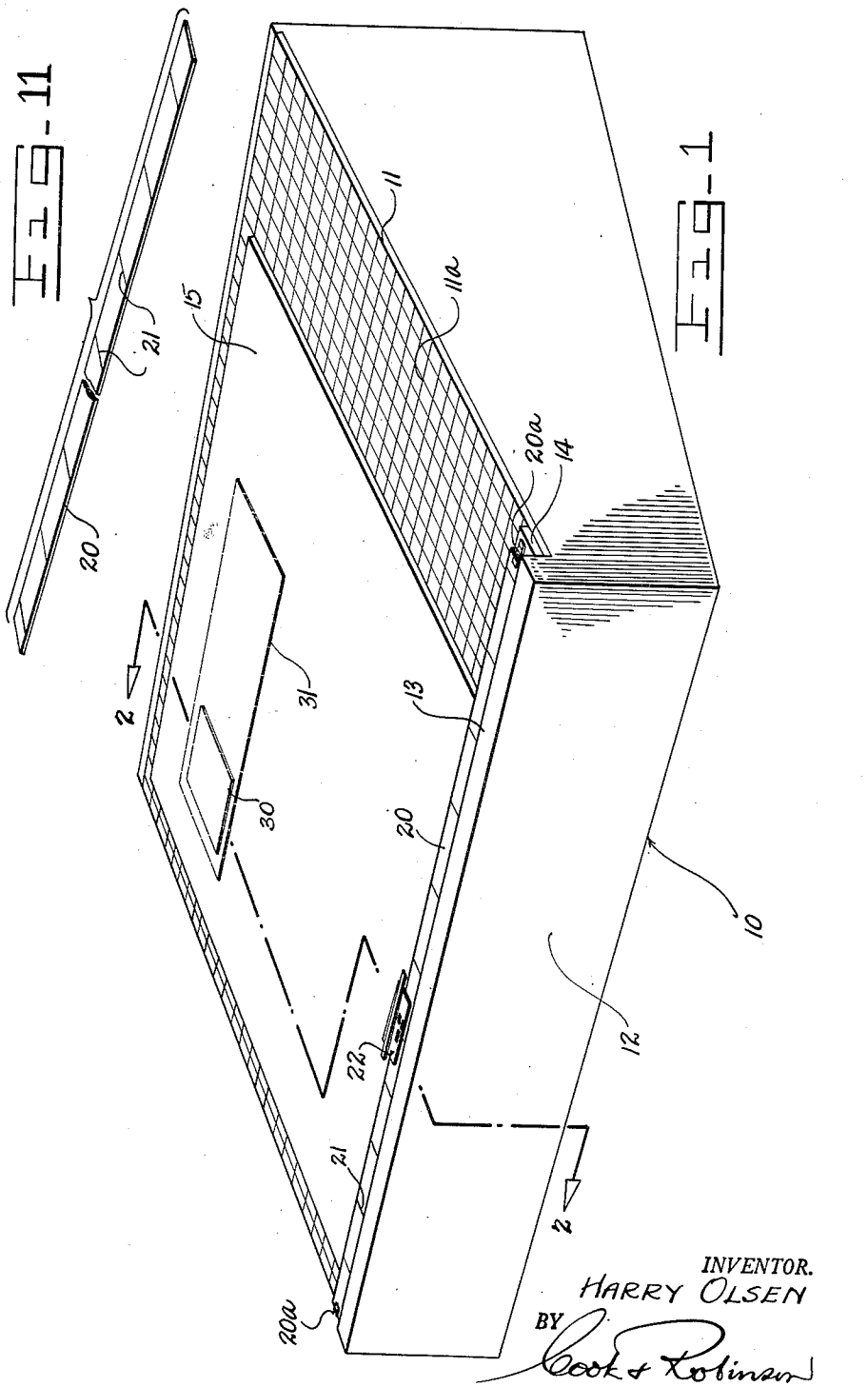
June 29, 1954 H. OLSEN 2,682,463

METHOD AND MEANS FOR MULTIPLE IMAGE PRINTING IN MULTIPLE COLOR JOBS

Filed March 13, 1952

3 Sheets-Sheet 1



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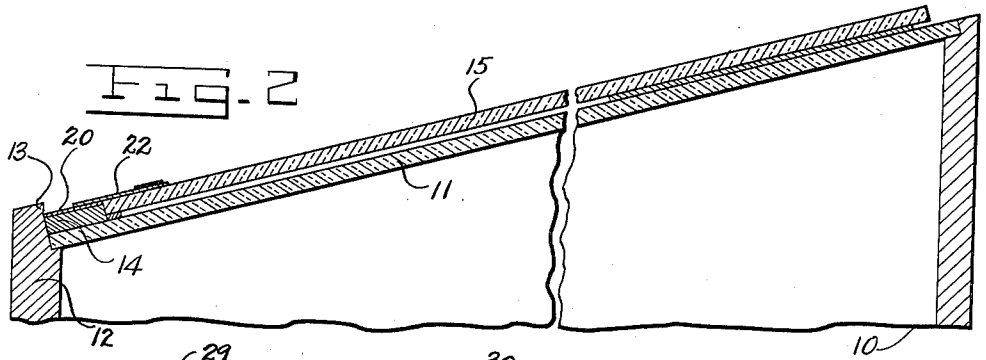
3 Sheets-Sheet 2

