

(No Model.)

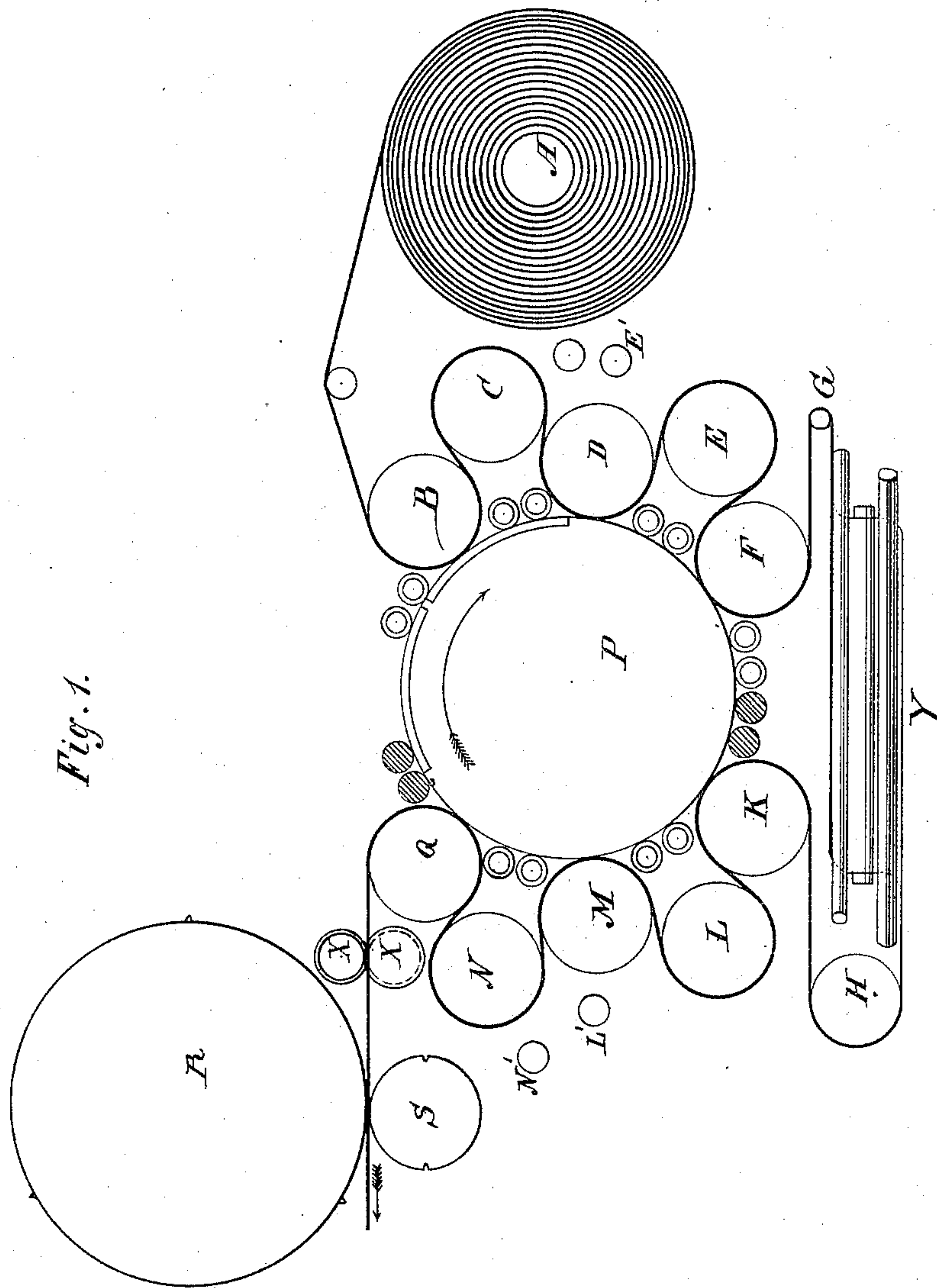
6 Sheets—Sheet 1.

E. ANTHONY.

DELIVERY APPARATUS FOR PRINTING MACHINES.

No. 314,555.

Patented Mar. 31, 1885.



WITNESSES:

F. L. Middleton
S. W. Sney

INVENTOR

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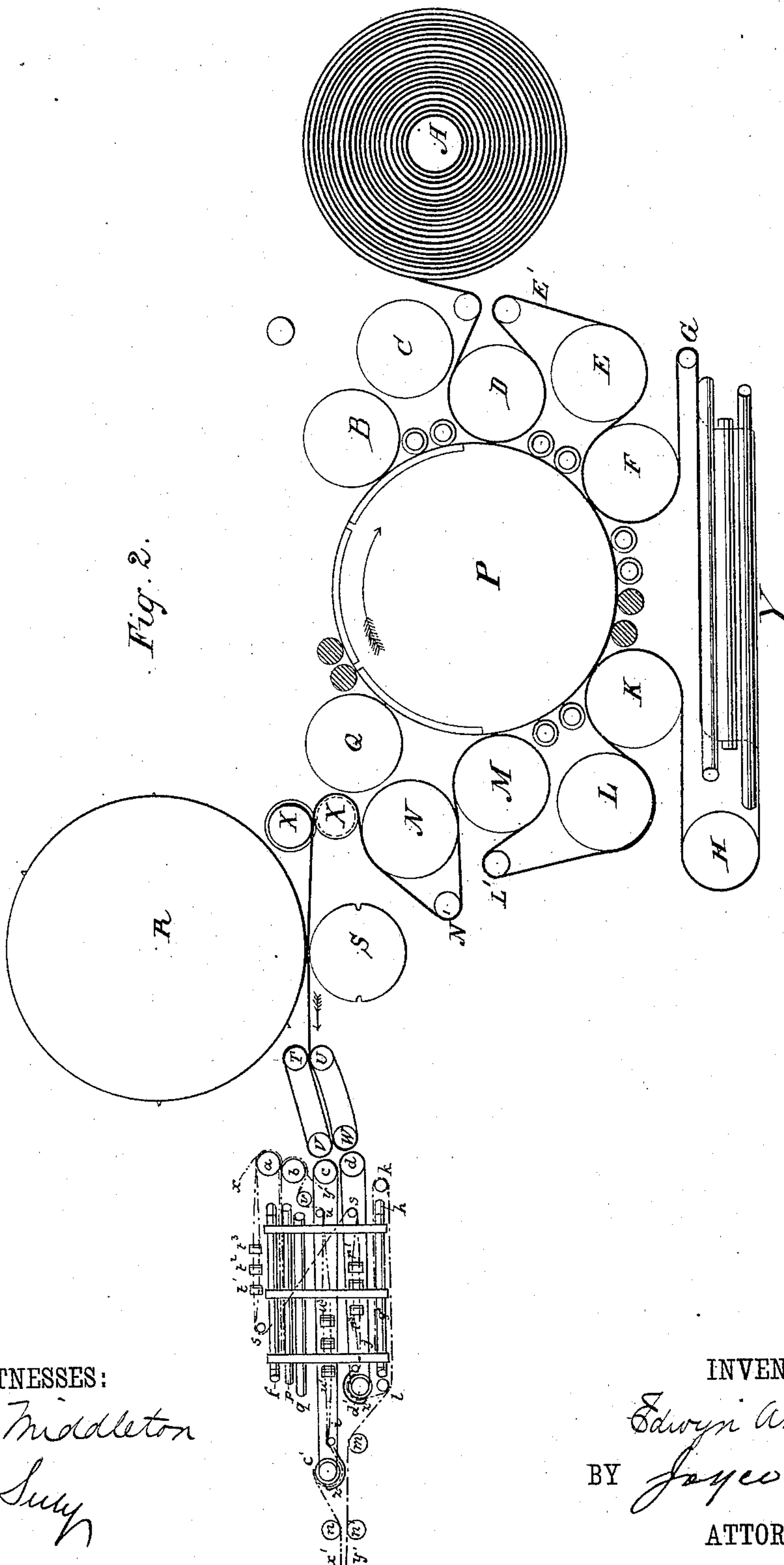
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6 Sheets—Sheet 3.

