No. 676,816. Patented June 18, 1901.

J. L. FIRM.

PRINTING PRESS.

(Application filed Feb. 16, 1901.)

(No Model.) 4 Sheets—Sheet 1.

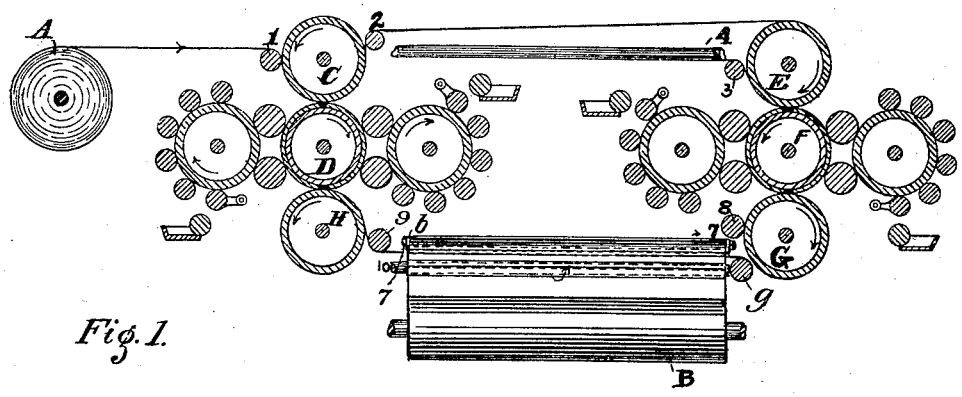

Fig. 1.

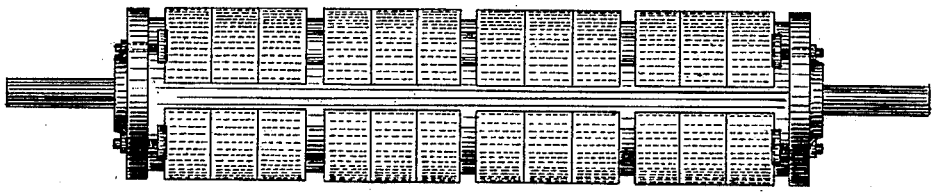

Fig. 2.

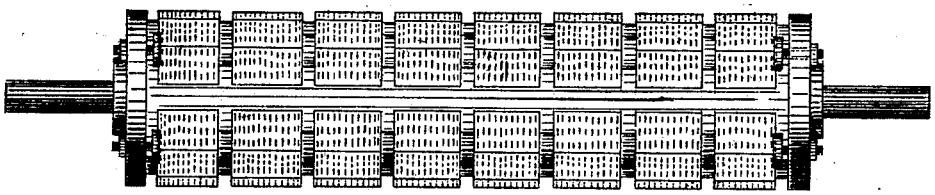

Fig. 3.

Witnesses
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(No Model.) 4 Sheets—Sheet 2.

