

Dec. 16, 1924.

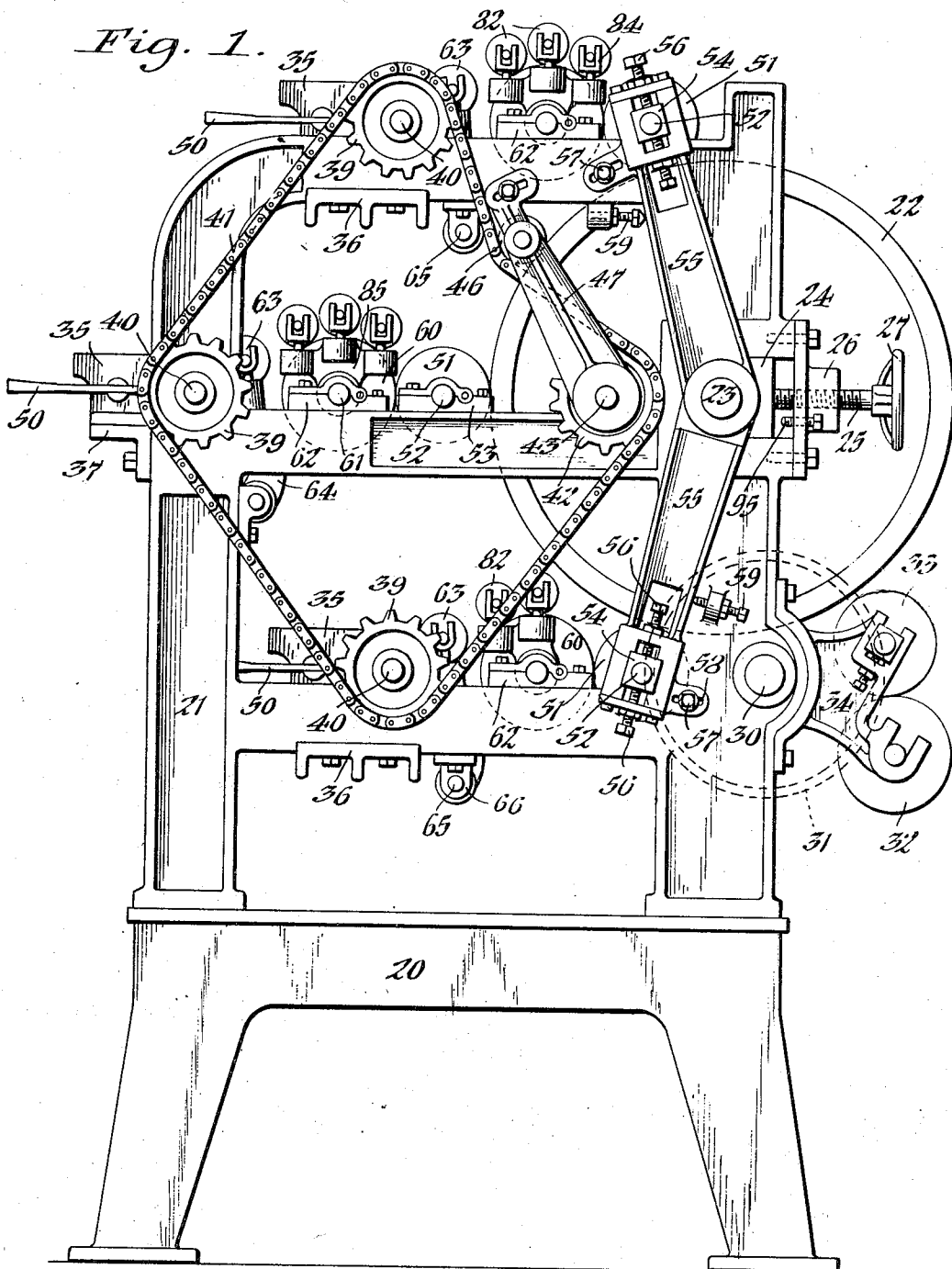
1,519,544

G. F. McINDOE

MULTICOLOR PRINTING PRESS

Filed July 22, 1921

5 Sheets-Sheet 1



