

Feb. 28, 1950

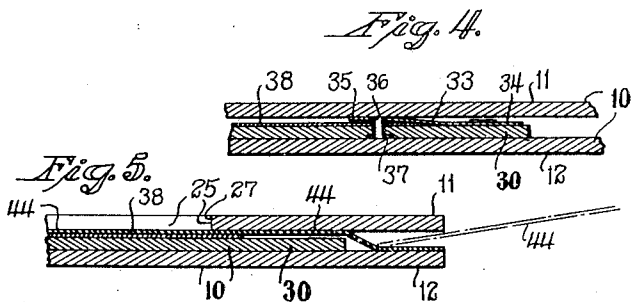
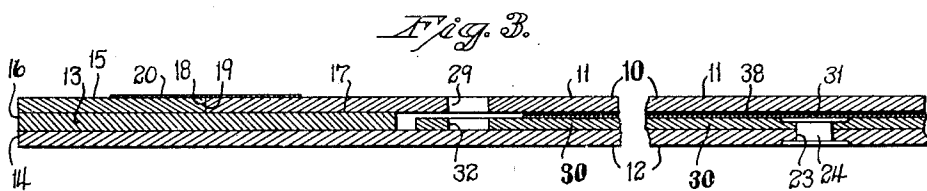
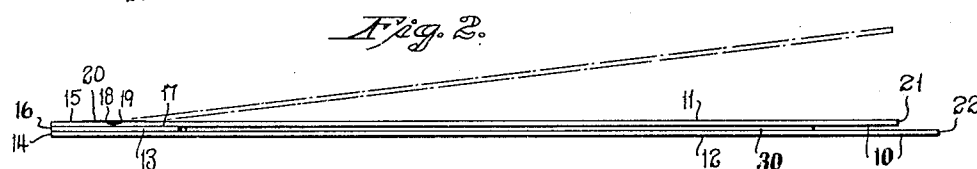
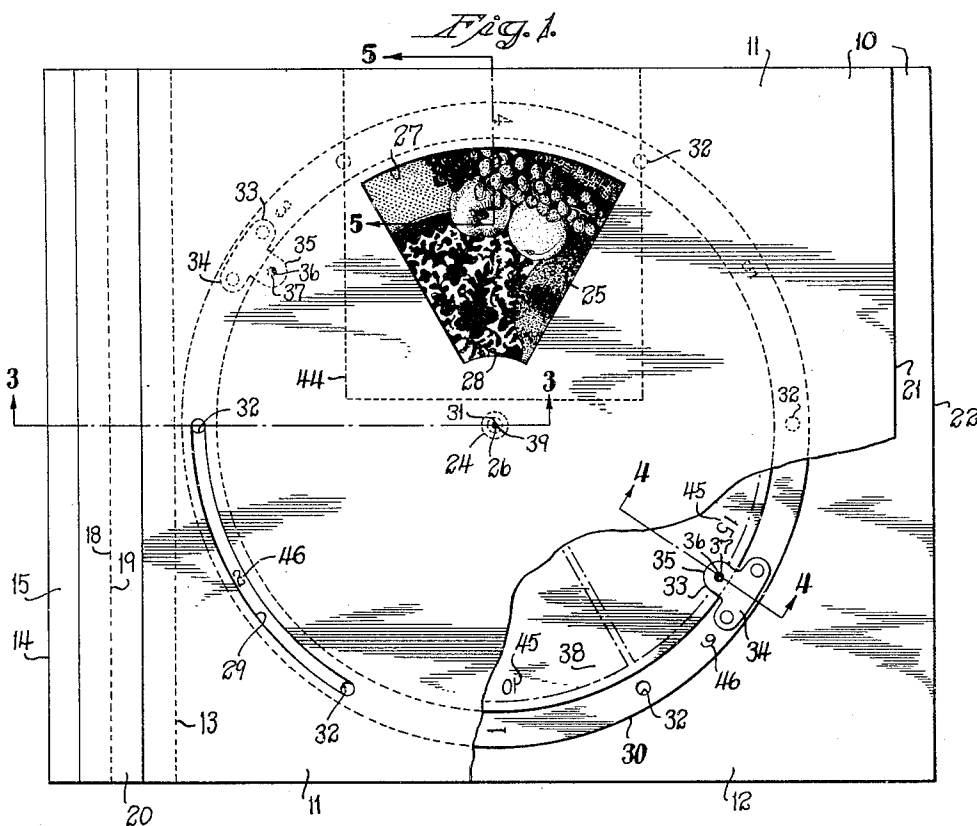
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2,498,741

