No. 752,807. PATENTED FEB. 23, 1904.

W. SPALCKHAVER.

WEB PRINTING MACHINE.

APPLICATION FILED JULY 19, 1902.

NO MODEL. 5 SHEETS—SHEET 1.

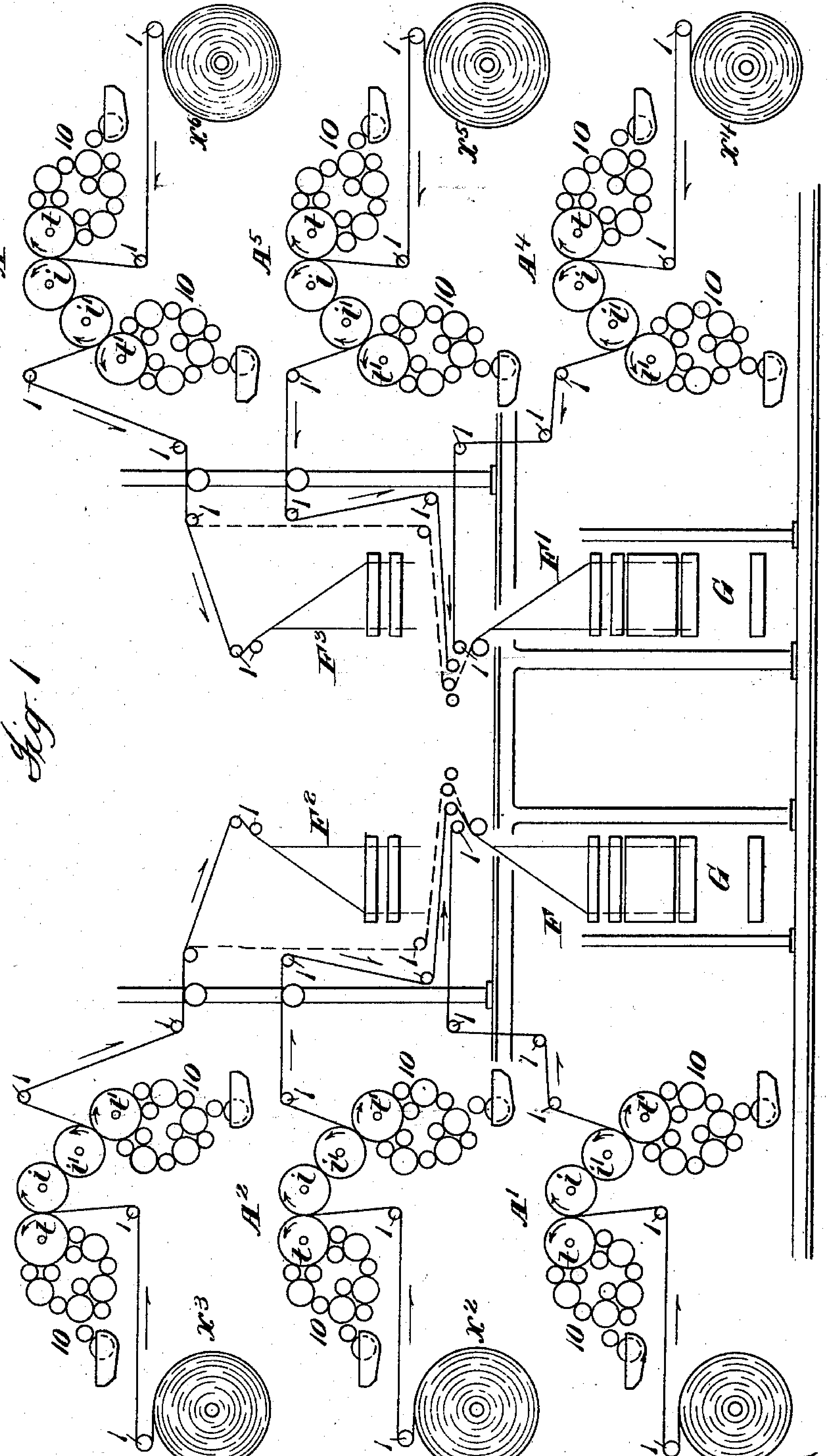

Fig. 1

