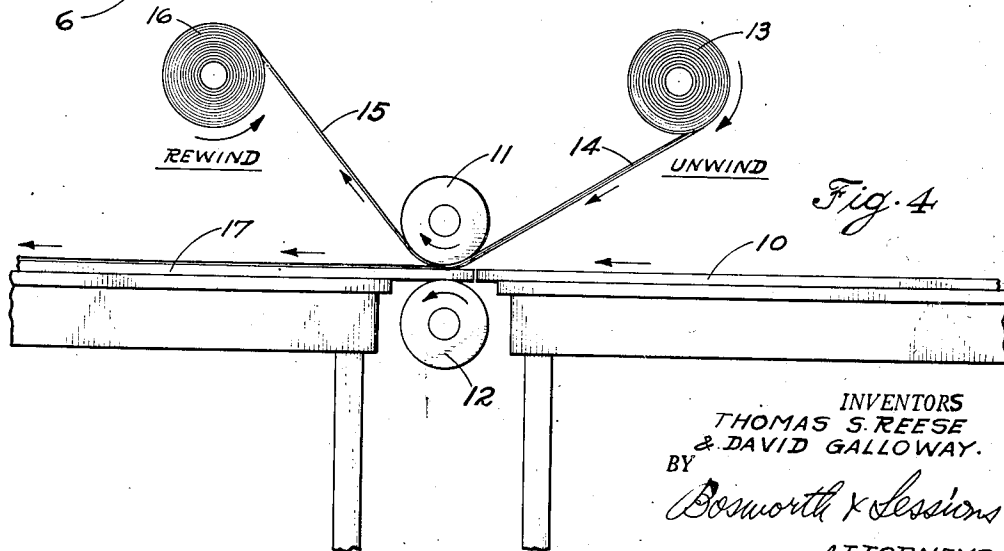
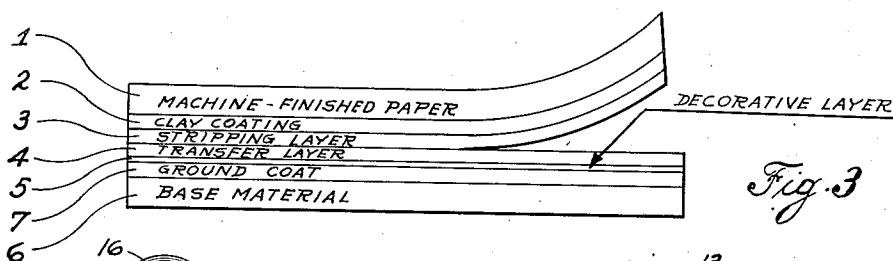
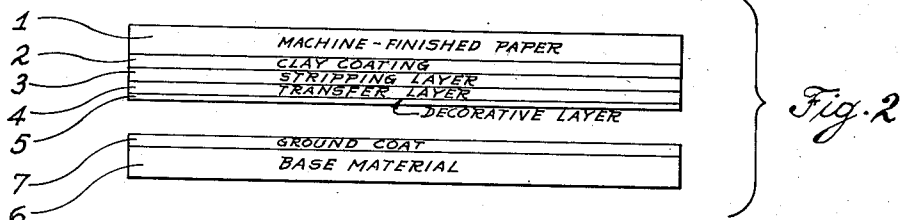
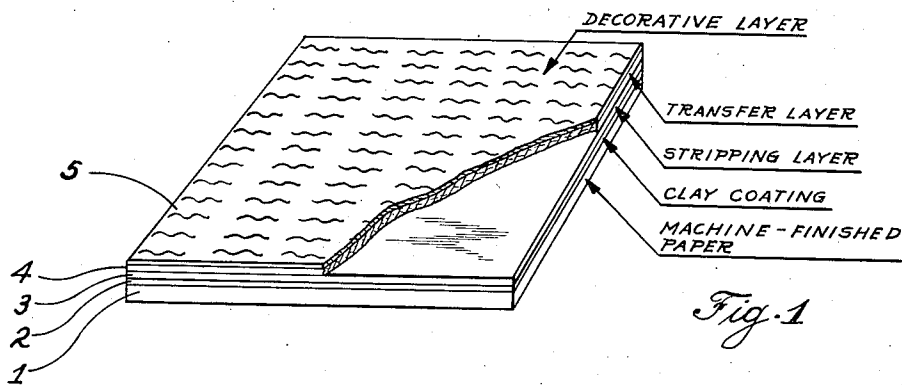


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 DRY STRIP TRANSFER, METHOD OF USING SAME, AND
 ARTICLE PRODUCED THEREBY
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This invention relates to a dry-stripping decorative transfer, to the method of making it, to the method of applying it, and to the product obtained by using it.

