

(No Model.)

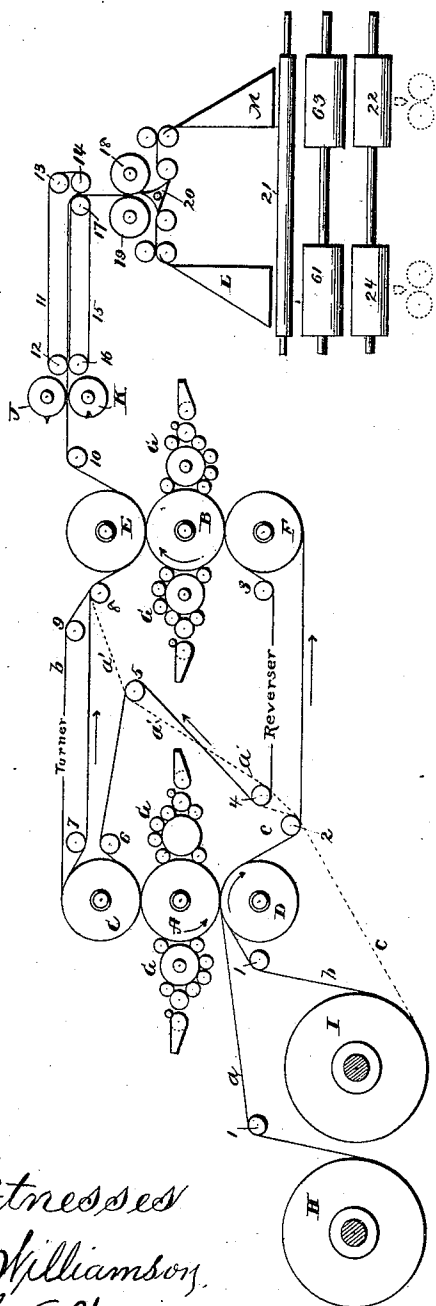
3 Sheets—Sheet 1.

L. W. SOUTHGATE.
PRINTING PRESS.

No. 471,403.

Patented Mar. 22, 1892.

Fig. 1.



Witnesses
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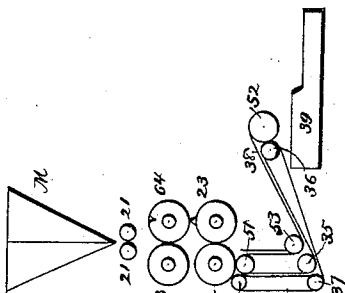


Fig. 2.

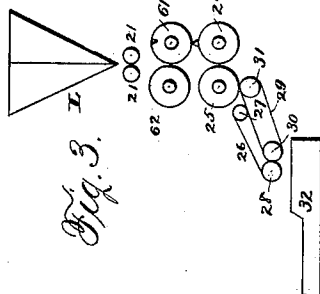


Fig. 3.

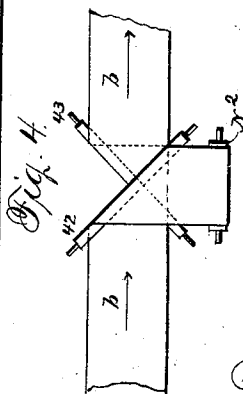


Fig. 4.

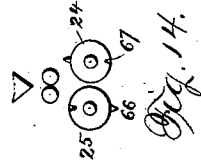


Fig. 14.