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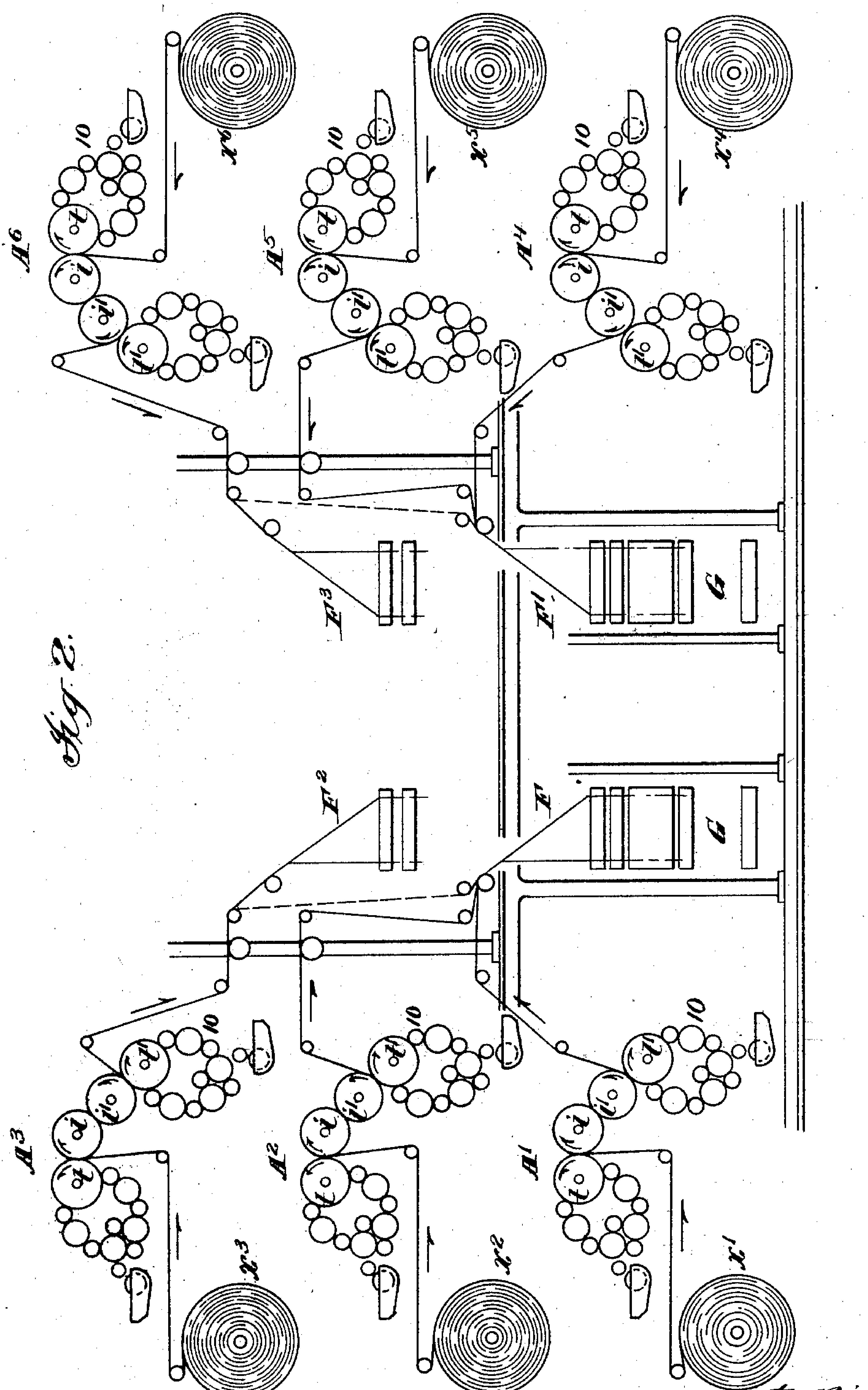
NO MODEL. 5 SHEETS—SHEET 2.

Fig. 2.



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NO MODEL. 5 SHEETS—SHEET 3.