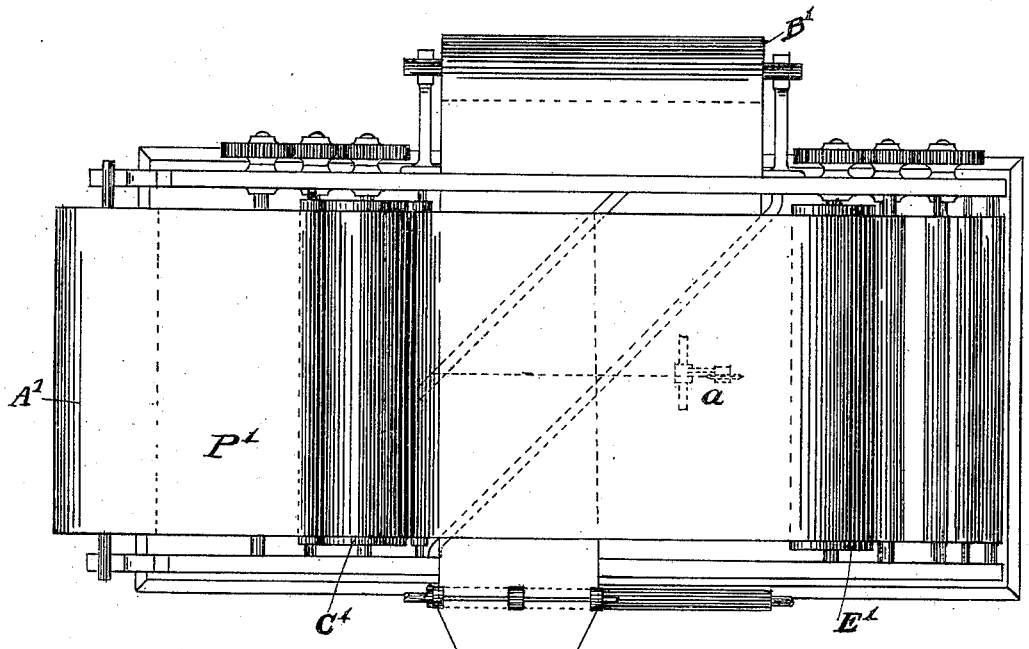
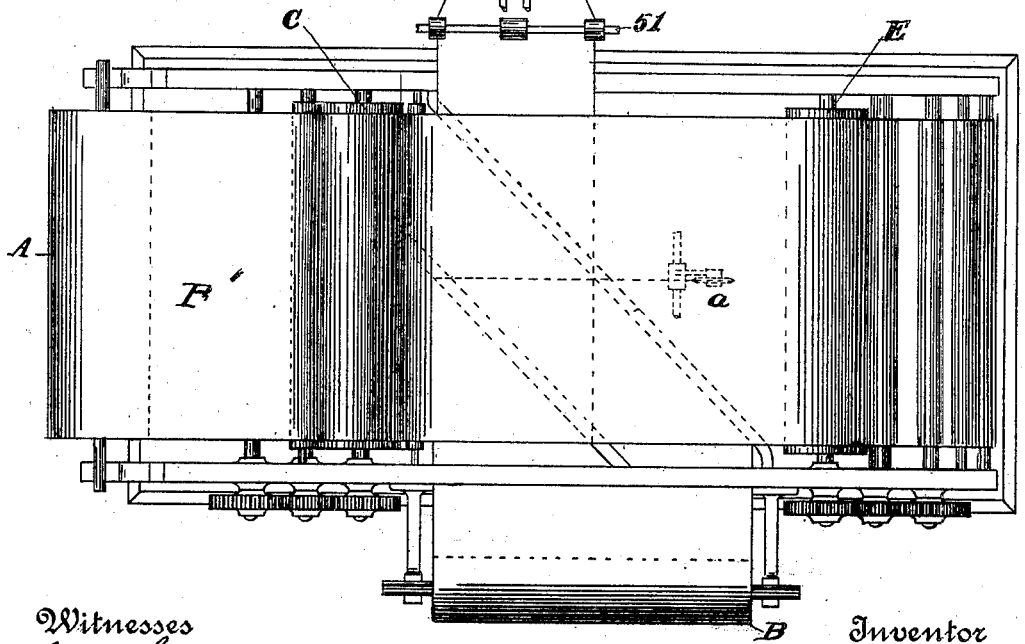


Fig. 4.



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(No Model.) 4 Sheets—Sheet 3.