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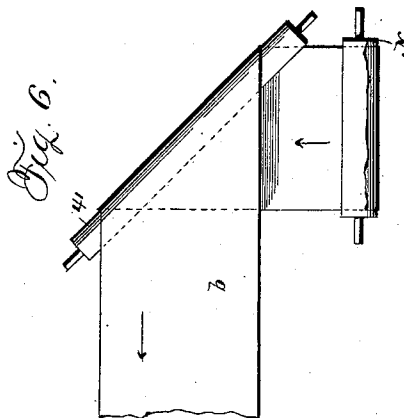
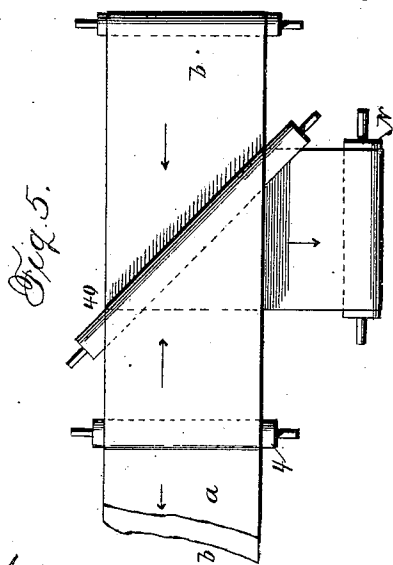
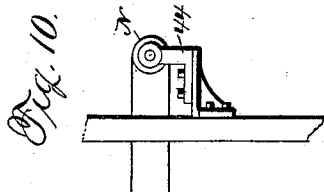
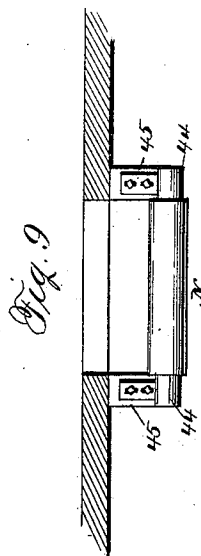
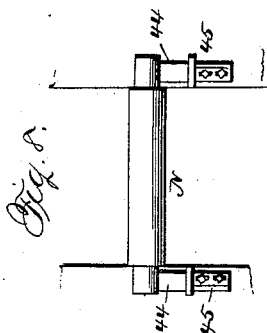
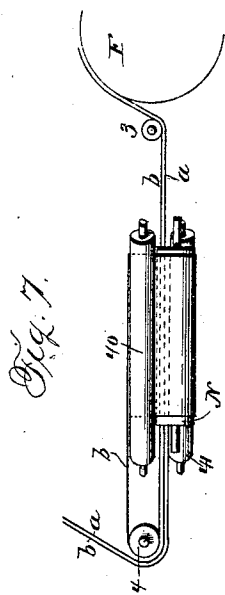
(No Model.)

3 Sheets—Sheet 2.

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PRINTING PRESS.

