said metal plate, of which the surface is roughened, in the desired colors according to the pattern. Furthermore, by making the metal plate have rounded edges and rough surfaces with these process steps, the stain applied to the metal plate can be made permanent and long-lasting.

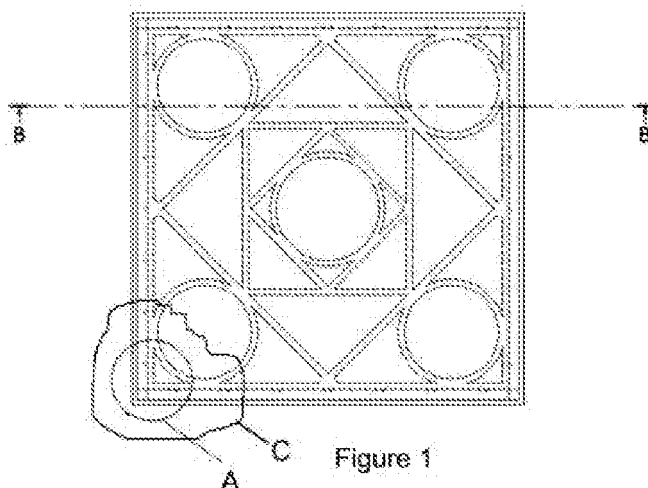


Figure 1

Description

The Related Art

[0001] The present invention relates to a method for obtaining patterns named stained glass, which can be applied between at least two or more plate like glasses with products such as door or window glasses made of glass material in plate form used in order to accomplish various functionalities on interior and exterior walls of all kinds of places, and relates to a product of this method.

[0002] The present invention particularly relates to production of the said stained glass patterns by being obtained through a number of methods, in which plates made of metal materials are put through a number of operations.

Prior Art

[0003] Goods and materials, especially doors, windows and knick knackeries made of glass materials are produced for various purposes. In order to provide these goods and materials with advantages in terms of decorativeness and functionality, various processes are performed on glass materials. This is most frequently done with the methods of processing the own pattern of the glass or obtaining patterns by painting its surface. Therefore the stained glass method, which is performed by forming patterns on the glass by painting it, is the most frequently used method. However, glasses stained and made patterned with this method have significant risks in terms of safety. Patent document no TR 2006/02446, named "Colored opaque glass production" can be given as an example to these products. The invention; is the method of painting of sintered or mattified glasses, and it is **characterized in that**; it relates to re-adhering of particles, which are detached from the glass surface, due to the distortion liquid or separation of them, and during the said adhering or separation, the distortion liquid, which is applied before or after the coloring agent, entering between the glass main body and the detached and re-stuck or separated particle together with the coloring agent and being transformed into permanent form, and the said painting process being made automatically in machine for single or multiple glasses, independent of the size.

[0004] Another document found in the literature is the patent with file no TR 2004 02966. The said patent relates to "The method of figuring glass with fabric". With this method developed, patterned fabrics can be used in glass decoration. Special printed fabric is placed between two glasses, two-sided tape is adhered at 4 sides of the first glass, and the fabric is stretched over the glass smoothly. Tin foil at three sides of the two sided tape is ripped off and the second glass is adhered over the first one. Laminated liquid is poured from the open side between the two glasses. The un-ripped side of the two sided tape is ripped off and the two glasses are adhered

to each other. Air bubbles between the two glasses are removed by vacuum. Glasses are properly left to dry. In the product developed with this method, since no gap is provided between glass plates, thermal insulation can not be provided. Moreover, in case of leaking of air through glass plates, the combining adhesive and the fabric can absorb moisture and separate from the glass surfaces. This situation especially leads to appearance problems because of material deformation such as decomposition of the fabric.

