(No Model.)

3 Sheets—Sheet 1.

T. J. TURLEY.

MULTICOLOR PRINTING.

No. 538,984. Patented May 7, 1895.

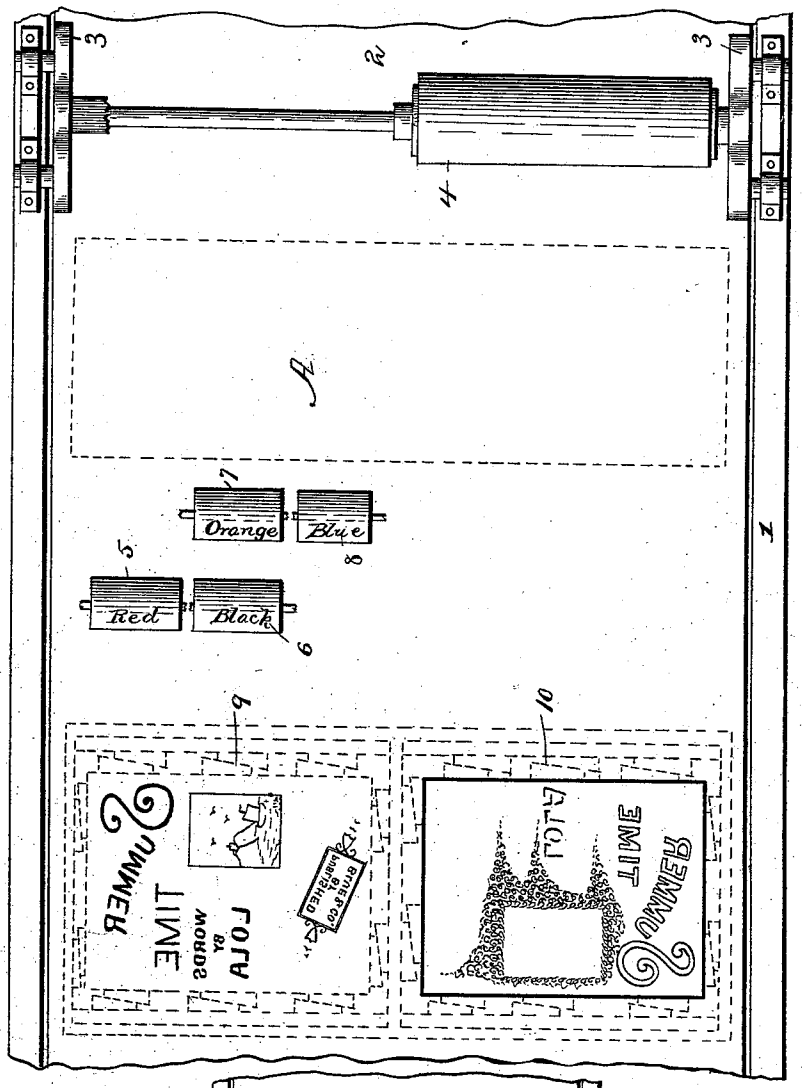

Fig. 1.

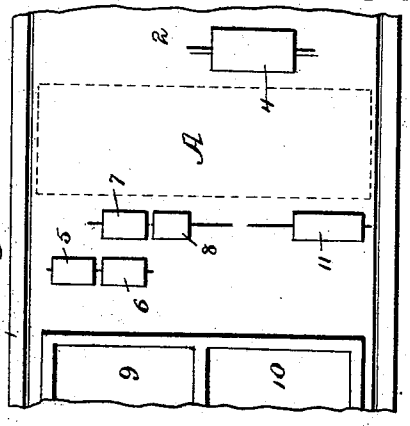

Fig. 4.

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Inventor.
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Attys.

(No Model.)

3 Sheets—Sheet 2.

T. J. TURLEY.

MULTICOLOR PRINTING.

No. 538,984. Patented May 7, 1895.

Fig. 2.

