(No Model.) 5 Sheets—Sheet 1.

F. F. W. OLDFIELD.

MULTICOLOR PRINTING MACHINE.

No. 457,663. Patented Aug. 11, 1891.

Fig. 1

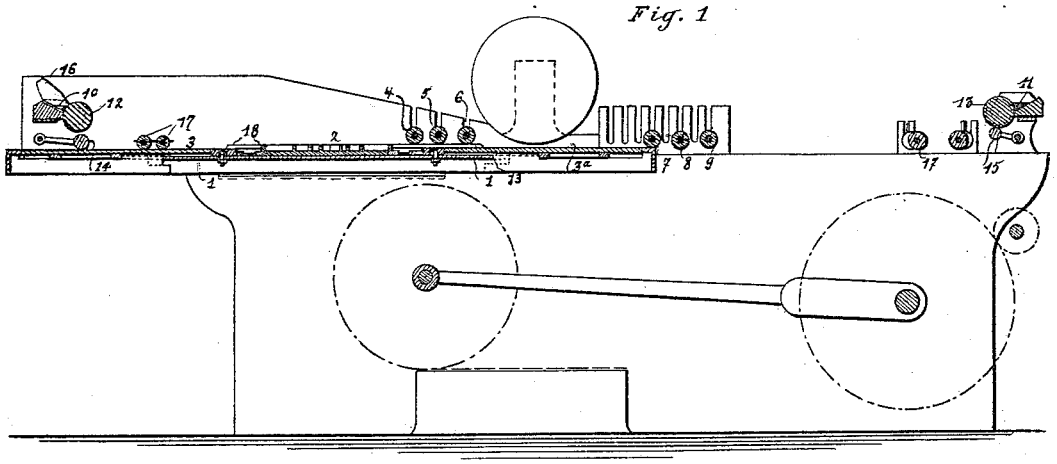
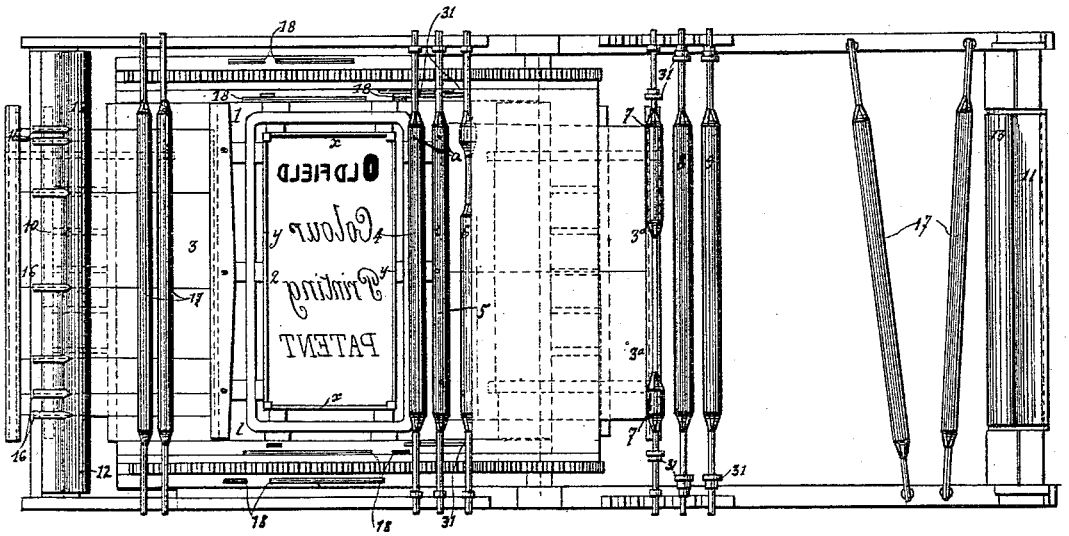


Fig. 2



Witnesses
William Miller
Edward Wolff.

Inventor.
Francis F. W. Oldfield
by
Van Santvoord & Hauff
his attorneys.

(No Model.) 5 Sheets—Sheet 2.

F. F. W. OLDFIELD.

MULTICOLOR PRINTING MACHINE.