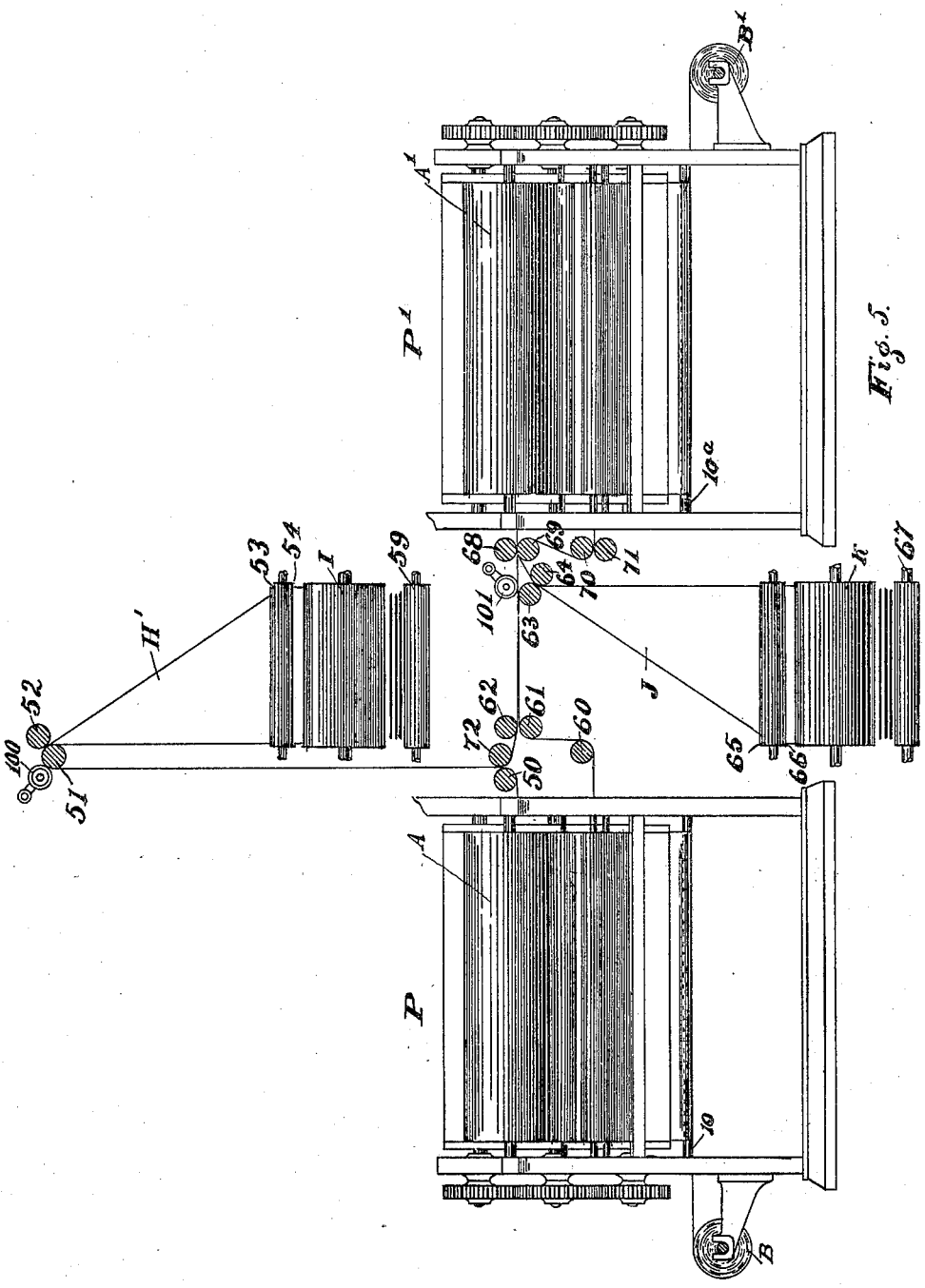

Fig. 5.

Witnesses
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(Application filed Feb. 16, 1901.)

(No Model.) 4 Sheets—Sheet 4.

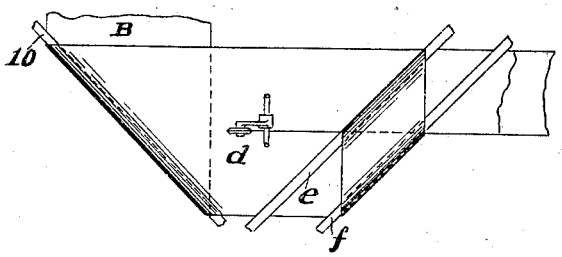


Fig. 6.

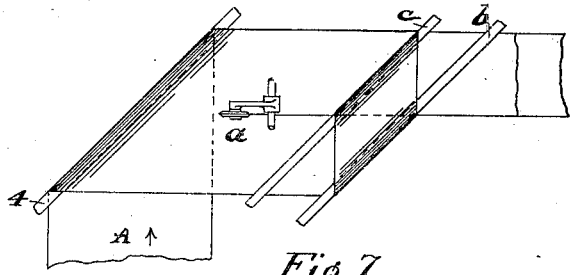


Fig. 7.

