May 26, 1970 L. D. GUTHRIE 3,513,775

PROCESS FOR REGISTERING AND SILK SCREENING BOTH SIDES OF A SHEET

Original Filed Oct. 28, 1963 3 Sheets-Sheet 1

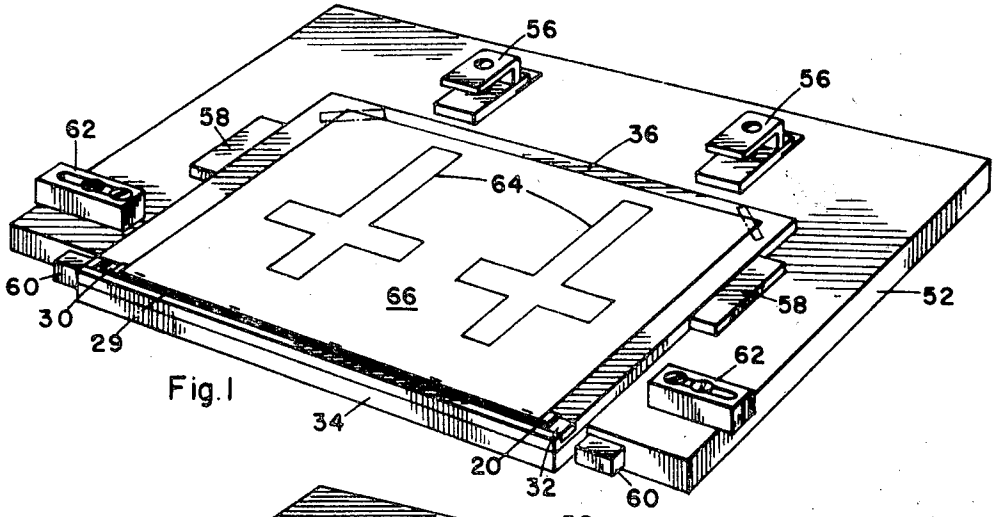


Fig. 1

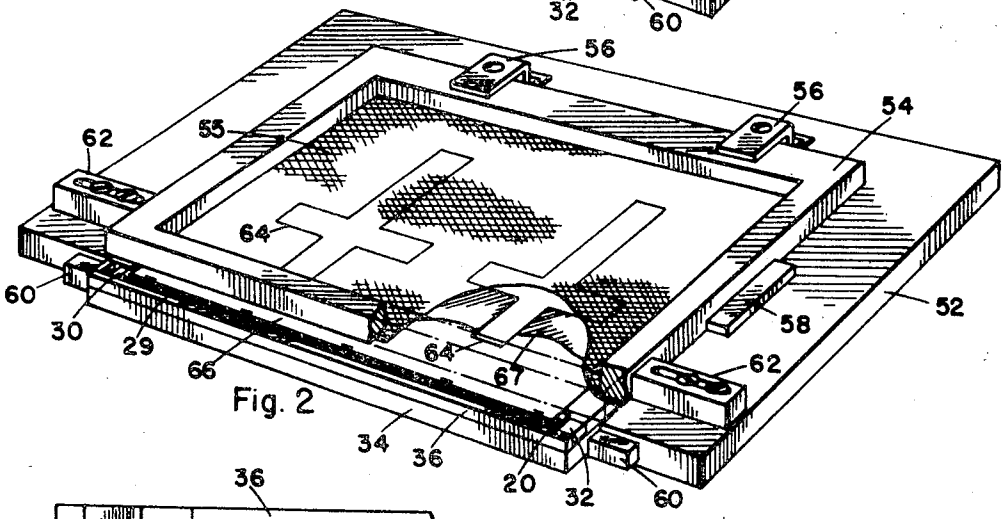


Fig. 2

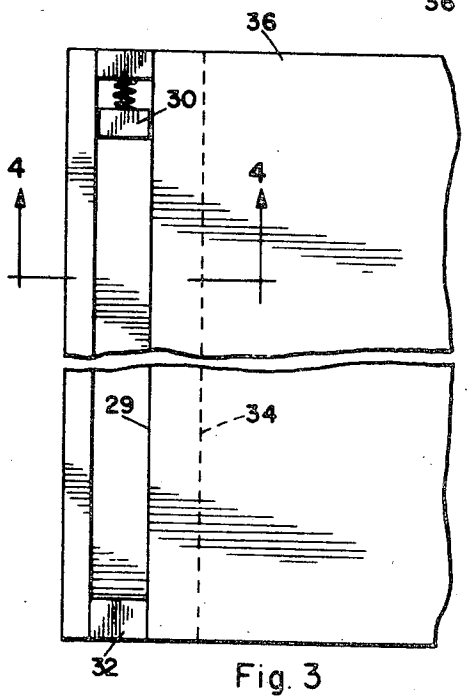


