May 13, 1941. J. H. GFELLER 2,241,380

STENCIL PRINTING

Filed June 23, 1938 3 Sheets-Sheet 1

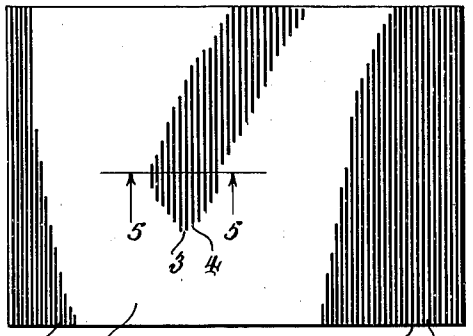

Fig. 1.

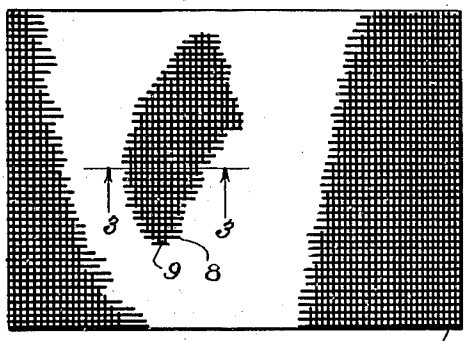

Fig. 2.

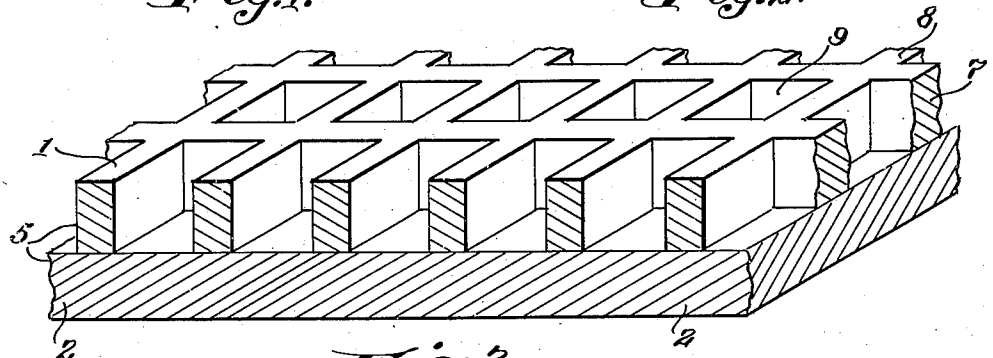

Fig. 3.

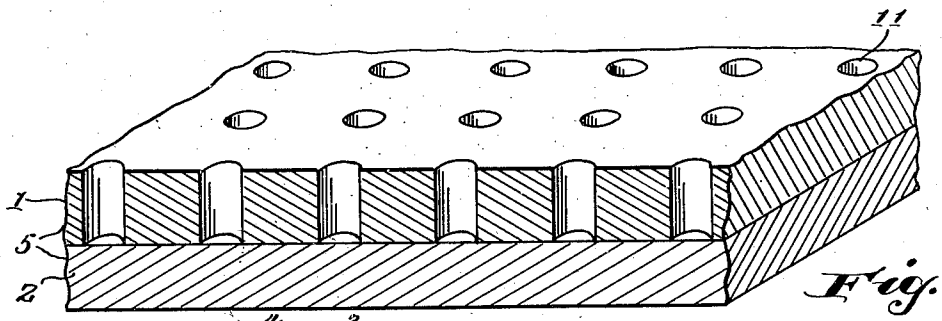

Fig. 4.

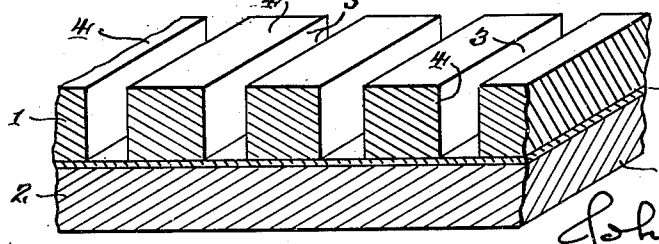

Fig. 5.