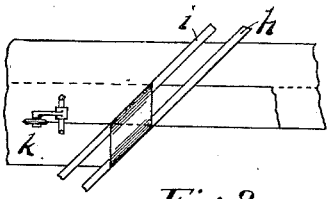
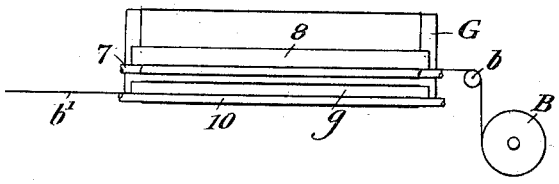


Fig. 8.

Fig. 10.



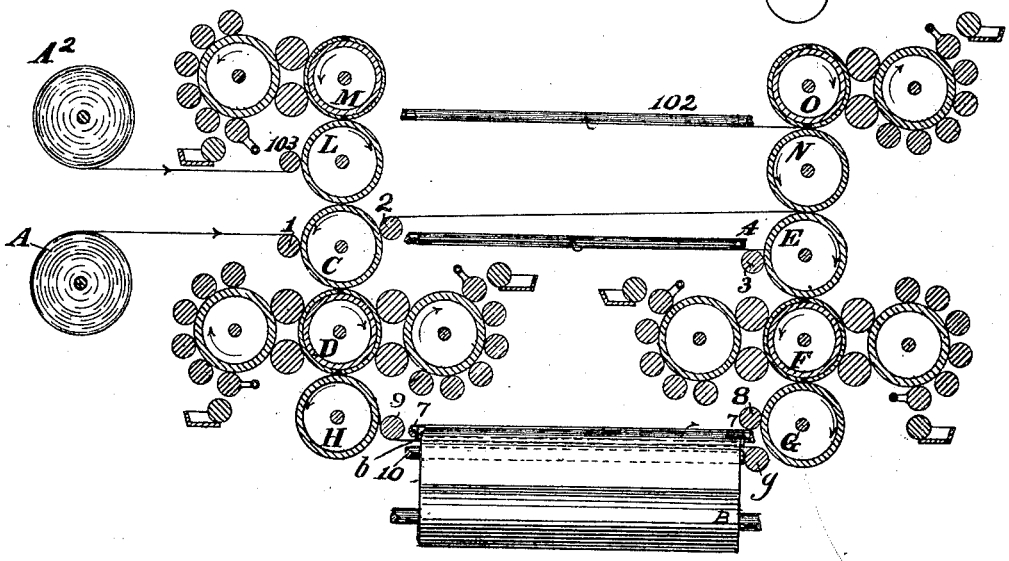


Fig. 9.

Witnesses
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H. L. Reynolds.

Inventor
J. L. Firm

UNITED STATES PATENT-OFFICE.

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

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 676,816, dated June 18, 1901.

Application filed February 16, 1901. Serial No. 47,548. (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 a new and Improved Printing-Press, of which the following is a full, clear, and exact description.

My invention relates to an improvement in printing-presses, and comprises the novel features hereinafter described, and particularly pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a diagrammatic side sectional elevation of my press. Figs. 2 and 3 show a form-cylinder having two methods of grouping of the forms. Fig. 4 is a plan of my press. Fig. 5 is an end elevation of my press. Figs. 6, 7, and 8 are details showing the manner of combining different web-sections. Fig. 9 is a diagrammatic side sectional elevation of a modified arrangement, and Fig. 10 is a detail showing in elevation the means for leading the web from the roll B into and out of the press.

In the form of presses heretofore most commonly used it has been necessary to provide as many forms as there were pages printed during each revolution—that is, where four papers were printed at each revolution of the press and these were eight-page papers thirty-two forms were required, and where sixteen-page papers were produced sixty-four forms were required, and all other sizes of papers in proportion.

With my present invention the same number of pages may be printed by the employment of just half the number of forms. For instance, where four eight-page papers ordinarily required thirty-two forms or plates they may on my present press be printed from sixteen forms or plates.

In addition by the use of my present invention supplement-pages may be printed and assembled as separate signatures, which are inserted by the machine in the center of the newspaper without pasting the two together, so that hand insertion of such supplements is avoided, and they may be separated from the body of the paper for convenience in reading. I also secure a considerable economy in construction by dispensing with half of the form-cylinders.

In many of the large newspaper offices the time consumed in making the necessary matrices and form-plates for an issue is considerable, making it necessary to close the forms earlier than would be necessary if the number of forms could be reduced. In addition the extra labor and material consumed is considerable and is a constant expense.

