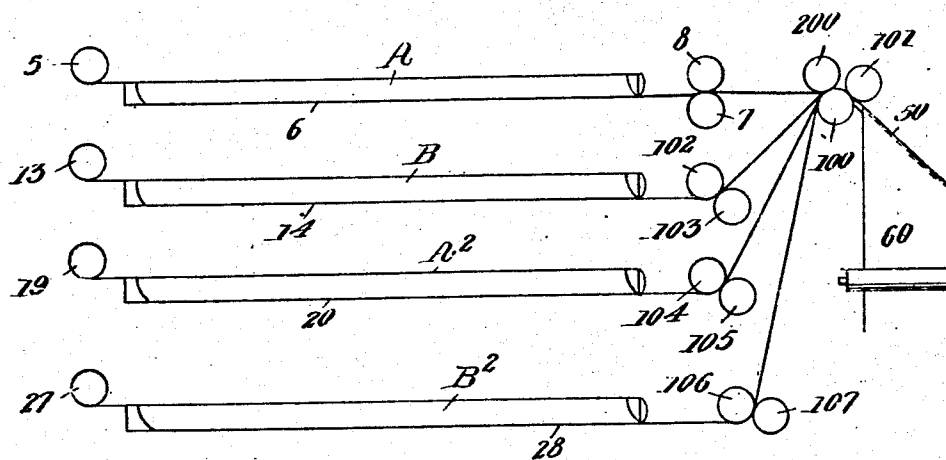
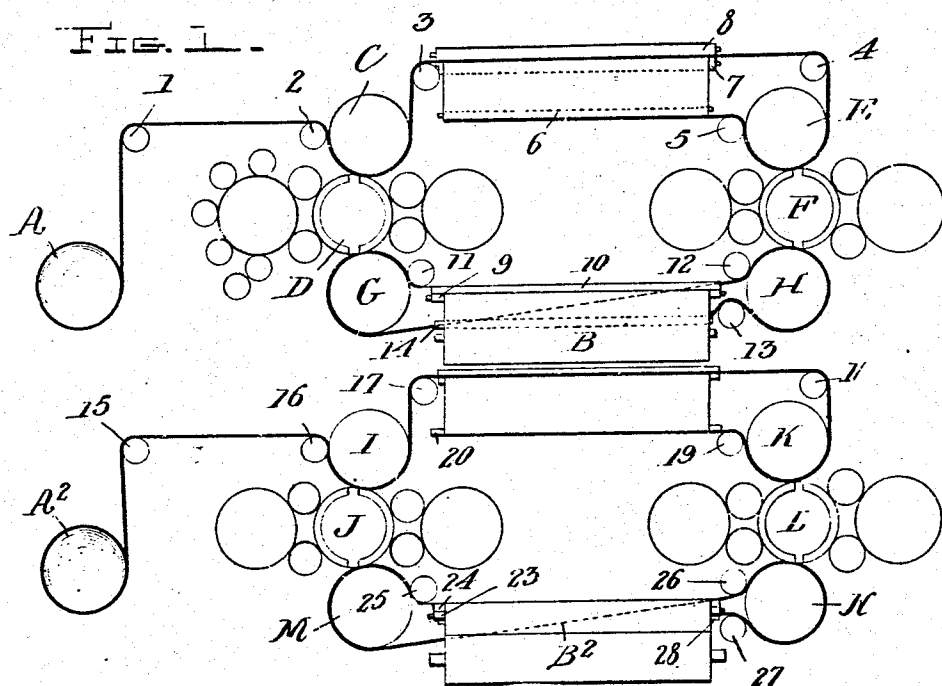


J. L. FIRM.
PRINTING MACHINE.
APPLICATION FILED FEB 23, 1907.

938,046.

Patented Oct. 26, 1909.
4 SHEETS—SHEET 1.



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4 SHEETS—SHEET 2.

