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METHOD OF DECORATING METALLIC SURFACES

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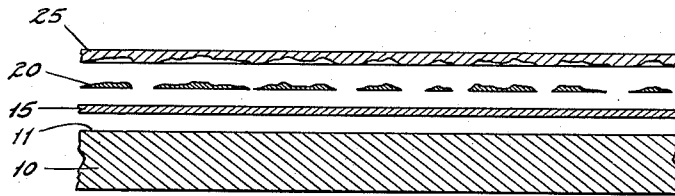


Fig. 1

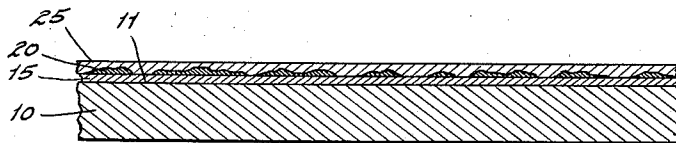


Fig. 2

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METHOD OF DECORATING METALLIC SUR-
FACES

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This invention relates to a decorated surface and methods of obtaining the same. More particularly, the invention relates to surfaces decorated with special coatings of lacquers, varnishes, inks and the like to simulate a natural object, such as stone, marble, mother-of-pearl, wood and other objects of pleasing appearance having variations in tones and/or designs.

For some time past, articles of manufacture have been decorated to simulate natural objects with varying degrees of success. Imitations of natural wood grains, marbles and other articles, at the present time, are being applied to various surfaces such as to the surfaces of sheet metal and inferior woods. Much attention has been given to the tonal values, as well as to the clearness and exactness of designs, resulting in very accurate and satisfactory reproductions insofar as the design reproduction is concerned.

However, the design reproductions made in the past have lacked a certain lustrous quality found in natural marbles, mother-of-pearl, wood and other articles. This quality is difficult to describe accurately. By way of illustration, if panels of certain wood veneer or solid wood panels are viewed from several positions, it has different appearances and seems to possess iridescent properties and in many instances as the angle of observation is changed, the tonal depths of the design will vary in optical effect. This optical effect can be observed also in the appearance of certain grades of polished granite, marbles, etc. That is, if the article is placed in a certain position, and the point of view of the observer gradually changed, as by walking past or around the article, changes apparently flicker across the face of the article. This characteristic distinguishes the appearance of the reproduction of the natural object from the appearance of the article itself. In the past, the simulation of these changes has been elusive. Wherefore, the general object of the present invention is to provide reproduced surfaces having the peculiar iridescent characteristics of natural objects above mentioned, and to provide a practical, economic method of decorating an article so as to enable such reproduction. In the furtherance of this object I have found that the methods hereinafter disclosed are adaptable to the production of many designs, not necessarily reproductions of the appearances of natural objects, with highly satisfactory optical results.

In the past, attempts have been made to simulate the peculiar iridescent quality of natural articles, which may be called "sheen". This

sheen effect in natural objects appears in some respects to be an internal luster. The practice, in general, has been to rely mainly on the surface polish imparted to the final or wearing coat of lacquer or varnish which is applied to the reproduction in association with a heavily pigmented ground coating and to the design. This practice does not simulate the sheen effect in any way, but simply imparts the usual surface gloss to the decorated article while simulating the color and tonal effects of the natural object. Some attempts have been made to obtain tonal depth by using flaky insoluble materials in extra undercoatings, but this method, while increasing tonal depth in the appearance of the design, did not give the sheen effect nor afford any practical method of controlling the degree of sheen desired. Hence, such attempts to obtain a sheen effect in this manner will be found to be expensive and will lack the full advantages afforded by the use of the present method.

Some attempts have been made to obtain such sheen effect or iridescence by color control, in some instances by applying more than one design coat to the article, the color shade of one coat varying from the color or shade of another coat. An example of such a method will be found in my prior Patent 1,884,566, issued October 25th, 1932. Such methods were directed mainly to variations in color and added to the attractiveness of the reproduction, but not because that method reproduced a sheen effect, but rather because that method more accurately reproduced the tones and colors of the natural article through the inclusion of very subdued undertones. The sheen effect was still lacking as before.