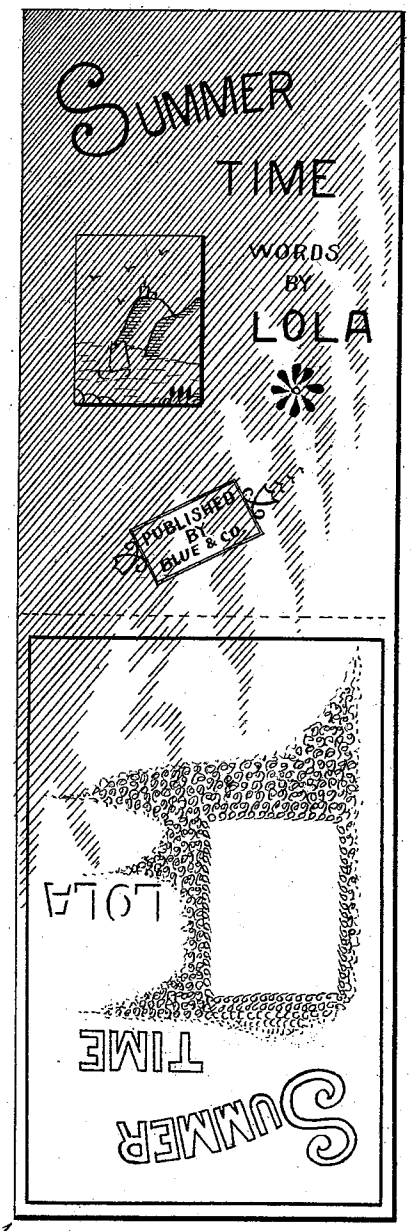
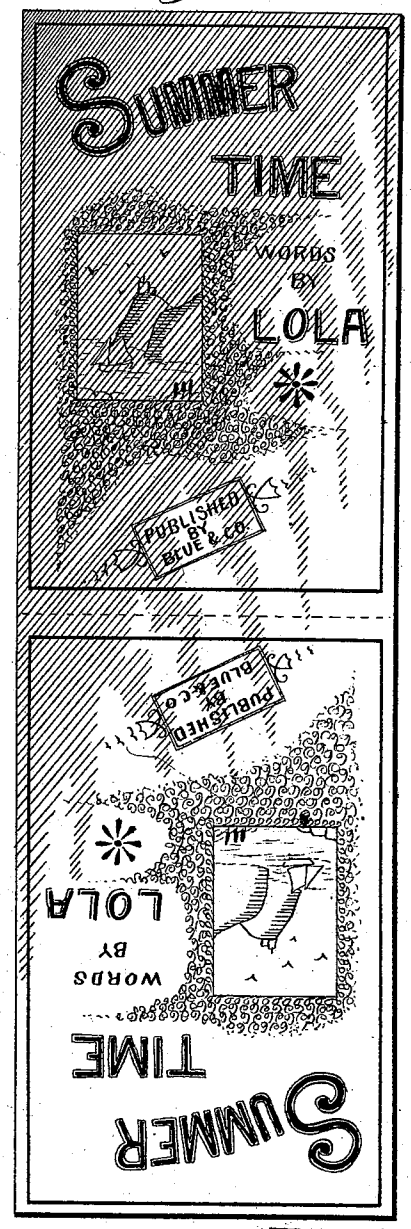


Fig. 3.



Witnesses:
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(No Model.)

3 Sheets—Sheet 3.

T. J. TURLEY.

MULTICOLOR PRINTING.

No. 538,984. Patented May 7, 1895.