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5 Sheets-Sheet 2

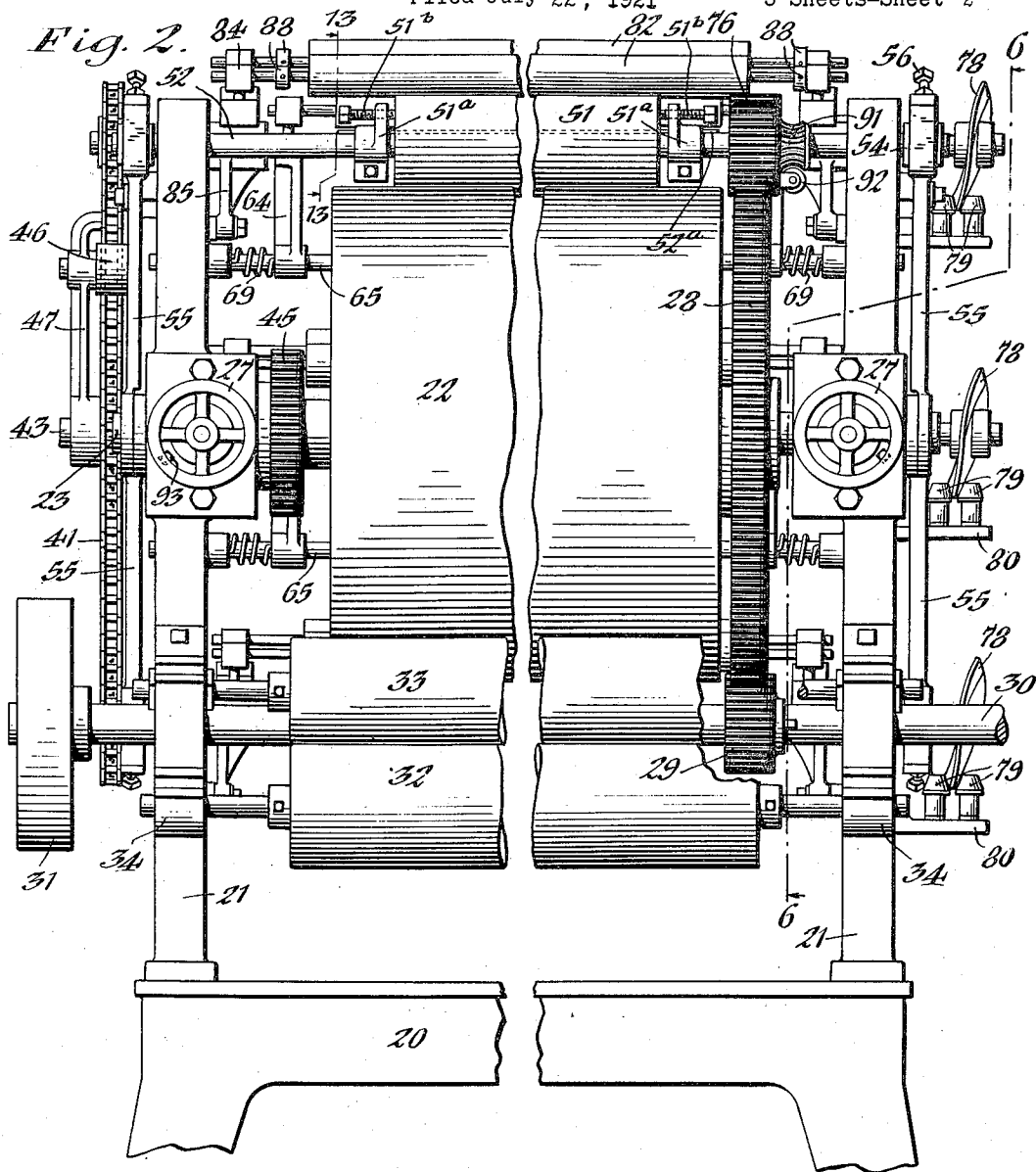
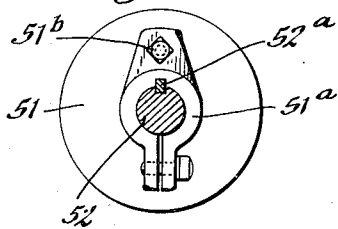


Fig. 13.



