

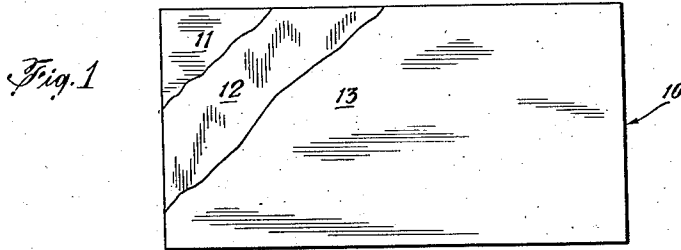
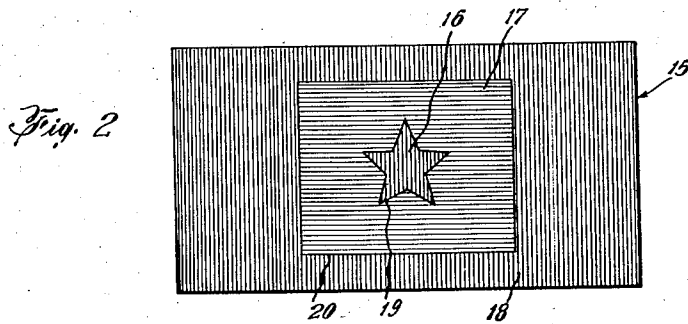
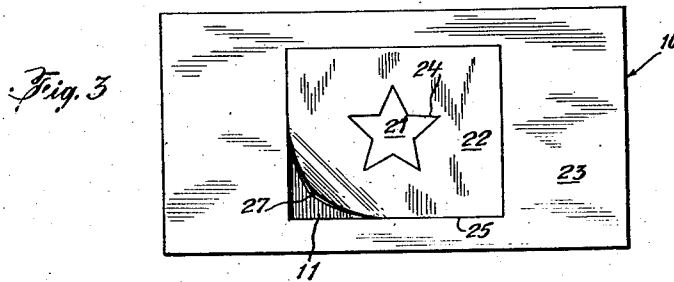
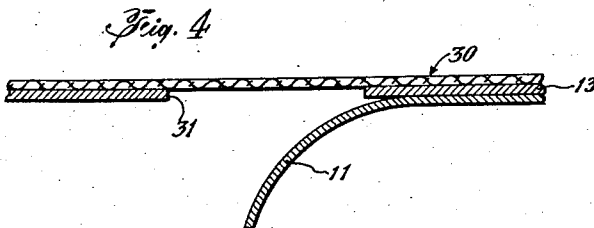
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G. BARSKY ET AL

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PRINTING STENCIL AND METHOD OF MAKING THE SAME

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PRINTING STENCIL AND METHOD OF
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This invention relates to new and useful improvements in the art of surface ornamentation, and relates more particularly to an improvement in the process of printing by the "silk screen" method wherein a mechanical negative of the design to be reproduced is formed on a screen of bolting cloth, silk, or other foraminous material, such screen being tightly mounted in a frame. After the screen has been prepared, the design is printed by forcing a printing paste or other coloring material through the screen and onto the surface to be ornamented.

A valuable contribution to the art of silk screen reproduction and particularly to the method of preparing the mechanical negative was disclosed in D'Autremont Patent No. 1,781,834, wherein a unitary, homogeneous transparent film of approved thickness was formed on a substantially transparent backing sheet of paper or the like. The film was usually formed of nitrocellulosic material. There was further provided a sufficient degree of adhesion between the film and the backing paper to normally hold such film on the backing paper, the bond not being so great, however, as to prevent easy removal of the film during the operation of cutting portions thereof corresponding to the design to be reproduced.

After the film had been so cut with the aid of a knife upon which sufficient pressure was exerted to cut through the film but not through the paper backing, and the cut portions removed from the main body of the film, such film was caused to adhere to the screen by placing the film in contact therewith and then rendering the film adhesive by the application of a solvent thereto. The opposed surfaces of the film thus exhibited alternate hospitalities, the degree of adhesion for the silk being far greater than for the paper backing or carrier sheet. After the solvent had dried, the paper backing was stripped and the stencil ready for printing.

A stencil sheet of the type just described has proven far more effective than the old "brush-in" method wherein the entire mechanical negative was formed on the silk by means of a brush, for in cases wherein the design had considerable intricate detail the task was a long one, the edges were not sharp, and the life of the screen was short. The use of the stencil sheet is of practically no value, however, in the printing of designs on textiles, since the printing colors always contain a goodly proportion of caustic elements which attack both the silk and the

film, and what was far more serious, caused the film to separate from the screen. Thus, the silk screen industry, which in recent years had risen from a mere novelty in surface decoration to an important place in the major graphic arts, as a result of the creation of the foregoing stencil sheet, was entirely unsuited for textile printing.