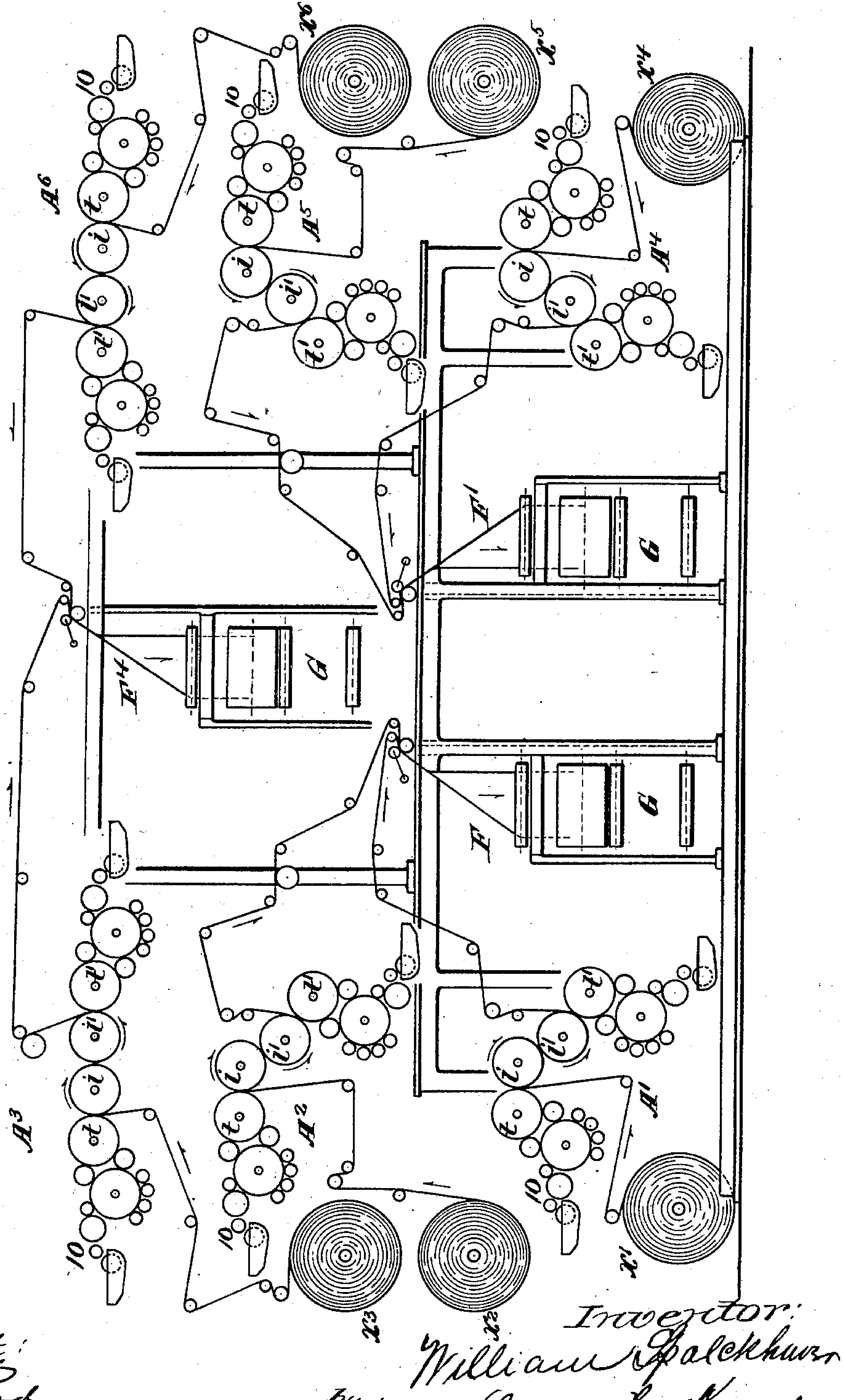

Fig. 3.

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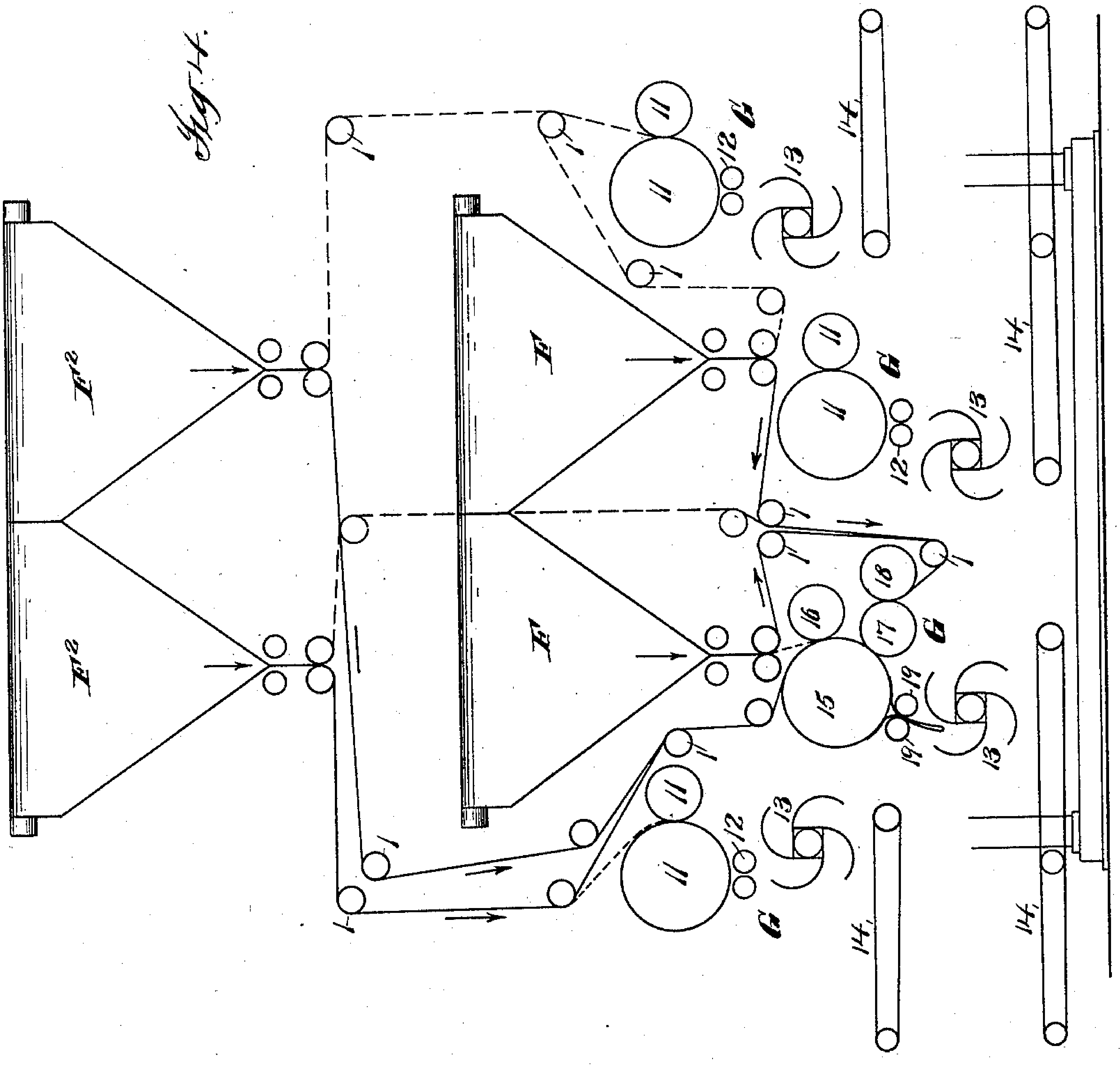
Fig. 4.



