

No. 679,191.

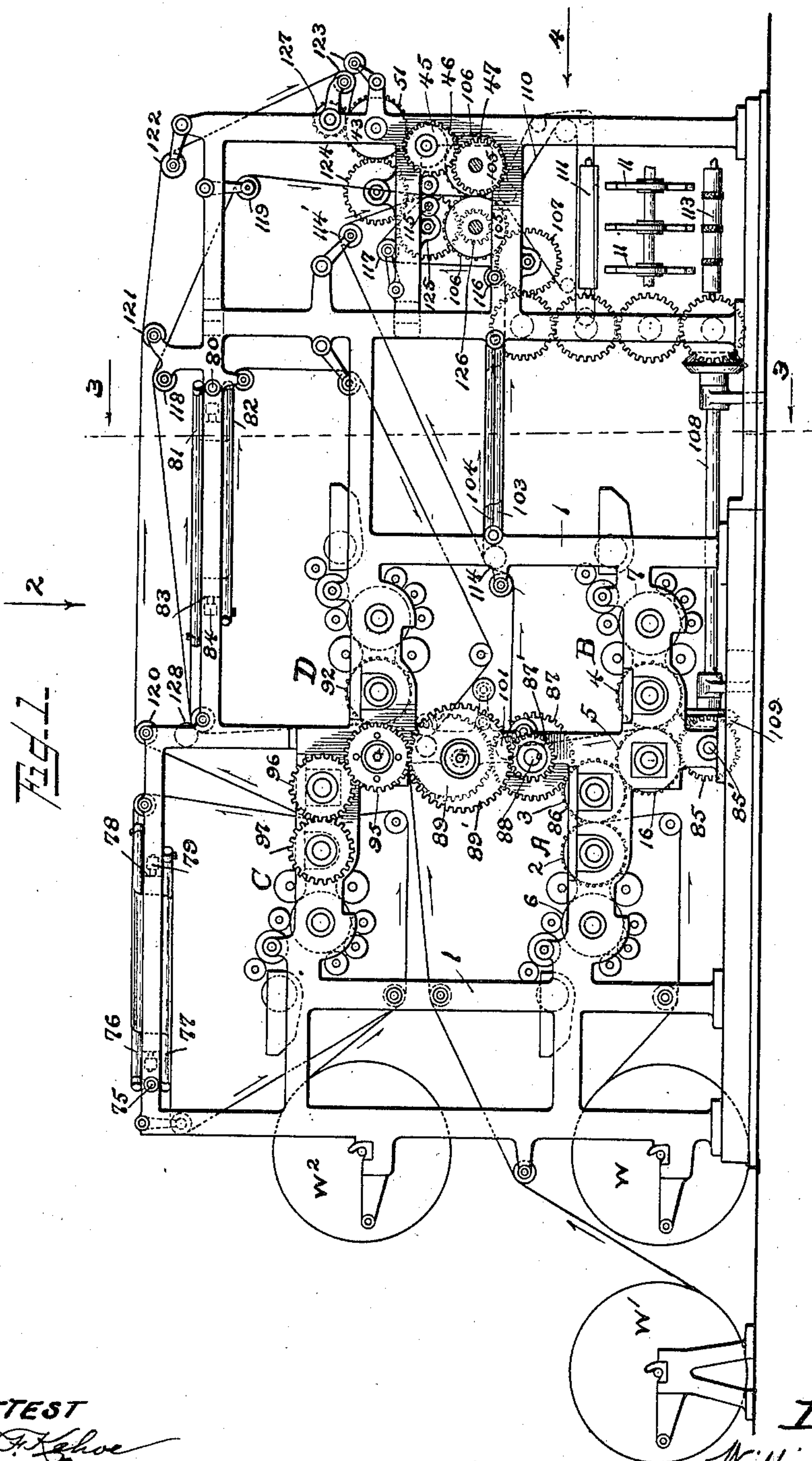
Patented July 23, 1901.

W. SPALCKHAVER.
ROTARY PRINTING MACHINE.

(Application filed Nov. 12, 1900.)

(No Model.)

6 Sheets—Sheet 1.



ATTEST

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J. A. Travers

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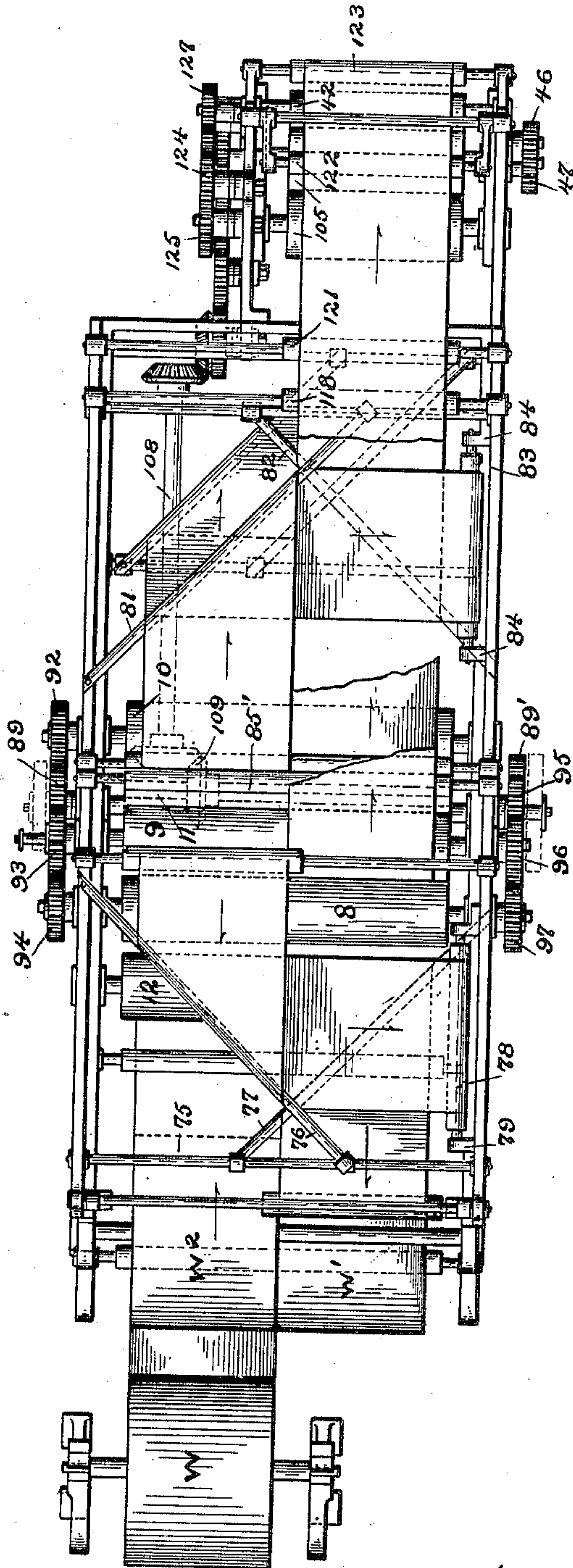
W. SPALCKHAVER.
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6 Sheets—Sheet 2.