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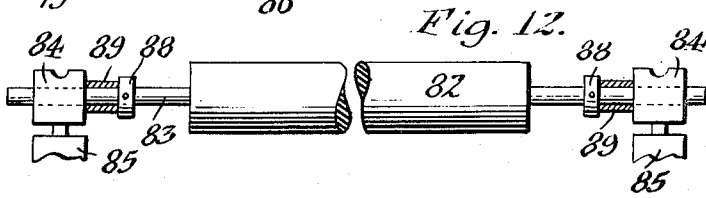
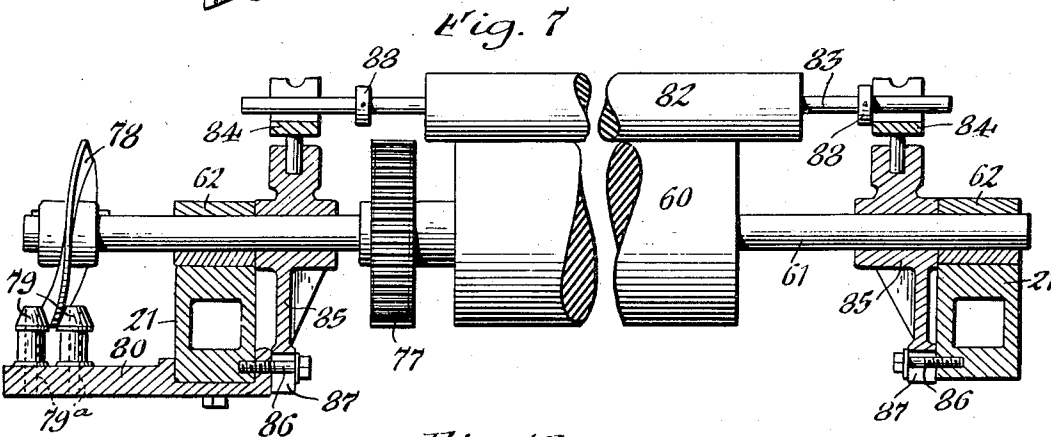
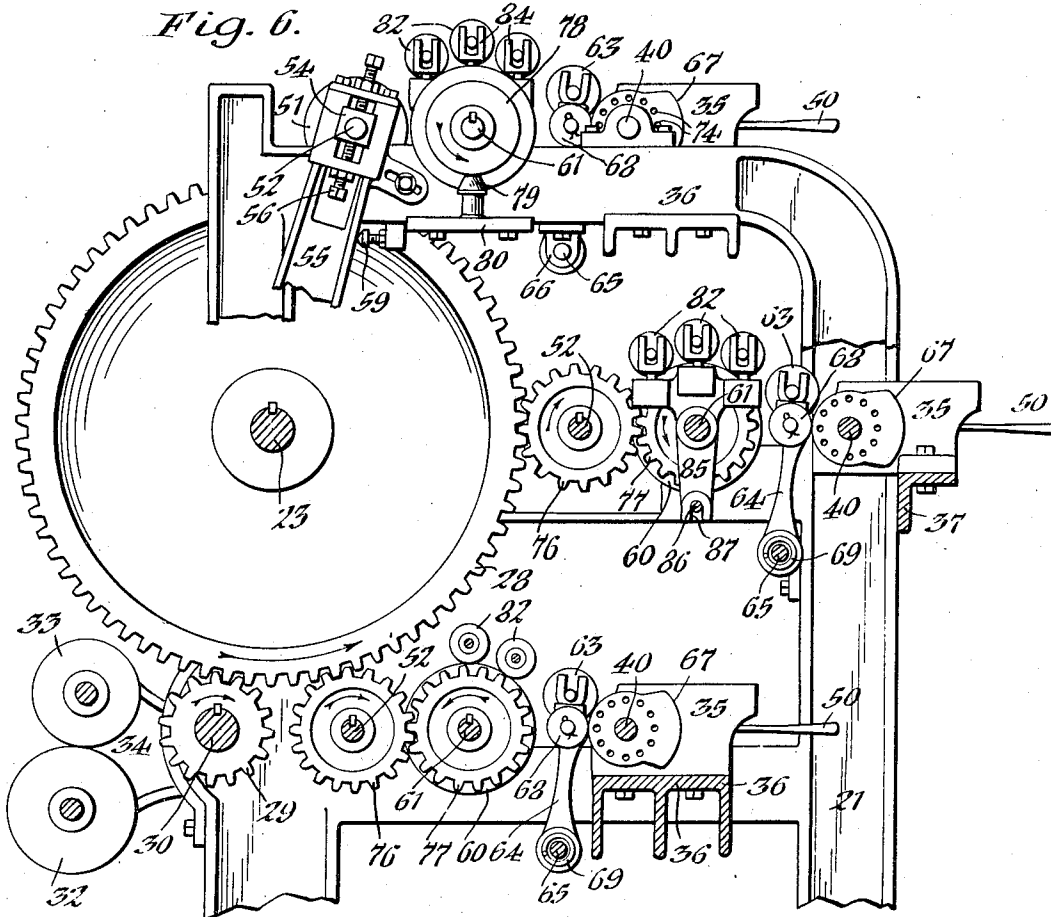
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MULTICOLOR PRINTING PRESS

Filed July 22, 1921

5 Sheets-Sheet 4



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MULTICOLOR PRINTING PRESS

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5 Sheets-Sheet 5

Fig. 8.

