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(54) Process for decorating metals

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(56) References cited:
EP-A- 0 810 102
WO-A-93/04872
GB-A- 1 463 596

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Description

[0001] The decoration of surfaces by the transfer system, independently on their being fabrics or metals in the general meaning of the word, is already known in the art.

[0002] These applications are still carried out with various techniques, all of which require for the polymerization of the inks on the surfaces to be decorated, the presence of pressure and heat.

[0003] EP 0810102 discloses a printing process for decorating architectural aluminium profile bars. According to this process, a coloured powder coating is applied onto the profile bars as a base coat, and the coated profile bar is then driven into a tunnel oven for heating. After exiting the tunnel oven, the profile bar enters a printing unit where specially constructed pressing silicon cylinders force a transfer paper or a transfer fabric to cover the bar. On the transfer paper or transfer fabric a sublimable pattern is impressed, which pattern is transferred onto the bar by sublimation. The transfer paper or transfer fabric is automatically removed after use. A transparent powder coating is applied as top coat to achieve maximum outdoor resistance.

[0004] WO 93/04872 discloses a process for printing a sublimable pattern onto a metallic substrate having a substantially flat profile. After applying a primer/basecoat and a polymeric coating to the surface that is to be decorated, a transfer sheet bearing a sublimable pattern placed on the coated surface. The transfer sheet and the metallic substrate are then subjected to temperatures and pressure sufficient to cause the sublimable ink to sublime and become attached to the polymeric coating. Pressure is applied to the transfer sheet by means of a heat transfer press comprising a base covered with a resilient silicon rubber plate, providing support for the metallic substrate which is to be printed. Located above the silicon rubber plate is a movable member provided with a platen, the temperature of which may be varied. Compressed air acts on the platen, that presses the transfer sheet against the metallic substrate so as to allow the sublimable pattern to be transferred onto said substrate.

[0005] Object of the invention is the decoration of metals, metal alloys, in the form of extruded profiles, sheets and objects from metal in general.

[0006] The process utilizes the already known transfer system. The novelty lies in the decoration of sheets and profiles extruded on all the faces by one only treatment, independently on the shape of the section, utilizing at the same time suction and compressed air.

[0007] The new system allows to make the transfer process quicker, and to obtain an optimal result with regard to the quality of the end product.

[0008] The surface to be decorated is submitted to the traditional pickling treatments, to prepare it for painting and to allow a better adhesion of the paint film onto the metal surface.

[0009] The base paint or primer utilized is colorless, and the chromatic colors as well as the pattern of the decoration are transferred by the transfer system.

[0010] This process is innovating in that the systems used still today include the coloring of the surface with priming colors whereon the pattern is transferred through transfer.

[0011] This allows to obtain a range of colors that is markedly more various, with shades of colors and color-matching that are still unthinkable on metal surfaces; in fact, the color range of inks is much more various and more easily realizable, compared to the color range of powder paints.

[0012] As mentioned above, the process utilizes suction and compressed air.

[0013] Two processes shall be distinguished, the first one for the decoration of extruded profiles, the second one for the decoration of sheets.

[0014] The process utilized for the decoration of extruded profiles requires the utilization of suction and compressed air.

[0015] As said above, this system allows the decoration on all the faces of the profile, whatever the shape of the section, with one only process.

[0016] After the pickling process and the painting with transparent paints, the extruded profile is wrapped up in the support (transfer) which is constituted by particularly smooth paper bearing on its surface the colors and the pattern to be transferred.

[0017] As specified above, the paper employed shall have a particularly smooth surface obtained by a mechanical finishing, and a weight in grams of 30 g/m².

[0018] By gluing means, the paper is closed around the profile on three sides, so as to form a bag open on the head side.

[0019] The gluing performed is perfectly tight, and suction shall be from the open side, to remove air from the bag, causing at the same time the paper to adhere to the surface of the metal extruded profile.

[0020] Suction shall take place gradually, in order to allow a perfect adhesion of paper to the profile in the longitudinal direction, avoiding therefore the formation of folds and flaps.

[0021] The final suction value shall be contained and not exceed the ceiling of 150 mm of Hg column.

[0022] In the presence of high temperatures, paper shows a slight expansion, that facilitates a better adhesion on the metal surface.

