No. 684,450. Patented Oct. 15, 1901.

F. H. MOWBRAY.

MULTICOLOR PRINTING PRESS.

(Application filed May 14, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

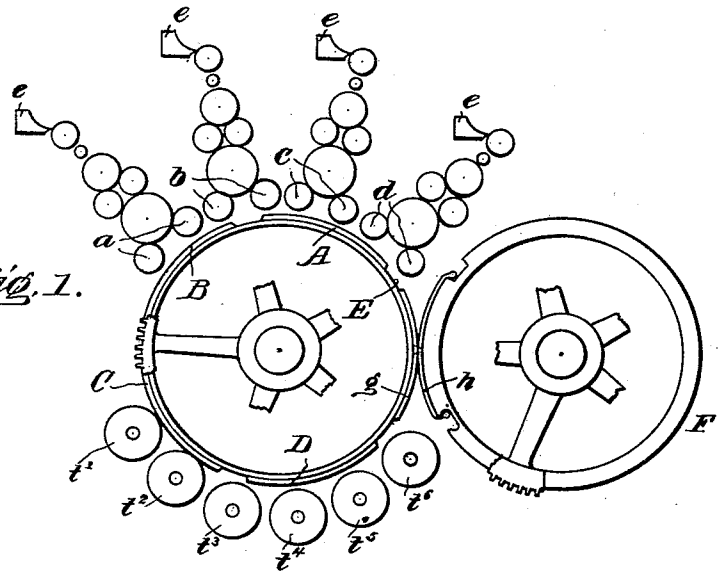
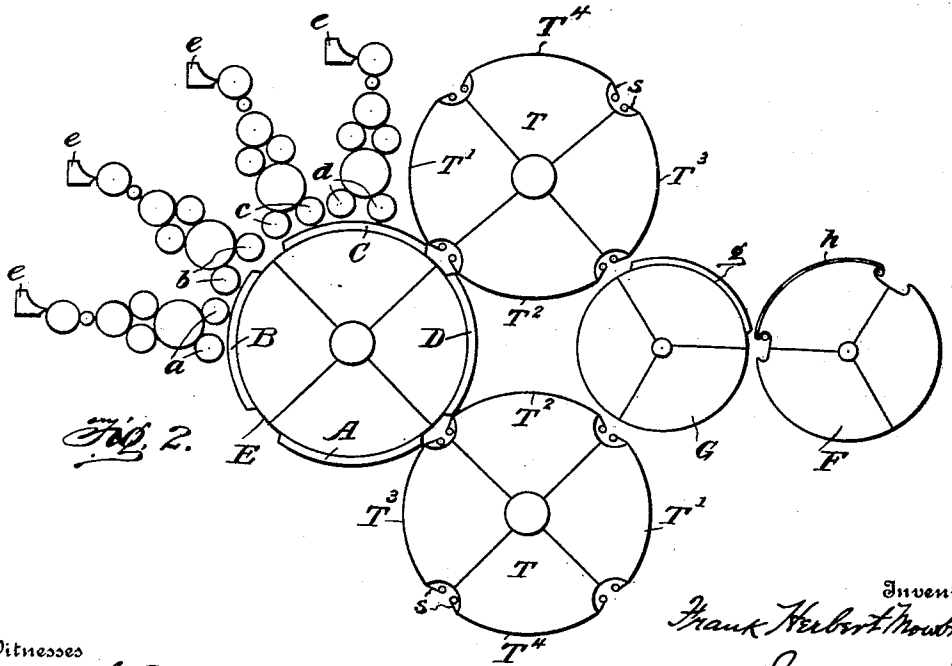


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

Fig. 3.

