June 29, 1926. 1,590,380

G. I. KEEL

METHOD OF REPRODUCING PICTURES

Filed May 2, 1925

FIG. 1

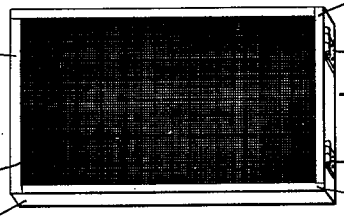


FIG. 2

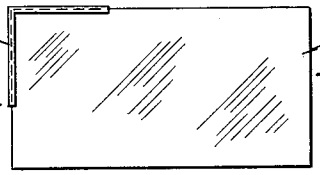


FIG. 3

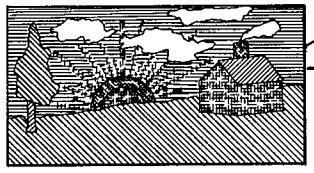


FIG. 4

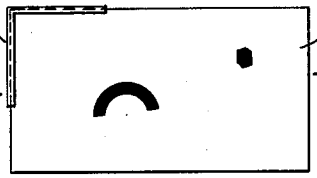


FIG. 5

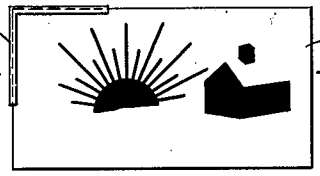


FIG. 6

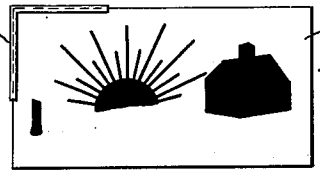


FIG. 7

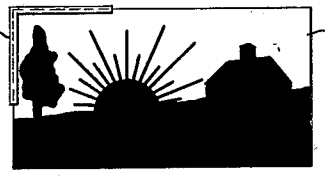


FIG. 8

FIG. 9

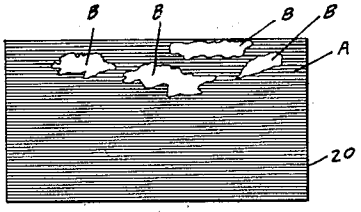


FIG. 10

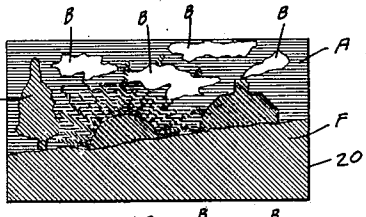


FIG. 11

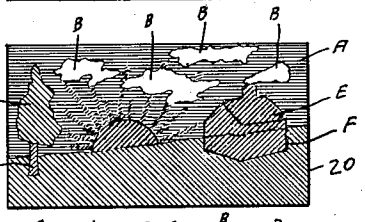


FIG. 12

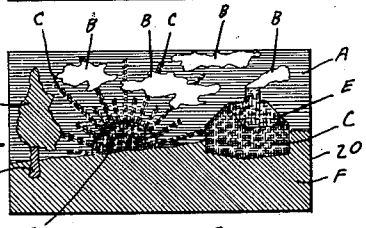
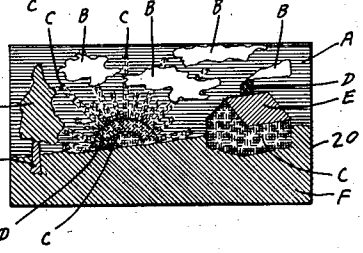


FIG. 13



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GLEN I. KEEL.

BY Fitzgerald & Fitzgerald

ATTORNEYS.

Patented June 29, 1926. 1,590,380

UNITED STATES PATENT OFFICE.

GLEN IRVIN KEEL, OF INDIANAPOLIS, INDIANA, ASSIGNOR OF ONE-HALF TO MOORE BROTHERS COMPANY, A PARTNERSHIP COMPOSED OF FRED H. MOORE, JAMES R. MOORE, AND LEVI P. MOORE, OF ROCHESTER, INDIANA.

METHOD OF REPRODUCING PICTURES.

Application filed May 2, 1925. Serial No. 27,342.

This invention pertains to the process of reproducing pictures or designs containing one or more colors on any suitable material such as paper, card-board, wood, fabrics, glass or the like, and on such materials where ordinary methods of printing would be of no avail.

The principal object of the invention is to provide a more or less mechanical process for blocking out as compared with the well known manual operation. This not only permits the colors to coincide more perfectly but saves a great deal of time and labor in blocking out a picture or design which is intricate and is composed of many lines and variations. This method permits of obtaining perfectly registered colors in oil, water or any other paste mediums, and of effecting an embossed surface, of which reorders may be had without the remaking of screens.