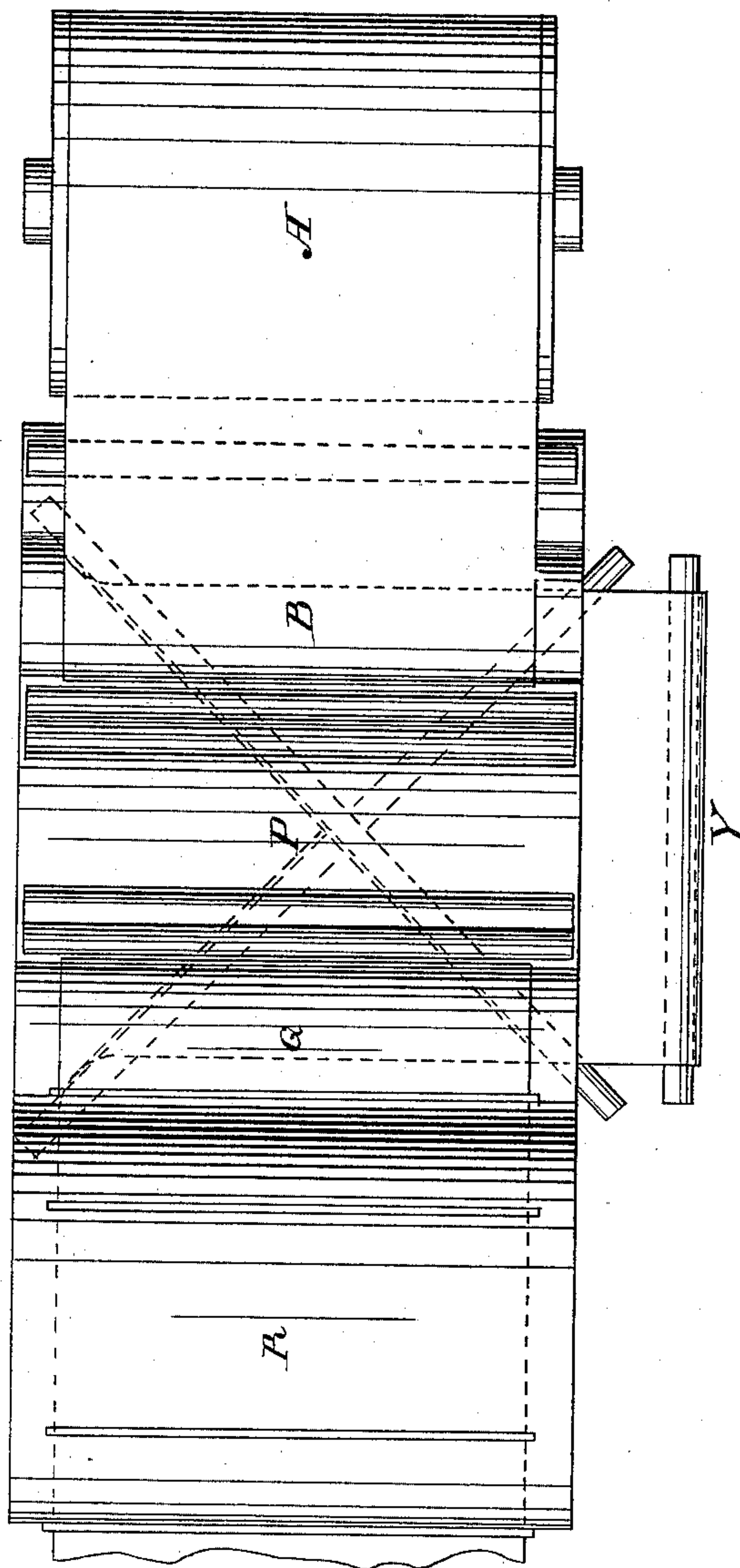
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Fig. 3.