The object of the present invention is to provide means for employing this stencil sheet method in connection with the ornamentation of fabrics such as piece goods, as well as for printing designs in one or more colors on textile articles, such as handkerchiefs, ties, tablecloths and the like.

The foregoing method of employing nitrocellulose film and silk bolting cloth cannot be used for printing on textiles for the reason that the alkali in the printing paste and dyes attacks the silk, thus weakening the fibers and accordingly loosening the bond between the film and the silk, and the edges of the film become serrated and chipped.

We have discovered, however, that by a proper choice of composition for the film, proper choice of composition of the foraminous screen, and a proper choice of solvents for adhering the film to the screen, a stencil screen may be prepared which is suitable for printing on textiles with alkaline materials.

Among the compositions which can be used for the film we have obtained good results with a plasticized vinyl resin film, or with a film formed of cellulose ethers, such as benzyl cellulose, ethyl cellulose and methyl cellulose. These cellulose ethers form a particularly tough film which is highly resistant to the alkaline dyes. A film of this character must have an approved measure of flexibility, and in order to plasticize the cellulose ether we use compatible plasticizers which are also resistant to the effect of the alkaline dyes, one of such being sperm oil, which is the ester of a high molecular-weight alcohol and fatty acid. We may also employ some hydrogenated abietic acid esters, since such esters are also quite alkali resistant.

In order to prepare a laminated separable stencil sheet suitable for this purpose, we prefer to take a sheet of glassine paper, coat it with a thin film of rubber cement, and then add one or more coats of a composition by mixing fifty (50) parts, or thereabouts, of the following solution with three (3) parts of sperm oil, and one (1) part of hydrogenated methyl abietate.

The solution just mentioned is made up as follows:

	Parts
Ethyl cellulose (low viscosity)-----	36
Xylol-----	80
Butyl acetate-----	35
Butanol-----	15

If desired, the final mixture may be diluted further with a suitable solvent, and this composition is desirably applied to the backing material of glassine paper by means of a coating machine, although if desired it may be sprayed or even applied with a brush. The laminated stencil sheet, which is substantially transparent, may now be placed over the design to be reproduced, and such design cut and the portions corresponding to the design removed in the manner described in the foregoing patent, No. 1,781,834.

The method of preparing the printing stencil constituting the present invention is illustrated generally in the drawing, in which:

Fig. 1 is a plan view of a stencil sheet with several layers of the laminated film successively broken away.

Fig. 2 is a plan view of a design to be reproduced.

Fig. 3 is a plan view of a stencil sheet wherein the film has been cut and a portion thereof partially stripped away.

Fig. 4 is a broken section taken through a printing stencil showing the foraminous material and the stencil adhesively secured thereto, a portion of the paper backing having been stripped away.

The stencil sheet designated by the reference numeral 10 comprises a backing sheet or carrier sheet 11, which is preferably made from laminated glassine paper, as aforesaid, such paper being substantially transparent. By forming this backing sheet of laminated paper, the possibility of a knife cut penetrating the same is considerably lessened, and a laminated paper also has more body and is generally more suited for the present purpose than single ply paper.

The paper is first given a coat of rubber cement 12, which effectively prevents the film-forming material applied thereafter from penetrating the fibers of the paper and generally regulates the degree of adhesion between the film and the backing sheet. The film 13 is made from the materials previously described, and is desirably applied to the paper with the rubber cement coating by means of a coating machine. Inasmuch as such films must preferably be of a thickness of five-thousandths of an inch, or thereabouts, the stencil sheet is run through a coating machine two, three or four times in order to build up a unitary, homogeneous film of this thickness.

In Fig. 2 a design to be reproduced is designated generally by the reference numeral 15, and includes a star 16 enclosed by a substantially rectangular area 17, such area being surrounded by a border portion 18. In this instance we will assume that the star is to be of the same color as the original textile fabric, and accordingly only the portions between lines 19 and 20 are to be colored. Thus a negative is made corresponding to positive area 17.

The stencil sheet 10 is placed over the design to be reproduced and is secured thereto by gummed tape or otherwise, and a small knife is then employed to cut the film along lines 19 and 20 defining star 16 and area 17, such lines being

shown in Fig. 3 as 24 and 25, respectively. The artist then inserts his knife under one corner 27 of the rectangular portion 22 and begins peeling the film from this area. This peeling operation does not remove the star portion 21 because of cut line 24, and such portion remains upon the paper backing in its proper position relative to portion 23.