Witness:

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May 13, 1941. J. H. GFELLER 2,241,380

STENCIL PRINTING

Filed June 23, 1938 3 Sheets-Sheet 2

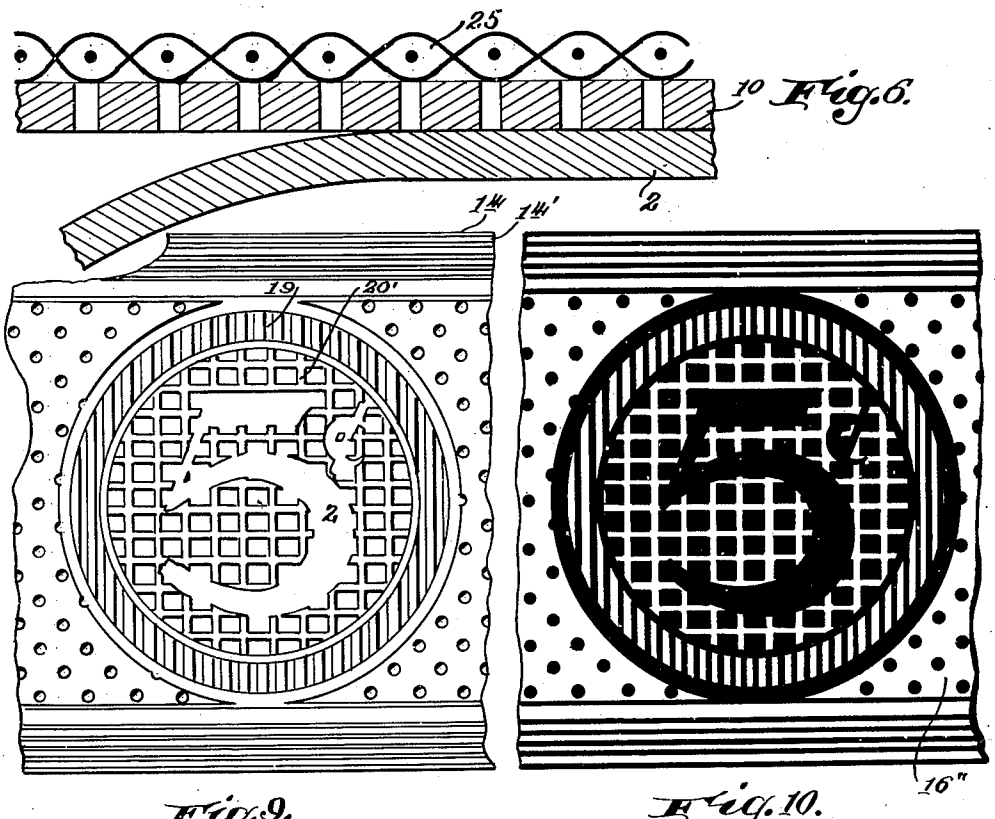

Fig. 6.

Fig. 9.

Fig. 10.