No. 457,663. Patented Aug. 11, 1891.

Fig. 4

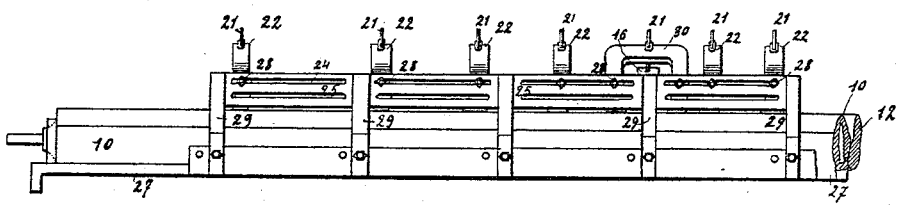


Fig. 6

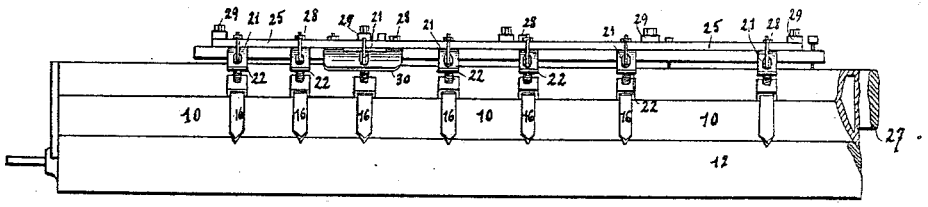


Fig. 5

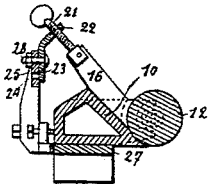
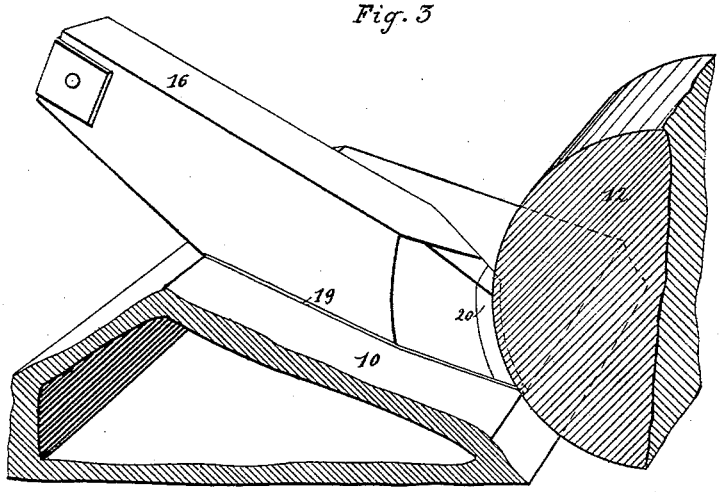


Fig. 3



Witnesses
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(No Model.) 5 Sheets—Sheet 3.

F. F. W. OLDFIELD.

MULTICOLOR PRINTING MACHINE.

No. 457,663. Patented Aug. 11, 1891.

Fig. 13.

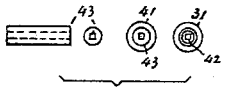


Fig. 12.

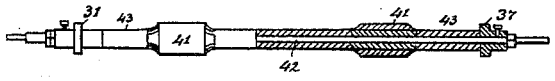


Fig. 14.

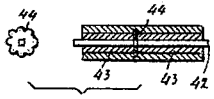


Fig. 8.

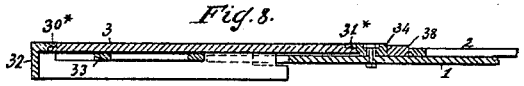


Fig. 7.

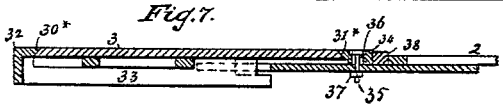


Fig. 9.

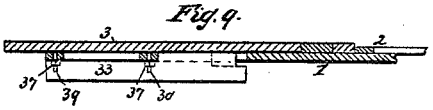


Fig. 10.

