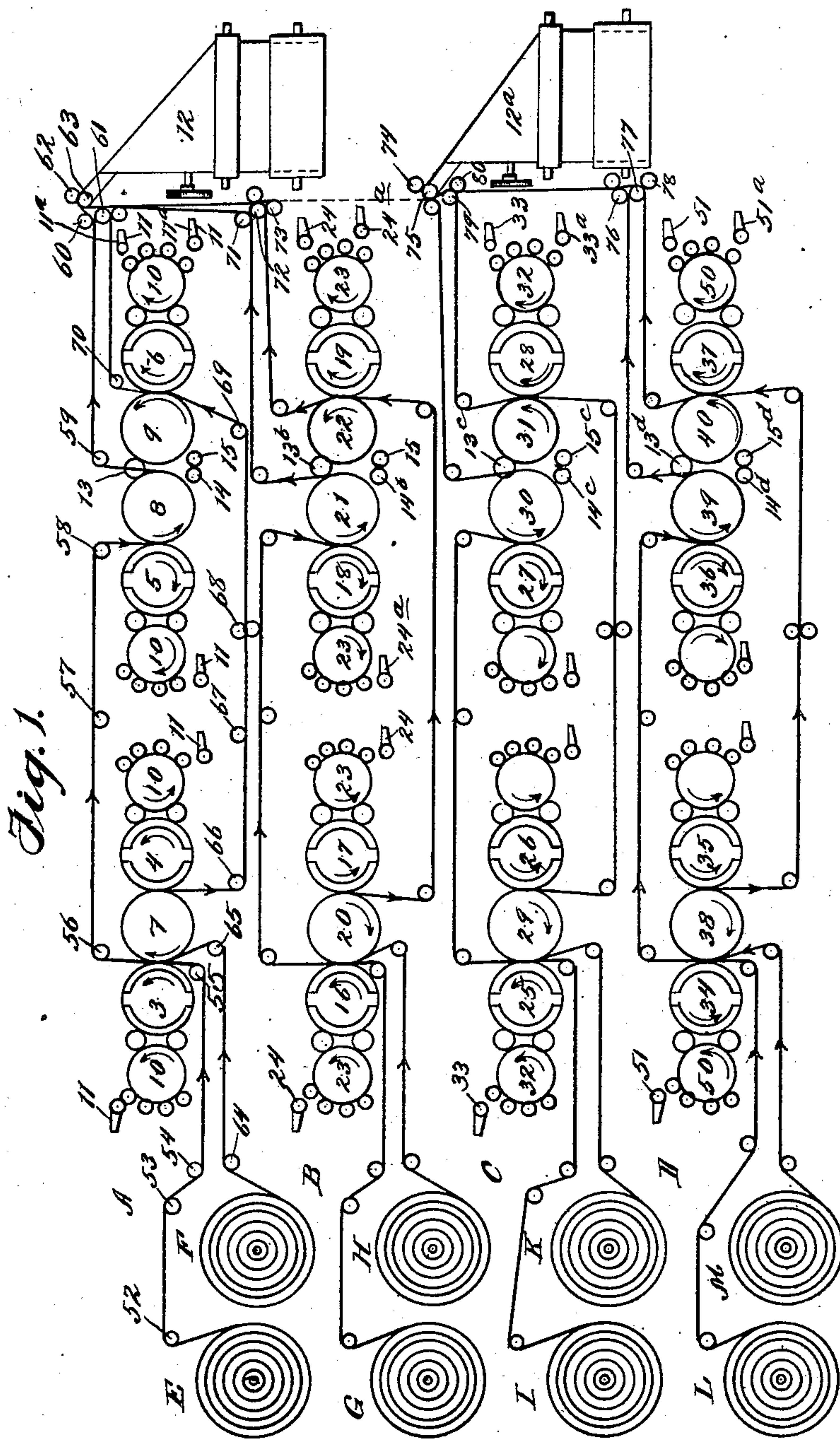


J. L. FIRM.
PRINTING PRESS.

APPLICATION FILED MAY 16, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:

W. D. Perry
J. B. Weir

Inventor:

Joseph L. Firm
By Bms, Adams, Pisan & Haerum
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No. 724,457.