Fig. 2.



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6 Sheets—Sheet 3.

Fig. 4.

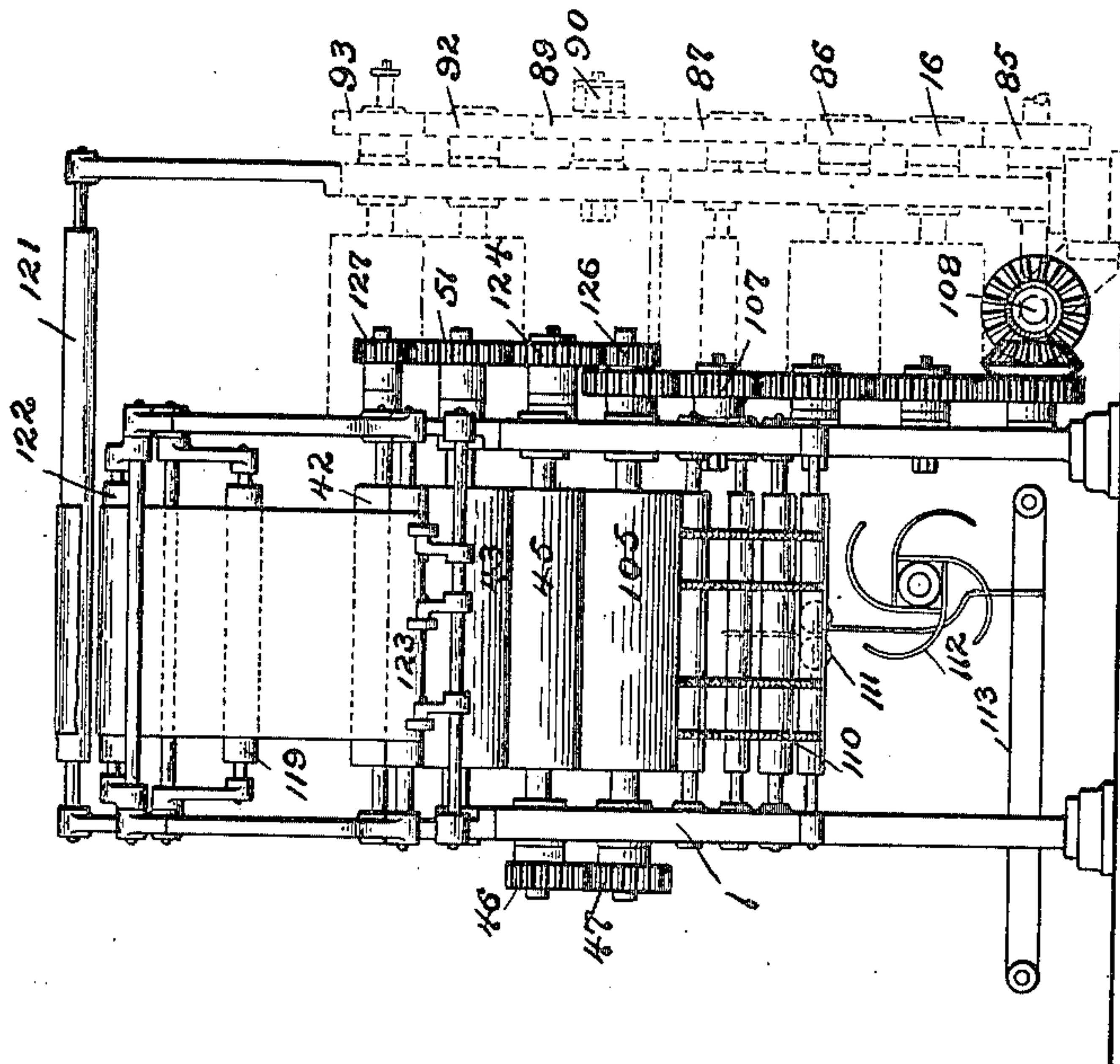
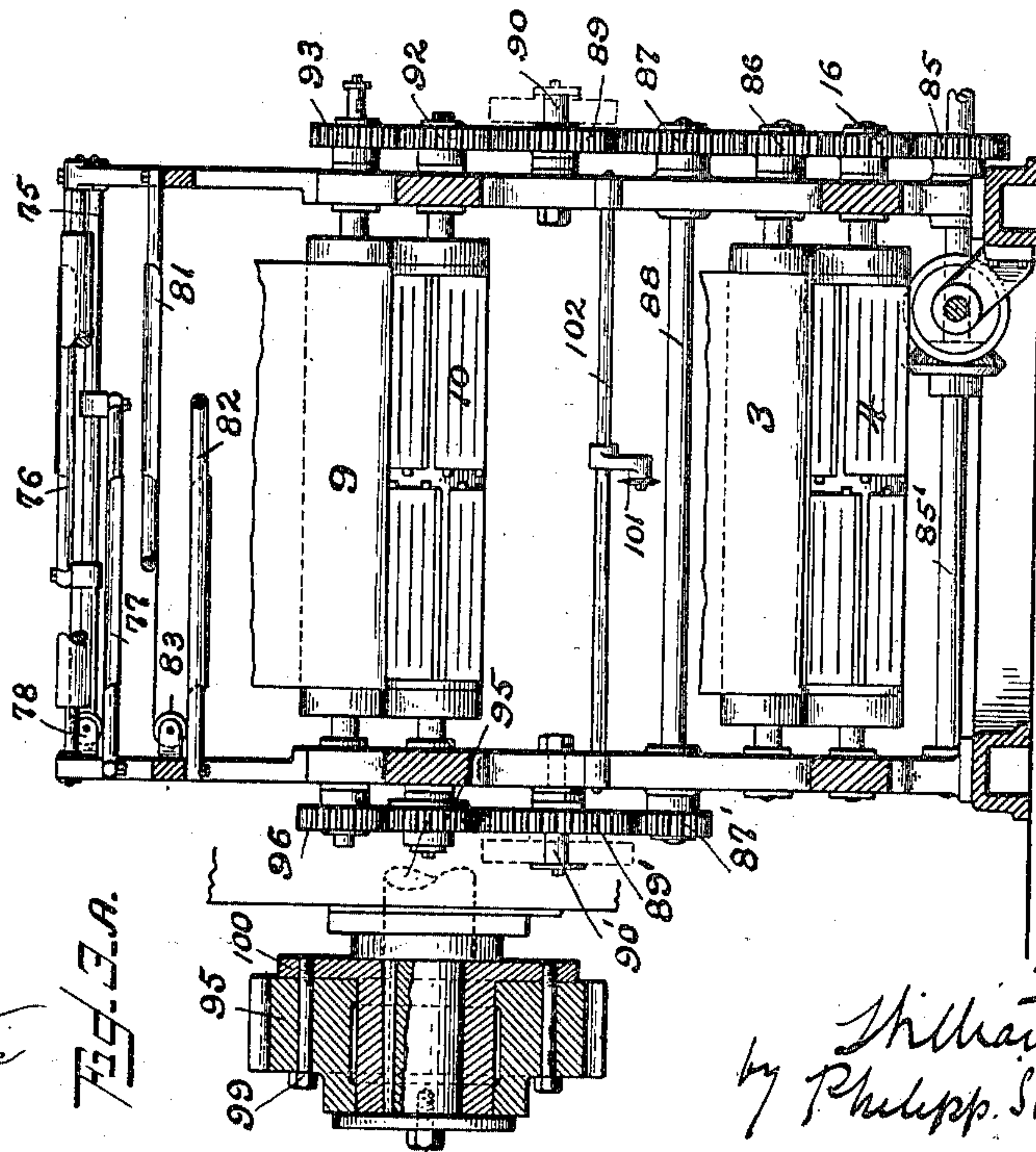


