

No. 752,896.

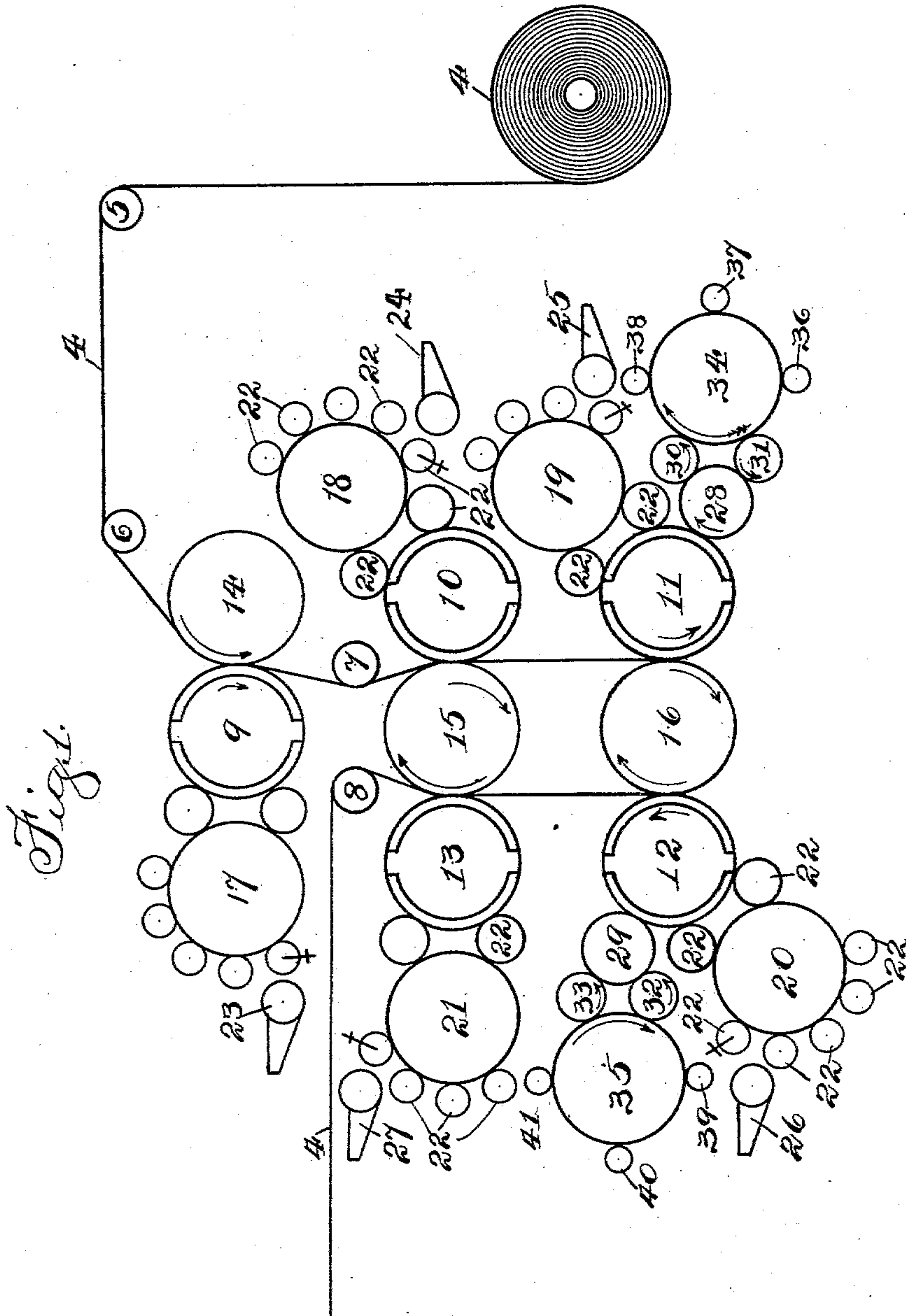
PATENTED FEB. 23, 1904.