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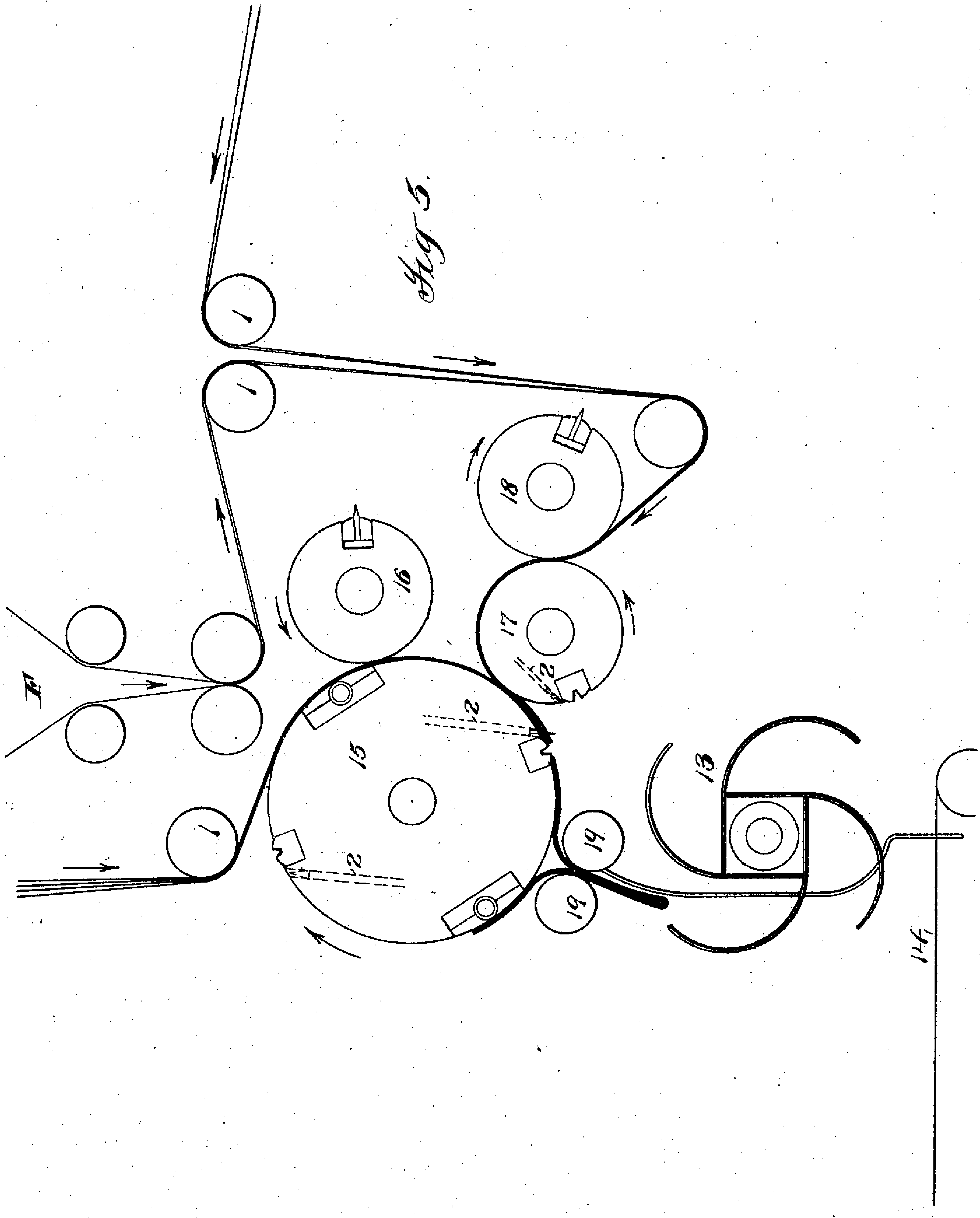
APPLICATION FILED JULY 19, 1902.

