

H. L. RECKARD.
 PHOTOMECHANICAL PROCESS OF ENGRAVING.
 APPLICATION FILED OCT. 5, 1909.

962,097.

Patented June 21, 1910.

3 SHEETS—SHEET 1.

Fig. 1.

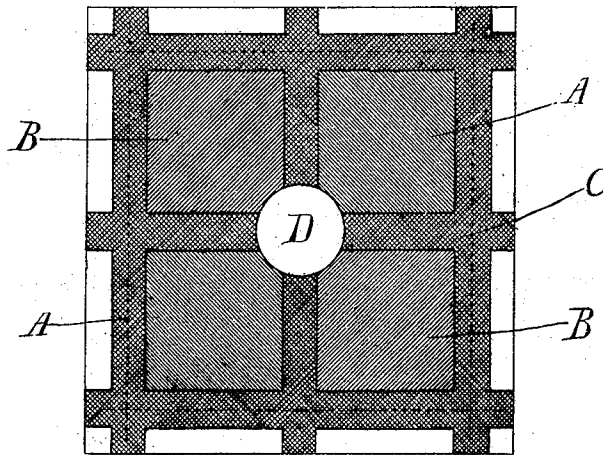


Fig. 2.

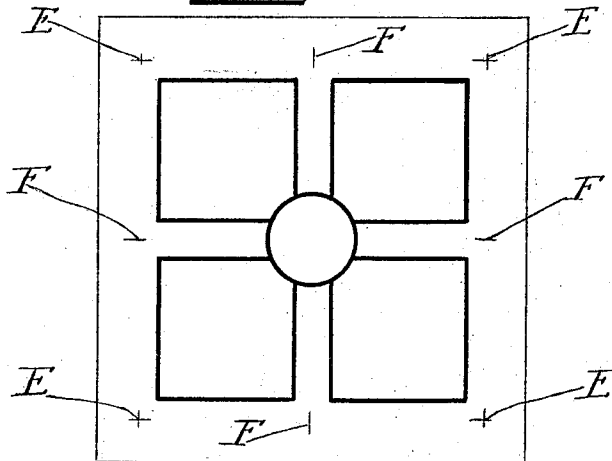
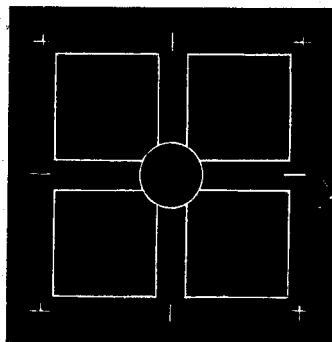


Fig. 3.



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3 SHEETS—SHEET 2.

Fig. 4.

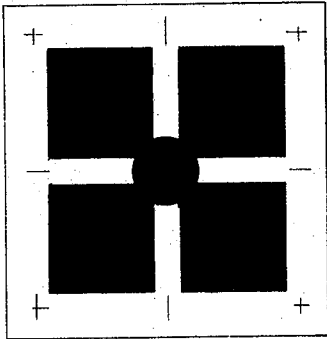


Fig. 7.

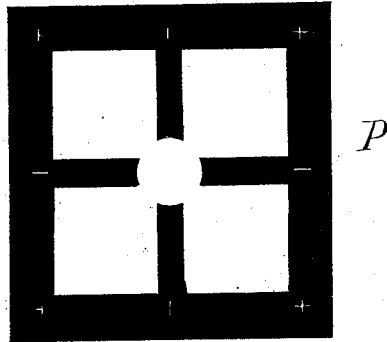


Fig. 5.

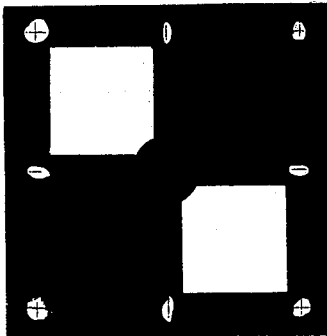


Fig. 8.

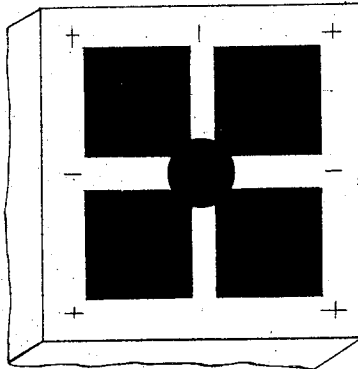


Fig. 6.