J. L. FIRM.  
MULTICOLOR PRINTING MACHINE.

APPLICATION FILED NOV. 17, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



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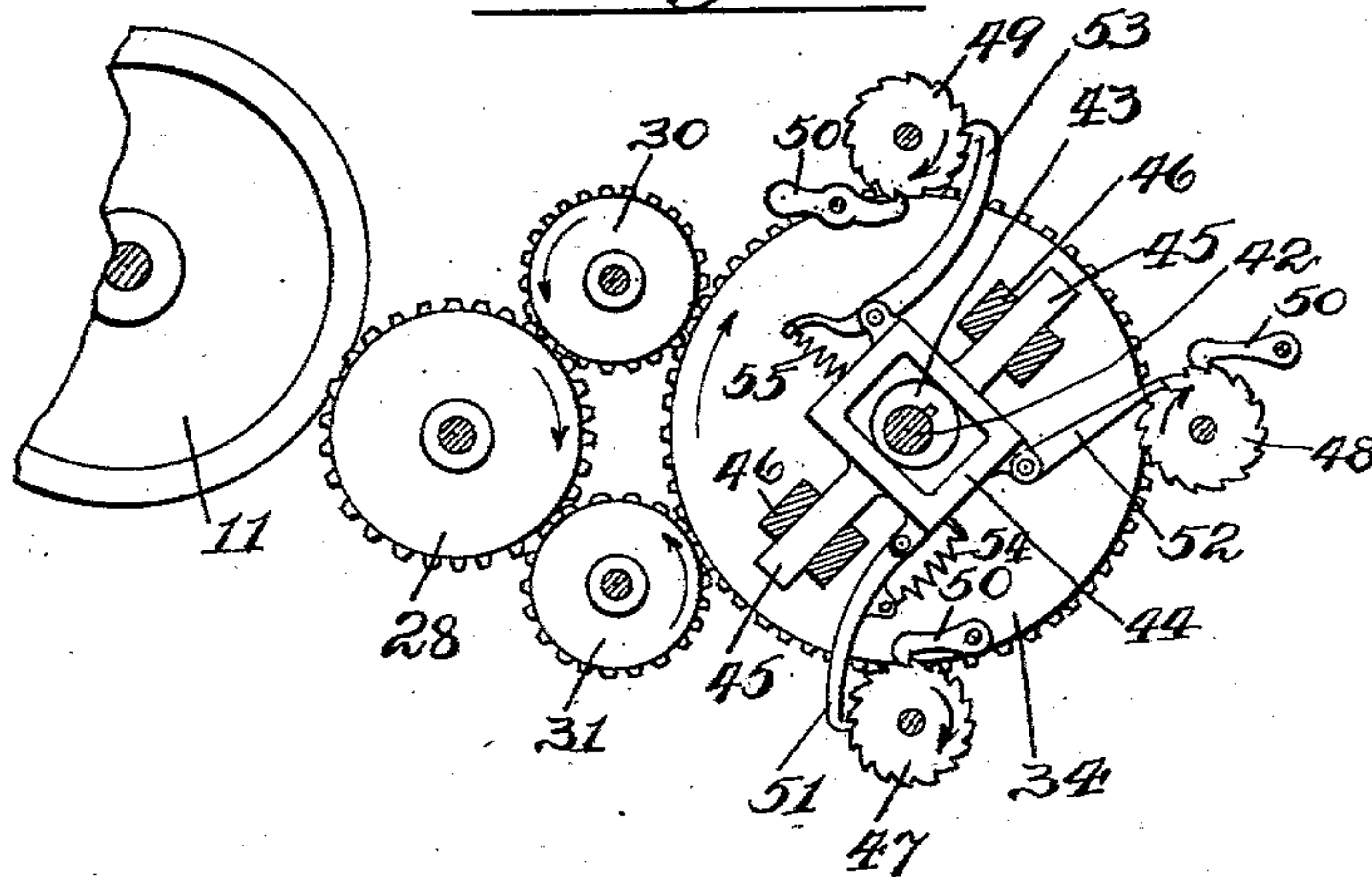
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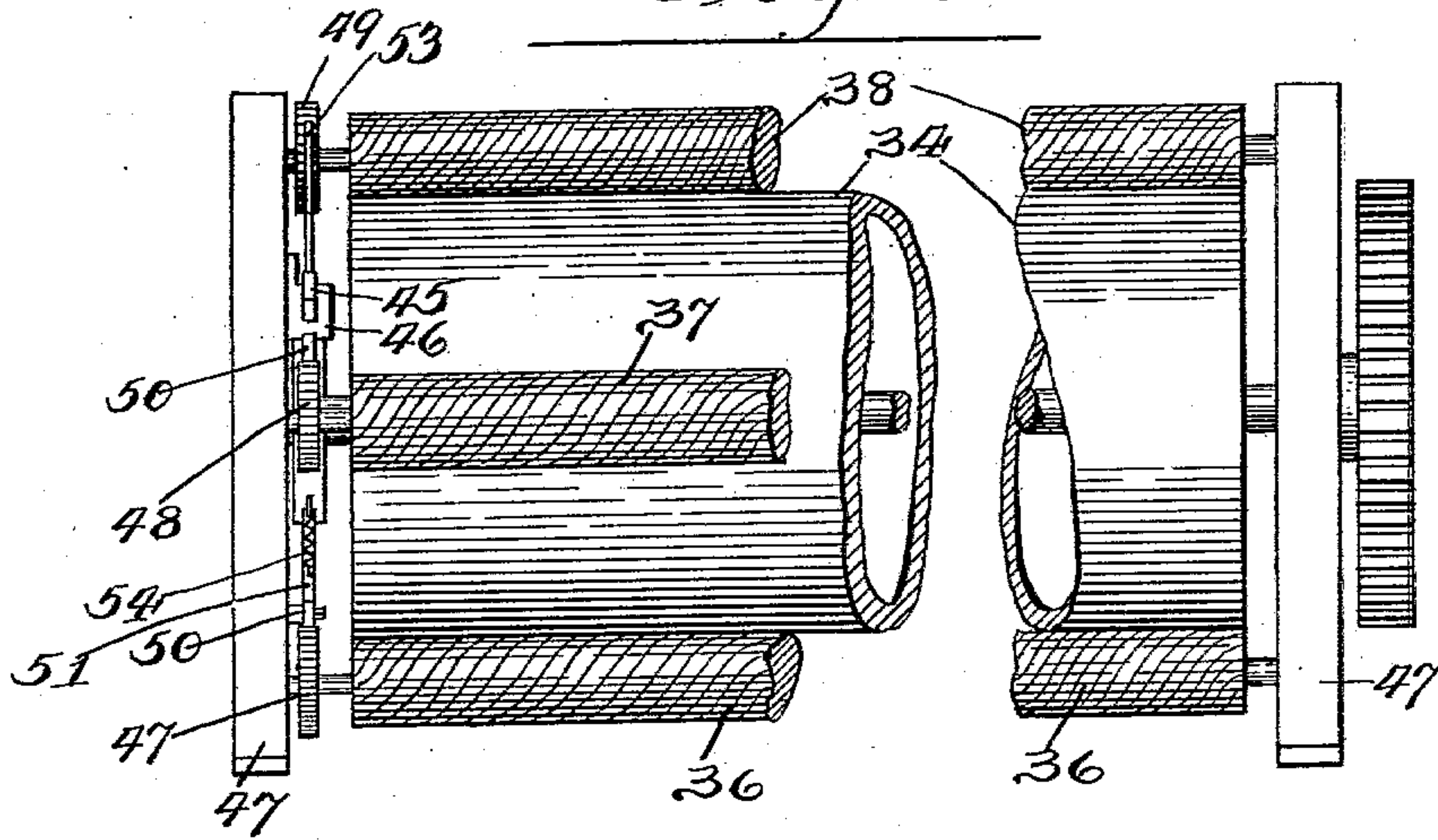
NO MODEL.