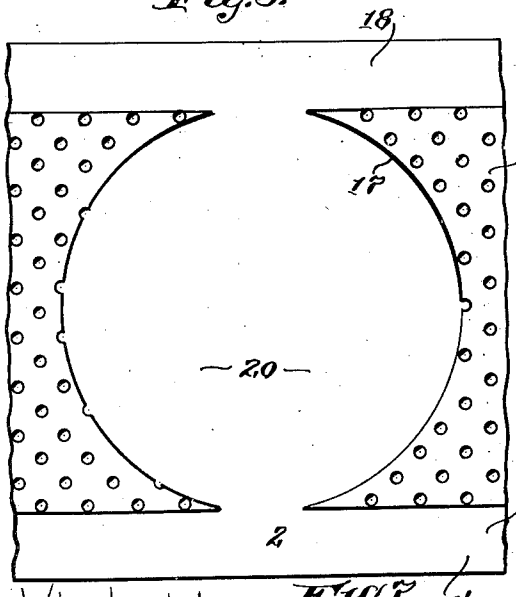

Fig. 7

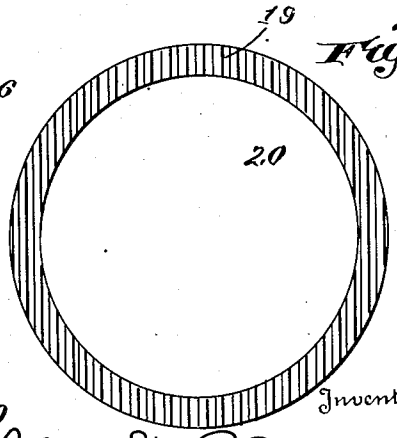

Fig. 8

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May 13, 1941. J. H. GFELLER 2,241,380

STENCIL PRINTING

Filed June 23, 1938 3 Sheets-Sheet 3

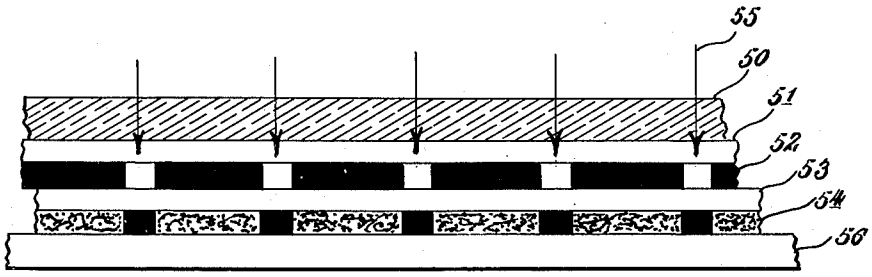

Fig. 11.
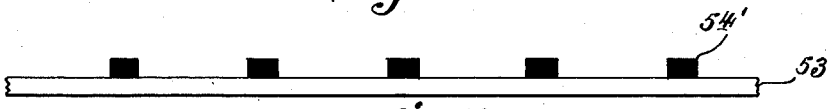
Fig. 12.

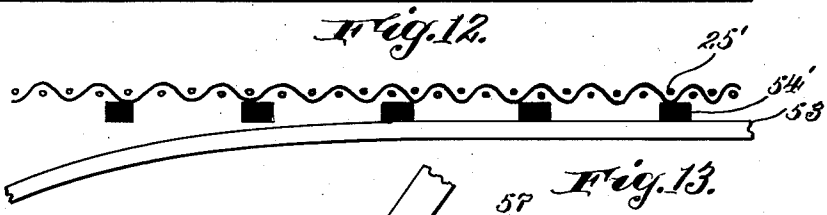

Fig. 13.

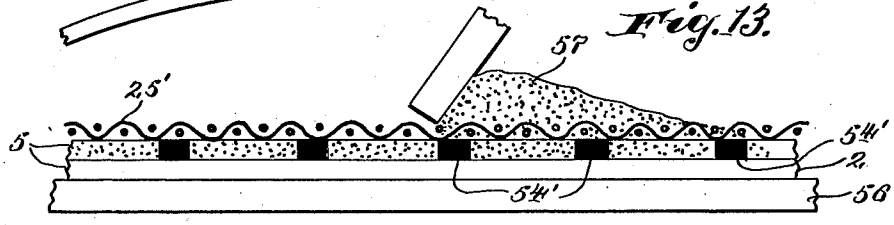

Fig. 14.

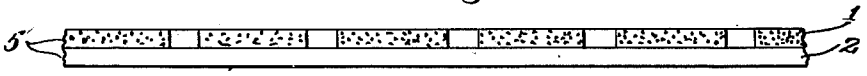

Fig. 15.