Fig. 3

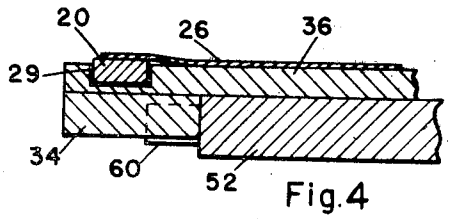


Fig. 4

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PROCESS FOR REGISTERING AND SILK SCREENING BOTH SIDES OF A SHEET

Original Filed Oct. 28, 1963 3 Sheets-Sheet 2

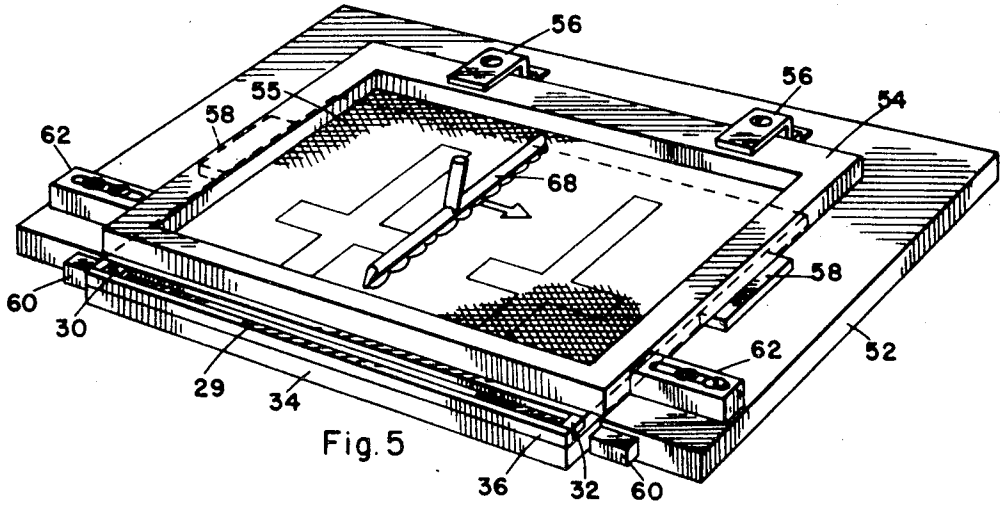


Fig. 5