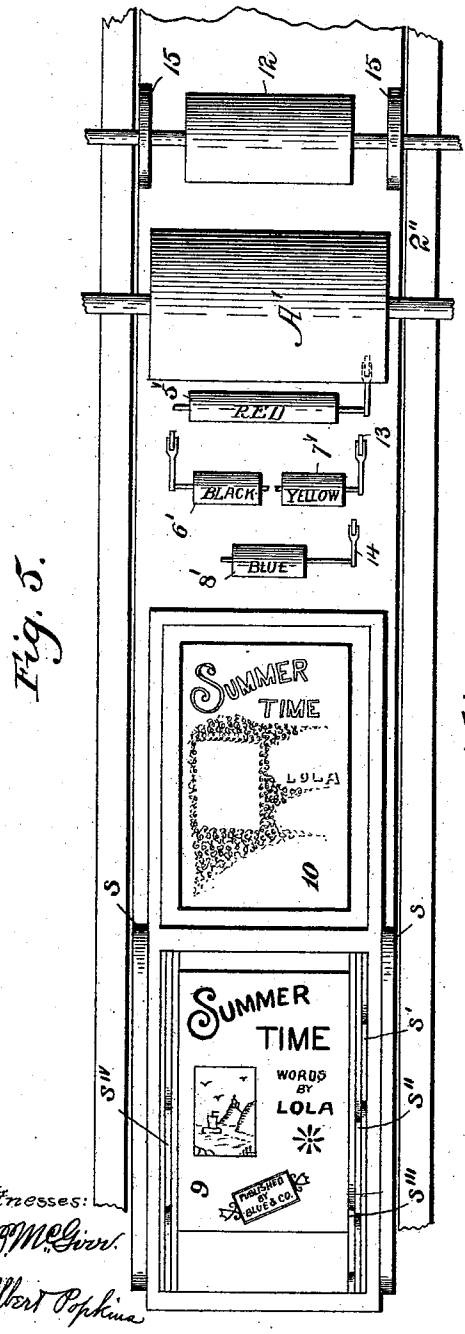

Fig. 5.

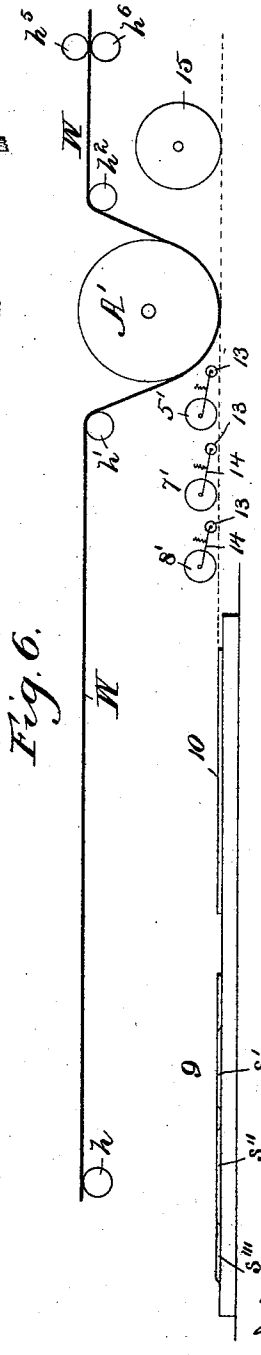

Fig. 6.

Fig. 7.

Witnesses:
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UNITED STATES PATENT OFFICE.

THEODORE JONES TURLEY, OF NASHVILLE, TENNESSEE.

MULTICOLOR PRINTING.

SPECIFICATION forming part of Letters Patent No. 538,984, dated May 7, 1895.

Application filed April 18, 1895. Serial No. 546,291. (No model.)

To all whom it may concern:

Be it known that I, THEODORE JONES TURLEY, a citizen of the United States, residing at Nashville, Davidson county, Tennessee, have invented certain new and useful Improvements in Multicolor Printing, of which the following is a specification.

My invention relates to a novel method of multi-color printing, and its object is to provide an efficient mode or process of printing a plurality of contrasting colors in close register, without blending.