Fig. 3.



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Fig. 3.

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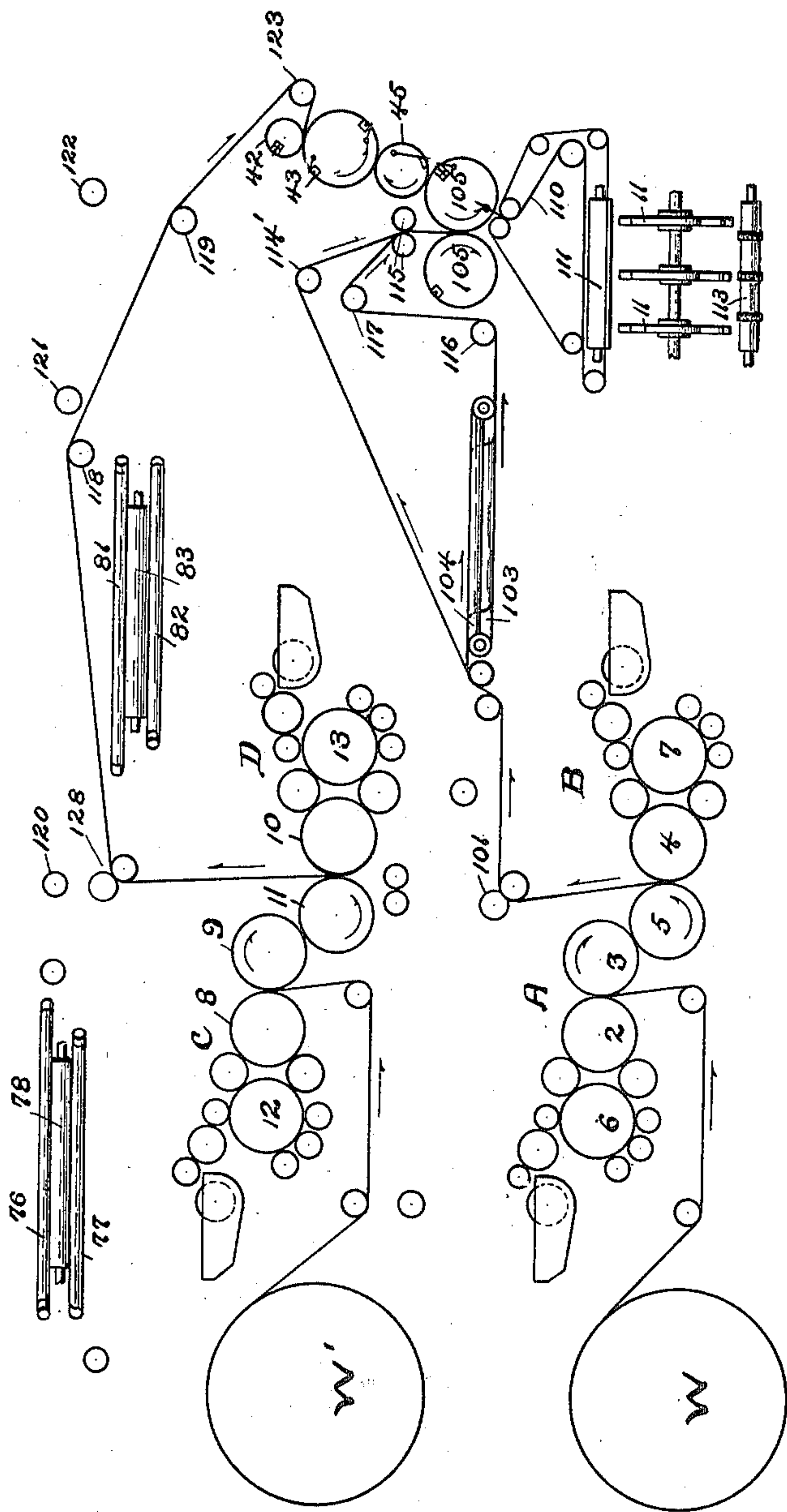
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(No. Model.)