Fig. 2



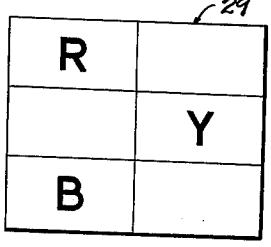


Fig. 3

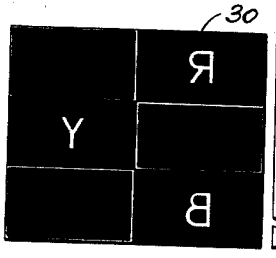


Fig. 4

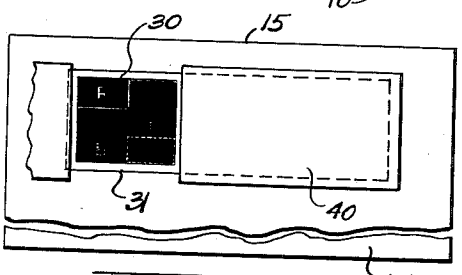


Fig. 5

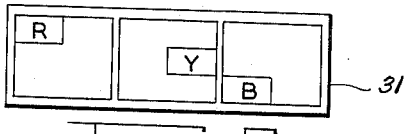


Fig. 6

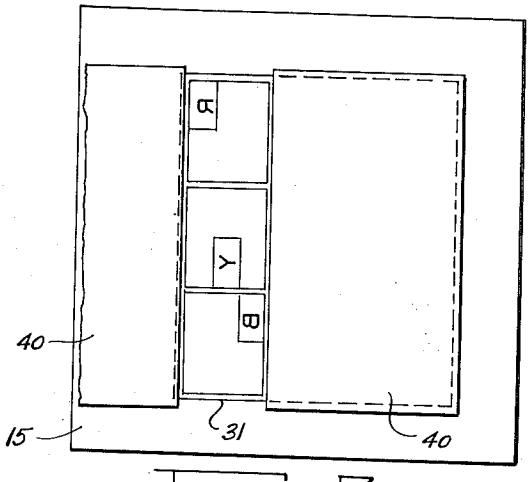


Fig. 7

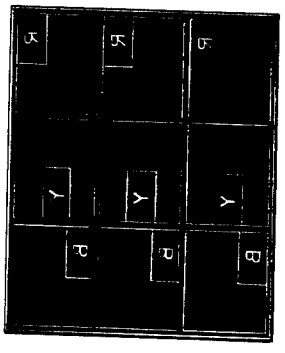


Fig. 8

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3 Sheets-Sheet 3

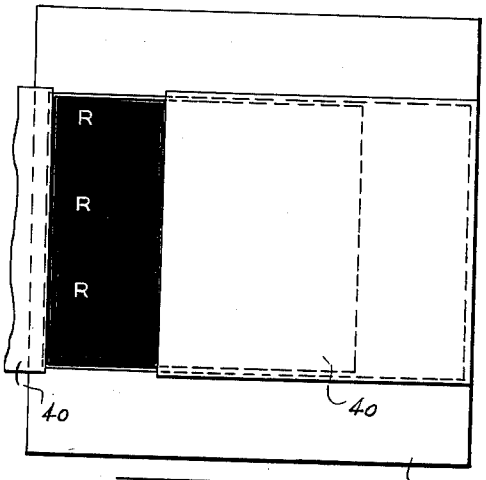

Fig. 9

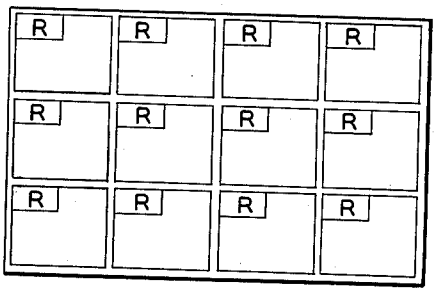

Fig. 10

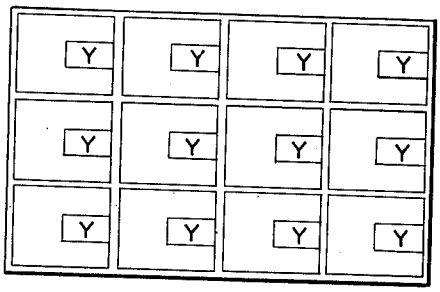

Fig. 10A

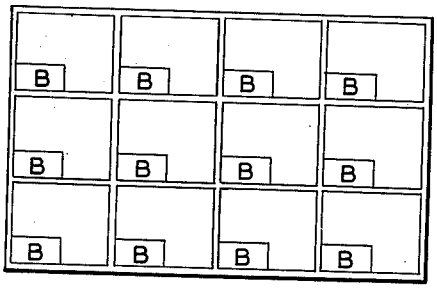

Fig. 10B

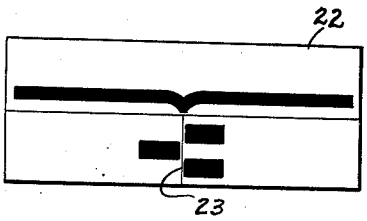

Fig. 12

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Patented June 29, 1954

2,682,463

UNITED STATES PATENT OFFICE

2,682,463

METHOD AND MEANS FOR MULTIPLE IMAGE PRINTING AND MULTIPLE COLOR JOBS

Harry Olsen, Seattle, Wash.

Application March 13, 1952, Serial No. 276,326

2 Claims. (Cl. 95—5.1)

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This invention relates to a method of and means for making negative and positive photographic films for use in the production of printing plates by the photographic process. More particularly, this invention pertains to the method and means for making sets of positive or negative films which contain multiple images for color separating art work and wherein a single drawing containing all of the colors is the original source from which the films are produced. The invention hereinafter described is a simple and inexpensive method whereby a multiplicity of identical images can be produced in perfect alignment on a single photographic film, and this film can be used to produce a printing plate for one particular color with a multiple of identical images thereon.

The printing of multiple images from a single printing plate is the common and economical practice when printing labels, wrappers, stickers, decalcomanias and the like printing matter. Also, it is a well known practice to produce color separated positive films by making a master negative of an original drawing or design and then, by separate operations, opaquing out the various parts of the drawing that represent the different colors and producing negatives therefrom after the opaquing operation for each color.

