

No. 724,455.

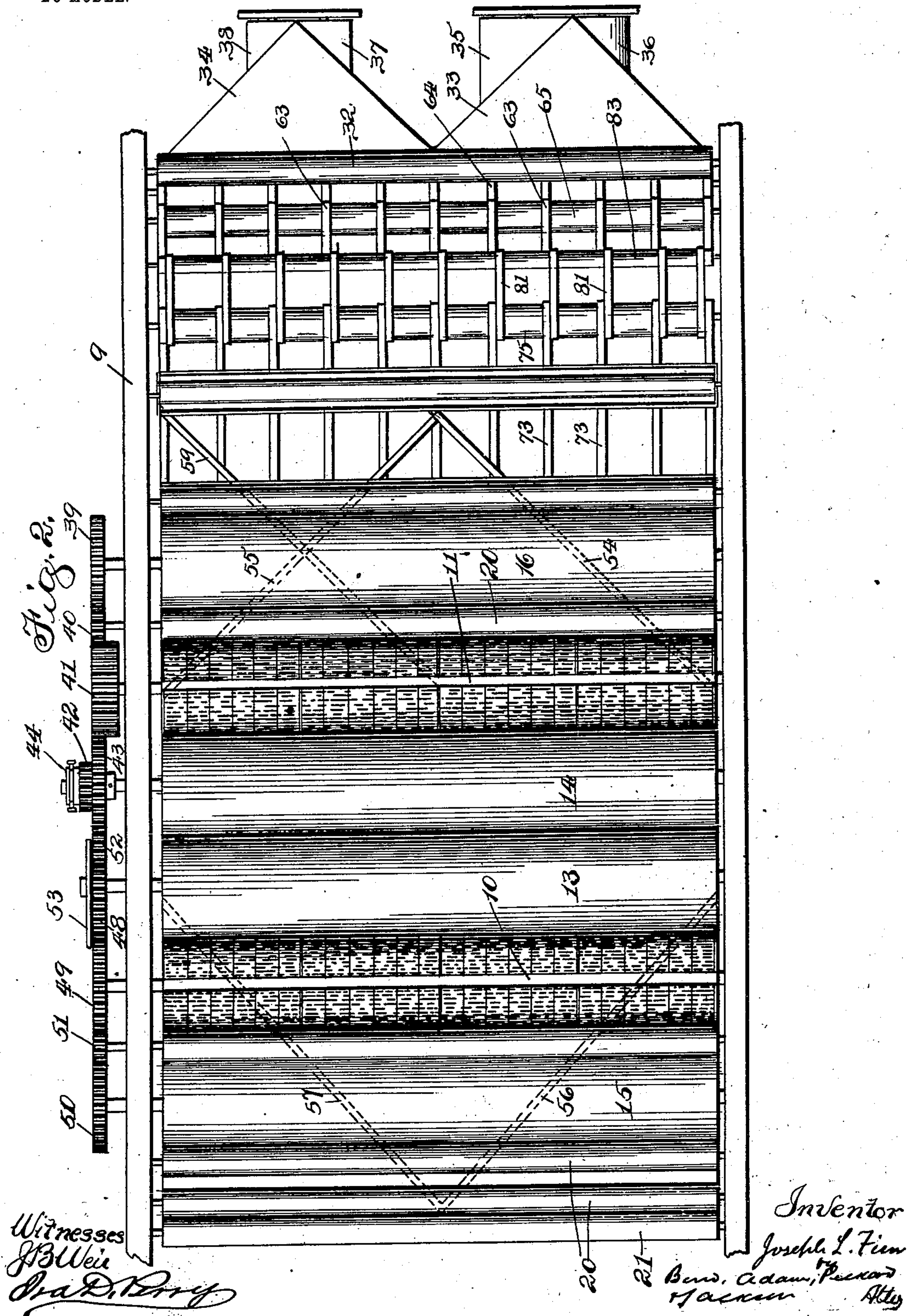
PATENTED APR. 7, 1903.

J. L. FIRM.
PRINTING PRESS.

APPLICATION FILED MAY 1, 1902.

NO MODEL.

3 SHEETS—SHEET 2.



Witnesses
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3 SHEETS—SHEET 3.

Fig. 3.