NO MODEL. 5 SHEETS—SHEET 5.

Fig. 5.



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No. 752,807. Patented February 23, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM SPALCKHAVER, OF BROOKLYN, NEW YORK, ASSIGNOR TO ROBERT HOE, OF NEW YORK, N. Y.

WEB-PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 752,807, dated February 23, 1904.

Application filed July 19, 1902. Serial No. 116,159. (No model.)

To all whom it may concern:

Be it known that I, William Spalckhaver, a citizen of the United States, residing at borough of Brooklyn, city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Web-Printing Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to an improved web-printing machine for printing a plurality of webs simultaneously, the especial object of the invention being to provide a compact high-speed machine with direct and short runs of the webs which shall be capable of producing a large variety of products delivered at convenient points while providing for the most convenient access of the attendants to all the printing, inking, and delivery mechanisms for the various purposes involved in web printing.

For a full understanding of the invention a detailed description of constructions, embodying the same in preferred forms, will now be given in connection with the accompanying drawings, forming a part of this specification, and the features forming the invention will then be specifically pointed out in the claims.

In the drawings, Figure 1 is a diagrammatic side elevation of a press having six perfecting mechanisms with the delivery mechanisms arranged in the preferred manner. Fig. 2 is a similar view showing a different arrangement of the delivery mechanisms. Fig. 3 shows another modification. Fig. 4 shows the preferred form of folding and delivery mechanisms for double-wide presses such as shown in Figs. 1 and 2. Fig. 5 is an enlarged detail of a portion of Fig. 4.

Referring now especially to Fig. 1, there are shown six printing mechanisms, each adapted to print and perfect a web, these printing mechanisms A', A^2, A^3, A^4, A^5, and A^6 being arranged with three printing mechanisms at each end of the press, having the first and second pairs of type and impression cylinders lettered, respectively, $t\ t'$ and $i\ i'$, and inking mechanisms 10, which may be of any suitable form. The printing mechanisms at both ends of the press are arranged with their cylinders parallel and in line—that is, in the same vertical planes longitudinally of the press—and between the printing mechanisms in the same vertical planes with the cylinders are arranged four delivery mechanisms having longitudinal folders $F\ F'\ F^2\ F^3$, which longitudinal folders are arranged with two folders $F\ F'$ on the lower-floor level between the printing mechanisms $A'\ A^4$ and two folders $F^2\ F^3$ above and in line with the folders $F\ F'$ and between the upper printing mechanisms. The longitudinal folders on the same level are arranged back to back—that is, with their folding inclines pointing in opposite directions and toward the end of the press next which they are respectively placed, and the longitudinal folders deliver to folding and delivery mechanisms below the folders $F\ F'$, which are preferably of the form described hereinafter, and are shown only diagrammatically in Fig. 1. The press, therefore, is a straight-line press throughout from the printing mechanisms to the longitudinal folders, so that the respective webs x', x^2, x^3, x^4, x^5, and x^6 from their web-rolls have direct and short runs through the printing mechanisms to the longitudinal folders at the center of the press.

The press shown in Fig. 1 is preferably a double-wide press, and delivery mechanism is preferably used by which the products of all the printing mechanisms or of more or less of the printing mechanisms, as desired, may be combined into a single product or the products of the different printing mechanisms delivered separately at convenient points on the same floor-level. The preferred form of this mechanism, which in itself includes certain features of the invention, is shown in end elevation in Fig. 4 and a portion thereof in detail in Fig. 5.