[0005] As is known, standard glasses with the purpose of general usage have a frangible material structure. Besides, using very high strength glass in the said places is a quite expensive application. For providing a tiny bit solution to this problem, in the prior art, while staining is performed between glasses without the need of any operation or distortion on own surface of the glass, stained glass can also be obtained by using plates, which is made of metal or its derivative materials, and which can be stained into the desired color and be shaped according to the desired pattern. Metal has a stronger and less fragile structure than glass. Therefore, since a metal layer found over a glass surface would be visually more deterrent and functionally more durable, the security problem would be slightly solved. However, right along with this, new problems occur. Metal is a material, which can easily corrode when it contacts with water or moisture. Its forming can be more difficult than formation of a pattern in the desired geometry with a paint applied on glass. Furthermore, it is a difficult problem to provide the stability of the metal between the said glasses without being deformed for a long time.

[0006] As a result of the investigations, no novelty or improvement is found in the literature and the prior art for solving the said problems.

[0007] As a result, the need for products, which are durable and long-lasting, which are provided by obtaining the stained glass patterns, that provide decorativeness between glass surfaces, by putting metal plates through a number of processes by a number of methods, and which eliminate the said disadvantages, and inadequacy of existing solutions have necessitated development in the related art.

Purpose of the Invention

[0008] From the known status of the art, the present invention relates to a method for obtaining metal plates with stained glass appearance, which provide decorativeness and various functionalities between glass surfaces, by putting these through a number of operations by a number of methods in order to make them more durable and long-lasting, and relates to a product of this method.

[0009] The purpose of the invention is to provide a decorative glass embodiment by putting metal plates, which are placed between or on the glass surfaces, through operations such as giving shape / providing pattern,

smoothing, sanding and staining in order to make them more durable and long-lasting.

[0010] Another purpose of the invention provide a product made of sintered glass, which is deterrent for people having the purpose of burglary, and more secure for user for protecting the place by using a material between the said glasses such as metal, which is stronger and has lower fragility.

[0011] Furthermore, the high cost of the high-strength glasses, which are difficult to break, and used with a similar purpose as another way of providing security, are reduced with this method and financial saving opportunity is provided for the user by presenting an alternative and cheaper application.

[0012] Another purpose of the invention is to provide thermal insulation by placement of the metal plates with stained glass appearances among the many of the at least two glass plates in a way that a certain gap would be left between them.

[0013] By means of the invention, thanks to the processes of cutting the metal plate with laser while the metal material is being made ready for use, sanding operation applied on the metal surface, and straightening of the corners of the metal by smoothing operation, the said metal plate has the patterned appearance and becomes more durable against various chemical and physical deformations. These operations bring about many advantages, such as endurance against chemical and physical deformations, which are;

- **Purpose of the invention via cutting by laser,**
In serial production, providing production with the same quality in large quantities, minimum roughness in the piece and burr-free cutting, zero deformation in material, production without mould, low cost and ease of working, ability to perforate with very diameters, more economical process than production with machining, and providing prevention of smashed or crushed parts of the materials, Providing placement and cutting of a certain number of a single piece or more than one different pieces on a plate with a certain size, provided that the thickness of the pieces would be equal.

- **Purpose of the invention via smoothing (surface straightening) operation,**

By means of the smoothing operation with the desired geometry; sharp corners and burrs at the edges of the metal sheet resulting from the cutting operation are removed by cutting and straightening. Thanks to the smoothing of the sharp corners and burrs on the material before entering into sanding process, a better and more suitable surface is obtained for staining. If these sharp corners are not removed, they cause detachment of the stain after staining or cause that particular surface area retain less stain. In time this causes the material corrode from that point.

Moreover, metal plates having sharp corners have

higher risk of cracking and deformation during transportation and mounting operations. Therefore, following cutting with laser, and before sanding, solution of the said problems is provided with the help of mechanical equipment by performing smoothing of all of the sharp corners and burrs resulting from the cutting operation.