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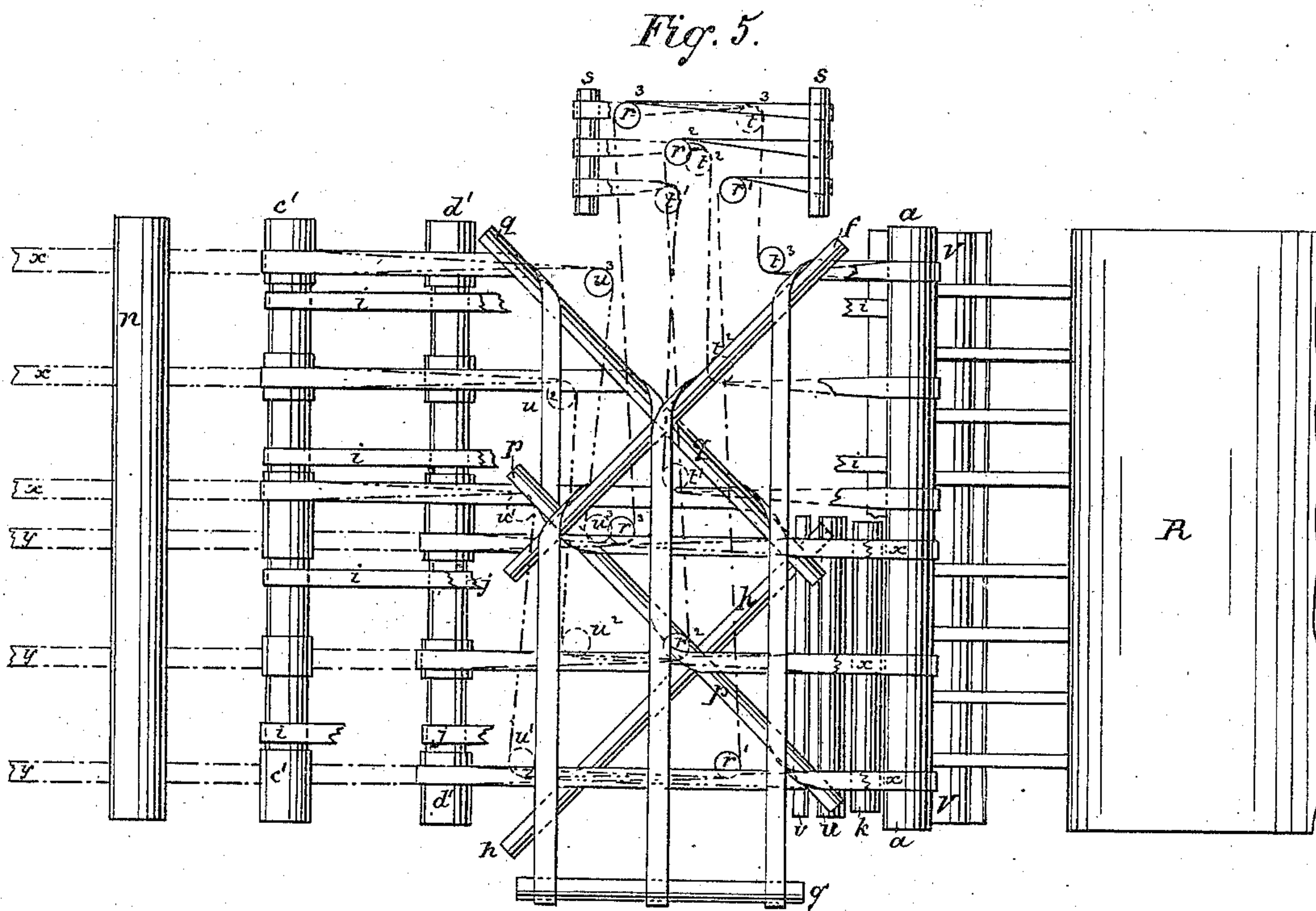
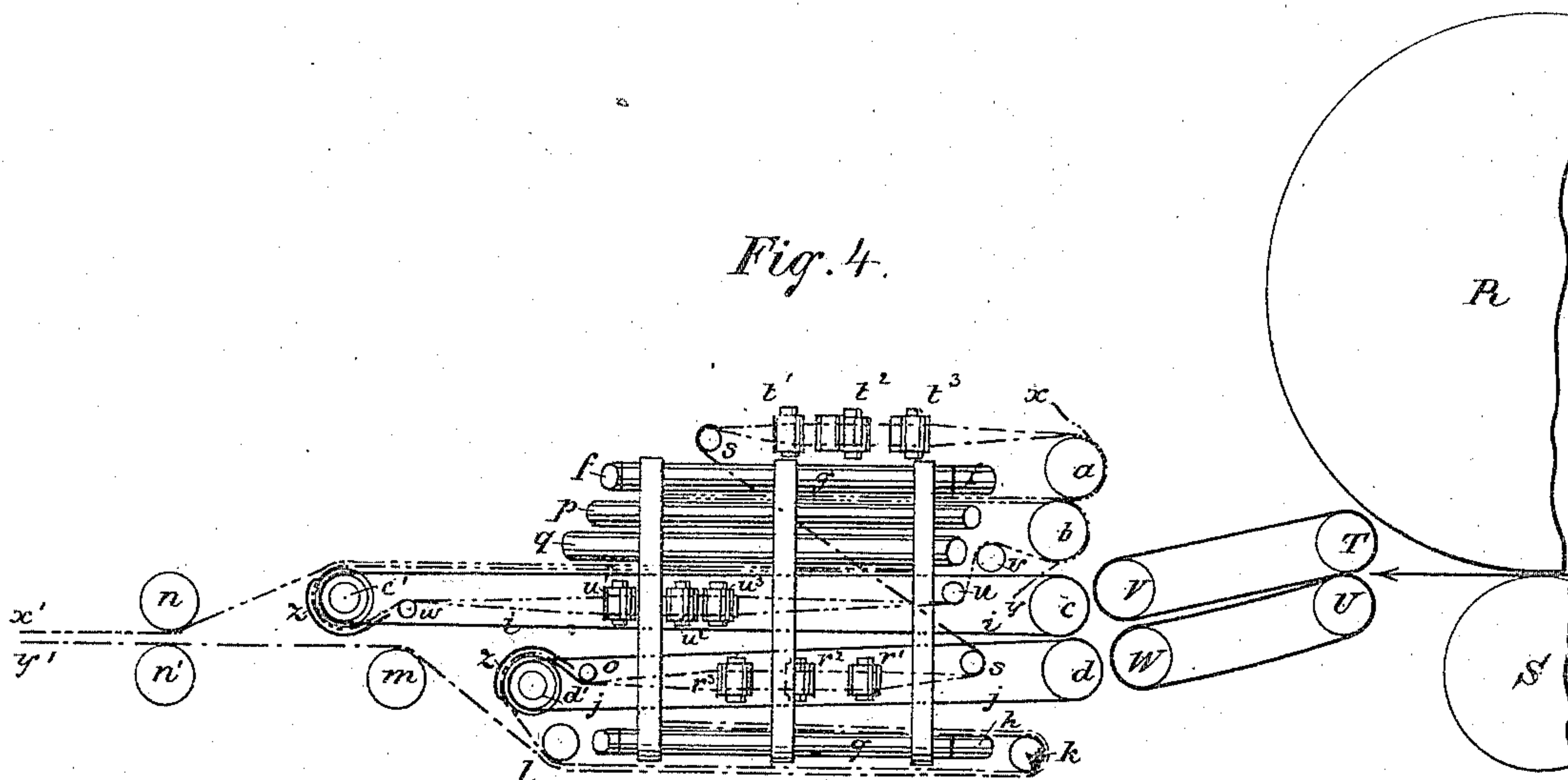
6 Sheets—Sheet 4.

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(No Model.)

6 Sheets—Sheet 5.

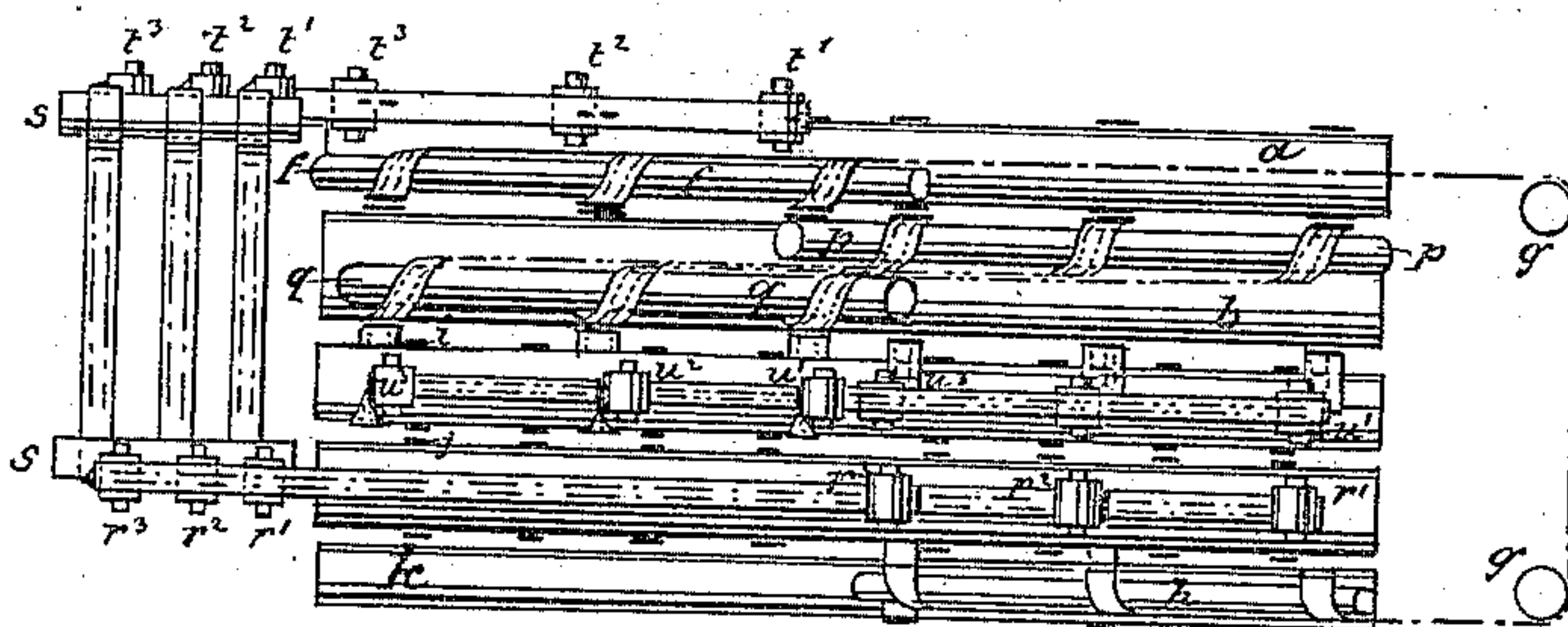
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Fig. 6.