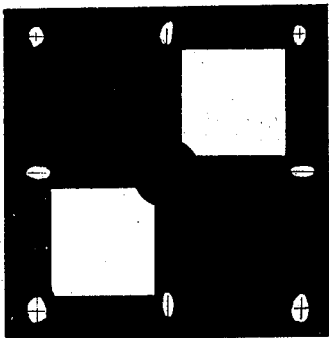
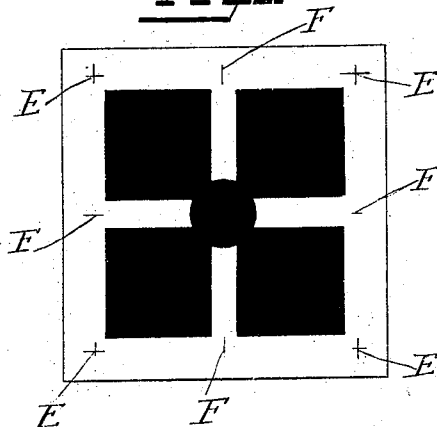


Fig. 9.



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 3 SHEETS—SHEET 3.

Fig. 10

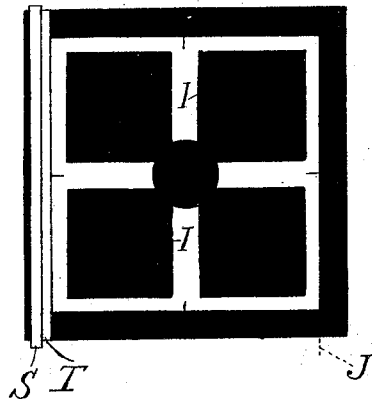


Fig. 11

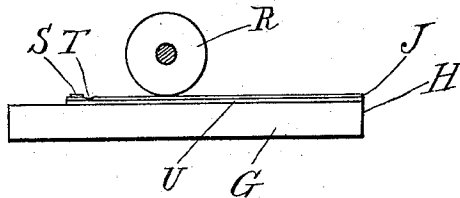
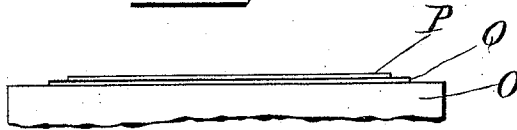


Fig. 12



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UNITED STATES PATENT OFFICE.

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PHOTOMECHANICAL PROCESS OF ENGRAVING.

962,097.

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To all whom it may concern:

Be it known that I, HENRY L. RECKARD, a citizen of the United States, residing at Hartford, county of Hartford, State of Connecticut, have invented certain new and useful Improvements in Photomechanical Processes of Engraving, of which the following is a full, clear, and exact description.

My invention relates to multi-color printing in two or more non-overlapping colors known as mosaic and has for its object to produce a photo-mechanical process of engraving several rollers so as to provide for the flow of the printing color in or on the fabric being printed so that adjacent colors will meet but not overlap or run into one another.

As is well known, in multi-color printing provision has to be made for the flow of the printing color in or on the fabric being printed and in order to provide for this flow, the intaglio printing surface is made slightly smaller than the area covered by the color in the printed fabric.

My invention provides a method for producing this slightly smaller intaglio surface on each of the respective printing rollers in a manner which is accurate, speedy and inexpensive.

The following is a description of a process embodying my invention, reference being had to the accompanying drawings, in which,

Figure 1 represents the original sketch of a three-color mosaic design; Fig. 2 is an outline drawing of the areas covered by the several colors; Fig. 3 is a negative of the drawing of Fig. 2, reduced in size; Fig. 4 is a transfer made from a photo-lithograph produced from the negative of Fig. 3 having the part of its surface which corresponds to all but one color in the original blotted out; Fig. 5 is a similar transfer, having the part of its surface which corresponds to all but a second color blotted out; Fig. 6 is a similar transfer having the part of its surface corresponding to all but the third color blotted out; Fig. 7 represents a photographic negative of Fig. 4; Fig. 8 represents a photo-lithograph made from Fig. 7; Fig. 9 represents a transfer taken from the photo-lithograph of Fig. 8; Fig. 10 represents a sheet of zinc to which the ink from the transfer of Fig. 9 has been transferred and

which has been further treated; Fig. 11 represents the roller to be engraved being brought in rolling contact with the zinc sheet, Fig. 10. Fig. 12 shows a step in a modification of my process.