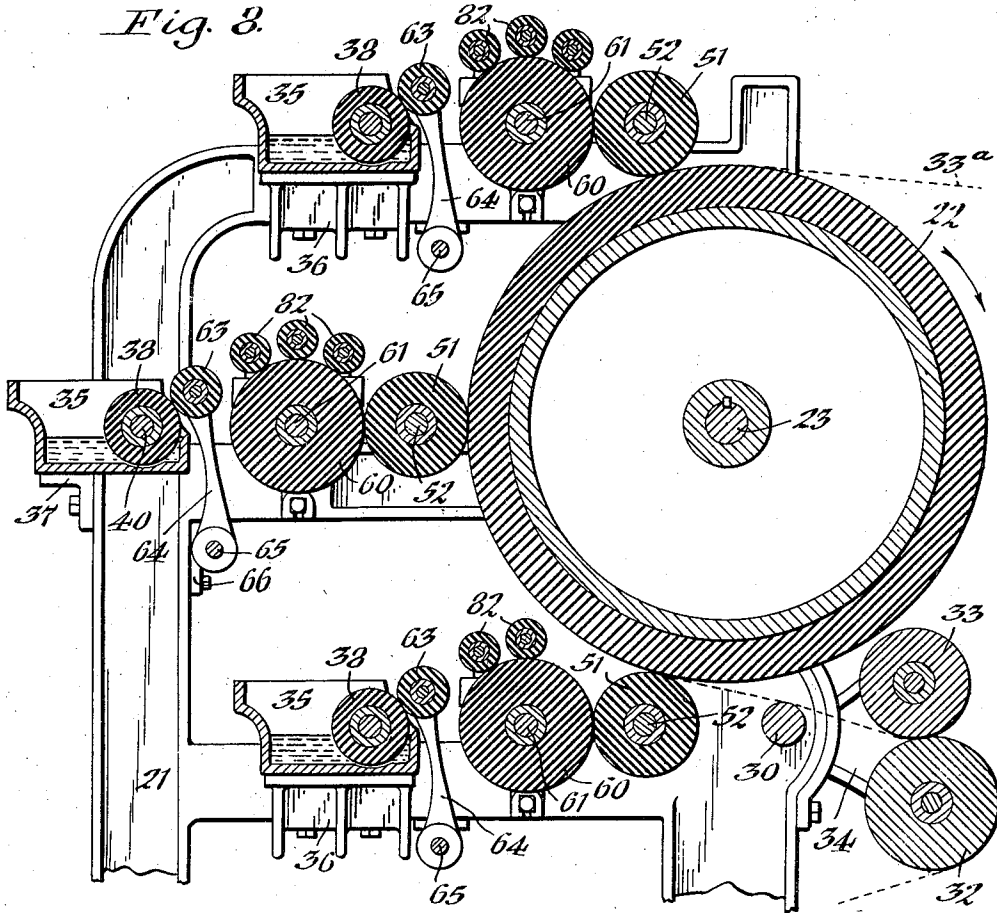


Fig. 9.

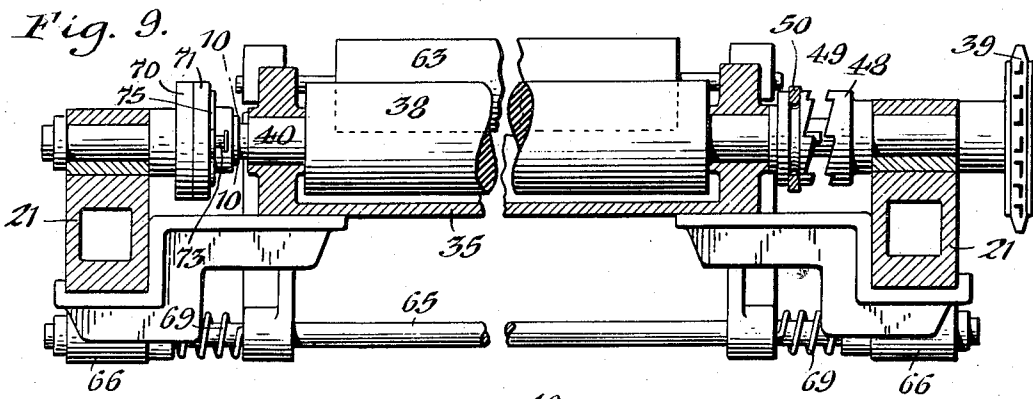


Fig. 10.