6 Sheets—Sheet 4.

Fig. 5.



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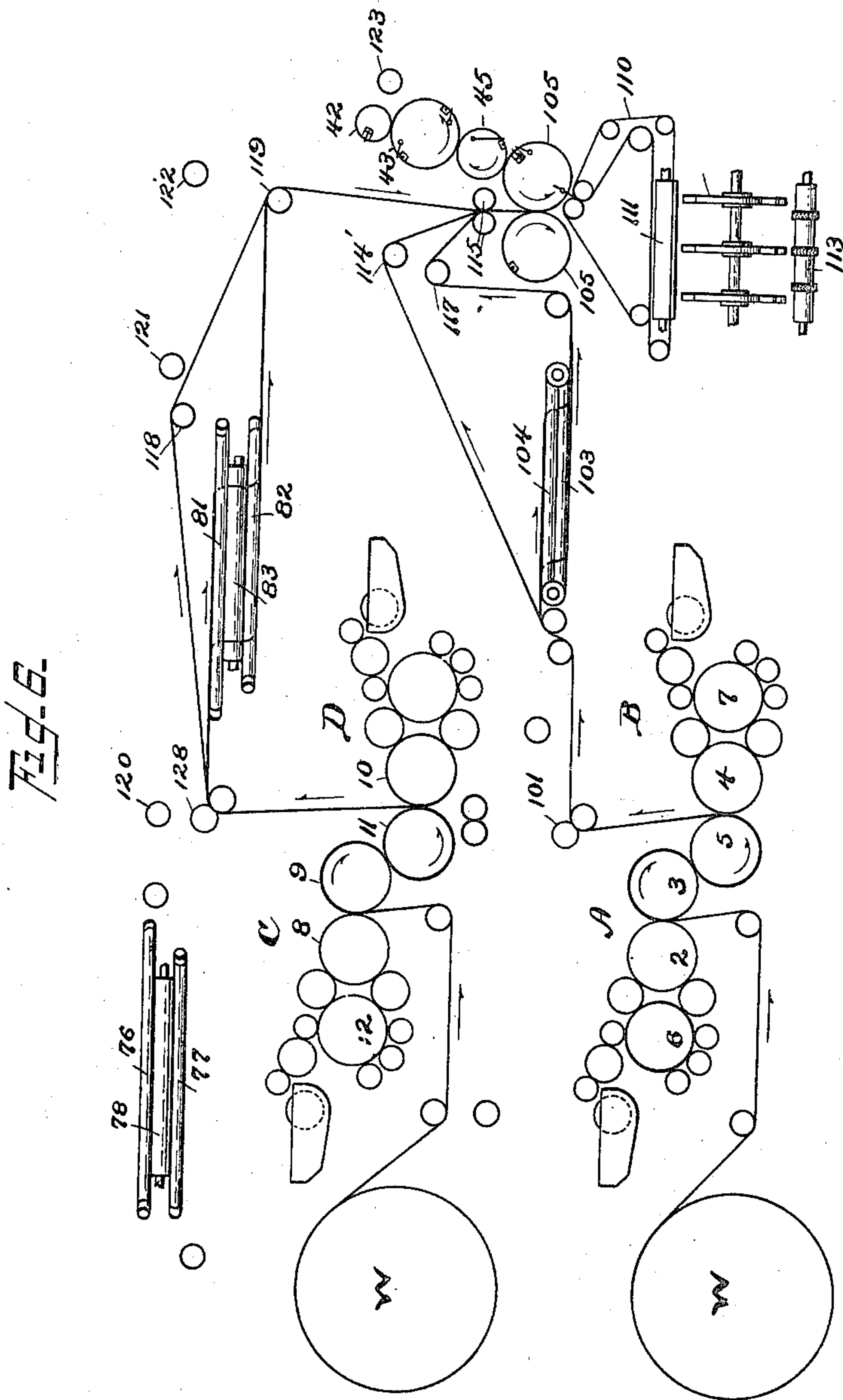
Patented July 23, 1901.

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ROTARY PRINTING MACHINE.

(Application filed Nov. 12, 1900.)

(No Model.)