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Fig. 7.

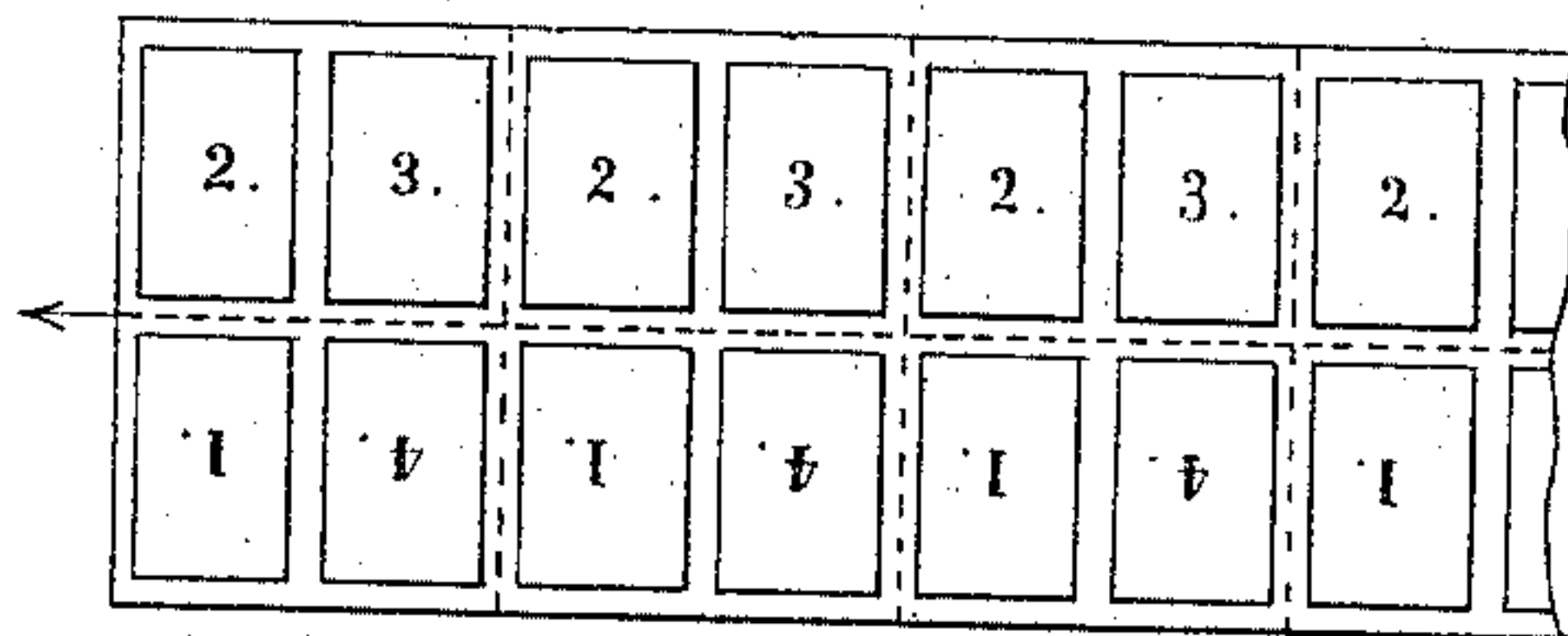


Fig. 8.

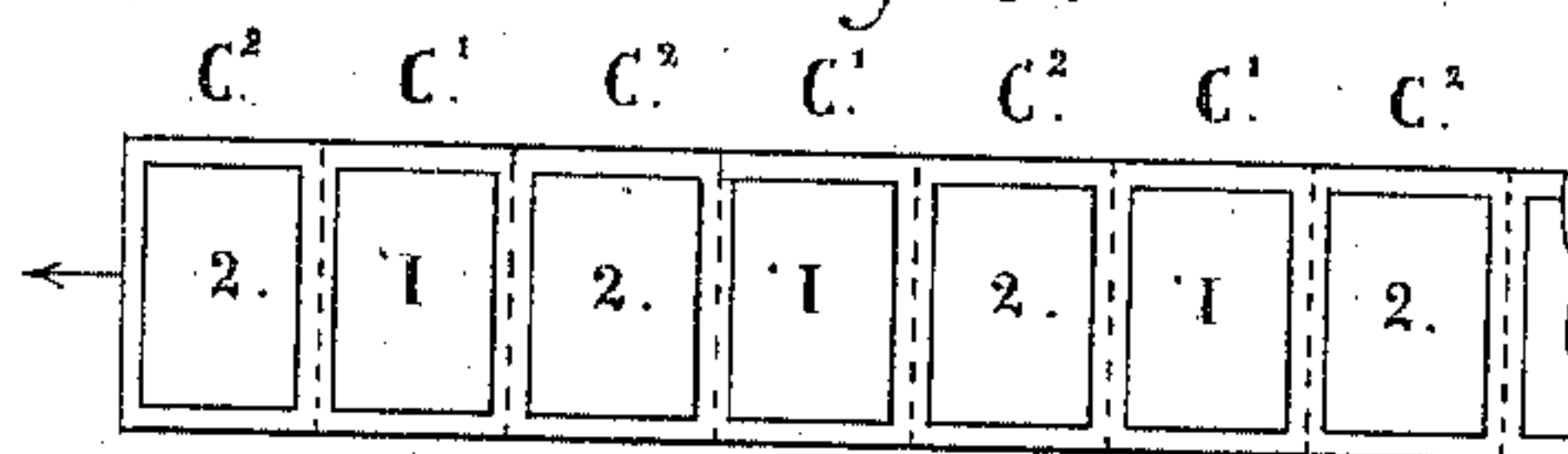


Fig. 9.