- **Purpose of the invention via sanding process,**

The purpose is to provide convenient adaptation and consistency of the stain onto the surface it is applied and also provide its persistency at that surface. No matter how quality the stain applied on metal surface would be, if the surface smoothness is not adequate, application of stain will be insufficient. Before staining, surface has to be cleared from oil, rust, particles, wetness or moisture, or any kind of material that would shield adsorption of the stain to the surface. Because, the stain would provide shielding in order to separate metal and oxygen or moisture from each other. In order to provide a long-lasting shielding, the stain has to adsorb well onto surface. The stain adhering on the foreign substance found on the surface would later come away with that substance and leave metal unprotected.

By means of the sanding process, the primary purpose is to uncover the self of the metal by removal of the rust and corrosion, which are visible or invisible in micronized dimensions, found on the metal surface. Different sanding abrasives are used for different metal structure and manufactures according to the sector it is used.

The purpose of the sanding process is to completely clean the metal on which the stain would be applied, and forming of pores and roughness which would provide the stain adsorb on the metal surface. If you consider applying stain on a regular glass surface, since the friction of the glass surface is so low, the stain applied would leave the surface in a very short time. Sanding process provides roughness such as the roughness on the abrasive paper. Adhering of the stain applied on the metal surface via any chemical reaction is not possible. As in the glass surface example, the stain applied contacts with the surface, and if an appropriate roughness is not found on the surface, the stain would scale off in a short time after it is dried due to various chemical and physical deformations. Complete adhering of the stain applied on the surface is possible as a result of a mechanical adhering. In order to provide complete adhering, surface roughness, in other words, sanding made with an appropriate abrasive is a must. Non-metallic abrasives are used as a measure especially for materials that are stainless and aluminum.

[0014] In order to achieve the above said purposes, the present invention is a method for processing metal plate in order to obtain stained glass pattern from the

said metal plate, which is applied between or on the glasses in plate form, and it is **characterized in that**; it comprises the process steps of cutting the said metal plate with laser in order to provide the desired pattern, following the said laser cutting operation, if present, rounding the corner parts with smoothing operation and removing the burrs left from laser cutting operation, abrading (sanding) the surface of the said metal plate by appropriate surface abrasive chemical for metal material, and staining the said metal plate, of which the surface is roughened, in the desired colors according to the pattern.

[0015] In order to achieve the above said purposes, the present invention is a metal plate placed between at least two glasses, which are configured with certain distance gaps at inner and outer sides, and it is **characterized in that**, it comprises edges with radius and sanded (rough) surface on all over the patterned surface.

[0016] In a preferred application of the invention; metal plate comprises paint film on the said sanded rough surface.

[0017] The structural and characteristics features of the invention and all advantages will be understood better in detailed descriptions with the figures given below and with reference to the figures, and therefore, the assessment should be made taking into account the said figures and detailed explanations.

Brief Description of the Figures

[0018]

Figure -1: is the two dimensional front view of the final product having stained glass application between the glasses.

Figure -1a: is the cross sectional view of the BB-line given in Figure 1.

Figure -1b: is the detail A taken from Figure 1 and it is the two dimensional front view.

Figure -1c: is the detail C taken from Figure 1 and it is a perspective front view.

Figure -2: is the two dimensional front view of the metal plate, on which the process steps of the methods of the invention are applied, following its shaping with laser cutting.

Figure -3: is a view of a sectional part of the said metal plate, which has sharp corners and surface burrs following cutting by laser.

Figure -3a: is the smoothed view of the metal plate shown in Figure-3.

Figure -3b: is the view of the sanding of the surface of smoothed metal plate.

Figure -3c: is the view of formation of paint film by staining of the sanded surface.

Figure -4: is the view of the surface stained final state of metal plate shown in Figure-3c.

