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(54) Method and apparatus for applying a relief image to a transparent plate

Verfahren und Vorrichtung zum Aufbringen eines Reliefbildes auf eine transparente Platte

Procédé et dispositif pour l'application d'une image en relief sur une plaque transparente

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(73) Proprietor: **BIWEX N.V.**
NL-5015 BS Tilburg (NL)

(72) Inventor: **Bos, Gerrit**
4817 VE Breda (NL)

(74) Representative: **Eveleens Maarse, Pieter et al**
Arnold & Siedsma,
Advocaten en Octrooigemachtigden,
Sweelinckplein 1
2517 GK Den Haag (NL)

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Description

[0001] The present invention relates to a method for arranging a relief on a transparent plate.

[0002] The present invention also relates to a device to be used for this purpose.

[0003] In methods of the prior art for arranging a relief on a transparent plate use is made of a blasting technique, engraving technique, laser technique or an etching technique. It will be apparent that for etching in glass aggressive substances are necessary which are highly undesirable from an environmental viewpoint.

[0004] Blasting or treating glass in other manner is quite possible to perform per se but is labour-intensive and expensive work.

[0005] EP-A-0 614 857 provides a method and an apparatus for arranging a relief, wherein the above mentioned drawbacks are obviated.

[0006] This prior art method comprises the following steps:

- arranging a curable product on the glass plate, which product can adhere to the glass plate;
- placing a shaping mould on which the image for arranging is arranged in mirror image and in relief;
- pressing the glass plate and the shaping mould together;
- causing said curable product to cure; and
- releasing the surface of the glass plate and the shaping mould after curing,

[0007] The prior art apparatus further comprises:

- a shaping mould, on which the image for arranging is arranged in mirror image and in relief;
- means for arranging on the glass plate a curable product which adheres to the glass plate;
- means for pressing the mould onto the glass plate;
- means for causing the curable product to cure; and
- means for separating the mould from the glass plate,

[0008] Although this prior art method and apparatus are well suited for arranging reliefs with random patterns on glass, they are not suitable for arranging reliefs representing images on glass.

[0009] The aim of the invention is to provide such a method and an apparatus which are well suitable for arranging reliefs representing images onto glass.

[0010] This object is achieved in that the used shaping mould is a flat shaping mould, and that the pressing together of the glass plate and the mould takes place before the curing of the curable product.

[0011] The invention also relates to a device for arranging images on the surface of a transparent plate, wherein the shaping mould is flat and that the means for pressing the mould onto the glass plate are located upstream of the means for causing the curable product to

cure.

[0012] It is noted that by separation of the pressing and the curing functions a mutual interference of these processes is avoided resulting in a higher quality image.

[0013] Attractive preferred embodiments of the present invention are specified in the sub-claims.

[0014] The invention will be further elucidated with reference to the annexed drawing, in which:

figure 1 shows an illustration of an embodiment of the method according to the present invention.

[0015] As shown in figure 1, a glass plate 1 provided with an image 2 is taken as starting point. According to the relevant embodiment of the present invention it is possible to copy the image 2 onto another glass plate 3. It is pointed out here that such a copy is made in mirror-image since during the copying process a mirror reproduction is manufactured. It will be apparent that instead of on a glass plate, an image can also be arranged on a transparent plate of another material.

[0016] An edge of self-adhesive tape 4 is arranged for this purpose on the edges of the second glass plate 3 onto which the image 2 must be copied. A recess 5 is arranged in the edge, for instance on one side. As will be explained later, this recess 5 serves to drain the excess curing material to be subsequently arranged.

[0017] After arranging the edge adhesive tape the remaining space of the glass plate is covered with a thin layer of curable material which adheres to the glass plate 3 during curing. Resin or lacquer 6 which cures when radiated with UV light is an example of such a curable material. This material is arranged with the most uniform possible thickness.