It is furthermore a method of reproduction by which the finest and most delicate effects may be had, such as photographs, pastel paintings, fine line drawings, benday work, etchings, engravings, etc., without the use of the costly zinc, copper and stone plates, thus permitting fine multi-colored works at a lesser cost.

It further permits of small or large quantities of work done in oil colors, which are of a weather proof nature, hence the saving of costly enamel works for outdoor advertising.

The full nature of the process and other features and advantages acquired thereby will be hereinafter more fully set forth and described.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

In the drawings Fig. 1 is a perspective view showing the frame with a screen stretched thereon. Fig. 2 is a plan view of a celluloid blocking out sheet. Fig. 3 illustrates the original or master design. Figs. 4 to 8 inclusive illustrate various steps in the blocking out process upon the celluloid shown in Fig. 2. Figs. 9 to 13 inclusive illustrate the various steps in the production of a picture or design upon a cardboard or the like after the various colors have been passed through the corresponding screens.

In practicing this process there is used a wooden frame 10 provided with a small mesh screen 11 mounted thereon. Said screen is preferably of fabric, but may be of wire or any other suitable material. The screen is tacked on the edges of one side of the frame 10 and sealing strips 12 of paper tape or the like are glued thereon, whereby said screen will be tightly drawn and secured in place and there will be no leakage of the paint which will be hereinafter described, between the screen and frame. One side of the frame is provided with the hinge members 13 adapted to register with the corresponding hinge members which may be mounted on the work table whereby the screen when in printing position will be properly aligned by the connection between the hinge members, thus permitting it to be raised and lowered for inserting fresh sheets of card-board or the like thereunder. In this connection it will be noted that the side of the frame upon which the screen is secured is positioned adjacent the surface of the work bench as shown in Fig. 14.

There is further provided a celluloid sheet 14 ground on one side and of substantially the same size as the picture or design to be reproduced. Said celluloid sheet is provided at one corner with a metal registering strip 15, having two arms adapted to lie along the adjacent edges thereof and to which said sheet is rigidly clamped. This permits the celluloid being properly positioned with respect to the screen and frame for printing purposes and assists in more perfect alignment of the design.

For the operation there is provided a single original or master design as illustrated on the card 16 shown in Fig. 3, and a different screen for each color to be reproduced. However, one celluloid sheet 14 suffices for the entire process.

Each of the screens 12 is treated in the following manner preparatory to use in the manner which will be hereinafter described. The screen 11, after it has been stretched to the frame 10, is washed thoroughly with alcohol and dried. This is done to rid the silk, which is the preferable type

of screen, of the oils and perspiration of the hands etc. As soon as the screen is thoroughly dry it is taken into a dark room and by the aid of a ruby lamp or the like, a sensitizing solution is flowed on to the outer side of the screen, that side which is flush with the surface of the frame. The excess solution after flowing over the screen is caused to flow into a suitable black photographic tray or similar container to be again used. The screen thus treated is then set aside in a dark box to dry thoroughly. After drying, the treated surface of the screen will be hard, so as to form a substantially impervious surface. It is again processed by pouring the same solution into the frame on the inner side of the screen and washing it about therein until the surface has become thoroughly covered. By reason of the hardness of the solution on the outer side, the solution during this operation will be prevented from passing through the screen. The excess solution is then poured out of the frame and the screen is placed back in the dark box again for drying. After the screen is thoroughly dried the mesh will be completely closed by a hard substance and be impervious. It may be noted here that the reason for processing the screen in a dark room is that the solution is of such a character as to be affected by light in the manner of a photographic film or plate, for reasons which will hereinafter be set forth.

The solution consists of the following ingredients: One quart of fish glue of the best quality such as Le Page's photo engraving glue, is mixed thoroughly with 48 ounces of boiling hot water. Into this solution 4 ounces of pulverized bichromate ammonia is mixed after which the solution is permitted to become cool. Separately of the above solution, 2 ounces of powdered egg albumin is thoroughly mixed in 14 ounces of cold water and 4 ounces of clear ammonia. This second mixture is mixed into the first mixture of the glue solution when it has become cold. A third mixture is provided consisting of ½ ounce of pulverized nitrate of silver which is thoroughly mixed with 32 ounces of cold water. This third solution is then mixed with the other two solutions after which the combined solution is strained through a fine cloth and kept or corked in an amber bottle. It is then ready for use. A dark room is employed for processing the screen as above described and the screen is given a sensitized impervious surface which is affected by light striking it as in the case of a photographic plate, which action will be utilized for the purpose hereinafter described.