PHOTOGRAPHIC PRINTING MASK

Filed June 26, 1946

3 Sheets-Sheet 1



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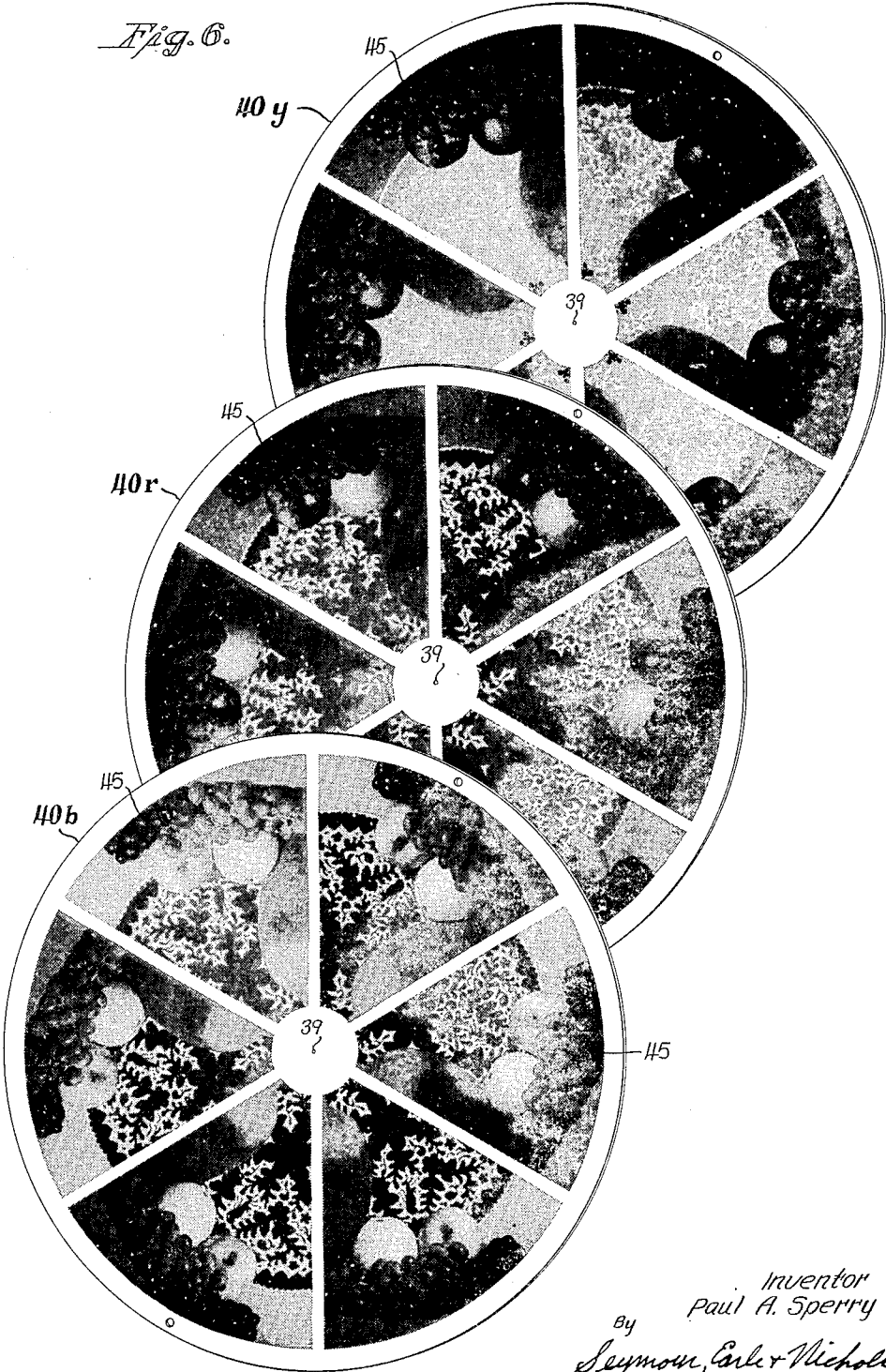
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