[0018] As also shown in figure 1, the glass plate on which the image 2 is situated is then placed on glass plate 3 with the image side toward glass plate 3, wherein glass plate 3 of course makes contact with adhesive tape 4 and the quantity of lacquer 6 enclosed between the adhesive tape. Any excess lacquer 6 will flow out via the opening 5.

[0019] The thus formed assembly 7 is subjected to a pressure force. A press can be used for this purpose, for instance such as is known in the graphic art for printing etches or lithographs, although it is also possible to make use of the pressing device 8 shown in figure 1.

[0020] This pressing device 8 is formed by a bottom roller 9 and a top roller 10, one of which, the top roller 10 for instance, is drivable in rotation by means of a motor or a hand crank. The rollers 9, 10 are further mounted such that they are urged toward each other so that a pressure force is exerted on the assembly 7. Excess lacquer 6 will herein flow out through the opening 5. A close contact is thus obtained between the lacquer layer 6 and the glass plate 3 to which the lacquer layer is applied. It is sometimes necessary to apply a layer for improving the adhesion between the lacquer and the glass. Such agents are easily obtainable. In order to enable curing

of lacquer layer 6 use is made of a lamp 11 transmitting UV light which is placed in a reflector 12. This lamp 11 is arranged under the path followed by assembly 7 so that the lacquer 6 is radiated through the lower glass plate 3 and cures by means of the UV light.

[0021] It is pointed out here that it is possible to perform the same method without arranging adhesive tape. This results in a layer thickness which is perhaps less uniform so that the pressure between rollers 9, 10 must be adjusted more precisely. It is also prudent to take steps against spillage.

[0022] It will be apparent that instead of using lacquer curing with UV light and a UV lamp it is also possible to make use of lacquers which are sensitive to electromagnetic radiations of other wavelengths and to make use of a device for transmitting an electromagnetic radiation in the relevant wavelength.

[0023] By rotating rollers 9, 10 the entire assembly 7 is initially pressed together by rollers 9, 10 and then radiated by lamp 11, wherein the relevant lacquer cures.

[0024] As shown in the following illustration of figure 1, both glass plates 1, 3 are then separated from each other, for example by inserting a knife 13 or other sharp object between glass plates 1, 3. It is also useful to make use of a pressurized air line to blow air between the two glass plates once a start has been made.

[0025] It is noted out here that it is of course important that the UV lacquer only adheres to the smooth glass plate and not to the glass plate provided with the image 2 for copying. For this purpose it is important to pretreat glass plate 1 with a so-called "release" material. This release material ensures that glass treated with a layer of this material does not adhere to any other material. An example of such a release material is the material which is sold under the name Clear Shield® and which is available from Ritech, in Raamsdonksveer, the Netherlands.

[0026] It will be apparent that the image, which is arranged on the original glass and which is visible through the roughness of the glass on particular parts thereof, is copied onto glass plate 3. The rough parts of the surface are in any case transferred by the resin, while the smooth parts of the resin are also transferred.

[0027] The image is moreover coloured by adding a quantity of stain to the lacquer. Repetition of this process with other colours can result in the effect of stained glass or antique glass.

[0028] The above described method and device are particularly suitable for copying a few glass plates.

[0029] It will be apparent that diverse modifications can be made to the thus described device without deviating from the appended claims.

Claims

1. Method for applying an image (2) executed in relief on a flat transparent glass plate (3), comprising the following steps:

- arranging a curable product (6) on the glass plate (3), which product can adhere to the glass plate;
- placing a shaping mould (1) on which the image (2) for arranging is arranged in mirror image and in relief;
- pressing the glass plate (3) and the shaping mould (1) together;
- causing said curable product (6) to cure; and
- releasing the surface of the glass plate (3) and the shaping mould (1) after curing,

characterized in that the used shaping mould (1) is a flat shaping mould, and that the pressing together of the glass plate (3) and the mould (1) takes place before the curing of the curable product (6).