I have referred to the use of a ground coating having a flaky material embodied therein, such as disclosed in the patent to Lang, No. 1,651,136, issued November 29th, 1927. The method disclosed in said patent is effective in improving the results obtained by the graining processes therein referred to, as such method increases the depth of tone and color contrast while at the same time effecting a more accurate blending of colors than methods in common use at that time.

The use of such flaky material in the ground coat must in practice be limited (used sparingly) to an extent such that the effect is very unlike the lustrous iridescence (sheen) which is present in natural articles, such as wood grain. In fact, the value of the use of such flaky material in the ground coat lay in that it broke the monotony of surface reflection, which in the imitation of

certain surfaces, particularly various natural surfaces, was ordinarily too uniform, and this use enabled tonal variations in the high-lights (non-grained e. g. areas) not found in work made by methods known prior to the advent of the Lang patent. Metallic flake, as taught by the Lang patent, and as practiced, was therefore used sparingly and never became a dominant characteristic of the ground or any other part of the decorative treatment. This sparing use was necessary principally because otherwise the flake could be identified upon casual observation of the finished product, as metallic. Other attempts to obtain the lustrous iridescence or sheen effect of natural objects have been made, but such attempts, so far as I know, failed to produce the same in a practical way.

The peculiar iridescent and softly luminous qualities found in natural objects heretofore mentioned and which qualities, for lack of a better term are herein designated as "sheen", and which seem to add life not only to the colors, the tones, the tonal depths and the tonal contrasts, but to the very article itself, are not found in articles decorated by methods taught by said prior patents.

A further object is to provide a decorative treatment, productive of a finish presenting the aforesaid sheen effect to the observer in varying degrees, depending upon the variations in tonal depth of the material comprising the design layer, and wherein the uncoated surface of the article to be decorated is utilized in carrying out the process.

Another object is to provide a method of decorating articles, so that said sheen effect, which is present in natural articles, may be simulated and the degree of sheen controlled in quantity production.

Other objects of the invention will become more apparent from the following description, and the essential features of the invention will be summarized in the claims.

The drawing, Fig. 1, illustrates a diagrammatical representation, in cross-section, of a piece of material decorated in accordance with the present invention, the various coatings being separated to more clearly indicate the same; Fig. 2 is a diagrammatical representation similar to Fig. 1, but having the coating in intimate relationship.

At this point, it may be stated, that in general, any of the various known grain reproduction methods may be used in applying the design or grain coatings in connection with the process demonstrated in this application. For example, a practical and effective method of obtaining an accurate design is disclosed in the patent to J. P. Henry, No. 1,548,465, issued August 4th, 1925. This process comprises etching a suitable roll or plate by using a carbon tissue or resist exposed through a photographic film or plate bearing the light and dark contrasts and tonal effects to be reproduced. This produces a printing member to which may be applied a color having a predetermined degree of transparency as will be disclosed. After the application of the color, the plate or roll is scraped to remove excess pigment, leaving a pigment design in the etched pockets, which design is then transferred to the work to be decorated in a suitable manner. It is to be understood that other forms of printing media may be used in connection with the present process, but I have found the so-called Henry process when used in conjunction with the pres-

ent process, gives very satisfactory results, but other processes than that mentioned above may be employed. For instance, the so-called "half-tone process" or any of its variations may be utilized. The printing member may likewise be such as to enable the use of a direct printing mechanism or an offset printing mechanism, the only requirement being that the result will be a true reproduction of the design in color and tonal variation of the same.

Heretofore, when it has been desired to decorate a metallic surface in simulation of a wood panel or other natural article, it has been the practice to first clean the metal surface and apply thereto an opaque pigmented base coat. It has long been considered that one of the first, if not the main essentials for successful simulation of a natural object was the provision of an opaque ground color or foundation coating, on which the design was to be applied, and that such foundation be similar in color to the back-ground color of the natural wood or object being simulated.

Now, my departure from the above procedure enables the attainment of results far beyond normal expectation and reproduces the natural sheen without obvious artificialities. I obtain this result primarily by operating on a metallically bright surface, as above mentioned.