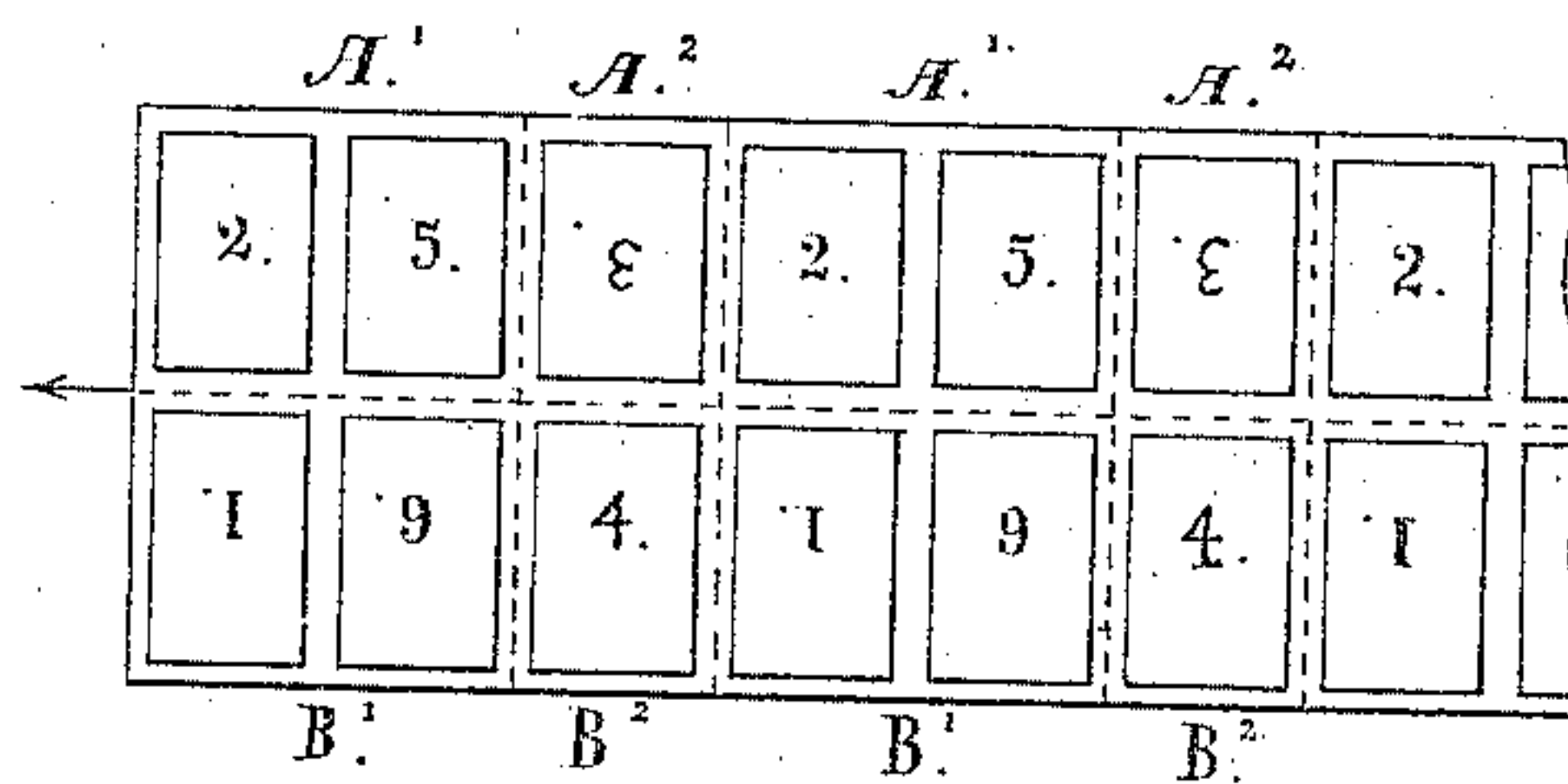


Fig. 10.