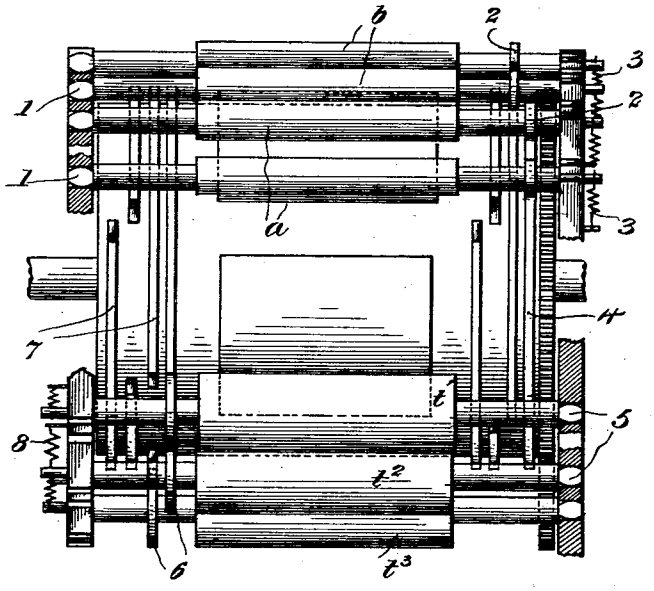
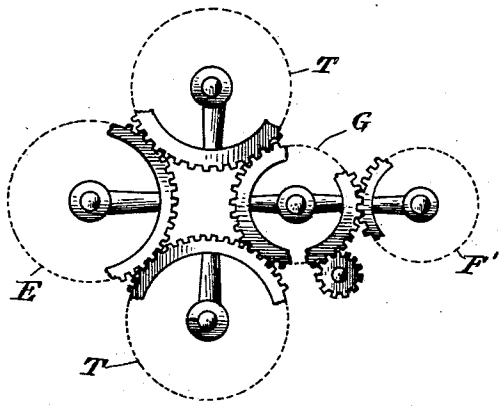


Fig. 4.



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UNITED STATES PATENT OFFICE.

FRANK HERBERT MOWBRAY, OF BALHAM, ENGLAND.

MULTICOLOR-PRINTING PRESS.

SPECIFICATION forming part of Letters Patent No. 684,450, dated October 15, 1901.

Application filed May 14, 1901. Serial No. 60,134. (No model.)

To all whom it may concern:

Be it known that I, FRANK HERBERT MOWBRAY, a subject of the King of Great Britain, residing at Balham, in the county of Surrey, England, have invented certain new and useful Improvements in Multicolor-Printing Presses, of which the following is a specification.

This invention relates to multicolor-printing machines wherein hard design or color plates each bearing a design or part design in relief or in intaglio and each inked with ink of a different color are used to ink a form or printing plate by means of intermediate circular or segmental elastic transfer-surfaces, the several colored designs or part designs being either directly and individually transferred from the said elastic surfaces or in certain cases, as hereinafter described, collected together upon the same surface and then collectively transferred in correct register to the printing-plate; and it has for its object to provide means whereby better inking effects can be obtained than is the case with such machines as hitherto arranged. For this purpose additional transfer-surfaces are provided, so that the printing-plate may be twice inked for each color so desired, such transfer-surfaces being either situated each upon a separate roller or grouped upon one or more cylinders or carriers. This double inking of the printing-plate for each color separately is neither to be confused with the double inking of a color-block and a particular transfer-surface attained by allowing the color-blocks to come twice into contact with their same respective inking-rollers and transfer-surface, nor is it to be confused with the double inking of the printing-plate in all the colors collectively.

By this invention the printing-plate is inked twice for each color so desired, being inked once by each of two separate transfer-surfaces, any inequalities in the thickness of layer of color deposited or distribution effected by the first transfer-surface being filled in by the second without affecting the register. The advantage of such an arrangement is shown more especially when using "composition" transfer-surfaces. Should one of these surfaces contain a flaw, it will, although twice inked, be noticeable as a white speck on the print. It is evident that such surface imperfections, always present in more or less noticeable form on the transfer-surfaces, can be neutralized by the use of two transfer-surfaces for each color. Moreover, rich tones and uniformly heavy flat effects are far easier to produce with the use of the said double inking, as will be readily understood.