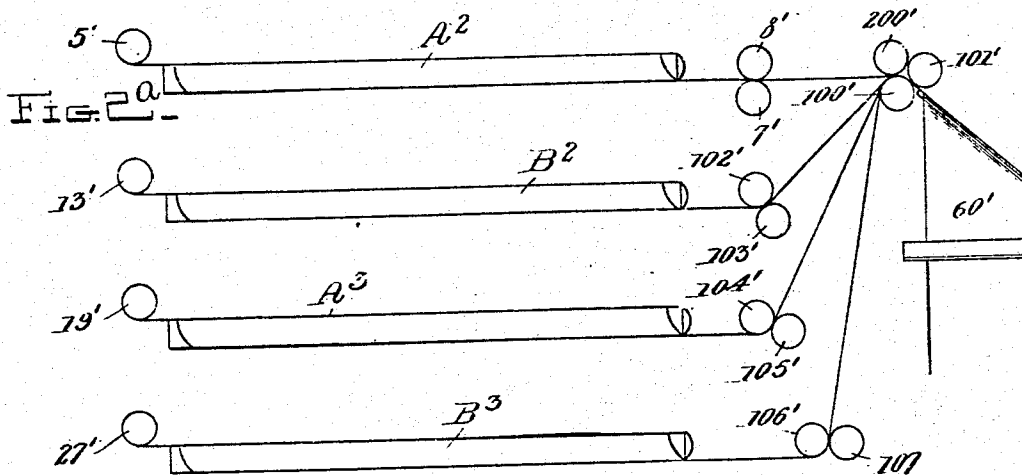
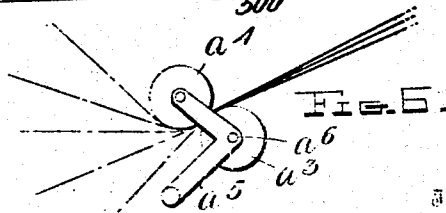
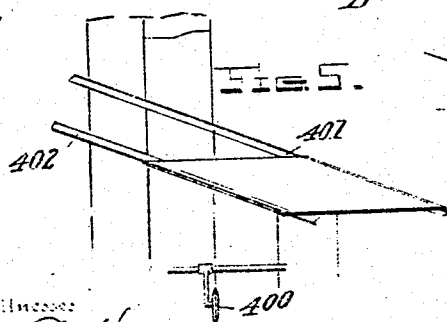
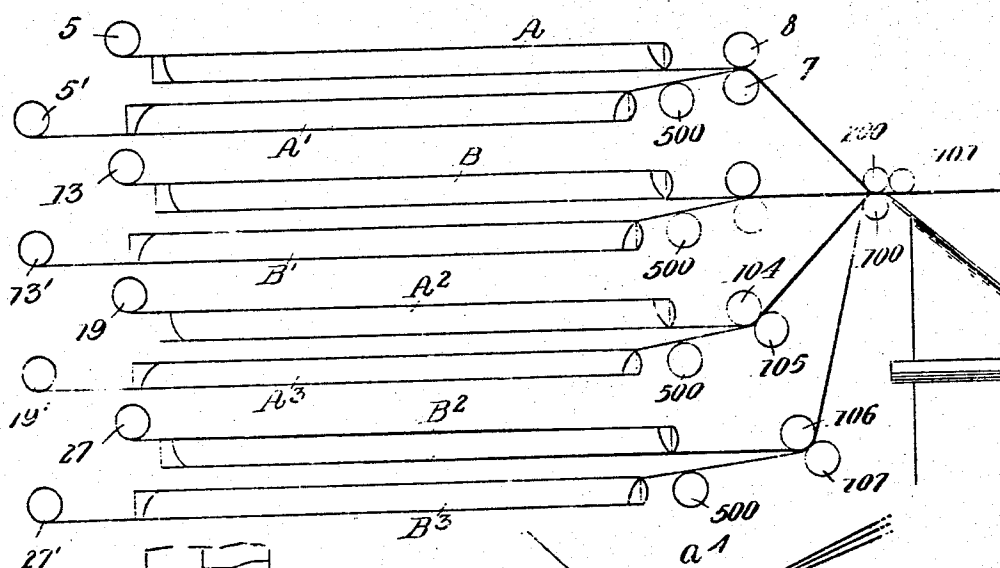


FIG. 2b.