Heretofore, standard commercial practice in the manufacture and use of decorative transfers has required preparation of the transfer in a manner allowing the temporary supporting material, usually paper, to be soaked with water preparatory to its removal, itself a messy operation demanding the exercise of considerable care. Because the use of water for this purpose often tends to damage the base material to which the transfer is applied, it has frequently been necessary to trim off the edges of the base material after what is called the "transfer layer" has been consolidated with it and the paper removed. Decorative transfers of this kind are rather expensive to make, difficult to handle, and often subject to uncontrollable dimensional changes as a result of changes of temperature, humidity and other applicable factors.

In general, commercial practice in connection with the manufacture of such decorative transfers involves the use as a temporary carrier of a special non-sized paper known as "water leaf," which, for the reason that it is a paper for which there is only a limited demand, is more expensive than conventionally sized machine-finished papers. In practice, one side of the paper is coated with a layer of starch followed by various coatings of dextrin, after which the desired decoration is coated or printed on the dextrin coating. The transfer layer, which is applied to the decoration with or without a background color, is usually applied in the form of a nitrocellulose, ethyl cellulose or acetyl cellulose lacquer. The transfer as a whole is then brought into contact with the base material, which is prepared by applying to it a preliminary coat in which, if the transfer is not itself colored, may be incorporated the color that characterizes the finished product. Thereafter the paper is removed by wetting it and stripping it off, following which the assembly is baked or permitted to air-dry, depending on the materials employed.

In general, processes for making and applying transfers of this general type are disclosed in prior Patents 1,627,407, 1,924,961 and 1,982,927, all granted to Thomas S. Reese.

The present invention has for one of its principal objects to eliminate disadvantages which attach to the manufacture and use of transfers of the kinds described in the above-identified patents. Among other things, it contemplates the manufacture and use of a dry-stripping decorative transfer which, by virtue of the nature

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of the materials which make it up, is relatively free from dimensional instability, excessive sensitivity to humidity, and the common tendency to shrink and cause the paper to curl. To this end, the invention makes use of two more or less incompatible resinous layers, one of them being laid down on the other, between which the separation is effected when the dry-stripping operation is performed.

Other objects and advantages of the invention will be apparent from the following description and from the accompanying sheet of drawings, in which Figure 1 shows in diagrammatic fashion a transfer made up in accordance with the present invention; Figure 2 shows in schematic fashion how the transfer is applied to a base material; Figure 3 shows in like schematic fashion the manner in which the paper is detached, the same being intended to illustrate the operation of dry-stripping; and Figure 4 shows a method and means for applying the transfer and removing the paper in a commercial operation, the showing in Figure 4, like that of Figure 1, being diagrammatic.

According to the invention, in lieu of unsized paper such as "water leaf," there is employed for the temporary carrier a sized machine-finished paper, usually a paper made by one of the ordinary mechanical or chemical pulping processes, containing a small amount of a conventional size of casein, rosin or the like that is added to the pulp to give the paper strength and dimensional stability under varying conditions of humidity. Preferred for the purposes of the present invention is a smooth-surfaced calendered paper having a stretch of about 1% as measured by a Mullin tester, a breaking strength of about 20 lbs. per square inch, and a thickness of about 0.004 inch. Preferably, but not necessarily, such paper is finish-coated on one or both sides with finely divided kaolin (china clay), whiting or the like.

Papers so finished are available on the market and, as a rule, it is therefore not necessary for the manufacturer of the transfer to apply a finishing coat to the paper; indeed, if it is not present, he may, if desired, do without it.