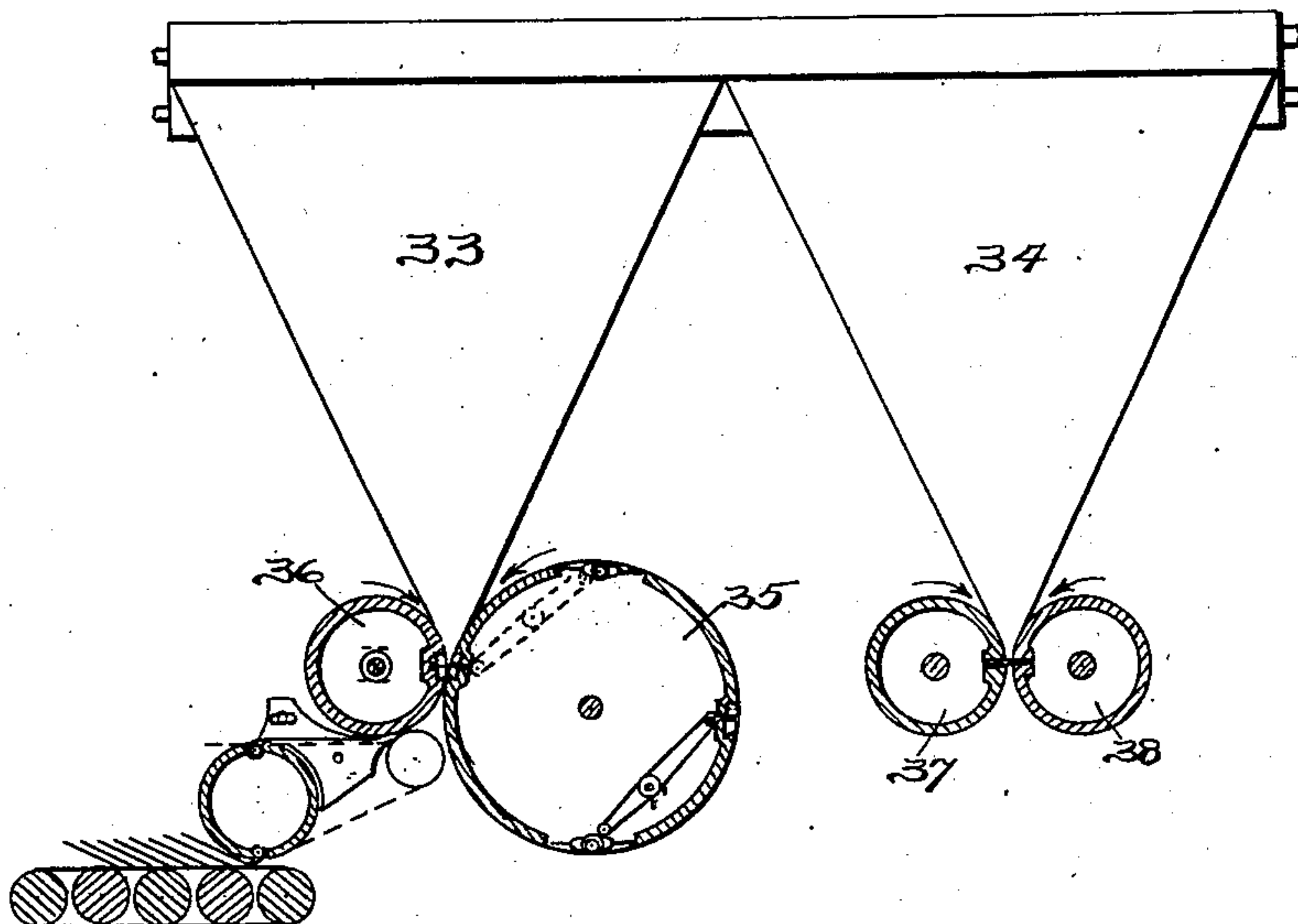


Fig. 5.