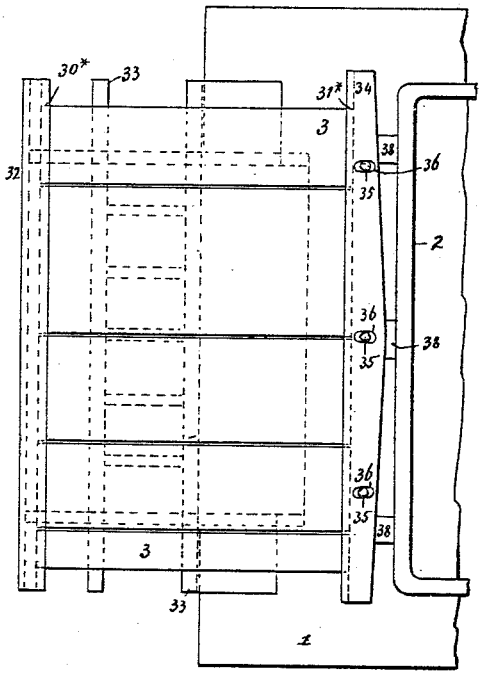
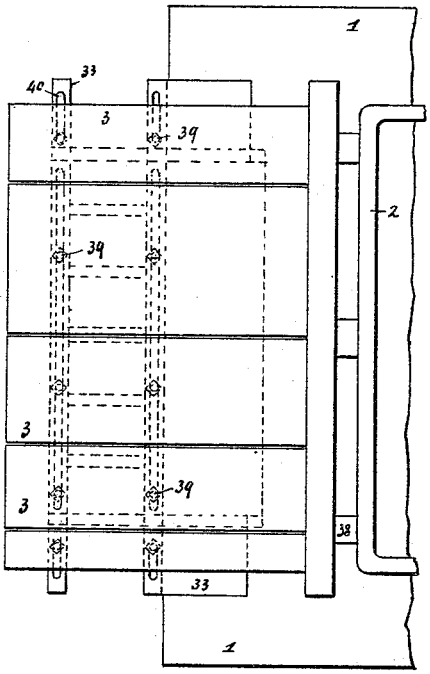


Fig. 11.



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(No Model.) 5 Sheets—Sheet 4.

F. F. W. OLDFIELD.

MULTICOLOR PRINTING MACHINE.

No. 457,663. Patented Aug. 11, 1891.

Fig. 15.

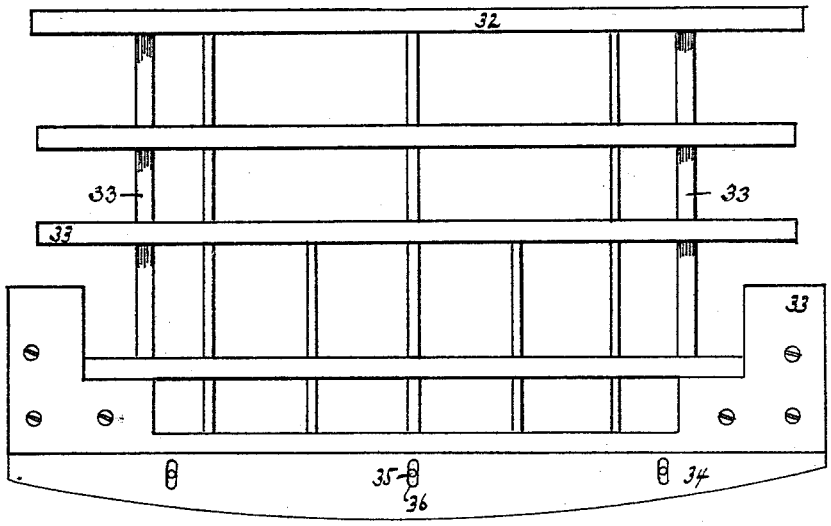

Fig. 15a

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F. F. W. OLDFIELD.

MULTICOLOR PRINTING MACHINE.

No. 457,663. Patented Aug. 11, 1891.

