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(54) Method for transferring designs and patterns.

(57) A method of transferring designs and patterns using an electrostatic recording paper. A desired pattern is printed, hand drawn or copied on the electrostatic recording paper, thus producing a transfer paper. The transfer paper is pasted on a surface of an object via an adhesive, and then the recording paper is wet by water or some other liquid and peeled off, thus leaving the pattern on the surface of the object. A synthetic resin protective film is applied on the surface of the pattern on the object. The objects which receive the transfer of the desired designs and patterns are made can be any including floors, walls, glass windows, ceilings, walls, fences, etc. of completed buildings and the inside and outside surfaces of elevators, vehicles, etc.

EP 0 634 295 A2

The present invention relates to a method for transferring designs and patterns onto the surfaces of various objects.

There are several different ways in transferring patterns and designs (collectively called "patterns" below) onto surfaces of various objects. Since these transfer methods require predetermined continuous steps to finish, the methods are only suited for mass production which is done by manufacturers who own large scale printing machines.

As a result, the transfer of patterns onto the floors, walls, glass windows, ceilings, walls, fences, etc. of completed buildings and on the inside and outside surfaces of elevators, vehicles, etc. is considered to be virtually impossible.

In addition, it is currently extremely difficult to transfer or apply clean and bright patterns on curved surfaces or on the surfaces of objects which have a poor surface smoothness due to fine indentations and projections of approximately 1 to 5 mm.

Accordingly, the general aim of the present invention is to solve these problems.

The primary aim of the present invention is to provide a novel transfer method which allows the simple transfer of designs and patterns including letters, numbers, symbols, etc. (called "pattern" or "patterns") to any desired surfaces, such as floors, walls, vehicles, elevators, ceilings, glass windows, wood, cloth, leather, paper, rubber, plastic, stone, ceramics, metals, concrete, asphalt roadways, etc. even if the surfaces are curved, uneven or have a poor surface smoothness.

The invention solves the problem by the use of an electrostatic recording paper, and patterns to be transferred onto surfaces are executed on such a paper. A pattern is executed on the recording paper by various different ways including printing, color copying, hand drawing and other methods. The electrostatic paper with the pattern thereon is pasted on the surface of an object that receives the patterns. Then, the electrostatic paper is peeled off while being wet with a liquid such as water, a solvent, etc., leaving the pattern alone on the surface of the object.

More specifically, according to the present invention, (1) a transfer paper is prepared by executing a desired pattern on an electrostatic recording paper by way of printing, hand drawing, color copying, etc., and (2) the thus obtained transfer paper with a pattern layer thereon is affixed via a tackifier or adhesive agent on the surface of an object upon which the pattern is to be transferred, and then (3) the electrostatic recording paper is wet by water or another liquid and is peeled off so that only the pattern layer with the pattern thereon remains on the surface of the object. The surface of the thus transferred pattern layer is coated with a synthetic resin so that a protective film is formed on the pattern on the object.

The invention will be described in detail below.

The basic material used in the present invention is a so-called "electrostatic recording paper" made and sold by numerous paper manufacturers, copy machine makers, etc.

The electrostatic recording paper has a thickness of 30 to 60 microns, and the surface thereof is coated with a substance, such as a conductive powder, etc. which has a property of causing an adhesion of substances that carry an electrostatic charge.

In the present invention, a transfer paper is first made by executing a desired pattern on the electrostatic recording paper.

If the pattern is printed, hand drawn, color copied, etc. with the use of oil-based pigments (and not water-based dyes), then the pattern is executed or applied directly to the electrostatic recording paper without performing any pretreatment.

If, however, the pattern is executed with materials such as water-based inks, water-based dyes, etc., it is desirable that the transfer paper be formed by printing, hand drawing, color copying or ther methods after pretreatment. The pretreatment is performed by coating the electrostatic recording paper with gelatin, polyvinyl alcohol or a calcium carbonate dispersion liquid, and then the pattern is executed thereon.

In addition, if the pattern is executed by color copying using toners, the electrostatic recording paper should be coated beforehand with a transparent binder. After this process, the pattern is applied by color copying on the surface of such a transparent coating film to produce a transfer paper.