Reference Numbers

[0019]

1. Metal plate
10. Edge with radius
11. Sanded rough surface
12. Paint film
13. Tab
2. Inner glass
3. Outer glass
4. Connection bracket
5. Protective frame

- I. Formation of pattern by cutting with laser
- II. Smoothing operation; Providing radius to edge parts, burr cleaning
- III. Surface abrasion (Sanding)
- IV. Staining

Detailed Description of the Invention

[0020] In this detailed description, the pattern obtained by decorative metal sheet cutting in metal plate (1) form between two glasses (2, 3) and method of production, which are the subject of the invention, are only explained for better understanding of the subject and without forming a limiting effect on the invention.

[0021] In Figure -1, the two dimensional front view of the final product having metal plate (1) obtained with the method of the invention and inner and outer glasses (2, 3) is given. The metal plate (1), which will be placed between the said double glasses (2, 3), are fixed onto a connection bracket (4) in this part by being inserted through the channels (not shown in figure) formed on the said connection bracket (4). Besides, the said connection bracket (4) is in a form such that it would surround the said metal plate (1). Moreover, the said connection bracket (4) also has protective frame (5) which surrounds it from its outer parts.

[0022] Figure -1 a: is the cross sectional view of the B-B-line given in Figure 1. In this figure, the said double glasses (2, 3) placed with certain distances to each other, between these, the section of the metal profile (1) in the form of the pattern provided to it, the section of the connection bracket (4) on which the metal profile (1) is fixed, and at outer part of that, the section of the protective frame (5) are shown.

[0023] Figure -1b: is the detail A taken from Figure 1 and it is the two dimensional front view. The said metal plate (1) is fixed to the said connection bracket (4) by the tabs (13) formed as projections from its own edge parts

or by being attached to it in a compatible shape with the form of its own edge.

[0024] Figure -1c: is the detail C taken from Figure 1 and it is a perspective front view. From the figure given, the structures and locations of the components shown in Figure 1a can be seen clearly.

[0025] In the light of the figures given, the detailed description of the invention with its process steps are given below in order. By application of these process steps to the metal plate (1) in the form of a planar metal sheet, the stained glass metal plate (1), which has the patterns placed in the final product shown in Figure 1, and which can be in various colors, is obtained.

I. Formation of pattern by cutting with laser;

[0026] The desired pattern is first formed on computer by CAD/CAM. Afterwards it is transferred to a CNC machine and cutting of the metal plate (1), which is in the form of a planar metal sheet, is performed with laser. In Figure -2, the two dimensional front view of the planar metal plate (1) after formation of pattern by cutting with laser (I) is shown.

II. Smoothing process: Providing radius to edge parts and burr cleaning;

[0027] After formation of pattern on the metal plate (1) by cutting with laser (I), as it can be seen from Figure -3, surfaces with sharp corners and having surface burrs are formed. In Figure -3a, the smoothed view of the part of the metal plate (1) shown in figure-3 is given. With the smoothing operation, the sharp edges left at the corners and the burrs are removed and edge with radius (10) are formed.

III. Surface abrasion (Sanding) Process;

[0028] In Figure -3b, the view of the sanding by spraying a metal abrasive chemical on the surface of smoothed metal plate is shown. With this operation, sanded rough surfaces (11) are obtained on the surfaces of the metal plate (1) that will be stained.

IV. Staining Process;

[0029] In Figure-3c, the view of formation of paint film (12) by staining of the sanded surface is given. Sanded rough surfaces (11) can be stained in the desired color with opaque or transparent stains. In Figure 4, the state of the surface of metal plate (1) shown in Figure-3c and the paint film (12) which are combined with staining are shown after the process. The surface of the metal plate (1) is stained, and for final product, a metal plate (1) with stained glass pattern is obtained.

[0030] In this way, formation of stained glass pattern on the metal plate (1) and staining of this pattern in the desired way is provided. Both of the smoothing and sand-

ing processes (II, III) are very important steps for convenient adsorption of paint film (12) on the metal plate surface (1) and remaining there for a long time without being deformed. The metal plate (1), on which the above said process steps applied, is ready for being attached between the double glasses (2, 3). It is fixed to the connection bracket (4), found between the double glass (2, 3), from inner part.