To minimize color-mingling and deformation of design, especially when superposing inks in a moist condition, it is essential, first, that each color be transferred by means of a separate transfer-surface to the printing-plate, and, secondly, that the different-colored inks be arranged in order with regard to their strength or body consistency, so that a strong ink—that is to say, a hard and sticky ink—may be made to pick up a weaker or softer ink without any giving off of the stronger to the weaker ink. It may be shown, therefore, that in order to fulfil these conditions in superposing inks and at the same time to obtain a double inking of the form or printing plate for each color separately the machine must be arranged in such a manner that any two transfer-surfaces arranged for one particular color must first give off their ink to the form-plate before a second pair of transfer-surfaces representing another color begins. In a single printing-plate transfer-machine where the printing and the color plates are seated upon a common carrier this may conveniently be performed by grouping around the said carrier the required number of transfer-rollers having a diameter an aliquot part of that of the plate-cylinder. This number need not necessarily be double that of the color-plates on the carrier, since in cases where the part designs on the color-plates do not correspond as to relative position and in further cases where the color and character of the design are not such as to make color-mingling probable two or more colors may be collected upon a single transfer-roller. In single printing-plate transfer-machines, however, where the form-plate is seated upon a carrier separate from the color-plates more care will be required in the grouping to obtain at the same time two independent inkings of the form-plate for each color sepa-

rately and the required order of colors. This is especially so in the case of such machines, hereinafter called "differential transfer-machines," as have the transfer-beds seated upon a common carrier and in which the printing-plate in order to come successively into contact with the different transfer-beds is of different diameter to the color-plate carrier and transfer-bed carrier. Although such machines on account of the different curvature of form and color plates and liability to defective register through any shake or inequalities in the driving-gear may be considered less suitable for fine work than a machine wherein all the color-plates and printing-plates are of the same external diameter and seated rigidly upon a common carrier, they may be found suitable for a certain class of flat work if working under satisfactory inking conditions. To legislate for this, an additional transfer-surface carrier may be provided, gearing with either the color-block carrier or the form-plate carrier, but preferably not with the two. A convenient manner of arranging this to avoid clashing of gear will be to have the additional transfer-surface carrier driven by a separate spur-wheel upon the driving-cylinder shaft either at the same end or the end remote from the driving spur-wheel, the pitch and diameter of this wheel corresponding exactly with that of the driving-wheel. Although differential transfer-machines have hitherto been devised merely for an odd number of colors, they may also be arranged for an even number of colors, as shown in Figure 2, still giving satisfactory inking results.

In the accompanying drawings, Figs. 1 and 3 illustrate the present invention as applied to a machine of the class illustrated and described in Letters Patent No. 632,322, granted September 5, 1899, to Ivan Orloff.

Referring to said figures, E indicates a cylinder or common carrier upon which is mounted a plurality of partial design-plates A, B, C, and D and also an assembling plate or form *g*. The design-plates are inked, respectively, by pairs of inking-rolls *a b c d*, said rolls being supplied with ink from fountains *e* in the usual manner. Around the carrier-cylinder E are a series of transfer-rolls *t'* to *t⁶*, inclusive. These rolls effect the transfer of colors from the design-plates to the form *g*, as in the Orloff patent; but in said patent each color is transferred by a single roll, while in the present invention each color is transferred independently by two rolls. The effect of this improvement is twofold. It produces a double inking of the form in each color, thus strengthening the colors, and it prevents defects which might be produced in the print by reason of breaks or defects in the transfer-rolls—that is, if a gap in one roll produces a defective inking of a form its companion roll will cure the defect. The cams for operating the inking and transfer rolls may be the same as those illustrated in the Orloff patent above mentioned. Thus, as shown in Fig. 3, the inking-rolls have ball-bearings 1 at one end and cam-rolls 2 at their opposite ends. The springs 3 tend to draw the inking-rolls into contact with the design-plates, and cam-ribs 4 hold them out of contact, excepting at the proper times. Similarly the transfer-rolls have ball-bearings 5 at one end and cam-rolls 6 at the opposite ends coöperating with cam-ribs 7. Springs 8 hold the rolls in contact with the ribs.