To paper of this kind, with or without the finishing coat, what may be called a stripping layer is applied by laminating, knife-spreading, roll-coating, reverse roll-coating, brushing or spraying so as to provide or form a thin coat, preferably from about 0.0005 to about 0.0010 inch in thickness when dry, of a resinous film-forming material taking the form of a vinyl halide polymer. The latter preferably consists of a polymer of vinyl chloride or a co-polymer of vinyl chloride and vinyl acetate. If desired, the film-form-

ing material may include amorphous silica or some other siliceous or non-siliceous abrasive to the extent of about 3% to 10%, based on the resin, to provide a flattening effect and enhanced adhesiveness. The film-forming material may be applied in the form of a calendered sheet, in the form of a stiff emulsion, or in the form of a free-flowing suspension or solution.

An organosol is an example of a composition that may be used for the layer of resinous film-forming material. It may consist of a resin, a plasticizer and one or more solvents, which in a typical case may be present in these proportions: as resin, polymerized vinyl chloride (solids), 65%; as plasticizer, dioctyl phthalate, 52% of resin content; and as solvents, methyl ethyl ketone or the like diluted with toluol, xylol or a petroleum fraction, 35% of resin content. Before application, which may be at room temperatures, the organosol has a fusion temperature of about 350° F. (3 minutes). Compositions of this general type are made and sold by various manufacturers. Among the available organosols are Ultrasol L-6763 and Ultrasol L-6848, made by Monsanto Chemical Co. (Plastics Division). The former, which has a viscosity of 2600 centipoises, is preferred for the purposes of the invention.

Another example of a coating composition suitable for these purposes makes use of the copolymer of vinyl chloride and vinyl acetate made by Bakelite Corporation and sold under the trademark Vinyl Resin VYHH. The latter, which takes the form of a white powder, consists by weight of about 87% vinyl chloride and about 13% vinyl acetate. In formulating the coating composition, 62 pounds of the powder are mixed with 94.5 pounds of acetone, 63 pounds of methyl isobutyl ketone and 157.5 pounds of toluol to yield approximately 51 gallons of a composition which has a solids content of 16.6% by weight. It has a viscosity by the Ford cup method of 23 seconds at 72° F. and can be applied at ordinary room temperatures.

Still a third example involves calendering or otherwise laminating a film of a vinyl chloride polymer or copolymer having a thickness of about 0.0005 inch to paper of the desired characteristics; e. g., uncoated machine-finished paper, to provide a stripping layer on one side thereof.

Whether the stripping layer be of one of the above-described formulations or of some other formulation, it is usually desirable to allow the film so applied to harden before proceeding further. To this end, the coated product may be run through a drying tunnel through which is passed a current of air at an elevated temperature. Thereafter the product may be passed in known fashion over drums to cool and wind it.

After the stripping layer has hardened, by which time it should have become so tenaciously attached to the paper or to the finishing coat on the paper that for practical purposes it is inseparable from it, the next step is to lay down on the stripping layer a colored or uncolored layer of resinous film-forming material of such nature that the layer is largely incompatible with the previously applied stripping layer. The incompatibility may be varied as desired within rather broad limits but should not extend so far that the second layer of film-forming material will not adhere satisfactorily to the first layer; rather, there should be enough adherence to permit the transfer as a whole to be handled as a unit but not so much as to preclude easy separation and removal of the paper and the associated

stripping layer. The second layer, by contrast with the first, is separable from the paper and constitutes the transfer layer.

The thickness of the transfer layer must be sufficiently to cover the stripping layer adequately and may vary between about 0.0003 and about 0.0010 inch after elimination of the solvents.

By way of example of a coating composition that may be applied at ordinary room temperatures to form the transfer layer, one may knife-spread, brush, spray or roll-coat onto the stripping layer a nitrocellulose lacquer such as the following:

Ingredients	Parts by weight
Nitrocellulose, RS-1/2° (falling ball method)	15.00
Blown Castor Oil	7.50
Dibutyl Phthalate	3.50
Ethyl Acetate	14.00
Butyl Acetate	7.50
Butyl Alcohol	3.75
Ethyl Alcohol	3.75
Toluol	45.00
Total	100.00

Similarly, as indicated in the following formulation, it is possible to use a coating composition in which the solid residue consists largely of cellulose acetate:

Ingredients	Parts by weight
Cellulose Acetate, 3 to 4 seconds viscosity (falling ball method)	20.00
Santicizer M-17 (Methyl phthalyl ethyl glycolate)	10.00
Santicizer #8 (Mixture of ortho and para N-ethyl toluene sulfonamides)	3.00
Acetone	16.00
Methyl Ethyl Ketone	37.00
Methyl Cellulosolve Acetate	7.00
Ethyl Lactate	7.00
Total	100.00

Such composition likewise may be applied at ordinary room temperatures.