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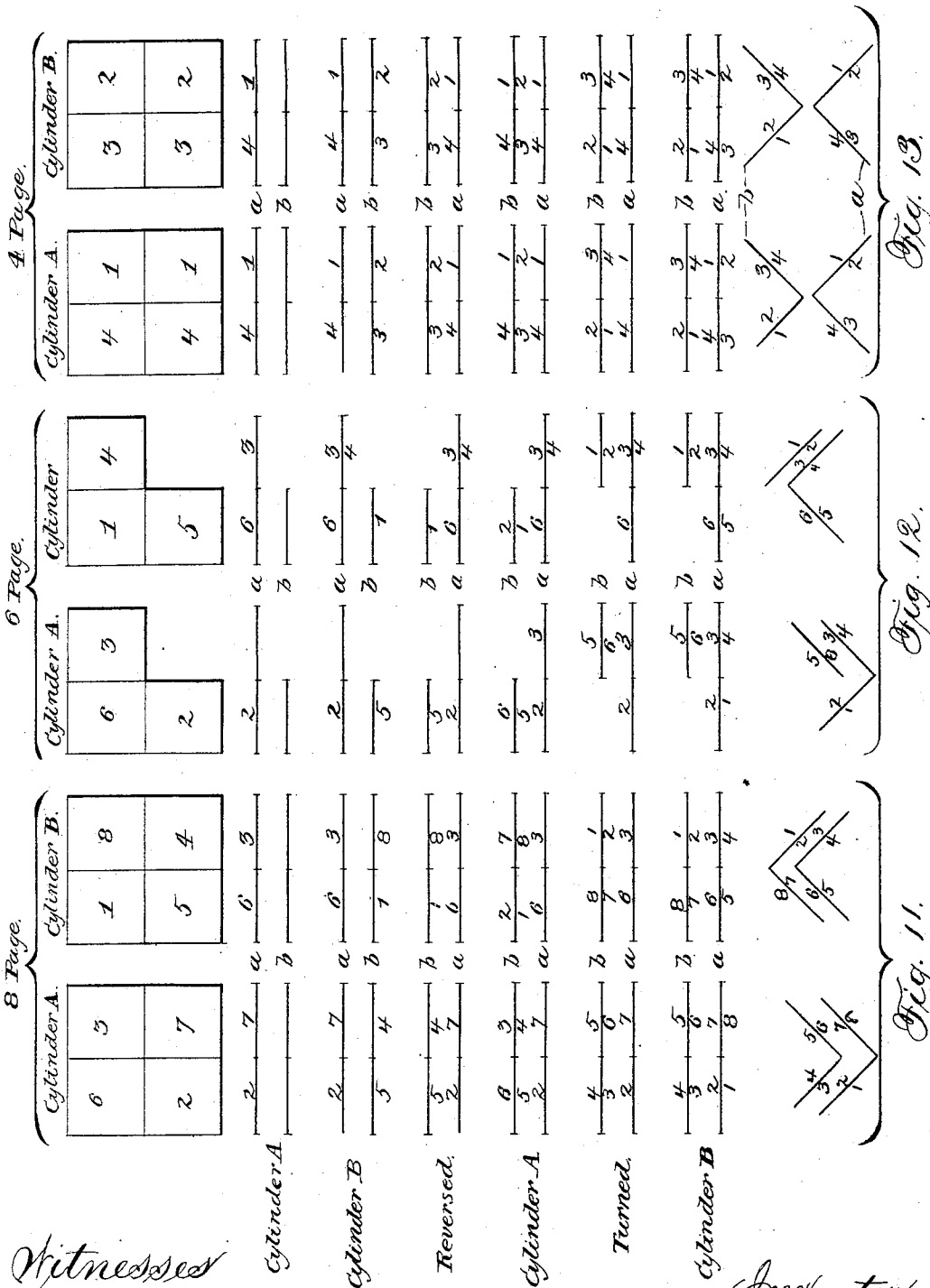
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Witnesses

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UNITED STATES PATENT OFFICE.

LOUIS W. SOUTHGATE, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO THE CAMPBELL PRINTING PRESS AND MANUFACTURING COMPANY, OF NEW YORK.

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 471,403, dated March 22, 1892.

Application filed August 17, 1891. Serial No. 402,947. (No model.)

To all whom it may concern:

Be it known that I, LOUIS W. SOUTHGATE, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Printing-Presses, of which the following is a specification.

The aim of this invention is to double the capacity of the ordinary web-press, and, further, to assemble the products so that a four, six, or eight page paper or any addition or multiple thereof may be printed and folded in a machine of single width.

To this end the invention consists of the device described and claimed in this specification and illustrated in the accompanying drawings, in which—

Figure 1 is a diagram illustrating the printing-machine and the folding-machine and how the webs are passed through the same. Figs. 2 and 3 are end elevations of the double folding-machine. Fig. 4 is a plan of the web-turner. Figs. 5, 6, and 7 are a plan, a sectional plan, and a side elevation, respectively, of what I term the "web-reverser," on an enlarged scale. Figs. 8, 9, and 10 are a side elevation, a plan, and an end elevation showing the manner in which the parallel cylinders of the turner and of the reverser are mounted. Figs. 11, 12, and 13 are diagrams showing the arrangement of plates and illustrating the way in which an eight, six, and four page paper, respectively, is printed and folded; and Fig. 14 represents a modification of part of the mechanism of the double folder.