The coloring on the master design has been indicated as follows: A represents sky-blue; B white clouds and smoke coming from a chimney. C represents the sun rays and the center of the sun. D represents an orange halo around the sun and chimney. E represents the brown trunk of the tree and the roof of the house and F represents the green foreground and the foliage in the tree. In following out the process, the celluloid sheet 14 is placed over the master design and the color covering the smallest area thereon (which is the color which will be last applied) is blocked out on the frosted surface of the celluloid. Therefore in this instance the area indicated by D will be blocked out on the celluloid by any suitable means so as to be opaque as shown in Fig. 4. In other words, the celluloid sheet would appear just as shown in Fig. 4. The screen frame 10 is then laid in a suitable printing frame such as used in making blueprints, and the celluoid is positioned over the surface of the screen and aligned therewith by means of the aligning strips 15, after which the screen is exposed to the light, preferably sun-light. An exposure is made through the translucent part of the celluloid. Obviously, that portion of the design which is blocked out on the celluloid, or opaque, will not be penetrated by the light and the sensitized surface thereunder will be unaffected. A sufficient exposure is given so that the light passing through the translucent part of the celluloid will affect the sensitized screen so as to harden the solution with which it is treated to such extent that it cannot be readily washed out. However, that portion of the screen which is not reached by the light will remain soluble. The celluloid is removed in a dark room and the screen washed thoroughly in water which has the effect of washing out and removing from the mesh such of the solution as is untouched by the light. Therefore we have a design transferred from the celluloid to the screen which is represented by open mesh as against the remaining portion of the mesh in the screen being closed and impervious. This may be called screen No. 1 and after taping the edges with paper tape as heretofore mentioned it will be set aside for future use. If at any time pinholes shall occur in the screen after the washing out operation, they may be painted out with a soft brush with a solution of 10 parts orange shellac, 1 part dry lamp black and 1 part castor oil, which solution is substantially permanent and pliable as well.

Thereafter the celluloid, which for convenience we will call the negative of this process, is replaced over the master design and the colored portion thereof covering the next larger area is blocked out in addition to that which has already been blocked out on the negative. As shown herein the next smallest color is that indicated by C which

is yellow. The negative after this blocking will present an opaque portion such as shown in Fig. 5 representing the combined colored portions D and C. A print of the negative formed in this character is then made on a second screen in the same manner as above described which may be called screen No. 2. Thereafter the same celluloid is again placed over the master print and an additional portion blocked out which in this instance would be the next smallest color, or that which is represented by E which is orange. A print of this negative is then made on a third screen which may be called screen No. 3. The same celluloid or negative is then used in the same manner for blocking out the additional color represented by F which is green in this instance as shown in Fig. 7, and a fourth print is made on a fourth screen as above described, which may be called screen No. 4. The fifth color which in this instance is sky-blue, indicated by A, is then blocked on the negative so that nothing is left thereon but the white which corresponds to the clouds and smoke and which alone is the original color of the cardboard upon which the print is made. This screen may be called screen No. 5. It will be noted, therefore, that five screens have been printed from the same celluloid or negative, screen No. 1 having its mesh open by exposure and washing throughout the area covered by the smallest color. Screen No. 2 is opened throughout the two areas and so on until screen No. 5 is open throughout all areas which are colored.

The screens are then employed for printing purposes in reverse order. Screen No. 5 is first used. The operator hinges the screen in position on the operating table by inter-locking the hinged sections. This readily positions the screen and permits it to be raised and lowered. The card-board 20 to be printed is then placed under the screen and registered into place by small strips of card-board of metal as register strips and the usual means of forcing the color thereto is employed by passing a squeegee across the surface of the screen. The color may be either of oil, water or any other color of a paste and opaque nature. Thus the color is forced through the open area of the screen on to the card-board 20. This screen No. 5 is used for printing in this manner as many card-boards or prints 20 as are desired to be made therefrom after which it is removed and the next screen is mounted in place. It will be obvious that as screen No. 5, in this instance, is the first screen used that the color designated by A or sky-blue, is passed therethrough so as to cover the entire area of the print with the exception of the white clouds and smoke marked B as shown in Fig. 9. When screen No. 4, which is the next in order, is placed in position its color F which in this instance is green, is forced through the openings in the screen so as to leave on the print the green fields and foliage in the tree over a portion of the sky-blue field as shown in Fig. 10. Thus the colors green and blue, as presented by F and A respectively, are printed. The third screen to be used is screen No. 3 which will add brown to the colors already on the print through that portion of the negative shown in Fig. 6, whereby the print will appear as shown in Fig. 11, i. e., the green on the blue and the brown on the green and blue. Screen No. 2 is then placed in position and the color indicated by C or a yellow color is forced through the open mesh for coloring the print throughout the space shown as blocked out in Fig. 5, resulting in a print such as is shown in Fig. 12. Lastly screen No. 1 is placed in position and the orange will be forced through that portion of the screen shown as blocked out in Fig. 4 so as to color the print as shown in Fig. 13. The print is now completed having five colors in addition to the original color of the paper, said colors being built up one upon the top of the other, the color of the greatest area coming first and the succeeding colors lying on top thereof, the color of the smaller area coming last. This gives the desired embossed effect and appearance of an oil painting.