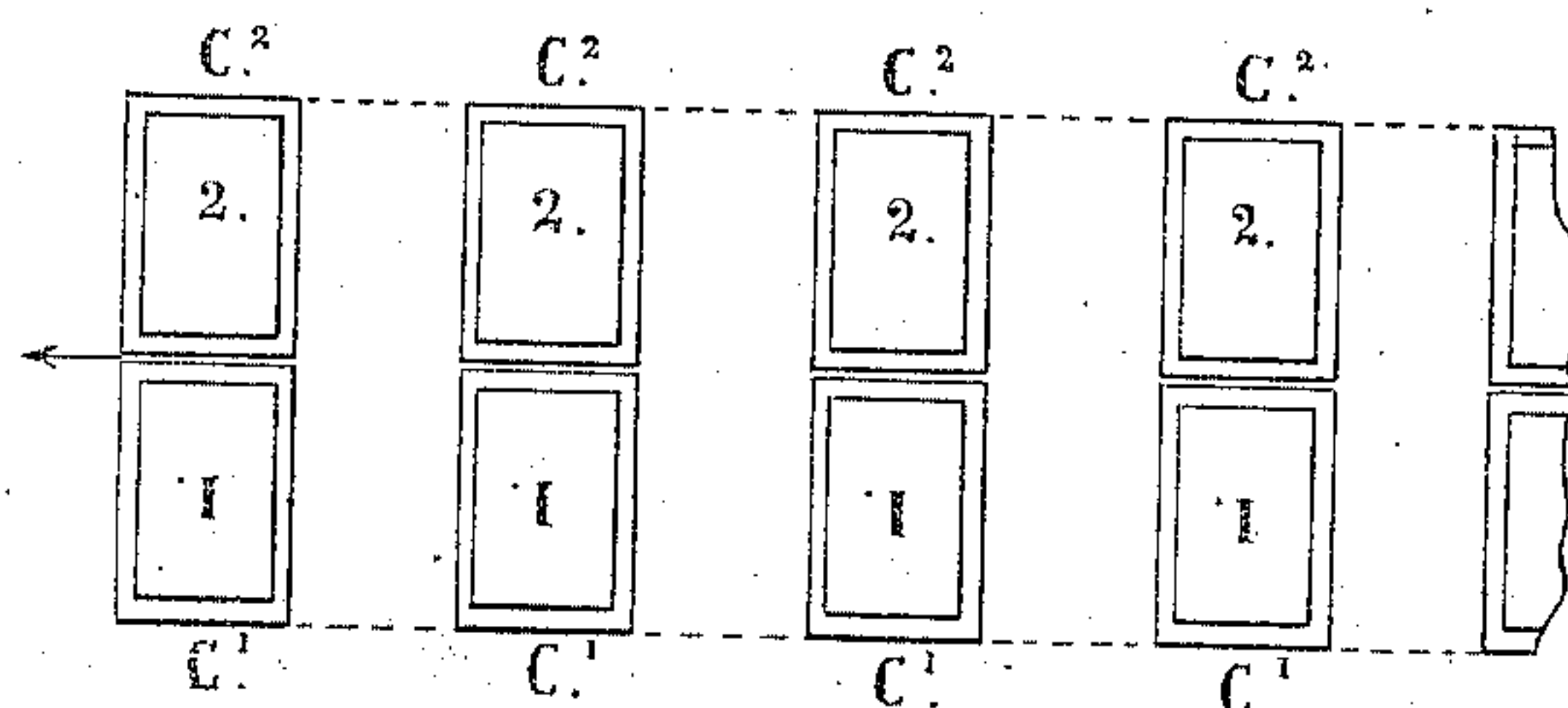
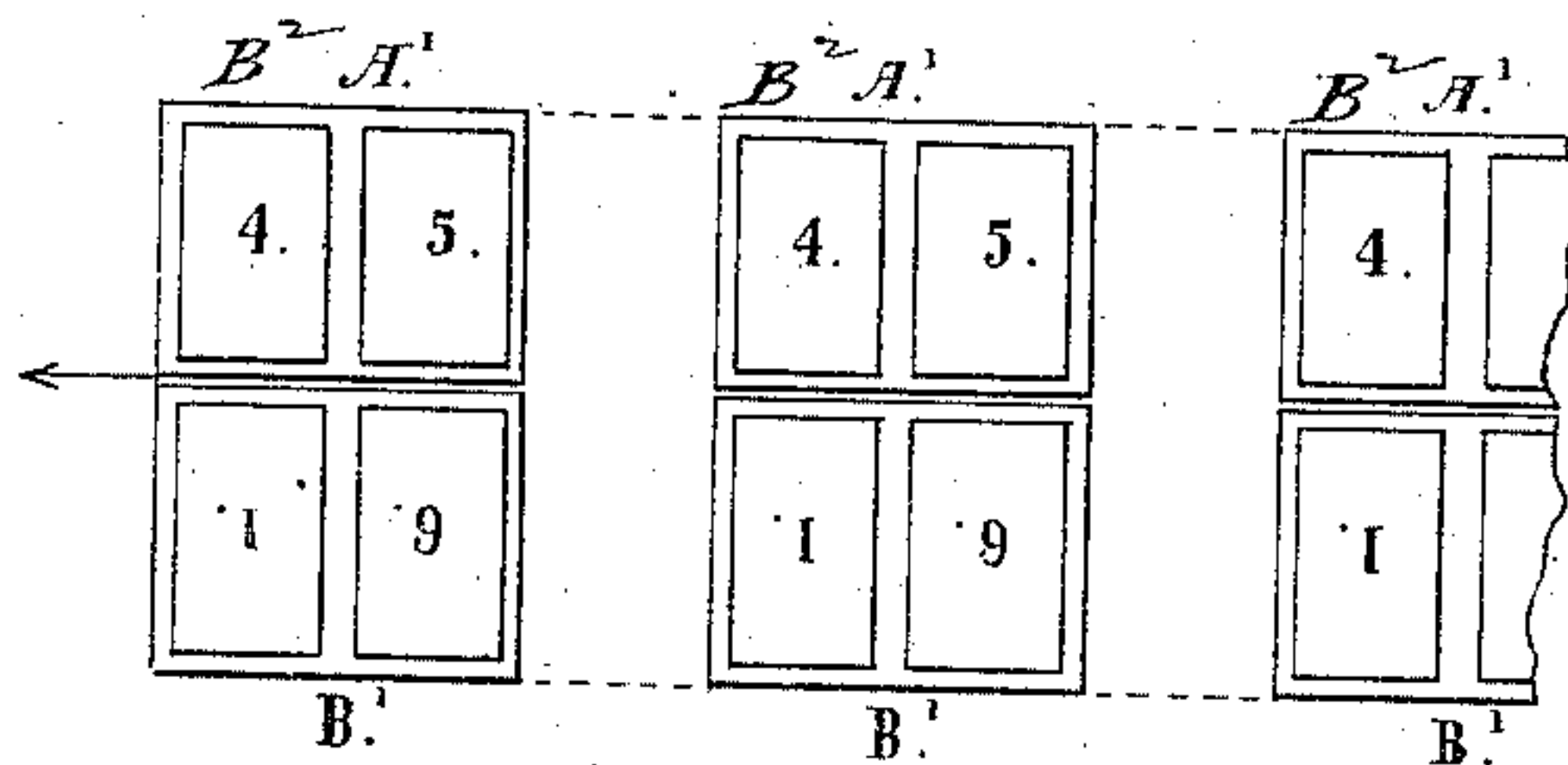


Fig. 11.



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UNITED STATES PATENT OFFICE.

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DELIVERY APPARATUS FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 314,555, dated March 31, 1885.

Application filed April 27, 1883. (No model.)

To all whom it may concern:

Be it known that I, EDWYN ANTHONY, a subject of the Queen of Great Britain, residing at Jersey City, county of Hudson, State of New Jersey, have invented a new and useful Improvement in Delivery Apparatus for Printing-Machines, of which the following is a specification.

My invention relates to an improvement or extension of the invention contained in an application made by me on the 26th day of March, 1883, for Letters Patent for an improvement in printing-presses. The said application contains a mechanism for printing a four-page paper, and by using a half-breadth web a two-page paper may be likewise printed, as therein explained.

The present invention consists in combining with mechanism capable of printing a web to produce a six-page paper, of mechanism for reversing the sides of the web, mechanism for slitting the web, and mechanism for transversely cutting it into sheets of unequal breadth; and it likewise consists in combining therewith deflecting devices whereby in each case, after printing, the smaller sheets are transferred laterally and associated with the larger sheets, and thus the whole are brought into side by side streams and in a form such that they can be operated on by any folding mechanism adapted to fold two streams of four-page papers running reverse ways up.

Figure 1 is a side view of the machine (up to and including the cutting-cylinders) when arranged for printing a four-page paper; Fig. 2, a side view thereof when arranged to print a six-page paper, and containing a reduced view of the apparatus for bringing the web into four-page form. Fig. 3 is a plan view corresponding to Fig. 1. Figs. 4, 5, and 6 are a side view, plan view, and end view, respectively, of the said apparatus; and Figs. 7, 8, 9, 10, and 11 illustrate the order of the pages on the web in the cases to which they refer.

I will first describe the course of the web and the mechanism up to and including the cutting-cylinders.

P marks the form-cylinder. The inking-surface must occupy only one-half of the cir-

cumference of the cylinder, in order that there may be room to place three forms round the cylinder, as in Fig. 2. The inking and distributing rollers are supposed to oscillate in the usual manner, no mechanism for that purpose being shown, since it may be effected in any usual way. No adjustment of these oscillations will be necessary for printing different numbers of pages; but of course the supply of ink must be suitably regulated.

B D F K M Q designate impression-cylinders, and C E E' G H L L' N N' mark the ordinary carrier-cylinders.

Y is the reversing apparatus.

X X designate the slitting mechanism for longitudinally dividing or splitting the web along its central line, its construction being the ordinary one of a rotary disk or circular cutter and co-operating grooved cylinder. The cutting mechanism R S for transversely severing the web consists of a cylinder, S, with two equidistant longitudinal grooves or slots therein, and having a circumference equaling the breadth of a four-page paper, (measured in the direction of its motion,) and of a cylinder, R, capable of carrying six equidistant longitudinal knives, and with a circumference equal to three times the breadth of a four-page paper.