Referring to Figs. 4 and 5, it will be seen that my press consists of two duplicate parts P and P′. It is therefore necessary to describe in detail only one of these parts. In Fig. 1 the essential elements of one of these parts are shown. Two form-cylinders D and F are used, impression-cylinders C and H cooperating with form-cylinder D and impression-cylinders E and G with form-cylinder F. Two web-rolls A and B are used. The web-roll A is mounted at one end of the press and passes over the guide-roller 1 and the impression-cylinder C to and over the guide-roller 2, being printed on one side by the form-cylinder D in its passage over the impression-cylinder. From the guide-roller 2 it passes to and about the impression-cylinder E to the guide-roller 3, being in the meanwhile printed on the other side by the form-cylinder F. Leaving the guide-roller 3, the web passes over a turning-bar 4, and is thus led out of the press at one side. After leaving the bar 4 it is slit by the slitter *a*, (see Fig. 7,) and one-half is superposed on the other by passing over the turning-bars *b* and *c*. The web-roll B is placed at one side of the press and facing the space between the two sets of printing mechanisms, of which the impression-cylinders G and H are parts. The web is first conducted over guide-roller *b*, thence over the turning-bar 7, which presents the web fairly to the impression-cylinder G beneath the guide-roller 8. The web after passing about the impression-cylinder G and being thereby printed upon by the form-cylinder F passes over the guide-roller *g*, and thence across to the guide-roller 9 and impression-cylinder H, the web during this portion of its course passing between the two turning-bars 7 and 10 without being en-

gaged by either. The position of the web at this point is clearly seen in Fig. 10, where it is leading off of the top of the guide-roller *g*. This figure is taken as a section on a plane just within or to the right of the guide-roller 9, as shown in Fig. 1. The web then passes about the impression-cylinder H, during which passage it is printed upon the other side by the form-cylinder D. The web is then led over a turning-bar 10, by which it is conducted out from the center of the press at one side, as shown at *b'* in Fig 10, this being, as herein shown, the inner side or that toward the other half of the press. In its passage out of the side of the press it is slit by the slitter *d*, (see Fig. 6,) and one-half superposed on the other by passing over the turning-bars *e* and *f*.

Each form-cylinder and its impression-cylinders form what I have herein called a "printing-couple," and each half of my device consists of two of such printing-couples arranged as vertical stacks and separated by a space which is greater than the width of the web which the press is designed to use, or, in other words, separated a distance exceeding the length of the cylinders. These two stacks or printing-couples occupy two sides of a polygon, which, as shown, is a rectangle, through which polygon the webs pass from one printing-couple to the other, into which polygon the lower web is delivered from the roll B and from which polygon both the printed webs are discharged to the folders. By reason of the separation of the printing-couples or stacks, as above stated, the webs may be turned within said polygon, and sufficient room is provided for the location therein of inking mechanisms and to permit ready access to and adjustment of said inking mechanisms. The other half of the press is composed of the same parts arranged in the same manner. As viewed in plan, the four form-cylinders used will be seen to be arranged at the corners of a rectangle and parallel with or lying in opposite sides of said rectangle. It will thus be seen that four different webs may be simultaneously delivered to the central space between the two parts of the press, where the folding mechanisms are located.

After leaving the press the web A, which is in two superposed parts, is first associated with the corresponding web A', which is correspondingly delivered from the other half of the press between the rollers 68 and 69, from which it passes beneath the roller 62, meeting the web A as it passes between the rollers 50 and 72, and thence both webs pass between the rollers 51 and 52, where they may be slit by the slitter 100, if desired. When the slitter *a* or *d*, located in the press, is used, it will not be necessary to use the slitter 100, and when the slitter 100 is used it will not be necessary to use the slitter *a* or *d*. The webs are then led over the former H and between the rollers 53 and 54, from which they are delivered to a transverse cutting and folding mechanism I and then to an apron running over the roller 59, said transverse cutting and folding mechanism being of any usual or desired type. The webs B and B' pass through similar mechanisms in their respective halves of the press and are delivered, respectively, beneath the roller 60 and between the rollers 70 and 71. The web B passes over the roller 61 and between rollers 63 and 64, while the web B' passes over the roller 67 and then between the rollers 63 and 64, where the two webs are associated and where they may be slit by the slitter 101 if not previously slit by slitters *d* or *k*. The two webs, which are then of four thicknesses, pass over the former J, between rollers 65 and 66, to the transverse cutting and folding mechanism K, and the carrier-belt which passes over the roller 67, being delivered as two separate sixteen-page papers. The product of the webs A and A' is also two copies of sixteen-page papers, which makes for the whole press four copies of sixteen-page papers.