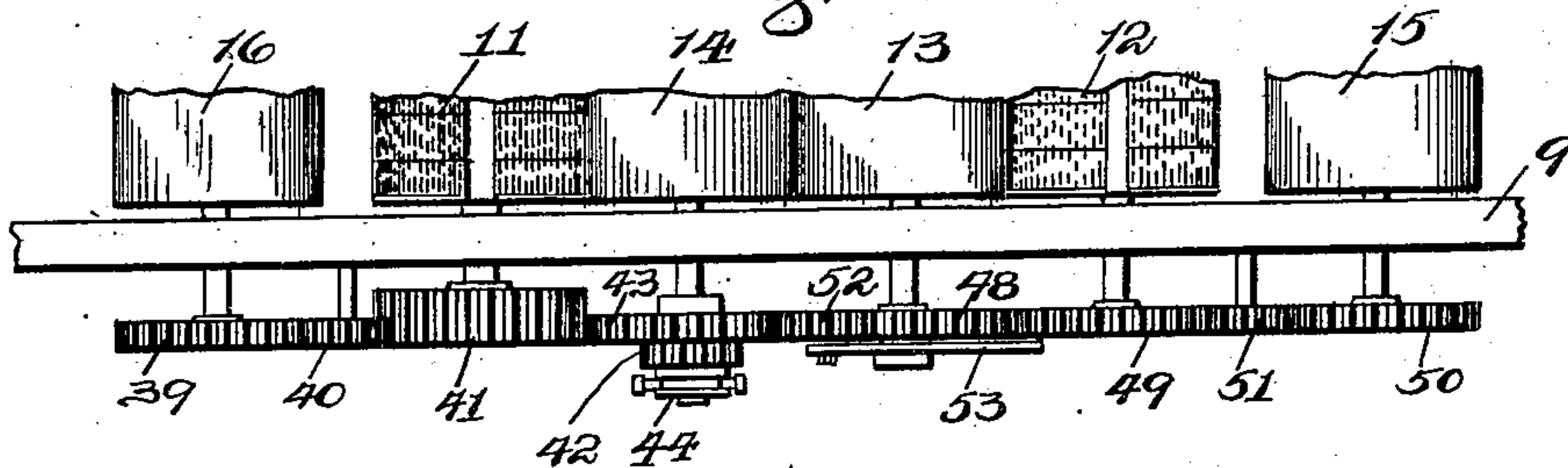


Fig. 6.