Cellulose ethers may be employed in lieu of cellulose esters as indicated by the following formulation, in which ethyl cellulose is similarly used and applied:

Ingredients	Parts by weight
Ethyl Cellulose, 3 to 5 seconds viscosity (falling ball method)	20.00
Raw Castor Oil	2.50
Butyl Alcohol	8.00
Ethyl Alcohol (denatured)	15.50
Toluol	54.00
Total	100.00

Lacquers containing polyvinyl acetals may likewise be used, as indicated by the following formulation based on polyvinyl formal:

Ingredients	Parts by weight
Polyvinyl Formal ¹	15.00
Butanol	5.00
Ethyl Alcohol (denatured)	25.00
Toluol	55.00
Dibutyl Phthalate	2.50

¹The polyvinyl formal should be one of low viscosity and low hydroxyl content; i. e., the hydroxyl content (as polyvinyl alcohol) should be from 5 to 7%.

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A formulation in which polyvinyl butyral is used for these purposes is the following:

Ingredients	Parts by weight
Polyvinyl Butyral ¹	4.00
Ethyl Alcohol (denatured).....	22.00
Butyl Alcohol.....	7.00
Toluol.....	15.00

¹ The polyvinyl butyral should be of the high-viscosity type; i. e., 140 to 200 centipoises (7½% solution in methanol at 20° C.)

As a rule, the various polyvinyl acetal lacquers may be applied to advantage at ordinary room temperatures; e. g., 72° F.

As will be observed from the five preceding formulations, all of these coating compositions contain large amounts of volatile solvents to be eliminated. This is best done at somewhat elevated temperatures, particularly under circumstances in which the recovery of the solvents is contemplated. A process of hardening similar to that described above in the case of the coating composition used to form the stripping layer may be employed for the purpose.

Once the transfer layer has been allowed to harden, it is possible to imprint on the transfer layer so as to form a decorative layer, preferably by using a medium compatible with the materials of which the transfer layer is formed. By imprinting, reference is had to the production of a continuous or discontinuous design, as by means of an appropriate plate or roller, with or without the use of ink. The decorative feature that is to form part of the transfer as a whole is usually formed in or on the transfer layer but may in some cases be formed in or on the stripping layer in such manner that it will adhere to and remain on the transfer layer when the separation of the two layers is accomplished.

When lacquers of the types described above are employed for forming the transfer layer, a lacquer-like ink may be used for printing. By way of example, such ink may have the following formulation:

Ingredients	Parts by weight
Carbon Black.....	3.00
Nitrocellulose, 30 to 35 centipoises.....	10.00
Dibutyl Phthalate.....	4.00
Ethyl Acetate.....	3.75
Butyl Acetate.....	9.50
Butyl Alcohol.....	3.75
Toluol.....	21.00

(NOTE: The above ingredients are ground together in a ball mill.)

If, as is contemplated, the ink is to be employed at a temperature of about 72° F., a very thin film, not more than .0001 inch in thickness, should be applied to the transfer layer.

It is also practicable to interchange the materials used for the stripping and transfer layers, using the lacquer coating as the stripping layer laid down on the paper or on the finishing coat on the paper. Any of the formulations given above for the lacquer will serve the purpose, giving rise to in such case what has been referred to as the inseparable layer of resinous film-forming material. In such case, the transfer layer; that is to say, the separable layer of resinous film-forming material, will take the form of one of the compositions mentioned above as formu-

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lated on the basis of a vinyl halide polymer, a copolymer of a vinyl halide and vinyl acetate, or a material of similar physical characteristics and chemical properties that is incompatible with the residue of the previously applied lacquer.

In the latter case the decorative layer should of course be compatible with the vinyl halide polymer or copolymer. It may be compounded as indicated in the following formulation:

Ingredients	Parts by weight
Carbon Black.....	3.00
Vinyl Resin VYHH.....	10.00
Diethyl Phthalate.....	3.50
Methyl Ethyl Ketone.....	17.50
Methyl Isobutyl Ketone.....	17.50
Toluol.....	15.00

(NOTE: The above ingredients are ground in a pebble mill.)