The stencil sheet is then placed film side against the screen of foraminous material, indicated by the reference numeral 30, and the solvent applied to the upper surface of the foraminous material, thus causing the film 13 to become securely bound to the fabric 30. As soon as the solvent dries the paper backing 11 may then be readily stripped and the stencil ready for printing, as indicated in Fig. 4. The printing edges 31 of the stencil are thus firmly bonded to the screen.

Instead of the ordinary silk bolting cloth, or bolting cloth made of cotton or other cellulosic materials, we use a cloth made of synthetic materials which are very highly alkali resistant. One material which we have found very useful is made from a vinyl resin spun into fiber and woven into cloth. This material consists chemically of an unplasticized synthetic resin, the copolymer of vinyl chloride and vinyl acetate. It is also possible to use other synthetic fibers, such as polyamine-polybasic acid condensation products.

We prefer that the artificial fiber have a fair measure of elasticity in order that it may be properly secured onto a frame and will remain relatively springy under conditions of use, and so retain its shape and also maintain accuracy of design during the printing process.

The choice of solvents for cementing the film to the screen is also highly important. We prefer to use a solvent combination which will quite definitely soften the film but effect the fabric only slightly. In fact, it has been found that a far better bond is obtained if the fabric is affected slightly by the solvent. It must not, however, be dissolved.

When the material of the fabric is swelled slightly and the film softened, the subsequent pressing together of the two will cause a migration of one composition into the other, so that on evaporation of the solvent a highly effective bond between the film and the screen is obtained. We have also found that a highly effective printing stencil of the screen type may be made by employing substantially the same composition both for the fabric and for the film. For example, we have used a vinyl resin fabric and a plasticized vinyl resin film, and cemented the film to the fabric. In this way a substantially homogeneous chemical structure is obtained in which the alkali resistance of one part is practically the same as that of the other. In addition to this, the bonding of such a composition is practically perfect, as there must occur complete fusion since both compositions are substantially the same and are dissolved in the same solvent.

In making the printing stencil in this fashion, however, care must be exercised in the application of the solvent in order that the screen is not dissolved sufficiently to materially reduce its strength. We have found that a suitable solvent for our purpose is a mixture of equal parts of toluol, ethyl acetate and butyl acetate.

It will be appreciated that many changes and modifications may be made in the foregoing printing stencil and method of making the same without departing from the spirit of the invention

as defined by the appended claims. For instance, other alkali resistant synthetic fabrics, including fabrics made from glass, may be used for the foraminous. The spun glass fabric, however, is not so alkali resistant as the fabric made from the vinyl resin.

What we claim is:

1. A printing stencil comprising a foraminous screen and a film cemented thereto, the film having openings therein corresponding to a design to be reproduced, said screen being formed from a vinyl resin spun into a fabric.

2. A printing stencil comprising a foraminous screen and a film cemented thereto, the film having openings therein corresponding to a design to be reproduced, said screen being formed from a vinyl resin comprising the copolymer of vinyl acetate and vinyl chloride.

3. A printing stencil comprising a foraminous screen and a film adhesively joined thereto, the film having openings therein corresponding to a design to be reproduced, said screen being formed from material selected from a class consisting of vinyl resin, acrylate resins, and polyamine-polybasic acid resins.

4. A printing stencil comprising a foraminous screen and a film cemented thereto, the film having openings therein corresponding to a design to be reproduced, said screen being formed from a vinyl resin spun into a fabric, said film being formed from a vinyl resin.

5. A printing stencil comprising a foraminous screen and a film cemented thereto, the film having openings therein corresponding to a design to be reproduced, said screen being formed from material selected from a class consisting of vinyl

resin, acrylate resins, and polyamine-polybasic acid resins, said film being formed from ethyl cellulose.

6. A printing stencil comprising a foraminous screen and a film cemented thereto, the film having openings therein corresponding to a design to be reproduced, said screen being formed from a vinyl resin spun into a fabric, said film being formed from material comprising ethyl cellulose having mixed therewith xylol, butyl acetate, butanol and a plasticizer.

7. A printing stencil comprising a foraminous screen and a film cemented thereto, the film having openings therein corresponding to a design to be reproduced, said screen being formed from a synthetic fibre which is alkali resistant, the film being formed from a composition containing 3 parts sperm oil, 1 part hydrogenated methyl abietate, and 50 parts of a solution containing the following:

	Parts
Ethyl cellulose (low viscosity)	36
Xylol	80
Butyl acetate	35
Butanol	15

8. The method of forming a printing stencil comprising a foraminous screen and a stencil film carried thereby, the screen being formed from a vinyl resin fabric and the film from a cellulose ether, which method consists in adhesively joining the film to the screen with a solvent including a mixture of toluol, ethyl acetate and butyl acetate.

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