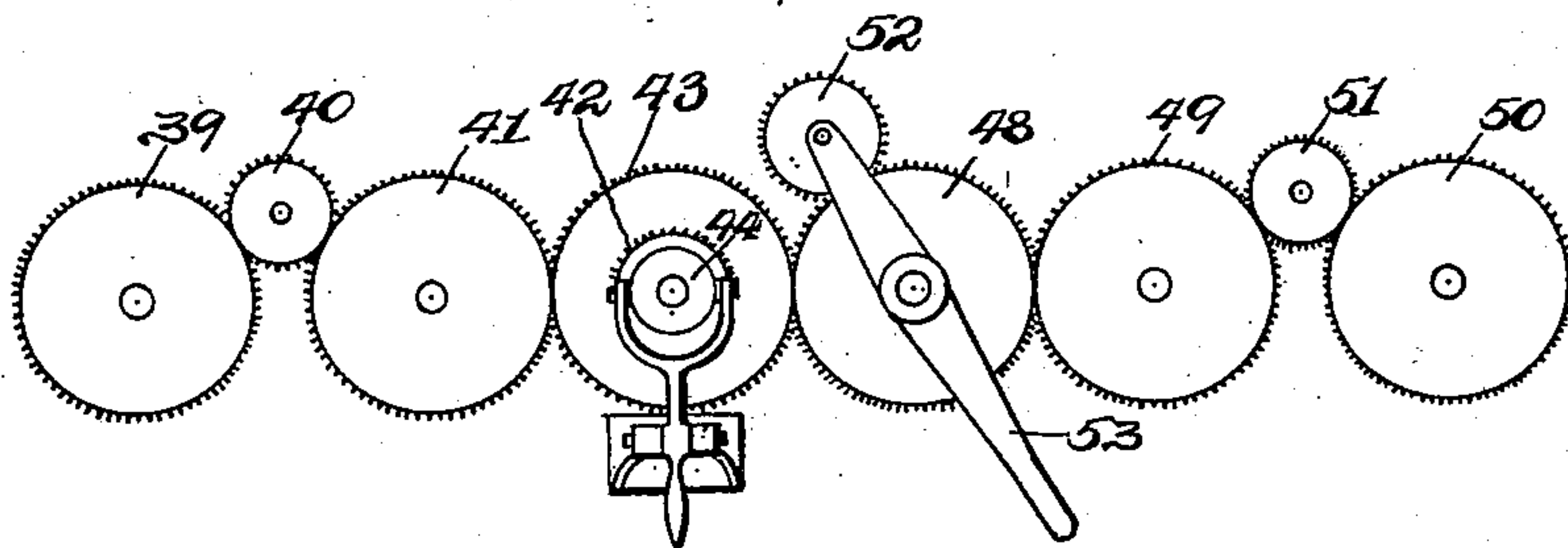
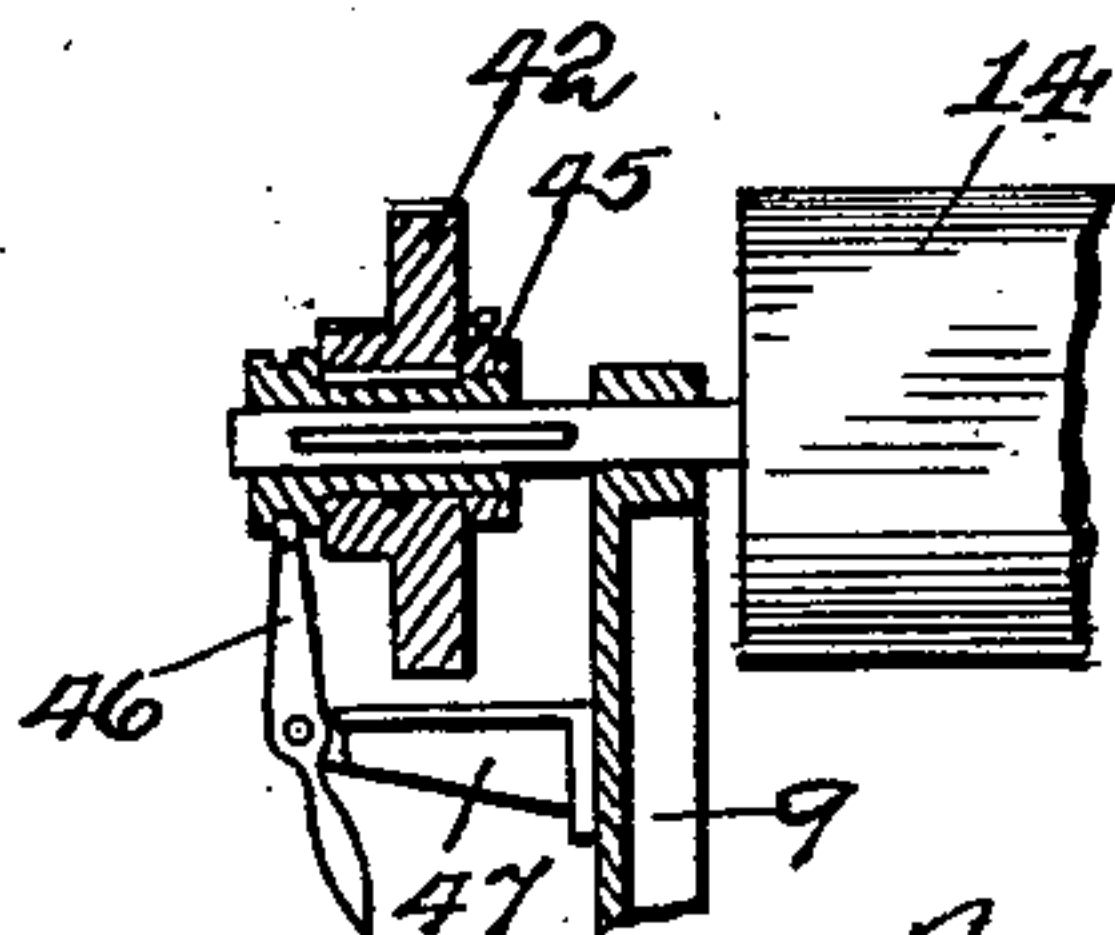


Fig. 7.



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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. 724,455, dated April 7, 1903.

Application filed May 1, 1902. Serial No. 105,464. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH L. FIRM, a citizen of the United States, and a resident of 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 certain improvements in rotary web-perfecting printing-presses, and has for one of its objects the construction of a printing-press requiring less space and less expense in building for the production of the variety of its products.

Another object of my invention is to provide a rotary printing-press capable of printing upon an extra web to form an inset without requiring a second and separate set of type and impression cylinders.

My invention relates, further, to the improvement of printing-presses in sundry details hereinafter set forth.