In this connection it may be observed that any suitable sensitizing solution may be employed, the particular solution set out and described in detail being suitable for the purpose and having been conceived for use with respect to this particular process. Also any number of colors or variations therein may be employed without departing from the nature or scope of this invention. Furthermore, the negative which has been described herein as a celluloid sheet may be in the nature of a glass plate or any other form of transparent material.

This process lends itself to commercial work inasmuch as the negative employed may be a photographic plate of any commercial print or photograph such as a newspaper advertisement or picture, an oil painting, a photograph or the like. In reproducing an engraving of a complicated character, considerable time would be eliminated in arriving at a print of this kind by making the photograph thereof and taking the positive plate from the photographic negative which positive plate may be used after the same manner as the celluloid negative herein described. A half tone negative may be made from a photograph in a sixty line screen finer or coarser, and this used as the negative for reproducing the photograph which is made up of little dots such as found in a newspaper cut. Us-

ing the process herein described permits of reproducing the finest line to the heaviest line without missing a detail. In such a reproduction from a photograph or the like using a positive plate in the same manner as the negative herein, coloring may be added by opaquing or blocking out portions of the negative plate and transferring the same to screens to be used for the various colors as above described.

The invention claimed is:

1. The process of producing multi-colored pictures or designs consisting of providing a plurality of mesh screens, blocking out a portion of the first screen excepting for an area representing a color of relatively small area, blocking out a second screen excepting for a portion representing the combined area of the color of relatively small area and the color of the next larger area, running the color through the second screen first and thereafter running the color through the first screen so as to cover a portion of the color first run.

2. The process of producing multi-colored pictures or designs consisting of blocking out a plurality of screens and causing a portion of each screen to be opened, the open portion of the first screen being relatively small and the open portion of the following screens being relatively larger and inclusive of the opening through the preceding screens, and thereafter applying color through the last screen having the all inclusive openings first and the first screen having the smallest openings last.

3. The process of reproducing multi-colored pictures or designs consisting of sensitizing a plurality of screens so as to render them impervious, blocking out the color of smaller area on a negative, printing one of said screens therewith so as to render the screen open throughout the blocked out portion of the negative, blocking out the color of next largest area on the negative in addition to the portion previously blocked out and printing the same on a second screen so as to render said screen open throughout the area of the combined blocked out portions, passing color on to picture or design through the open portion of said second screen and thereafter passing another color through the open portion of said first screen so as to cause it to cover a part of the first color applied.

4. The process of producing multi-colored pictures or designs consisting of providing a plurality of sensitized screens employing a single negative by successively blocking out the various colors thereon beginning with the color of least area and ending with the color of greater area, printing each of said screens through said negative after each successive blocking out so as to cause each of said screens to be opened throughout the blocked out area and impervious throughout the remainder thereof, and thereafter passing the desired color on to the picture or design through each of said screens independently of each other, the last screen to be printed being the first through which the color is passed, and the first screen to be printed being the last through which the color is passed.

5. The process of producing multi-colored pictures or designs consisting of treating said screen, providing a plurality of screens by mounting mesh upon a plurality of frames, treating said screens with a sensitized solution for rendering said mesh impervious, forming a negative by blocking out the color of least area on a transparent plate so as to render that portion of the plate opaque, exposing the first screen to the light through said negative so as to harden the exposed portion of the screen and permit the unexposed portion of the solution to be washed therefrom, blocking out the color of next largest area on said negative so as to render that portion opaque in addition to the previous blocked out portion of the negative, exposing a second screen to the light through said negative and washing out the solution from the unexposed surface, drying said screens, applying the desired color to the picture through the open part of the second screen, and thereafter applying the second desired color to the picture through the open portion of the first screen last.

In witness whereof, I have hereunto affixed my signature.

GLEN IRVIN KEEL.