Fig. 18

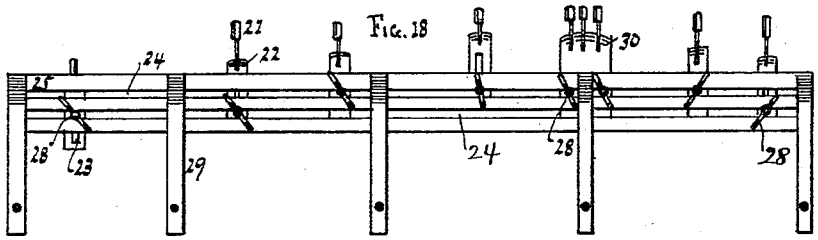


Fig. 17

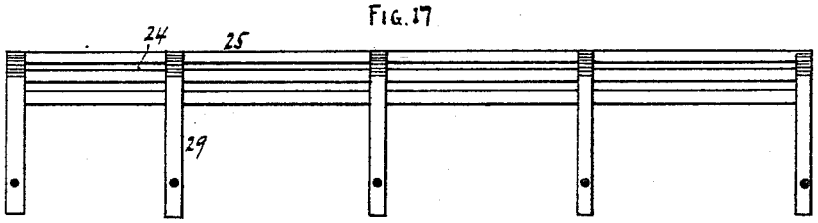


Fig. 19.

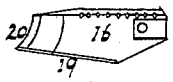


Fig. 20

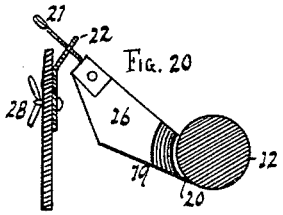


Fig. 21

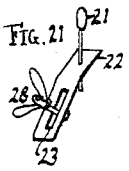
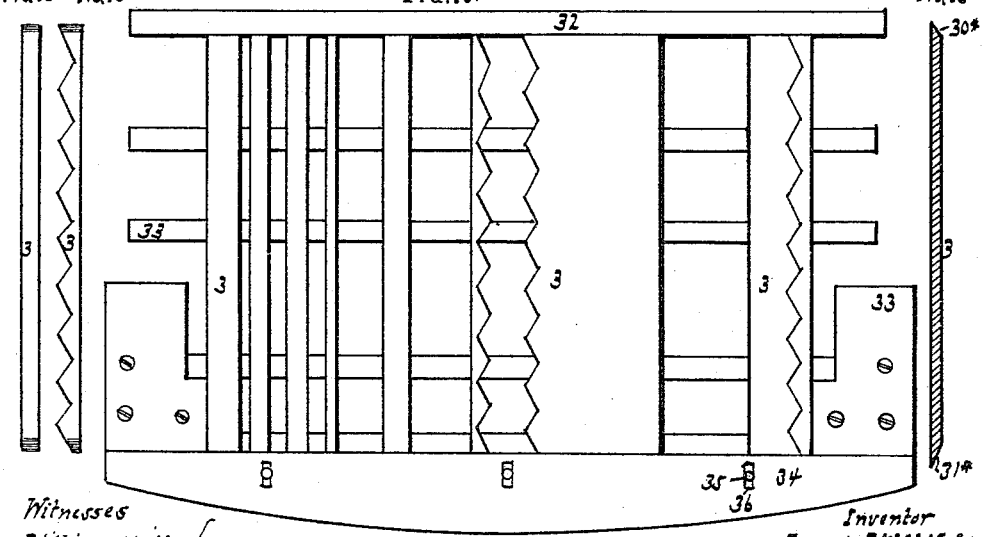


Fig. 16a Fig. 16b Fig. 16. Fig. 16c



Witnesses
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UNITED STATES PATENT OFFICE.

FRANCIS FRAPPELL WASHINGTON OLDFIELD, OF PECKHAM, ENGLAND.

MULTI-COLOR-PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 457,663, dated August 11, 1891.

Application filed September 4, 1890. Serial No. 363,914. (No model.) Patented in England June 4, 1889, No. 9,302.

