

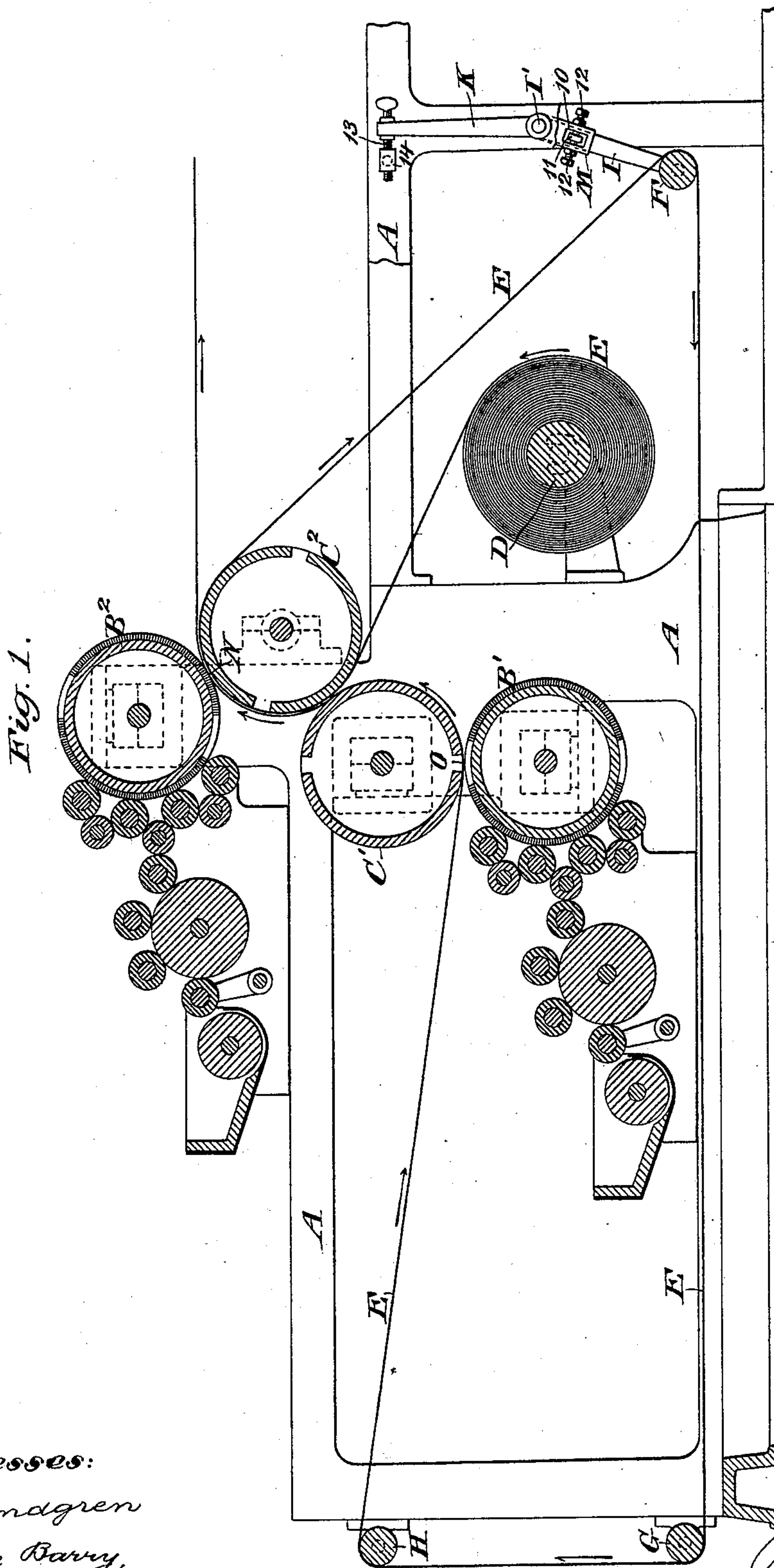
(No Model.)

4 Sheets—Sheet 1.

J. C. HEMPHILL.  
ART OF PRINTING.

No. 539,268.

Patented May 14, 1895.



Witnesses:  
O. Sundgren  
George Barry,

Inventor:  
James C. Hemphill  
by attorneys

R. W. Lewis

(No Model.)

4 Sheets—Sheet 2.

J. C. HEMPHILL.  
ART OF PRINTING.

No. 539,268.

Patented May 14, 1895.

