

Nov. 27, 1951

J. ULANO

2,576,491

COMPOSITE SHEET MATERIAL

Filed May 21, 1948

FIG. 1

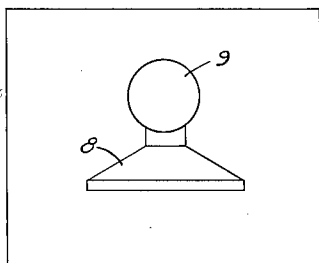


FIG. 2

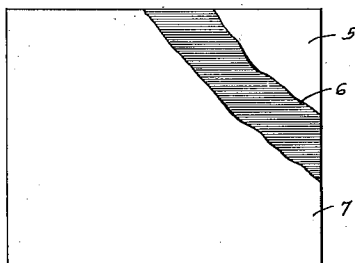


FIG. 3

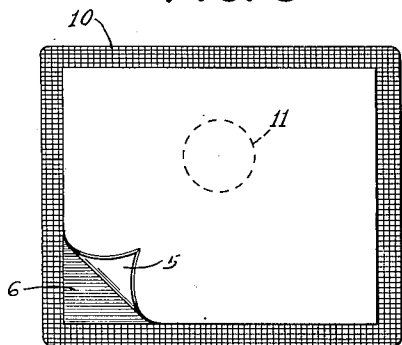


FIG. 4

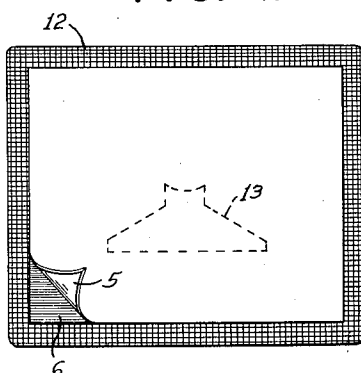


FIG. 5



INVENTOR

Joseph Ulano

BY

Dennis Edwards, Norton and Bassora
ATTORNEYS

UNITED STATES PATENT OFFICE

2,576,491

COMPOSITE SHEET MATERIAL

Joseph Ulano, Brooklyn, N. Y.

Application May 21, 1948, Serial No. 28,457

4 Claims. (Cl. 101—128.2)

1

This invention relates to composite sheet material adapted especially for use in processes in which a pattern is produced by cutting outlines of and removing a portion of the material.

One such process is known as silk screen printing, in which the pattern is transferred to fabrics and the like by the application of a pigmented vehicle through a silk screen to which the cut-out sheet material has been applied to form a kind of stencil. The pigmented vehicle, passing only through that portion of the screen which is not covered by the material, forms a pattern on the fabric corresponding to the cutaway portion of the material. Another process is photographic, the image or pattern being transferred by the passage of light through the cutaway portion onto a photo-sensitive surface.

Heretofore, sheet material available for such uses has consisted of a sheet of glassine or waxed paper (see Patent No. 1,781,834) as a backing having a layer of rubber composition and a superposed layer or film of nitrocellulose lacquer. This may be produced by spraying or roll coating a solution of the rubber composition on the paper and similarly applying a solution of nitrocellulose lacquer upon the rubber coating.

In use, the composite sheet is placed over the design which is to be reproduced and the nitrocellulose film is cut with a sharp instrument in the outline of the design. The cut-out portion of the nitrocellulose film is stripped, leaving the remainder of the nitrocellulose film intact. The nitrocellulose film is then adhesively secured to a textile fabric, preferably silk, screen. Thereafter the paper backing is stripped and discarded.

A difficulty arises, however, because the paper is highly susceptible to changes of relative humidity. It expands and contracts as much as three-eighths of an inch in all directions in the sizes ordinarily used for the purpose. Hence, if the cutting is started and thereafter, before completion, the relative humidity changes, the design will be distorted. Even if the cutting is completed, the changes in dimension of the paper backing may distort the design before it is transferred to the silk screen. Where more than one color is to be used, two or more screens must be prepared, and distortion interferes with proper registry of the colors when the design is finally transferred to the fabric. Hence the paper backing as heretofore used is far from satisfactory, and sometimes unusable when relatively large designs are to be transferred.

It is the object of the present invention to provide a composite sheet material which is free from the difficulties and disadvantages hereinbe-

2

fore mentioned, and particularly one which is not susceptible to changes in dimensions as the result of variation of relative humidity.

Other objects and advantages of the invention will be apparent as it is better understood by reference to the drawing, in which

Fig. 1 illustrates a design to be transferred, part of the design being red, for example, and the other green, for example. Of course, particular colors employed have no relation to the present invention, since any colors may be used.

Fig. 2 is a plan view of the sheet material with portions cut away to indicate the successive layers;

Fig. 3 is a plan view showing the application of the composite sheet to the silk screen with a part of the design cut out;

Fig. 4 is a similar view showing the silk screen with the composite sheet applied thereto, and with the other portion of the design cut out; and

Fig. 5 is a side elevation of the composite sheet.

I have discovered that a very superior composite sheet material for the purposes mentioned and similar purposes may be prepared from a sheet consisting of copolymers of a vinyl halide such as vinyl chloride and a vinyl ester of an aliphatic acid such as vinyl acetate. Such sheet material is available as a commercial product. It is a thin sheet having an average thickness of .005 inch, flexible, transparent or translucent and of uniform quality. It is not susceptible to variations of relative humidity and does not expand or contract under such variations. It is not affected by solvents such as are used in preparing a composite sheet. Hence it is particularly suited, as distinguished from other plastic sheet material, for the purposes of the present invention.