2 SHEETS—SHEET 2.

*Fig. 2.*



*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

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## MULTICOLOR-PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 752,896, dated February 23, 1904.

Application filed November 17, 1902. Serial No. 131,721. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH L. FIRM, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Multicolor-Printing Machines, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to rotary multicolor-printing presses in which two or more colors are printed upon one side of a web; and its object is to provide mechanism by which the mixing of the colors from one impression-cylinder to another when one color is overlaid upon another may be prevented and a uniformity of color-printing thereby secured.

Heretofore there has been considerable trouble in multicolor-presses, caused by the fact that the color printed upon the web by the first color-impression cylinder is transferred more or less, according to the moisture of the color, from the web to the second color-impression cylinder when the second color-cylinder is designed to overlay a second color upon the first. This causes a blending of the first color with the second, which increases as the press is used until the color is considerably changed and a uniformity of color-printing prevented. For instance, suppose that it is designed to print upon one side of the web a block of green color. To do this, the block is printed by the first color-cylinder with blue ink. The web thus printed with the block of blue is carried to a second color-cylinder bearing a corresponding block, which will register with the imprint of the first block and which is supplied with yellow. The yellow color overlaid upon the blue will produce the required green. The blue block of color, however, reaching the second impression-cylinder in a somewhat moist condition will leave a certain portion of the blue from the web upon the yellow block of the second form-cylinder, and when the yellow ink is supplied again to this block it will mix with the slight portion of blue left upon the block, as above described. This will cause a slight difference in the shade of the yellow supplied the next time, and this increases until the color is considerably changed. The same of

course is true if red and blue are overlaid to produce purple, or red and yellow to produce orange, and so on. The trouble is still further increased if other colors are used to overlay the first two, the two first colors being carried along more or less moist by the web to the next impression-cylinder and thence transferred to the next impression-cylinder until that color also is blended with the colors from the first two cylinders.

It is the object of my invention to do away with this difficulty, and I attain it by means of the mechanism heretofore described, as illustrated in the drawings.

In the drawings, Figure 1 is a diagrammatic side elevation view of several inking, impression, and form cylinders of a press. Fig. 2 is an enlarged detail, being an end view of one of the cylinders to which the ink is transferred and showing the mechanism by which the wipers are rotated. Fig. 3 is an enlarged detail, being an end view, broken away, of the parts shown in Fig. 2, together with a portion of the frame of the press.

Referring to the drawings, 4 indicates a web of paper.

5, 6, 7, and 8 indicate guide-rollers.

9, 10, 11, 12, and 13 indicate form-cylinders.

14, 15, 16 indicate impression-cylinders, impression-cylinder 14 coacting with form-cylinder 9, impression-cylinder 15 coacting with form-cylinders 10 and 13, and impression-cylinder 16 coacting with form-cylinders 11 and 12.

The several form and impression cylinders rotate in the direction indicated by arrows in Fig. 1.

17, 18, 19, 20, and 21 indicate ink-cylinders of the usual form and construction and supplied with the usual ink and distributing rolls 22, which operate in the usual well-known manner and receive ink from ink-fountains 23, 24, 25, 26, and 27. As these ink-rollers and distributing-rolls act in the usual well-known manner, it is not necessary to describe them further here.