To print a four-page paper, the web A must be broad enough to have two pages abreast printed thereon. It is then conducted (see Fig. 1) round impression-cylinders B C D E F, and gets printed on one side; thence round roller G, whence it is directed to the reversing apparatus Y, and from there round impression-cylinders H K L M N Q, whereby it gets printed on the opposite side. Now, printed on both sides, it is divided longitudinally by being slit in the center while passing through the slitting mechanism X X, and afterward it is severed transversely by the cutting-cylinders R S. This cutting-cylinder R, when a four-page paper is being printed, must carry three equidistant knives, and the web will pass between the rollers T U, Fig. 4, in two streams of four-page papers, as indicated by Fig. 7, the dotted lines denoting the lines of longitudinal slitting and trans-

verse severance, whereby the web is divided into four-page papers.

To print a two-page paper, the web A must be half the breadth it was before. Its course to the rollers T U will be similar to the case of a four-page paper, and no adjustments will be required further than the due regulation of the supply of ink, (which of course will be only needed half across the machine,) the adjustment of the reversing device, and distance of travel, as hereinafter stated, the non-use of the longitudinal slitter, which may be put out of action by the removal of the circular cutter or upper member, X X, and the placing of six instead of three equidistant knives in the cylinder R. The web will then pass between the rollers T U, as shown in Fig. 8, the dotted lines indicating, as in Fig. 7, the lines of severance of the web.

To print a six-page paper, the roll A is of the same breadth as for a four-page paper, but three instead of two forms must be placed round the form-cylinder. (See Fig. 2.) Since one-half instead of one-third of the cylinder is now occupied by forms, only four instead of six impression-cylinders are required to print the web continuously on both sides, and its distance of travel between successive impression-cylinders must be greater than before. The impression-cylinders B Q are therefore somewhat raised, so that they do not touch the forms on the form-cylinder, and the composition inking-rollers in connection therewith are removed. Longitudinal slitting is the same as for a four-page paper, and the cutting-cylinder R must now carry four knives, which are placed at intervals, as in Fig. 2, such that two of the parts, into which they divide the cylinder R, are each equal to the breadth of a four-page paper, and two of them each equal to half the said breadth, as indicated in Fig. 2. The web A may pass round cylinders B and C to cylinder D, (precisely as it did for a four-page paper, since cylinder B no longer prints,) or it may pass to cylinder D, as shown in Fig. 2. It then passes round cylinders E' E to cylinder F; thence round cylinder G to the reverser Y; thence round cylinder H to cylinder K, from there round cylinders L L' to cylinder M, and from cylinder M it may pass round cylinders N and Q to the slitters X X, (precisely as for a four-page paper, since cylinder Q no longer prints,) or it may pass round cylinder N' to the slitters X X, as shown in Fig. 2. The web next passes between cutting-cylinders R S, and thence between the rollers T U, issuing as shown in Fig. 9, the dotted lines indicating, as before, the lines of severance. Of course, if preferred, cylinder D or F may be raised instead of cylinder B, and cylinder K or M instead of cylinder Q, the travel of the web being adapted accordingly, and instead of cutting-cylinder R, a cylinder carrying only one knife and whose circumference equals half the breadth of a four-page paper, may be

used provided suitable movement is given to the knife. Indeed it is obvious that the transverse cutting mechanism may be varied indefinitely, and it is clear that the circumference of form-cylinder P may be any even multiple of the breadth of three forms, a corresponding number of impression-cylinders of course being required.

I will now describe the sheet-associating mechanism or apparatus to the left of the rollers T U, Fig. 2. The rollers V and T are connected by tapes, as are the rollers W and U. (See Figs. 4, 5, 6.) There is a slight space between rollers V and W, while rollers T U touch one another, so as to grip the web as it passes between them. Rollers V and W are caused to oscillate in a circular arc, so that they are at one time opposite the pair of rollers *c d*, as in the figure, and at another time opposite the pair of rollers *a b*. The rollers *a* and *b* touch one another, as do also *c* and *d*. The centers of rollers *a b c d* lie in the arc of a circle which is concentric with that in which rollers V and W oscillate. The oscillations of rollers V and W must be different, as hereinafter explained, according as a two, a four, or a six page paper is being printed. No means of effecting these oscillations is shown, as such devices are old and well known. In fact, instead of the oscillating rollers a switch or switches or any other suitable device may be used by which a stream of sheets may be divided into two paths.

m n n' c' d' indicate rollers whose axes are parallel to those of the rollers *a b c*, &c. On rollers *d' c'* are loose pulleys, (see Fig. 5,) those on roller *c'* being connected by tapes with *c*, and those on roller *d'* similarly connected with *d*.

z z' are guards in connection with rollers *c' d'*, respectively. The loose pulleys on the shafts of the rollers *c' d'* are slightly less in diameter than the rollers themselves. The roller *c'* rotates in the contrary direction to that in which the tapes do run which connect the pulleys on said rollers *c'* with the roller *c*, and the guard *z* is to prevent the sheets running outward from coming in contact with the roller *c'*. Similar remarks apply to the roller *d'* and the guard *z* therewith connected.

For the sake of clearness some of the rollers are placed farther apart than they would be in practice, and some details are omitted. Thus the rollers *n* and *n'* should touch one another, and *n* be much closer to roller *c'* than is shown. Similarly, roller *m* should be much closer to roller *d'*, and both much nearer to the tapes connecting rollers *c c'*, so that there should be but a very small interval between the guard *z* and the lower sides of the said tapes, and the said guard should be very thin and smooth and lie as close as possible to the roller *c'*; but all these things are well understood by those skilled in the art, as the devices just described are old and well known.

f and *h* are turning bars arranged parallel

to one another, the former at the top and on one side, and the latter at the bottom and on the other side of the center of the apparatus, while both are inclined at an angle of forty-five degrees to the axis of the printing-cylinder.

p and q are similar parallel bars arranged at right angles to the other two bars, f and h , and also inclined at an angle of forty-five degrees to the axis of the printing-cylinder, both being at the top but on opposite sides of the center of the apparatus, the former being in a horizontal plane below that of the turner f , and the turner q likewise in a horizontal plane below that occupied by the turner p .

g g are two rollers whose axes are at right angles to the axis of the printing-cylinder, (see Fig. 6,) the upper surface of one of them being flush with the upper surface of the turning-bar f , and the under surface of the other flush with the under surface of the turning bar h .

k and l (see Fig. 4) are rollers, round which tapes pass.

o s u v w are rollers for returning the tapes, their axes being parallel to that of the printing-cylinder, and r' r^2 r^3 t' t^2 t^3 u' u^2 u^3 are guide-pulleys for returning the tapes, their axes being all parallel to one another and at right angles to the axis of the printing-cylinder.