As the backing sheet, I prefer a vinyl resin resulting from conjoint polymerization (by which is meant polymerization of two or more compounds while in mutual contact) of a vinyl halide such as vinyl chloride and an oxygen-containing vinyl compound such as the vinyl esters of aliphatic acids, of which esters vinyl acetate is typical. The proportions of these substances in the original monomeric mixture may be varied. I prefer a mixture containing 70 parts of vinyl chloride to 30 parts of vinyl acetate, but mixtures containing from 70 to 95 parts of vinyl chloride to 5 parts of vinyl acetate are generally suitable for the purpose. The sheet material may be prepared from the pure resin by calendering between hot rolls, or between heated, polished plates. As indicated, such vinyl resins are not affected by moisture in the atmosphere and do not, therefore,

expand and contract as the result of variations in relative humidity.

Referring to the drawing, 5 indicates a sheet of vinyl resin of the character described. To this sheet I apply, by roll coating, spraying or otherwise, a thin layer of a strippable adhesive such as rubber cement reduced with naphtha. The volatilization of the solvent leaves a coating of rubber which serves two purposes. It prevents solvents of the nitrocellulose lacquer from softening the resin. It also aids the peeling of the nitrocellulose film in the subsequent application of the sheet material.

Upon the rubber coating, I apply, by spraying, roll coating or otherwise, a layer or film 7 of nitrocellulose. The composition employed may be varied, but I prefer to use one-half second and five seconds nitrocotton with pure castor oil as a plasticizer in a solvent consisting of a mixture of ethyl acetate, ethyl alcohol and petrole. The viscosity of the solution of nitrocellulose should be such as to permit the application in the manner indicated of a film about two-thousandths of an inch in thickness. When the film is dried by evaporation of the solvent, the composite sheet is complete and ready for use.

In its application, a design consisting for example of the green portion 8 and the red portion 9 is formed on a suitable sheet. The composite sheet is laid thereover, and the part to be reproduced in red is cut away as indicated in Fig. 3. The sheet is then laid on the screen 10 with the nitrocellulose film resting upon the fabric of the screen. A suitable softener for the nitrocellulose film may be applied and the sheet rolled until adequate adhesion results. Thereupon the backing sheet 5 is stripped, and the screen appears with the cutaway portion 11 so that the pigmented vehicle may be applied to transfer the design to fabrics and the like.

Similarly, as shown in Fig. 4, the green portion 8 of the design as shown in Fig. 1 is traced with a sharp instrument, and the nitrocellulose film within the design is removed. Thereupon the sheet is reversed and placed upon the screen 12, and the nitrocellulose film is caused to adhere thereto in the manner previously indicated. Thereupon the backing sheet 5 is stripped, leaving the screen 12 covered by the cellulose nitrate film, with the cutout design 13 thereon. By using the two screens successively with suitable pigmented vehicles, the design of Fig. 1 can be transferred to fabric and the like and, because the base material 5 has not been modified in dimensions, perfect registry between the colors will be maintained. Of course, this is more important with complicated designs which are frequently transferred, in the manner indicated, to fabrics.

No claim is made herein to the process of transferring designs, since that process has been in common use for many years. The invention

depends upon the use of the vinyl resin sheet material to avoid the defects which exist in paper backings heretofore employed in the manufacture of composite sheets for the purpose described.

Various changes may be made in the composite sheet as described without departing from the invention or sacrificing the advantages thereof.

I claim:

1. A composite sheet for use in forming silk screen stencils including a backing sheet of vinyl resin comprising a copolymer of a vinyl halide and a vinyl ester of an aliphatic acid, said backing sheet having an average thickness of about 0.005 inch and being dimensional stable in the presence of moisture, a cuttable stencil film, and a thin layer of strippable adhesive firmly securing the stencil film to the backing sheet.

2. A composite sheet as set forth in claim 1 in which the backing sheet comprises a copolymer of vinyl chloride and vinyl acetate.

3. A composite sheet as set forth in claim 2 in which the backing sheet comprises from 70% to 95% of vinyl chloride and 30% to 5% of vinyl acetate.

4. A composite sheet as set forth in claim 3 in which the adhesive is one having a rubber base and the stencil film is nitrocellulose.

JOSEPH ULANO.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,627,935	Stinchfield	May 10, 1927
1,781,834	D'Autremont	Nov. 18, 1930
1,829,618	Studer	Oct. 27, 1931
2,028,712	Swan	Jan. 21, 1936
2,028,936	Kratz et al.	Jan. 28, 1936
2,030,731	Young	Feb. 11, 1936
2,038,118	McLaurin	Apr. 21, 1936
2,047,957	Fletcher	July 21, 1936
2,099,154	Waters	Nov. 16, 1937
2,234,064	Ulano et al.	Mar. 4, 1941
2,240,773	Hannon	May 6, 1941
2,281,909	Barsky	May 5, 1942
2,302,817	Toland	Nov. 24, 1942
2,311,889	Toland	Feb. 23, 1943
2,312,623	Brooks et al.	Mar. 2, 1943
2,354,574	Carson	July 25, 1944
2,366,083	Box et al.	Dec. 26, 1944
2,414,320	Miller	Jan. 14, 1947

FOREIGN PATENTS

Number	Country	Date
357,204	Great Britain	of 1931

OTHER REFERENCES

"Vinylite Resins for Surface Coatings," published by Bakelite Corp. (1942). (Copy in Div. 67.)