Thus, a transfer paper having a pattern layer with the pattern thereon is obtained in different ways.

The tackifier or adhesive agent used in the present invention to affix the transfer paper to the surface of an object is selected in accordance with the material properties of the object and with the material properties of the pattern layer which is to be transferred. In other words, a material which causes tacky adhesion or bonding of both (the object and the transfer paper) without harming the material properties of them should be selected.

For example, if the pattern layer formed by a water-based ink is to be transferred to an ornamental metal plate (which is a transfer-receiving material), a solvent type adhesive agent for metals is most suitable. If the pattern layer formed by color copying is to be transferred to a concrete surface, it is desirable to use casein, a two-part epoxy adhesive or a two-part urethane adhesive as the adhesive agent.

As seen from the above, the tackifiers and adhesive agent which are used in the present invention can be solvent type adhesive agent or tackifiers, instant adhesive agents, emulsion type adhesive agents or tackifiers, and water-soluble adhesive agents or tackifiers. In any event, the tackifier or adhesive agent used in the present invention is selected, via trial applications, etc., in accordance with the material

properties of the object and the pattern layer which is applied onto the surface of an object.

The tackifier or adhesive agent selected pursuant to the above criteria is applied on the surface of an object. In case the surface of the pattern of the transfer paper is not susceptible to the solvents, a solvent type adhesive agent may be applied on the surface of the pattern of the transfer paper instead of the object's surface.

If the object is a hard material, a two-part urethane adhesive, a two-part epoxy adhesive or an acrylic type adhesive is desirable as the adhesive agent. On the other hand, if the object is a material that is weak in bonding, such as vinyl rubber, glass, iron, etc., it is desirable to first apply a binder to the object and then to use a tackifier or adhesive agent of a solvent type which can retain tackiness even after drying.

If the object is soiled or if the soil cannot be easily removed from the surface of the object, as in concrete, iron, etc., a gold, silver or white leaf is pasted to the pattern surface of the transfer paper. Instead, respective colors such as red, white, etc. can be applied on the transfer paper. A tackifier is applied on such a color and dried, and then with the tackiness still remaining, a mold release paper is pasted to the pattern surface. The mold release paper is peeled off and then the transfer paper is affixed to the object at the site of transfer of the pattern.

If the object is a soft material, such as paper, leather, cloth, synthetic leather, etc., a single-liquid type acrylic or urethane water-soluble adhesive agent or tackifier is used because such an agent does not cause a loss of the softness.

If the object does not have a smooth surface and has indentations and projections instead, a two-part epoxy adhesive, a two-part urethane adhesive or a two-part acrylic adhesive is applied on the surface of the object to smooth the surface.

If the object has a smooth surface, the tackifier or adhesive agent is applied, and then soapy water is applied thereon. With the use of the soapy water, the transfer paper can move freely when it is pasted to the surface of an object, thus allowing an easy affixing to a desired position. The affixing is completed when the soapy water is dried, and the transfer process can go to the next step.

When an extremely clean and attractive design is desired as on the doors of vehicles, etc., it is preferred that the transfer paper be applied via an instant adhesive agent by letting the dry be delayed for two to ten minutes so that the air and liquid are removed between the object and the transfer paper before the instant adhesive agent is completely dried.

After the pattern on the transfer paper has been pasted on the surface of the object, the transfer paper is wet with water or some other liquid and then peeled away. In other words, the transfer paper is wet with water, etc., on its back surface (i. e., the surface with no pattern) and is peeled off so that the pattern layer with the pattern thereon only remains as a transferred pattern on the surface of the object.

After the pattern has thus been transferred on the object, a synthetic resin is applied on the surface of the pattern layer so that a protective film is formed. The film can improve the durability of the transferred pattern.

In cases where the pattern layer is a water-based layer, it is desirable that the protective film is a lipophilic synthetic resin coating layer. If the pattern layer is an oil-based layer, it is desirable to use a hydrophilic synthetic resin coating layer to form the protective film.

For example, if the pattern is obtained from a water-based ink, a solvent type urethane resin, acrylic resin, fluororesin, etc. is used to form the protective film. When these materials are used, discoloration is prevented and wear resistance can be increased. Thus, the durability of the pattern is improved.

