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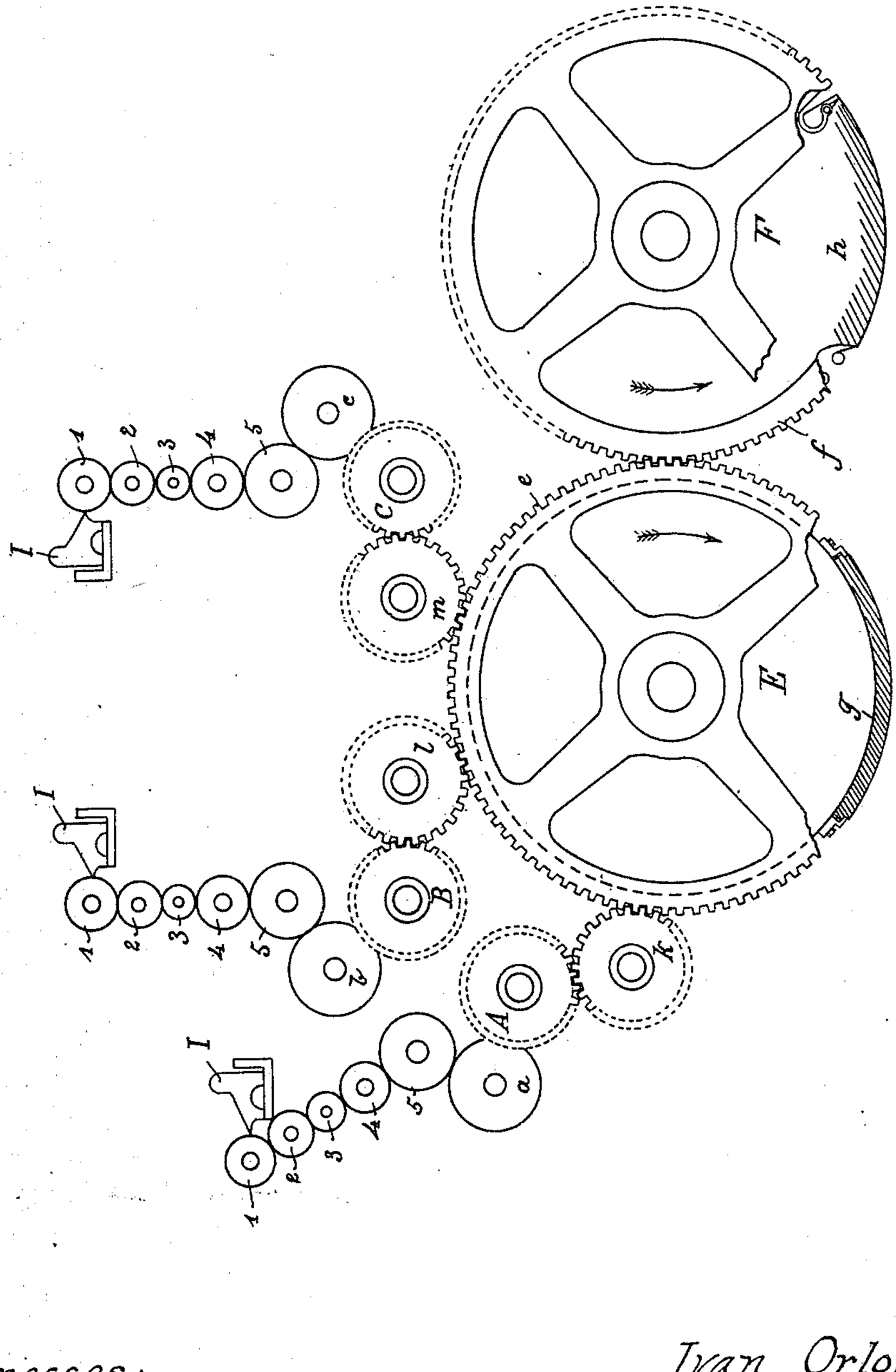
I. ORLOFF.

MULTICOLOR PRINTING MACHINE.

(Application filed Apr. 10, 1899.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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MULTICOLOR-PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 669,484, dated March 5, 1901.