It is also old in the art to produce a multiple of identical images in alignment on a single film, which are caused to be registered on the film by the use of expensive and elaborate mechanical equipment. The production of a film with multiple images that are aligned and registering by hand, is also old. The latter method of production, however, is a long and laborious task, especially if a large number of images, 30 or 40 for example, are to be produced on each final film in the set. If the individual printer or operator is unable to purchase the expensive mechanical equipment, his only alternative is to use the hand production method requiring that he must first produce a negative by photographing the original drawing or design. He must then, for each color to be used, opaque the negative and print a positive therefrom. After each opaquing operation and printing of the positive, the negative must be cleaned and opaqued for another color. The operator is then required to produce a negative for each image to be reproduced on each final film. After the plurality of color opaqued negatives has been produced by the third step, the operator must then place each of these negatives on a glass backing in perfect registered alignment, each with the others. If there are to

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be thirty negatives used, this is a long and laborious task and the registering and aligning must be repeated for each color which appears in the original drawing or design. This means aligning thirty negatives on each of three films or a total of ninety negatives. In actual practice, it is practically an impossible task to obtain perfect alignment and registration of the plurality of negatives used by this old process.

It is therefore the principal object of my invention to provide a simplified and inexpensive method and means whereby a multiple of images can be produced on each final film and wherein a single opaqued negative for each color is used in the first instance.

It is a further object of my invention to provide a method for producing a multiple of images on a final film in a relatively short time and which guarantees that each image will be in perfect registered alignment with each of the other images on the film. It also assures that the images on the final film for each of the colors in the set will be perfectly registered from one final film to the other.

In the accompanying drawings I have illustrated the several steps which comprise my method of producing multiple images on the final films and have shown certain pieces of equipment whereby the objectives of the present invention are carried out. In these drawings—

Fig. 1 is a perspective view of my special printing table, illustrating the glass carrier on the table and a negative film applied to the glass on the underside thereof.

Fig. 2 is a vertical cross-section of the table taken on line 2—2 in Fig. 1.

Fig. 3 is a view of the original design or drawing as prepared for photographing wherein three colors are illustrated in the design.

Fig. 4 is a view of the master negative produced by a simple photographing process from the original design or drawing.

Fig. 5 illustrates the master negative mounted on the carrier glass and opaqued for the first step in color separation.

Fig. 6 illustrates the positive prints produced on a new, single strip of film from the opaqued master negative.

Fig. 7 illustrates the developed positive mounted on the carrier glass in a lateral position.

Fig. 8 illustrates the film wherein there are multiple negatives for each color.

Fig. 9 illustrates the film of Fig. 8 mounted on the carrier glass and with a portion thereof masked off.

Figs. 10, 10A and 10B illustrate the set of three final films with the multiple images produced thereon in positive form.

Fig. 11 is an enlarged view of the register strip.

Fig. 12 is an enlarged view of the registering marker.

Referring more in detail to the drawings and primarily to Figs. 1 and 2: the device 10, which I refer to as a "table" is of rectangular form, approximately 36 inches long and 28 inches wide. The particular size of the table, however, may be varied as desired or required. The table comprises a frame structure and has a top surface that is inclined at approximately 25 degrees, the purpose for the inclination will hereinafter be fully set forth. The top surface of the table 10 comprises a smooth glass plate 11 of substantially the same dimensions as the table frame and it is mounted directly thereon. The glass plate is of substantial thickness to provide the required strength and rigidity. By means of lines 11*a* formed with white paint on the underside thereof, the plate surface is divided into one inch squares. Then the entire under surface of the plate is coated over these lines with a light-proofing paint or other masking material. The purpose or function of the white lines will later be fully described.

The front wall 12 of the table frame projects above the top surface 11 of the glass plate and provides a ledge or ridge 13. A straight edge 14, preferably of glass, is disposed in fixed position on the glass surface 11 inwardly of the ledge and the straight edge extends the full length of the table. The straight edge must be perfectly smooth and true and although I prefer to use glass, a metal or wood straight edge could, if desired, be used as a substitute therefor.