Referring more particularly to the drawings, one element of a design to be printed by three rollers is contained within the dotted lines of Fig. 1. Three colors, A, B, C and a blank space D are represented in the design. Three rollers are therefore provided of exactly the same size, one for each color. I first make an outline drawing (Fig. 2) of the three colors, the outline being the outline of all three colors. The lines of this drawing (Fig. 2) are of such width that the space provided by them in the subsequently engraved surfaces will be such a space as experience has shown to be necessary to leave for the flow of contiguous colors. This space is well understood by those skilled in the art and has long been allowed for in engraving of rollers for use in multi-color printing. The outline drawing should be made in dead black ink on a smooth white card, as shown in Fig. 2, and the limits of the element indicated thereon as at E. I then make from the drawings a negative (Fig. 3) upon a sensitized plate, the space within the limits being made equal to the space to be occupied by the element on the engraved surface. Wet-plate photography is preferably used on account of the strong contrast which it provides between transparency and opacity. I then make from this a photo-lithograph upon a stone or suitable metal surface and print therefrom on a smooth white card in dead black ink a number of copies, at least equal to the number of colors. I then fill in with dead black color on one card the areas represented by all except one of the colors, as shown in Fig. 4. That is, I fill in what corresponds to the white area of the original sketch and all but one of the color areas. On another card I fill in with dead black color the areas represented by all except a second of the colors, as shown in Fig. 5, and on the third card I fill in the areas represented by all except the third color, as shown in Fig. 6. This leaves on each photo-lithographic copy a different white area. The result is to produce three negative pictures, one of each of the areas of the several colors. The areas as shown in

these pictures are proportional to the areas within the lines of the drawing (Fig. 2) and are therefore smaller than the corresponding areas covered in the original sketch would be if the design had been photographed without having first been outlined, the areas in outlining having been trimmed down by one half of the width of the outline. The areas to be engraved on the roller in each instance are shown upon the inked photolithographic print in clear white, the surrounding area being in black. Three negative photographs are then made on sensitized plates, one from each of the cards shown in Figs. 4, 5 and 6. The negative photograph P of the card of Fig. 4 is shown as an example in Fig. 7. These negative photographs are each a positive photograph of the trimmed area covered by the respective colors in the design. Having obtained these photographs, a roller is made from each photograph as follows: Taking, for instance, the photograph shown in Fig. 7, a photolithograph (Fig. 8) is made therefrom upon a suitable stone or metal. A transfer (Fig. 9) is made from this photolithograph. After the transfer is made, the roller to be engraved may be rolled over it so as to transfer the ink thereto. The roller, when the ink has been transferred thereto and the paper removed is etched. In etching the roller is first powdered with fine asphalt powder, applied with soft cotton, and then dusted with a clean piece of cotton. The asphalt adheres to the inked parts but does not adhere to the copper. The roller is then warmed from the inside until the asphalt blends with the ink. When cooled, the roller is immersed in a bath of acid, being revolved to insure even action. I prefer to use as an etching solution chlorid of iron two parts and water one part; nitric acid may be used. In a similar manner the blank spaces of Fig. 5 are etched upon another roller. In a similar manner the blank spaces of Fig. 6 are etched upon a third roller, care being taken that the etchings upon the several rollers are so located as to register properly when in the printing machine.