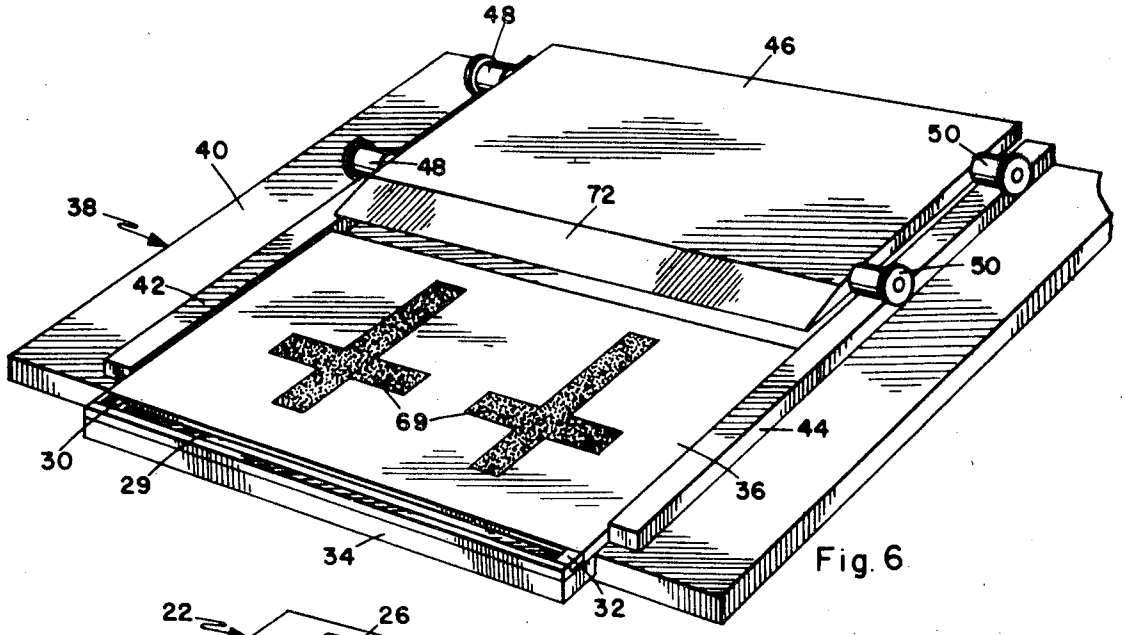


Fig. 6

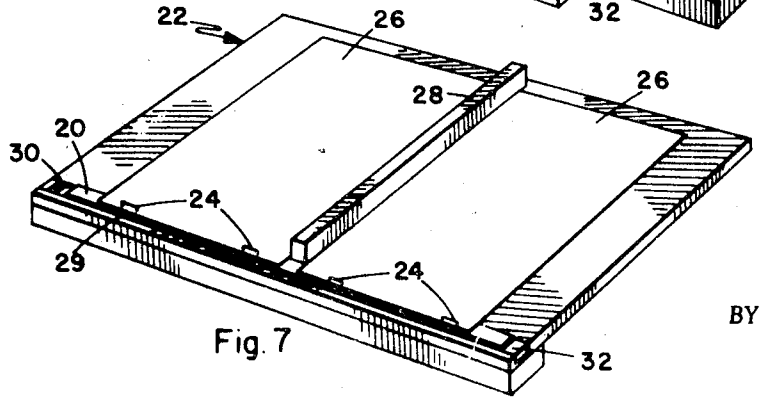


Fig. 7

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PROCESS FOR REGISTERING AND SILK SCREENING BOTH SIDES OF A SHEET

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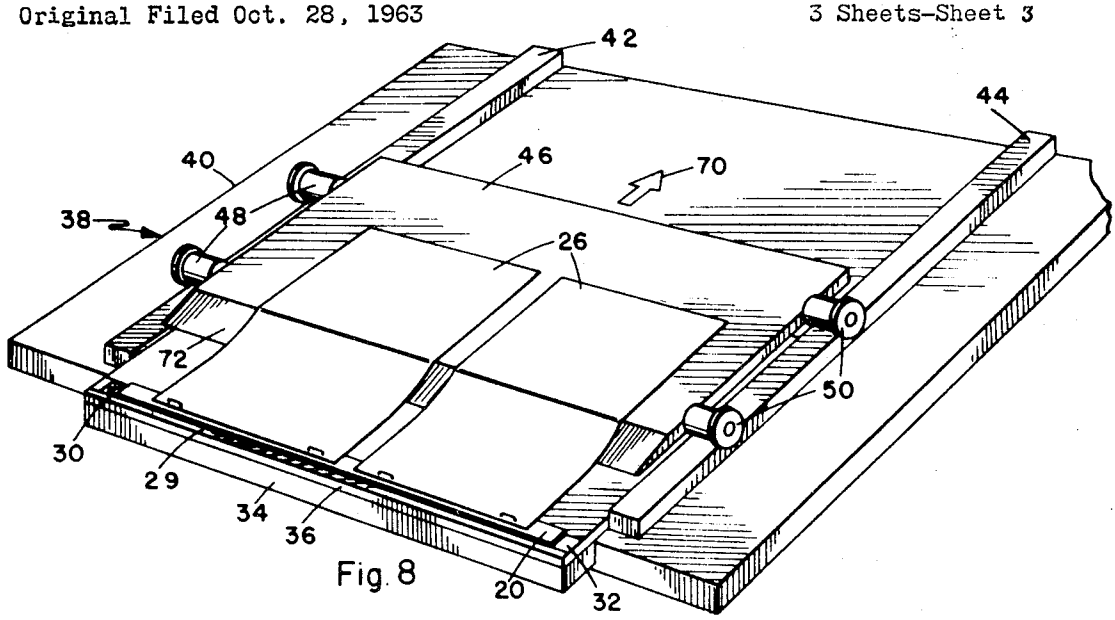