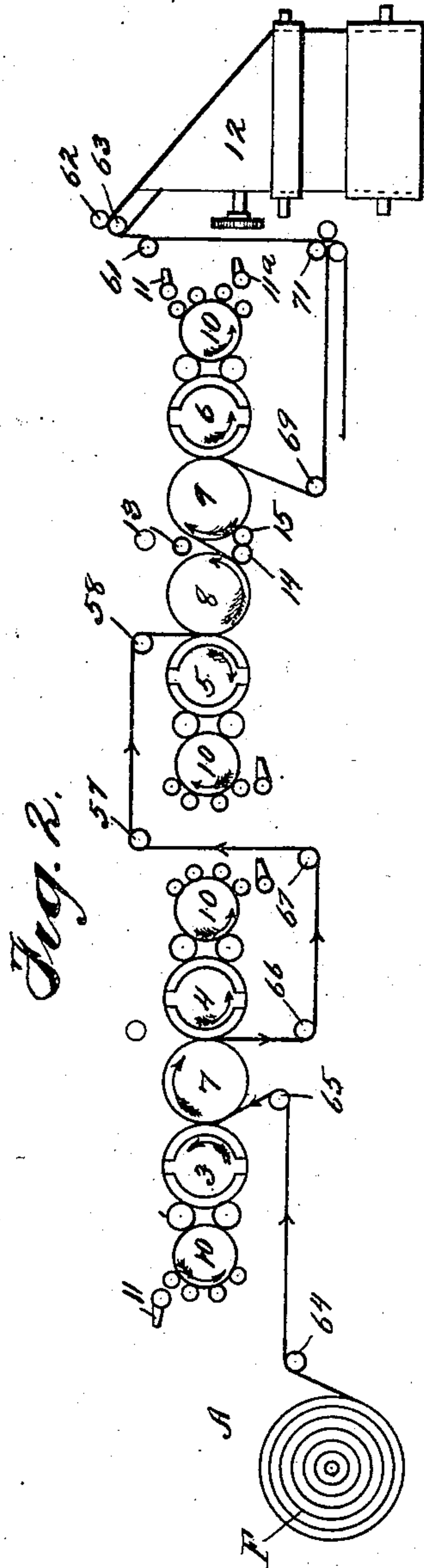
PATENTED APR. 7, 1903.

J. L. FIRM.
PRINTING PRESS.

APPLICATION FILED MAY 16, 1902.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

JOSEPH L. FIRM, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE GOSS PRINTING PRESS COMPANY, OF CHICAGO, ILLINOIS.

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 724,457, dated April 7, 1903.

Application filed May 16, 1902. Serial No. 107,578. (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 Printing-Presses, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to rotary web-perfecting presses; and it consists in a new arrangement of the printing mechanism whereby a number of advantages will be secured. It has been customary heretofore in presses which were designed to print more than four rolls—that is to say, from six to eight rolls of paper—to arrange the two sets of printing mechanisms facing each other, with the folding mechanism in the center of the machine in order to save an undue height of the machine.

In the press herein shown and described the printing mechanisms are arranged in four decks, each deck consisting of four form and three impression cylinders all arranged on the same or substantially the same plane, whereby with four superposed decks, as shown in the drawings, eight rolls may be printed at one time, and the rolls of paper are all at one end of the machine and the folding and delivery mechanism at the other.

In the drawings, Figure 1 is a diagrammatic elevation of my press. Fig. 2 is a diagrammatic elevation of one of the decks, showing it arranged for printing one web in colors.

Referring to the drawings, the printing mechanisms are arranged in four decks A, B, C, and D, superposed upon one another, with the form and impression cylinders of each deck arranged with their axes upon the same plane. Deck A is adapted to print, as hereinafter described, webs E and F; deck B, webs G and H; deck C, webs I and K, and deck D, webs L and M.

Referring to deck A, 3 4 5 6 represent form-cylinders. 7 indicates an impression-cylinder adapted to coact with form-cylinders 3 and 4. 8 indicates an impression-cylinder adapted to coact with form-cylinder 5, and 9 an impression-cylinder adapted to coact with form-cylinder 6. 10 10 indicate ink-ing mechanisms of any well-known and approved form and construction. 11 11^a indi-

cate fountains. 12 indicates longitudinal folding and delivery mechanism, which is adapted to fold and cut the webs and deliver the folded sheets, and may be of any well-known and approved form and construction. The form and impression cylinders 3, 4, and 7 are geared together in the usual way and revolve in the direction indicated by arrows in the drawings. The form and impression cylinders 5 and 8 are geared together in the ordinary way. 13 indicates a gear which meshes with the gear on impression-cylinder 8 and impression-cylinder 9, impression-cylinder 9 and form-cylinder 6 being geared in the ordinary manner. The gear 13 may be removed and gears 14 15 brought into position to engage with the gears upon impression-cylinders 8 and 9, as shown in Fig. 2. The gears 14 and 15 meshing together, the rotation of impression-cylinder 9 and form-cylinder 6 will thereupon be reversed, as shown by arrows in Fig. 2. Any approved mechanism may be used for moving the gear 13 and the gears 14 15 into and out of engagement with impression-cylinders 8 and 9—such, for instance, as the device shown in my application for Letters Patent, Serial No. 105,987, filed May 5, 1902.