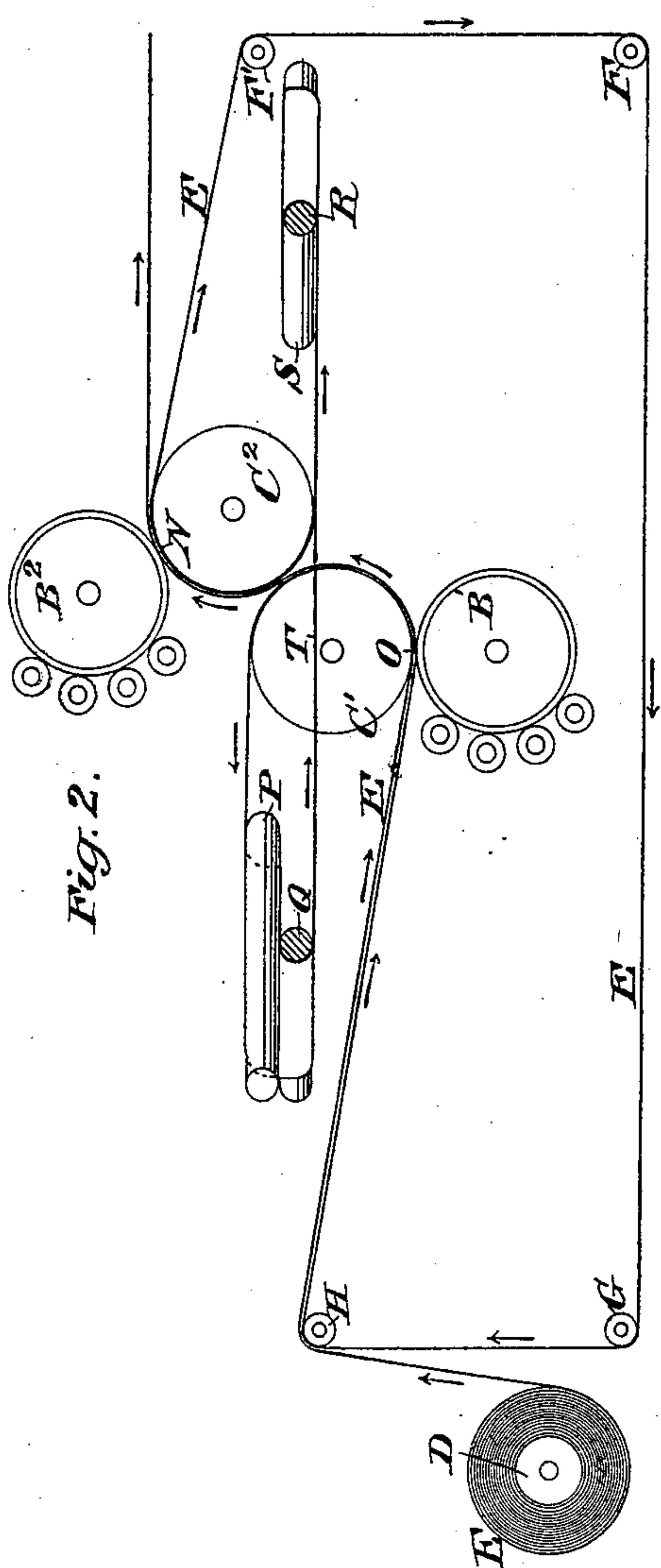


Fig. 2.