For example, a metal article or panel is procured and the surface thereof to be decorated is cleaned until it presents an ordinary mill-bright surface, capable of reflecting light through portions of the overlying decorative coating and/or design transfer, e. g. The material for said overlying coatings and/or transfers are prepared in such manner that when combined, the desired degree of sheen effect is obtained. The treatment may include a substantially clear or transparent or translucent varnish or lacquer coating applied to the bright metal surface before the latter has had an opportunity to oxidize to such an extent as to dull such surface to any material degree.

It is well known that while a varnish or lacquer is termed or called "clear", nevertheless it is slightly brown or colored, due to slight impurities in the body fluid, as well as to the different light penetrating and refracting qualities of the materials used in the composition of the varnish or lacquer. This brownish tinge is especially noticeable when a varnish or lacquer coating is placed on a metal surface, and is accentuated in a small degree when the metal surface is bright. This tinge of color on the bright metal surface starts to build up the sheen effect so long sought.

After the coating has dried, the pattern or design coating is applied thereto as by any well-known printing process. I prefer to use, as stated, a photo-mechanically reproduced etched pattern plate or roll in connection with an offset printing process, as I find such pattern and printing process exceedingly well adapted for the reproduction of grain designs and the like, in that the tones and contrasts of the surface being simulated are more accurately reproduced thereby. After the transfer has been effected, I then apply one or more coatings of varnish or lacquer over the transferred design, the translucency or transparency of which coating or coatings is determined by the degree of translucency or transparency of the coating or coatings, and the degree of sheen desired, and I thereby obtain the completion of the general color effect without impairing the tonal variations in contrast of the design with the metallically bright surface as

modified by the varnish or lacquer coating, while subduing the general brightness of the base to the desired sheen appearance, and concealing the metallic character of the base surface so that on inspection it cannot be identified as metal.

From the foregoing example, it will be apparent to those skilled in the art of surface decoration that four points of control of the sheen effect or iridescent effect ultimately desired is available, namely, control of the degree of brightness of the metallic surface, control of the degree of translucency of the inks used in applying the design control of the degree of transparency or translucency of the first coat of material applied to the metallic bright surface; and finally, control of the degree of transparency or translucency of the finishing coating or coatings. As an example, the first coat applied over the metallic bright surface, is preferably translucent lacquer or varnish as herein defined. Ordinarily, after the application of the design, whether in opaque or translucent pigment material, the metallic character of the base surface is fully concealed, that is, cannot be identified upon inspection as metal, although still reflecting a considerable amount of light between the denser lines of the design, and sometimes through the most dense portions of the design. The design is an important element in this concealment of the actual true character of the base surface. The design so operates by clearly exposing only small areas of the underlying coated surface for inspection. In addition, as preferably practiced, using an etched intaglio photogravure pattern in a full or partial range of tones, substantially the entire decorated surface is toned to some extent.

The extent to which the solid coatings 15 and 25 or either of them is or are used in concealing the metallic character of the base surface is thus determined in part by the character of the design. For instance, both coatings 15 and 25 may be almost transparent and fairly thin if the grain lines are sufficiently close together all over the surface to preclude a clear view of the underlying metal over a substantial area.

In some cases the solid coating (15 and/or 25) alone is sufficient to conceal the true metallic character of the base surface.

Assuming now that the color effect of the design and the sheen effect is substantially that desired, a coating of clear, that is substantially transparent varnish or lacquer is placed over the design so that it interlocks both with the design and the uncovered portions of the sub-coating of translucent varnish or lacquer. If, on the other hand, the luster or sheen is still too pronounced, then additional so-called "clear" varnish or lacquer layers may be superimposed on the design and sub-coating to subdue the sheen, or the top coating may comprise a lacquer or varnish containing sufficient coloring matter so that a single normal coat of it is not transparent, but only translucent.

I have obtained very pleasing results on panels having, as a base, ordinary cold rolled steel of mill brightness,—that is, the degree of brightness which is imparted to sheet steel having what is known as a No. 3 stock finish. This brightness is dependent upon the number of passes of the stock through the rolls of the finishing mill. If a high sheen or iridescent effect is desirable, the sheet metal panel can be subjected to a slight polishing operation or a hard sand blast or a steel wooling operation or any practical surface brightening operation. I have

also obtained a striking combination in design effects by the use of tinned sheet metal and galvanized sheet metal, the latter having a mottled bright appearance, the flake formations varying from small granular appearance on some of the panels to large, fine or flaked appearance.