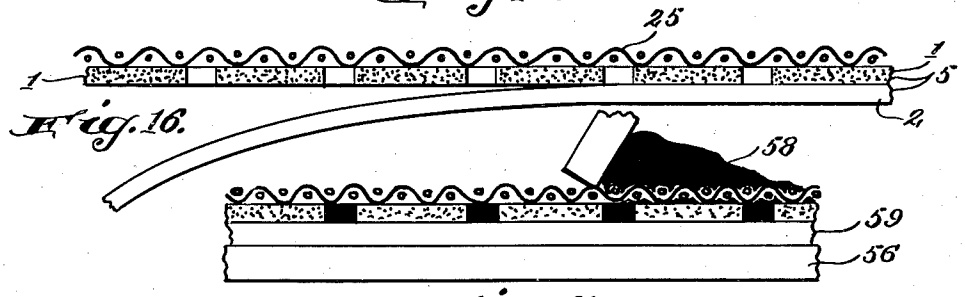

Fig. 16.

Fig. 17.

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Patented May 13, 1941 2,241,380

UNITED STATES PATENT OFFICE

2,241,380

STENCIL PRINTING

John H. Gfeller, Baltimore, Md., assignor of one-half to F. A. Davis & Sons, Baltimore, Md., a partnership composed of E. A. Davis, F. A. Davis, A. C. Davis, and H. C. Davis

Application June 23, 1938, Serial No. 215,383

6 Claims. (Cl. 41—3.5)

The invention relates to a stencil sheet for the reproduction of designs with one or several different forms of shading. The film is preferably transparent, and is removably attached to a backing sheet which is also preferably transparent, the word transparent including different degrees of transparency and translucency which transparent feature makes it possible to register the sheet with a master print or design to be reproduced.

According to the preferred practice of the invention, the film may be of lacquer or shellac, or other suitable medium, and the backing is preferably of waxed paper, the film may be attached to the paper by means of an adhesive or by its own adhesive qualities and other suitable sheet materials may be substituted for paper as a backing.

In printing, the film may be cut in the form of various designs and portions of the film removed from the backing, after which the film which is frequently prepared in section and then assembled as a complete design is caused to adhere to a foraminous screen of a type well known in the art, and the paper is peeled off, then a paper sheet or paper board on which the reproduction is to be formed, is placed under the silk screen and the printing is done in accordance with the known silk screen process, the pigment or printing medium in the form of a paste passing through the screen on to the paper through the openings in the film which is in fact a stencil in the form of a predetermined design.

The process of printing by means of a silk screen having thereon a design cut of a continuous film, the pigment or printing agent being passed through the screen is known. The present invention adds to this known art the convenient use of various types of shading, and a new stencil film for use in this connection. This film may be made photographically, or by a special machine or by hand as by passing shellac or lacquer through a stencil, or it may be produced in any other convenient manner.

In the drawings,

Figure 1 is a plan of a film sheet for producing shading.

Figure 2 is a similar plan of a film sheet for producing a different type of shading.

Figure 3 is a perspective view also in section on line 3—3, Figure 2, showing the shaded film sheet of Figure 2 on an enlarged scale.

Figure 4 is a view similar to Figure 3 showing on a similar scale a film sheet adapted to produce shading of the dotted type.

Figure 5 is a view similar to Figures 3 and 4 showing the type of shaded stencil sheet of Figure 1, but having an adhesive for attaching the film to the backing or paper.

Figure 6 is an enlarged section showing a film like Figure 4 attached to a silk screen, the backing being in the process of being removed from the film.

Figure 7 shows a shaded film sheet of the Figure 3 type, the film being cut in the form of the back ground of design, the cut-out portions being removed from the backing.

Figure 8 shows a portion of the shaded film sheet cut for application to the design of Figure 7.

Figure 9 shows a film sheet, particularly the film sheet of Figure 7 having attached thereto various fragments cut from other film sheets, and pasted or otherwise caused to adhere to the backing shown in Figure 7, the film fragments being arranged in the form of a design and adapted to be later transferred from the backing to a silk screen in the manner illustrated in Figure 6.