2. Method as claimed in claim 1, **characterized in that** the shaping mould (1) is provided with a "release" material whereby, when cured, the curable material (6) does not adhere to the shaping mould (1) wherein this latter can be removed from the glass plate in simple manner.

3. Method as claimed in claim 1 or 2, **characterized in that** the curable product (6) which can adhere to the transparent plate is coloured.

4. Device for applying images (2) in relief onto a surface of a flat transparent glass plate (3), the device comprising:

- a shaping mould (1), on which the image (2) for arranging is arranged in mirror image and in relief;
- means (13) for arranging on the glass plate (3) a curable product (6) which adheres to the glass plate (3);
- means (9,10) for pressing the mould (1) onto the glass plate (3);
- means (11,12) for causing the curable product (6) to cure; and
- means (13) for separating the mould (1) from the glass plate (3),

characterized in that the shaping mould (1) is flat and that the means (9,10) for pressing the mould (1) onto the glass plate (3) are located upstream of the means (11,12) for causing the curable product (6) to cure.

5. Device as claimed in claim 4, **characterized in that** the device is provided with means for applying a "release" material to the mould.

6. Device as claimed in claim 4 or 5, **characterized in that** the means for pressing the

mould onto the transparent plate comprise at least two pressing rollers (9,10).

7. Device as claimed in claim 4, 5 or 6, **characterized in that** the means (11,12) for causing the curable product to cure comprise a lamp for transmitting radiation toward the glass plate (11).

Patentansprüche

1. Verfahren zum Aufbringen eines in Reliefform ausgeführten Bildes (2) auf einer flachen, transparenten Glasplatte (3), das die folgenden Schritte aufweist:

- Anordnen eines härtbaren Produktes (6) auf der Glasplatte (3), wobei das Produkt an der Glasplatte anhaften kann;
- Plazieren einer formgebenden Matritze (1), auf der das anzuordnende Bild (2) spiegelbildlich und in Reliefform angeordnet ist;
- Zusammenpressen der Glasplatte (3) und der Formgebungsmatritze (1);
- Bewirken einer Aushärtung des härtbaren Produktes (6) und
- Lösen der Oberfläche der Glasplatte (3) von der Formgebungsmatritze (1) nach dem Aushärten;

dadurch gekennzeichnet, daß die verwendete Formgebungsmatritze (1) eine flache Formgebungsmatritze ist und daß das Zusammenpressen der Glasplatte (3) und der Matritze (1) vor dem Aushärten des härtbaren Produktes (6) stattfindet.

2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, daß** die Formgebungsmatritze (1) mit einem "Löse-"Material versehen ist, wobei das härtbare Material (6), wenn es gehärtet ist, nicht an der Formgebungsmatritze (1) anhaftet, wobei diese letztere auf einfache Weise von der Glasplatte entfernt werden kann.

3. Verfahren nach Anspruch 1 oder 2, **dadurch gekennzeichnet, daß** das härtbare Produkt (6), das an der transparenten Platte anhaften kann, koloriert ist.

4. Vorrichtung zum Aufbringen von Bildern (2) in Reliefform auf einer Oberfläche einer flachen, transparenten Glasplatte (3), wobei die Vorrichtung aufweist:

- eine Formgebungsmatritze (1), auf der das anzuordnende Bild (2) spiegelbildlich und in Reliefform angeordnet ist;
- Einrichtungen (13) zum Anordnen eines härtbaren Produktes (6), das an der Glasplatte (3) anhaftet, an der Glasplatte (3);
- Einrichtungen (9,10) zum Pressen der Matritze (1) auf die Glasplatte (3);
- Einrichtungen (11,12) zum Bewirken eines Aushärtens des härtbaren Produktes (6) und
- Einrichtungen (13) zum Trennen der Matritze (1) von der Glasplatte (3),

dadurch gekennzeichnet, daß die Formgebungsmatritze (1) flach ist und daß die Einrichtungen (9,10) zum Pressen der Matritze (1) auf die Glasplatte (3) stromaufwärts relativ zu den Einrichtungen (11,12) zum Bewirken des Aushärtens des härtbaren Produktes (6), angeordnet sind.