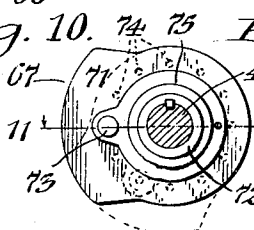
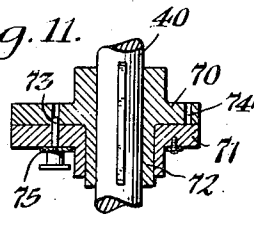


Fig. 11.



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Patented Dec. 16, 1924.

UNITED STATES PATENT OFFICE.

GEORGE F. McINDOE, OF LOCKPORT, NEW YORK, ASSIGNOR OF ONE-HALF TO NIAGARA PAPER MILLS, OF LOCKPORT, NEW YORK, A CORPORATION OF NEW YORK.

MULTICOLOR-PRINTING PRESS.

Application filed July 22, 1921. Serial No. 486,707.

To all whom it may concern:

Be it known that I, GEORGE F. McINDOE, a citizen of the United States, residing at Lockport, in the county of Niagara and State of New York, have invented new and useful Improvements in Multicolor-Printing Presses, of which the following is a specification.

This invention relates to a multi-color printing press for printing a continuous pattern on a strip of material, such as wall paper.

One of the objects of this invention is to provide the press with simple means for effectively controlling the supply and uniform distribution of color to the pattern or printing rolls.

Another object is the provision of improved means for adjusting the several pattern rolls in order to properly register their patterns with one another.

Further objects of the invention are to provide simple means for adjusting the pattern rolls relatively to the impression cylinder to permit the use of pattern rolls of different diameters and to render the impression cylinder movable with relation to the pattern rolls by convenient means, so that it may be withdrawn from said rolls until the color has been thoroughly distributed thereon, thereby avoiding waste of paper.

Still further objects are to simplify the press in other respects and to provide a machine of this character which is reliable in operation.

In the accompanying drawings: Figure 1 is a side elevation of a multi-color press embodying my improvements. Figure 2 is a fragmentary front view thereof. Figure 3 is a sectional top plan view thereof. Figure 4 is an enlarged transverse section on line 4—4, Fig. 3. Figure 5 is a vertical section on line 5—5, Fig. 4. Figure 6 is a fragmentary vertical longitudinal section on line 6—6, Fig. 2. Figure 7 is an enlarged transverse section on line 7—7, Fig. 3. Figure 8 is a longitudinal section on line 8—8, Fig. 3. Figure 9 is an enlarged transverse section on line 9—9, Fig. 3. Figure 10 is an enlarged vertical section on line 10—10, Fig. 9. Figure 11 is a horizontal section on line 11—11, Fig. 10. Figure 12 is a frag-

mentary sectional elevation of one of the auxiliary distributing rolls having the spacing sleeves thereon. Figure 13 is an enlarged cross section on line 13—13, Fig. 2. Similar characters of reference indicate corresponding parts throughout the several views.

20 represents the base or bed of the press and 21, 21 the side frames which are mounted on said base and upon which the working parts of the machine are supported.

22 represents the platen roll or impression cylinder which is mounted on a horizontal shaft 23 arranged transversely at the front end of the machine and journaled in suitable bearing blocks 24 adjustably mounted in the side frames. Each of these bearing blocks is movable lengthwise of the frame by a screw 25 connected with said block and engaging a nut 26 secured to said frame, the screw being provided with a suitable hand wheel 27 for rotating it.

Keyed to the shaft 23 is a driven gear wheel 28 which meshes constantly with a relatively small gear 29 keyed to a driving shaft 30 journaled in suitable bearings in the side frames 21 and provided at one end with a pulley 31 adapted for connection with a source of power. By means of this drive mechanism, the impression cylinder is rotated in the direction of the arrow, Fig. 8, to advance the paper around the rear side thereof.

32, 33 represent a pair of sheet guiding rolls which are disposed vertically below the lower side of the impression cylinder 22 and journaled at their ends in bearing brackets 34 secured to the front ends of the side frames, as shown in Figs. 1 and 2. The paper or web 33^a to be printed passes forwardly from the supply roll, not shown, around the front side of the lower roll 32 and thence rearwardly between the latter and the upper roll 33 to the impression cylinder.