[0023] The adhesion of paper to the profile, obtained by suction, causes pleats and air pockets in the central region of the extruded profile, which pockets, because of the length of the profiles (about 6,5 m), cannot be eliminated by simple suction.

[0024] In these central regions of the extruded profiles, adhesion is ensured through the pressure of a cloth (cotton jacquard fabric) treated with proofing systems to ensure air-tightness.

[0025] Said cloth is constantly kept under pressure...
with compressed air.

[0026] During transfer, this cloth, kept under pressure on the profiles, removes the air pockets that have formed in the central regions, allowing a better adhesion of paper to the surface of the profile.

[0027] The process utilized for the decoration of sheets needs only the use of compressed air.

[0028] Sheets shall be covered on a face by paper whereon, on reaching the transfer temperature, the aforementioned jacquard cloth will exercise the pressure desired to ensure the pressure of paper on the support to be decorated.

[0029] The pressure exercised by the cloth will ensure the perfect adhesion of paper to the sheet support, allowing a transfer without bleeds and distortions of the colors and patterns to be transferred to the sheet surface.

[0030] The last step of the process lies in bringing the profiles to the transfer temperature of from 160 to 210°C for a period of 15-16 seconds, necessary for the transfer and crystallization of monomers for the perfect polymerization of the inks on the profile.

[0031] In order to reach the temperature necessary for the polymerization process, the profiles are placed in a tunnel-oven of the ventilated type fed by a fumes-air heating system, and a particular ventilation system.

[0032] The transfer of the profiles in the inside of the tunnel is obtained with the help of longitudinal or transversal translation trolleys, provided with a rigid top bearing the profiles and sheets.

[0033] The heating system is obtained by a fumes-air exchanger having a special conformation.

[0034] Air laps at the same speed all the exchange surface, assuring the passage all over the surface of the exchanger, avoiding also the formation of vortexes that lead unavoidably to the formation of air stagnation in large regions.

[0035] Ventilation in the inside of the oven is ensured by two centrifugal fans located downstream of the exchanger.

[0036] The particular system utilized for ventilation allows the formation of fluid threads as linear as possible, so as to ensure a uniformity of temperatures throughout the length of the tunnel.

[0037] When all the system is steadily running, monitoring the different temperatures, the maximum difference that may be find in the inside of the tunnel is of 2°C.

Claims

1. A method comprising:

- placing a paper support bearing a transferable pattern in contact with a metal object;
- heating said paper support and said metal object, and applying pressure to said paper support in contact with said metal object by means of compressed air, so as to transfer said pattern onto said metal object;

characterized in that, said applying comprises pressing said paper support against said metal object by means of a cloth from jacquard cotton fabric treated with systems that impart air-tightness to it, said cloth being pressed against said paper support by said compressed air.

2. A method according to claim 1, wherein said placing comprises covering said metal object with said paper support.

3. A method according to claim 1, wherein said placing comprises wrapping said metal object into said paper support.

4. A method according to claim 3, wherein said wrapping comprises forming a bag having an open side with said paper support.

5. A method according to claim 4, wherein said forming comprises gluing said paper support on three sides thereof so as to close said metal object into said paper support.

6. A method according to claim 3, or 4, and further comprising sucking air from said open side so as to make said paper support adherent to said metal object.

7. A method according to any preceding claim, wherein said heating comprises feeding said metal object into a tunnel oven by longitudinally translating said metal object.

8. A method according to any of claims 1 to 6, wherein said heating comprises feeding said metal object into a tunnel oven by transversely translating said metal object.

9. A method according to claim 7, or 8, wherein said cloth is constantly kept inside said tunnel oven.

10. A method according to any of preceding claims, wherein said cloth is inflated to a pressure of 1 Atm.

11. A method according to any of preceding claims; wherein said paper support has a smooth surface obtained by a mechanical finishing process and a weight of 30 g/m².