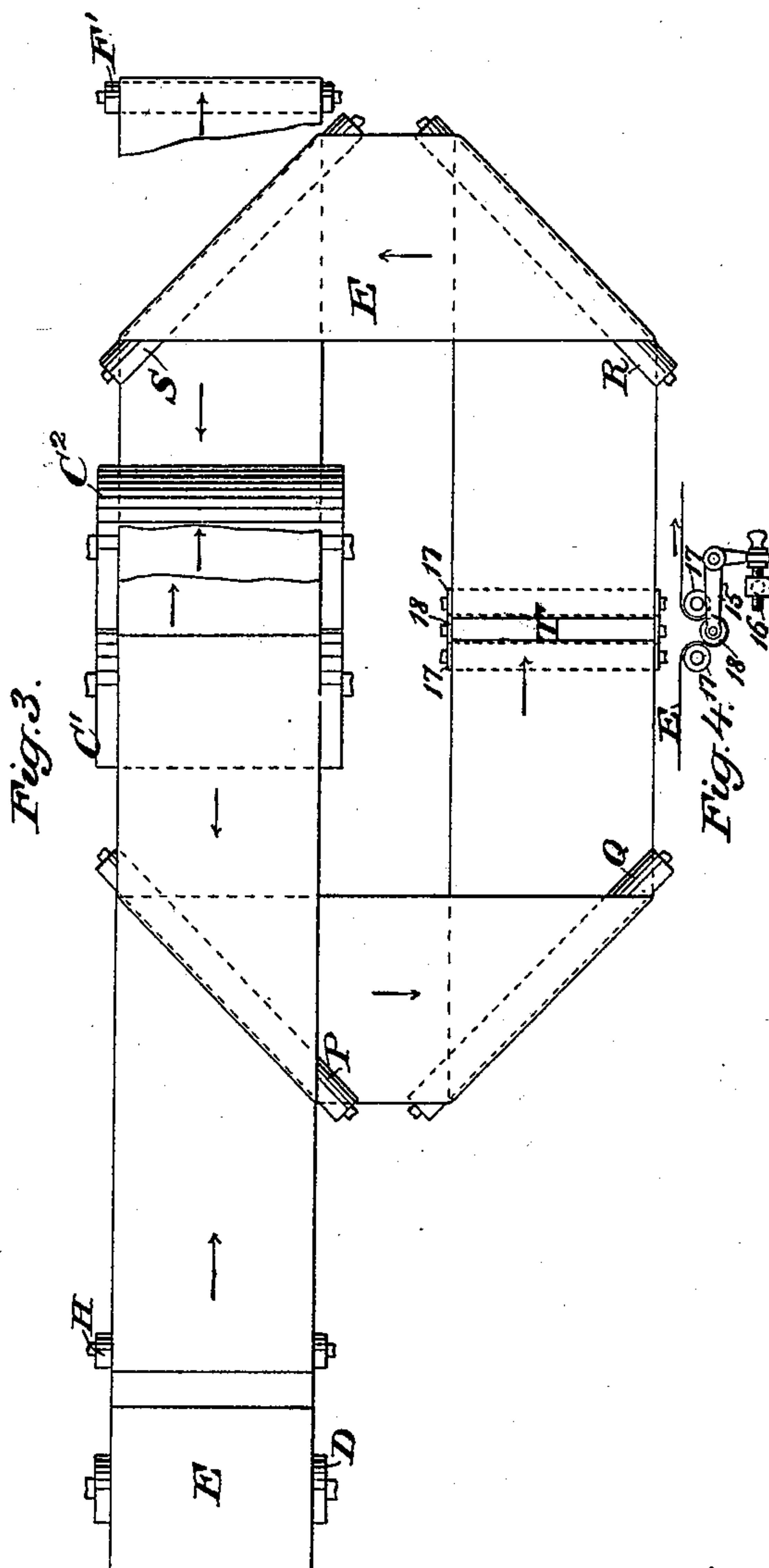


Fig. 3.

Fig. 4.