Figure 10 shows the design which is produced by using the stencil shown in Figure 9.

Figure 11 is a section illustrating diagrammatically the first step in the process of producing any stencil film sheet photographically.

Figure 12 is an edge view of a master film sheet or stencil for producing film sheets for making dots, this type being used for illustration, any shading being producible in this way.

Figure 13 is a similar view showing the transfer of the master film to a foraminous screen.

Figure 14 illustrates the application of shellac or lacquer to the master film on the screen to produce a negative of the master film or stencil.

Figure 15 is an edge view of the film sheet in final form.

Figure 16 shows this being transferred to the screen for printing, and

Figure 17 illustrates printing with the film.

Referring to the drawings by numerals each of which is used to indicate the same or similar parts in the different figures; the film sheet Figures 3, 4, and 5, comprises a perforated film 1 which is preferably transparent being of shellac or lacquer, or other material which is adapted to be applied as a covering or coating to one side of a backing and to be separated from the backing in transferring to a screen as hereinafter described. The film must be flexible and of reasonable strength. As shown in Figures 3, 4, and 5, it is attached or coated adhesively and removably to and upon a backing sheet 2 which in the practice of the invention has been waxed paper for which other suitable flexible sheet material may be substituted. Together the film and backing compose film sheet 5.

The film in each instance is perforated, it being feasible to produce the film in various

forms of shading, three of which are shown for example.

Figures 1 and 5 show the perforations in the form of narrow longitudinal slots 3 which are separated by lines of the film shown at 4, it being understood that in printing the color passes through the slots 3 and forms lines separated by spaces in the form of lines which are produced by the lines 4 of film.

Figures 2 and 3 illustrate a film sheet 5, the film of which consists of lines 7 and 8, extending at right angles to each other and spaced apart forming small perforations or openings 9.

Figure 4 shows a film sheet 5 in which the film 1 is perforated with substantially circular holes 11 which as shown are uniformly spaced though uniformity of spacing, size, or shape is not essential, and this film is adhesively attached to a backing sheet 2 corresponding to the backing sheet 2 of Figure 3. Figure 5 shows on an enlarged scale a film sheet which may be considered identical with that of Figure 1, the same consisting of parallel lines of film at 4 having between them parallel slots 3 through which the color or printing medium ink, etc., is passed in printing. The backing 2 in this instance has the film secured to it by means of a layer of adhesive indicated by reference character 15. This adhesive may be glue or rubber cement or any convenient type of adhesive, or with films of an adhesive nature it may be omitted.

In preparing this type of film for printing in accordance with the method of the invention which is dependent on the design to be produced, the design in the present instance being as shown in Figure 10, the background which appears in greatest area and more or less toward the outside, indicated by reference character 16, Figure 7 is made from a suitable shaded film sheet, the operator forming the circle 17 in any convenient way as by tracing from its master design being reproduced after which the film is removed from within the circle 17 and from the margins 18 and 18' at the top and bottom, the exact nature of these steps and their sequence being dependent upon the design.

In accordance with the design shown, the circle or ring 19 is then cut from the type of film shown in Figures 1 and 5, but not necessarily being a film having the adhesive 15. In this instance the circle is formed by cutting through the backing sheet as well as through the film. This circle or ring 19 is then placed in position registering with the corresponding feature of the master and its backing sheet contacts and is secured to backing sheet 2 in Figure 7, inside circle 17, see Figure 9, after which a section of film corresponding to the master design as to the area within the circle 19, the area being indicated by reference character 20 is cut from the type of film shown in Figures 2 and 3, this circular sheet is indicated by 20'. This is secured to the backing 2 in Figure 7 inside the ring 19, and, as shown, the ring 19 and circle 20' are suitably spaced. The areas 18 and 18' are then covered by cutting strips 14, 14', etc. from a plane continuous film sheet, and attaching them adhesively to the backing 2 at the top and bottom in Figure 7 where the film 1 has been removed. This gives a film sheet in the form described, and shown in Figure 9, except for the central figure which for illustrative purposes is in the form of the numeral 5. This is formed by tracing with a sharp instrument knife being most generally used from the master sheet and scraping or otherwise removing the film from the area in the form of a 5. The film sheet in Figure 9 is now ready for transfer to the silk screen, as shown in Figure 6.