In Figs. 1 and 2 I have illustrated by broken lines, a piece of plate glass, designated by reference numeral 15, which will hereinafter be called the "carrier glass." This carrier glass may be rectangular or square, with edges merging at right angles. Also, it is perfectly clear and smooth surfaced and all four edges are true "straight edges." The preferred dimensions of the carrier glass are 24 inches by 24 inches, but in any event it must be larger than the films to be placed thereon. It is removable from the table in order that several carrier glasses might be used in sequential operations.

In Fig. 11 I have illustrated an enlarged view of the "register strip" 20 which is a part of the present equipment and which is adapted to be removably secured to the straight edge 14 by pieces of adhesive tape 20*a* or other suitable securing means. The register strip is preferably made of thin metal and has fine line markings thereon, designated by numeral 21. These markings which are applied by the operator for each job or operation are usually equally spaced in multiples of distance.

In Fig. 12 I have illustrated a "registering marker" 22 which is used in combination with the register strip for positioning the carrier glass. The marker 22 is transparent and has a fine line 23 thereon which is adapted to be aligned with the markings on the register strip. The registering marker is secured to the carrier glass as illustrated in Fig. 1 to overhang the lower edge of the glass plate and to ride upon the register strip. By registering the fine line 23 with a designated line 21 on the register strip, the operator can thereby assure the exact positioning of the carrier glass when carrying out the method of my invention. The registering marker may be re-used but it is preferable to use a new register strip for each job or color separating operation.

The reason for forming the table with an inclined top surface is to cause the bottom edge of the carrier glass, by reason of the weight of the glass, to engage at all times in solid abutment against the straight edge 14. This assures that the glass will not become angularly positioned on the table surface and thus produce images on the film that are not in perfect longitudinal and lateral alignment. The inclination of the table surface should not exceed thirty degrees because it is desirable to maintain the vertical pressure of the carrier glass on that surface. The lines 11*a* are provided for the purpose of squaring and aligning the sensitized film placed thereon and to minimize the amount of film which is required for each operation and thereby eliminate waste.

The present method, and the means used in practicing my invention, will now be fully described and I will set forth in detail the several steps and operations required to produce the set of final films which are subsequently used in the preparation of the individual printing plates for each color. For the purposes of this explanation, it is assumed that the label or print to be produced contains a design featuring three colors. For example, the design illustrated in Fig. 3 which contains the colors red, yellow and blue in a specific diagram relationship. In the drawings I have designated the several colors by the capital letters R, Y and B respectively. Also it is assumed that multiple images for each color will be printed by a single engagement of the paper, cloth or metal with the printing plate and that the images are to be identical in size and shape. It is further assumed that for this particular explanation that 12 images will be printed from a single printing plate in three horizontal rows with four images in each row.

The procedure in making or producing the set of final films according to my method is as follows: First, the drawing or design 29, shown in Fig. 3, is photographed by a simple and commonly used photographic process to produce a master negative 30 as is illustrated in Fig. 4. For my process, only one master negative is required. The negative is mounted on the carrier glass 15 as illustrated in Fig. 5; being squared at a right angle to the bottom edge of the carrier glass. With the aid of a light table (not shown) the negative is opaqued out for a particular color, such as red. A sensitized strip of film 31 is placed on the table 10 surface squared to the lines 11*a* and the carrier glass is placed on the table upside down so that the opaqued negative is in inverted position on the underside of the glass and in position to overly the film and the bottom edge of the carrier glass abutting the straight edge 14.

With the master negative so mounted and the selected color opaqued out, a positive is produced on the sensitized film by means of direct contact printing. The exposure light or projection lamp used for printing is not shown but any conventional light source for this purpose may be used. The print thus produced is a positive image of the master negative opaqued out for the color red. The master negative is then washed and the same process is repeated for each additional color in the original drawing and thus are produced the positive images printed in spaced

relationship on the single strip of film 31 as illustrated in Fig. 6.