Fig. 8

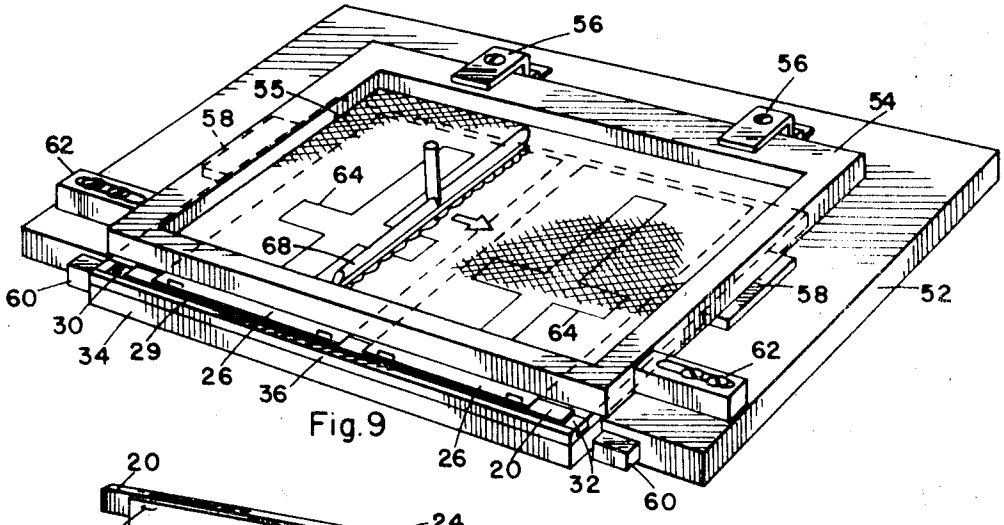


Fig. 9

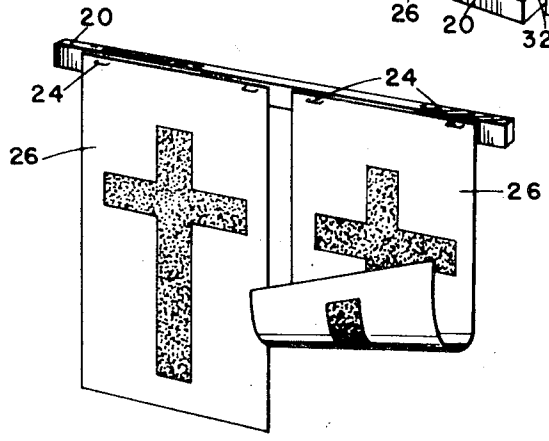


Fig. 10

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3,513,775

PROCESS FOR REGISTERING AND SILK SCREENING BOTH SIDES OF A SHEET

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Original application Oct. 28, 1963, Ser. No. 319,112, now Patent No. 3,336,864, dated Aug. 22, 1967. Divided and this application Aug. 21, 1967, Ser. No. 677,813
Int. Cl. B41f *15/00, 1/20;* B41m *1/12*
U.S. Cl. 101—129 2 Claims

ABSTRACT OF THE DISCLOSURE

This method achieves great accuracy in the placement of the master design on a smooth printing surface and the placement of the material to be dyed or inked. Registration bars are very accurately located relative to the printing surface and silk screen equipment used. The sheet material to be printed remains attached at one edge thereof to a registration bar for printing first on one side and then on the other. The material is progressively laid onto the printing surface by gradually withdrawing a support from the underside of the material.

This application is a division of application Ser. No. 319,112, filed Oct. 28, 1963 and entitled "Silk Screening Process and Apparatus."