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 4 SHEETS—SHEET 3

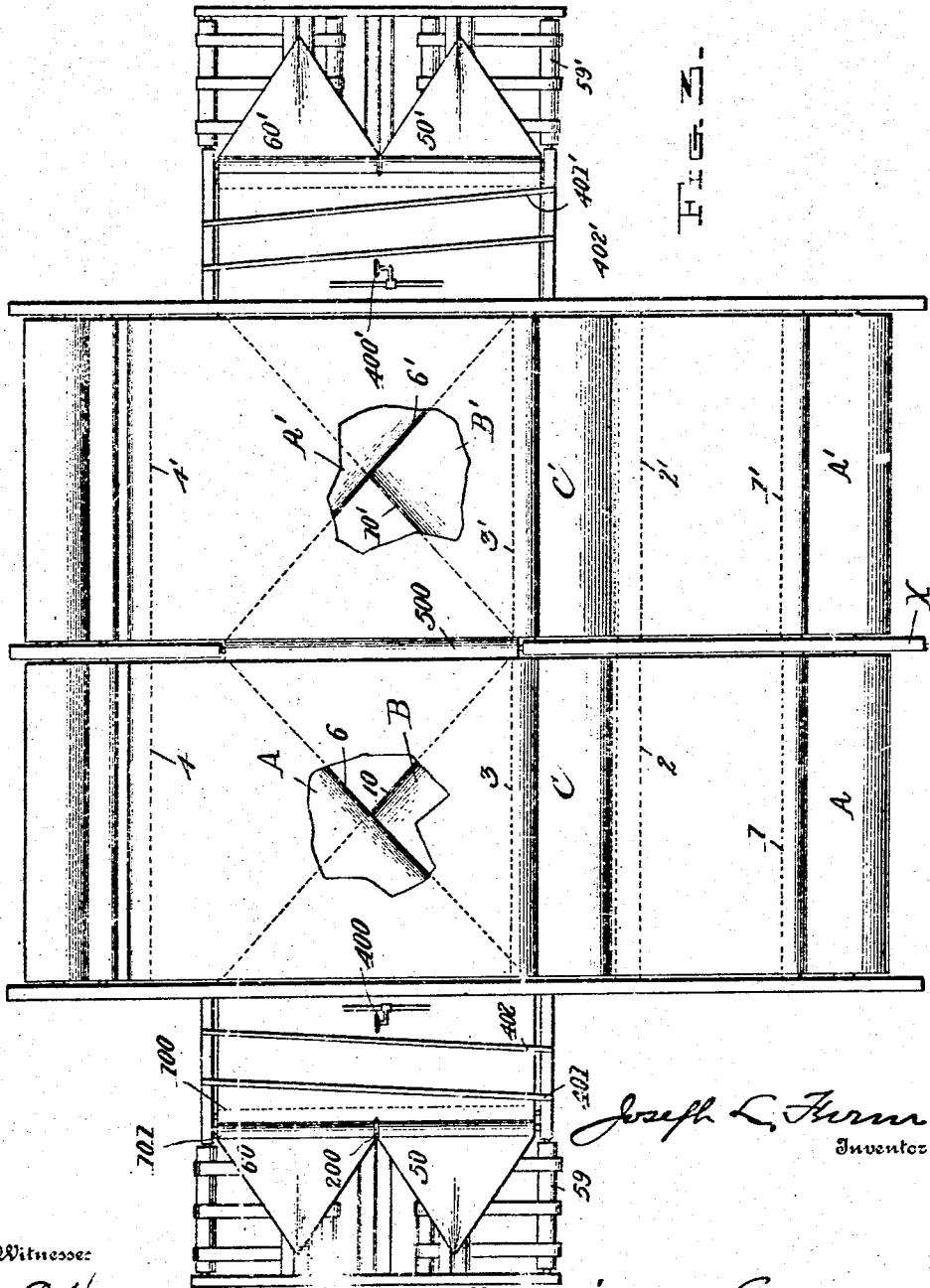


FIG. 3.

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4 SHEETS—SHEET 4.