The screen indicated by reference character 25 is a foraminous fabric or other foraminous flexible material. The film 1, Figure 9, is adhesively and separably attached to the backing sheet 2 as already described. In portions of the film sheet, Figure 9, the backing sheet would be double, due to attaching sections of film sheet to each other, but this is not material to the illustration Figure 6. The film 1, if of shellac, may be caused to adhere to the screen by pressing with a hot iron, or, if it is lacquer, its surface may be brushed with a lacquer solvent after it is pressed against the screen, i. e. the film surface is pressed against the surface of the screen and caused to adhere in either manner thus described or in any other suitable manner.

The backing sheet 2 is then peeled off as illustrated in Figure 6, and the transfer of the film to the screen is complete. The design is printed by placing the silk screen with the film thereon over a piece of paper, paper board, or whatever is suitable on which the print is to be made, and the film is trowelled with pigment or paste, it being possible to use any number of colors by a succession of printing steps as is well-known in the stencil and screen printing arts at the present time.

The film sheet may be made in various ways; Figure 11 illustrates diagrammatically the first step of a method of making photographically a shaded film sheet embodying the invention. Figures 12, 13, 14, and 15 illustrate further steps of the process. For convenience the process may be treated as relating to the film sheet shown in Figure 4.

It is also of interest that the shaded film sheet thus described is capable of use not only in various combinations of shaded background in which figures can be cut and produced as illustrated, Figure 10, and in various other forms, but it is also capable of combinations either singly or with different types of shading with the continuous film previously developed. It is also believed that the shaded film adds to the previously known silk screen art a feature which greatly increases the scope of application and creates new possibilities of the production of results not previously contemplated in this art as previously developed.

The illustration, Figure 11, includes glass sheet 50 overlying a sheet 51 of Celluloid on the bottom side of which is a negative 52 of the shading to be reproduced. This may be dotted shading as at 16'' in Figure 10, or any design. Beneath the negative 52 is a sheet of Celluloid 53 carrying on its under side a light sensitive film 54 which is completely soluble in the dissolving solution and removed thereby except as to the area which has been subjected to the action of light rays. The arrows illustrate light rays and 56 is a support. Exposure of the film 54 to light through the negative 52 as shown comprises the first step in the process.

Figure 12 shows a master film 54' produced from the film 54 by removing the portions not affected by light by means of a solvent or developing solution which is the second step.

Figure 13 shows the master film 54' being attached to a silk screen 25' and the backing 53 of Celluloid or the like being removed, which is the

third step. Figure 14 illustrates passing shellac or lacquer 57 through the screen 25' and master film 54' to form the silk screen printing film sheet 5, i. e. film 1 on backing 2 of paper, or the like. This is the fourth step. The support is indicated by reference character 56.

Figure 15 illustrates the completed film sheet 5. Figure 16 illustrates the transfer of the film of said sheets from backing 2 to the screen 25 as already described, and Figure 17 illustrates printing through the screen 25, the film 1 being used as a stencil. The printing medium, or paste, is shown at 58, and the paper or paper board on which the first is shown at 59.

It should be noted that while the method described of producing the film is essentially a photographic one, i. e. it includes the production of the film by means of a stencil of photographic or any other origin, it may be produced by stamping, or in various ways.

The invention is of particular advantage in that it adds the convenient production of shaded backgrounds and other shaded surfaces, and areas to the scope of the previously known screen printing art in which this possibility was not previously included. In many instances this greatly improves the appearance of the print, and also reduces the number of printing operations where different color and, or shade effects are obtained.