Although factory practice does not always require it, a colored or uncolored ("clear") surface coating of the same family of materials may be applied to the exposed face of the transfer to obviate damage to the decorative layer during storage.

In practice, the transfer is applied to a base material which has been prepared by applying to it a clear or colored preliminary coat, hereinafter referred to as a ground coat, that is similar to or at least compatible with the material of the surface layer of the transfer. The ground coat may advantageously incorporate the colorant, if any, used to impart the desired color to the final product; however, if the transfer itself carries the colorant, the ground coat will ordinarily be uncolored. The ground coat may conveniently take the form of a tacky liquid similar to those disclosed in prior Patent 1,924,961. In such case, it will include, along with one or more solid constituents, a substance susceptible of removal at somewhat elevated temperatures; for example, a relatively high-boiling organic solvent such as "Butyl Cellosolve" (butyl ether of ethylene glycol).

The base material is preferably a rigid or relatively rigid material of any one of the wide variety of substances available for this purpose, including metal, glass, wood, hard board, paper board, or the like.

A suitable formulation for application to a base material to form a ground coat of the tacky type is as follows:

Ingredients	Parts by weight
Titanium Dioxide.....	45.00
Alkyd Resin ¹	58.00
Xylol.....	60.00
Naphtha (Varnish Makers' and Painters' Naphtha).....	20.00
Butyl Carbitol (Diethylene glycol monobutyl ether).....	1.75

¹ Dehydrated castor-oil type of medium oil length.

As an alternative, it is possible to apply to the base material a ground coat of the nature of a nitrocellulose lacquer or some suitable similar composition that will dry by evaporation at room temperatures, following it when dry by a welding solution that will have a softening or solvent action on, but will not too strongly attack, both the ground coat and the surface layer or layers of the transfer that is to be applied to it. If the exposed layer of the transfer is one containing a

vinyl polymer such as vinyl chloride, a vinyl copolymer such as vinyl chloride-vinyl acetate, or a vinyl acetal such as vinyl formal, vinyl butyral or the like, the welding solution may advantageously be formulated to include Butyl Cello-
 solve, Ethyl Cellosolve or even Methyl Cellosolve; if, on the other hand, the exposed layer is of the nature of a nitrocellulose lacquer residue, the welding solution may advantageously be a mixture of equal parts of ethyl lactate and diacetone alcohol diluted with water.

The welding solution may be clear or colored, the former if the colorant is in the ground coat or carried by the transfer and the latter if neither one incorporates a suitable colorant.

The following is an example of a welding solution suitable for use in the case of vinyl compounds:

Ingredients	Parts by weight
Methyl Cellosolve Acetate (Ethylene glycol monomethyl ether acetate).....	1.00
Butyl Cellosolve.....	1.00
Water.....	2.00

Where a nitrocellulose or like lacquer is employed in forming the exposed layer of the transfer, the following is a suitable formulation for the welding solution:

Ingredients	Parts by weight
Diacetone Alcohol.....	1.00
Ethyl Lactate.....	1.00
Water.....	4.00

If desired, rather than apply the welding solution to the base material, it is possible to apply the welding solution, colored or uncolored, to the exposed layer of the transfer.

The transfer is preferably applied intact to the base material, the side of the transfer revealing the decorative layer being brought into contact with the coating on the base material. This may be done by feeding the base material from one source and the transfer from a separate source to a common pressure zone where, using cooperating rolls, a pressure of about 500 pounds per square inch may be employed to apply the transfer to the base material. The effect of applying a pressure of this order of magnitude is to consolidate the ground coat, the decorative layer and the stripping layer, forming a composite which at this stage intervenes between the base material and the paper comprising the temporary carrier for the transfer.

In this condition, the bond between the stripping layer applied to the paper and the transfer layer that forms part of the composite remains as before a weak bond permitting ready removal of the paper and the associated inseparable layer of resinous film-forming materials; i. e., the stripping layer. However, the step of stripping off the paper and the associated inseparable layer of resinous film-forming materials should not be attempted until the whole has been subjected to the action of mild heat or permitted to stand for a sufficient length of time to bring about elimination of any excess solvent by slow evaporation at room temperatures. Thereafter, the paper and the stripping layer may be removed by dry-stripping with a modicum of force applied to one corner of the paper by the fingers

or with the aid of machinery designed for the purpose.