Original application filed June 3, 1897, Serial No. 639,200. Divided and this application filed April 10, 1899. Serial No. 712,682. (No model.)

To all whom it may concern:

Be it known that I, ÏVAN ORLOFF, a subject of the Russian Emperor, residing at St. Petersburg, Russia, have invented certain new and useful Improvements in Multicolor-Printing Machines, of which the following is a specification.

This application is a division of my invention, Serial No. 639,200, filed June 3, 1897.

The invention relates to devices for multicolor-printing in which separate design plates or patterns (one for each color) are inked by separate inking-rollers and the designs of the said design plates or patterns transferred to and assembled on a common printing-plate, from which the printing on a sheet of paper or other suitable material is effected by one impression.

The objects of my invention are, first, to provide means for transferring the several designs of the color plates or patterns to the common printing-plate in an absolutely-unchanged condition and with absolute accuracy in a predetermined relative position with respect to each other in order to obtain a perfect register of the colors, and, second, to avoid mutual fouling or clouding of the colors in order to keep the colors clean, even though continuously running the press.

The general object of my invention is therefore to render the said multicolor-printing machines applicable to fine or art work hitherto exclusively performed by successively printing the several colors from individual printing-plates.

In order to plainly illustrate the merits of my invention above similar methods hitherto suggested, I shall first fully disclose the technical effects of my improved method before describing the devices for carrying out the same represented in the accompanying drawing.

In order to secure a perfect register of the colors assembled on the printing-plate, the several designs of the design-plates must be transferred to the printing-plate in an unchanged condition and applied thereto accurately in a predetermined position with respect to each other. I attain this perfectly by using hard design-plates and a hard printing-plate not liable to yield under the pressure of the press and by transferring the design of each design-plate to the common printing-plate by means of an elastic transfer-roller rolling over the design-plate and over the printing-plate without any sliding movement and meeting the same each time in the same relative positions. The result of this arrangement is as follows: The elastic roller being susceptible of a close contact with the hard design-plate as well as with the hard printing-plate the color will be perfectly and uniformly transferred from the former to the latter, and as both plates have a hard surface the design of the design-plate will be sharply reproduced on the transfer-roller and likewise the design of the printing-plate sharply printed on the paper. However, the picture reproduced on the transfer-roller slightly differs from its original, as the elastic transfer-roller undergoes a deformation in the line of contact with the hard design-plate and receives the picture just in that line and in its deformed condition; but as only the elastic transfer-roller has been deformed and this roller will undergo the very same deformation when coming into contact with the hard printing-plate and transferring thereto its picture the picture will be delivered while the transfer-roller is in just the same deformed condition in which it was when it received the same. The picture will therefore be deformed back, and thus appear on the printing-plate in its original form. As, further, the design-plate and the printing-plate are in a fixed relative relation or registering relation to each other and the transfer-roller rolls over the same without sliding, the picture is always received by the roller on the same part of its surface and likewise always delivered by the roller to the same part of the printing-plate. If, therefore, a plurality of design-plates is provided in a registering relation with respect to each other and to the printing-plate, the design of each design-plate will be transferred to its proper position on the printing-plate. Thus the several design-plates having been arranged each in a

proper registering relation with respect to the printing-plate the respective color-designs will be transferred to the printing-plate in a perfectly-registering condition and finally printed in the same condition on the paper.

A great inconvenience inherent in the methods hitherto suggested for printing in colors consists in that by the successive superimposition of different colors in a moist condition the single colors foul or cloud each other in a short time and so more and more modify the color tones required, unless the plates and rollers are frequently cleaned, involving frequent stopping of the press and much loss of time. In the preferred form of my invention I overcome this inconvenience by combining with each design-plate a separate transfer-roller and assemble the colors only on a hard printing-surface. Thus in the three-color process, for instance, yellow is never transferred back to the red design-plate nor yellow and red to the blue design-plate, as would be the case by using a common transfer-roller, and the colors of the several design-plates are kept clean. Moreover, the retransfer of colors from the printing-plate back to the transfer-rollers is insignificant, as at each impression a complete compensation is effected by the clean colors supplied from each design-plate to its respective transfer-roller. On the one hand, the supply of color to the printing-plate is obviously but a part of that to the transfer-rollers, so that only a small quantity of color could be transferred back, and, on the other hand, the tendency of passing of the colors from the hard printing-plate to the elastic transfer-roller is much less than the reverse. By these combined facts mutual fouling or clouding of the colors is practically prevented.