In printing ten-page papers two quarter-width webs are used, one in each half of the press, and in making twelve-page papers two half-width webs are used and no slitting or second turning of the webs is required.

In making fourteen-page papers two three-quarter-width webs are used, which are slit and turned, as in making eight-page papers and as illustrated in Fig. 8, the webs A' and B' making four copies of six-page papers and being combined with the webs A and B, which are producing eight-page papers in the same manner in which the webs are combined when producing sixteen-page papers.

In all sizes of papers eight pages are printed on one half of the press and the remainder upon the other half, and if the remainder is less than eight pages a web of less than full width is used for their production, as above stated.

In printing eight-page papers one side only of the press is used and two full-width webs. The other side of the press might also be used if additional folding mechanisms were provided.

In Fig. 9 a modification is shown by which an additional web may be employed in each half of the press and the size of the paper thus increased. In this modification the impression-cylinders C and E and everything beneath them are the same as previously described. Two form-cylinders M and O, with their impression-cylinders L and N and their inking mechanisms and turning-bar 102, are added. An additional web A^2 is employed, which is placed at the end of the press above and parallel with the web A. This extra web passes beneath roller 103 about the impression-cylinder L, during which it is printed upon one side by the forms upon the form-cylinder M, and then passes about the impression-cylinder C, between said cylinder and the web A, the printed side of web A^2 being next the cylinder C. The web A^2

travels in company with the web A until the impression-cylinder E is reached. Here the web A^2, which is uppermost, parts with the web A and instead of passing downward about the impression-cylinder E passes upward about the impression-cylinder N and is printed upon its blank side by the form-cylinder O. The web is then passed about the turning-bar 102 and conducted out at the side of the machine, where it is slit and turned, as necessary, and combined with the web A, which issues just below it. It is then conducted through the cutting and folding mechanisms along with the web A.

In Fig. 2 the imposition of forms upon the form-cylinder is shown, such as would be used in printing ordinary newspapers. In Fig. 3 forms of a smaller size are shown, such as would be used in printing a magazine-supplement which would be folded separately and inserted within the paper, but not pasted thereto, so that it may be removed for reading, if desired. The division of the plates on this cylinder is such that two or more of the plates occupy the same space as one of those, such as shown in Fig. 2.

With this machine it is possible to print eight-page papers with one section and to print four, six, or eight page papers with the other section, which shall be folded and inset with the first section and yet be independent thereof, so that it may be removed for reading.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In a printing-press the combination with two printing-couples each consisting of a single form-cylinder and two impression-cylinders, of means for conducting two webs through said printing-couples to print both their sides, slitting and associating mechanisms for each web, and means for delivering all the sections of said webs in superposed position from the same side of the press and from between said couples.

2. In a printing-press the combination with two printing-couples each consisting of a single form-cylinder and two impression-cylinders, of means for conducting two webs through said printing-couples to print both their sides, slitting and associating mechanisms for each web, means for delivering all the sections of said webs in superposed position from the same side of the press and from between said couples, and web folding and cutting mechanisms at the side of the press and receiving the webs therefrom.

3. In a printing-press the combination with two groups of printing mechanisms each consisting of a single form-cylinder and two impression-cylinders, of means for conducting two webs successively through each of said groups to print both their sides, means for delivering said webs from the same side of the press between said groups, and plural, oppositely-facing web folding and cutting mechanisms arranged one above the other at the side of the press, and adapted to receive the webs as delivered from the press.

4. In a printing-press, the combination with two printing-couples each consisting of a single form-cylinder and two impression-cylinders, of means for conducting two webs through said printing-couples to print both their sides, means for delivering said webs into the space between the printing-couples, slitters and turning-bars between said printing-couples adapted to deliver all the sections of both webs in superposed position and from the same side of the press.