Referring to the said drawings, A and B represent two type-cylinders geared to run in opposite directions. These type-cylinders are preferably made so as to carry four plates, and the plates are preferably so arranged that the columns will be parallel to the travel of the web.

Mounted to bear against the type-cylinders, preferably vertically above and below the same, are the impression-cylinders C and D, bearing on type-cylinder A, and the impression-cylinders E and F, bearing on type-cylinder B.

Suitable inking devices G are arranged, as shown, at each side of each type-cylinder, so

that the type-cylinders will be properly inked, so as to print where the same come into contact with the impression-cylinders.

Two rolls of paper H and I are mounted at one end of the machine, so that the two webs may be drawn from the same over suitable guide-rollers I I between the cylinders D and A. From here the double web passes around guide-roll 2, around cylinder F, between cylinder F and B, around guide-roll 3 to what I term a "reverser," and which will be described at length further on. From the reverser the double web runs around guide-rolls 4, 5, and 6, around cylinder C, and between the latter and cylinder A. From the cylinder C the webs are separated, one going under the roll 7 and the other going through a web-turner, over roll 9, and then to roll 8, where the webs reunite. From the roll 8 the double web passes around cylinder E and thus in contact with cylinder B, then around a guide-roll 10, and then between the cutting or perforating cylinders J and K. From the cylinders J and K the double web is carried by the belt 11, running around belt-pulleys 12, 13, and 14 and by the belt 15, running around pulleys 16 and 17, to between the cylinders 18 and 19. These cylinders 18 and 19 run at increased peripheral speed relatively to the mechanism before described, and therefore the sheets will be separated from the web in the usual manner.

Mounted below the cylinders 18 and 19 is a switch 20 of any of the usual constructions, and the same is arranged to switch the sheets alternately to each of the folders, or rather to the double folder now described. Each folder consists of the former L and M, and these formers L and M are oppositely set or arranged with their backs to each other. In some instances, of course, the equivalent inclined double roll may be used in place of the formers. From the switch 20 the sheets are carried by the usual tapes (not shown) alternately down over the formers L and M and then between the presser cylinders or rollers 21 21. From the cylinders 21 21 the sheets pass through the cutting-cylinders 61, 62, 63, and 64, which may be used in connection with a four-page paper, and the operation of which will be de-

scribed further on, to the folding-cylinders 22, 23, 24, and 25. The cylinder 23 tucks the sheets into the cylinder 22 in the usual manner to make the second fold, and the cylinder 24 tucks the sheets in the same manner into the cylinder 25. Thus the sheets are twice folded. If it is desired to further fold the sheets, the folding rollers and tuckers may be arranged below the previously-described folding-cylinders in the usual manner, and as indicated in dotted lines in Fig. 1; but in modern newspaper work two folds are generally sufficient.

In most instances it is desirable to deliver all the folded sheets on the same side of the machine, and, as shown in Figs. 2 and 3, this may be readily done. The folded sheets from the cylinder 25 are carried by belt 26, passing around pulleys 27, 28, and 30, and by belt 29, passing around pulleys 30 and 31, and deposited in the receiver 32. The sheets from the cylinder 22 are carried by belt 33, running around pulleys 34, 35, 36, and 37, and by belt 38, running around pulleys 51, 35, 36, 52, and 53, and deposited in the receiver 39. These receivers, as shown, are arranged on the same side of the machine. The details of the formers L and M and of the folding-cylinders 22, 23, 24, and 25 are not shown, as the same *per se* form no part of the invention, and as the same are of the ordinary construction well understood. Thus this double folding-machine will fold sheets delivered to it in opposite ways, and, as hereinafter described, this is the way the sheets are printed. The disposition of the folding and cutting cylinders on four shafts is very advantageous in that it saves gearing.