To this end my invention consists essentially in first arranging two or more forms in sets of two, which may be termed primary and secondary forms, in such manner upon a printing press, of any of the usual types known to the art, that one of the forms of each set may be inked by either a single inking device carrying a single color or a plurality of inking devices carrying a plurality of colors, and the other form of the set inked by a plurality of inking devices carrying a plurality of colors; then printing simultaneously from all the forms, by the impression mechanism, upon a single sheet of paper, whether in web form or in ordinary separate sheets; and finally shifting the sheet of paper and again printing so that each impression received at the one passage through the press receives a complementary impression on the next passage therethrough. In other words, I first set up each form of the sets with the design, or matter to be printed, and ink each portion of each form in the desired color or colors in which they are to appear in the completed design or work. In the form of my invention in which separate sheets are used, I then take an impression from the forms, thus producing upon the paper, at the first impression, two incomplete designs, having thereon the appropriate colors intended; and then I shift the paper, so as to make the impressions taken from the primary forms register with the secondary forms and vice versa, and finally printing again in exactly the same manner as before, I secure a double set of impressions comprising a completed design, in which the colors are in close register and in which they may be interwoven in any manner desired, not being limited to mere bands, as is the case in the practice of methods in vogue up to the present time.

In another form of my invention in which a web is used, I take an impression and then shift the web the length of one form, and print again from the forms so that the impression taken from the secondary forms registers with the primary forms, and at this point I may state that the terms "primary" and "secondary" are purely relative, as it is evident that either of the forms of a set may be termed primary or secondary, as desired. I should also state that when the term "passage" is used in the specification and the claims I mean to include the taking of an impression, whether by turning the paper end for end, as in the bed and cylinder press, or by shifting the paper, as in the web press.

My new method can be carried out on various kinds of presses, and in the accompanying drawings, I have illustrated in diagrammatic views two different kinds of presses to which it may be readily applied, and its applicability to other styles may be readily understood by those skilled in the art.

In the drawings, Figure 1 is a plan view of a portion of the bed and cylinder press, showing the relation between the color-inking apparatus, impression-cylinder, and the forms from which the printing is to be done. Fig. 2 shows a double impression made on the first run of the press. Fig. 3 shows a double impression made at the second run of the press embodying two completed designs. Fig. 4 is a plan view of a modification of the arrangement shown in Fig. 1. Fig. 5 is a plan view of a traveling-cylinder press for a similar purpose. Fig. 6 is a diagrammatic side view of the same. Fig. 7 is a detail.

Usually in operating coloring inking apparatus for printing a plurality of colors, it is not possible to print two contrasting colors in close register for the reason that allowance must be made for the dip and circumference of the color inking rollers, which are usually held normally above type-high at predetermined points in the travel of the bed of the press. By the use of my method of arranging and operating such apparatus, I am enabled to print two or more contrasting colors in close

register in such manner that with two runs of the press I produce two or more complete designs in a plurality of colors, upon each sheet of paper, in each of which designs two or more of said colors are in close register.

In carrying out my invention, I prefer to use a supplemental inking apparatus such as shown, for example, in my Patent No. 530,865, dated December 11, 1894, or my Patent No. 538,985, dated May 7, 1895, though it is to be understood that any form of supplemental inking apparatus may be used in which the inking rollers are preferably held normally out of contact with the bed of the press, and are thrown into contact with the form on the bed of the press at predetermined points in the travel thereof, but it is preferable that the hair line, or close register work should be done by a sectional roller, such as that shown in my pending application, referred to above.

By the term "sectional rollers," it is to be understood that I mean rollers whose length is less than the width of the bed of the press.

In carrying out my invention, as applied to the ordinary bed and cylinder press, I lock on the bed of the press, primary and secondary forms in sets of two, in line transversely of the bed of the press, upon one of which is a complete design of the ground work of the matter to be printed and upon the other is what may be termed a skeleton for the close register work. Upon one side of the impression cylinder opposite the first mentioned form, I locate the proper number of supplemental inking apparatus adjusting them so that each roller thereof will ink the appropriate color in the travel of the bed of the press, and upon the opposite side of the impression cylinder, I mount in suitable brackets, a sectional roller aligning with the form for the hair line work. I then pass the sheets, upon which the designs are to be printed, through the press in the usual way, upon each of which two impressions will be made, and the one containing the two or more colors forming the ground work and the other, immediately below it, will contain the outline or hairline work in a single color. I then turn the sheet end for end and repass it through the press in the same manner, the forms still retaining the same fixed relation to the impression cylinder and the inking apparatus, and the same impressions are made upon the two separate portions of the paper, thus making two complete perfected designs in three or more colors.