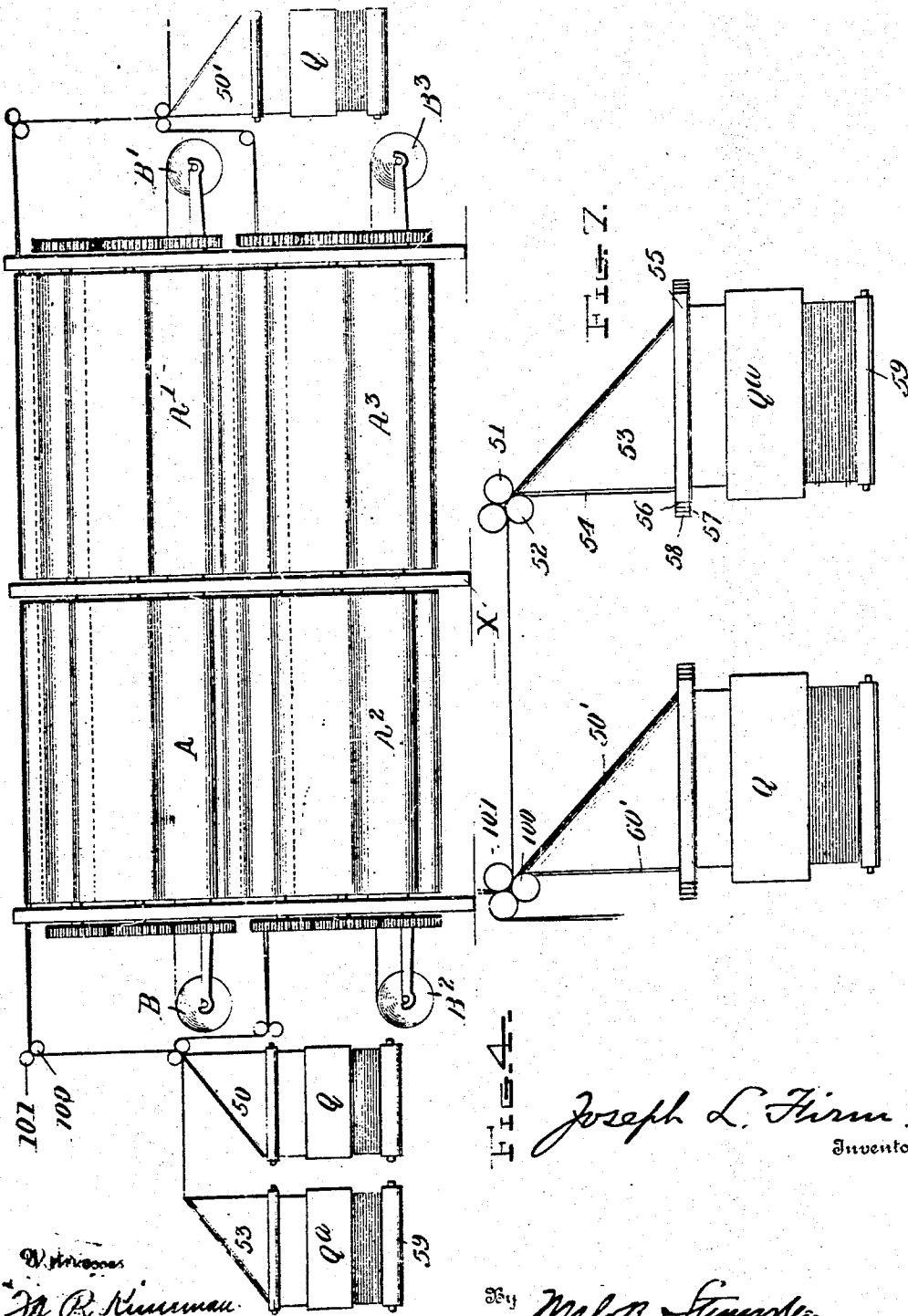


FIG. 4.

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UNITED STATES PATENT OFFICE.

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PRINTING-MACHINE.

938,046.

Specification of Letters Patent.

Patented Oct. 26, 1909.

Application filed February 23, 1907. Serial No. 358,391.