Deck B is arranged and operates in precisely the same manner as deck A, 16 17 18 19 being form-cylinders, and 20 21 22 being impression-cylinders, and 23 inking mechanisms supplied with fountains 24 24^a. 13^b and 14^b 15^b are gears which are arranged and operate in the same manner as gears 13 14 15, above described.

Deck C is arranged and operates in precisely the same manner as deck A, 25 26 27 28 being form-cylinders and 29 30 31 impression-cylinders, 32 being inking mechanisms and 33 33^a ink-fountains. 13^c 14^c 15^c are gears which are operated in the same manner as gears 13 14 15, above described.

Deck D is arranged and operates in precisely the same way as deck A, 34 35 36 37 being form-cylinders; 38 39 40, impression-cylinders; 50, inking mechanisms, and 51 51^a being ink-fountains. 12^a indicates longitudinal folding and delivery mechanism designed to fold the webs longitudinally, sever them into sheets, and deliver the sheets and

may be of any well-known and approved form and construction.

Referring now to Fig. 1, which indicates the ordinary use of the press, as will be seen from such figure, each deck is designed to perfect two webs of paper. Web E, passing over rollers 52 53, under rollers 54 55, passes upward between form-cylinder 3 and impression-cylinder 7, where it is printed upon one side. It then passes over rollers 56 57 58 downward between form-cylinder 5 and impression-cylinder 8, where it is printed upon the other side. It then passes downward partially around impression-cylinder 8, over roller 59, between rollers 60 61 to the top of the longitudinal folding mechanism 12, between rollers 62 63, and thence downward over the longitudinal folding mechanism, where it is folded and delivered in any well known way. Web F passes over roller 64, under roller 65, upward between form-cylinder 3 and impression-cylinder 7, between impression-cylinder 7 and web E, which protects web F from being printed by form-cylinder 3. The web then passes over and partially around impression-cylinder 7 and downward between it and form-cylinder 4, where it is printed upon one side. Web F then passes under rollers 66 67 68 69, upward between form-cylinder 6 and impression-cylinder 9, where it is printed upon the other side, over roller 70, and thence to meet web E, between rollers 60 and 61 and the rollers 62 63 at the top of the folding and delivery mechanism 12. Webs G and H pass through deck B in precisely the same manner as webs E and F pass through deck A—that is to say, web G, led by suitable rollers, passes upward between form-cylinder 16 and impression-cylinder 20, where it is printed upon one side, then over suitable rollers it passes downward between form-cylinder 18 and impression-cylinder 21, where it is printed upon the other side, around impression-cylinder 21, upward under roller 71, where it meets webs E and F, between rollers 62 63, in registry with said webs. Web H, passing between form-cylinder 16 and impression-cylinder 20, and between impression-cylinder 20 and web G, passes over impression-cylinder 20 and between it and form-cylinder 17, where it is printed upon one side. Thence led by suitable rollers it passes upward between form-cylinder 19 and impression-cylinder 22, between rollers 72 73, meeting webs E, F, and G between the rollers 62 63 in registry therewith. The four webs thus superposed all pass together into longitudinal folding and delivery mechanism 12. Webs I and K pass through and are printed by deck C in the same manner as webs E and F pass through deck A, above fully described. The run of the webs through deck C is indicated by arrows and being, as above stated, the same as that described for webs E and F of deck A need not be further described here. Webs I and K after being printed on both sides pass

between rollers 74 75, where they are brought into registry with one another and pass downward over longitudinal folding and delivery mechanism 12^a to be folded and delivered in the usual way. Webs L and M pass through deck D in the same manner as webs E and F pass through deck A. Their course is indicated by arrows upon the drawings, and with the above description of webs E and F the run of webs L and M need not be further described. Led by suitable rollers 76 77 78 79 80 the perfected webs L and M are brought up into registry with webs I and K between rollers 74 75 and pass downward with said webs over the longitudinal folding mechanism 12^a, where they are longitudinally folded, cut, and delivered in any well-known and approved manner.

When it is desired to use any one of the decks of printing mechanism above described to print colors, the arrangement and run of the webs shown in Fig. 2 is employed. For purposes of illustration I have shown deck A as so employed, although it is obvious that either deck B, C, or D, or two, or three, or four of them, may be so employed, if desired.