The course of the various sets of tapes may now be easily traced. One set (marked i) connect roller c with loose pulleys on roller c' , and another (marked j) connect roller d with loose pulley on roller d' , as before explained. Each of these sets should consist of the same number of tapes, and they should run a tape of one set on a tape of the other in pairs, as indicated in Fig. 5. Similarly, the sets connecting rollers T and V and rollers U and W should run one of one set on another of the other set, in pairs. A set of tapes passes round the roller a and another round the roller b . These two sets should also be the same in number and run in pairs, as before explained. Each set may consists of any convenient number. Six are shown in the drawings; but a larger number would be better in practice, care of course being taken to fix them so as not to conflict with the sets i and j . The course of the tapes round roller a (and similarly of those round roller b) differs for the opposite halves of the roller. Consider first those which lie on the side toward the rollers g . Let a tape start at x , go round roller a , thence round the turning-bars p q , and from there to the roller n , its end being indicated by the letter x' . Its future course will depend on the after folding and delivery mechanism, and therefore I have not shown it joined to the other end, x ; but of course it must be ultimately returned, by guide-pulleys or other suitable means, to the other end, x . A tape starting round roller b (on its side toward the rollers g) goes round the turning-bars p and q , thence over the roller c' , thence round the roller w , thence round the guide-pulleys u' , (or u^2 or u^3 , as the case may be,) and

thence round the rollers u v , thus returning to the roller b , from which it was supposed to start. Now consider the tapes which run on rollers a and b on the other side—*i. e.*, on the side toward the rollers s . A tape starting from roller a passes round the turning bar f , thence over the rollers g , thence round the turning bar h , thence round the rollers k l d' o , thence round the guide-pulleys r' , (or r^2 or r^3 , as the case may be,) thence round the rollers s , thence round the guide-pulleys t' , (or t^2 or t^3 , as the case may be,) and from there returns to the roller a , whence it was supposed to start. A tape starting at y goes round roller b , then round the turning bar f , thence round the rollers g , thence round the turning bar h , and from there round the rollers k l m to the roller n' , its end being indicated by the letter y' . Its future course will depend on the after folding and delivery mechanism, and therefore I have not shown it joined to the other end, but of course it must be ultimately returned, by guide-pulleys or other suitable means, to the other end, y .

It will be seen that the sets of tapes I have described form three distinct channels or pathways. A stream of papers passed between rollers c and d will be conducted in a direct line to between rollers n and n' . A stream of papers passed between rollers a and b , on the side toward rollers g , goes round the turning bars p q , and thence between rollers n and n' , but on the opposite side of the machine to that from which it started—*i. e.*, on the side toward roller s —and the said stream will pass between rollers n and n' on the top of the stream coming from between rollers c and d . A stream of papers passed between rollers a and b , on the side toward rollers s , goes round the turning bar f , thence round the rollers g , thence round the turning bar h , and from there round the rollers k l m , to between the rollers n and n' , but on the opposite side of the machine to that from which it started—*i. e.*, on the side toward roller g —and the said stream will pass between rollers n and n' underneath the stream coming from between c and d . The length of the two pathways from between rollers a and b to between rollers n and n' need not be the same; but each of them must exceed the length of the pathway from between c and d to between rollers n and n' by once, or four times, or seven times, or &c. times, the breadth of a four-page paper. The course of the webs in each case can now be understood.

For a four-page paper, the forms should be placed on the form-cylinder so that the web issues printed on, as in Fig. 7. No oscillation of the rollers V W is required, except for the purpose of breaking the web, if, as is usual, it has not been completely severed by the knives carried by cylinder R . It is usual and advisable to connect roller T and cylinder R by fine tapes, and also roller U and cylinder S , so that the web may surely enter between rollers T and U . The knives in cylinder R must then have small breaks in them to admit the free

passage of the said tapes. If the rollers V W oscillate for the above purpose, the oscillation must be arranged so that the stream of papers constantly passes between the rollers *c* and *d*. The stream will thus pass between rollers *n* and *n'* in precisely the same form that it enters between rollers *c* and *d*—that is, as shown in Fig. 7—and it must now be conducted to any suitable folding apparatus which gives the first fold at right angles to the direction of motion.

For a two-page paper, a half-breadth roll should be placed in the machine on either side—say, for example, toward rollers *g*. One of the turning bars in the reverser Y should be adjusted so that the web may not undergo any lateral transfer, and the distance of travel of the web from cylinder F to cylinder K should be suitably fixed. Then, the web being on the side toward rollers *g*, the oscillation of the rollers V W should be timed so that all the papers marked C² in Fig. 8 enter between rollers *a* and *b*, and all those marked C' enter between rollers *c* and *d*. The stream will thus pass between rollers *n* and *n'* in the state indicated by Fig. 10, and it may be folded by the same mechanism as is the four-page paper, by suitably conducting it to the devices for giving the second fold, since the stream is in the same state as is the four-page stream after it has received its first fold.

To print a six-page paper, the forms must be arranged on the printing-cylinder so that the web is printed on as indicated by Fig. 9, and the oscillations of rollers V W timed so that all the papers marked A' B' are delivered between the rollers *c* and *d*, and all those marked A² B² between rollers *a* and *b*. Thus the A²'s go underneath the B's, and the B's go on top of the A's, so that the stream passes between rollers *n* and *n'* in the state indicated by Fig. 11. This stream may therefore be folded by the same mechanism which folds the four-page stream, Fig. 7, provided the periodical times of imparting the folds are slowed in proportion to the longer time between successive sheets; or instead, the motion of the stream, Fig. 11, may be slowed by any usual device, so that the stream becomes a continuous one, and the speed of the whole folding mechanism relatively to the other mechanism slowed in the same proportion. It will be observed that the half-webs are transferred laterally without

being reversed, and any other suitable device may be employed for the purpose instead of those here shown. It is also evident that mechanism which reverses as well as transfers may be used instead, if preferred, the forms being placed on the printing-cylinder, so that the web shall issue printed on, as indicated in Fig. 9, except that pages three and four are interchanged; and indeed by choosing different folding mechanisms the ways of bringing the six-page papers into four-page form may be very much varied.

If it is not required to print a two-page paper, or if the two-page paper is delivered open or folded by separate mechanism, or if the four-page folding mechanism is capable of operating on a stream, such as in Fig. 8, then the transferring mechanism may be dispensed with, for if pages three and four, Fig. 9, be turned round or interchanged, A² may be brought onto A', and B² under B'.

What I herein claim as my invention is—

1. The combination, in a web printing-press, of a form-cylinder (adapted to receive six forms, two abreast, the columns lying parallel to its axis and not occupying its whole surface,) and impression and carrier cylinders, with mechanism for reversing the sides of the web, mechanism for longitudinally slitting it along its central line, and mechanism for transversely severing it into sheets of unequal breadth, (measured in the direction of their motion,) all substantially as described.

2. The combination, with printing mechanism whereby a web is perfected, a slitting mechanism dividing it longitudinally into two webs, mechanism for transversely severing both of said webs into sheets of unequal breadth, mechanism for moving forward side by side the larger sheets, and deflecting devices whereby the smaller sheets are transferred laterally and associated with the larger sheets, all substantially as described.

3. The combination, with printing mechanism operating to perfect a web, of mechanism for severing it into alternately large and small sheets and means for associating the small with the large sheets, all substantially as described.

EDWYN ANTHONY.

Witnesses:

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