12. A method according to any of preceding claims, and further comprising, before said placing, painting said metal object with a colourless base paint or primer.
Patentansprüche

1. Verfahren, mit den Schritten:
   - Anordnen eines ein übertragbares Muster tragenden Papierträgers in Kontakt mit einem Metallogegenstand;
   - Erwärmen des Papierträgers und des Metallogegenstandes, und Druckausüben auf den Papierträger in Kontakt mit dem Metallogegenstand mittels Druckluft, um das Muster auf den Metallogegenstand zu übertragen;

dadurch gekennzeichnet, dass das Druckausüben Drücken des Papierträgers gegen den Metallogegenstand mittels eines Tuches aus Jacquard-Baumwollgewebe umfasst, das mit Verfahren behandelt wurde, die ihm eine Luftdichtigkeit verleihen, wobei das Tuch durch die Druckluft gegen den Papierträger gedrückt wird.

2. Verfahren nach Anspruch 1, wobei das Anordnen Bedecken des Metallogegenstandes mit dem Papierträger umfasst.

3. Verfahren nach Anspruch 1, wobei das Anordnen Einwickeln des Metallogegenstandes in den Papierträger umfasst.


5. Verfahren nach Anspruch 4, wobei das Bilden der Tasche Leimen des Papierträgers an drei Seiten desselben umfasst, um den Metallogegenstand in den Papierträger einzuschließen.


8. Verfahren nach einem der Ansprüche 1 bis 6, wobei das Erwärmen Zuführen des Metallogegenstandes in einen Tunnelofen durch quergerichtetes translatorisches Bewegen des Metallogegenstandes umfasst.

9. Verfahren nach Anspruch 7 oder 8, wobei das Tuch fortwährend in dem Tunnelofen belassen wird.

10. Verfahren nach einem der vorhergehenden Ansprüche, wobei das Tuch auf einen Druck von 1 Atm aufgeblasen wird.

11. Verfahren nach einem der vorhergehenden Ansprüche, wobei der Papierträger eine glatte Oberfläche, die durch ein mechanisches Endbearbeitungsverfahren erhalten wurde, und ein Gewicht von 30 g/m² aufweist.


Revendications

1. Procédé comprenant :
   - le placement d'un support en papier portant un motif transférable en contact avec un objet métallique ;
   - le chauffage dudit support en papier et dudit objet métallique, et l'application d'une pression sur ledit support en papier, en contact avec ledit objet métallique, au moyen d'air comprimé, afin de transférer ledit motif sur ledit objet métallique ;

caractérisé en ce que ladite application comprend la pression dudit support en papier contre ledit objet métallique au moyen d'une étoffe de tissu Jacquard de coton traitée avec des systèmes qui lui assurrent une étanchéité à l'air, ladite étoffe étant pressée contre ledit support en papier par ledit air comprimé.

2. Procédé selon la revendication 1, dans lequel ledit placement comprend le recouvrement dudit objet métallique avec ledit support en papier.

3. Procédé selon la revendication 1, dans lequel ledit placement comprend l'enveloppement dudit objet métallique dans ledit support en papier.

4. Procédé selon la revendication 3, dans lequel ledit enveloppement comprend la formation d'un sac ayant un côté ouvert avec ledit support en papier.

5. Procédé selon la revendication 4, dans lequel ladite formation comprend le collage dudit support en papier sur trois côtés de celui-ci afin d'enfermer ledit objet métallique dans ledit support en papier.

6. Procédé selon la revendication 3 ou 4, et comprenant de plus l'aspiration d'air depuis ledit côté
ouvert afin de faire adhérer ledit support en papier audit objet métallique.

7. Procédé selon l'une quelconque des revendications précédentes, dans lequel ledit chauffage comprend le chargement dudit objet métallique dans un four à tunnel par translation longitudinale dudit objet métallique.

8. Procédé selon l'une quelconque des revendications 1 à 6, dans lequel ledit chauffage comprend le chargement dudit objet métallique dans un four à tunnel par translation transversale dudit objet métallique.

9. Procédé selon la revendication 7 ou 8, dans lequel ladite étoffe est constamment maintenue à l'intérieur dudit four à tunnel.

10. Procédé selon l'une quelconque des revendications précédentes, dans lequel ladite étoffe est gonflée à une pression d'une atmosphère.

11. Procédé selon l'une quelconque des revendications précédentes, dans lequel ledit support en papier a une surface lisse, obtenue par un procédé de finissage mécanique, et un poids de 30 g/m².

12. Procédé selon l'une quelconque des revendications précédentes, et comprenant de plus, avant ledit placement, la peinture dudit objet métallique avec une couche primaire ou une peinture de fond sans couleur.