6 Sheets—Sheet 5.



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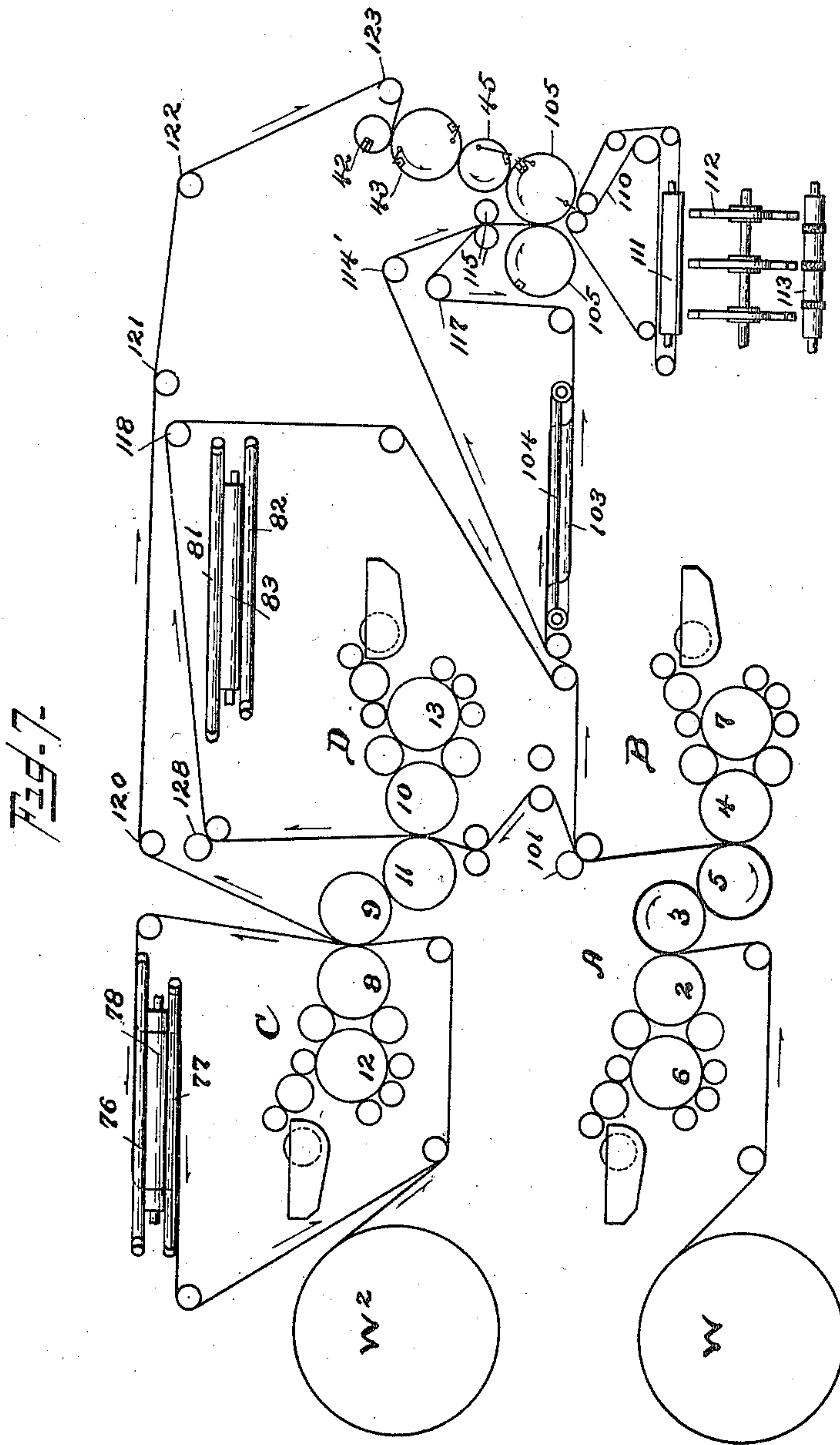
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ROTARY PRINTING MACHINE.

(Application filed Nov. 12, 1900.)

(No Model.)

6 Sheets—Sheet 6.



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UNITED STATES PATENT OFFICE.

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

ROTARY PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 679,191, dated July 23, 1901.

Application filed November 12, 1900. Serial No. 36,190. (No model.)

To all whom it may concern:

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

This invention relates to certain improvements in rotary printing-machines.

In an application of Oscar Roesen for improvements in rotary printing-machines, filed of even date herewith, Serial No. 36,209, there is described a printing-machine which embodies, among other things, a pair of single wide printing-couples, which are arranged to operate as a single machine, and two additional single wide couples, which may be used either independently or as a single machine, each of said additional couples being provided with a transferring and reversing mechanism, so that it may be used as a double-ender to give two printings to a web when desired. The particular machine described in the application referred to when employing four single wide printing-couples is capacitated to produce products which vary by two pages up to sixteen pages. It is open to the objection, however, that in producing a fourteen-page product it introduces three half or "dinky" sheets and also that it cannot be readily adapted to the production of color-work.

The object of the present invention is to produce a machine which while employing four single wide couples arranged substantially in accordance with the invention set forth in said application shall be capable of producing a fourteen-page product, which does not embody three half or dinky sheets and which can be readily adapted for use in the production of certain kinds of color-work.

With this and other objects in view the invention consists in certain constructions and in certain parts, improvements, and combinations, as will be hereinafter fully described and then set forth in the claims hereunto appended.

In the accompanying drawings, which form a part of this specification and in which like

characters of reference indicate the same parts, Figure 1 is a side elevation of a machine constructed in accordance with the invention. Fig. 2 is a top plan view of the machine illustrated in Fig. 1. Fig. 3 is a section on the line 3 3 of Fig. 1 looking in the direction of the arrow in said figure, the inking mechanisms being removed. Fig. 3^a is a detail view illustrating the manner of mounting one of the gears. Fig. 4 is an end elevation of the folding mechanism, the printing-couples being indicated in dotted lines to show the relative position of the folding mechanism. Figs. 5, 6, and 7 are diagrammatic views illustrating the manner of running the webs in the machine in order to produce different products.

Referring to the drawings, which illustrate one embodiment of the invention, 1 is a frame, which may be of any usual or desired construction. Suitably mounted in this frame, and preferably in the lower part thereof, are a pair of printing-couples A and B. The couple A consists of form and impression cylinders 2 and 3, respectively, and the couple B of form and impression cylinders 4 and 5, respectively. Any suitable inking mechanism may be used with the printing-couples, and such inking mechanisms are indicated at 6 and 7, respectively. Inasmuch as these inking mechanisms are of the usual type, a specific description of them is unnecessary. The machine also embodies two other printing-couples C and D, which are, as shown, preferably located above the couples A and B. These couples consist of form-cylinders 8 and 10 and impression-cylinders 9 and 11. Suitable inking mechanisms 12 and 13, which are or may be of the same construction as those employed with the couples A and B, are indicated as operating in connection with the form-cylinders 8 and 10, respectively. As in the application referred to, the couples C and D are preferably so arranged that each of them may be used as a double-ender—that is, so that each of them may print upon a half-width web, which is run first through one end of the couple and then through the other end, in order to receive two printings. As in said application, therefore, a suitable transferring and reversing mechanism is provided

for each couple. Instead of employing the triangles shown in said application in the present machine the transferring and reversing mechanism preferably consists of angle-bars, together with a suitable guide-roller, and this transferring and reversing mechanism instead of being located between the couples is located above them. To this end, therefore, the frame 1 is preferably carried up above the couples, as shown in Fig. 1, and a cross-bar 75 is mounted therein, said cross-bar serving to support the ends of angle-bars 76 and 77, the other ends being supported on the frame. In connection with these angle-bars 76 77 a suitable roller 78 is employed, said roller being mounted in bearings 79 on one side of the frame 1. This construction forms a transferring and reversing mechanism for the couple C. Similarly a cross-bar 80, extending across the frame over the couple D, serves to support the ends of angle-bars 81 and 82. Operating in connection with these bars is a roller 83, supported in suitable bearings 84 on the side of the frame, the whole forming a preferred form of transferring and reversing mechanism for the couple D.