[0031] The products obtained in this way with the glass embodiment having metal plate (1) with stained glass appearance can be produced in suitable forms for usage in various places for various purposes such as, especially, window glasses, doors and ornaments.

[0032] The protection area of this application has been specified under claims and cannot be limited to the descriptions only given as sampling above. It is obvious that a person skilled in the related art can apply the innovation disclosed by this invention into similar purposed other areas by means of changing the parts in form and using similar structures. Therefore, it is also clear that such embodiments lack of innovation criteria.

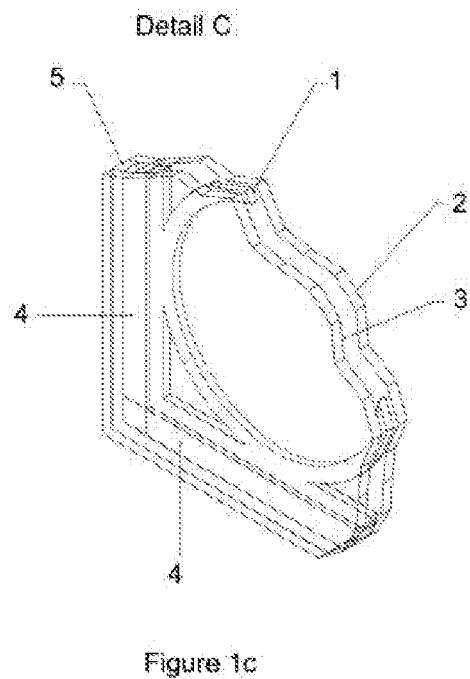
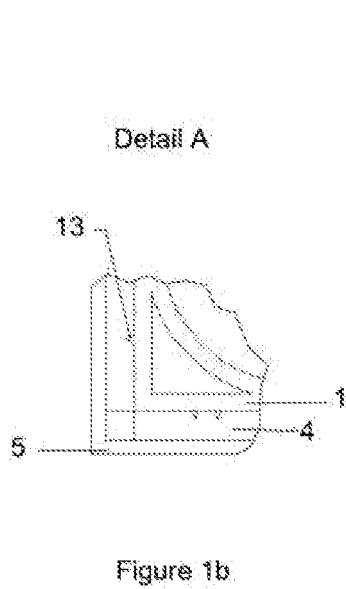
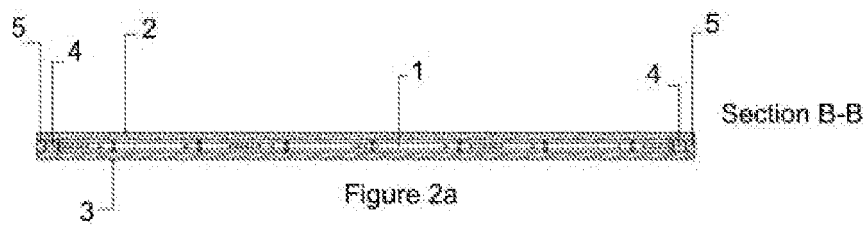
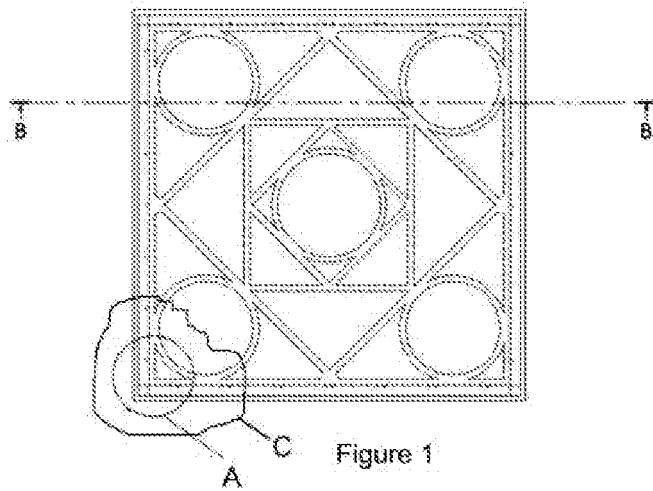
Claims