To all whom it may concern:

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

This invention is a dual printing machine of the web-perfecting type, embodying four double printing couples arranged in two sets or parts side by side, each couple consisting of two form and four impression cylinders in the same plane, the couples being superposed in each set or part, and the axes of the cylinders of the respective sets being concentric or in line with each other. The machine will print webs from eight rolls of paper and longitudinally fold, cut, and transversely fold the same simultaneously, or at one operation.

A feature of the invention is that one set or part of the mechanism may be run without the other; or part of one or both may be run with or without the other.

A further especial feature of the invention is that the webs can be associated from one set or part across to the other, to insure or vary the products as desired or required. This optional cross association from one part of the machine to the other affords means for an almost unlimited variation of the product, up to thirty-two pages.

Another feature of the invention is the economizing of space and cost, by bringing a printing mechanism of large capacity into a compact form, having less folding carriers than would otherwise be the case, and also increasing the output.

The machine is illustrated in the accompanying drawings, in which—

Figure 1 is a diagrammatic elevation of one side of the press, the folders and carriers being omitted. Figs. 2 and 2^a are diagrams illustrating one association of the webs. Fig. 2^b is a diagram illustrating the cross-over. Fig. 3 is a plan view of the machine. Fig. 4 is a front end elevation. Fig. 5 is a detail of a cutter and turning bars. Fig. 6 is a detail illustrating an adjustment for registering. Fig. 7 is a detail showing a set of extra longitudinal folders and carriers.

As shown in Figs. 3 and 4, it will be seen that the machine consists of two duplicate

or similar parts or sides, separated by the middle frame X of the machine. The products from each part may be delivered at the corresponding ends of the machine, or the product from one side, or part thereof, may be crossed over through the middle frame X and associated and delivered with the products from the other side, as hereinafter explained. A description of the construction and operation of one side will be sufficient for both, the webs of one side being indicated by A, B, A² and B², and the webs of the other side being indicated by the letters A', B' and A², B².

Referring particularly to Fig. 1, the run of the webs may be traced as follows: The web A passes from its roll, which is located at the front of the machine, over the rollers 1 and 2 to impression cylinder C and form cylinder D, and printed on one side, and thence over the rollers 3 and 4, to impression cylinder E, and printed on its reverse side by form cylinder F, thence over the roller 5, and turning bar 6, between rollers 7 and 8, thence between rollers 100, and 101, where it meets the web B (see Fig. 2). This web passes from its roll at the side of the machine, over the roller 9, and turning bar 10, thence under the roller 11, to impression cylinder G, and printed upon by form cylinder D, thence under the roller 12, to impression cylinder H, and printed upon its reverse side by form cylinder F, thence over the rollers 13, the turning bar 14, under the web B, and through the end of the machine to the rollers 102 and 103, where it meets the web A, between the rollers 100 and 101, and thence to the longitudinal folders 50 and 60. The web A² for the lower printing couple passes from its roll at the front end of the machine over the rollers 15 and 16, to impression cylinder I, and is printed upon by form cylinder J, thence over the rollers 17 and 18, to impression cylinder K, and is printed upon its reverse side by form cylinder L, thence over the roller 19, and turning bar 20, and under the rollers 104 and 105, where it is associated with the webs A and B, at the rollers 100 and 101. The web B² passes from its roll at the side of the machine over the roller 23, and turning bar 24, thence under the roller 25, to impression cylinder M, and is printed upon by form cylinder J, thence under the roller 26, to im-

pression cylinder N, and is printed upon its reverse side by form cylinder L, thence over the roller 27, and over the turning bar 28, thence out and under the rollers 106 and 107, where it meets the webs A, B and A², and is associated between the rollers 100 and 101, and all pass thence to the longitudinal folders 50 and 60, making four copies of sixteen page papers, in delivery form, after being slitted by the slit 200.

It will be understood that the above description relates to the webs printed at one side of the machine. The webs A', B', A² and B², printed at the other side of the machine, follow the same relative course through the corresponding printing mechanisms. The elements of each are duplicates of those described and are primed to distinguish the same, said webs being finally delivered over the longitudinal folders 50' and 60' at the side of the machine opposite to the folders 50 and 60. This will give four more copies of sixteen page papers in form, making a total capacity, by the arrangement described, of eight copies of sixteen page papers at each operation.