Instead of applying the rollers directly to the transfers, I prefer to transfer the ink from the transfers to the rollers through the medium of a thin zinc sheet. For this purpose I apply to each of the transfers a separate sheet of zinc about 1/100 of an inch thick, under pressure. The ink adheres to the zinc sheets, as shown at I, Fig. 10, the paper of the transfers being removed by the application of water. The zinc sheets are then etched. In doing this each of the sheets is inked up strong and sharp in the ordinary lithographic manner and powdered with fine asphalt. They are then dusted clean with cotton or with a brush, prefer-

ably with cotton. The plates are then warmed until the asphalt is melted into the ink, forming a hard smooth acid resist. The exposed edges and backs of the zinc plates outside the limits of the design are then coated with asphalt varnish except a space about 1/16 of an inch wide at the beginning of the design. The plates are then immersed in dilute nitric acid (about sixteen parts water, one part nitric acid) which is allowed to eat out the exposed surfaces to a depth of about 2/1000ths of an inch so that it may be inked with an acid resisting ink applied with a smooth inking roller. The eating must be of such a depth that the inking roller will deposit no ink in the depths of the plate. They are type surfaces and not planographic surfaces. The designs to be engraved upon the rollers are in the depths of the plates. After etching, the acid resist and asphalt are washed off the zinc plates with turpentine and one edge of each is cut off on a line J with the remote edge or end of the design. One of the plates is then inked with a stiff acid resisting ink and placed on a smooth table G, Fig. 11, having a straight edge H, the cut-off edge of the zinc plate corresponding exactly with the straight edge of the table shown in Fig. 11. The first roller R (Fig. 11) to be engraved is then supported above the table. A strip of thin clean paper S is placed on the zinc plate on the table in a line parallel with the edge or beginning of the design about 1/16th of an inch away from the design so as to leave uncovered the etched line T at the beginning of the design. The sticky ink holds the paper in place. The roller is then lowered on to the strip of paper (which is to provide a perfectly clean rest for the roller) and pressure applied. The roller is then caused to make one complete revolution rolling over the surface of the inked plate and the ink is thereby transferred to the surface of the roller. In order to make the zinc plate contact more perfectly with the roller to be engraved, I preferably place between it and the table a yielding backing U. The area corresponding to one color shows in clean copper on the roller, the field around the area being covered with acid resisting ink. The roller is next etched. In doing this it is powdered with fine asphalt powder applied with soft cotton and then dusted with a clean piece of cotton. It is then warmed and treated in the manner before described. When the three rollers have thus been etched from the respective photographs of the cards of Figs. 4, 5 and 6, either with or without the use of the zinc plate, and properly cleaned, they are ready to be placed in the machine and if the work has been done with care so that the engraved portions are properly located, they will register cor-

rectly so that when the proper colors are supplied to the rollers respectively the three color design will be properly printed upon the fabric, space being allowed for the flow of adjacent colors.

A modification of my process consists in producing the photo-lithograph of Fig. 8 and the other similar photo-lithographs corresponding to the other color areas by a somewhat different method. Each of these photo-lithographs has its uninked area slightly trimmed or reduced on all sides so as to be less than the corresponding area of the resultant print, the difference being the space left for color flow. In order to make such a photo-lithograph, I may outline the areas covered by the different colors with a very fine line, and then produce a negative of this outline drawing of the size of the final print desired. I then produce photo-lithographs from this negative and take photo-lithographic prints from the photo-lithograph in the ordinary manner. Upon a number of these photo-lithographic prints corresponding to the number of colors I then blot out the area corresponding to all except the area covered by one color, a different area being left on each photo-lithographic print. I then make wet plate photographs of each of these blotted out prints. I then make photo-lithographs from each of the negatives thus obtained, but instead of applying the negative to the photo-lithograph *i. e.* stone O directly, as is ordinarily done, I interpose between the negative P and the sensitized stone on to which the photo-lithograph is to be formed, a thin sheet of celluloid or other transparent material Q (Fig. 12). The result is that the protected areas of the stone O are somewhat smaller than the dark parts of the negative, owing to the light being allowed to penetrate under the edges of the dark areas of the negatives by reason of the presence of the transparent material. The space necessary to allow for flow is well understood by those skilled in the art, and the thickness of the transparent material must be sufficient so as to make the engraved spaces upon the metal finally engraved small enough to provide for this space. Having obtained this photo-lithograph having its inked portions of the desired size, the rest of the process is carried out as before explained. Where repeats are made, a plurality of similar transfers are made and mounted on a lay-out. To assist in placing the transfers properly upon the lay-out, I provide in addition to the limit or cutting marks E, registration marks F. The originals of these marks are placed upon the drawing of Fig. 2, as shown at E and F. The traces of these marks are erased or blotted out upon the zinc sheet or other metal surface to be engraved before etching, where necessary. When they will appear on ground-

ed or ungrounded intaglio surfaces of rollers for fabric printing, they need not be erased, since they will be obliterated on the fabric printed by the flow of the color therein.