Any suitable means may be used for driving the several couples of the machine. In the construction shown a power-driven gear-wheel is indicated at 85, mounted on the main power-shaft 85'. This gear 85 meshes with a gear 16 of the impression-cylinder 5, which gear 16 in turn meshes with a gear 86 on the impression-cylinder 3, and the two form-cylinders 2 and 4 are provided with the usual intermeshing gears. While any suitable means may be provided for driving the couples C and D, this means in the present case is preferably such that both the couples may be driven either at the speed of the couples A and B or at lesser speed. This lesser speed will vary according to the product to be produced and to the particular folding mechanism employed. In the construction shown, however, this lesser speed will be half the speed of the couples A and B. In the construction shown the gear 86 is in mesh with a gear 87, mounted on a shaft 88, extending across the machine from side to side. The gear 87 in turn meshes with a pinion 89, mounted on a stud 90, suitably supported in the frame. The pinion 89 meshes with a gear 91, mounted on the shaft of the impression-cylinder 11, which gear 91 in turn meshes with a gear 92 on the shaft of the form-cylinder 10. The gear 91 also meshes with a gear 93, which is one of a pair of intermeshing gears 93 94, which are mounted on the shafts of the impression and form cylinders 9 and 8, respectively. The gearing which has just been described has its several elements so related that the couples C and B will be driven at a speed which is uniform with the couples A and B.

In order to drive the couples C and D at a lesser speed than the couples A and B, the shaft 88 is preferably provided on the end op-

posite to that which carries the gear 87 with a small gear 87', which meshes with a pinion 89', mounted on a stud 90', suitably supported in the frame. The pinion 89' meshes with a gear 95, which is mounted on the end of the shaft of the impression-cylinder 11, said gear being so arranged, for a purpose hereinafter stated, that it may be either secured to the shaft or run loose thereon. The gear 95 meshes with a gear 96, which is one of a pair of intermeshing gears 96 97, which are mounted on the ends of the shafts of the impression and form cylinders 9 and 8, respectively. The train of gearing which has just been described has its various elements so related that the speed which it transmits to the couples C and D is one-half the speed of the couples A and B. In order to drive the couples C and D through this train of gearing, the full-speed driving connections before described are interrupted, preferably by sliding the pinion 89 outward on its stud 90. The upper couples will then be driven from the gear 86 through the gear 87, the shaft 88, the small gear 87', the pinion 89', and the gears 95, 96, and 97. It will of course be understood that when the upper couples are to be driven at full speed the driving connections just described will be interrupted, this being preferably accomplished by moving the pinion 89' outward on its stud 90'.

In order to drive the couple D at full speed and the couple C at half-speed, the gear 95 is permitted to run loose on the shaft of the cylinder 11. To effect this, the gear 95 is secured by screws 99 to a collar 100, which collar is feathered or otherwise secured to the shaft of the cylinder 11. When, therefore, it is desired to allow this gear to run loose, the screws 99 are removed. In this arrangement the gear 93 on the shaft of the impression-cylinder 9 will be moved out of mesh with the gear 91. Both the pinions 89 and 89', however, remain in driving position. With this arrangement the power from the gear 86 will be transmitted through the gear 87, pinion 89, and gears 91 92 to the members of the couple D and through the half-speed gears 87, 89', 95, 96, and 97 to the members of the couple C, the gear 95 at this time acting simply as an intermediate and running at half the speed of the shaft on which it is mounted.

It may be here remarked that in this machine the forms are so arranged on the form-cylinders that the columns of the printed pages are parallel to the axis of the cylinder—that is to say, the columns run longitudinally of the cylinder. The single wide couples A and B are therefore provided with a suitable slitting and transferring mechanism by which the single wide web is slit and a part thereof transferred laterally.

Any suitable form of slitting mechanism may be employed to slit the web coming from the single wide couples. In the construction shown, however, a slitter 100 is provided,

said slitter being mounted on a cross-bar 102, suitably supported in the frame.

The transferring mechanism may also be of any suitable form, but is shown as consisting of the usual bars 103 104.

Any suitable form of cutting and folding mechanism may be employed. In the construction shown the cutting and folding cylinders are marked 105. These cylinders have intermeshing gears 106, one of said gears meshing with a gear 107, which forms one of a train driven from a counter-shaft 108, located at the base of the machine and taking its power from a bevel-gear 109, (see Fig. 3,) mounted on the shaft 85'. After leaving the cutting and folding cylinders 105 the sheets are taken by tapes 110, by which they are presented to a pair of folding-rollers 111. These rollers have the usual blade coöperating with them (not shown) and operate to deliver the folded sheets to an S-fly 11, which in turn drops them onto a conveyer 113, by which they are carried out of the machine. This delivery is mechanism of a form well known in the art, and any other suitable form of delivery mechanism may be substituted therefor.

The web supplies for the couples will vary somewhat according to the product to be produced. When the machine is arranged as in Fig. 1, at which time it is producing a fourteen-page product, three web-rolls W , W' , and W^2 are employed. The web-roll W furnishes a single wide web—that is to say, the web is two pages wide (using the ordinary newspaper-page as the unit of measurement)—and the web-rolls W' W^2 furnish half-width webs. The web W is led to and through the couples A and B, by which it is printed and perfected, these couples preferably always running as a single machine. After leaving the couples A and B this web is slit by the slitter 101, and the two parts run over a guide 114. From this guide 114 one part of the web is run over a guide 114' into a pair of rollers 115, which operate to deliver it to the cutting and folding cylinders 105. The other half of the web W passes through the transferrers 103 104 and is shifted laterally, after which it is directed by means of guides 116 117 to the rollers 115.

With the arrangement of the machine shown in Fig. 1 the couple D is being driven at full speed and is operating as a double-ender. The web is supplied to it from the half-width roll W' . This web after being printed on one end of the couple is run through the transferring and reversing mechanism, consisting of the bars 81 82 and the roller 83, by which it is transferred laterally and turned over. It is then passed through the other end of the couple, receiving in this instance a perfecting impression, and then passes over guides 118 119 to the rolls 115, at which point it meets the two parts of the web W .