I have also found that an unexpected result is obtained by spraying the surface to be decorated with a metal spray or by first coating the surface with a dense flake mixture including as for instance bronze or aluminum flakes. The effect may be controlled by varying the density of the flake mixture, that is, by increasing or decreasing the amount and/or size of the flakes in the mixture.

The lacquer or varnish comprising the base color may be either transparent to the degree hereinbefore expressed or this transparency may be reduced to the degree of translucency by the use of suitable dyes or colors which are soluble in the lacquer or varnish; or, pigment may be mechanically mixed in the lacquer or varnish by using less than enough pigment to cause complete concealment of the surface being covered by this first coating. If desired, a certain amount of insoluble pigment, together with soluble dyes may be used in the varnish or lacquer, but the pigmentation or coloring in any event will depend upon the general optical appearance of the design which it is desired to produce.

The ink used is preferably of sufficient translucency to permit reflectivity upwardly there-through from the metallic bright surface and the ultimate degree of reflectivity can be controlled by the degree of transparency or translucency, as the case may be, of the top coating or coatings, thus permitting an increase or decrease in the sheen or iridescent effect during the last step of the process.

Should it become apparent that the desired degree of reflectivity has been obtained after the application of the first coat and the design pattern, then the top coating or finishing coat or coats can be transparent.

To avoid confusion or indefiniteness in the terms "transparency" and "translucency" as hereinbefore used, I define said terms as follows:

A transparent lacquer or varnish would include varnishes and laquers when no dye or coloring matter has been introduced, but there is some color present, due to the base materials used in the manufacture of the lacquer or varnish and also those lacquers and varnishes wherein soluble dyes have been introduced for color transparency purposes.

A translucent coating, as herein meant, comprises a lacquer or varnish, the natural transparency of which has been considerably reduced by mechanically mixing some pigment matters therein or some soluble dye matters or both, but the coating when applied to the metallic bright surface in practical thickness permits some light reflection to pass therethrough.

It is to be understood that the color controls will be dictated by the color combinations and tones thereof present in the original design which it is desired to produce coupled with the determination of the degree of reflectivity by controlling the degree of translucency of the respective coatings.

For the pattern or design coat, I prefer to use an ink or lacquer or varnish having a certain degree of translucency, such degree depending, to an extent, upon the amount and density of the ink used; hence the degree of translucency varies

throughout the pattern. This, added to the building up of the sheen effect, once such effect has been initiated, permits true reproductions of tonal values while at the same time obtaining the optical effect of iridescence or sheen in the appearance of the article thus decorated.

Despite the many complicated ways of grain-ing I find that my invention can be carried out in a very simple and inexpensive manner, and, in fact, while an improvement over past methods, the present invention may be carried out with less expense than many ordinary methods of reproduction which make no attempt to provide a sheen effect.

I claim:

1. The method of obtaining a decorative surface which comprises producing an iridescent effect by applying a design transfer of varying tonal depth to a metallicly bright surface, previously covered with a translucent coating to thereby produce varying degrees of brightness and then applying over said surface and design, and the tonal variations thereof a protective coating of material.

2. The method of producing decorative surfaces which comprises controlling the degree of light reflectivity of a uniformly metallicly bright surface, by applying a translucent bonding medium in the form of a lacquer or varnish coating to said surface, then using a translucent ink in obtaining an intaglio transfer design, and which varies throughout in transfer thickness, whereby a full range of translucent tonal variations are obtained, and controlling the general color effect of the entire surface being decorated, by incorporating sufficient coloring matter in said coating to subdue the light-reflecting characteristics of the metallicly brightened surface of the base material to a material degree.

3. The method of producing a sheen effect in the art of decorating surfaces, which comprises using a base material having a uniformly brightened light-reflecting surface, applying to the surface a coating of translucent colored varnish adapted to serve as a bond with an ink or pigment to be applied thereto in the form of an offset transfer design, and applying to such coating an offset transfer design which varies in pigment thickness from the light tones to the full or deep tones relative to said brightened metallic surface, then applying a protective coating of varnish or lacquer.