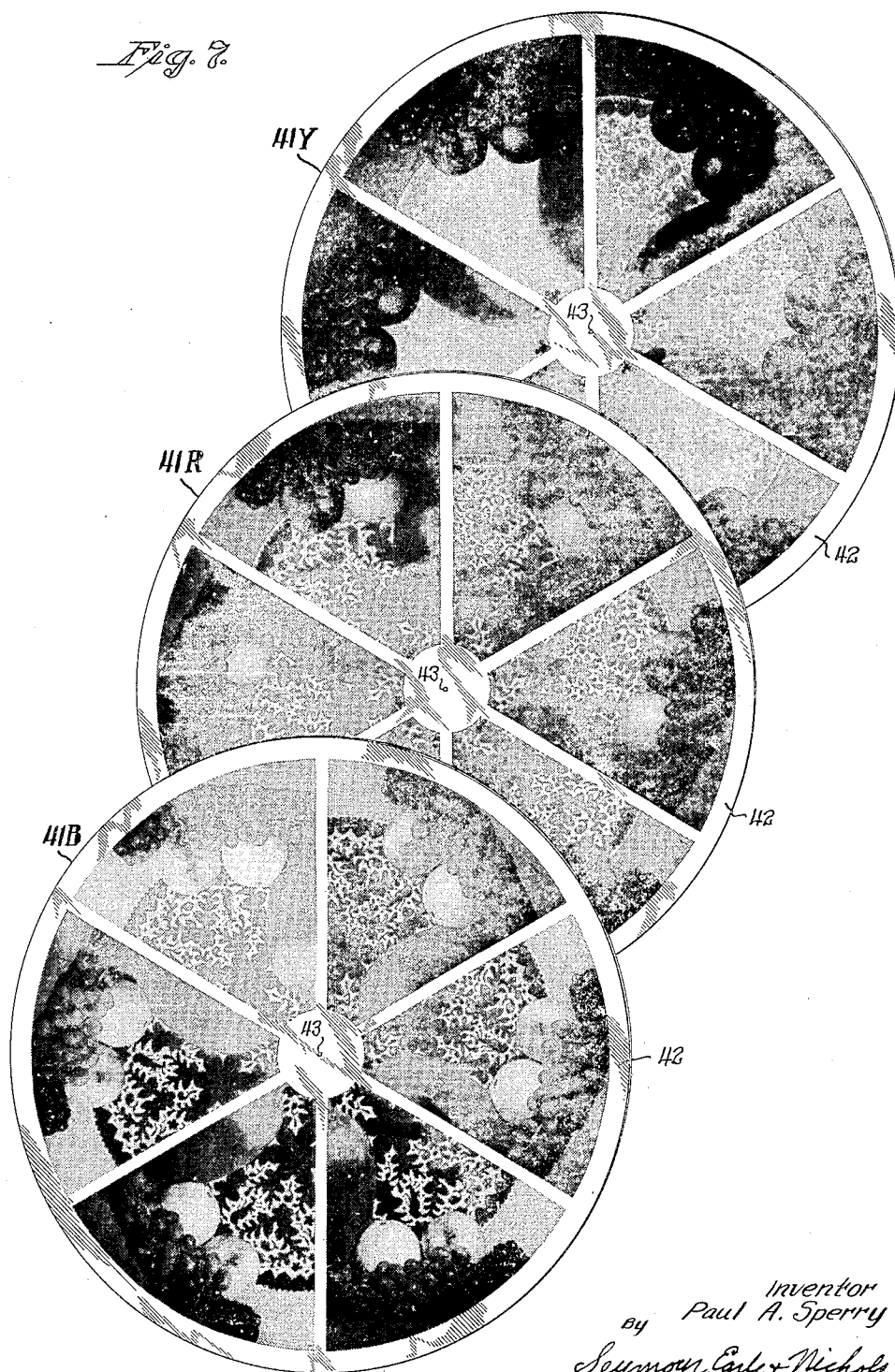
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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PHOTOGRAPHIC PRINTING MASK