Arranged at the rear end of the machine are a series of ink or color fountains which are disposed one above another, three of such fountains being shown in the drawings. These fountains are arranged transversely of the machine between the side frames 21, the upper and lower fountains being preferably arranged vertically in line

and supported at their ends on brackets 36, while the other fountain is arranged at a level about midway between said upper and lower fountains and in rear thereof, the same being supported at its ends on brackets 37. Journaled in each of these ink fountains and immersed in the color contained therein is a color supply roll 38. Sprocket wheels 39 are mounted on the shafts 40 of these color rolls and passing around them is a driving chain 41, which is driven from a sprocket wheel 42 mounted on one end of a short transverse shaft 43. Secured to the other end of the latter is a gear wheel 44 which meshes with a gear wheel 45 mounted on the impression cylinder shaft 23. To permit of adjusting and tightening the driving chain, it preferably passes under an idler wheel 46 carried by an adjustable vertically-swinging lever 47 fulcrumed on the shaft 43.

By this arrangement the color rolls are positively driven at a uniform rate of speed. Should it be desired to temporarily stop the rotation of any of these rolls, for instance, if too much color is being distributed by these rolls to the printing mechanism, a suitable clutch is employed for each color roll for disengaging the same from the drive mechanism. In Figs. 3 and 9 is illustrated the preferred form of clutch which consists of a stationary, toothed member 48 and a shiftable toothed member 49 actuated by a horizontally swinging hand lever 50.

Each color fountain forms a part of a single-color printing unit, which, together with the remaining units, produces the multi-colored pattern on the sheet as it is passed through the machine. Each of these printing units is preferably constructed as follows:

51 indicates the pattern or printing roll which is carried by a shaft 52 and which is arranged transversely between the side frames 21. This pattern roll may be of any suitable construction and bears on its face the desired pattern, the paper to be printed passing between said roll and the impression cylinder in the usual manner. The pattern roll of the intermediate printing unit is journaled in longitudinally adjustable bearings 53 mounted on the side frames of the machine, while the corresponding upper and lower pattern rolls are journaled at their ends in bearing blocks 54 carried by the outer ends of vertically-swinging arms 55, 55, preferably fulcrumed on the ends of the shafts 23. These arms are of equal length and the upper and lower pattern rolls are equidistant from the central pattern roll. The bearing blocks 54 are adjustable lengthwise of their arms, by adjusting screws 56, engaging opposite ends of said blocks. Clamping screws 57 passing through slotted ears 58 of these arms serve to hold the latter

in position, while adjusting screws 59 engaging the front and rear edges of the lower and upper arms, respectively, permit of a fine adjustment of said arms to properly position the pattern rolls relatively to the impression cylinder. Furthermore, by providing the adjustable arms 55, pattern rolls of different diameters may be easily and quickly substituted for those of the size shown in the drawings. For example, if it is desired to use smaller pattern rolls, it is only necessary to swing the arms toward the center pattern roll to obtain a perfect circumferential register of said rolls with the impression cylinder 22 and color distributing rolls 60, while if it is desired to use larger rolls, the arms are correspondingly swung farther away from the center pattern roll to obtain a perfect register thereof.

Contacting with the rear side of each of the pattern rolls 51 is a color distributing roll or cylinder 60 carried by a shaft 61 arranged transversely of the machine and journaled at its ends in longitudinally-adjustable bearing blocks 62. The color is transferred from the color roll to this distributing cylinder by a transfer roll 63, Figs. 6 and 8, which is preferably mounted to rock or oscillate between said color roll and said distributing cylinder. For this purpose, the transfer roll is removably supported at its ends in upright rock arms 64 secured to a transverse shaft 65 journaled in bearings 66 secured to the side frames of the machine. Referring to Figs. 6, 9, 10 and 11, a cam 67 mounted on the shaft 40 of the color supply roll and engaging a contact or antifriction roller 68 of the corresponding rock arm, serves to actuate the arm in one direction, while a spring 69, surrounding the shaft 65 and fastened at one end thereto and at its other end to said rock arm, serves to move the arm in the opposite direction.

To permit of varying the contact period of the transfer roll 63 with the color supply roll and color distributing roll, and thereby regulate the amount of color transferred from one roll to the other, the cam 67 is preferably composed of two adjustable sections 70, 71 arranged side by side, as shown in Figs. 9, 10 and 11. One of the sections, preferably the outer section 70, is keyed to the color supply roll shaft 40 while the inner section 71 is rotatably mounted on the hub 72 of said outer section and provided with a coupling pin 73 adapted to register with one or another of an annular row of openings 74 in the outer section. Said coupling pin is preferably carried by a flat spring 75 fastened to the face of the inner cam section to reliably hold the coupling pin in place.