I have thus described specifically and detail a film sheet for silk screen printing and the preferred manner of producing, applying, operating and using the same, the invention relating both to the film sheet and to the method of producing it. Having thus described the invention specifically and in detail, I would have it understood that the specific terms herein are used descriptively rather than in a limiting sense, the scope of the invention being defined in the claims.

What I claim as new and desire to secure by Letters Patent is:

1. The method of forming a stencil for screen printing which consists in providing a film sheet consisting of transparent backing sheet and a transparent perforated, shaded film adhesively and removably affixed thereto, the film covering one side of the backing, placing the backing sheet on a master design to be reproduced, the film being uppermost, removing portions of the film in accordance with the design, thus exposing portions of the backing, preparing other portions of film sheets having a suitable backing to fit said exposed portions of the backing in accordance with said design and superimposing said latter sheets on corresponding exposed portions of the first said backing, the backing of said superimposed film sheet being in contact with and affixed to said exposed portions of the first backing, in furtherance of the completion of the design, removing portions of the film in the form of figures of said design, causing the outer surfaces of the film thus assembled as a whole to adhere to a foraminated screen, and removing the backing.

2. The method of forming a stencil for screen printing which consists in providing a film sheet consisting of a transparent backing sheet and a perforated, shaded film removably affixed thereto, the film overlying one side of the backing, and being adhesively and removably affixed thereto, placing the backing sheet on a master design to be reproduced, the film being uppermost, removing portions of the film in accordance with said design and superimposing other film sheets having removable backing sheets on corresponding exposed portions of the first backing, the backing of said superimposed film sheet being in contact with and affixed to said exposed portions of the first backing, thus exposed in furtherance of the completion of said design, removing portions of said film in the form of figures of said design, causing the film thus assembled as a whole to adhere to a foraminated screen, and removing the backing.

3. As an article of manufacture a film sheet, for producing a design by stenciling process consisting of a transparent non-photographic film possessing adhesive properties and having perforations arranged in a shading pattern, a transparent flexible backing sheet detachably secured to the film and coextensive therewith said film being provided with a cut-away portion representing a contour inherent in the design, a second film sheet likewise consisting of a film having perforations arranged in a shading pattern and a backing sheet coextensive therewith and removably secured thereto, said second sheet being positioned within the cut-away portion with its backing sheet in contact with the first backing sheet, the entire film being adapted for transfer to a foraminous screen by adhesion removal of said backing sheet as a unit.

4. As an article of manufacture a non-photographic film sheet, the same consisting of a film having perforations arranged in a predetermined pattern for shading, and a transparent flexible backing sheet removably secured to and forming a detachable covering for the film on one side thereof, the film being adapted for transfer from the backing by adhesion to a foraminous screen for stencil printing.

5. As an article of manufacture, a stencil sheet for reproducing multi-colored designs comprising a transparent backing sheet and a transparent non-protographic film adhesively carried by and readily removable from said backing sheet by a scraping process, the transparent film having its outer exposed surface of an adhesive nature, whereby, the film or any portion thereof is transferable to a stencil screen by adhesion thereto and removal of the backing, the film having a large number of relatively small preformed openings corresponding to a predetermined shading pattern whereby when the film or any portion thereof is transferred to a stencil screen it is adapted to the production of surface and similar shadings by the stenciling process.

6. The method of forming a stencil for screen printing which consists in providing a pair of composite film sheets each comprising a transparent backing portion and a transparent film portion removably and coextensively affixed thereto, the film of one of said sheets having preformed perforations, placing one of said sheets on a master design to be reproduced with its backing portion in contact with the design, removing an area of the film portion in accordance with the design thus exposing the backing portion, placing the other composite film sheet within the removed area of the film portion and with its backing portion in contact with the other backing portion, removing an area of the latter film portion according to the design, causing the thus assembled film portions to adhere to a foraminated stencil screen and removing the backing portions as a unit.

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