July 1, 1924. 1,499,997

J. J. ORMOND

METHOD AND APPARATUS FOR PRINTING MULTICOLOR OPTICAL SLIDES

Original Filed Aug. 29, 1921

Fig. 1

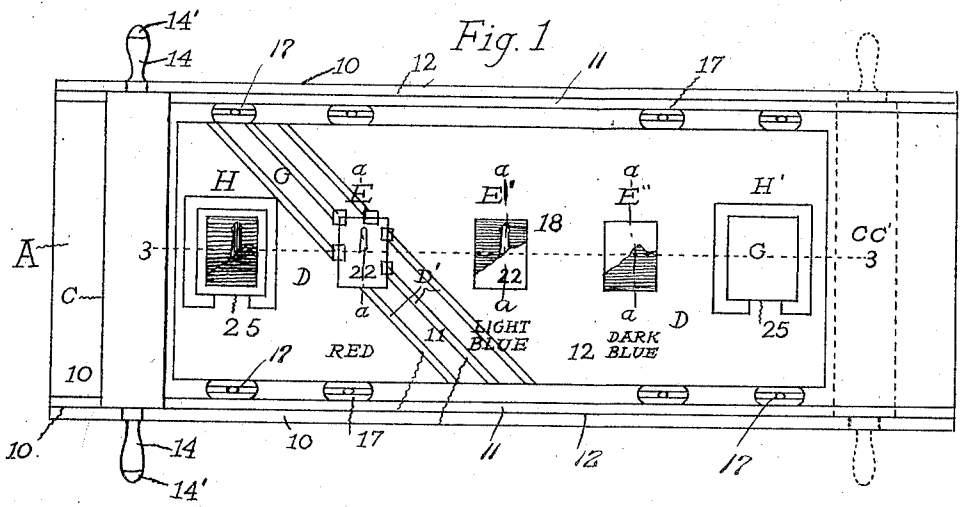


Fig. 2

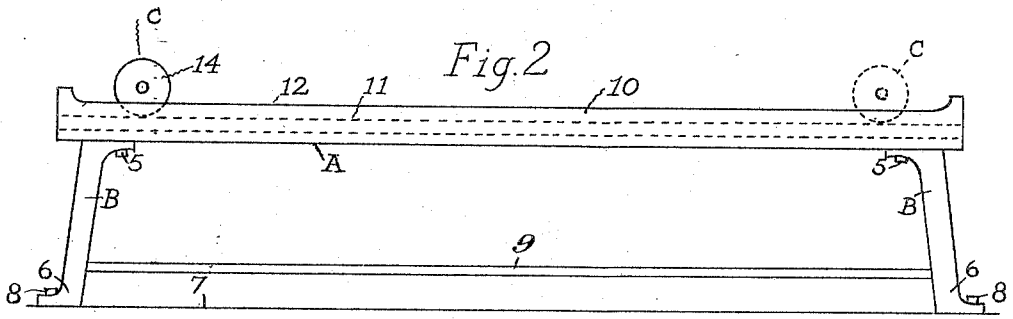


Fig. 3

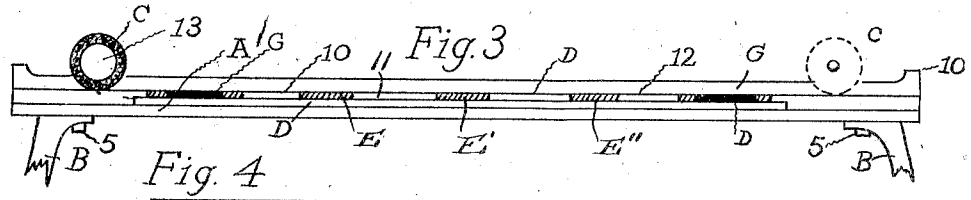
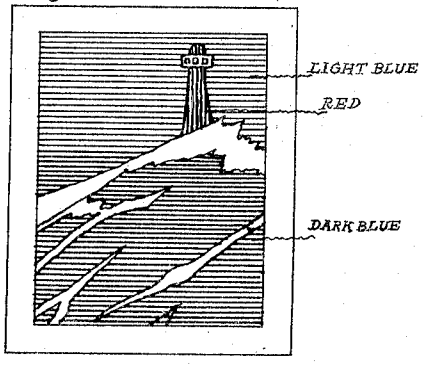



Fig. 4



INVENTOR
JOHN JOSEPH ORMOND
BY Clarence Ladd-Davis
ATTORNEY

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UNITED STATES PATENT OFFICE.