4. The method of obtaining a decorative surface, comprising separately applying an open design layer of varying tonal density and a translucent complete layer of lacquer or varnish, one over the other on a metallicly bright surface, and controlling the degree of reflectivity of said surface by controlling the degree of translucency of one of said layers.

5. The method of effecting a decorative treatment, comprising coating a metallicly bright surface with lacquer or varnish, applying an open design of varying tonal depth to said coating, then applying on top another layer of lacquer or varnish, and modifying the reflectivity of said surface by controlling the translucency of one of said coatings in a manner to substantially negative the metallic appearance of said bright surface.

6. An article of manufacture, having a continuously metallicly bright surface with a decorative design thereover, said design being of an open formation in simulation of the grain ap-

pearance of natural wood, marble or other natural material, a substantially transparent protective layer overlying said design, and means cooperating with the metallicly bright surface and design to conceal the metallic character of said surface while producing a varying iridescent luster or sheen generally throughout the decorated surface of the article.

7. The method of producing decorative surfaces which comprises controlling the degree of light reflectivity of a metallicly bright surface, by applying to said surface a substantially translucent bonding medium in the form of a translucent lacquer or varnish coating, applying to said coating a design of varying tonal densities relative to said metallicly bright surface, and controlling the general color effect of the entire surface being decorated, by incorporating sufficient coloring matter in said lacquer or varnish to subdue the light-reflecting characteristics of the metallicly bright surface.

8. The method of decorating surfaces which comprises using a base material having a substantially uniformly metallicly bright surface, applying to said surface a coating of lacquer or varnish, drying said coating, applying to said coating an offset transfer design, varying throughout in tonal densities, applying over the transfer design a finishing coating of lacquer or varnish, and controlling the general color effect of the entire surface being decorated, by incorporating in one of said coatings sufficient coloring matter to subdue the light-reflecting characteristics of the metallicly bright surfaces of the base material.

9. The method of decorating surfaces, which comprises using a base material having a wholly brightened, light-reflecting surface, applying over such surface an offset transfer design which varies in pigment thickness from light tones to full depth tones relative to said brightened surface, and also applying over the surface a complete coating of varnish or lacquer containing sufficient color material uniformly mixed therewith to modify the reflecting value of the brightened surface to an extent such that no metal appears to be present on or under any part of the decoration.

10. As an article of manufacture, a base having a light reflecting metallic surface, a translucent color material layer overlying the same, and an open contrasting design of varying opacity embedded in the said layer, said layer and the design cooperating to conceal the metallic surface to such extent that it is not identifiable by inspection through said layer and design as metallic although functioning to reflect light through said layer.

11. As an article of manufacture, a base having a bright metal surface which has thereover one or more layers of translucent varnish or lacquer containing sufficient color to substantially conceal the metallic character of the surface while permitting light to be reflected from said surface therethrough, and an open grain design of varying tonal density and having a color contrasting with the color of said layer as modified by the underlying metal surface reflection.

12. As an article of manufacture, a metal base having a bright surface and having thereover one or more layers of translucent coating material containing sufficient color to substantially conceal the metallic character of the surface while permitting light to be reflected from said surface therethrough, and an open grain design of

varying tonal density and having a color contrasting with the color of said layer as modified by the underlying metal surface reflection.

13. As a decorative article of manufacture, a base, the surface of which is of a material other than that to be simulated, a layer of color material overlying said surface of the base, and additional darker color material in open grain design form and of varying densities overlying said layer and contrasting with the underlying color material, and means imparting to the underlying color material, where fully exposed between the grain lines, a non-glittering uniformly lustrous appearance.

14. As a decorative article of manufacture simulating a natural grain surface, a base, the surface of which is of a material other than that to be simulated, a continuous layer of color material overlying said surface of the base, and additional color material in open design form and varying degrees of translucency overlying said layer and contrasting with the underlying color material, and means cooperating with the color material of said continuous layer to impart thereto the characteristic lustrous but non-glittering appearance of mother-of pearl.

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