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4 Claims. (Cl. 95—2)

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The present invention relates in general to photography and more especially to improved means for making test prints by photography. In particular, the invention relates to an improved printing mask for use in making test bromide prints for producing colored prints, in accordance with the Trichrome Carbro color-printing process.

The production of colored photographic prints by the Trichrome Carbro process is, in general, characterized by making three separation negatives of the colored subject by the use of three separate filters commonly designated as the A filter (orange-red), the B filter (green), and the C filter (blue-violet), the black-and-white rendering of each separate negative being accomplished either by exposing all three negatives simultaneously, as is done with the "one-shot" camera, or by exposing each negative separately. After the separation negatives have been developed, suitable bromide prints, commonly known as the blue, red and yellow printers, are made therefrom, either by contact or projection printing methods, one bromide print being made for each separation negative. Three sheets of pigment tissue are then provided, each sheet corresponding to one of the primary colors, blue, red, and yellow, to be used in making the final print, these separate sheets of pigment tissue being mounted on their respective bromide printers and left for a predetermined length of time. Thereafter, each pigment tissue is peeled off of its respective bromide print and transferred to a sheet of waxed transparent or translucent supporting medium such as Celluloid. The final steps of the process comprise, in general, washing away the excess pigment tissue from the respective Celluloids and transferring each of the remaining pigment-tissue images from their respective Celluloid onto a single temporary carrier or paper backing, the three respective pigment images being superposed thereon in exact registration. The superposed pigment images are then transferred from the temporary carrier to a final paper backing to give the finished colored print.

Because of the many variables which enter into the process such as, for example, variations in density of the separation negatives, variations in the black-and-white rendering of the bromides, and variations in the primary color pigment tissues, it has been extremely difficult heretofore to obtain a final colored print having exactly the same colors as those of the original subject.

It is an object of the present invention to provide improved means to facilitate the production

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of a colored print having colors which will match substantially exactly the colors of the original subject.

A further object of the invention is to provide improved means for use in the Trichrome Carbro color printing process to enable a photographer to see in advance, the colors which will appear in the final print before carrying out all of the steps required to make a finished colored print.

A still further object is to provide improved apparatus for making bromide test prints for use in determining the proper black-and-white rendering required of each bromide for effecting the preferred color rendition in the final colored print.

A still further object is to provide an improved mask for making test prints by photography.

With the above and other objects in view, as will appear to those skilled in the art from the present disclosure, this invention includes all features in the said disclosure which are novel over the prior art.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a plan view of the improved photographic printing mask of this invention shown with the image-registering-leaf in operating position;

Fig. 2 is a front elevation of the printing mask shown in Fig. 1;

Fig. 3 is a fragmentary sectional elevation on line 3—3 of Fig. 1;

Fig. 4 is a fragmentary sectional elevation on line 4—4 of Fig. 1;

Fig. 5 is a fragmentary sectional view on line 5—5 of Fig. 1;

Fig. 6 is an exploded view of three bromide-print test disks made by using the printing mask shown in Fig. 1; and

Fig. 7 is an exploded view of three pigment-image test disks made from the three bromide-print test disks shown in Fig. 6.

In carrying out the present invention, an exemplary embodiment of which is shown in the drawings, a printing mask is employed which, as shown generally at 10 in Fig. 1, is a substantially-rectangular composite member comprising a front cover 11 and a back cover 12, each cover consisting of a relatively-thin but stiff sheet of cardboard, although metal, plastic or any other substantially-opaque material may be used.

The arrangement of the covers of the mask is generally like that of a conventional book. As shown in Figs. 2 and 3, the front cover 11 is spaced

vertically from the back cover 12 by means of a spacer-member 13 which may comprise a relatively-thin-and-narrow strip of cardboard or equivalent material secured to the back cover 12 along the left-hand edge 14 thereof, as shown in Fig. 1. Superposed on the spacer-member 13 is a marginal strip 15 of relatively-thin cardboard or equivalent material substantially half as wide as the spacer-member 13 and firmly secured thereon along its outer edge 16. The exposed surface 17 of the spacer-member 13 constitutes a step for supporting the left side of the front cover 11, the corresponding edge 18 of which is adapted to be held in abutting engagement with the adjacent longitudinal edge 19 of the marginal strip 15 by means of a hinge 20 which, in the present embodiment, comprises a strip of flexible binding or adhesive-tape material secured to the adjacent top surfaces of the respective marginal strip 15 and front cover 11. The opposite or right-hand edge 21 of the front cover 11 is offset with respect to the corresponding edge 22 of the back cover 12 to facilitate engagement of the edge 21 for opening the front cover 11.

The back cover 12 is substantially imperforate except for a substantially-central axial aperture 23 in which is mounted a rivet 24 or other equivalent device constituting a fixed pivot-pin, the upper end of which projects above the inside surface of the back cover, for the purpose hereinafter described.