5. Vorrichtung nach Anspruch 4, **dadurch gekennzeichnet, daß** die Vorrichtung mit Einrichtungen zum Auftragen eines "Löse-"Materials auf die Matritze, versehen ist.

6. Vorrichtung nach Anspruch 4 oder 5, **dadurch gekennzeichnet, daß** die Einrichtungen zum Pressen der Matritze auf die transparente Platte wenigstens zwei Preßwalzen (9,10) umfassen.

7. Vorrichtung nach Anspruch 4, 5 oder 6, **dadurch gekennzeichnet, daß** die Einrichtungen (11,12) zum Bewirken des Aushärtens des härtbaren Produktes eine Lampe zum Aussenden von Strahlung in Richtung der Glasplatte (3) umfassen.

Revendications

1. Procédé pour appliquer une image (2) exécutée en relief sur une plaque de verre plate et transparente (3), consistant à :
- disposer un produit pouvant être cuit (6) sur la plaque de verre (3), lequel produit peut adhérer à la plaque de verre ;
 - placer un moule à former (1) sur lequel l'image (2) à aménager est placée en étant inversée et en relief ;
 - presser la plaque de verre (3) et le moule à former (1) ensemble ;
 - provoquer la cuisson dudit produit pouvant être cuit (6) ; et
 - nettoyer la surface de la plaque de verre (3) et

le moule à former après la cuisson,

caractérisé en ce que le moule à former employé (1) est un moule à former plat et **en ce que** le pressage de la plaque de verre (3) et du moule (1) a lieu avant la cuisson du produit pouvant être cuit (6). 5

2. Procédé selon la revendication 1, **caractérisé en ce que** le moule à former (1) est fourni avec un matériau de « démoulage » moyennant quoi le matériau pouvant être cuit (6), lorsqu'il est cuit, n'adhère pas au moule à former (1) dans lequel ce dernier peut être retiré de la plaque de verre de manière simple. 10 15

3. Procédé selon la revendication 1 ou 2, **caractérisé en ce que** le produit pouvant être cuit (6) qui peut adhérer à la plaque transparente est coloré. 20

4. Dispositif pour appliquer des images (2) en relief sur une surface d'une plaque de verre plate et transparente (3), le dispositif comprenant :
- un moule à former (1) sur lequel l'image (2) à aménager est placée en étant inversée et en relief ; 25
 - des moyens (13) pour disposer sur la plaque de verre (3) un produit pouvant être cuit (6) qui adhère à la plaque de verre (3) ; 30
 - des moyens (9, 10) pour presser le moule (1) sur la plaque de verre (3) ;
 - des moyens (11, 12) pour provoquer la cuisson du produit pouvant être cuit (6) ; et
 - des moyens (13) pour séparer le moule (1) de la plaque de verre (3), 35

caractérisé en ce que le moule à former (1) est plat et **en ce que** les moyens (9, 10) de pressage du moule (1) sur la plaque de verre (3) sont situés en amont des moyens (11, 12) provoquant la cuisson du produit pouvant être cuit (6). 40

5. Dispositif selon la revendication 4, **caractérisé en ce que** le dispositif est fourni avec des moyens d'application d'un matériau de « démoulage » sur le moule. 45
6. Dispositif selon la revendication 4 ou 5, **caractérisé en ce que** les moyens de pressage du moule sur la plaque transparente comprennent au moins deux cylindres de pressage (9, 10). 50
7. Dispositif selon la revendication 4, 5 ou 6 **caractérisé en ce que** les moyens (11, 12) provoquant la cuisson du produit pouvant être cuit comprennent une lampe pour transmettre la radiation vers la plaque de verre (3). 55