The present invention relates generally to a silk screening process and apparatus and more particularly to such a process by which correct registration may be obtained when silk screening a similar design on opposite surfaces of either porous or non-porous material.

BACKGROUND

The art of silk screening inks and dyes directly onto the surface of cloth, paper, ceramics or metal is an old one and numerous methods have been proposed for proper registration of the master drawing or design. In one process that is extensively used a silk screen table surface is formed of one or more pieces of thick glass and a bank of lights is installed beneath this surface. The master drawing or registration points or lines are positioned on the underside or between the layers of glass. By positioning the material to be silk screened on the glass directly over the drawing or registration points, the operator may manually position the material so each successive color or design may be reasonably accurately registered.

In the other general process boundary lines or registration marks are drawn on the silk screen table surface, or tape or cardboard is used to define physical boundaries and contours.

With the equipment indicated above two general practices are followed in applying the ink or dye to the material. One is to silk screen the material as it lies directly on the glass or table surface. After being silk screened the material is carefully lifted off the surface of the table and hung up to dry. The residue of ink which penetrated through the material is then carefully cleaned from the table surface with solvent and rags and the whole process of registering and silk screening is repeated.

In the more common procedure paper is laid on top of the table and the material to be silk screened is positioned on top of the paper. After silk screening, the material is carefully lifted off the paper, and the paper is discarded. A new piece of paper is laid down and the whole procedure is repeated.

The above processes are not only time-consuming to obtain reasonably good registration but extremely wasteful of material.

OBJECTS AND DRAWINGS

Accordingly it is the primary object of this invention to provide an improved process of silk screening which will greatly reduce, if not eliminate, the loss in time and material occasioned by human error in non-registrations.

It is a still further object of this invention to provide an improved process of silk screening which will eliminate the waste of paper underlay.

It is a further and important object of this invention to provide an improved process of silk screening which will insure correct registration and screening of multiple pieces in each cycle.

With these and other objects definitely in view, this invention consists in the novel constructions, combination and arrangement of elements and portions, as will be hereinafter fully described in the specification, particularly pointed out in the claims, and illustrated in the drawings, which form a material part of this disclosure and in which:

FIG. 1 is a perspective view of a silk screening table with a registration board in place thereon and a master drawing, secured to a registration bar, in position on the registration board;

FIG. 2 is a view similar to FIG. 1 showing the stencil and silk panel, constituting the silk screen, with its frame, in position;

FIG. 3 is a plan view of a registration board, on an enlarged scale, with parts broken away;

FIG. 4 is a section on the lines **4**—**4** of FIG. 3;

FIG. 5 is a perspective view illustrating the application of a design in ink on the surface of a registration board;

FIG. 6 is a perspective view of a material laying carriage with an inked registration board in position therein;

FIG. 7 is a perspective view of a jig used for mounting material on a registration bar, with a registration bar and blank material in position thereon;

FIG. 8 is a view of the material laying carriage in position to apply the material to the inked registration board;

FIG. 9 is a view of the silk screening table and frame showing the final step of silk screening the design and

FIG. 10 is a view showing the finished article.

Like reference numerals refer to the same or similar parts throughout the specification.

Briefly the novel process of the instant invention involves two basic steps. First the design to be imprinted on the material is silk screened directly onto a table top or, as will be referred to hereafter, the smooth surface of a registration board. The material is then laid directly on and into the fluid ink on the table. With nonporous material it is obvious that the design will be imprinted on only the side that is in contact with the ink. With porous materials such as fabric some ink will impregnate the material and appear on the other surface. In the next step the silk screen frame is lowered over the material and the design is impressed on the other surface. Again with porous material, the ink will be forced completely through thereby securing the desirable complete saturation of the design through the material.

With reference to the drawings the various elements of the apparatus used to practice the improved process will now be described.