The front cover 11 is provided substantially midway between its transverse edges 18 and 21 respectively with a substantially-sector-shaped window or exposure-opening 25, the straight sides of which extend radially from a central point 26 of the front cover, the point 26 being a projection of the fixed pivot-pin 24 in the back cover 12. As shown in Fig. 1, the window is provided with outer and inner arcs 27 and 28 respectively which define the transverse dimensions of the window, each arc being struck on a circle concentric with the central point 26 of the front cover 11. In the embodiment shown, the angle subtended by the outer and inner arcs is substantially 60°, but it will be understood that this angle may be less than or greater than 60°, in accordance with the particular requirements to be fulfilled. Formed in the front cover 11 adjacent the left-hand side and lower corner thereof, is an arcuate slot 29 which is concentric with the central point 26 of the front cover and likewise subtends an angle of substantially 60° corresponding to the angular measure of the sector-shaped window 25. The arcuate slot 29 is of such width as to accommodate the pointed end of a skewer (not shown) or similar type of instrument for indexing the printing paper, as hereinafter described.

Mounted within the front and back covers of the printing mask is a carrier-disk 30, the diameter of which is somewhat less than the longitudinal and transverse dimensions of the cover 11. The carrier-disk 30 is rotatably mounted on the back cover 12 by the flanged pivot-pin 24, the upper end of which projects up through the carrier-disk 30. Formed on the upper end of the pivot-pin 24 and projecting slightly above the surface of the carrier-disk 30, is a relatively-sharp paper-centering teat 31. At substantially-equally-spaced points about the rim of the carrier-disk 30 are a plurality of apertures 32, the apertures 32 being on a circle, the radius of which corresponds substantially to the radial distance of the slot 29 from the center 26 of the front cover. The apertures 32 are also spaced

apart substantially 60° to correspond to the angular measure of the arcuate slot 29, the space between any two apertures being given an index number 46. Fixed at diametrically-opposite points adjacent the rim of the carrier-disk 30 and between any two pairs of apertures 32, are suitable clips or paper-retaining members 33, each consisting of a thin and relatively-flexible material such as cardboard, a stiff fabric or equivalent material, secured at its outer end 34 to the carrier-disk 30 by rivets or equivalent fastening-means. Each clip is provided with an integral radially-and-inwardly-extending tab or finger 35, having an aperture 36 adjacent its inner free end. Directly below the aperture 36 of each tab 35 is a punch-stub or rivet 37 (see Fig. 4) fixedly secured in the carrier-disk 30, the upper end of each punch-stub 37 projecting upwardly sufficiently to engage in the aperture 36 of its respective paper-retaining tab 35. The paper-retaining tabs 35 are adapted thus, due to their inherent flexibility, to be bent upwardly so as to withdraw their respective apertures 36 from off the corresponding punch-studs 37 and permit the mounting of a sheet of printing paper, or equivalent medium embodying a light-sensitive emulsion, on the carrier-disk 30, the sheet of printing paper being secured to the carrier-disk by the tabs 35, as hereinafter described.

The carrier-disk 30 is adapted to be rotated substantially freely between the front and back covers 11 and 12 respectively, due to the vertical spacing thereof. Assuming that the front cover 11 is in its normal position, i. e., closed down over the back cover 12, then rotation of the carrier-disk 30 may be accomplished by first inserting a skewer or other instrument such, for example, as the pointed end of a pencil, into the arcuate slot 29 to engage one of the apertures 32 in the rim of the carrier-disk 30 and then moving the skewer through the length of the arcuate slot 29. Thus, when the skewer is engaged in an aperture 32 of the carrier-disk 30 at the upper extremity of the slot 29, by moving the skewer from the upper end of the slot 29 to its lower end, the carrier-disk 30 will be indexed through an arc of substantially 60°. When the aperture 32 in which the skewer is engaged, arrives at the lower end of the slot 29, the next-succeeding aperture 32 of the carrier-disk 30 will be at the upper end of the slot 29, so that the skewer may be removed from the lower aperture 32 and engaged in the upper aperture 32 to again index the carrier-disk 30 through an arc of substantially 60°. In this manner, the carrier-disk 30 may be indexed through 360° in six successive steps, the number 46 of each indexing step appearing in the arcuate slot 29, as shown in Fig. 1.