Upon withdrawing the coupling pin from engagement with the outer cam section and turning the inner cam section relatively thereto in one direction or the other, the

effective length of the cam-face is shortened or lengthened and the period of contact of the transfer roll with the color supply roll and color distributing roll is varied accordingly. This variable action of the transfer roll relatively to the color supply roll and distributing roll, permits the amount of ink or color to be regulated to suit various kinds of work.

Rotary movement may be imparted to the pattern roll 51 and color distributing roll 60 of each printing unit in any suitable manner. As shown in Figs. 3 and 6, these rolls are preferably driven in opposite directions by intermeshing gear wheels 76 and 77, mounted on the respective shafts of said rolls, the gear wheels 76 being driven by the gear wheel 28 which drives the impression cylinder 22.

Means are provided for reciprocating the distributing roll 60 endwise across the surface of the pattern roll to effect a more uniform distribution of the color thereon. The preferred means, as shown in Figs. 6 and 7, consist of a spiral cam disk 78 which is keyed to the distributing roll shaft and whose opposite sides engage a pair of upright rollers 79 journaled on fixed studs 79^a carried by a bracket 80 secured to the adjacent side frame 21 of the machine. By this construction, when the distributing roll is rotated, it is at the same time reciprocated across the surface of the pattern roll.

Running in contact with the upper sides of each main distributor roll 60 is a series of supplemental distributing rolls or riders 82 which serve to spread the color uniformly over the surface of said main distributor roll. The spindles 83 of these supplemental rolls are preferably supported in forked bearings 84 removably arranged in the upper ends of adjustable brackets 85 supported on the distributing roll shaft 61, as shown in Figs. 3, 6 and 7. Clamping screws 86 engaging slots 87 in the lower ends of these brackets are provided to hold them in adjusted position. By this construction, when the bearing blocks 62 supporting the main distributing roll shaft 61 are adjusted longitudinally of the frame to accommodate pattern rolls of different diameters, the brackets 85 carrying the supplemental distributing rolls are likewise moved with said bearing blocks, said supplemental roll remaining in substantially the same relative position in the main distributing roll. During such adjustment, each bracket 85 rocks about its clamping screw 86 as a fulcrum.

The supplemental distributing rolls 82 may be held from endwise movement, so as to turn only relatively to the main distributing roll 60; or they may be allowed to reciprocate therewith, or they may be allowed to reciprocate only a partial stroke or distance therewith, depending upon the particular

character of the work to be printed. For producing these results, the spindles are provided near their ends with fixed collars 88, Fig. 7, which are spaced more or less from the corresponding bearings 84, so that the supplemental distributing rolls are allowed to reciprocate with the main distributor roll by their frictional contact therewith, said collars alternately abutting against said bearings and limiting the stroke of the supplemental rolls. By interposing spacing sleeves 89 between said collars and said bearings, as shown in Fig. 12, the supplemental rolls are held against endwise movement relative to the main distributor roll. By removing one of these spacing sleeves and leaving the other in position, the supplemental rolls are reciprocated with the main distributor roll, but their stroke is obviously shorter than when both of said sleeves are removed.

In order to properly register the pattern rolls 51 of the several printing units to reproduce the multi-colored pattern on the paper as it passes through the machine, each of them is capable of rotary adjustment independently of the others. For this purpose, reference being had particularly to Figs. 4 and 5, each of the pattern-roll driving gears 76 is loosely mounted on the hub 90 of a worm wheel 91 keyed to the shaft of said pattern roll. Journaled on the outer side of the driving gear is a worm 92 which meshes with said worm wheel, and which is provided with a square end 93 for turning it with a suitable wrench. The gear 76 is held against lateral displacement on its hub by a flange 94 extending from the inner edge of the latter and by said worm and worm wheel. These last-named elements not only permit of the rotary adjustment of the pattern roll, but also act as a positive coupling between the driving gear 76 and the pattern roll shaft, whereby motion is normally transmitted to the latter from the gear 28. By this arrangement, independent rotary adjustment of the several pattern rolls can be easily and quickly effected without in any way interfering with the rest of the driving mechanism of the machine.

Besides being capable of rotary adjustment to obtain a proper circumferential register of their patterns, the pattern rolls 51 are also capable of longitudinal adjustment on their shafts 52 to effect a proper horizontal or lateral register of their patterns. For this purpose, as shown in Figs. 2, 3 and 13, each of the pattern rolls is splined on its shaft, as shown at 52^a. Also splined on said shaft at either end of the pattern roll are adjustable collars 51^a carrying adjusting screws 51^b which contact with the corresponding ends of said pattern roll. By manipulating these adjusting screws, the pattern roll may be moved in one direction

or the other on its shaft to properly register its pattern with those of the remaining rolls.

