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(54) **Support for sublimable colour transfer for decorating objects and artifacts and the process thereof**

(57) Sublimable colour flexible transfer support to decorate various objects by means of the transfer technique, wherein the supporting layer is constituted by a film, or a layer or a strip from gas-tight thermoformable support such as polyvinyl alcohol; process for the realisation of said transfer support, comprising the following steps: preparing a metal matrix by photoengraving or the like; applying a sublimable colour decoration by means of said matrix on to a support from a flexible, non-extensible material such as polypropylene or the like, according to known techniques of rotogravure and the like; and transferring then said decoration from said support from polypropylene to a flexible supporting base from gas-tight thermoformable plastic material such as polyvinyl alcohol, by heat compression direct contact of the support from polypropylene with said supporting layer

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Description

[0001] The present invention relates to a sublimable colour transfer support to be used for the decoration of objects from metal, plastics, ceramics, wood and the like, with the transfer decoration technique.

[0002] This invention also relates to a process for the realisation of said sublimable colour transfer support, as well as the apparatus for the realisation thereof.

[0003] Processes are known for the production of objects of various types, having also a complex outline, and in particular large size variously decorated profiles, which processes comprise the following steps: wrapping up the object or artefact whose surface has undergone a prior treatment of pre-painting, anodic oxidation or the like, in a sublimable colour support carrying the decorations desired; covering the object wrapped up in the support with a membrane from rubber or the like; creating a vacuum through suitable ducts between the membrane or the artefact wrapped up in the support on prior interposition of means suitable to ensure the flow and outflow of air, so as to cause the support to uniformly adhere to the shape of the artefact, and permanently yielding means suitable to equalise the pressure exercised by the membrane; and lastly heating the whole so as to realise the transfer of the colours and therefore the pattern, and the polymerisation of the colours.

[0004] The transfer support is constituted, as is known, by a supporting base constituted by a sheet or strip from paper, fabric and the like, on a face of which the decoration to be then transferred to the object to be decorated is carried by employing sublimable colours.

[0005] To create the decoration on the supporting base, the silk-screen process is usually employed, which consists in spreading the colour on a matrix which is kept in touch with the surface of the supporting base, said matrix being constituted by a fabric previously covered with impermeable material which leaves exposed only the shape of the ornament to be transferred to the support. The colour, under the pressure of a special knife, filters through the very small holes of the fabric weft and deposits on the base.

[0006] By the silk-screen technique the fibres of which the matrix is made are subject to a marked wearing by effect of the pressure exercised by the knife on each pass, and the same matrix is then deformable by effect of the mechanical stress. It is therefore easy for the pattern and the decoration to result irregular on the base and to show defects which are afterwards transferred to the decorated artefact.

[0007] Besides, the transfer support made from paper, fabric or the like according to the known art has some severe drawbacks consisting especially in that, when a vacuum is created to cause the transfer support to adhere to the artefact by means of the pressure exercised by the membrane, folds may form in the support, irregularities in the adhesion of the artefact, and conse-

quently, defect may occur in the decoration of the artefact.

[0008] It has been noticed, in fact, that by employing transfer supports realised according to the known technique, with the base from paper, fabric or the like, the decoration transferred to the artefact frequently shows defects such as deformations of the profile, bleedings, diffusion and superposition of the colours and the like.

[0009] Object of the present invention is to provide a sublimable colour transfer support to be employed for the decoration of various objects by the transfer technique or transfer, such as to allow to reproduce on the artefacts to be decorated, decorations with sharp outlines, without bleedings, colour superpositions and the like.

[0010] Another object of the present invention is to provide a sublimable colour flexible transfer support, such as to be easily removed from the surface of the decorated object, once the transfer of the decoration has been performed.

[0011] Still a further object is to provide a transfer support that can also constitute, once the sublimable colour transfer has been performed, a protective film for the decorated artefact obtained.

[0012] These and still other objects and the related advantages that will be apparent thanks to the following description are achieved by a sublimable colour flexible transfer support to be employed to realise a decoration on the surface of various objects from metal, plastics, wood, ceramics and the like, such as metal profiles from steel or light alloy, rolled sections, artefacts for urban equipment, tiles, household articles and the like by means of the transfer technique, which support, according to the present invention, comprises a supporting base constituted by a sheet, a strip or the like from gas-tight thermoformable plastic material, the pattern or decoration to be transferred to the object to be decorated being carried in sublimable colours on a face of such supporting base.

[0013] More particularly, said gas-tight thermoformable plastic material is polyvinyl alcohol.

[0014] As is known, polyvinyl alcohol is a water soluble synthetic polymer having the formula $(-CH_2CHOH-)_x$, entirely gas-tight, oils-, lipids-, hydrocarbons-proof and the like, and resistant to high temperatures, of over 200°C.

[0015] It has been observed that the transfer support realised from said thermoformable plastic material, during the step of transfer of the decoration to the object by effect of the temperature and the pressure, perfectly adheres to the object without formation of folds, irregularities and the like.

[0016] Besides, once the transfer of the decoration to the artefact by sublimation has been performed, the film from thermoformable material, in particular from polyvinyl alcohol, constituted by the exhausted supporting base, may be left on the artefact to protect the surface of the same and removed only when the operations of

storing and/or transportation of the artefact and its final working and installation have been carried out. In this way one can avoid to proceed to a protection operation consisting, according to the known art, in the application of paints, protective films, and the like. In other words, said supporting base constitutes, according to the present invention, also a protective film once the transfer of the sublimable colours has been performed.

