Oct. 31, 1961 H. S. BRICKELL 3,006,795

DECALCOMANIA AND PROCESS OF MAKING SAME

Filed Aug. 22, 1956

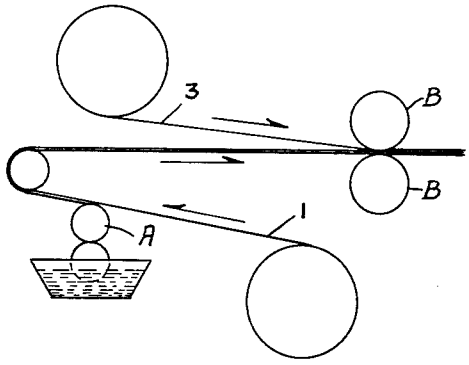

Fig. 1.

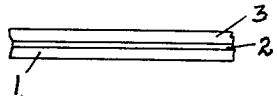

Fig. 2.

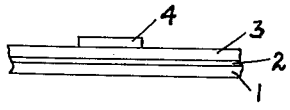

Fig. 3.

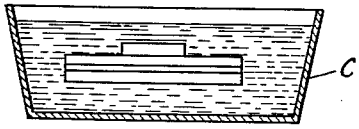

Fig. 4.

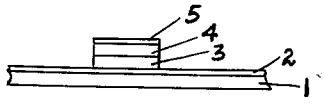

Fig. 6.

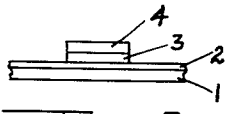

Fig. 5.

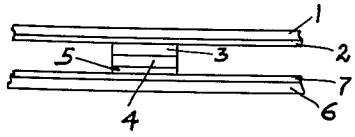

Fig. 7.

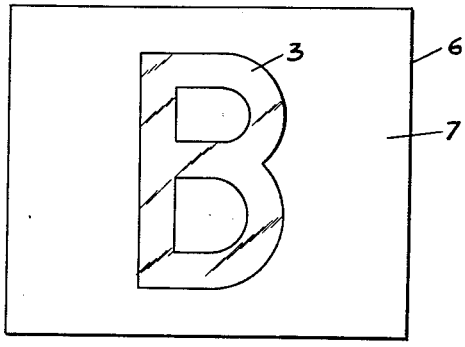

Fig. 8.

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3,006,795
DECALCOMANIA AND PROCESS OF MAKING SAME

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2 Claims. (Cl. 156—3)

This invention is for an improvement in transfer patterns of the type commonly referred to as decalcomania and which are generally used for advertising or ornamentation but which, according to the present invention, may also have other utility, as for example printed electrical circuits or other uses requiring metal foil patterns, and relates to a new transfer print of this character and a method of making the same.

Transfer prints or decalcomania usually comprise a supporting base of paper over which is a film of gum or glue, usually a water-softenable film, such as dextrine. This coat accepts the printing which is subsequently applied. When the decal is wet, the glue releases the printed design from the paper so that it may be slipped onto the permanent base where it is to be displayed. The water-softenable film then constitutes a transfer adhesive which secures the printing to the permanent base, or other adhesive may be used between the dextrine and the printing.

The principal object of the present invention is to provide a decalcomania in which the pattern is comprised of a sheet material such as metal foil or plastic films whereby ornamental effects of unusual quality can be secured, and by using foil the pattern may comprise ornamentation or an electrical circuit. My invention further provides a novel method of making such a transfer pattern.

These and other objects and advantages are secured by my invention which may be more fully understood by reference to the accompanying drawings, in which:

FIG. 1 is a schematic view of the first step in the preparation of the decal;

FIG. 2 is an enlarged schematic view of the three-ply sheet resulting from FIG. 1;

FIG. 3 is a view similar to FIG. 1 showing a protective pattern or "resist" applied over the top sheet or ply of FIG. 2;

FIG. 4 is a diagrammatic view representing the subsequent etching of the film except where protected;

FIG. 5 is a schematic view similar to FIG. 2 of the etched product;

FIG. 6 is similar to FIG. 5 but shows a transfer adhesive applied to the resist layer;

FIG. 7 is a view similar to FIG. 6 showing the final lamination; and

FIG. 8 is a plan view of the finished product.

Referring to the drawings, **1** represents a sheet of pliable material providing a temporary base. It may be a thin sheet of tissue paper impregnated with lacquer or latex adhesive. To one surface is applied an adhesive by suitable means, such as a roller-coater A. This adhesive, which may be termed a temporary adhesive, may be a material similar to that impregnated into the paper, as lacquer or latex adhesive. The adhesive layer is marked **2**. While the adhesive **2** is still fresh and before it is set, a film **3**, such as metal foil, is brought against it and adhered thereto preferably with pressure, as with pressure rolls B.