In the drawings, Figs. 1 to 4, A indicates the position of the impression cylinder in dotted lines. 1 represents the side frames of the press; 2, the bed; 3, the brackets for supporting the sectional inking roller, 4, carrying a single color, and 5, 6, 7, and 8, show the relative positions of the color inking rollers carrying a plurality of colors, which as before stated, may be operated by any of the ways known to the art, but preferably by the mechanism disclosed in my patents before mentioned.

Referring in particular to the drawings, it will be seen that the plate, type, or electrotype, carrying the design, is locked within the main form in line with the several inking rollers, two of these forms being locked together in line transversely of the press and transversely to the inking movement of the inking devices; and by "inking movement" I mean the relative movement between the inking devices and the forms. The secondary form 9, it will be observed in this case the upper one, is intended to print the ground work or body color, or colors, while the lower one, or primary form, 10, is intended to print the close register, skeleton or hair lines, or shade lines, which will surround the several portions of the body work. As shown in the drawings the words "Summer Time" are to be printed in "red," opposite to which is the red ink roller, 5, and the sketch or picture, is to be printed in "black," opposite the black ink roller, 6, and the descriptive words "By Lola" are to be printed in "orange," opposite the orange ink roller, 7, while the inscription "Published by Blue & Co." is to be printed in "blue," and is opposite the blue ink roller, 8; and the hair lines, the marginal lines, and shade lines, are to be printed by the sectional "green" ink roller. It will now be seen, for example, if two thousand sheets are to be printed with any given design having a plurality of colors five for example, one thousand sheets of paper of suitable lengths for containing two designs end to end, are passed through the press, after the forms are caused to be inked in the manner described, and two impressions are made or imprinted upon each sheet such as that shown in Fig. 2, the upper one of which will contain four colors, as above described, and the lower one a single color, green, in this instance, the latter of which constitutes the hair line color. After the one thousand sheets have been run through the press in this manner, the whole is turned end for end, that is through one hundred and eighty degrees, and are repassed through the press in exactly the same manner as before, a second set of double impressions being imprinted upon each sheet as it passes through the press forming complementary impressions to the first impressions. The close register work will accordingly be imprinted upon that part of the sheet or paper upon which the ground work was previously printed and the ground work will be imprinted upon that part thereof whereon the close register work was previously imprinted. It will thus be seen that there will be one thousand sheets finished, each containing two complete designs thus making a total of two thousand separate sheets, each having thereon a complete design in five colors.

By using the sectional ink roller at type-high, I am enabled to use the ordinary ink

table of the press for supplying ink to said rollers, these rollers, in such case, being placed on the opposite side of the impression cylinder from the other ink rollers. When the presses are not supplied with such ink tables, as is sometimes the case, the sectional rollers may be placed upon the same side of the impression cylinder as the other ink rollers, if desired, and ink supplied thereto by supplemental inkers; and they may, or may not, in such case be normally at type-high, and if it is desired to ink the primary form with two or more colors, one of these colors may be applied by the sectional roller, 4, carrying a single color supplied from the ordinary ink table, and the other colors by supplemental rollers, 11, arranged on the same side of the impression cylinder with the other supplemental roller, 5, 6, 7, and 8, and receiving ink from a supplemental inking apparatus in a similar manner to the latter rollers, as shown in Fig. 4.