The design-plates are made of any hard material, preferably of metal, and may be plain or provided with designs in relief or intaglio. They are inked by the well-known means. The printing-surface is likewise restricted to be a hard one, but may in other respects be of any material and be either plain or provided with a raised or sunken design.

When using a plain printing-surface, the colored designs of the design-plates are simply transferred to the printing-plate and to the paper, showing mere copies of the original designs; but if the printing-surface itself is provided with a design the impression on the paper will show this design in the different colors corresponding to the designs of the design-plates. Two kinds of designs, different in form, will then appear on the paper, the one consisting of the design of the printing-plate and the other being composed of the designs of the design-plates applied to and constituting the printed parts of the first design. By these means there will be combined in the final impression the design of the printing-surface and those of the design-plates, and by combining the same infinitely-varying effects may be attained not attainable by consecutive printing. In art reproduction—say in the three-color process, for instance—the design-plates may consist of the three primary half-tone plates for red, blue, and yellow and the printing-form of a plain surface or likewise of a half-tone plate or other engraved plate.

By using design-plates and a printing-plate consisting of surfaces of zinc or aluminium or of lithographic stones my invention is rendered applicable to chromolithographic printing.

The elastic transfer-rollers may be made of any suitable material, such as usual roller composition, leather, india-rubber, and the like.

In the present case I use as design-plates a series of rolls, each having upon its surface a partial design corresponding to that part of the multicolor design which is to be inked in one of the colors. I also preferably use a corresponding series of transfer rolls or surfaces, which transfer the designs from the partial-design rolls to a single printing plate or form upon which said color designs are assembled. The complete multicolor design is then transferred at one impression to the paper. The transfer-rolls are geared to the carrier for the form and the color-design rolls are geared to the transfer-rolls. The printing-form, transfer surfaces or rolls, and partial-design rolls are thus geared together in trains and perfect register of the colors on the form thereby assured. A series of suitable rolls are used to transfer the colors from the ink or color receptacles to the color-rolls.

The accompanying drawing shows, partly in side view and partly in diagram, so much of a rotary multicolor-printing machine as is necessary to illustrate my invention.

Referring to the drawing, E indicates a form-cylinder carrying on its surface a form *g*. The cylinder E is provided with a gear *e*, which meshes with the gear *f* on an impression-cylinder F, which is provided with suitable grippers and a backing *h* for the paper to be printed on. The design-rolls A B C, the number of which can be varied at pleasure, are provided with their respective portions of the multicolor design. These design-rolls have gears in mesh with similar gears upon transfer-rolls *k l m*, and the latter gears are in mesh with the gear *e* of the cylinder E. The inks are supplied from ink-fountains I to the design-rolls by means of sets of intermediate rolls 1 2 3 4 5 and inking-rolls *a b c*.

The design-rolls may be of any hard material upon which the designs may be engraved, or the designs may be on separate plates attached to the rolls in any suitable way. The transfer-rolls are elastic and composed of the usual roller composition, india-rubber, or other suitable material. The form *g* is of hard material, being preferably a metal plate. It may have a smooth surface, in which case

the multicolor design will be simply an aggregation of the several designs of the design-rolls, or the form may have a design of its own in relief or intaglio. Obviously the gears of the several rolls and cylinders are to be so constructed and arranged that the partial designs of the design-rolls will be assembled in perfect register upon the form.

I am enabled with the machine described to mix or blend the colors upon the form, and thus to secure the effects commonly produced by the well-known three-color process by a single impression. As heretofore practiced, several impressions (one for each color) have been necessary in this class of work. In such work those portions of the multicolor design in which the colors are to be blended are represented upon a plurality of design plates or rolls, and the colors transferred from such portions are superposed and blended upon the form before printing.

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

1. In a multicolor-printing press, the combination with an impression member, and a printing-form coacting therewith, of a plurality of design-plates in registering relation to the printing-form, and having designs corresponding to the respective portions of the multicolor design which are to be inked in different colors, a plurality of transfer-surfaces in registering relation with the design-plates and with the printing-form, said transfer-surfaces being arranged to transfer different portions of the multicolor design from the design-plates to the form, and means for inking the design-plates.