Referring now particularly to Figs. 4 and 5, which show the delivery mechanism for longitudinal folders $F\ F^2$ at one end of the press, each of these four folders of the double wide press is provided with a delivery mechanism G, which, except in case of one of the lower folders F, is shown as of the common form, including a pair of cutting, folding, and collecting cylinders 11, folding-rolls 12, to which the sheets are folded from cylinders 11, and **S**-fly 13, receiving the folded sheets and delivering them to the usual delivery-tapes 14. The deliveries G for the lower longitudinal folders F F are arranged directly below these cylinders, as usual, and the deliveries G for the upper longitudinal folders F^2 are arranged outside and preferably a little above the deliveries G G for the longitudinal folders F F, so as to bring the products of all four folders, when such products are delivered separately, to approximately the same level and into the most convenient position for delivery. The guide-rollers 1 are provided for guiding the folded webs from the upper folders F^2 down to their respective deliveries G G, for separate delivery, and for guiding these webs for combination with each other or with the webs from folders F F, as desired. This arrangement secures important advantages as compared with constructions in which the cutting and delivery mechanism or the cutting mechanism for the upper folders is between the upper and lower folders, the principal advantages being that the distance between the upper and lower folders may be reduced. The change from separate delivery of sheets from the upper webs to the association of the upper with the lower webs is very convenient, and sheets from the upper folders may be delivered at or near the level of sheets from the lower folders without the long and objectionable feed of sheets, which is required if the sheets from the upper webs are severed above the lower folders and then brought down to a low delivery.

In cutting and delivering thick products formed of many sheets, as in case the webs from all of the six printing mechanisms are associated, difficulty is experienced in cutting and associating the sheets forming the product, so that it is desirable to cut sheets from the associated webs and then associate these sheets, thus avoiding the cutting of sheets from so large a number of associated webs. For this purpose one of the delivery mechanisms G for the folders F is preferably constructed, as follows, as shown in Fig. 4 and in detail in Fig. 5. This delivery mechanism G consists of a large cutting and folding cylinder 15, having two sets of the usual pins 2 for taking the sheets and coacting with the cutting-cylinder 16, by which the sheets are severed, these two cylinders receiving directly the webs from two of the folders, which may be the two upper folders F^2 or the lower and upper folders on one side of the press and a second pair of cylinders 17 18, cylinder 17 having the usual pins 2, and these cylinders being provided with the usual cutting-blade and groove, which receive the webs from the other folders whose product is not delivered directly to the cylinders 15 and 16, and these cylinders 17 18 sever sheets and deliver them to the cylinder 15, so as to be taken by the pins 2 of cylinder 15 with the sheets that are severed by cylinders 15 and 16 and folded off from cylinder 15 by the usual folding-blade through the folding-rolls 19 to **S**-fly 13, and thus delivered to the tapes 14.

As shown in full lines in Fig. 1, all the printing mechanisms are in use so as to perfect six webs, webs x' x^2 and x^4 x^5 being combined and delivered to the bottom folders F F' and the webs x^3 x^6 from the top printing mechanisms passing to the upper folders F F^3 and then being combined with the products from folders F F'. Figs. 4 and 5 show how the upper and lower webs are combined, only single webs on folders F F being shown, however, instead of two webs, as in Fig. 1. In this lead of the webs the folded webs from folders F^2 are combined by being led to the left over guide-rolls 1, and thus down to the cylinders 15 16, so as to be cut thereby and taken by the pins 2 of the cylinder 15, and the webs from the two folders F are led in toward each other and then downward around guide-rolls 1, and thus to cylinders 17 18, by which the sheets are severed from these webs, and the leading ends of the sheets transferred from pins 2 of cylinder 17 to pins 2 of cylinder 15, so as to be taken with the sheets on cylinder 15 from folders F^2, and the combined product folded off to **S**-fly 13 and delivered to tapes 14. Double-wide webs x' x^2 x^3 are thus combined into a single product of twenty-four pages, and in the same manner the webs x^4 x^5 x^6 are combined, the product of the press with all six mechanisms in use thus being two twenty-four-page papers or two sixteen-page papers if only two printing mechanisms at each end of the press be used, as shown in Figs. 4 and 5.

It will be understood that various products may be secured by using less than the whole number of the printing mechanisms and by combining the products of the printing mechanisms as desired and that any of the printing mechanisms may be thrown out of operation without interfering with the other mechanisms. If desired, for certain products the webs x^3 x^6 may be led downward to folders F F' and combined directly with one or more of the webs x' x^3 on these folders instead of being led to the folders F^2 F^3, or one or more of the webs from either end of the press may be led to the other end and combined with the webs at that end, so that all or any number of the webs may pass to a single folder. There is shown in dotted lines in Figs. 1 and 2 the lead of the webs x^3 x^6 directly to the lower folders. The lead of the webs from one end of the press to the other end for the delivery of all the webs at one end of the press either by the lower folders alone or divided between the upper and lower folders will be understood without illustration.