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Brown & Sewall

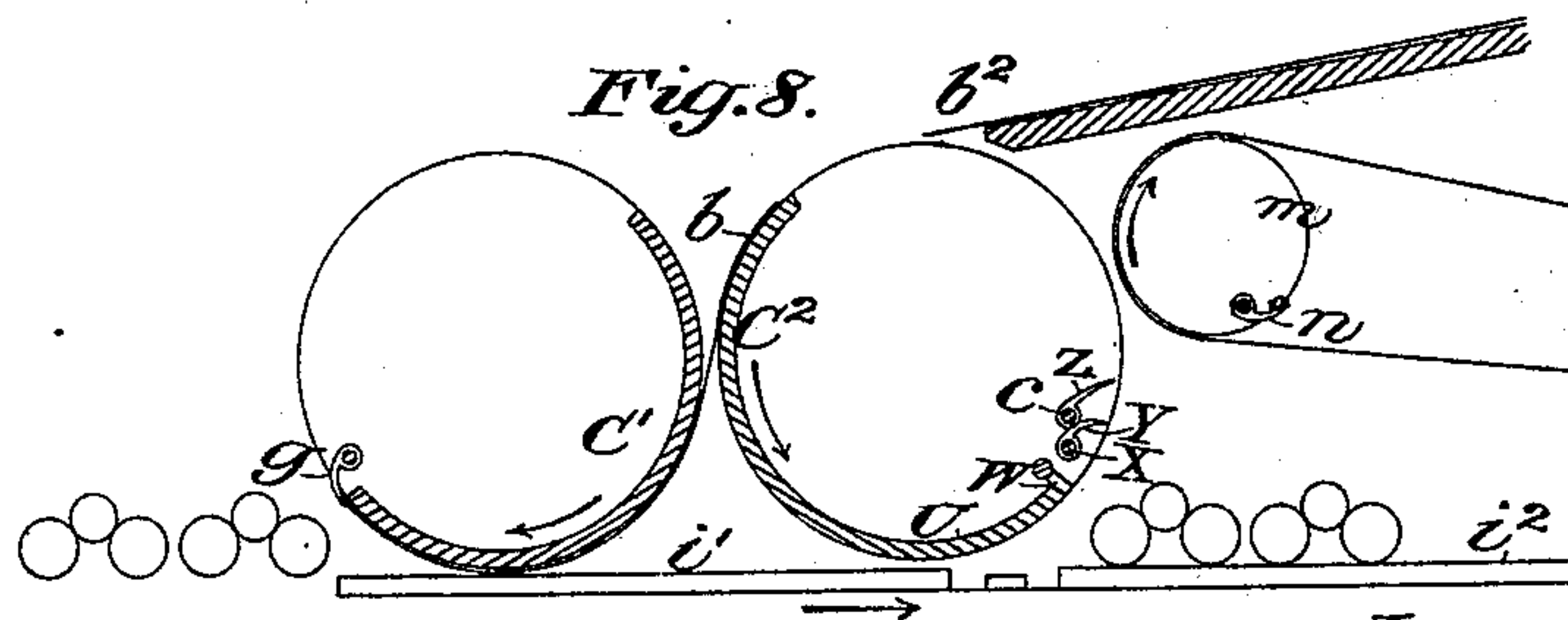
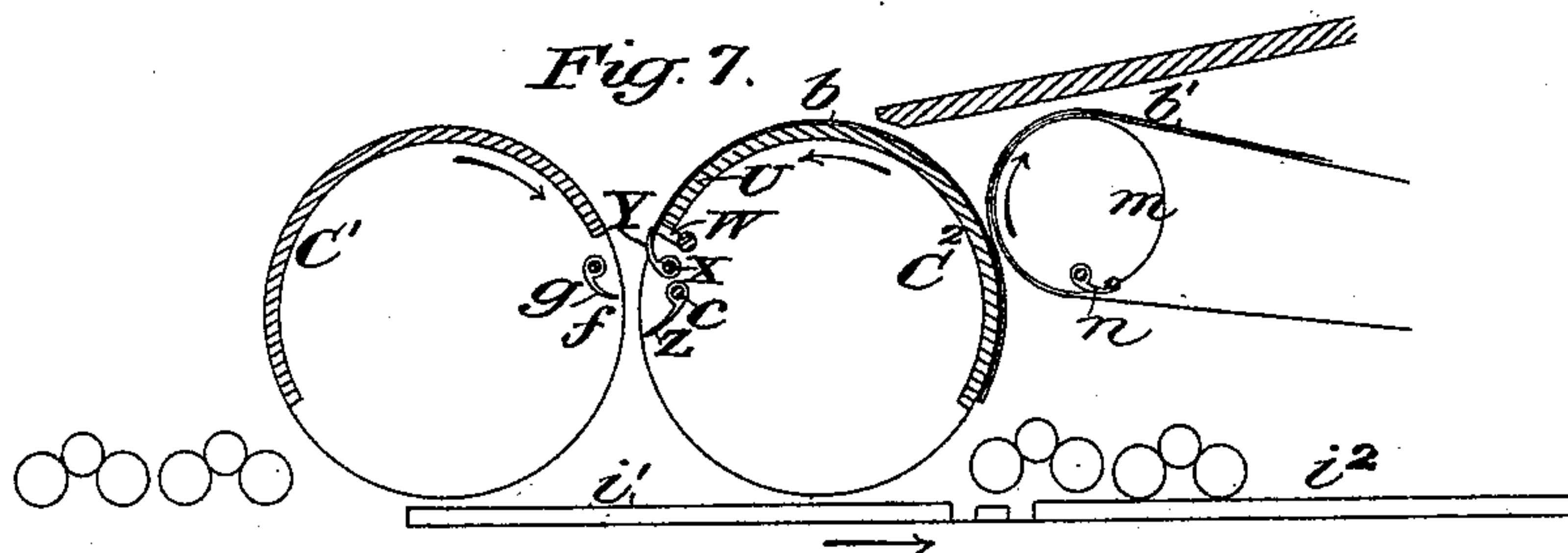
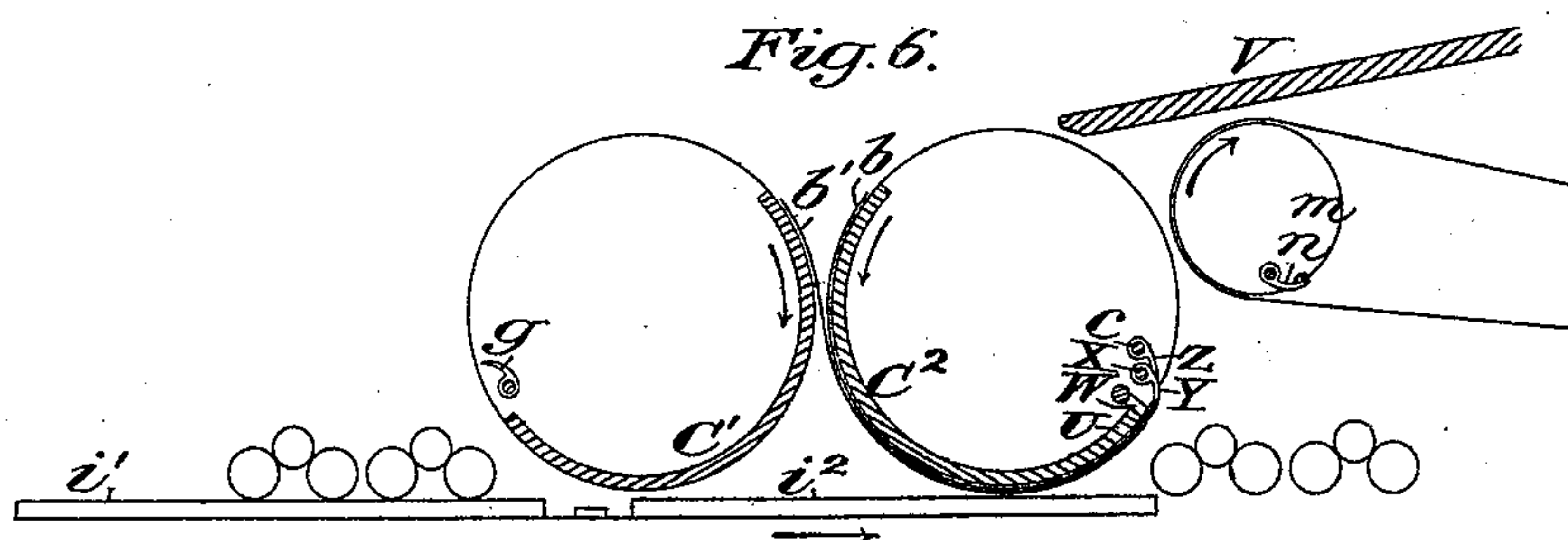
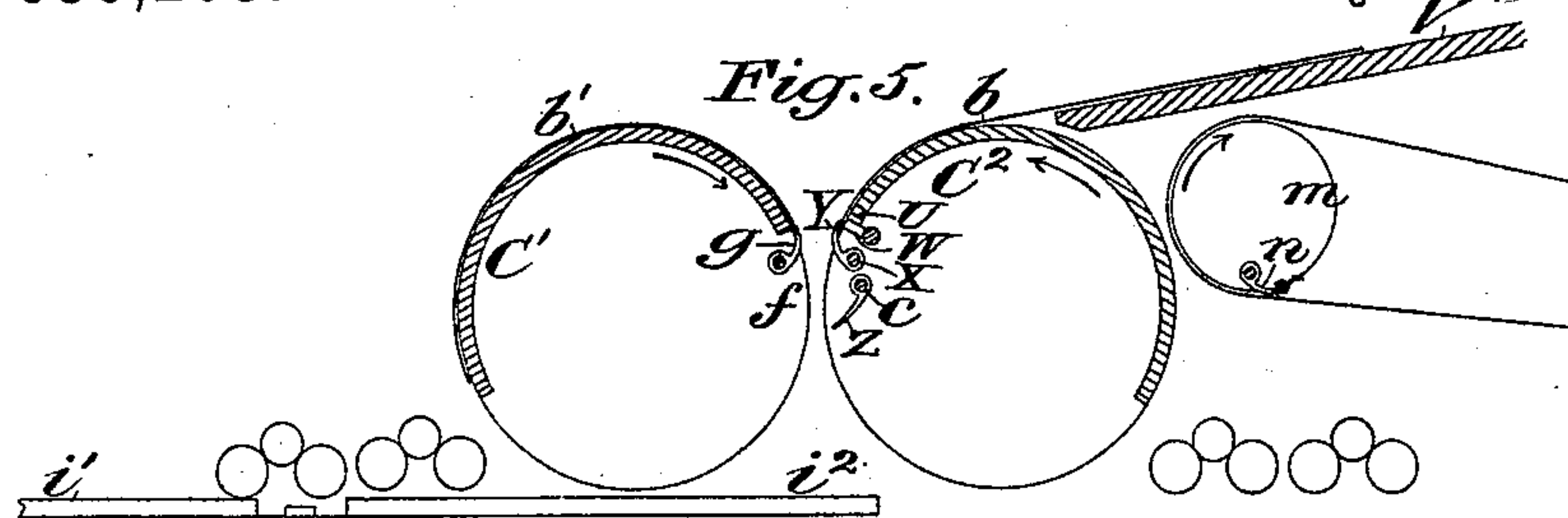
(No Model.)