In order to thoroughly and uniformly apply the color to the distributing rolls 60 and pattern rolls 51, preparatory to running the paper through the machine, means are provided for withdrawing the impression cylinder from contact with the pattern rolls without however throwing the cylinder out of gear with the pattern rolls, so as to maintain the proper register of their patterns. This is accomplished by loosening the clamping screws 57 of the arms 55 and rotating the screws 25 in the proper direction to move the impression cylinder forwardly out of contact with the pattern roll of the central printing unit. The pattern rolls of the upper and lower printing units may then be withdrawn from contact with the impression cylinder by moving the bearing blocks 54 thereof outwardly. Suitable stops 95 carried by the nuts 26, as shown in Fig. 1, may be employed for limiting the forward movement of the bearing blocks 24 and preventing the disengagement of the gears 28 and 76. By this construction, the printing and wasting of paper is avoided while the colors are being thoroughly and uniformly distributed upon the pattern rolls through the medium of the color rolls, transfer rolls and distributing rolls.

The operation of the machine is as follows:

Assume the pattern rolls to be in proper register and the colors from the several fountains 35 to have been thoroughly distributed over said rolls in the manner hereinbefore described. The sheet or web of paper to be printed is now passed forwardly from the supply roll, not shown, thence rearwardly between the rolls 32, 33, and thence around the rear side of the impression cylinder to the take-up or rewind roll, not shown. Having thus threaded the web through the machine, power is applied to the pulley 31 to rotate the driving shaft 30, which transmits motion to the impression cylinder 22. From the latter motion is transmitted simultaneously to the three different-colored printing units, as hereinbefore described. As the paper passes through the machine, the patterns from the respective pattern rolls are reproduced thereon. Should the operator find that one or another of the pattern rolls is receiving too much color, he may temporarily throw it out of action and stop it by means of the corresponding clutch lever 50. On the other hand, if he finds that a pattern roll is not getting enough color, he may adjust the cam 65 of the corresponding printing unit, so that the period of contact of the companion transfer roll 61 with the respective

color and distributing rollers is lengthened, whereby a greater quantity of color is applied to said pattern roll. The adjustment of the cams 65 may be effected without stopping the machine, it being only necessary to disengage the clutch of the color roll on which the cam to be adjusted is mounted.

The several printing units of this machine are actuated from a single driving shaft which permits the pattern rolls to rotate at the same uniform speed for producing the desired results. As a whole, the machine is comparatively simple in construction, it is easily adjustable for printing various kinds of work, and it is reliable and efficient in operation.

The pattern rolls 51 may be constructed of rubber or other material having a flexible pattern surface while the color distributing rolls 60 may be constructed of steel or similar material. The preferred form of pattern roll employed with this machine is shown and described in co-pending application No. 462,312, filed April 18, 1921.

I claim as my invention:

1. A multi-color printing press, comprising a frame, an impression cylinder supported on said frame, a driving shaft geared to said impression cylinder, a plurality of color units each including a pattern roll, a color-distributing roll and a color-supply roll, gearing on one side of the frame for driving the pattern and color distributing rolls, gearing on the opposite side of said frame for driving the color-supply rolls, both sets of gearing being driven from the impression cylinder, and clutch mechanism for said color-supply rolls for selectively disengaging them from said driving gearing.

2. A printing press comprising a frame, an impression cylinder thereon, a color printing unit disposed in juxtaposition to said impression cylinder and including a pattern roll, a main color distributing roll and a supplemental distributing roll contacting with the latter, means for reciprocating said main distributing roll across the face of said pattern roll, bearings for the spindle of said supplemental distributing roll, fixed stops on said spindle for permitting the supplemental distributing roll to reciprocate in unison with the main distributing roll the full length of its stroke, and detachable means mounted on the supplemental distributing roll spindle for varying the stroke of the latter relative to said main distributing roll.

3. A printing press, comprising a frame, an impression cylinder supported on said frame, a color printing unit disposed in juxtaposition to said impression cylinder and including a pattern roll, a main color distributing roll and a supplemental dis-

tributing roll contacting with the latter, means for reciprocating said main distributing roll across the face of said pattern roll, bearings for the spindle of said supplemental distributing roll, stop collars fixed on said spindle and arranged to permit said supplemental distributing roll to reciprocate in unison with said main distributing roll, and spacing sleeves detachably mounted on the supplemental distributing roll-spindle between said collars and said bearings.

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