The reverser will now be described, the web from roll H being designated by *a* and that from roll I by *b*. The web *b* is turned back over roll 4 and then is passed over the top of the forty-five-degree turner bar or roll 40, then around the parallel cylinder N, then back and up over the forty-five-degree turner-bar 41, and thus under the web *a*. The turner-bars in the reverser are preferably arranged in the same vertical plane, one above the other, as shown. This does not turn the web *b*, but simply reverses the webs, placing web *b* on the opposite side of the web *a* as the turner-bars 40 and 41 are parallel. The turner (see Fig. 4) is of the ordinary construction, and may be arranged between cylinders C and E or at any convenient point, so as to turn web *b* after the same is printed on both sides. The turner consists of the oppositely-disposed forty-five-degree turner-bars 42 and 43 and the parallel cylinder N². The parallel cylinder N and N² of both the reverser and the turner are mounted in the brackets 44, which are horizontally adjustable on brackets 45, which latter are vertically adjustable on the press-frame. Thus the rolls N and N² may be accurately adjusted, so that the web *b* will properly run on the turner-rolls and so that when the web *b* again joins the web *a* that the web *b* will be in proper register with web *a*.

The operation will now be described, it being first noted that when the webs come the second time into contact with the type-cylinders that the second set of plates on the type-cylinders will print on the webs over the pages that have been previously printed by the first set of plates, and vice versa; also, it may be noted that the rolls 2, 5, and 8 are vertically adjustable, so as to secure proper register between the various impression-cylinders.

The operation of printing and folding eight-page papers will first be described, and reference, so as to follow this description, should be had to Figs. 1 and 11. In Fig. 11 the disposition of the plates on the type-cylinders is shown developed into plan, and the left-hand column shows the pages or the part of the webs first printed by the type-cylinders and the right-hand column shows the pages last printed from each type-cylinder, and at the bottom is indicated the way each double sheet is folded. The double web from the rolls first passes around impression-cylinder D and in contact with the type-cylinder A, where pages 27 and 63 are printed on web *a*, then around impression-cylinder F in contact with type-cylinder B, where pages 54 and 18 are printed on web *b*; then the webs are reversed by the reverser, or the web *b* is placed under the web *a* as the webs are then moving, thus bringing the printed surface of each web together or opposed to each other; then the double web passes around the impression-cylinder C and thus in contact with the type-cylinder A, where web *b* is printed upon the opposite side to that previously printed by cylinder B, and pages 63 and 27 are printed; then the web *b* is turned over by the turner; then both webs pass around cylinder E and thus in contact with type-cylinder B, where pages 18 and 54 are printed on web *a*. The special location of the turner is thus seen to be immaterial so far as effecting the result is concerned, as the same may be arranged at any point in the travel of the webs beyond cylinder C. Thus two oppositely-disposed eight-page papers are printed at each revolution of the type-cylinders. The double web thus printed is carried to the cutting or perforating cylinders J and K and then to cylinders 18 and 19, where the double sheets are pulled from the double web and switched into the reversely-arranged double folder previously described, where each double sheet is folded so that the heading comes outside.

For a six-page paper the plates are arranged as shown in Fig. 12—that is, with two diametrically abreast and one plate behind—and the web *b* used in this instance is only one-half width. This is easily accomplished by using a half-roll in place of the roll H of full width. The operation with this web and half-width web is exactly the same as before described in connection with the eight-page paper, and results in two products of six pages each folded and disposed, as shown in Fig. 12. It may be noted in connection with the six-

page paper that when the half-web passes over the turner that the half-web will be laterally transposed from one side of the machine to the other, as indicated in the diagram, and as is readily understood as the turner-bars of the turner are oppositely disposed.