The carrier-disk 30 is adapted to support a sheet of printing paper such as, for example, a bromide paper for use in the Trichrome Carbro color-printing process. To this end, the printing paper, shown at 38, is preferably cut in the form of a disk, the diameter of which corresponds substantially to the distance between the outer ends 34 of the two paper-retaining members 33, so that the tabs 35 of the respective paper-retaining members 33 will overlie the peripheral edge of the printing paper 38, as shown clearly in Figs. 1 and 4. When so mounted on the carrier-disk 30, the teat 31 of the pivot 24 punctures the printing-paper disk at substantially its center, while the peripheral edge of the printing-paper disk overlies, at two diametrically-opposite points, the two punch-studs 37 of the carrier-disk 30. The

printing-paper disk 38 is adapted to be secured to the carrier-disk 30 by pressing the apertured tabs 35 down over the upper ends of their respective punch-studs 37 to perforate the peripheral edge of the printing paper thereover.

The above described means for securing a sheet of printing paper to the carrier-disk is highly satisfactory, but it will be understood that any other equivalent means may be used.

In general, when using the printing mask, it is mounted beneath a projector and an exposure is made on the light-sensitive emulsion of the printing-paper disk 38 through the window 25 of the front cover 11. The exposure time of this first exposure may be recorded directly on that limited portion or test area of the printing paper which has been exposed, as indicated at 45, or may be tabulated on a suitable memorandum for each respective test area. Thereafter, the carrier-disk 30 is indexed in the manner described above through an angle of substantially 60°, whereupon a second exposure is made on the next succeeding test area of the printing disk. The time of the second exposure is usually greater, although it may be less than, the time of the first exposure and may likewise be recorded on its respective test area of the printing paper. This procedure is continued until six successive exposures have been made and recorded on the printing paper through the window 25, each exposure being for a different length of time. Consequently, when the printing paper disk 38 is developed, there will appear thereon six successive images of the same subject, each image being of different black-and-white rendering in accordance with the exposure time 45 recorded thereon.

It will be understood that all other factors which enter into the printing process are maintained as nearly constant as possible during the exposure of each respective test area, the only variable being the exposure time. When mounting the printing-paper disks on the carrier 30, the paper-centering test 31 of the carrier-disk 30 indents or punctures the center of the printing-paper disk so as to preclude lateral movement of the paper disk with respect to the carrier-disk 30. The apertures thus punctured in the centers of successive printing-paper disks may serve also to facilitate registration thereof whenever registration is a factor in the printing process.

The printing mask may, of course, be used for any type of photographic printing process to determine the exposure time required for a preferred black-and-white print, but it is particularly adapted for use in making color prints by the Trichrome Carbro process.

As pointed out above, in carrying out this process, three black-and-white bromide prints are required, each being made from its respective separation negative. In making these bromide prints with the printing mask described above, three separate bromide test-prints are formed, indicated generally by the numeral 40 in Fig. 6, the bromide test-disk 40b being the blue printer, the bromide test-disk 40r being the red printer, and the bromide test-disk 40y being the yellow printer; each bromide disk having six successive black-and-white pictures of the same subject but varying in black-and-white rendering in accordance with the various exposures used. Having made these bromide test-disks or test-prints, the photographer then proceeds to make the corresponding pigment-image test-disks, indicated generally by the numeral 41 in Fig. 7, in the manner characteristic of this particular color-printing

process. That is to say, three sheets of pigment tissues are obtained, one being the primary color blue identified by the letter B, the second the primary color red identified by the letter R, and the third the primary color yellow identified by the letter Y. Each sheet of pigment tissue may be cut out in the shape of a pigment-tissue disk corresponding substantially in size to the bromide-print disks 40; and is mounted on its respective bromide print 40b, 40r, and 40y, in the manner practiced in the Trichrome Carbro process. In order to identify, subsequently, each test area of each pigment-image test-disk with the corresponding test area of its respective bromide, a notch, indenture, or other equivalent indicia (not shown) may be made in the periphery of each disk of pigment and its respective bromide test-disk at the time the two are superposed. After a predetermined length of time, the sheets or disks of pigment, each bearing six images, are stripped off of their respective bromides. Now, instead of mounting each disk of pigment on a waxed Celluloid, as is usually done when making a final color print, the pigment disks are mounted directly on suitable transparent or translucent carriers such as clean sheets of Celluloid 42, the excess pigment material being subsequently washed away to leave the six pigment-images on each respective Celluloid carrier 42. This procedure is followed for each one of the three primary color tissues blue, red and yellow, to give the corresponding colored images on three separate sheets of Celluloid, as indicated at 41B, 41R and 41Y in Fig. 7. To facilitate the subsequent registration of the pigment-images on the three separate sheets of Celluloid 42, these sheets may also be trimmed down in the shape of disks, each having a center point or marking 43 corresponding to the central aperture 39 of its respective bromide test-disk 40.