In the accompanying drawings, Figure 1 is a diagrammatic section. Fig. 2 is a top or plan view. Fig. 3 is an end view showing the longitudinal folders and part of the folding mechanism. Fig. 4 is a detail of one of the sets of turning-bars. Fig. 5 is a detail, being a plan view of the gears driving the sundry cylinders. Fig. 6 is a detail, being a side view of the same. Fig. 7 is a detail, being a section on line 7 7 of Fig. 6.

Referring to the drawings, 9 indicates the framework of the press.

10 and 11 indicate form-cylinders, and 13 14 impression-cylinders, which are journaled in the frame of the press and driven by the gearing hereinafter described.

15 16 indicate ink-rollers, which are also driven by the gearing hereinafter described.

17 18 19 indicate ink-fountains, which supply ink to the inking and distributing rollers 20 and which are all of the same size and construction and need not be further described.

21 22 23 24 25 26 27 28 29 30 31 32 indicate rollers around or over which the webs pass on their passage through the press, as hereinafter described, and which are journaled in the framework in any well-known and approved manner.

33 34 indicate longitudinal folders. The longitudinal folders are of any well-known form and description adapted to fold the web longitudinally on the run.

35 36 indicate cutting, folding, and collecting cylinders, which preferably, as shown, are of the same construction and operation as those shown in Fig. 3 and described in the specification of Letters Patent to me, No. 635,719, of October 24, 1899, and which when the web is delivered to them as hereinafter described operate in the same manner described in that patent, and therefore need no detailed description here.

The longitudinal folder 34 is provided with folding-rolls 37 38, which are of any well-known and approved form and operate in the well-known manner to cooperate with the V-shaped former to fold the paper longitudinally on the run and which, forming no part of my present invention and being well known, need not be further described.

Figs. 5 and 6 show the gearing by which the respective form, impression, and inking cylinders are driven. These gears are located upon the opposite ends of the rollers from that shown in Fig. 1. Upon the shaft of the inking-roller 16 is keyed or otherwise secured a gear 39, which meshes with an idler-gear 40 on a suitable stub-shaft. The idler-gear 40 meshes with a gear 41, which is keyed upon the shaft of the form-cylinder 11. The gear 41, as is best shown in Fig. 5, is of twice the thickness of the rest of the gears, for the purpose hereinafter described. 42 indicates a compound gear provided with a larger gear 43 and a smaller gear 44, which are keyed or otherwise secured, as is best shown in Fig. 7, to a sleeve 45, which is feathered upon the shaft of the impression-cylinder 14, so as to slide to and fro thereon. The sleeve 45 is slid longitudinally on its shaft by means of a lever 46, mounted upon a bracket 47, attached to the frame 9. 48 indicates a gear which is keyed or otherwise secured to the outer end of the shaft of the impression-cylinder 13 and normally, when in the position shown in Fig. 5, meshes with the gear 43. 49 indicates a gear keyed or otherwise secured to the shaft of the form-cylinder 10. 50 indicates a gear

which is keyed or otherwise secured upon the end of the shaft of the inking-roll 15. 51 indicates a gear which is mounted upon a suitable stub-shaft and meshes with the gears 49 and 50. 52 indicates a gear which is carried upon one end of a lever 53. The lever 53 is pivoted upon the outer end of the shaft of the impression-cylinder 13, and the gear 52 meshes continually with the gear 48, but may be swung out of the way or down into position to mesh with the gear 44, as is shown in Fig. 6, when desired and for the purpose hereinafter described. As is hereinafter set forth, for the ordinary products of the press—that is to say, for all products except for a ten-page paper—the gear 52 will be thrown up out of the way and the gear 43 be in its outer position, so as to mesh with gears 41 and 48. The gearing being driven from any appropriate point and in any suitable manner, the several form, impression, and inking cylinders will be driven through the train of gearing above described. The gears 39 41 43 48 49 50 are all of the same size, whence it follows that in the position last above described the several form, inking, and impression cylinders will all be driven at the same surface speed. When by means of the lever 53 the compound gear 42 is thrown inward upon the shaft, the gear 43 still will remain in mesh with the gear 41, which is of double thickness, as was said above, for that purpose, but will be freed from engagement with the gear 42. If the gear 52, by means of the lever 53, is thrown down so as to mesh with the gear 44, which by the inward movement of the compound gear 42 upon its shaft is thus brought into alinement with the gear 52, the gear 48 will be driven in the reverse direction from which it was driven before, and the gear 44 containing half as many teeth as the gear 43 the gear 48 will be driven at half the speed at which it was previously driven. This will slow down the speed of the impression-cylinder 13 and form-cylinder 10 to one-half of their previous speed. The purpose of this will be hereinafter described.