The resulting sheet, shown in FIG. 2, then has an impregnated tissue paper base **1**, an adhesive layer **2**, and a foil layer **3**. FIG. 2 is of course schematic and exaggerated, and does not represent actual relative thicknesses.

A pattern using a "resist" material is then printed over

the exposed surface of the metal foil, the pattern being the pattern to appear on the finished product, but in the case of letters would often be reversed. Suitable resists for the purpose are asphaltum, mineral waxes, natural or syntheic resins, and desirably I use as a resist some material which may itself be an adhesive. It may be rendered adhesive either by slight heat or by the use of a solvent. It is not necessary, however, that the resist be adhesive, and in the ensuing description I shall specifically describe the use of an additional adhesive. The pattern printed over the foil with the resist material is designated **4**.

The sheet thus prepared is then immersed in a solution, sometimes called a "mordant" or "etch," which reacts with and etches or dissolves those surfaces of the foil not protected by the resist. The base **1** and adhesive **2** of course protect the opposite face of the foil from chemical attack. For example, with aluminum foil, hydrochloric acid solution is used as a mordant; for copper, perchloride of iron, and for plastic film, a solvent for the plastic. Suitable reactive chemicals or solvents are well known and per se form no part of my invention. FIG 4 illustrates this step of etching away the unprotected foil. In this view, C is a simple receptacle containing the mordant into which the composite sheet is put and immersed for the necessary length of time. In some cases agitation increases the rate of etching. When the foil around the resist has been thus removed the product is washed. The resulting product is shown in FIG. 5. Assuming that the resist is not also an adhesive, an adhesive layer **5** is then applied over the exposed foil, as indicated in FIG. 6. This may be termed the transfer adhesive.

With this adhesive the laminate is then mounted on the "decal paper" which is a heavy paper base with a dextrin or other glue or film thereover, preferably water-soluble. In FIG. 7 the laminated body has been turned upside down with respect to FIG. 6 and mounted on the decal paper. The paper itself is designated **6** and the water-soluble film is marked **7**.

When thus completed, the original base **1** and temporary adhesive layer **2** are stripped away, leaving the reverse face of the foil exposed. The decal then has the appearance indicated in FIG. 8, with the exposed foil **3**, etched to the desired pattern, clean and shining. If the adhesive **2** is shellac, alcohol may be used for stripping away layers **1** and **2**. If latex cement is used, proper pulling should separate layers **1** and **2** from the foil. The etched foil pattern is secured to the coated decal papers **6—7** by the adhesive layer **5**, and if the resist material **4** is used as the transfer adhesive, layer **5** may be omitted. If **4** is a thermo-plastic material, slight heat may be used to apply it to the base.

Printed circuits can be prepared in this way with the metal foil giving an assured continuous conducting path. Such a printed circuit may be prepared flat and then transferred to the base on which it is to be used. If desired it may even be transferred either to the outside or inside of a cylinder, making it possible to place a circuit in a very limited space, and enabling capacitance to be designed into a circuit, and with other advantages.

In many cases, the exposed surface of the decal may be coated with clear lacquer or varnish to protect the foil.

The decal shown in FIG. 8 is used in the same way as a conventional printed decal. The base **6** is wetted, whereby the water soluble glue releases the design, enabling it to be slipped from the decal paper and adhered to the permanent base by the adhesive **5**. Because of the pattern or letters being formed of metal foil or other sheet material, unusual decorative effects are obtained with decals embodying my invention, and in the case of electrical circuits, a much better conducting path can

be provided than with usual printing or silk screening procedures.

It is also contemplated that instead of using a chemical to etch the foil, electro-chemical processes may be used to remove the area of the foil not covered by the resist.

Since the pattern-forming or generating foil or plastic sheet is ordinarily so thin and flexible that the pattern or letters could not be handled individually, the first supporting sheet and temporary adhesive provide body or thickness for handling, as well as providing a resist to protect one surface of the film during etching. Different colored foils or films may be used in combination, and if desired, in succession by repeating the etching step to give added attractive value to the pattern or to identify parts of electrical circuits.

Various changes and modifications may be made from the specific procedures herein disclosed within the contemplation of my invention and under the scope of the following claims.

I claim:

1. The method of making a decalcomania transfer in which the decalcomania pattern is a continuous flexible film which comprises the steps, in the order named, of first releasably adhering a sheet of thin flexible material to one surface of an etch-resistant supporting flexible film, printing a pattern to appear on the decalcomania on the exposed surface of the material with an etch-protecting adhesive resist, leaving the remaining area of the material exposed, treating the composite sheet so

prepared with an etching medium to completely remove those portions of the material not so printed upon with the resist, adhering the resist coated surface of the material to a water-soluble glue surface of a decalcomania paper, and then removing the etch-resisting supporting film to expose that surface of the etched pattern which was initially adhered to the supporting film, whereby the resist is then interposed between the pattern and the decalcomania paper.

2. The method of making a decalcomania transfer as defined in claim 1 in which the thin flexible material is metal foil.

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