To all whom it may concern:

Be it known that I, FRANCIS FRAPPELL WASHINGTON OLDFIELD, a subject of the Queen of Great Britain and Ireland, and a resident of Peckham, in the county of Surrey, England, have invented certain Improvements in or Connected with Printing-Machines, Particularly for Multi-Color Printing, (for which I have obtained a British patent, No. 9,302, dated June 4, 1889,) of which the following is a specification.

The object of this invention is to provide a printing-machine with means whereby it is rendered capable of printing from a single "form" any desired number of different colors at one printing.

I will describe the invention with reference to the accompanying drawings, in which—

Figure 1 is a longitudinal section; Fig. 2, a plan, and the remaining views, Figs. 3 to 21, are details of the apparatus, which will be hereinafter referred to.

The apparatus is illustrated as applied to a printing-machine for printing posters, in which the form from which the impressions are to be taken is fixed to a bed or platform caused to reciprocate to and fro beneath an impression-cylinder, as in the well-known "Wharfedale" type of printing-machine; but the invention may be applied to other descriptions of printing-machines.

According to this invention the bed or platform 1, carrying the form 2, is provided at one end or at both ends with inking-surfaces 3 3^a, by which the inking-rollers 4 5 6 7 8 9 are supplied with color, the said inking-surfaces consisting of plates or strips which receive the color from a trough or troughs 10 11 by means of ductor-rollers 12 and 13, respectively, and vibrating rollers 14 15, beneath which the inking-surfaces pass at each reciprocation of the bed or platform. These inking-surfaces are or may be of various widths, as shown, and are fitted to the reciprocating table so as to be capable of being adjusted in position to suit the positions in the form of the lines of type or characters to be inked with the different-colored inks. Suitable modes of fixing these inking-surfaces to the bed of the machine are shown in plan in Figs. 10, 11, 15, 16, 16^a, and 16^b, and in longitudinal section in Figs. 7, 8, and 9. In these figures the inking-surfaces rest upon a frame-work 33, which is secured to or forms part of the bed or platform of the machine.

Fig. 15^a shows a transverse section of the frame-work, and Fig. 16^c is a transverse section of an inking-surface.

In Figs. 7, 10, and 16 the inking-surfaces 3 have beveled ends $30^\times$ $31^\times$, the end $30^\times$ fitting under the correspondingly-beveled edge of a cross-bar 32, forming part of the frame-work 33, the other end $31^\times$ of the inking-surface being secured by an adjustable bar 34, held to the bed or platform 1 by screw-bolts 35, whose heads are countersunk in the bar, so as to offer no obstacle to the free passage of the inking-surfaces under the inking-rollers. The bolts 35 pass through slots 36 in the bar 34 and are secured by nuts 37, which bear upon the under side of the bed 1, so that the bar 34, while held down upon the bed, may be moved so as to bear tightly against the edge $31^\times$ of the inking surface or surfaces when those surfaces and the form are "locked up" or secured by driving quoins or packing-pieces 38 into the space between the edges of the form and the bar 34.

In Fig. 8 one edge $30^\times$ of the inking-surface 3 has a tongue or ledge formed upon it, which fits an undercut portion or a groove formed in the cross-bar 32 of the frame-work 33 or extension of the bed before referred to. The opposite edge $31^\times$ of the inking-surface being held in place by quoins or packing-pieces 38, driven in between it and the edge of a bar 34 of rectangular cross-section, which is secured in place in a manner similar to that described with reference to the bar 34 in Figs. 7 and 10; or the bar 34 in Fig. 8 may be dispensed with, and the ends $31^\times$ may be screwed directly to the bed 1, screws being passed through a slot in the bar and into each inking-surface to prevent any lateral movement thereof.

In Figs. 9 and 11 the inking-surfaces 3 have threaded projections 39 formed thereupon, which threaded projections pass through slots 40, formed in the frame 33, and when the surfaces 3 are adjusted in position they are secured by screwing up the nuts 37 upon the projections, so that the said nuts bear against the under side of the frame 33.