Referring to Fig. 2, only one web is used—for instance, web F. In this case the gear 13 is thrown out of gear with impression-cylinders 8 and 9 and gears 14 15 brought into gear therewith, which causes the direction of rotation of impression-cylinder 9 to be reversed, causing it to rotate in the direction shown by the arrow in Fig. 2. This also reverses the direction of rotation of form-cylinder 6 and inking mechanism 10. In this case also ink-fountain 11^a is used instead of ink-fountain 11. The web of paper, passing over roller 64 and under roller 65, passes upward between form-cylinder 3 and impression-cylinder 7, where it is printed upon one side in one color. It then passes over and partially around impression-cylinder 7 and downward between it and form-cylinder 4, where it is printed upon the same side by the second color. The web is then conducted into rollers 66 67, upward over rollers 57 58, and downward between form-cylinder 5 and impression-cylinder 8, where the web is printed upon its reverse side in black, or, if desired, with a single color. The web then passes under and partially around impression-cylinder 8 and from thence across to impression-cylinder 9, over and partially around impression-cylinder 9, and between it and form-cylinder 6, where it is printed upon the same side as at first by a third color from said form-cylinder 6. The web thus printed upon one side in three colors and upon the other side in black or a single color passes under rollers 69 71 and upward between rollers 62 63 and thence downward over and into the longitudinal cutting and folding mechanism 12, where it is associated with the product of press B, printed as hereinbefore described.

It will be seen from the above description that when it is desired to print in colors the

press has a capacity of printing simultaneously eight webs of paper upon the four decks. If it is desired to use one of the decks for printing colors, the press will print six webs of paper simultaneously in black ink and one web in black and colors. In case two of the decks are used to print colors the press will print simultaneously four webs in black and one in colors. In case it is desired to do so the products of decks C and D may be led upward, as indicated by dotted lines in Fig. 1, and, associated with the products of decks A and B, pass with them between rollers 62 63 into the folding and delivery mechanism 12.

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

1. In a printing-press, the combination with two sets of printing-couples having their axes in the same horizontal plane, one of said sets of printing-couples consisting of two form-cylinders and one coacting impression-cylinder, and the other of two form-cylinders and two coacting impression-cylinders, of mechanism adapted to lead two webs superposed upon each other between one form-cylinder and the coacting impression-cylinder of said first-named set of printing-couples, whereby one of said superposed webs will be printed upon one side, mechanism adapted to lead the other of said superposed webs between the said impression-cylinder and the other form-cylinder of said first-named set of printing-couples, and mechanism adapted to lead each of said two webs between a form-cylinder and coacting impression-cylinder of said second set of printing-couples, whereby both webs will be printed upon the other side, substantially as described.

2. In a printing-press, the combination with two sets of printing-couples having their axes in the same horizontal plane, one of said sets of printing-couples consisting of two form-cylinders and one coacting impression-cylinder, and the other of two form-cylinders and two coacting impression-cylinders, of mechanism adapted to lead two webs superposed upon each other between one form-cylinder and the coacting impression-cylinder of said first-named set of printing-couples, whereby one of said superposed webs will be printed upon one side, mechanism adapted to lead the other of said superposed webs between the said impression-cylinder and the other form-cylinder of said first-named set of printing-couples, and mechanism adapted to lead each of said two webs between a form-cylinder and coacting impression-cylinder of said second set of printing-couples, whereby both webs will be printed upon the other side, substantially as described.

anism adapted to lead two webs superposed upon each other between one form-cylinder and the coacting impression-cylinder of said first-named set of printing-couples, whereby one of said superposed webs will be printed upon one side, mechanism adapted to lead the other of said superposed webs between the said impression-cylinder and the other form-cylinder of said first-named set of printing-couples, mechanism adapted to lead each of said two webs between a form-cylinder and coacting impression-cylinder of said second set of printing-couples, whereby both webs will be printed upon the other side, mechanism adapted to reverse the direction of one form-cylinder and the coacting impression-cylinder of said second set of printing-couples, and mechanism adapted to lead a single web through the form and impression cylinders of both of said sets of printing-couples successively, whereby one web may be printed upon one side in black or a single color and upon the other side in a plurality of colors, substantially as described.

3. In a printing-press, the combination with a plurality of superposed decks of printing mechanism, each deck composed of two sets of printing-couples, one consisting of two form-cylinders and one impression-cylinder and the other of two form-cylinders and two impression-cylinders, all arranged with their axes on the same horizontal plane, of mechanism adapted to lead two webs simultaneously through said two sets of printing-couples in each deck, mechanism for reversing the direction of rotation of one form and one impression-cylinder of the second set of printing-couples in each deck, and mechanism adapted to lead a single web through both sets of printing-couples in each deck, substantially as described.

JOSEPH L. FIRM.

Witnesses:

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HELEN M. COLLIN.