The photographer is now enabled to superpose the three pigment-image test-disks 41 on each other, preferably with the blue pigment-image 41B on top, the yellow pigment-image 41Y on the bottom and the red pigment-image 41R between the blue and yellow pigment-images. By arranging the three Celluloids so that the respective centers 43 thereof are coincident, the pigment-images of the six successive test-areas of each Celluloid will be substantially in register. This assembly of the three primary color pigment-images 41B, 41R and 41Y, permits the photographer to make innumerable combinations of the six individual pigment-images of each of the three pigment-image test-disks 41 simply by rotating the disks relative to each other about their common center 43 until (when viewed against a white light source), a particular color combination is secured, which substantially exactly matches the colors of the original subject. Having thus established the proper combination of three pigment-image test areas which will produce the desired colors in the final colored print, the photographer then notes the exposure time 45 of the corresponding test area of each respective bromide-print 40 and may then proceed to make three bromide prints for use in making the final colored print, the exposure of each bromide print being that of the selected test area of the corresponding bromide test-disk. The photographer is thus assured that the final colored print will have substantially exactly the same colors as those of the original subject.

It will be appreciated, moreover, that in the event the photographer wishes to secure unusual

or unique results by emphasizing one color at the expense of another, this unique result which he wishes to secure can be determined exactly insofar as its color is concerned by selecting the proper combination of pigment test-areas and then exposing the bromide prints accordingly, as described above.

It is necessary to the success of the Trichrome Carbro color printing process that the pigment images of the respective primary colors blue, red and yellow shall be superposed in exactly registered relationship.

In order, therefore, to facilitate the registration of the pigment images of each respective test area of the pigment-test disks 41, it is desirable to provide the printing mask 10 with means to insure that the black-and-white prints of corresponding test areas of each respective bromide 40b, 40r, and 40y will be in exact registration when the bromide print disks are superposed, in order that the pigment-images in the test areas of the pigmented Celluloids formed from these respective bromides will likewise be registerable when the Celluloids are arranged one on the other. To this end, an image-registration leaf comprising a blank piece of paper 44 or other equivalent material, somewhat greater in size than the size of the window 25 of the cover 11, is secured at its upper edge to the upper edge of the back cover 12, see Figs. 1 and 5, substantially opposite the window 25 and is adapted to be swung up and down about its upper edge as a hinge; and to extend normally between the front and back covers so as to overlie the printing paper 30 mounted on the carrier-disk 30. In use, the registration-leaf 44 is first swung down over a disk of bromide printing paper and then the front cover 11 is closed down thereover, whereupon an image of the picture is projected through the window of the front cover onto the leaf 44. While the image is projected on the leaf 44, the photographer may carefully outline or draw in the image thereon by means of a pencil or other suitable marking-means; or for even greater exactitude, the registering-leaf 44 may comprise a piece of photographic printing paper on which the image is printed, the print being secured in like manner to the upper edge of the back cover 12, as shown in Fig. 1, and brought into registry with the projected image. Thereafter, the image-registering leaf 44 bearing the penciled or printed image, see Fig. 1, is withdrawn from between the covers, as indicated by the broken lines in Fig. 5, and the six successive exposures are then made on the bromide paper which, for example, may be the blue printer 40B. When the bromide-disk for the red printer 40r is mounted on the carrier 30, the image-bearing leaf 44 is swung down over the bromide printing paper to cover that portion thereof which would be exposed through the window 25 of the mask. The latter is then properly reoriented with respect to the projector so as to register an image projected onto the leaf 44 with the image which has been formed already thereon. Having re-oriented the mask 10 and in particular the window 25 thereof with respect to the projected image, the mask is held securely, whereupon the leaf 44 is withdrawn and six successive exposures are made on this second bromide test-disk. A similar procedure is followed for making the yellow printer test-disk 40y. As a consequence, the successive images in the test areas of each bromide disk 40 will be found to exactly register when the disks are assembled one on the other

about a common pivot extending through the central aperture 39 of each test disk.