The color-trough 10, from which the inking-

surfaces 3 are supplied with ink or color, is provided with adjustable partitions 16, (see Figs. 3, 4, 5, 6, 19, and 20,) which separate from each other the various colors in use, the said partitions being capable of being slid along the trough and retained in place at the required distances apart, corresponding to the positions and widths of the inking-surfaces on the table, and in order to prevent the colors from mingling one with another the partitions in the trough are made of wood or metal provided with india-rubber and leather or other suitable yielding bearing-surfaces 19 20, respectively, (see Fig. 3, which is a perspective view of one of the partitions 16 and a portion of the trough 10 with a portion of the ductor-roller 12,) which, when the partitions are fixed in position, press against the interior surfaces of the trough and also against the ductor-roller, so as to effectually prevent the passage of the color from one division of the trough to another. With reference now to Figs. 4, 5, and 6, which represent the trough 10 and its appurtenances in rear elevation, cross-section, and plan, respectively, the partitions 16 are secured by thumb-screws 21, passing through bracket-arms 22, having slots 23 at their lower ends to permit of their vertical adjustment through the medium of screws 28, which pass through horizontal slots 24 in a horizontal frame 25, connected by supporting-arms 29 with a bridge-piece 27, on which the color-trough 10 is supported. By this means the bracket-arms 22 can be raised or lowered and can also be adjusted to and from each other as conditions may require. The inner extremities of the set-screws 21 bear against the upper ends of the partitions 16, so that by turning the screws 21 the partitions are adjusted toward the ductor-roller 12. In order to permit the placing of partitions in the color-trough at points opposite the supporting-arms 29, I provide the double-armed bracket 30, Fig. 18. In Figs. 17 and 18 I illustrate detail rear elevations of the horizontal frame 25, and in Fig. 21 a detail perspective view of one of the bracket-arms 22.

Referring now to Fig. 1, the color is conducted from the troughs 10 11 by the ductor-rollers 12 13 to the vibrating rollers 14 15 and by the latter to the inking-surfaces 3 3^a at each reciprocation of the table, and is distributed thereupon by distributing-rollers 17 and transferred therefrom to the inking-rollers in the same manner as in machines for printing with a single color, the inking-rollers 4, 5, and 6 according to this invention being simultaneously supplied with different-colored inks, forming rings of color on the rollers of widths and distances apart corresponding to the widths and distances apart of the inking-surfaces, as may be seen in Fig. 2.

It will be understood that if desired the inking-surfaces for any form may be divided, so that some of the surfaces are placed on one side of the form and the remainder on the opposite side thereof, an inking-trough being provided at each end for the supply of those inking-surfaces which travel below that end. In this case the distributing-rollers may be set at an angle. I find that adjacent inking-surfaces in any case should have a space of not less than one-eighth of an inch between them to prevent the ink traveling from one surface to another.

When the inking-surfaces are in close proximity to one another, as in Fig. 2, the distributing-rollers must not be set at an angle, but must lie at right angles with the travel of the bed, or color would be transferred from one inking-surface to another.

When it is desired to print one or more of the letters or characters in a line with a color different from the color of the other letters or characters in the same line—as, for instance, the initial letter O in the example illustrated—an additional inking-roller 7 is supplied with color from a separate trough 11 and is arranged so that by means of raised strips or "lifts" 18, provided on the reciprocating table, the lift-rollers 31 may be raised or lowered and one end or both ends of the inking roller or rollers may be caused to fall at the requisite times, so as to ink the letter or character intended to be inked thereby and then rise above the surfaces of the letters or characters to be inked or which have been inked with the other color. It should be noted that only one end *a* of each of the rollers 4 and 5 need be lifted for the purpose of avoiding the initial letter O in the form in Fig. 2. These other rollers by being thus lifted at the proper time (by suitable packing-strips not necessary to illustrate) are made to avoid the initial letter O or the part inked by roller 7, and by tacking down some of the packing-strips wherever necessary the rollers are caused to rise, as may be required, and then are permitted to fall back to the bearer when said rollers are again required to ink. One end of these rollers 4 and 5 need only be lifted as high as to avoid the initial letter O and to be in position to ink the other initial letters in the same line; or if this is not possible the other initial letters can be inked by a short or sectional roller—as, for example, roller 6—which sectional roller is made of such length as to avoid the initial letter O and to ink the other initial letters. The additional roller or rollers for the initial letter or for other extra colors may consist of a number of short lengths 41, mounted on a shaft or spindle 42 of square or equivalent cross-section, Figs. 12 and 13, with distance-pieces 43 between the said lengths to regulate the positions of the lengths of inking-roller on the spindle to correspond to the position of the letter or letters of the line or lines in the form to be printed in colors different to those of the rest of the line or lines; or the short lengths of the aforesaid additional roller or rollers may be obtained as follows: A disk of metal 44, Fig. 14, with serrated