What I claim is:

1. In a process of photo-mechanically engraving rollers for mosaic printing, the improvement which consists in producing a plurality of photo-lithographs whose uninked areas are reduced on all sides so as to be less than the corresponding areas of the resultant mosaic print to be made, the number of photo-lithographs corresponding to the number of colors to be printed, the uninked area on each of the several photo-lithographs being different and corresponding respectively to the colors to be printed, producing transfers from said photo-lithographs, transferring the ink of said transfers to thin sheets of metal, etching said sheets; inking said sheets when etched, applying the rollers to be engraved to said sheets under pressure, and etching said rollers. 70
2. In a process of photo-mechanically engraving metal for mosaic printing of a design in a plurality of colors, the improvement which consists in producing an outline drawing of the areas covered by the respective colors, producing a photographic negative of said outline drawing, producing a photo-lithograph from said negative, producing a plurality of photo-lithographic prints from said photo-lithograph corresponding in number to the different colors to be printed, blotting out on the several photo-lithographic prints all surface corresponding to the design except the area corresponding to one of the colors to be printed, a different area being left upon each print thus blotted out, producing photographic negatives of each of the blotted out prints, producing inked photo-lithographs from each of these negatives whose uninked areas correspond to and are reduced on all sides so as to be less than the corresponding areas of the resultant print to be made, the uninked area on each of the several photo-lithographs being different, producing transfers from said photo-lithographs, transferring the ink of said transfers to metal surfaces and etching said metal surfaces. 90
3. In a process of photo-mechanically engraving metal for mosaic printing, the improvement which consists in producing a heavy outline drawing of the areas covered by the respective colors, the width of the line being proportionate to the space to be left for color flow in the engraving, producing a photographic negative of said outline drawing, producing a photo-lithograph from said negative, producing a plurality of photo-lithographic prints from said photo-lithograph corresponding in number to the different colors to be printed, blotting out 130

on the several photo-lithographic prints all the surface except the area corresponding to one of the colors to be printed, a different area being left upon each print thus blotted out, producing photographic negatives of each of the blotted out prints of the size of the engravings to be made, producing lithographs from each of these negatives, transferring the ink from each of these negatives to metallic surfaces and etching the metallic surface so as to eat away the portions uncovered by the ink thus transferred.

4. In a process of photo-mechanically engraving metal for mosaic printing, the improvement which consists in producing an outline drawing of the areas covered by the respective colors, producing a photographic negative of said outline drawing, the lines in the drawing being such as to make the lines in the negative of a width corresponding to the space to be allowed for color flow upon the engraved surfaces, producing a photo-lithograph from said negative, producing a plurality of photo-lithographic prints from said photo-lithograph corresponding in number to the different colors to be printed, blotting out on the several photo-lithographic prints all the surface except the area corresponding to one of the colors to be printed, a different area being left upon each print thus blotted out, producing photographic negatives of each of the blotted out prints of the size of the engravings to be made, producing lithographs from each of these negatives, transferring the ink from each of these lithographs to metallic surfaces and etching the metallic surface so as

to eat away the portions uncovered by the ink thus transferred.

5. In a process of photo-mechanically engraving rollers for mosaic printing, the improvement which consists in producing an outline drawing of the areas covered by the respective colors, producing a photographic negative of said outline drawing, the lines in the drawing being such as to make the lines in the negative of a width corresponding to the space necessary to be allowed for color flow in the goods printed, producing a photo-lithograph from said negative, producing a plurality of photo-lithographic prints from said photo-lithograph corresponding in number to the different colors to be printed, blotting out on the several photo-lithographic prints all the surface except the area corresponding to one of the colors to be printed, a different area being left upon each print thus blotted out, producing photographic negatives of each of the blotted out prints, producing lithographs from each of these negatives, transferring the ink from each of these lithographs to metallic surfaces and etching the metallic surface so as to eat away the portions uncovered by the ink thus transferred, inking the metallic surfaces thus etched and transferring the ink therefrom to rollers to be engraved and etching said rollers so as to eat away the portions uncovered by ink.

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