It will be understood that in the double-web press shown the products at each end of the cylinders may be delivered separately, the web from each end of a cylinder being delivered by its own delivery mechanism or the webs from the upper and lower folders corresponding to the opposite ends of the cylinders being combined, so as to be delivered by either the inner or outer folding mechanisms at opposite sides of the press. There is shown in dotted lines in Fig. 4 the lead of the webs from the right-hand folders F F^2, so as to be combined and delivered by the upper right-hand delivery G, and the webs from the left-hand folders F F^2 may be combined in the same manner and delivered by the upper left-hand delivery G, or these pairs of webs may obviously be led so as to be combined and delivered by the inner deliveries G. By thus combining the upper and lower webs on each side of a double-wide press it will be seen that each end of the press shown with three printing mechanisms perfecting three webs will deliver two twelve-page papers, the total product of the press being four twelve-page papers. The web from one or both of the upper folders F^2 may be led downward between the folders F F to the lower delivery mechanisms, as also indicated in dotted lines in Fig. 4, which may be found desirable in some cases.

It will be seen that each of the pairs of lower and upper longitudinal folders F F^2 (shown in Figs. 4 and 5) with their delivery mechanisms form complete deliveries for the opposite ends of the cylinders, so that the construction shown in Fig. 1 with one pair of such folders and deliveries forms a complete single-wide press by which a twelve-page paper may be produced at each end of the press or different products of a less number of pages, or the webs from the two ends of the press may be led together to form a twenty-four-page paper with a single-wide press.

The delivery mechanisms are preferably arranged as shown in Fig. 1, above described, with their longitudinal folders arranged back to back, and certain features of the invention are limited to such arrangement. Within the broader features of the invention, however, the delivery mechanisms may be arranged with the folders facing each other, suitable guides being used for the combined or separate delivery of the webs to such folders for the various products. Such a construction is shown in Fig. 2, in which the press is or may be substantially the same otherwise as in Fig. 1; but the lower folders F F' and the upper folders F^2 F^3 are arranged facing each other—that is, with their inclines facing inward toward the center of the press. It will be understood that in this construction also the delivery mechanism may be of the same character as shown in Figs. 4 and 5 and the upper webs x^3 x^6 be led to the upper folders F^2 F^3 and then downward for joint or separate delivery by the outside delivery mechanism or mechanisms G or combined with the webs on the lower folders F F' for delivery with the latter, as described above in connection with Fig. 1.

The invention includes also a press construction in which a single folding and delivery mechanism is arranged above the two lower delivery mechanisms, this folding and delivery mechanism being preferably arranged over the space between the lower delivery mechanisms. Such a construction is shown in Fig. 3, in which the upper webs, or, if it be desired, some of the lower webs also, may be led to the upper longitudinal folder F^4 and thence to the upper delivery mechanism G. As illustrated in this figure, the two upper webs x^3 and x^6 are combined and led to the upper folder F^4, to be delivered together, and webs x' x^2 and x^4 x^5 at opposite ends of the press are combined and led to the respective folders F F', three eight-page papers thus being produced or six eight-page papers in a double-wide press, or the webs from the opposite ends of the cylinders may be combined as described in connection with Fig. 1, producing three sixteen-page papers delivered separately. It is obvious that with this construction also larger products may be produced by further combination of the webs, as described in connection with Figs. 1, 4, and 5.

It will be understood that the invention is not limited to the specific construction or arrangement of any of the presses shown nor to the number of printing mechanisms arranged at each end of the press, as the constructions illustrated may be varied without departing from the invention.

What I claim is—

1. The combination with a plurality of double-wide web-printing mechanisms at each end of a press arranged with their cylinders parallel and in line and with the printing mechanisms at the same end of the press arranged one above the other, of four folding and delivery mechanisms for each side of the double-wide press arranged in line with and between the printing mechanisms at the opposite ends of the press, two of said folding and delivery mechanisms for each side of the press being arranged between the lower printing mechanisms and the other two folding and delivery mechanisms for each side of the press being arranged above and in the same vertical planes transverse to the press with the lower folding and delivery mechanisms, and means for directing the webs from the folders at opposite sides of the press to their respective deliveries, or associating the webs on opposite sides of the press for delivery as a single product by one of the delivery mechanisms, or dividing them between two or more of the delivery mechanisms.

2. The combination with a plurality of double-wide web-printing mechanisms at each end of a press arranged with their cylinders par-

allel and in line and with the printing mechanisms at the same end of the press arranged one above the other, of four folding and delivery mechanisms for each side of the double-wide press arranged in line with and between the printing mechanisms at the opposite ends of the press, two of said folding and delivery mechanisms for each side of the press being arranged between the lower printing mechanisms and the other two folding and delivery mechanisms for each side of the press being arranged above and in the same vertical planes transverse to the press with the lower folding and delivery mechanisms, and means for directing the webs from the folders at opposite sides of the press to their respective deliveries, or associating the webs on opposite sides of the press for delivery as a single product by one of the delivery mechanisms, or dividing them between two or more of the delivery mechanisms, one of the delivery mechanisms for combined products having a folding-cylinder and cutting-cylinder coacting therewith to sever sheets from a part of the webs and a second pair of cutting-cylinders arranged to sever sheets from the other part of the webs to be combined and to transfer the cut sheets to the folding-cylinder for folding with the sheets cut thereon.