1. The invention is a method for processing metal plate (1) in order to obtain stained glass pattern from the said metal plate (1), which is applied between or on the glasses in planar plate form (2, 3), and it is **characterized in that**; it comprises the process steps of;

- cutting the said metal plate (1) with laser (I) in order to provide the desired pattern,
- following the said laser cutting operation (I), if present, rounding the corner parts with smoothing operation (II) and removing the burrs (II) left from laser cutting operation (I),
- abrading (sanding) (III) the surface of the said metal plate (1) by appropriate surface abrasive chemical convenient for metal material, and
- staining (IV) the said metal plate (1), of which the surface is roughened, in the desired colors according to the pattern.

2. The invention is a metal plate (1) placed on a glass surface (2) or between at least two glasses (2, 3), which are configured with certain distance gaps at inner and outer sides, and it is **characterized in that**; it comprises edges with radius (10) and sanded (rough) surface (11) on all over the patterned surface of the said metal plate (1).

3. A metal plate (1) with stained glass appearance according to Claim 2, and it is **characterized in that**; in order to provide color characteristics of the stained glass, it comprises paint film (12) on the said sanded rough surface (11).



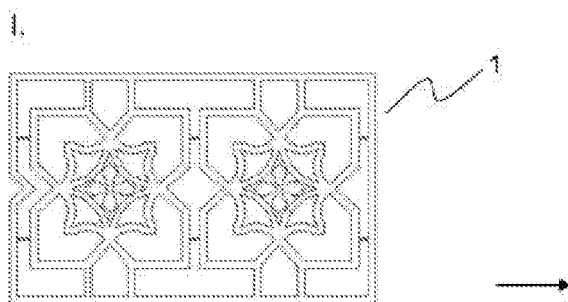


Figure 2

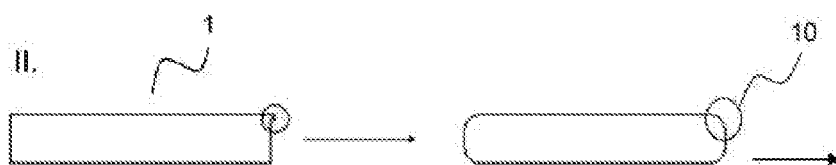


Figure 3

Figure 3a



Figure 3a

Figure 3b

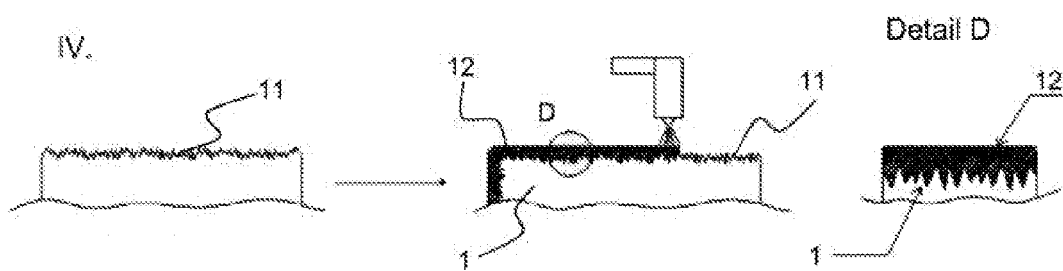


Figure 3b

Figure 3c

Figure 4



EUROPEAN SEARCH REPORT

Application Number
EP 10 15 3560

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 December 2010	Examiner Björklund, Sofie
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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