[0017] Always according to the present invention, a process to realise said thermoformable gas-tight flexible support comprises the following steps:

- preparation of an etched metal matrix carrying an impression corresponding to said decoration by means of known techniques such as photoengraving and the like;
- application of said decoration realised with sublimable inks on a sheet or a strip from nonextensible flexible materials according to techniques of inking, by means of said metal matrix;
- transfer of said decoration from said nonextensible flexible sheet or strip to a supporting base constituted by a sheet or strip from gas-tight thermoformable plastic material such as polyvinyl alcohol, by heat compression of said sheet or strip from non-extensible flexible material against said supporting base from gas-tight plastic material, obtaining a transfer support carrying said sublimable colour decoration.

[0018] More particularly, said non-extensible flexible sheet or strip is from polypropylene and the transfer of said decoration to said supporting base is carried out at a temperature of from 100 and 150°C, in any case at a temperature lower than the softening temperature of polypropylene or any other plastic material used and/or of decomposition of said material constituting the supporting base.

[0019] It has been found that said so obtained sublimable colour flexible transfer support allows to realise on any artefact or object any type of decoration, also with a complex pattern, free from defects such as deformation of the outline of the pattern, bleedings, superposition of colours and the like.

[0020] In particular, an apparatus for the realisation of a flexible support from thermoformable gas-tight flexible material, such as polyvinyl alcohol, having the form of a strip according to the present invention, comprises:

- a rotary cylindrical metal matrix, carrying an impression corresponding to said decoration, sucking from a tray containing said sublimable ink and provided with a device such as a doctor, a knife or the like, suitable to remove the excess ink from the surface of said matrix;
- a first roll around which there unwinds said strip from non-extensible flexible material, such as polypropylene or the like, kept in touch with the surface

of said cylindrical matrix, so that the decoration is carried to the surface of said strip according to the known techniques of rotogravure or the like;

- a second roll around which there rewinds said strip from non-extensible flexible material, such as polypropylene or the like, carrying said sublimable ink decoration;
- a nip roll heated at a temperature of from 100 and 150°C, suitable to keep said strip from nonextensible flexible material carrying said decoration unwinding from said second roll against the surface of a strip from flexible material such as polyvinyl alcohol unwinding from a third roll, so that said decoration is transferred to said strip from flexible material winding on a fourth roll.

Claims

1. A sublimable colour flexible transfer support to be used for the realisation of a decoration on the surface of various artefacts from metal, plastics, wood, ceramics and the like, such as metal profiles from steel or light alloy, rolled sections, artefacts for urban equipment and the like by means of the transfer technique, characterised in that it comprises a supporting base constituted by a sheet or a strip from thermoformable gas-tight plastic material, the pattern or the decoration to be transferred to the object to be decorated being carried in sublimable colours on a face of such base.
2. The flexible transfer support according to claim 1, characterised in that said thermoformable gas-tight plastic material is polyvinyl alcohol.
3. The flexible transfer support according to claims 1 and 2, characterised in that said supporting base constitutes also a protective film for said decorated artefact, once the transfer of the decoration by sublimation of said sublimable colours has been carried out.
4. A process for the realisation of a sublimable colour thermoformable gas-tight flexible support according to claims 1 and 2, characterised in that it comprises the following steps:
 - preparation of an etched matrix carrying an impression corresponding to said decoration by means of techniques such as photoengraving;
 - application of said decoration realised with sublimable inks on a sheet or a strip from non-extensible flexible material according to techniques of inking, by means of said metal matrix;
 - transfer of said decoration from said nonextensible flexible sheet or strip to a supporting base constituted by a sheet or strip from gas-

tight thermoformable plastic material such as polyvinyl alcohol, by heat compression of said sheet or strip from non-extensible flexible material against said support base from gas-tight plastic material, obtaining a transfer support carrying said sublimable colour decoration.

5. The process according to claim 3, characterised in that said sheet or strip from non-extensible flexible material is from polypropylene and in that the transfer of said decoration to said sheet or strip from flexible material by means of heat compression is carried out at a temperature of from 100 and 150°C.
6. Apparatus for the realisation of a flexible support having the form of a strip according to claim 1, characterised in that it comprises:
 - a rotary cylindrical metal matrix, carrying an impression corresponding to said decoration, sucking from a tray containing said sublimable ink and provided with a device such as a doctor, a knife, suitable to remove the excess ink from the surface of said matrix;
 - a first roll around which there unwinds said strip from non-extensible flexible material, such as polypropylene, kept in touch with the surface of said cylindrical matrix, so that the decoration is carried to the surface of said strip according to the known techniques of rotogravure;
 - a second roll around which there rewinds said strip from non-extensible flexible material, carrying said sublimable ink decoration;
 - a nip roll heated at a temperature of from 100 and 150°C, suitable to keep said strip from nonextensible flexible material carrying said decoration unwinding from said second roll against the surface of a strip from flexible material such as polyvinyl alcohol unwinding from a third roll, so that said decoration is transferred to said strip from flexible material winding on a fourth roll.
7. A flexible support according to claims 1 and 2, characterised in that said pattern or decoration to be transferred present on the surface of said flexible supporting base designed to get in touch with the surface of the object to be decorated is covered with a thin layer of adhesive.
8. The flexible support according to claims 1 and 2, characterised in that a transparent film is interposed between the surface of said supporting base and the layer constituted by the decoration.