Since the black-and-white images in the test areas of the respective bromides 40b, 40r, and 40y are registerable, then the corresponding pigment-images of the pigment test disks 41B, 41R and 41Y will similarly fall into substantially exact registration when the pigment-image-bearing Celluloids 42 are superposed on a common pivot coincident with their respective centers 43. This expedient readily facilitates registering the pigment-images of the respective test-disks 41 during selection of the proper combination of colored test areas for securing the final colored picture.

Although the printing mask 10 is designed to provide six successive test areas on a single piece of bromide paper for use in making colored pictures by the Trichrome Carbro process, it will be understood that the number of test areas of each sheet of printing paper may be more or less than six, and that the printing mask is in no sense limited in its use to any particular color-printing process but is applicable to photographic printing processes in general. In the latter instance, the printing mask would be used without respect to color separation and, hence, there would be no need for insuring the registration of three independent test-disks. Consequently, the registering-leaf 44 would be withdrawn, as indicated in Fig. 5.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. A printing mask comprising a front cover-member and a back cover-member, said front cover-member having a window, movable-means mounted between said back cover-member and said front cover-member for supporting a medium embodying a light-sensitive emulsion, means to index said movable supporting-means relative to said window, so as to successively expose limited areas only of said light-sensitive emulsion, and registration means comprising sheet material secured at one edge to the corresponding edge of one of said cover-members, said sheet material being displaceable from and replaceable between said cover-members and arranged to overlie said medium and to underlie said window to register the images of mediums supported successively on said movable-means.

2. A printing mask comprising a back-member and a front-member, said front-member being normally in engagement with said back-member and having a window, means to secure said front-member to said back-member to enable said front-member to be displaced with respect to said back-member, rotatable-means mounted on said back-member for supporting a printing paper, elements associated with said rotatable-means to index said rotatable-means relative to the window of said front cover when said front cover is in its normal position, so as to expose limited areas only of said printing paper, and an image-registering sheet material mounted on said back-member and arranged to extend between said front-and back-members to overlie said printing paper and underlie the window of said front-member to register the images of printing papers

mounted successively on said rotatable supporting-means.

3. A printing mask comprising a substantially-rectangular back-member having a flat bottom surface for holding said mask firmly on a supporting-surface, an opaque substantially-rectangular front-member having a window, said front-member being adapted normally to overlie said back-member, a hinge arranged to connect one edge of said front-member to a corresponding edge of said back-member to enable said front-member to be swung upwardly away from said back-member, a rotatable disk mounted on said back-member between said back-member and said front-member and constructed and arranged to support a medium embodying a light-sensitive emulsion, a pair of medium-perforating clips mounted on the periphery of said rotatable disk to detachably lock said medium thereon against rotation relative thereto, and indexing-means in the front face of said front-member and in the periphery of said rotatable disk arranged to cooperate so as to enable said disk to be rotated relative to said window and successively expose limited areas only of said light-sensitive emulsion.

4. A printing mask comprising a substantially-rectangular back-member having a flat bottom surface for holding said mask firmly on a supporting-surface, an opaque substantially-rectangular front-member having a window and an indexing-slot, said front-member being adapted normally to overlie said back-member, a hinge arranged to connect one edge of said front-

member to a corresponding edge of said back-member to enable said front-member to be swung upwardly and away from said back-member, a rotatable disk mounted on said back-member between said back-member and said front-member, paper-retaining means comprising a flexible tab-and-rivet assembly mounted on the periphery of said disk at substantially-diametrically-opposite points thereof each tab-and-rivet assembly being arranged to fasten down corresponding points on the periphery of said printing paper to said rotatable disk, said rotatable disk having indexing-apertures in its periphery constructed and arranged to cooperate with said indexing-slot of said front-member to enable said disk to be rotated relative to the window of said front-member so as to successively expose limited areas only of said printing paper.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
557,246	Wynne -----	Mar. 31, 1896
657,685	Watkins -----	Sept. 11, 1900
1,377,564	Derichsweiler -----	May 10, 1921
2,093,714	Andreis -----	Sept. 21, 1937
2,138,532	Wobensmith -----	Nov. 29, 1938
2,189,285	Gruber -----	Feb. 6, 1940