In other words, the protective film is formed by changing the synthetic resin solvent in accordance with the materials such as pigments, toners, coloring materials (e.g. oil paints, water colors), and color copy type materials for the patterns to be transferred so that the durability is improved, the pattern is reinforced, discoloration is prevented, and a beautiful finish is obtained.

If the pattern is transferred to a soft object, it is preferable to use a soft urethane resin or acrylic resin so that the "feeling" or texture of such a soft material is not lost.

When more effective prevention of discoloration is desired, ultraviolet absorbing agents, fluororesins, etc. are used.

With the above-described processes and procedures, patterns can be transferred to all types of objects. Thus, any desired designs and patterns can be transferred to the inside surfaces of completed buildings, to the inside surfaces of elevators and vehicles, to all types of materials in all types of locations, outside walls, fences, roadways, ceramic materials, glass windows, wood, leather, cloth, paper, rubber, concrete, plastics, metals, stone, etc., and also to spherical surfaces and curved surfaces.

The method of the present invention is simple and can be used to hide seams and joints. In addition, multiple transfer can be possible by transferring one design or pattern onto another.

More detailed and concrete description of the present invention will be given below as embodiments.

Embodiment 1

A figure of a soccer player in a game was formed on an electrostatic recording paper of 50 microns

thickness (manufactured by Fuji Xerox K.K.) using a pigment type color copier. No pretreatment was performed thereon. Thus, a 300 mm x 500 mm transfer paper with the succor player pattern layer thereon was obtained.

The object or the transfer-receiving material was a concrete block of the same size (300 mm x 500 mm) as the transfer paper. The concrete block was coated at a rate of 20 g/m^2 with a concrete sealer (manufactured by Nippon Paint K.K.) which has a 50 % solid content. The concrete sealer was used as an alkali-blocking agent.

Next, casein of aqueous solution with 35 % solid content (manufactured by Kyowa Kasei K.K.) was applied twice on the concrete sealer by a brush at a rate of approximately 60 g/m^2 (when wet) as an adhesive agent. The casein was dried by a hot air draft, and the transfer paper was pasted on this concrete block. When pasted, the pattern surface of the transfer paper is brought so as to be in contact with the surface of the concrete block.

Thereafter, the transfer paper was impregnated with water. In other words, the water is applied on the surface which is the opposite side from the pattern surface so as to wet it, and then the transfer paper was peeled off. The pattern on the pattern layer representing the soccer player in a game was thus transferred onto the surface of the concrete block.

The surface of the pattern of the soccer player was then coated at a rate of 30 g/m^2 (when wet) with a water-based polyurethane resin preparation containing a solid content of 32 % ("Neodeluxe UW" manufactured by Otani Toryo K.K.), and the coating was dried, thus forming a protective film.

After an approximately ten minutes of drying, a fluororesin containing 10 % of an ultraviolet absorbing agent ("Newgarmet #2300" manufactured by Tobe K.K.) was applied on the protective film at a rate of 20 g/m^2.

As a result, a beautiful concrete block with a durable, wear-resistant patterns of the soccer player in a game was obtained.

The concrete block had small indentations and projections on its surface, but they did not affect the transfer process at all.

Embodiment 2

The same electrostatic recording paper used in Embodiment 1 was used. In this Embodiment 2, a pretreatment was performed on the recording paper. The paper was first coated with a 10 % solution of gelatin (powdered gelatin manufactured by Yasu Kagaku Kogyo K.K.) at a rate of 50 g/m^2 (when wet) and then dried by a hot air draft.

Next, the famous painting "Mademoiselle Irene" of Renoir was printed on the thus obtained pretreated electrostatic recording paper. The printing was done by an iris machine (IRIS3047 Color-in-jet printer made in U.S.A. and sold by Marubeni Electronics K.K.) using water-soluble dyes of four different colors which are cyan, magenta, yellow and black. A transfer paper was thus obtained.