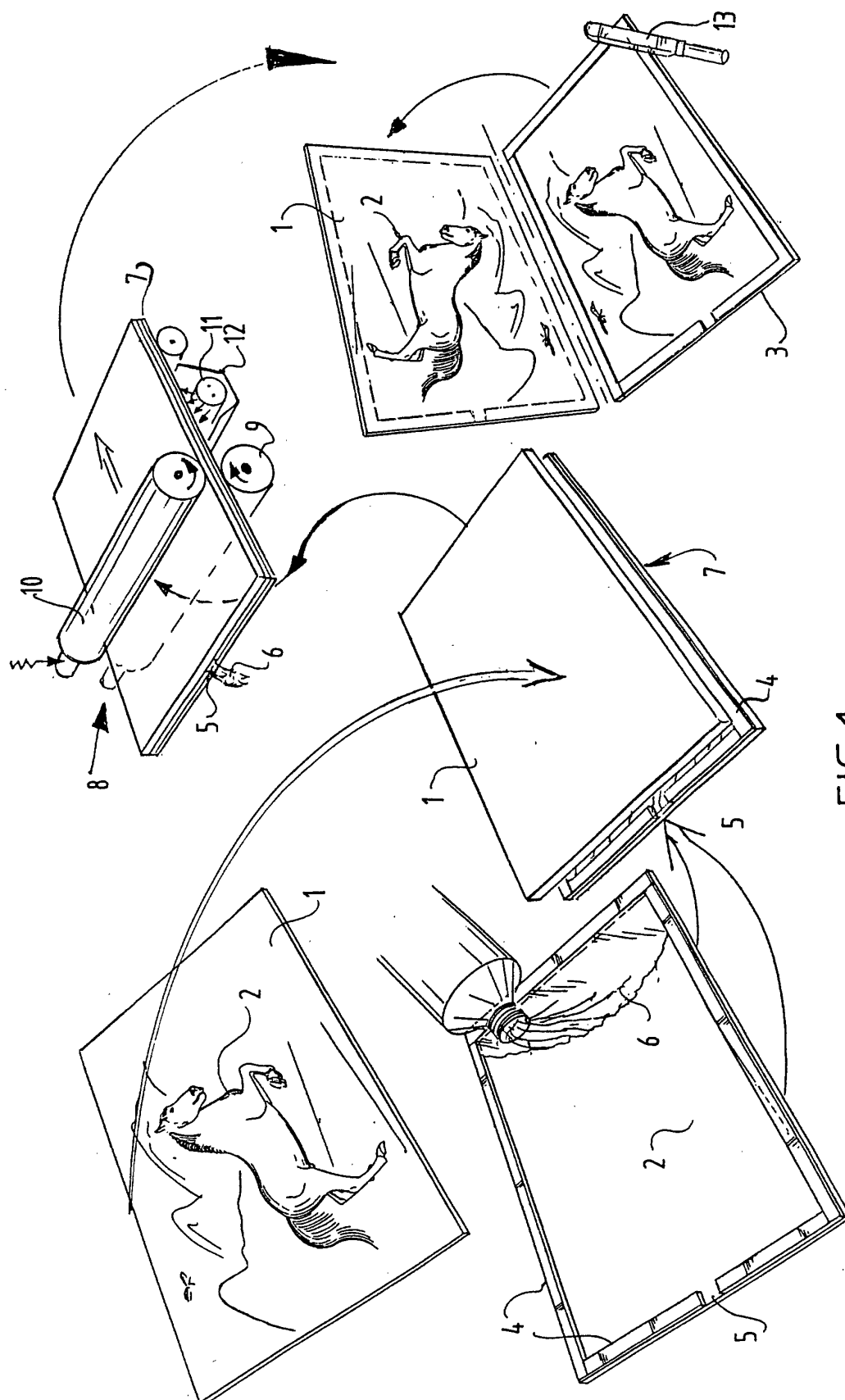


FIG. 1