Various modifications of the product may be made, and I will explain how said products are modified on one side (the left side, referring to the drawings), the products from the other side being duplicates by corresponding arrangements of the webs and devices therein. Thus, in making ten page papers I use two full width webs A and B, and a half width web A², giving, with corresponding webs A', B', and A², four copies at each side of the press. The webs B² and B³, and impression cylinders M and N, are not used. In making twelve pages I use the webs A, B and A², all full width. As before, the webs B², B³, and impression cylinders M and N, are not used. In making fourteen pages, I prefer to use the folder side of the press and only one of the longitudinal folders is used on each side of the press. I use two half width webs A and B, and a three-fourths width web A², which is slit by the slit 400 (Fig. 3) and the two page part is turned over the bars 401 and 402 (Fig. 5) making a six page portion associated with the eight page portion from the webs A and B. In making eighteen pages I use three one-half width webs A, B and A², and one three-fourths width web B², slitted and associated similarly. In making twenty pages I use two half-width webs A and B, and two three-fourths width webs A² and B². In making twenty-two pages I use a one-half width web A, and three three-fourths webs B, A² and B². In making twenty-four pages I use three full width webs A, B and A², slitted by the slit 400, and turned over the bars 401 and 402. In making thirty-two pages I use all the webs, slitting them and turning them over the bars 401 and 402, and

associating and folding them over one longitudinal folder 50.

The manner of associating the webs on one side and across the frame of the press from one side to the other will now be explained. Located in the middle frame X are four rollers 500, over which the webs from one side, say A', B', A² and B², pass from one side to the other, and associated with the webs A, B, A² and B², respectively. Also where eight copies are wanted an extra set of longitudinal folders and carriers are used, as shown in Fig. 7, at one side of the press, the folders and carriers at the other side being idle, as will be understood, when the webs are crossed from one part to the other. And with respect to the capacities herein-after mentioned, as well as those heretofore referred to, the transverse folders and carriers Q and Q² are assumed to be those described and claimed in my pending application, Serial Number 354101, each of which will cut and fold transversely two copies at each revolution. In making ten pages I cross over with the half width web A', of four pages and associate it in the center of the full width webs A and B, then I cross over with the half width web A², and associate it with the webs A² and B², giving eight copies of ten page papers. The webs B' and B² are not used. In making twelve pages I use full width webs A, B and A² and B², and cross over and associate therewith the webs A' and A², making eight copies of twelve pages. The webs B' and B³ are not used. In making fourteen page papers I use the full width webs A and B, A² and B², and cross over and associate therewith three-fourths width webs A' and A², giving eight copies of fourteen page papers. In making sixteen page papers I use all full width webs A, B, A² and B², and cross over with the full width webs A', B' and A² and B², giving eight copies of sixteen page papers at one side of the machine. In making eighteen page papers I use the webs A and B, and cross over with the webs A', and a three-fourths width web B'; then the webs A² and B², and cross over with the web A² and three-fourths width web B², giving eight copies of eighteen page papers at one side. In making twenty page papers I use the full width web A, and B, cross over with three-fourths width webs A' and B'; then the webs A² and B², full width, and the crossed over webs A² and B², of three-fourths width, giving eight copies of twenty page papers. In making twenty-two pages I use the full width webs A, B, A² and B², and cross over with three-fourths webs A' and B', giving four copies of twenty-two pages. I do not then use the lower printing mechanism at the right hand side of the machine, as it may be silenced by withdrawing the gear between the upper and lower decks. In making

twenty-four page papers I use the full width webs A, B, A² and B², and cross over with the full width webs A' and B', giving four copies of twenty-four page papers. In making thirty-two pages I use all full width webs, crossing over those on one side to the other and associate, cut and fold, giving four copies of thirty-two pages.

It is to be understood that a set of longitudinal folders and extra carrier will be used where eight copies are wanted, as shown in Fig. 7, the capacity of the folder being four copies for each carrier. As the webs cross from one printing mechanism to the other, the one at the right hand being idle, the extra carrier and folders are used instead.