5. In a printing-press the combination with two separated and parallel printing mechanisms, of means for conducting two webs through said printing mechanisms to print both their sides, means for delivering said webs when printed into the space between the printing mechanisms, slitters and turning-bars between the printing mechanisms adapted to deliver all the sections of both webs in superposed position and from the same side of the press.

6. In a printing-press the combination with two printing-couples each consisting of a single form-cylinder and two impression-cylinders, of means for conducting two webs through said printing-couples to print both their sides, means for delivering said webs into the space between the printing-couples, and turning-bars and slitters between the printing-couples, whereby all the sections of both webs may be delivered laterally from the same side of the press and in superposed position.

7. In a printing-press, the combination with two printing-couples arranged facing each other, and a web-roll support arranged at the side of the press between the printing-couples and with its axis at right angles thereto, of a turning-bar between said roll-support and the printing-couple, and means for conducting the web from one printing-couple to the other.

8. In a printing-press the combination with two printing-couples arranged facing each other, and a web-roll support arranged at the side of the press between the printing-couples and with its axis at right angles thereto, of a turning-bar between said roll-support and the printing-couple, means for conducting the web from one printing-couple to the other, means for delivering the web when printed into the space between the printing-couples, and turning-bars whereby the web may be discharged from the side of the press.

9. In a printing-press the combination with two printing-couples arranged facing each other, a web-roll support arranged at the side of the press between the printing-couples and with its axis at right angles thereto, and a turning-bar between said roll-support and the printing-couple, of a web-roll support parallel with the axes of the printing-couples, means for conducting each web from one

printing-couple to the other for printing its opposite sides, and means for conducting both webs away from the press at one side.

10. In a printing-press the combination with two printing-couples arranged facing each other, a web-roll support arranged at the side of the press between the printing-couples and with its axis at right angles thereto, and a turning-bar between said roll-support and the printing-couple, of a web-roll support parallel with the axes of the printing-couples, means for conducting each web from one printing-couple to the other for printing its opposite sides, and turning-bars engaging the printed webs to deliver them laterally or from the side of the press.

11. In a printing-press the combination with two printing-couples arranged facing each other, a web-roll support arranged at the side of the press between the printing-couples and with its axis at right angles thereto, and a turning-bar between said roll-support and the printing-couple, of a web-roll support parallel with the axes of the printing-couples, means for conducting each web from one printing-couple to the other for printing its opposite sides, means for delivering both webs when printed into the space between the printing-couples, and turning-bars adapted to then receive the webs and deliver them at one side of the press.

12. In a printing-press the combination with two printing-couples arranged facing each other and adapted to print upon two separate webs, means for conducting both webs from one printing-couple to the other to print opposite sides thereof, of means for delivering one web to the printing mechanism from within the polygon formed by said printing-couples and the webs in their passage between the printing-couples, and means for delivering the other web from within said polygon as it leaves the printing mechanism.

13. In a printing-press, the combination with two printing-couples arranged facing each other and adapted to print upon two separate webs, means for conducting both webs from one printing-couple to the other to print opposite sides thereof, and means for supporting a web-roll at one side of the machine with its axis substantially at right angles with the axes of the printing-couple, of a turning-bar within the polygon formed by the two printing-couples and the webs in their courses between the two printing-couples and adapted to deliver the side web to the rolls, a turning-bar in the said polygon adapted to receive the other web after printing to deliver it at the side of the press, and a turning-bar adapted to engage the first-named web after printing to deliver it from the press at one side.

14. In a printing-press, the combination with two printing-couples arranged facing each other and adapted to print upon two separate webs, means for conducting both webs from one printing-couple to the other to print opposite sides thereof, and means for supporting a web-roll at one side of the machine with its axis substantially at right angles with the axes of the printing-couple, of a turning-bar within the polygon formed by the two printing-couples and the webs in their courses between the two printing-couples and adapted to deliver the said web to the rolls, and turning-bars and slitters adapted to engage the webs after printing to deliver them in superposed sections at the side of the press.

15. A printing-press composed of two parts each adapted to perfect two webs, said parts being separated lengthwise of the cylinders, means for delivering said webs laterally to the space between the two parts, and web folding and cutting mechanisms located between said parts and receiving the webs.