2. In a multicolor-printing press, the combination with an impression member, and a printing-form coacting therewith, of a plurality of design-plates in registering relation to the printing-form, and having designs corresponding to the respective portions of the multicolor design which are to be inked in different colors, a plurality of transfer-rolls geared in registering relation with the design-plates and with the printing-form, said transfer-rolls being arranged to transfer different portions of the multicolor design from the design-plates to the form, and means for inking the design-plates.

3. In a multicolor-printing press, the combination with an impression member, and a printing-form coacting therewith, of a plurality of design-plates in registering relation to the printing-form and having designs corresponding to the respective portions of the multicolor design which are to be inked in different colors, a corresponding plurality of transfer-rolls, each transfer-roll being geared in registering relation with its respective design-plate and with the form, and means for inking the design-plates.

4. In a multicolor-printing press, the combination with an impression member, and a hard printing-form coacting therewith, of a plurality of hard design-plates in registering relation to the printing-form and having designs corresponding to the respective portions of the multicolor design which are to be inked in different colors, a corresponding plurality of elastic transfer-rolls, each transfer-roll being geared in registering relation with its respective design-plate and with the form, and means for inking the design-plates.

5. In a multicolor-printing press, the combination with an impression member, and a printing-form coacting therewith, of a plurality of transfer-rolls, a corresponding plurality of design-rolls having partial designs corresponding to the respective portions of the multicolor design which are to be inked in different colors, and means for inking said design-rolls, each transfer-roll being arranged to transfer the ink from one design-roll to the form, the design-rolls, the transfer-rolls, and the form being geared in registering relation to each other whereby the various portions of the design are made to register upon the form.

6. In a multicolor-printing press, the combination with an impression member, and a hard printing-form coacting therewith, of a plurality of elastic transfer-rolls, a corresponding plurality of hard design-rolls having thereon partial designs corresponding to the respective portions of the multicolor design which are to be inked in different colors, and means for inking said design-rolls, each transfer-roll being arranged to transfer ink from one design-roll to the form, the design-rolls, the transfer-rolls, and the form being geared in registering relation to each other whereby the various portions of the design are made to register upon the form.

7. In a press for printing multicolor designs, the combination with an impression member, and a printing-form coacting therewith, of means for assembling and blending colors upon the printing-form comprising a series of partial-design plates corresponding to the respective portions of the multicolor designs which are to be inked in different colors, means for inking said partial-design plates respectively in different colors, and a plurality of transferring devices for transferring the colors from said design-plates to their proper positions on the form, those portions of the complete multicolor design in which the colors are to be blended being represented upon a plurality of the design-plates, and the color transferred from said portions being superposed and blended upon the form before printing, the form, the design-plates and the transferring devices being in registering relation.

8. In a press for printing multicolor designs, the combination with an impression member, and a printing-form coacting there-

with, of a series of partial-design plates corresponding to the respective portions of the multicolor design which are to be inked in different colors, means for inking said partial-design plates, and a plurality of transfer-rolls coacting with the partial-design plates and said form to transfer the ink from the design-plates to proper position on the form, those portions of the multicolor design in which the colors are to be blended being represented upon a plurality of the design-plates, and the color transferred from said portions being superposed and blended upon the form before printing.

9. In a press for printing multicolor designs, the combination with an impression member, and a printing-form coacting therewith, of a series of partial-design plates corresponding to the respective portions of the multicolor design which are to be inked in different colors, means for inking said partial-design plates, and a plurality of transfer-rolls coacting with the partial-design plates and said form to transfer the ink from the design-plates to proper position on the form, those portions of the multicolor design in which the colors are to be blended being represented upon a plurality of the design-plates, and the colors transferred from said portions being superposed and blended upon the form before printing, the form and design-plates being of hard material and the transfer-rolls of elastic material, and said form, design-plates and transfer-rolls being in registering relation.

In testimony whereof I affix my signature in presence of two witnesses.

ÏVAN ORLOFF.

Witnesses:
WOLDEMAR HAUPT,
HENRY HASPER.