edges, and having a suitably-shaped hole at its center, may be threaded on the spindle 42 between each section 43 of the core of the roller and the composition cast around the sections and disks, so as to form a continuous smooth surface. The position of the place of junction between any two sections concealed by the composition is indicated by the position of the disks whose edges may be felt through the elastic composition by pressing thereupon with the fingers. Thus the operator is guided to the concealed ends of a section or sections, and by cutting through the composition at those points the section or sections with the composition thereupon may be readily removed without damage to the composition upon the remaining sections.

When it is desired to print border-lines of one color simultaneously with the multi-color type or characters in the form, additional inking-rollers are provided, as at 8 9, Figs. 1 and 2, supplied with color from the trough 11, which also supplies color for the letter O in the example illustrated, the rollers being arranged to rise and fall at the requisite periods in a similar manner to those described for printing more than one color in the same line, the roller 7 printing the initial O and a portion of the borders marked *x* in Fig. 2, (although the partial inking of the borders by the roller 7 may be dispensed with, if desired,) the rollers 8 and 9 printing those portions of the border marked *y* in Fig. 2.

It will be evident from the foregoing that by arranging different colors in a single trough lying above the bed of the machine at right angles to the direction of motion of the bed each line of type or character lying parallel to the said direction of motion may receive a color similar to or different from the adjacent lines, and that by having one or more color-troughs in addition to the above-mentioned and one or more additional sets of inking-surfaces and rollers any line or lines of type or character, as aforesaid, may receive different colors in succession along its or their length in the direction of motion of the bed of the machine.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a color-trough 10 and a series of inclined partitions 16, of a horizontal frame 25, vertically-adjustable bracket-arms 22, carried by said frame, and set-screws 21, engaging the bracket-arms and acting on the upper ends of the partitions, substantially as described.

2. The combination, with a color-trough 10 and a series of inclined partitions 16, having yielding bearing-surfaces 19 in contact with the bottom of the trough, of a bridge-piece 27, on which the trough rests, a horizontal frame 25, connected with the bridge-piece and having horizontal slots 24, and bracket-arms 22, adjustable along the horizontal slots of the frame and provided at their upper ends with set-screws 21, engaging the partitions, substantially as described.

3. The combination, with a color-trough 10 and a series of inclined partitions 16, arranged in the trough, of a bridge-piece 27, on which the trough rests, a horizontal frame 25, connected with the bridge-piece and provided with a series of parallel horizontal slots 24, a series of vertically and horizontally adjustable bracket-arms 22 on the frame, and set-screws 21, engaging the upper ends of the bracket-arms and acting on the partitions, substantially as described.

4. The combination, with a color-trough 10, inking-surfaces 3, and ink-distributing rollers, of a bridge-piece on which the trough rests, a horizontally-slotted frame connected with the bridge-piece, a series of bracket-arms adjustable horizontally and vertically on the slotted frame, and set-screws engaging the bracket-arms and acting on the upper ends of the partitions, substantially as described.

5. The combination, with a color-trough containing adjustable partitions and the ductor-roller 12, of a frame-work 33, having an undercut cross-bar 32, the removable and replaceable inking-surfaces 3, resting on the frame-work and having opposite beveled ends, with those at one end engaging the undercut part of the cross-bar, and the adjustable cross-bar 34, carried by the frame-work and engaging the opposite beveled ends of the inking-surfaces, substantially as described.

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

FRANCIS FRAPPELL WASHINGTON OLDFIELD.

Witnesses:
N. WILSON,
G. J. MORTLEMAN.