As is shown in Fig. 2, the form-cylinders are of a size adapted to contain each eight page-forms, four abreast and four on each semicircumference. The column-rules, as shown in the same figure in the construction of the press shown, run around the cylinders—that is to say, parallel with the run of the web.

54 55 56 57 indicate V-shaped web-turners, consisting of angle-bars whose purpose it is to turn to reverse the web, as hereinafter described, and transfer it laterally its own width for the purposes hereinafter set forth. These angle-bars are of the well-known form and construction and operate in the well-known way, and hence need not be further described here.

58 59 indicate turning-bars, whose function it is to transfer a portion of the slit web its own width laterally upon the other portion of the web for the purposes hereinafter set

forth and which operate in the well-known and usual manner and need no further description here.

A indicates the main web of paper, which is supplied to the press in the usual way and which may be of single width—that is, two pages wide—or double width—that is, four pages wide or three pages wide, according to the desired product—as hereinafter set forth. For the production of newspapers consisting of four, six, eight, twelve, or sixteen pages the course of the web A is as follows: It passes first over the rollers 21 22 between form-cylinder 10 and impression-cylinder 13 in the direction indicated by the dotted line in Fig. 1, the said cylinders rotating in the direction indicated by dotted arrows thereon. The web is thus printed upon one side. It then passes under and partially around impression-cylinder 13, form-cylinder 14, and form-cylinder 11, which run in the direction indicated by solid arrows thereon. The web is here printed upon the other side. It then passes down under roller 60, against which, if the web be more than two pages in width, it is slit by the slit 61 of the well-known form and description. It then passes out between angle-bars 58 59 without passing around them, under rollers 62, and between tapes 63 64, which are carried, respectively, by rollers 62, 65, 66, and 31, and between rollers 31 32 and down over the longitudinal folding mechanism. The above indicates the general course of the web for all of the above-mentioned products through the press. In making four-page papers the web will preferably be used of double width—that is, four pages wide. The form-cylinders 10 and 11 will carry forms which will be duplicates of each other upon each semicircumference and duplicates of each other upon each longitudinal half of each form-cylinder—that is to say, they will carry the matter for four papers of four pages each. The web, pursuing the course last above described, will be centrally slit by the slit 61, and each half will pass over its respective former 33 34, where they will be folded longitudinally, severed transversely between the successive margins, and delivered in any well-known and approved fashion, said delivery, as said above, forming specifically no part of my present invention. The press will thus produce simultaneously two copies of a four-page paper and will produce with each revolution of the form-cylinders four copies of a paper. To print a six-page paper, the web A will be three pages wide, in which case the plates will be omitted from one end of the form-cylinders. The web will follow the course last above described and by the slit 61 will be slit longitudinally into a two-page-wide and a one-page-wide section. The two-page-wide section will proceed straight forward, as last above described, while the one-page-wide section will be passed around the turning-bars 58 59, and thus shifted laterally by the said

turning-bars and superposed upon one side of the two-page-wide web in proper registry. The webs thus associated will pass together over the former to be folded longitudinally, severed transversely, and delivered, as above described, in any well-known and approved manner. To make eight-page papers, the web A will be four pages wide. The page-forms upon each semicircumference of the respective form-cylinders will be duplicates; but the matter upon one longitudinal half of said form-cylinders will contain the matter for one-half of the eight-page paper and the matter upon the other longitudinal half the matter for the other half of said paper. The web passing around the form and impression cylinders, as last above described, is perfected and slit centrally by the slit 61. One-half of the longitudinally-slit web is passed around the turning-bars 58 59, and therefore transferred laterally its own width upon the other half of said slit web in registry therewith, and the two halves thus associated together proceed to either one of the folders above described, where they are longitudinally folded and transversely severed and delivered in the well-known way, producing thus at each revolution of the form and impression cylinders two copies of an eight-page paper. In case it is desired to make a twelve-page paper, two six-page portions are formed in the manner above described for printing six-page papers, except that instead of having the forms upon each semicircumference of the respective form-cylinders duplicates of each other the forms upon one semicircumference will contain the matter for one six-page section of a twelve-page paper and the forms upon the other semicircumference the matter for the next six-page section of a twelve-page paper, which will immediately follow the first section through the press. These succeeding sections are superposed upon one another by the cutting, collecting, and folding cylinders 35 36 in the same manner as described in my Letters Patent above referred to, thus producing with each revolution of the press a single copy of a twelve-page paper consisting of two six-page sections collected upon one another. To make a sixteen-page paper, the process will be the same as that for making an eight-page paper, except that instead of having the forms upon each semicircumference of the respective form-cylinders duplicates of each other the forms upon one semicircumference will contain the matter for one eight-page half and upon the other semicircumference the matter for the other eight-page half of a sixteen-page paper. One eight-page section immediately follows the other in the press, where, passing down over the longitudinal folding mechanism, the two sections are collected in the manner described in Letters Patent to me above referred to, thus producing with each revolution of the form-cylinders a single copy of a sixteen-page pa-