APPARATUS

The material to be silk screened is first secured to an elongated bar of rigid material, preferably wood of rectangular cross section. For purposes of description this bar, which is illustrated as **20** in FIG. 10, will be hereinafter referred to as the registration bar. A number of these bars, determined by the number of sections of material to be silk screened, are provided all of the same length and of approximate width and thickness. The sections of material to be screened are stapled to the regis-

tration bar in a jig 22 shown in FIG. 7. For ease of removal the staples 24 are inserted approximately half way into the material of the registration bar. Any number of sections of material may be attached to the registration bar dependent on the length of the bar. As here shown, I apply two sections 26, 26 which are accurately positioned by means of a guide bar 28 secured to the jig 22. The sections of material here shown are sheer nylon organdy and will be hereinafter referred to as pennants it being understood however that other, generally sheet material, either porous or non-porous, may be substituted therefor. The forward edge of the upper surface of jig 22 is provided with a closed end groove or gutter 29 of approximately the same cross sectional area and length as the registration bar 20. A spring stop 30 in one end of the gutter accurately locates the registration bar 20 against a fixed stop, as shown in FIG. 7. A positioning bar 34 is secured to the underside of jig 22.

FIGS. 3 and 4 illustrate the details of a base member or board 36, hereinafter referred to as a registration board, upon which the sections of material 26 and registration bar 20 are mounted for the silk screening process. Registration board 36, shown positioned against the edge of a silk screening table in FIG. 4, is substantially the same size and construction as jig 22. However guide bars 28 are omitted from the registration board. Otherwise registration board is provided with a gutter 28, for reception of a registration bar 20, spring stop 30, fixed stop 32, and positioning bar 34. Registration boards 36 may be formed of any suitable material having a smooth hard surface. Tempered Masonite has been found to be entirely satisfactory.

FIGS. 6 and 8 illustrate the details of the material laying carriage assembly, indicated generally by the reference character 38 employed during two stages of the hereindisclosed process. Carriage assembly 38 consists essentially of a smooth surfaced and generally flat supporting member 40 having generally parallel spaced apart guide rails 42 and 44. Material laying carriage 46 is movably mounted on rails 42, 44 by pairs of spaced rollers 48 and 50. Rails 42, 44 are spaced apart a distance just equal to the width of registration board 36 so that they act to center and accurately position the registration board on supporting member 40.

The silk screen table and frame are illustrated in FIGS. 1, 2, 5 and 9 with reference to several of the steps in the novel process hereinafter described. With particular reference to FIGS. 1 and 2 a silk screen table 52 is essentially a flat work surface of sufficient size to support a silk screen frame 54. The rear portion of work surface 52 is provided with a pair of clamp hinges 56, 56 of conventional construction which permit ready removal and substitution of one silk screen frame for another. Spaced apart on the surface of table 52 a distance equal to the width of registration board 36 are a pair of guide blocks or rails 58, 58 defining parallel edges of a wide slot in the table 52, this slot opening to one edge of the table and accurately dimensioned to receive the registration board 36. A pair of guide blocks 60, 60 spaced the same distance apart as blocks 58, 58 may, if desired be positioned on the front edge of table surface 52, further defining said slot. A pair of adjustable guide blocks 62, 62 are positioned on table 52 for engagement with opposite edges of silk screen frame 54, for a purpose which will be hereinafter described.

OPERATION

For purposes of describing the novel silk screening process, the design to be silk screened on a section of material 26 is shown as a cross 64 which may be of any color, red for example, on a field of white, the material being, for example, sheer white nylon organdy. A number of registration bars 20 are provided, all having approximately the same length and cross sectional dimension. The nylon material is cut to the proper size. A registration bar 20 is placed in gutter 29 of jig 22, a strip of material 26 is laid on either side of the guide bar 28 and stapled to the registration bar at 24. The registration bar with the sheets of material attached is now removed and may be hung on a rack ready for the first step in the silk screening process. This step is repeated until all strips of material have been secured, usually in multiple or at least in pairs, to registration bars.