4 Sheets—Sheet 3.

J. C. HEMPHILL.  
ART OF PRINTING.

No. 539,268.

Patented May 14, 1895.



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(No Model.)

4 Sheets—Sheet 4.

J. C. HEMPHILL.  
ART OF PRINTING.

No. 539,268.

Patented May 14, 1895.

Fig. 9.

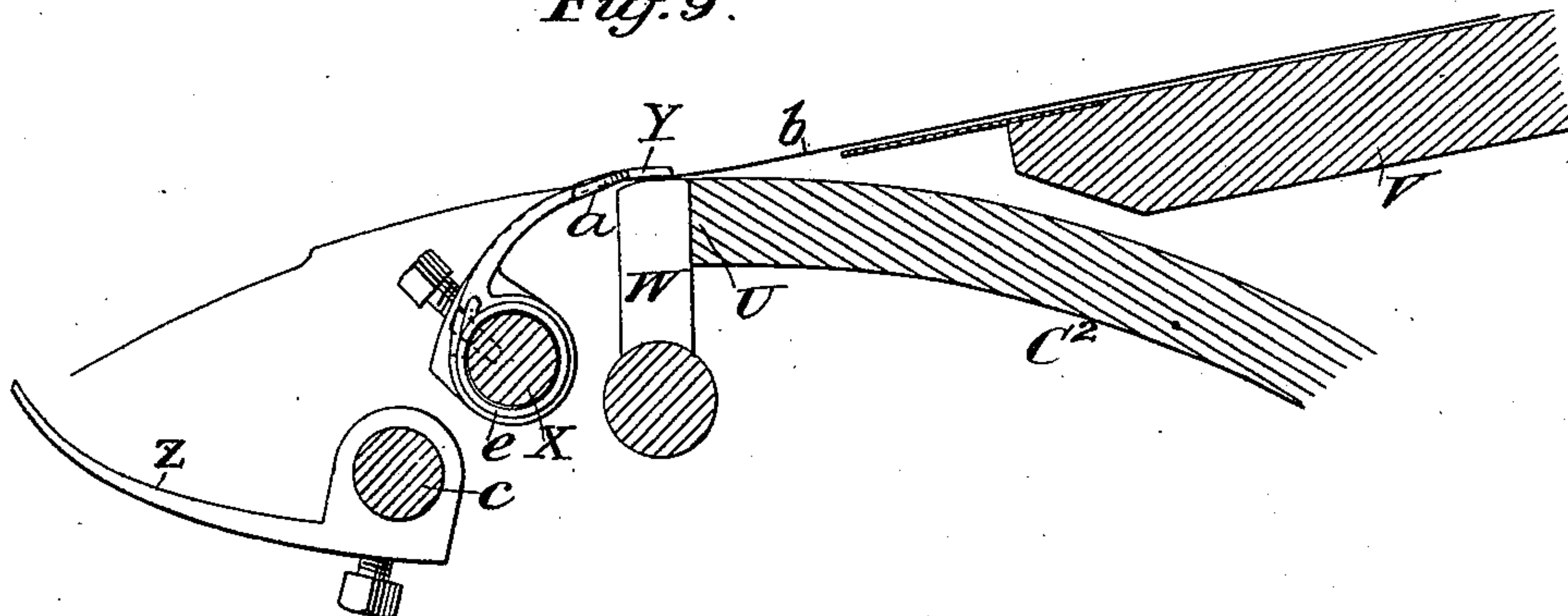


Fig. 11.