per consisting of two eight-page sections, collected as above described. To make a ten-page paper, the peculiar mechanism above set forth is used. The compound gear 42 is moved inward, as above described, so as to throw the gear 43 out of mesh with the gear 48, but keeping it in mesh with the double-thickness gear 41, above described. The gear 52 is then swung down into position to mesh with the gear 42. The result of this, as above described, is to reverse the previously-described motion of the impression-cylinder 13 and to slow it down to one-half the speed. The impression-cylinder 13 and form-cylinder 10 thereupon are rotated in the direction shown by the solid arrows in Fig. 1. The form and impression cylinders 10 and 13 are now moving at one-half the surface speed of the form and impression cylinders 11 and 14. The web A will be of single width—that is, two pages wide. The eight-page forms upon form-cylinder 11 will have the matter adapted to print one side of the web upon the forms which are located upon the farther longitudinal half of said form-cylinder seen from Fig. 1—that is to say, upon the side away from the folders 33—and the matter adapted to print the other side of the web will be upon the other longitudinal half of said form-cylinder. The forms upon the two semicircumferences of said form-cylinder will not be in duplicate, but one semicircumference will contain the forms adapted to print one four-page section of an eight-page paper and the other semicircumference will contain the forms adapted to print the other four pages of an eight-page paper, the two sections following each other, to be collected as hereinafter described. The web A, which, as is said above, is two pages in width, passes over rollers 21 22 23, between form and impression cylinders 11 and 14, where it is printed upon one side. It then passes under roller 28, the slit 61 being removed, and over the turning-bars 54 55, where it is shifted laterally its own width, as shown in Fig. 4. It then passes backward under roller 29, over impression-cylinder 14, and again between impression-cylinder 14 and form-cylinder 11, where, being shifted its own width laterally, it is printed upon the other side by the forms upon the nearer end of form-cylinder 11. It then passes down under roller 60, between the turning-bars 58 59, without passing around them, and out under the roller 62 into the tape-paths 63 64.

B indicates the second web for the production of a ten-page paper. This web will be of half-width—that is, one page wide. It passes over roller 24, under roller 25, between form and impression cylinders 10 and 13, where it is printed upon one side. The form-cylinder 10 will contain only two page-forms abreast, the pages lying side by side containing the matter for printing opposite sides of the web and the pages upon each semicir-

cumference being duplicates of those upon the other semicircumference. The one-page-wide web thus printed upon one side passes over impression-cylinders 13, under rollers 27 26, and around the turners 56 57, by which it is shifted laterally, and turned backward under roller 26 in registry with the page-forms upon form-cylinder 10, which are side by side with the page-forms which have printed the first side. The web, being transferred laterally its own width, is printed upon its second side by this second set of page-forms side by side with the first set while making its second journey between form-cylinder 10 and impression-cylinder 13. This web B on account of the slow-down speed of the form and impression cylinders 10 and 13, as above described, is traveling at one-half the speed of the web A. After being perfected the web B passes downward between cutting-cylinders 67 68, where it is severed transversely on every successive transverse margin. The web then passes down around the cutting-cylinder 68, from which it is stripped by a stripper 69 and is engaged by tapes 70, which are carried by sets of pulleys 71 72, which move at the same surface speed as that at which the web B has heretofore moved.