After the paper has been stripped therefrom, the exposed transfer layer may, if desired, be spray-coated with a layer of clear lacquer or varnish to furnish a protective layer.

These operations are illustrated in the accompanying drawings. Figures 1 and 2 show a decorative transfer made up of a relatively thick layer 1 of machine-finished paper, a thin clay coating 2 applied to one face thereof, a thin stripping layer 3, a transfer layer 4, likewise thin as compared to the layer of paper, and a very thin decorative layer 5, which may or may not be continuous in and of itself but which is ordinarily co-extensive with transfer layer 4. As indicated in Figure 2, the decorative transfer shown in Figure 1 is applied, with the paper side up, to a relatively thick base material 6 having thereon a ground coat 7. After the application of pressure to form the composite which at this stage intervenes between paper layer 1 and base material 6, paper layer 1, together with stripping layer 3 and the intervening clay coat 2, is removed by pulling it away from the transfer layer, which may be done by grasping the paper layer 1 at one corner and continuing to pull it uniformly away from the transfer layer 4.

The step of removing paper layer 1, together with clay coat 2 and stripping layer 3, need not follow immediately after application of the transfer to the base material; as a matter of fact, the base material with the decorative transfer applied and the paper layer still in place and intact may be routed, sawed or similarly worked before stripping is undertaken. The base material with the paper layer in place and intact may be shipped in that form, the paper layer 1 and the associated clay coat 2 and stripping layer 3 being removed by the consignee. The paper layer thus protects the decorative finish and prevents damage during fabricating operations. Alternatively, paper layer 1, clay coat 2 and the associated inseparable layer of resinous film-forming material comprising stripping layer 3 may be removed as soon as the solvent has been eliminated from the ground coat, after which the spray coat of clear lacquer or varnish may be applied, if desired, and the product made ready for use.

In factory practice it is convenient to feed the base material, prepared as described above, in the form of panels 10 to a pressure zone such as that afforded by two co-acting rollers 11 and 12 rotating in opposite directions, the panels following one another through the rollers with substantially no intervening spaces. Simultaneously there is fed to the pressure zone from a separate source such as a roller 13 a continuous web 14 which is made up of a decorative transfer of the type shown in greater detail in Figure 1. As the panels 10 and web 14 move into the pressure zone, they are united by the action of rollers 11 and 12, which are preferably interiorly heated to drive off the solvents, after which the paper layer and the associated inseparable layer of resinous film-forming material, designated 15 in Figure 4, is picked up in the form of a roll 16 or other compact mass lending itself to re-use. The panel to which the decoration has been applied in the manner described, designated 17, moves away from the pressure zone to be spray-coated with clear lacquer or varnish, allowed to dry, and used or stored.

By following the practices described above,

there is obtained a decorative transfer that is characterized by a high degree of dimensional stability, a high degree of resistance to the effects of heat, humidity and other atmospheric factors, and a capacity for easy application to a base material. When the transfer as a whole is once applied to the base material, the paper or other substance forming the temporary carrier may be readily separated and removed by a dry-stripping operation, this by virtue of the incompatibility between the separable and inseparable layers of resinous film-forming materials. The stripping operation may be carried out immediately or after the paper has been used to protect the finish during subsequent handling and fabricating operations. The need for applying water to soak the paper and the consequent damage to the base material are obviated, as is also the need for trimming the edges of the base material after application of the transfer and removal of the paper or other temporary carrier.

It is obvious that the foregoing disclosure is by way of example only and that numerous changes may be made within the purview of the invention. In lieu of employing machine-finished paper, it is possible to use a more expensive paper, although machine-finished paper, even if clay-coated, offers important economic advantages. As has been indicated, the compositions used for the stripping layer and transfer layer may be varied within wide limits. The base material may take any one of the forms previously mentioned or any one of various other conventional forms which usually, but not necessarily, are relatively thick as compared with the thickness of the composite formed as described by applying the transfer to the base material.

It is intended that the patent shall cover, by summarization in the appended claims, whatever features of patentable novelty reside in the invention.