When the machine is operating on a four-

teen-page product, the couple C is driven at half-speed through the agencies before described. It is supplied with web by the half-width roll W^2 , said web after passing through one end of the couple being transferred laterally and turned over by the transferring mechanism, consisting of the bars 76 77 and the roll 78, after which it is carried onward over guides 120 121 122. Inasmuch as this web W^2 is only being printed at half the speed of the other webs, it is obvious that in order that the sheets cut therefrom may be associated with the other webs an accelerating mechanism must be employed to increase the speed of the cut sheets. While any suitable accelerating mechanism may be used, the one which is preferably employed is that shown in United States Patent to Thomas M. North, No. 650,543, dated May 29, 1900, to which patent reference is made for a full description of this mechanism. For the purposes of this application, however, it may be said that after leaving the guide 122 the web runs between rollers 123 and then between a pair of cutting-cylinders 42 43. The cylinder 43 is provided with a gear 51, said gear meshing with a pinion 124, which in turn meshes with a pinion 125. The pinion 125 meshes with a small pinion 126 on the shaft of one of the cutting and folding cylinders 105. The relation of the pinions 126, 125, and 124 is such that the speed of the cylinder 43 is one-half the speed of the cylinders 105—that is to say, the cylinders 105 are driven at the speed of the incoming webs W W' , but the cylinder 43 is driven at the speed of the web W^2 . The cutting-cylinder 42 is provided with a gear 127, which is in mesh with the gear 51, before referred to. Between the cylinder 43 and one of the cylinders 105 a transferring-cylinder 45 is located. This cylinder 45 is arranged, as fully set forth in the patent above referred to, to take the sheet from the cylinder 43 (the sheet being taken on both cylinders by pins, not shown) at the speed of the cylinder 43 and bring it up to the speed of the cylinders 105, so that it delivers the sheet to these cylinders at the speed at which they are running. The cylinder 45 has on its shaft an elliptical gear 46, said gear being in mesh with a similar gear 47 on the shaft of one of the cylinders 105. The varying movements of the cylinder 45 will be effected through the elliptical gearing in a manner well understood.

From the foregoing description it will be understood that the single wide web which is cut by the cylinders 105 furnishes eight pages of the printed product, the half-width web W' furnishes four pages, and the half-width web W^2 furnishes two pages. It will be seen, therefore, that by the construction which has just been described a fourteen-page product is produced, which includes only one half or dinky sheet. It will also be seen that any product up to sixteen pages, varying by two pages, can be produced by this machine.

Should a four-page product be desired, it

can be produced by running a half-width web through the couples A B or by running the couples C and D as a single machine and leading a half-width web straight through them, the transferring mechanisms being in this case cut out.

Should a six-page paper be desired, the couples A B may be run at full speed on a half-width web which is led straight to the cutting and folding cylinders 105. The upper couples C and D may be run as a single machine on a half-width web at half-speed. The sheets cut from this web will by the accelerating mechanism be delivered to the four-page sheet which comes from the web printed by the couples A and B. This arrangement of the machine is indicated in Fig. 5. The same arrangement of the machine will produce a ten-page paper by running a single wide web on the lower couples A B, slitting it, and transferring one half laterally, so as to associate the two slit parts.

An eight-page paper can be produced by the lower couples alone printing on a single wide web, the web being slit and the two parts associated.

In order to produce a twelve-page paper, the lower couples may be run on a single wide web and the upper couples on a half-width web, the couples being run at full speed and as a single machine.

In order to produce a sixteen-page paper, the machine will be arranged as shown in Fig. 6, an extra slitter 128 being introduced. In this construction the lower couples are run as before on a single wide web, which is slit and the two parts associated. The upper couples are run as a single machine on a single wide web at full speed, the transferring mechanism for the couple C being cut out. The web after leaving the couple D, by which it is perfected, is led to the slitter 128, after which one half of it is run through the transferring and reversing mechanism of this couple, while the other half is led directly to the folder. This arrangement gives four four-page sheets properly associated.

In addition to the arrangements before described this machine is also capacitated to produce products printed in colors.

One color arrangement is indicated in Fig. 7. In this figure the lower couple is shown as running on a single wide web, which is slit by the slitter 101, and one half the web is led straight to the folder. The other half of the web is led upward through the couple D, which gives it a second printing on the same side as the printing given by the couple B. After passing through this couple the web is led over suitable guides and into the transferring mechanism 103 104, which operates in connection with the couples A and B. This transferring mechanism shifts the web laterally, so that it can be associated with the half-web which was led directly from the couples A B, and at the same time positions it so that the color-sheets will come on the outside of

the product. The arrangement described will give an eight-page paper with the two outside pages printed in colors. In order to get a ten-page paper, the same arrangement will be employed and the couple C will run at half-speed on a half-width web, the couple operating as a double-ender. The web printed by this couple will be led into the accelerating mechanism and will furnish a single sheet or two extra pages to be associated with the sheets cut from the slit single wide web, the outside web, as before stated, being printed in colors. Should a twelve-page paper be desired with the outside sheet printed in colors, the same arrangement is employed, except that the couple C is run at full speed and the web therefrom instead of being led into the accelerating mechanism is led directly to the cutting and folding mechanisms.

Should it be desired to utilize the entire machine on color-work, the web after leaving the couple B (see Fig. 6) may be led straight upward, the cutter 101 being thrown out to the guide underneath the couple C. From this point the web may take the course indicated for the upper web in Fig. 6, passing straight through the couples C and D, after which it is slit by the slitter 128 and disposed of as indicated in Fig. 6. With this arrangement the web will be led through all the couples in succession.

It is to be understood that the instrumentalities by which the invention is carried into effect may be varied widely. The invention is not, therefore, to be limited to the specific constructions described in the foregoing specification.

What is claimed is—

1. The combination with a pair of printing-couples arranged to operate as a single machine, of a second pair of couples, means whereby said second pair of couples may be operated as a single machine, which may be run at either full or half speed, means whereby one couple of said second pair of couples may be operated independently at either full or half speed, and a transferring mechanism so located with respect to said couple that it is capacitated for use as a double-ender, substantially as described.