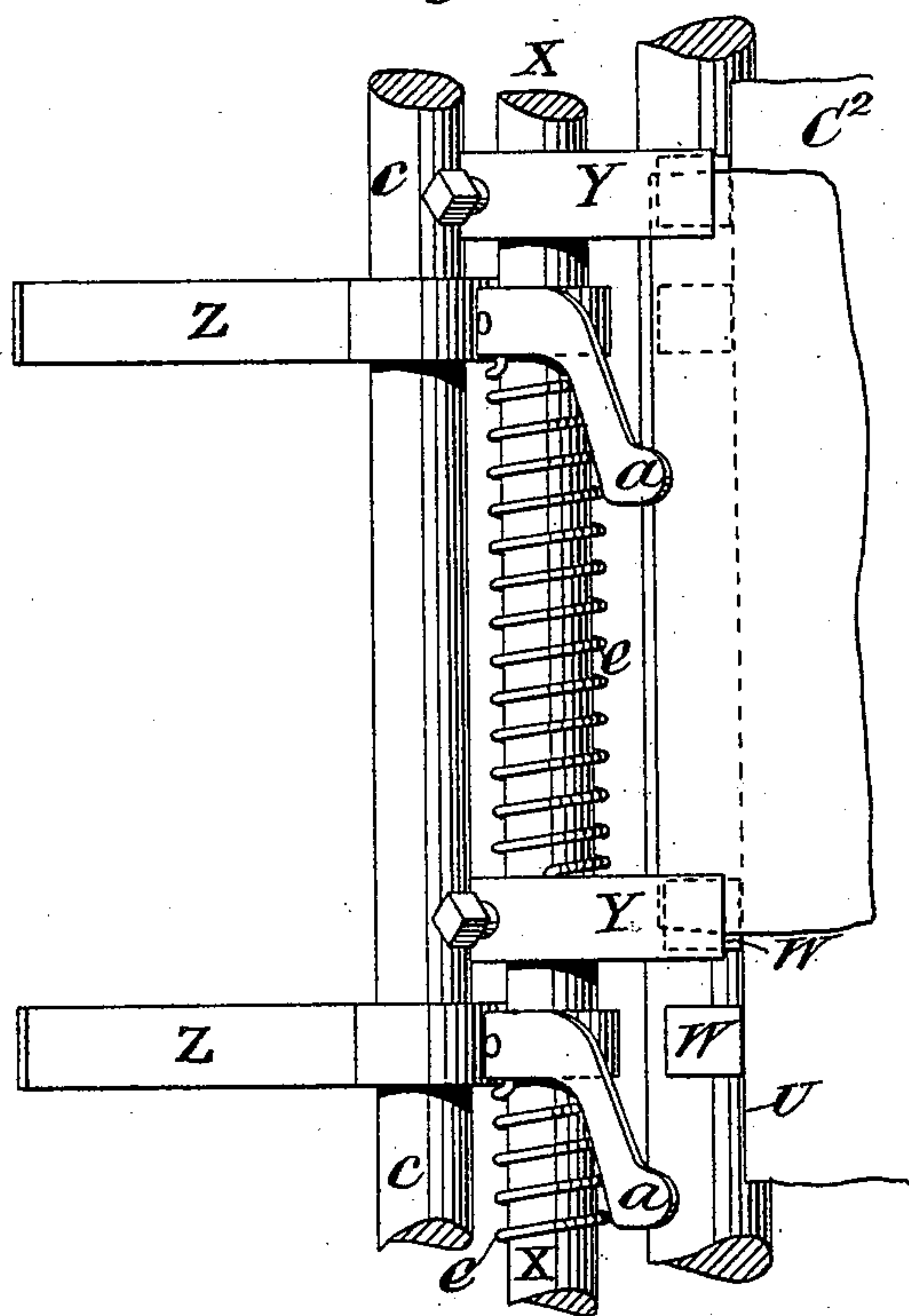


Fig. 10.