What is claimed is:

1. A transfer process comprising the steps of preparing a transfer by coating paper with an inseparable layer of resinous film-forming material, laying down on such inseparable layer a separable layer of resinous film-forming material that is incompatible with the inseparable layer, and imprinting a decoration on the separable layer; applying the transfer so prepared to a base material having a ground coat thereon, the transfer being so applied to the base material that the decoration on the transfer faces the ground coat on the base material; subjecting the assembly to temperature-pressure conditions conducive to consolidation of the ground coat on the base material and the separable layer on the transfer; and thereafter removing the paper and attached inseparable layer of resinous film-forming material by a dry-stripping operation that leaves on the base material the decoration and the separable layer of resinous film-forming material, the latter forming a covering for the decoration.

2. A process as in claim 1 in which the paper is machine-finished paper.

3. A process as in claim 1 in which the paper has a finishing coat on the side to which the inseparable layer is applied.

4. A process as in claim 1 in which the step of imprinting the decoration on the separable layer is done with an ink compatible with the material of which the separable layer is composed.

5. A process as in claim 1 in which the step of removing the paper and the attached inseparable layer of resinous film-forming material is

followed by a step of spraying a protective coating onto the separable layer of resinous film-forming material.

6. A method of making a dry-stripping transfer comprising the steps of applying to a machine-finished paper a first resinous film-forming material, said film-forming material being one that adheres tenaciously to the paper; laying down thereon a second resinous film-forming material, said second film-forming material being largely incompatible with said first film-forming material; and thereafter producing a design in said second film-forming material by a separate imprinting operation.

7. A method as in claim 6 in which one of the two film-forming materials is a vinyl chloride polymer.

8. A method as in claim 7 in which the film-forming material is a copolymer of vinyl chloride and vinyl acetate.

9. A method as in claim 8 in which the other of the two film-forming materials takes the form of a lacquer residue containing a substance selected from the group consisting of the cellulose esters, the cellulose ethers and the polyvinyl acetals.

10. A method as in claim 9 in which the design is imprinted with the aid of an ink containing a resin compatible with the film-forming material in which the design is produced.

11. A transfer comprising a temporary paper carrier, an inseparable layer of resinous film-forming material on the temporary paper carrier, a separable layer of resinous film-forming material laid down on the inseparable layer, and a decorative imprint on the outside face of the separable layer.

12. A transfer as in claim 11 in which one of the two layers of resinous film-forming material is a vinyl halide polymer.

13. A transfer as in claim 12 in which the film-forming material is a copolymer of vinyl acetate and a vinyl halide.

14. A transfer as in claim 13 in which the other of the two layers of film-forming material is a lacquer residue containing a substance selected from the group consisting of the cellulose esters, the cellulose ethers and the polyvinyl acetals.

15. An article of manufacture comprising a base material; a paper surfacing material overlying the base material, said paper surfacing material having a resinous film-forming material inseparable attached thereto on the side thereof facing the base material; and, intervening between the base material and the paper surfacing material, a composite made up of a layer of a resinous film-forming material different from the resinous film-forming material attached to the paper surfacing material, an intermediate decorative layer, and a ground coat on the base material, said paper surfacing material and inseparably attached film-forming material being detachable together from the composite and the underlying base material.

16. An article of manufacture as in claim 15 in which the paper surfacing material is a machine-finished paper.

17. An article of manufacture as in claim 15 in which the resinous film-forming materials comprising the separably and inseparably attached layers are mutually incompatible.

18. An article of manufacture as in claim 15 in which the base material takes the form of

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a rigid sheet of substantially greater thickness than the overlying layers.

19. A transfer comprising a temporary paper carrier, an inseparable layer of film-forming material on the temporary paper carrier, a separable layer of film-forming material laid down on the inseparable layer, a decorative imprint carried by the separable layers on the side thereof adjoining the exposed face of the transfer, and, on the exposed face of the transfer, a surface layer containing a colorant.

20. A transfer process comprising the steps of continuously feeding a base material from a source to a pressure zone, the base material having a ground coat thereon; continuously feeding to the same pressure zone from a separate source a transfer comprising a temporary carrier, an inseparable layer of resinous film-forming material, a separable layer of resinous film-forming material laid down on the inseparable layer, and a decoration on the separable layer; applying the transfer to the base material in the pressure zone in such manner as to consolidate the ground coat, the decoration, and the separable

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layer of resinous film-forming material; dry-stripping therefrom the temporary carrier and the inseparable layer of resinous film-forming material, meanwhile collecting the same in compact form; and applying a finishing coat of protective material to the composite on the base material.

THOMAS S. REESE.

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