2. The combination with a pair of printing-couples arranged to operate as a single machine, of a second pair of couples, means whereby said second pair of couples may be operated as a single machine, which may be run at either full or half speed, means whereby one couple of said second pair of couples may be operated independently at either full or half speed, and transferring mechanisms, one for each couple of the second pair so located with respect to the couples that each couple is capacitated for use as a double-ender, substantially as described.

3. The combination with a pair of printing-couples arranged to operate as a single machine, of a second pair of couples, means whereby said second pair of couples may be

operated as a single machine which may be run at either full or half speed, means whereby each couple of said second pair of couples may be run independently at either full or half speed, and transferring mechanisms, one for each couple of the second pair so located with respect to the couples that each couple is capacitated for use as a double-ender, substantially as described.

4. The combination with a pair of printing-couples, the form-carrying members of which have plates so disposed thereon that the columns are parallel with the axis of the cylinder, the couples being arranged to operate as a single machine, of a second pair of couples the form-carrying members of which have similarly-disposed plates, means whereby said second pair of couples may be operated as a single machine, means whereby one couple of the second pair of couples may be operated independently of the other, a transferring mechanism so located with respect to the independently-operated couple as to enable it to be used as a double-ender, substantially as described.

5. The combination with a pair of printing-couples, the form-carrying members of which have plates so disposed thereon that the columns are parallel with the axis of the cylinder, the couples being arranged to operate as a single machine, of a second pair of couples the form-carrying members of which have similarly-disposed plates, means whereby said second pair of couples may be operated as a single machine, means whereby one couple of the second pair of couples may be operated independently of the other, a transferring mechanism so located with respect to the independently-operated couple as to enable it to be used as a double-ender, a slitting mechanism arranged to operate in connection with the first pair of couples, and means for associating the several webs, substantially as described.

6. The combination with a pair of printing-couples, the form-carrying members of which have plates so disposed thereon that the columns are parallel with the axis of the cylinder, the couples being arranged to operate as a single machine, of a second pair of couples the form-carrying members of which have similarly-disposed plates, means whereby said second pair of couples may be operated as a single machine, means whereby one couple of the second pair of couples may be operated independently of the other, a transferring mechanism so located with respect to the independently-operated couple as to enable it to be used as a double-ender, a slitting mechanism arranged to operate in connection with each pair of couples, and means for associating the several webs, substantially as described.

7. The combination with a pair of printing-couples arranged to operate as a single machine, of a second pair of couples, means whereby said second pair of couples may oper-

ate as a single machine, means whereby one couple of said second pair may be operated independently of the other, a transferring mechanism so located with respect to the independently-operated couple as to enable it to be used as a double-ender, and suitable guides whereby a single web may be led through all or part of the couples in succession, substantially as described.

8. The combination with a pair of printing-couples arranged to operate as a single machine, of a second pair of couples, means for operating one couple of said second pair of couples at either full or half speed, a transferring and reversing mechanism arranged to operate in connection with said couple whereby the couple may be run as a double-ender, means for directing a web from the first pair of couples to the other couple of the second pair, a slitter operating in connection with the first pair of couples, means for associating the slit web, a folding mechanism, and means for leading the products of the several couples to said folding mechanism to be folded together, substantially as described.

9. The combination with a pair of printing-couples arranged to operate as a single machine, of a second pair of couples, means whereby said second pair of couples may be arranged to operate as a single machine running at either full or half speed, means whereby each couple of the second pair may be operated independently either at full or half speed, a transferring and reversing mechanism operating in connection with one of the couples of the second pair, whereby said couple may be used as a double-ender, a slitting mechanism arranged to slit the product of the first pair of couples, guides for directing a portion of the web thus slit through the couple of the second pair which is not acting as a double-ender, a transferer operating to shift said portion of the web laterally and associate it with the web from which it was cut, a sheet cutting and accelerating mechanism operating in connection with the double-ender couple, and a folding mechanism, substantially as described.

10. The combination with a pair of printing-couples arranged to operate as a single machine, of a second pair of printing-couples, means whereby said second pair of couples may be operated as a single machine, means whereby each of these couples may be run at full or half speed, a transferring and reversing mechanism operating in connection with each couple of the second pair, whereby it may be run as a double-ender, a slitting mechanism operating to slit the web printed by the first pair of couples, a transferring mechanism operating to associate the parts of the slit web, a sheet-accelerating mechanism operating in connection with one of the double-ender couples, and a cutting and folding mechanism, substantially as described.

11. The combination with a pair of printing-

couples arranged to operate as a single machine, the form-cylinders of said couples having the plates so disposed that the columns are parallel with the axis of the cylinder, a
5 second pair of printing-couples, the form-cylinders of which have their plates similarly disposed, means whereby said second pair of couples may be operated as a single machine, means whereby each couple of the second pair
10 may be run at full or half speed, a transferring and reversing mechanism operating in connection with each couple of the second pair, whereby each couple may be run as a double-ender, a slitting mechanism operating
15 in connection with the first pair of couples, a transferring mechanism operating to associate the parts of the slit web, a sheet-accelerating mechanism operating in connection with one of the double-ender couples, and a
20 cutting and folding mechanism, substantially as described.

12. The combination with a pair of printing-couples arranged to operate as a single machine, the form-cylinders of said couples having the plates so disposed that the columns
25 are parallel with the axis of the cylinder, a

second pair of printing-couples, the form-cylinders of which have their plates similarly disposed, means whereby said second pair of couples may be operated as a single machine, 30 means whereby each couple of the second pair may be run at full or half speed, a transferring and reversing mechanism operating in connection with each couple of the second pair, whereby each couple may be run as a double- 35 ender, each of said transferring and reversing mechanisms including angle-bars and an intermediate roller, a slitting mechanism operating in connection with the first pair of couples, a transferring mechanism operating 40 to associate the parts of the slit web, a sheet-accelerating mechanism operating in connection with one of the double-ender couples, and a cutting and folding mechanism, substantially as described. 45

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

WILLIAM SPALCKHAVER.

Witnesses:

F. W. H. CRANE,
L. ROEHM.