When a four-page product is desired, the folder mechanism is run at a slightly slower speed than that previously described through a suitable change-gearing, (not shown,) so that the peripheral speed of the cylinders 18 and 19 is not accelerated. The serrated knife or set of cutters is removed from the cylinder J, or the cylinders J and K are opened or spread apart, so that the webs may freely pass between the same, and knives are inserted in cylinders 62 and 63, so that the cylinders 61, 62, 63, and 64 will act as cutting-cylinders. The switch 20 is disconnected and one web is carried down over former L and the other over former M, from whence the sheets are cut off and folded in the usual manner. During this operation the cylinders J, K, 18, and 19 act simply as guides for the two webs.

In some instances I contemplate omitting the cutting-cylinders 61 62 63 64 and putting the knives on the folding-cylinders, as at 66 and 67 on cylinders 24 and 25.

The way the double web for the four-page sheets is printed is shown in Fig. 13, and as the operation is the same as described in connection with the eight-page sheets the operation of printing four-page papers will not be described at length; but it may be noted that all the sheets cut from the web *b* are folded one way and all those cut from web *a* the other. Thus four four-page papers are printed at each revolution of the type-cylinders.

In some instances the turning of the web *b* between impression-cylinders C and E may be omitted while printing four-page papers, so that the product will be webs similarly printed; but it is generally desirable to turn web *b* in all instances, because then the printing-machine can once be set in proper register, and then the machine does not have to be touched, no matter whether a four, six, or eight page paper is to be printed, so far as register is concerned, and the folding can be conveniently done, as before described.

In some instances it may be desired to print only on one web. This can be nicely done by running one web, as *a*, from the roll I first around guide-roll 2, (see dotted lines, Fig. 1,) then over rolls 4, 5, and 6, impression-cylinder C, in contact with type-cylinder A, where one side is printed, then over guide-rolls 7 and 8, around impression-cylinder E, in contact with type-cylinder B, where the other side is printed, thus acting as an ordinary single-web press.

A four-page paper could also be printed by running a web, as *a'*, around impression-cylinder D, in contact with type-cylinder A, around rolls 2, 4, and 5, up around the roll 8, and around cylinder E, thus perfecting against

type-cylinder B; but the first operation is preferred, because the impression-cylinders C and E are set in register in the operations of printing six and eight page papers. Of course while printing a single web two of the inking apparatuses are thrown out by being moved away from the type-cylinders in the usual manner; also, in the first operation the impression-cylinders D and F are thrown out by being moved away from the type-cylinders, and in the second operation the impression-cylinders C and F are thrown out. It will also be seen that during these operations that the web does not touch either the reverser or the turner. The product thus formed may all be printed in one way and directed to one folding-machine if the latter is set, as before described, for a four-page paper, or the product may consist of oppositely-disposed papers when the same would be cut from the web and alternately switched into each folding-machine, as described, in connection with printing eight-page papers. The disposition of the plates, in case only one web is printed, is so well understood that it is not thought necessary to describe the same; but it may be noted that if the double folder is to be used the plates must be set so that the product will be a web having the papers alternately oppositely disposed on the same. Thus a compact printing and folding machine is provided which has twice the speed of the ordinary web-printing press. Further, my improved machine will print one or two webs, as desired, the full or part width of the type-cylinders, and in case two webs are printed the same may be assembled or associated together to make a six or eight page paper.

It also will be seen that any multiple or addition of four, six, or eight may be printed by simply running the press two or more times, as may be necessary. Thus the machine has great speed range, and can be quickly started, as in the case of a six or eight page paper only a single set of plates is used.

The relative position of the parts and the disposition of the plates on the type-cylinders may be varied without departing from the principles of my invention.

Modifications of the construction may be made by the mechanic skilled in printing-press machinery without departing from the scope of my invention.

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

1. The method of printing, which consists in printing upon the exterior surfaces of a plurality of webs, bringing said printed surfaces together, and printing on the then exterior surfaces of the webs, substantially as described.

2. The method of printing, which consists in associating a wide and a narrow web, printing on the exterior surfaces of the same, bringing the printed surface of the narrow web against the printed surface of the wide web,

and printing on the then exterior surfaces of the webs, substantially as described.