16. A printing-press composed of two adjacent parts each adapted to perfect two webs, said parts being separated lengthwise of the cylinders, and means for combining the whole or parts of webs from both parts of the press to form each paper, means for delivering said webs laterally to the space between the two parts, and web folding and cutting mechanisms located between said parts and receiving the webs.

17. In a printing-press the combination of two web-printing mechanisms located alongside each other and separated in the direction of the length of the cylinders with means for delivering the webs laterally from a central point in each of said printing mechanisms into the space between the printing mechanisms, of folding and cutting mechanisms between the printing mechanisms adapted to receive the webs to cut and fold the same.

18. In a printing-press the combination of two printing-couples each consisting of a single form-cylinder and two impression-cylinders arranged in a vertical row and with horizontal axes, two web-roll supports, means for bringing one web into the press from the side and between the two printing-couples, and means for removing both webs laterally from the press from between the two printing-couples.

19. In a printing-press the combination of two printing-couples each consisting of a single form-cylinder and two impression-cylinders arranged in a vertical row and with horizontal axes, two web-roll supports, means for bringing one web into the press from the side and between the two printing-couples, means for conducting each web from one printing-couple to the other for perfecting it, and means for removing both webs laterally from the press from between the two printing-couples.

20. In a printing-press the combination of two web-perfecting mechanisms having the axes of their printing-couples parallel, said perfecting mechanisms being arranged side by side and separated in the direction of the

length of the cylinders, and means for combining webs from both of said perfecting mechanisms to form a complete paper.

21. In a printing-press the combination of two web-perfecting mechanisms, having the axes of their printing-couples parallel, said perfecting mechanisms being arranged side by side and separated in the direction of the length of the cylinders, web associating and folding mechanisms located between the printing mechanisms, and means for delivering the webs thereto from both printing mechanisms.

22. In a printing-press the combination of two web-perfecting mechanisms having the axes of their printing-couples parallel, said perfecting mechanisms being arranged side by side or separated in the direction of the length of their cylinders, plural web associating and folding mechanisms located between the printing mechanisms and one above the other, and means for delivering the webs thereto from both printing mechanisms.

23. In a printing-press the combination of two web-perfecting mechanisms having the axes of their printing-couples parallel, said perfecting mechanisms being arranged side by side or separated in the direction of the length of their cylinders, each of said perfecting mechanisms having two printing-couples separated a distance exceeding the width of the webs used, means for delivering the webs into the space between the printing-couples, turning-bars between said printing-couples whereby the webs from said perfecting mechanism may be delivered laterally from the center thereof into the space between them, and web associating and folding mechanisms between the web-perfecting mechanisms and adapted to receive the webs.

24. In a printing-press the combination of two web-perfecting mechanisms each containing two printing-couples, the axes of all four of said printing-couples being parallel and the couples being separated at the corners of a rectangle, means for conducting four webs through said printing-couples to perfect them, and means for delivering said webs after printing in a direction across the center of the rectangle and parallel with the axes of the printing-couples.

25. In a printing-press the combination of two web-perfecting mechanisms each containing two printing-couples, the axes of all four of said printing-couples being parallel and one at each of the corners of a rectangle, means for conducting four webs through said printing-couples to perfect them, web associating and folding mechanisms located at the center of said rectangle, and means for delivering the perfected webs to said associating and folding mechanisms.

26. In a printing-press the combination of two web-perfecting mechanisms each containing two printing-couples the axes of all of said couples being parallel and the couples being separated at the corners of a rectangle, means for conducting four webs through said printing-couples to perfect them, each web passing alternately through the two opposite or facing printing-couples, and means for delivering said webs after printing in a direction across the center of the rectangle and parallel with the axes of the printing-couples.

27. In a printing-press the combination of two web-perfecting mechanisms each containing two printing-couples, the axes of all four of said printing-couples being parallel, and the couples being separated at the corners of a rectangle, means for conducting four webs through said printing-couples to perfect them, plural web associating and folding mechanisms located at the center of said rectangle and at different elevations, and means for delivering the perfected webs to said associating and folding mechanisms.

New York, February 14, 1901.

JOSEPH L. FIRM.

Witnesses:
H. L. REYNOLDS,
W. A. PAULING.