JOHN JOSEPH ORMOND, OF MATTAPAN, BOSTON, MASSACHUSETTS, ASSIGNOR TO JOHN JOSEPH ORMOND, JOSEPH J. CALLAHAN, AND HERBERT A. GILLMAN, AS TRUSTEES OF THE ORMOND MULTICOLOR PRINTING COMPANY, A COMMON LAW TRUST OF MASSACHUSETTS.

METHOD AND APPARATUS FOR PRINTING MULTICOLOR OPTICAL SLIDES.

Application filed August 29, 1921, Serial No. 497,705. Renewed May 13, 1924.

To all whom it may concern:

Be it known that I, JOHN JOSEPH ORMOND, a citizen of the United States of America, residing at Mattapan, in the county of Suffolk, city of Boston, and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Methods and Apparatus for Printing Multicolor Optical Slides, set forth, described, and claimed in the following specification.

The object of my invention is to provide a method of and apparatus for so printing, with printer's ink, upon sheets or plates of glass or other transparent or translucent material adapted to be used as a lantern slide in projection apparatus, a design or picture from a plurality of printing plates each adapted to print a portion only of the complete design or picture and each adapted to be separately inked, by a single printing operation, that the complete design or picture when projected on a screen will be clear and distinct with its several portions in accurate registry.

With this general object and other objects hereinafter explained in view, my invention consists in the method hereinafter described and claimed and in the construction and combination of elements hereinafter described and claimed.

Referring to the drawings:

Figure 1 is a top plan view of an apparatus embodying my invention and adapted to carry out my method,

Figure 2 is a side view of the apparatus shown in Figure 1,

Figure 3 is a longitudinal central sectional view of the apparatus on line 3—3 of Figure 1, and

Figure 4 is a plan view of a projection slide printed by the method of my invention.

In the drawings A indicates the top-table or bed-plate of the printing apparatus supported by legs B which are secured to it by bolts 5. These legs are preferably provided with feet 6 which may be secured to the floor 7 by bolts 8. Stay rods 9 connect the end legs on each side together.

Along the sides of the bed-plate A at or near its edges are arranged side pieces 10. These side pieces are each provided on their inner sides below their upper edges with a ledge 11 continuous from end to end of the bed-plate and adapted to serve as a guide rail on which the transfer printing roller C may be rolled. Outside the guide rail 11 is a shoulder 12 by which the transfer printing roller is kept from movement laterally of the bed-plate as it is rolled from end to end thereof in the operation of printing. The guide rails 11 and the shoulders 12 are accurately machined so as to be straight and smooth from end to end.

The transfer printing roller C is of relatively soft composition of a general character similar to that of which the inking rollers commonly used in printing are made, carried on a core 13 usually of metal. The ends of this core extend beyond the ends of the roller and on these ends are carried handles 14 which are free to rotate, or to permit the ends of the core to rotate in them, so that by means of them the transfer printing roller may be moved from one end of the bed-plate to the other and in such movement will be rotated by contact of its end portions with the rails 11. The handles 14 are held on the end portions of the core 13 by nuts 14′.

While the transfer printing roller is of composition similar to that of which inking rolls are made, the composition is preferably somewhat harder and slightly more resistant than that commonly used in inking rollers and for this purpose varnish may be added to the glue and glycerine of the ordinary composition used.

The transfer printing roller C is, of course, of the same diameter from end to end and is of such length that its ends rest upon the ledges or rails 11 on opposite sides of the bed-plate so that as it progresses from end to end of the bed-plate its end portions will roll upon these guide rails and, by reason of the fact that the material of the roller is relatively soft, it will tend to cling to the surface of the rails sufficiently to prevent any slipping and so that the rotation of the roller will be in exact relation to the extent of its progression.

Secured upon the bed-plate A in any convenient manner, as by locking quoins 17 is the plate-base D. This may be of any usual construction which will be adapted to hold the printing plates E, E′ and E″ in fixed position. The base-plate shown is of a con-

struction commonly known in which diagonal slots D′ are formed adapted to receive locking hooks by which the printing plates are firmly secured in the position to which they are adjusted. Three printing plates, E, E′ and E″, are here shown but a greater or less number may be used depending on the number of colors to be used in the completed design or picture. The surface of printing plate E is cut away so as to leave only the portion of the design or picture which is to be printed of a particular color. In the drawing this printing plate is so cut away that the printing surface left on it is only that which is adapted to print the lighthouse of the design shown, which is to be printed in red. The surface of printing plate E′ is so cut away as to leave only what is needed to print the sky of the design, in light blue. The surface of printing plate E″ is so cut away as to leave only the portion adapted to print the sea of the design, in dark blue.