3. The method of perfecting and associating two webs, which consists in printing on the exterior surfaces of a double web, bringing said printed surfaces together, printing on the then exterior surfaces of the double web, and turning one of said webs after the same has been perfected, substantially as described.

4. The printing-machine consisting of the type-cylinders, each having a plurality of impression-cylinders co-operating with the same, means for feeding a plurality of webs to the machine, means whereby the said webs will be carried around said impression-cylinders so as to be perfected, and an associating mechanism arranged so that the emerging printed webs will form a series of alternately oppositely turned or disposed associated products, substantially as described.

5. The printing-machine consisting of the type-cylinders, each having a plurality of impression-cylinders co-operating therewith, means for feeding a plurality of webs to the machine, and a reverser arranged to change the relative position of the webs, substantially as described.

6. The printing-machine consisting of the type-cylinders, each having a plurality of impression-cylinders co-operating therewith, means for feeding two webs to the machine, and a reverser acting on one of said webs only, substantially as described.

7. The printing-machine consisting of the type-cylinders, each having two impression-cylinders co-operating with the same, means for feeding two webs to the machine, said webs uniting so as to travel substantially together through the machine, and a reverser acting on one web only and adapted to change the relative position of the webs so that each will be perfected, substantially as described.

8. The combination of the type-cylinders, each having a plurality of impression-cylinders co-operating therewith, means for feeding two webs to the press, and a reverser interposed at a point between the second and third impression-cylinders, around which said webs pass, said reverser being arranged to change the relative position of the webs without turning the same, substantially as described.

9. The printing-machine consisting of the two type-cylinders, each having two impression-cylinders co-operating therewith, means for feeding two webs between each impression-cylinder and type-cylinder, and devices arranged to direct the webs so that each will be perfected in traveling the above path, substantially as described.

10. The reverser adapted to change the relative position of two webs without turning or affecting the direction of the travel of the same, consisting of the roll, as 4, adapted to

turn one of the said webs back, the two parallel forty-five-degree turning bars or rolls, and the roll or cylinder parallel to the travel of the said webs, substantially as described.

11. The combination, in a printing-machine through which two webs or a double web is passed, of a turner bar or roll adapted to turn one of said webs laterally, the parallel cylinder, and the second turner-bar arranged as shown, the said cylinder being both vertically and horizontally adjustable, whereby register may be obtained between the webs when they reunite, and proper action of the deflected web may be obtained on the turner-bars, substantially as described.

12. The combination, with a printing mechanism adapted to perfect a plurality of webs, of a web-reverser, and a web-turner set so that the webs may be associated to form oppositely-disposed products, substantially as described.

13. The combination of the type-cylinders A and B, each having two impression-cylinders bearing against the same, means for feeding a double web through the machine, the web-reverser interposed between the second and third impression-cylinders, around which said double web passes, and a web-turner arranged at a point beyond the third impression-cylinder, around which said double web passes, substantially as described.

14. The printing-machine consisting of the type-cylinders, each having a plurality of impression-cylinders co-operating with the same, means for feeding a plurality of webs to the machine, means whereby the webs will be carried around said impression-cylinders, and an associating mechanism arranged so that the emerging printed webs will form a series of alternately oppositely-disposed associated products, in combination with two oppositely-arranged folding-machines, and means for cutting said webs into sheets and directing the same alternately to each folding-machine, substantially as described.

15. The double folding-machine arranged to fold alternately oppositely-disposed products, consisting of the two former-folders arranged back to back, and a switch mounted so as to direct the sheets alternately to each folder, substantially as described.

16. The double folding-machine arranged to fold oppositely-disposed products, consisting of the two former-folders arranged back to back, a sheet-severing mechanism, and a switch mounted so as to cut a web into sheets and direct the same alternately to each folder, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LOUIS W. SOUTHGATE.

Witnesses:

JAMES J. RAFFERTY,
H. E. HILL.