The film with the three positives printed thereon is then removed from the glass, developed and dried, and the individual prints are given a second opaquing for color if required. This step is accomplished by the conventional opaquing for color process. After the positive has been removed, developed and dried and opaqued for color, it is then mounted in inverted position on the underside of the carrier glass laterally thereof and squared to the bottom edge as is illustrated in Fig. 7.

I then perform what I term the "step and repeat operation." First, I place a sensitized film on the table surface squared to the lines 11*a*. I then mark the register strip at predetermined intervals therealong and secure the register strip to the table adjacent the ledge 13. The registering marker is secured at the bottom edge of the carrier glass on the top side thereof and with a portion of the registering marker extending beyond the edge to overlay the register strip.

If I have determined to produce three such rows, as is illustrated in Fig. 8, I have placed indexing marks on the register strip at three equally spaced intervals which are slightly greater than the width of the images to be produced. By raising the upper edge of the glass, I slide the glass to the position where the fine line 23 on the registering marker is exactly and directly above the designated fine line mark 21 on the register strip. The carrier glass in then disposed flatly upon the sensitized film and table surface and, when so positioned, a negative print is made on the film, by simultaneous direct contact printing from the positive film, of all three images, red, yellow and blue. After the first printing, the upper edge of the carrier glass is raised and the glass is advanced to registration with the next indexing mark, where the printing operation is repeated. Then, the same operation is repeated a third time with the carrier plate registered at the third indexing mark. Thus, by three exposures, I have now produced the negative film illustrated in Fig. 8.

As a result of the operation just described, I produce a single negative which contains three adjoining red images, three adjoining yellow images and three adjoining blue images. These images are all perfectly registered and aligned, one to the other, on the negative film. The negative film is then removed from beneath the carrier glass, developed and dried and a new sensitized film is placed on the table. The negative film just produced is then mounted in inverted position on the under surface of the carrier glass as illustrated in Fig. 9 and it must be perfectly squared with the edges of the glass. With the negative secured to the carrier glass, the images representing yellow and blue are masked off on the negative by the masking paper 40 and the multiple images represented by the color red are then ready to be printed on the new sensitized film by direct contact printing.

I first mark and position a new register strip on the straight edge. Then I secure the registering marker to the carrier glass in the manner previously described and I am now prepared to proceed by the final step and repeat process. The carrier glass is lifted at the top edge and the fine line on the registering marker is registered with the first indexing mark on the new register strip. A direct contact positive print is made of all the red images. The glass is raised and moved to the second, third and fourth indexing marks and the printing is repeated at each step. I have now produced the first of the set of final films, illustrated in Fig. 10, which contains twelve red images and this is the photographic film from which the printing plate is subsequently produced in the conventional or common manner. To obtain the exposed film for images of yellow, I place a new sensitized film on the table and repeat the identical process except that I mask off the colors red and blue and expose only the images of the color yellow. This is repeated four times as previously described. To assure perfect registering and alignment, I use the same indexing marks on the register strip in each step or exposure as was used for the color red. After producing the final film for the images colored yellow, I remove the final film and repeat the same process on a new film for the color blue. At this point the red and yellow images are masked out so that only the color blue is exposed. The final films are developed and dried and they are now ready to be used in making the printing plates from a positive film.

In the process or method just described, I have produced the final set of films which are in positive form. These positive films are commonly used in silk screen printing, for making deep etched offset plates, and for producing metal name plates. For other types of printing, such as engraving, it is necessary to have negative films from which the printing plates are produced. To obtain the negative, final films, the positive film in Fig. 6 is opaqued for color as previously described and a negative is made therefrom by contact printing on to a new strip of film. The remainder of the process is identical to that previously described except that I now have a negative to produce the images in Fig. 8 which is a positive and from the positive I produce negative final films in Figs. 10, 10*a* and 10*b*. In addition to engraving, the negative, final films are used to produce albumen surface metal plates with printing or designs thereon.