In Figs. 5, 6 and 7, I have shown the relation of the parts in a traveling cylinder machine to which my method may be applied. I have taken as an example the well known Kidder press, such as shown in Patent No. 291,521, dated January 8, 1884, using one cylinder, and in order to apply my method thereto, for five colors for example, it is not necessary to make any material alteration in the construction of the press, for the rollers, 12, can be mounted in slotted bearings in the cylinder frames and provided with wheels, 15, of slightly greater diameter than the roller, adapted to run in contact with suitable strips, *s*, on the bed of the press, so as to raise the said rollers above type-high when the cylinder passes over the secondary form 9, to clear the same; and the ordinary ink roller can be readily removed, and supplemental inking devices, such as shown in my patent and application referred to, substituted therefor. These supplemental inking devices are provided with form rollers 5′, 6′, 7′, and 8′, normally held above type-high, and are carried on one end of levers, 14, on the other ends of which levers are wheels, 13, running at or below type-high, and adapted, to engage the strips, s', s'', s''', s^{iv}, properly placed, preferably within the chase and secured therein by the usual furniture, so that the several rollers will be lowered at the proper time to ink the part of the form, 9, in the color carried by the particular roller. Instead of mounting the roller, 12, so as to raise and lower it may be mounted at type-high, and receive its ink from a table at the end of the bed, the forms being so arranged that this roller, in the travel of the cylinder, will not quite touch the secondary form, thus dispensing, if desired, with the wheel, 15, and strip, *s*. The two forms 9 and 10 are locked on the stationary bed, 2″, longitudinally thereof as shown. The web, W, passes around the rollers *h*, *h*′, the impression cylinder, A′, and the rollers, h^2, and between the feed rollers, h^5, and h^6, as in the ordinary machine, so that the said web may be intermittently fed forward, the length of one form, by the feeding mechanism after each impression is taken.

The operation of the press is the same as that of the ordinary Kidder press, it being only necessary to add that as the web, W, is shifted the length of one form after each impression, each impression between the first and the last ones will produce a design in contrasting colors in close register, the impression taken from the primary form after each shift having a complementary impression made thereon from the secondary form.

While I have shown only two forms of presses to which my invention is applied, it is obvious that it may be readily applied to other types as well, such for example, as a bed and platen press, using a moving web for the impression, intermittently fed, the forms being arranged so as to be inked according to my method by supplemental inking devices, or by hand, and it may also be readily carried out upon a rotary press, as well, by suitably arranging the inking devices, as heretofore indicated.

One great advantage that arises from the practice of my new method is the fact that I am enabled to print contrasting colors, in close register with practically the expenditure of work necessary to print the plurality colors at one impression, since a double impression is made at each run or shift, and two complete designs made with simply two runs, of the press; and this result is effected by attachments to the ordinary presses now in use, no change whatever being required in the construction of said presses in order that my invention may be applied thereto.

While I have shown and described two forms for printing two impressions at a run or shift, it is obvious that an even multiple of these forms may be employed, the arrangement of the color inking rollers being the same, for each set of two, as that shown in the drawings. This number is limited in fact only by the size of the forms used with respect to the width of the bed of the press upon which they are secured.

I claim as my invention—

1. The herein described improvement in the art of multi-color printing which consists in arranging primary and secondary forms in line upon the bed of the press, causing the primary forms to be inked by a single inking device or a plurality of inking devices, and causing the secondary forms to be inked by a plurality of inking devices, printing simultaneously from all the forms on a single sheet of paper, shifting the sheet and again printing so that each impression made at one passage through the press receives a complementary impression on the next passage therethrough, substantially as set forth.

2. The herein described improvement in the art of multi-color printing which consists in arranging primary and secondary forms transversely to the inking movement of the

inking devices, causing the primary forms to be inked by a single inking device or a plurality of inking devices, and causing the secondary form to be inked by a plurality of inking devices, printing simultaneously from both forms upon a single sheet of paper, then shifting the sheet and again printing so that each impression made at the one passage through the press receives a complementary impression on the next passage therethrough, substantially as set forth.

3. The herein described improvement in the art of multi-color printing which consists in arranging primary and secondary forms in sets of two transversely of the inking movement of the inking devices, causing the primary forms to be inked by a single inking device or a plurality of inking devices, and causing the secondary forms to be inked by a plurality of inking devices, printing simultaneously from all the forms upon a single sheet of paper, and finally turning the sheet end for end and printing again so that each impression made at one passage through the press receives a complementary impression on the next passage therethrough, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THEODORE JONES TURLEY.

Witnesses:
SAM H. ORR,
D. P. WORNNE.