The printing blocks E, E′, and E″ are arranged in line longitudinally of the plate-base D on a line parallel with the rails 11, 11, and the distance between any two of them, that is between a line *a*—*a* drawn through the centre of each of them at right angles to the longitudinal lines of the plate-base is precisely equal to the circumference of the printing roller C so that as the printing roller is rolled over the printing plates the point on the surface of the printing roller which registers with the centre of the printing plate E will register with the centre of printing plate E′ and, as the rolling movement continues, the same point will register with the centre of the printing plate E″. The contact of the end portions of the troller with the rails 11, 11, as above described ensures the rolling of the roller without slipping, necessary to this registration of the same point on the circumference of the roller with the centres of the successive printing plates.

H and H′ indicate holders for the plates G on which the design is to be printed. These holders are arranged in line with the printing plates and are secured on the base-plate in any convenient manner. They must, of course, be so spaced from the adjacent printing plate that the design will be printed in the desired position on the plate. By arranging a plate holder at each end of the base-plate the apparatus is adapted to print on one as the roller is rolled in one direction over the printing plates and to print on the other as it is rolled back to initial position, the printing roller, of course being thoroughly cleaned after each printing operation before being again used.

In operation, the printing plates and the plate holders being adjusted into proper position and securely locked and a plate G being placed in the plate holder, the printing plates are each inked with ink of the proper color. The printing roller C is then rolled over the printing plates, its rotation being regulated by the contact of its ends with the rails 11, to bring its surface into contact with the printing plates in succession and to take up on its surface the ink from the printing plates the spacing of the printing plates and the regulation of the rotation of the printing roller ensuring accurate registry. After the printing roller has passed over the last one of the printing plates, plate E″ in the construction shown, its further rotation carries it onto the plate G on which it deposits the inks taken up from the printing plates to form the complete design or picture.

Any number of printing plates may be used depending only on the length of the base-plate which must be of such length as to permit the printing plates to be spaced apart the distance equal to the circumference of the printing roller used.

The printing plates may be of any character, electrotype plates, etched or engraved plates or plates of any other kind which will present a surface adapted to take ink and to permit the ink to be readily taken up from it by the printing roll. Accuracy in positioning the printing plates and accurate movement of the printing roller over the printing plates is essential to the printing of a lantern slide in order to avoid even slight overlapping of different colors or gaps between the different portions of the design which while not perhaps noticeable on inspection of the slide would be very apparent when the design is projected onto a screen.

While the method and apparatus described is of particular use in printing multicolor plates for use as lantern slides, the invention is equally adapted for use in printing in colors on paper, cloth or anything else which presents a surface adapted to be printed on.

Having thus described my invention what I claim is:

1. In a process of printing a multicolor design on a sheet or plate in which a transfer printing roller having a relatively soft surface is caused to roll over a series of printing plates each having a printing surface adapted to print a particular portion only of the design, to take up ink therefrom, said printing plates being suitably spaced apart, regulating the rotation of the transfer printing roller by contact of its relatively soft surface with a guide surface of relatively hard material extending longitudinally of the series of printing plates.

2. In a process of printing a multicolor design on a sheet or plate in which a transfer printing roller having a relatively soft

surface is caused to roll over a series of printing plates each having a printing surface adapted to print a particular portion only of the design, to take up ink therefrom, so spacing the printing plates apart that the distance between the centres of any two adjacent plates is the same, using a transfer printing roller of such diameter that its circumference is equal to the distance between the centres of adjacent printing plates, and regulating the rotation of the transfer printing roller by contact of its relatively soft surface with a guide rail.

3. In a multicolor printing apparatus the combination of a base-plate having a guide rail arranged longitudinally thereof, a series of printing plates each having a printing surface adapted to print a particular portion only of a design, arranged on the base plate in a line longitudinal thereof and so spaced apart that the distance between any two adjacent printing plates is the same and a transfer printing roller having a relatively soft surface adapted to take up ink from the printing surfaces of the printing plates, having its circumference equal to the distance between the centres of adjacent printing plates and so arranged with reference to the guide rail that a portion of its relatively soft surface rolls upon it to thereby regulate the rotation of said roller as it is rolled over the printing plates.

Signed, at the city of Boston, county of Suffolk, and Commonwealth of Massachusetts, this eighth day of June, 1921.

JOHN JOSEPH ORMOND.