Fig. 6 is a detail view of means for registering the webs. The rollers a¹ can shorten or lengthen the webs by moving the crank a², which has a fulcrum at a³, around the roller a³, which is stationary. These means can be applied at any or all of the pairs of rollers 7, 8; 102, 103, etc.

In Fig. 7, and also at the left end in Fig. 4, I show a view of the extra folder in front of longitudinal folders 50 and 60. This folder is used when eight or more copies are required. The webs pass between the rollers 100 and 101, as before, thence the upper webs pass between rollers 51 and 52, thence to the longitudinal folders 53 and 54, and between the rollers 55 and 56, 57 and 58, to the extra cutting and folding carrier Q^a, thence to the rotary fly 59. The lower webs pass down the longitudinal folders 50 and 60, as ordinary. The webs having passed through the printing mechanism, before passing over the longitudinal folders 50 and 60, are slit by the slit 200, one-half of the slit web passes over the longitudinal folder 50 and the other over the folder 60, and thence to the transverse folding, cutting and delivery mechanism Q. It is to be understood that when making papers of over fourteen pages only one of the longitudinal folders 50 and 60, and 50' and 60', are used on each side.

Fig. 3 shows the turning bars 6, 10, 6' and 10' in position to deliver the products to the right and left sides of the press respectively. When the products are to be crossed over and delivered all at one side of the press, the turning bars referred to have to be reversed, that is, placed on the opposite diagonal, in one part or set of the machine, so that, say, the webs A', B', A² and B², instead of being delivered at that side of the press, are turned in the opposite direction and passed over the rollers 500 to association with the corresponding web on the other side of the press. This association is illustrated diagrammatically in Fig. 2^b.

I claim:

1. In a printing machine, in combination,

two sets of web-perfecting printing mechanisms arranged side by side, with cylinders in the respective sets in line axially, and web rolls feeding in at both the front and the outer sides of the mechanisms, means to deliver the products from the outer sides of each set respectively, and means to optionally associate and deliver the products from both sets together, at the outer side of one set.

2. In a printing machine, in combination, two sets of web-perfecting printing mechanisms arranged side by side, each set having a plurality of printing couples, with the cylinders of the couples of the respective sets in line axially, means to feed webs from a plurality of rolls into the front and the outer sides of the respective sets, means to associate and deliver the product from each set separately at the outer side thereof, and means to optionally cross over the product from one set and associate and deliver the same with the product from the other set.

3. In a printing machine, in combination, two sets of web-perfecting printing mechanisms arranged side by side, with cylinders in one set arranged endwise with respect to cylinders in the other set, and means to cross over and deliver the product of one set through the frame of both sets and with the product of the other, including turning bars located between the cylinders of the respective sets, under the line of web travel therebetween.

4. In a printing machine, in combination, two sets of web-perfecting printing mechanisms in the same frame, each set having a plurality of printing couples arranged one above the other, with cylinders in the respective sets in endwise relation to each other, means to feed a plurality of webs to the couples and means to cross over, associate and deliver the webs from the couples of one set through the frame of both sets and with the corresponding webs from the corresponding couples of the other set.

5. In a printing machine, in combination, two sets of web-perfecting printing mechanisms arranged side by side in the same frame, with cylinders in the respective sets in line axially with each other, associating, folding and delivering mechanisms for the product of each set, at opposite sides of the machine, auxiliary folding and delivering mechanisms at one side of the machine, and means to cross over the product of one set through the frame to the side having the said auxiliary mechanisms.

6. In a printing machine, in combination, four double printing couples arranged in two sets standing closely side by side with cylinders of the respective sets in line axially, each couple consisting of two form and four impression cylinders in the same plane, the couples being superposed in each

set, means to associate and deliver the product of the couples of each set from the outer side of each set respectively, and means to optionally cross over, associate and deliver
5 the product of the couples of one set with the product of the corresponding couples of the other set.

In testimony whereof I affix my signature,
in presence of two witnesses.

JOSEPH L. FIRM.

Witnesses:

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