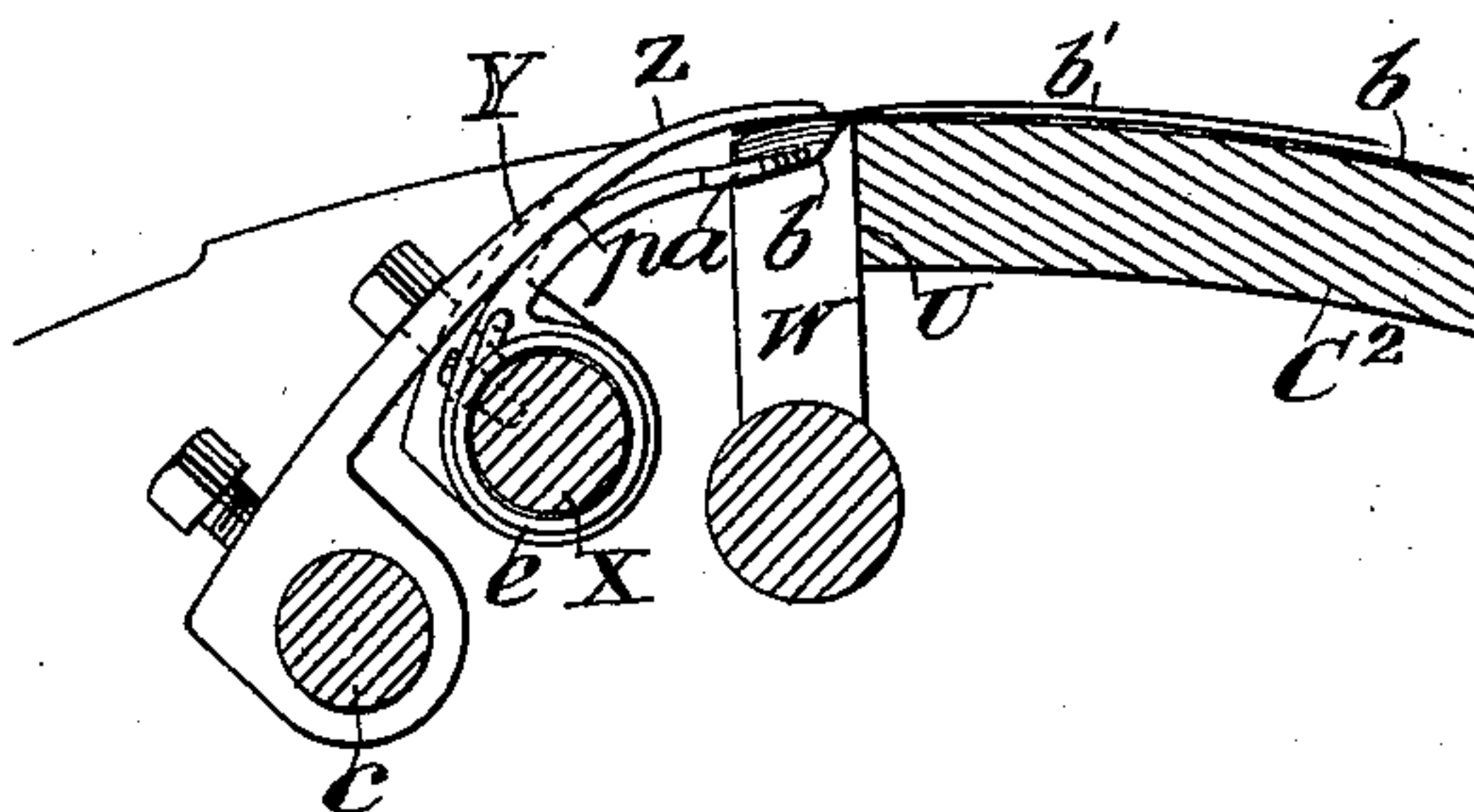


Fig. 12.

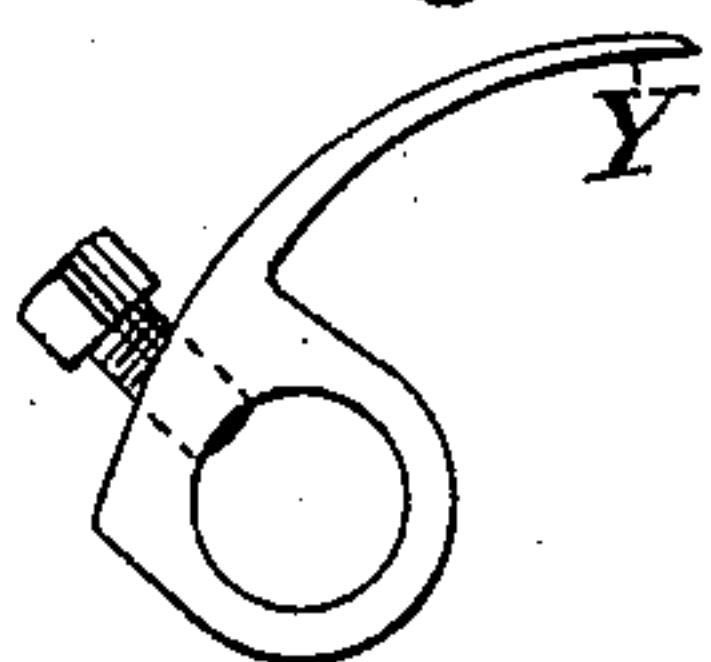
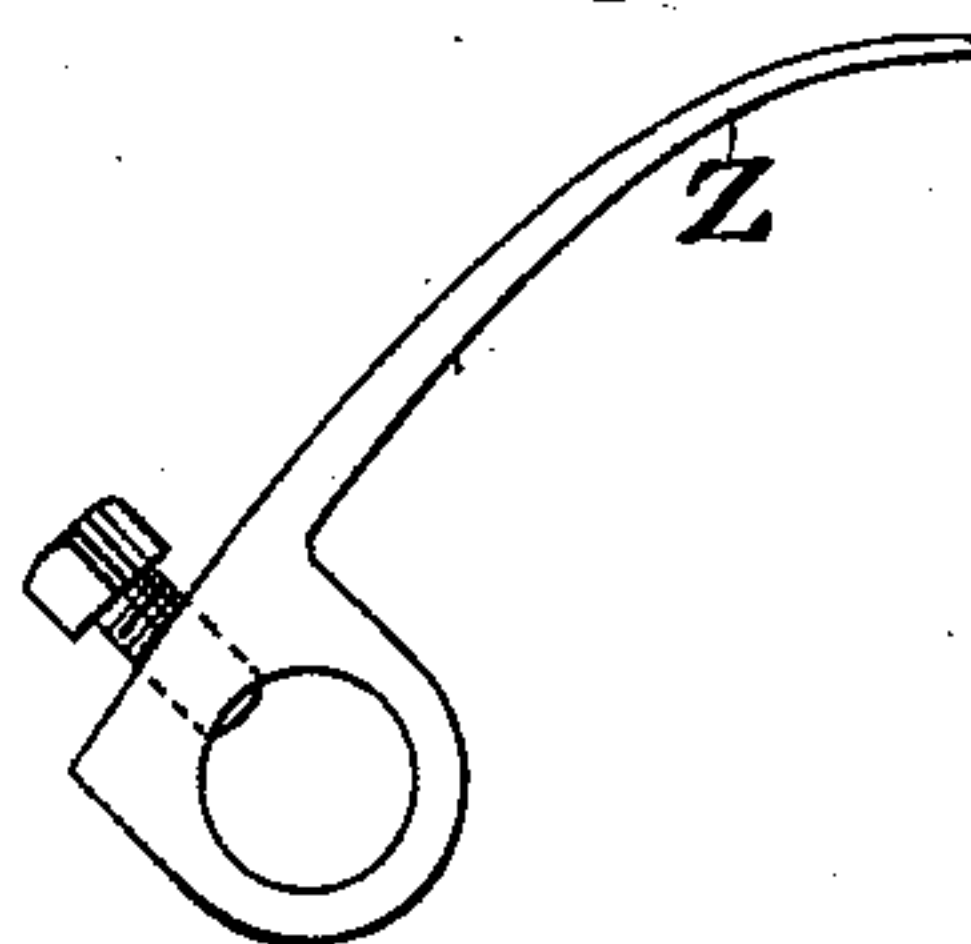