73 indicates tapes which are carried by pulleys 74 75 and which move at the same surface speed as that at which the web A travels—that is to say, at double the surface speed of the web B. 76 indicates coacting tapes which pass around pulleys 77 78 and move at the same surface speed as the tapes 73 and coact with them. The severed sheet from the web B, entering from the slower tapes 70 to the speeded tapes 73 76, is at once separated from its succeeding sheet and is ultimately carried ahead at the same speed at which the web A has been traveling, which will cause a separation of one page length between the successive single leaves or two-page sheets thus printed and severed from the web B.

79 indicates a cam-roller, which may be arranged to cooperate with another roller 80 to insure accuracy of the surface speed of the severed sheet and to deliver it to the first web in proper registry and at the same surface speed. This cam-roller may be of any well-known form and construction and need not be further described, as it forms no part of my present invention. The severed sheet thus speeded and separated from its succeeding sheet passes between tapes 81 82. The tapes 81 pass around pulleys 75 and 83 and the tapes 82 around pulleys 84, over pulleys 85, and around pulleys or rollers 66. The speeded sheet, passing between the tapes 81 and 82, is delivered to the first four-page section of the web B at proper surface speed and in proper registry. The web A in the meanwhile has been pasted upon its under side by a paster 86, operating in the well-known fashion, which distributes paste along the central margin of the web, and when the

web is brought into registry with the severed sheet of web B the insert is pasted upon the under side of said web B. The first section of the ten-page paper thus produced, consisting of the first four-page portion produced from web A and of the two-page section produced from web B, thus associated together pass upward between the tapes 63 64, between the rollers 31 32, and down over the folder, where they are folded longitudinally. The cutting and collecting cylinders 35 36 thereupon sever the folded web A transversely upon every successive margin, and, operating in the manner described in my Letters Patent above mentioned, collect upon the first six-page section, produced as above described, the second four-page section, thus producing a ten-page paper consisting of one six-page and one four-page section collected together. These sections thus collected are folded and delivered in the manner described in my Letters Patent above mentioned.

I have shown at the left-hand end of Fig. 1 two ink-fountains 17 18. It is of course understood that only one of these fountains will be used at a time, the other being thrown out. The fountain 17 will be used when the form-cylinder 10 is rotating in the direction shown by the solid arrow in Fig. 1—that is, when a ten-page paper is being made, as above described. When the form-cylinder 10 is rotated in the direction shown by the dotted arrow, however, the inking-cylinder 15 being then turned in the opposite direction from what it was before, the ink-fountain 18 will be used.

I have shown and described my invention as applied to a press in which the form-cylinders are adapted to have the columns run around the cylinder—that is to say, with the column-rules in the direction of the run of the web—and have shown the appropriate folding apparatus for such purpose. I do not, however, confine my invention to a press of this description, as it is obvious that it could be applied to a press in which the column-rules run longitudinally of the cylinder—that is, transversely of the run of the web—without departing from the spirit of my invention.

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

1. In a printing-press, the combination with two printing-couples, consisting each of one form-cylinder and one impression-cylinder, of mechanism adapted to drive both printing-couples at the same speed, whereby one web of paper may be run through both printing-couples and perfected, and adapted also to be shifted to drive one printing-couple at a slower rate of speed than the other, means for leading a main web to the one of said couples driven at the original speed to print one side of said web on one end of the form-cylinder, means for shifting said web laterally and leading it to the same printing-couple to perfect the other side of said web, means for leading a second insert-web to the slowed-

down printing-couple to print one side of said insert-web on one part of the form-cylinder, and means for shifting said insert-web laterally and leading it back to said slowed-down printing-couple to print the other side of said web on another part of said form-cylinder, substantially as described.

2. In a printing-press, the combination with two printing-couples, consisting each of one form-cylinder and one impression-cylinder, of mechanism adapted to drive both printing-couples at the same speed, whereby one web of paper may be run through both printing-couples and perfected, and adapted also to be shifted to drive one printing-couple at a slower rate of speed than the other, means for leading a main web to the one of said couples driven at the original speed to print one side of said web on one end of the form-

cylinder, means for shifting said web laterally and leading it to the same printing-couple to perfect the other side of said web, means for leading a second insert-web to the slowed-down printing-couple to print one side of said insert-web on one part of the form-cylinder, means for shifting said insert-web laterally and leading it back to said slowed-down printing-couple to print the other side of said web on another part of said form-cylinder, means for severing said insert-web on every transverse margin, and means for associating said severed sheet with the perfected product of said main web, substantially as described.

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