In preparing the silk screen 55, a master drawing 66 is stapled to a registration bar, which is positioned in the gutter of a registration board. This assembly is then placed on the silk screen table in position shown in FIG. 1. Then, as indicated in FIG. 2, a negative film or a hand stencil 67 is accurately positioned over the master drawing and the silk screen frame after having been correctly located in the hinged clamps is lowered over and onto the stencil. It should be understood that where multiple color designs are to be silk screened a different stencil will be prepared and applied to a frame for each color desired. The silk screen frame is now raised and the master drawing is removed leaving the plain registration board in place and the silk screen again lowered into position. Ink of the desired color is placed in the opening of the silk screen frame and drawn across the frame, in the usual manner by the squeegee 68, FIG. 5, to apply the inked design 69 corresponding exactly with the original design 64, directly on the surface of the registration board. The frame 54 is now lifted and the registration board with the inked design thereon is removed and placed in position, as shown in FIG. 6, on the surface 40 of the carriage assembly 38 with the carriage 46 located in the rearward position, as clearly shown. The carriage 46 is now moved forward to cover the design and a registration bar, with blank sections 26 of material secured thereto, is positioned in the gutter 29 of the registration board, as shown in FIG. 8, with the material draped over the carriage 46 as indicated in the same figure. Carriage 46 is now moved in the direction of arrow 70 and the material 26 will be slightly tensioned, to remove any wrinkles, as it moves over the surface of the carriage and down the sloping front edge 72 to be laid directly on the inked design 69 on the registration board. It will be evident that, in this position, the under surface of the material will be completely coated with ink and, since the material is porous, some of the ink will be absorbed into and completely through it.

The fiinal step in the process may now be completed. With the carriage 46 in its rearward position the registration board, with the registration bar and sections 26 of material already inked on one side, may be removed and re-positioned on the silk screen table as shown in FIG. 9. Ink is drawn across the silk screen 55 by the squeegee 68 in the usual manner and the design is impressed on the upper surface of the sections of material 26. During this step some of the ink will be forced through the material onto the registration board so that there will always be an adequate supply of ink on the board for the next cycle of operation. After completing this step the registration bar, with the finished sections 26 thereon, is removed and hung on any suitable drying rack.

It will be evident that, in a multi-colored design, the above steps should be repeated, a separate stencil and silk screen frame being provided for each color. Thereafter for the reuse of the silk screen frames to assure correct registration with the master drawing a frame is correctly positioned over the master drawing aligning the stencil therein with the master drawing, the clamp hinges 56 are then secured and guide blocks 62 are adjusted to contact the edges of silk screen frame 54 so that said frame is fixedly positioned.

From the above description it will be seen that the improved process insures equal distribution of inks or dyes on both top and bottom surfaces of material and complete impregnation of porous material. Correct regis-

tration and screening makes possible a vastly accelerated production rate per man hour. A further savings in cost is effected by the elimination of paper underlay and the elimination of wasted ink in the saturation of such underlay.

It is understood that minor variation from the form of the invention disclosed herein may be made without departure from the spirit and scope of the invention, and that the specification and drawings are to be considered as merely illustrative rather than limiting.

I claim:

1. In a silk screening process the steps comprising securing a master design in a predetermined position on a first elongated bar;

locating said bar and master design in a predetermined position on a base member of inflexible material;

locating said base member in a predetermined position on a silk screen table;

aligning a silk screen frame, having a stencil cut to said master design, with said master design;

removing said master design;

silk screening a design on said base member;

securing at least one section of blank material to an elongated bar;

securing said bar member in a predetermined fixed position on said base member;

progressively lowering said blank sheet material into contact with said coating to transfer the design to one surface of said sheet material;

transferring said base member with the sheet material thereon to said silk screening table; and

silk screening the same design in the same position on the other side of said sheet material.

2. In a silk screening process the steps comprising:

securing a master design in a predetermined position on a bar;

locating said bar and master design in a predetermined position on a base member of inflexible material;

locating said base member in a predetermined position on a silk screen table;

aligning a silk screen frame, having a stencil cut to said master design, with said master design;

hingedly securing said silk screen frame in position on said table over said master design;

removing said master design;

silk screening a design on said base member;

securing at least one section of blank sheet material to a bar;

securing said bar in a predetermined fixed position on said base member;

progressively lowering said blank sheet material into contact with said coating to transfer the design to one surface of said sheet material;

transferring said base member to said silk screening table; and

silk screening the same design in the same position on the other side of said sheet material.

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WILLIAM B. PENN, Primary Examiner

U.S. Cl. X.R.

101—114, 123, 296