The web 4 is led over guide-rolls 5 and 6 between form-cylinder 9 and impression-cylinder 14, where it is printed upon one side with black ink. It is then led past guide-roll



7 between form-cylinder 10 and impression-cylinder 15, where it is printed upon the second side with one color. The web then passes between form-cylinder 11 and impression-cylinder 16, where it is printed upon the second side with the second color. It then passes downward under and partly around impression-cylinder 16 and between it and form-cylinder 12, where it is printed upon the second side again with a third color. It then passes upward between form-cylinder 13 and impression-cylinder 15, where it is printed upon the second side with black ink or, if desired, with a fourth color, although that would be unusual. The web thus printed in black upon one side and in three colors and black upon the other side passes over the guide-roll 8 and out of the press, to be delivered in any well-known and approved manner. (Not shown.)

28 29 indicate rollers which are preferably of a circumference equal to one-half the circumference of the form-cylinders and run at the same surface speed as the form-cylinders.

Rollers 28 and 29 are covered with composition and rotating in the direction shown by arrows in Fig. 1 bear against the plates upon the form-cylinders 11 and 12.

30 and 31, 32 and 33 indicate composition rollers, 30 and 31 bearing against the roller 28 and 32 and 33 against the roller 29, rotating in the direction indicated by arrows in Fig. 1.

34 35 indicate drums or receiving-cylinders which bear, respectively, against the rollers 30 and 31 and the rollers 32 and 33 and rotate in the direction indicated by arrows in Fig. 1.

36, 37, and 38 indicate wipers which bear upon the surface of the drum or receiving-cylinder 34, and 39, 40, and 41 indicate wipers which bear against the surface of the drum or receiving-cylinder 35. These wipers are preferably the kind described in Letters Patent to me, No. 374,355, of December 6, 1887, and as therein described consist of a metallic shaft covered with a fabric, such as Brussels carpet, upon which is wound a covering of unbleached muslin, which is adapted to take up the ink, as hereinafter described, and when fouled may be readily removed and replaced.

Referring particularly to Figs. 2 and 3, 42 indicates a shaft upon which the cylinder 34 is mounted. 43 indicates an eccentric keyed upon the said shaft. 44 indicates a rectangular strap within which the eccentric 43 turns and which is provided with two bearing-arms 45. The bearing-arms 45 slide in guides 46, which are secured to the inside part of the frame 47. As the drum 34 rotates the eccentric 43, acting upon the strap 44, causes the strap to reciprocate the arms 45, sliding in the guides 46. 47, 48, and 49 indicate ratchet-wheels which are keyed or otherwise secured to the shafts upon which the rollers 36, 37, and 38 are mounted. 50 indicates dogs which are pivoted to suitable portions of the frame

47 and engage the teeth of the ratchet-wheels 47, 48, and 49 and operate to hold them against rotation in the direction opposite to that indicated by the arrows on the wheels 47, 48, and 49 in Fig. 2. 51, 52, and 53 indicate pawls which are pivotally mounted upon the strap 44 and engage, respectively, with the teeth of the ratchet-wheels 47, 48, and 49. In the construction indicated the pawls 51 and 53 are kept in contact with the ratchet-wheels 47 and 49 by means of springs 54 55, and the pawl 52 is kept in contact with the ratchet-wheel 48 by gravity. It is obvious that with each reciprocation of the strap 44 the pawls will engage with the ratchet-wheels 48 and operate to give them partial rotation in the direction indicated by the arrows in Fig. 2. For instance, when the strap is moved upward and to the right in Fig. 2 the pawls 51 and 52 will engage the teeth of the ratchet-wheels 47 and 48 and give the wipers 36 and 37 a partial rotation in the direction indicated by the arrows in Fig. 2. When the strap is reciprocated in the opposite direction, the pawls 51 and 52 will slip over the teeth of the ratchets 47 and 48, while the pawl 53 will engage with the teeth of the ratchet-wheel 49 and give to the wiper 38 a partial rotation in the direction indicated by the arrow. It is of course clearly understood that the mechanism illustrated in Fig. 2, which has been described as connected with the drum or receiving-cylinders 34 and as operating the wipers 36, 37, and 38, is duplicated upon the drum or receiving-cylinder 35 to operate the wipers 39, 40, and 41 in the same way with relation to the rotation of the cylinder 34, as above described.