The object to which the pattern of "Mademoiselle Irene" of Renoir was applied was an ornamental plate made of aluminum of the size of 130 cm x 150 cm. This plate was coated at a rate of 10 g/m^2 with a solvent type binder for metals of 40 % of solid content ("Fuyube Mitchaku Binder M" manufactured by Kansai Paint K.K.) and was dried. A pretreatment was thus accomplished. Afterward, a single-part moisture-setting polyurethane adhesive of 30 % solid content ("Kyoresin S-1800" manufactured by Kyowa Kasei K.K.) was applied thereon used a spray gun at a rate of 30 g/m^2.

After drying this adhesive agent (with its tacky nature remaining), the pattern surface of the pattern paper of "Mademoiselle Irene" was pasted on the aluminum plate.

Next, this transfer paper was wet (more specifically, the surface without the pattern was wet) with water and peeled away in the same manner as in Embodiment 1. As a result, the pattern of the famous painting "Mademoiselle Irene" was transferred to the surface of the ornamental aluminum plate.

The surface of the pattern was then coated at a rate of 35 g/m^2 with a two-part polyurethane resin of a solid content of 35 % (manufactured by Mikuni Paint K.K.) and dried. As a result, a protective film was obtained.

The aluminum plate to which "Mademoiselle Irene" of Renoir was thus transferred was extremely beautiful, just like the original. The patterns thus obtained were extremely superior in terms of resistance to wear.

The most important and special feature of the present invention is to use an electrostatic recording paper. Designs and patterns executed on this electrostatic recording paper are pasted onto an object and thus transferred thereon. The electrostatic recording paper is then peeled off, leaving only the pattern layer on the object. No special equipment is required, and the method of transfer is extremely simple.

As seen from the above, according to the present invention, any desired design and pattern can be applied with superior durability onto surfaces of all different types of objects in different locations, both broad and narrow, such as the inside and outside surfaces of completed buildings, window glasses, inside surfaces of elevators and vehicles, surfaces of roadways, etc.

Furthermore, the method of the present invention can transfer beautiful and vivid designs and patterns on the surface of an object even if they have poor surface smoothness. In addition, the transfer can be made on spherical surfaces and other curved surfac-

es. Moreover, joint transfer and multiple (double, triple, etc.) transfer operations are executable too. Thus, the method of the present invention has an extremely broad range of application.

As described above in detail, the present invention can improve the decorative nature of all types of object and is extremely useful in industries related to decoration.

Claims

1. A method for transferring a pattern characterized in that (a) a transfer paper is obtained by executing a desired pattern on an electrostatic recording paper by means of printing, hand drawing or color copying, etc.; (b) a pattern surface of said transfer paper is pasted to a surface of an object, which acts as a transfer-receiving material, via a tackifier or adhesive agent, (c) said electrostatic recording paper is then wet by water or some other liquid and is peeled away so that only a pattern layer is transferred to said object, and (d) a surface of a thus transferred pattern layer is coated with a synthetic resin so that a protective film is formed.

2. A method for transferring a pattern according to Claim 1, wherein a pattern is executed after said electrostatic recording paper has been coated with one selected from the group consisting of a transparent binder, gelatin, polyvinyl alcohol, and calcium carbonate.

3. A method for transferring a pattern onto a surface of an object comprising the steps of:

executing a desired pattern on an electrostatic recording paper, thus obtaining a transfer paper;

affixing said transfer paper to a surface of an object via an adhesive;

wetting said transfer paper;

peeling off of said transfer paper from said surface of said object, thus leaving said desired pattern on said surface; and

applying a synthetic resin on said pattern so as to form a protective film.

4. A method for transferring a pattern according to Claim 3, wherein said execution of said desired pattern to said electrostatic recording paper is performed by one selected from the group consisting of printing, hand drawing, and copying.

5. A method for transferring a pattern onto a surface of an object comprising the steps of:

affixing a transfer paper, which is obtained by executing a pattern on a surface of an electrostatic recording paper, to a surface of an object via an adhesive;

wetting said transfer paper;

peeling off of said transfer paper from said surface of said object, thus leaving said pattern on said surface; and

applying a synthetic resin on said pattern on said surface so as to form a protective film on said pattern.

6. A method for transferring a pattern according to Claim 5, wherein said execution of said pattern to said electrostatic recording paper is performed by one method selected from the group consisting of printing, hand drawing and copying.