3. The combination with a plurality of double-wide web-printing mechanisms at each end of the press arranged one above the other with their cylinders parallel and in line, of a plurality of folding and delivery mechanisms for each side of the double-wide press arranged in line with and between said printing mechanisms, two of said folding and delivery mechanisms being arranged between the lower printing mechanisms and two of said folding and delivery mechanisms being arranged above the lower folding and delivery mechanisms, and means for directing the webs from the folders at opposite sides of the press to their respective deliveries on their own side of the press, or associating the webs on opposite sides of the press for delivery as a single product by one of the delivery mechanisms, or dividing them between two or more of the delivery mechanisms.

4. The combination with a plurality of double-wide web-printing mechanisms arranged one above the other with their cylinders parallel and in line, of two folding and delivery mechanisms for each side of the double-wide press arranged in line with said printing mechanisms, two of said folding and delivery mechanisms being arranged opposite the lower printing mechanisms and the other two folding and delivery mechanisms being arranged above the lower folding and delivery mechanisms, and means for directing the webs from the folders at opposite sides of the press to their respective deliveries, or associating the webs on opposite sides of the press for delivery as a single product by one of the delivery mechanisms, or dividing them between two or more of the delivery mechanisms, one of the delivery mechanisms for combined products having a folding-cylinder and cutting-cylinder coacting therewith to sever sheets from a part of the webs and a second pair of cutting-cylinders arranged to sever sheets from the other part of the webs to be combined and to transfer the cut sheets to the folding cylinder for folding with the sheets cut thereon.

5. The combination with a plurality of double-wide web-printing mechanisms at each end of a press arranged with their cylinders parallel and in line and with the printing mechanisms at the same end of the press arranged one above the other, of two folding and delivery mechanisms for each side of the double-wide press arranged in line with and between the lower printing mechanisms at the opposite ends of the press, and one or more folding and delivery mechanisms for each side of the double-wide press arranged above said lower folding and delivery mechanisms and in line with and between the printing mechanisms at the opposite ends of the press, and means for directing the webs from the folders at opposite sides of the press to their respective deliveries, or associating the webs on opposite sides of the press for delivery as a single product by one of the delivery mechanisms, or dividing them between two or more of the delivery mechanisms.

6. The combination with the lower folders F, F arranged side by side and their delivery mechanisms G, G, of folders F^2, F^2 arranged side by side above said folders F, F, and sheet cutting and delivery mechanisms G, G for said folders F^2, F^2 arranged above and on opposite sides of the delivery mechanisms for folders F, F, and below the tops of the folders F, F, substantially as described.

7. The combination with the lower folders F, F arranged side by side and their delivery mechanisms G, G, of folders F^2, F^2 arranged side by side above said folders F, F, sheet cutting and delivery mechanisms G, G for said folders F^2, F^2 arranged above and on opposite sides of the delivery mechanisms for folders F, F, and below the tops of the folders F, F and guides for directing the webs to a single-delivery mechanism or dividing them among some or all of said mechanisms, substantially as described.

8. The combination with the lower folders F, F arranged side by side and their delivery mechanisms G, G, of folders F^2, F^2 arranged side by side above said folders F, F, delivery mechanisms G, G for said folders F^2, F^2 arranged above and on opposite sides of the delivery mechanisms for folders F, F, and below the tops of the folders F, F and guides for directing the webs to a single-delivery mechanism or dividing them among some or all of said mechanisms, one of said delivery mechanisms for a combined product having a

folding-cylinder and cutting-cylinder coacting therewith to sever sheets from a part of the webs and a second pair of cutting-cylinders arranged to sever sheets from the other part of the webs to be combined and to transfer the cut sheets to the folding-cylinder for folding with the sheets cut thereon, substantially as described.

9. The combination with the lower folder F and its delivery mechanism G, of folder F^2 above said folder F, sheet cutting and delivery mechanism G for said folder F^2 arranged above and on one side of the delivery mechanism for folder F and below the top of the folder F, and guides for directing the webs from the two folders to a single-delivery mechanism, or dividing them between the delivery mechanisms, substantially as described.

10. The combination with the lower folders F, F arranged side by side and their delivery mechanisms G, G, of folder F^2 arranged above said folders F, F, cutting and delivery mechanism G for said folder F^2 arranged above and on one side of the delivery mechanisms for folders F, F and below the tops of folders F, F, and guides for directing the webs from the three folders to a single-delivery mechanism or dividing them among some or all of said mechanisms, substantially as described.

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

WILLIAM SPALCKHAVER.

Witnesses:

T. F. KEHOE,

C. J. SAWYER.