The operation of the above-described device is as follows: The web having been printed upon its first side in black by form-cylinder 9 and upon the second side in a color by form-cylinder 10, passes, as above described, to form-cylinder 11. As form-cylinder 11 continues its rotation after having printed the second color upon the second side of the web the composition roller 28, bearing upon the form, operates to take the ink from the form or plate and leave it clean for a second supply of ink from the roller 19 and distributing-rollers 22. The composition rollers 30 and 31 then acting upon the composition roller 28 operate to remove the ink taken from the form-cylinder 11 from the composition roller 28 and distribute it upon the surface of the drum or receiving-cylinder 34. From the drum or receiving-cylinder the ink is wiped clean by the wipers 36, 37, and 38, operating in the manner above described. The result of this is that the form upon the form-cylinder 11 has the surplus ink removed from it after it has done its printing, and it comes up clean to receive a supply of ink from the ink-fountain 25, thus preventing a transference and constant addition of color from the form-cylinder 10 to the form-cylinder 11 and preserving a uniformity of color in the over-



lay. The composition roller 29 and composition rollers 32 and 33, the receiving drum or cylinder 35, and wipers 39, 40, and 41 operate in the same manner upon form-cylinder 12 as the corresponding parts above described operate upon form-cylinder 11 and prevent a constant carrying over and addition of the colors from form-cylinders 10 and 11 to the surface of form-cylinder 12, where, if not so removed, they would, as stated above, constantly mix in ever-increasing quantities with the colored ink supplied to form-cylinder 12 from ink-fountain 26.

By the mechanism above described three overlays of color, one upon the other, in large blocks may be effected and at the same time uniformity of color secured. As form-cylinder 13 is used only to print black ink upon the second side of the web in the construction shown and as this black ink will not be overlaid upon the previously-printed color, it is not necessary in the construction shown and when so used to provide the form-cylinder 13 with the cleaning devices as above described.

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

1. In a multicolor-printing machine, the combination with a form-cylinder, impression-cylinder and inking mechanism adapted to print upon one side of a web, of a second form-cylinder, coacting impression-cylinder and inking mechanism adapted to print a second color upon the same side of a web, and mechanism bearing against said second form-cylinder at a point on its surface before it receives ink from said inking mechanism, and adapted to remove from said second form-cylinder ink offset upon said cylinder from said web, substantially as described.

2. In a rotary multicolor-printing machine,

the combination with a form-cylinder, coacting impression-cylinder and inking mechanism adapted to print one color upon one side of a web, and a second form-cylinder, coacting impression-cylinder and inking mechanism adapted to print a second color upon the same side of the web, of a receiving-drum, wipers bearing upon the surface of said receiving-drum, and adapted to remove the ink therefrom, and rollers bearing upon said receiving-drum and upon said second form-cylinder at a part of the surface of said second form-cylinder prior to its receiving ink from its inking mechanism, and adapted to transfer to said receiving-drum ink offset upon said second form-cylinder from said web, substantially as described.

3. In a rotary multicolor-printing machine, the combination with a form-cylinder, coacting impression-cylinder and inking mechanism adapted to print one color upon one side of a web, and a second form-cylinder, coacting impression-cylinder and inking mechanism adapted to print a second color upon the same side of the web, of a receiving-drum, wiping-rolls adapted to bear upon the surface of said receiving-drum and remove the ink therefrom, mechanism adapted to intermittently rotate said wiping-rolls against the movement of said receiving-drum, and rollers bearing upon said receiving-drum and upon said second form-cylinder at a part of the surface of said second form-cylinder prior to its receiving ink from its inking mechanism, and adapted to transfer to said receiving-drum ink offset upon said second form-cylinder from said web, substantially as described.

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