My invention makes available to the relatively small printer the means whereby he may produce the films for producing the desired designs or images on a series of printing plates so as to print multiple images for multiple color jobs and the colors will be in perfect register and alignment in each image with each of the other colors of the finished or complete design. Prior to my invention, the cost of producing such printed matter has been expensive because of high cost of mechanical equipment which was required or because of many hours required in attempting to accomplish similar perfection by hand placing and registering. The hand method is far from satisfactory because it is impossible to obtain perfect register and alignment, especially if several hundred small images are printed on each final film.

The cost of my equipment is relatively small; the method is simple and can be performed by any average printer who has knowledge of the photographic process. My method and relatively inexpensive equipment achieve the result of putting the small print shop operator in competition with the larger print shops which have heretofore practically monopolized this particular segment of the printing business.

The present application is a continuation-in-part of my prior application Serial No. 614,001, filed September 1, 1945, now abandoned.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is:

1. In the method of making a set of final films to be used in making printing plates for printing multiple color designs, the improvement which comprises positioning a sensitized film on a flat surface, marking a register strip at predetermined intervals and fixedly positioning the strip on the flat surface, mounting in squared alignment on a carrier a developed film consisting of positive images in spaced relationship representing each of several colors, disposing the carrier on the flat surface overlying the sensitized film and securing a registering marker on the carrier so as to partially overlay the register strip, aligning the registering marker with one of the markings on the register strip, transferring by direct contact printing the positive images to said sensitized film to produce a negative having images representing each of the several colors formed thereon, shifting the carrier and developed film mounted thereon across and over the sensitized film so as to align the registering marker with successive markings on the register strip and repeating the contact printing step each time the carrier is shifted to a new position over the sensitized film depending on the number of negative reproductions of each image representing color desired on the sensitized film, developing the sensitized film to produce a negative, mounting the resulting negative on the carrier in squared alignment and positioning the carrier on the flat surface over a second sensitized film and masking-off on the negative all but one group of the images representing a first color, transferring to the sensitized film by contact printing the exposed group of images, shifting the carrier and negative mounted thereon so as to align the registering marker with successive markings on the register strip and repeating the contact printing step each time the carrier is shifted depending on the number of reproductions of like images representing the first color desired on a single resulting positive, substituting a new sensitized film for the exposed film and shifting the masking to leave exposed a second group of like images representing a second color, and proceeding with the same apparatus and in the same manner to produce a second exposed film consisting of like images representing the second color, and again substituting a new sensitized film for the second exposed film, shifting the masking to expose the third group of like images representing a third color and proceeding with the same apparatus in the same manner to produce a third exposed positive film consisting of like images representing the third color.

2. Apparatus for use in step and repeat process comprising a table including a frame structure having a top surface provided with a ledge along one edge thereof, a straight edge on the top surface and engaging the ledge and a carrier member slidably mounted on said surface, said top surface being inclined upwardly and away from said ledge at an angle tending to hold by gravity said carrier against the top surface and the straight edge, a register strip on the straight edge and the straight edge positioned to receive said carrier against said straight edge, the carrier having a cooperating edge similarly accurately formed to be a straight edge, fine line markings on said register strip predeterminately spaced depending upon the size of the reproduction being made, and a registering marker on the carrier adjacent its straight edge and having fine line marking thereon for visual alignment with selected markings on said register strip.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
742,354	Ramsdell	Oct. 27, 1903
1,107,520	Holst	Aug. 18, 1914
1,430,059	Deeks	Sept. 26, 1922
1,658,184	Bornkessel	Feb. 7, 1928
1,787,662	Boedicker	Jan. 6, 1931
1,952,771	Mullen	Mar. 27, 1934
2,034,529	Olsen	Mar. 17, 1936
2,290,292	Neu	July 21, 1942
2,537,353	Kilminster	Jan. 9, 1951