In Fig. 2 is illustrated another embodiment of the invention, in which E' indicates a cylinder having four partial design-plates A' B' C' D', corresponding to the parts A B C D of Fig. 1. Devices for the double inking of these plates are provided and shown exactly the same as the devices illustrated in Fig. 1. In Fig. 2 the assembling plate or form *g'* is carried on a separate cylinder G. There are two transfer-rolls T, each having four transfer-surfaces T' T^2 T^3 T^4, which take the colors from the design-plates A' B' C' D', respectively. The transfer-rolls shown in Figs. 1 and 3 are in gear with the design cylinder or carrier E in such a manner that the surfaces of the rolls and of the design-plates travel at the same speed. Referring to Fig. 2, it will be seen that the transfer-rolls always contact with the design-plates, no cams for separating them being necessary.

In Fig. 4 is shown the gearing for the form of machine shown in Fig. 2. The transfer-rolls are always in gear and in contact with the design-roll and also always in gear with the form-roll.

The form-roll G is of three-fourths the diameter of the transfer-roll T and travels with the same peripheral speed. It therefore follows from this differential arrangement that the form *g'* will come into contact with the four transfer-surfaces on each roll and receive two inkings of each color.

Adjacent to the form-cylinder is the impression-cylinder F', carrying the platen *h'*. This impression-cylinder is in gear with the form-cylinder G; but the platen is arranged to contact with the form only at each fourth revolution—that is, when the form has collected all of the four colors or as many colors as are provided in the machine.

The mechanism for moving the platen-cylinder into and out of contact with the form-cylinder is not shown, as such mechanisms are common in the art and illustrated, for instance, in Letters Patent No. 339,014 to Richarz and Scott and No. 550,735 to Wendte, both for multicolor-printing machines.

It will be evident that the essential features of the invention may be embodied in many mechanical forms, and the claims are therefore not limited to the precise construction and arrangement of mechanisms illustrated and described.

Having now particularly described and as-

certained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a multicolor-printing press, the combination of a plurality of design-plates, a printing-form, and a series of pluralities of transfer-surfaces coöperating respectively with the design-plates to transfer the designs to the form, said transfer-surfaces being geared in registering relation with their respective design-plates and with the form.

2. In a multicolor-printing press, the combination of a plurality of design-plates, a printing-form, a series of pluralities of inking-rolls coöperating with the design-plates respectively to ink the same, and a series of pluralities of transfer-surfaces coöperating with the design-plates to transfer the designs from said plates to the form, said transfer-surfaces being geared in registering relation with their respective design-plates and with the form.

3. In a multicolor-printing press, the combination of the plurality of design-plates, a common carrier upon which said plates are mounted a printing-form, and a series of pluralities of transfer-surfaces coöperating with said design-plates respectively to transfer the designs from said plates to the form, said transfer-surfaces being geared in registering relation with their respective design-plates and with the form.

4. In a multicolor-printing press, the combination of a plurality of design-plates upon a common carrier, a printing-form upon a separate carrier, and a pair of transfer-rolls, each roll having a transfer-surface coöperating with each design-plate and adapted to transfer the design from the plate to the form, whereby two transfers of each color to the form are effected during each cycle of operations of the machine.

5. In a multicolor-printing press, the combination of a carrier having a plurality of design-plates thereon, two transfer-rolls, each having a plurality of transfer-surfaces adapted to coöperate with the design-plates respectively, and a form-cylinder of different diameter from the transfer-rolls, whereby the form is brought successively into contact with the different transfer-surfaces of each roll, for the purpose set forth.

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

FRANK HERBERT MOWBRAY.

Witnesses:

H. D. JAMESON,

F. L. RAND.