Fig. 13.



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# UNITED STATES PATENT OFFICE.

JAMES C. HEMPHILL, OF WESTERLY, RHODE ISLAND, ASSIGNOR TO THE C. B. COTTRELL & SONS COMPANY, OF JERSEY CITY, NEW JERSEY, AND NEW YORK, N. Y.

## ART OF PRINTING.

**SPECIFICATION** forming part of Letters Patent No. 539,268, dated May 14, 1895.

Application filed September 1, 1894. Serial No. 521,933. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES C. HEMPHILL, of Westerly, in the county of Washington and State of Rhode Island, have invented a new and useful Improvement in the Art of Printing, of which the following is a specification.

My improvement relates to what is known in the art of printing as "perfecting," that is to say, the printing of both sides of web sections consisting either of separate sheets or portions of a continuous web by causing such web sections in a continuous movement to pass first between one printing surface and corresponding impression surface to print one of its sides and afterward between another printing surface and corresponding impression surface to print its other side, and this part of my improvement consists in so feeding the web sections between the said two printing surfaces and corresponding impression surfaces in succession that each shall first act as a tympan or offset sheet and afterward have the offset thereby produced upon it covered or hidden by printing over it.

I will proceed to describe my invention in detail with reference to the accompanying drawings and afterward point out its novelty in the claims.

Figure 1 represents a longitudinal vertical section of the principal parts of a rotary continuous web-perfecting printing-machine, illustrating my invention. Fig. 2 is an outline diagram representing the principal parts of a rotary continuous web-perfecting printing-machine somewhat modified from that represented in Fig. 1, but also illustrating my invention. Fig. 3 is a plan view corresponding with Fig. 2. Fig. 4 is a detail view, which will be hereinafter explained. Figs. 5, 6, 7, and 8 are diagrams, each representing a vertical section of so much of a flat-bed perfecting printing-machine as is necessary to illustrate my invention in connection with and as performed by a machine of that class in printing on web-sections in the form of separate sheets, the said four figures showing the parts in different positions to illustrate the successive stages of their operation. Figs. 9 and 10 represent, on a larger scale, vertical sectional views of portions of the second im-

pression-cylinder and its grippers of the machine shown in Figs. 5, 6, 7, and 8. Fig. 11 represents a plan of a portion of the impression-cylinder and parts of its grippers corresponding with Fig. 9. Figs. 12 and 13 represent side views of certain grippers which are used in carrying out my invention.

I will first describe my invention with reference to Fig. 1.

A designates the framing of the machine; B', the first form or plate cylinder; C', the first impression cylinder; B<sup>2</sup>, the second form or plate cylinder and C<sup>2</sup> the second impression cylinder.

D is the roller from which the web of paper E to be printed is supplied.

F G H are guide rollers.

The rollers D G H are represented as supported in stationary bearings.

The roller F is represented as supported in adjustable bearings in the two similar arms I of a lever I K M which will be hereinafter more fully described.

The operation of this machine is as follows:

The web of paper from the roller D passes, as indicated by arrows in Fig. 1, first around the second impression cylinder C<sup>2</sup>, thence around the rollers F G H between the first form cylinder B' and first impression cylinder C' where one side is printed. It passes thence up between the second form cylinder B<sup>2</sup> and second impression cylinder C<sup>2</sup> where its second side is printed. While the second side is thus receiving the impression, the types on the second form cylinder B<sup>2</sup> press the fresh ink of the impression on the side first printed, into contact with the fresh unprinted portion of the web which passes around the second impression cylinder C<sup>2</sup> under that portion of the web which has been printed between the cylinders B' C' and thereby produce a faint outline of some of the types of the second form cylinder B<sup>2</sup> on the otherwise clean web at the point N on said cylinder C<sup>2</sup> to which the latter comes from the roller D. When the part on which this faint outline, or "offset" as it is called, is produced again reaches the point N it is on the outside and comes against the same types which cause the said offset and these types print over the same



places and cover up the said offset. The operation is now completed and the web runs off to the folder or delivery.

It may be understood that the distance along the web from the point N around the rollers F G H and cylinders C' C<sup>2</sup> to the point N again, must be equal to an exact multiple of the length of a single sheet or of the circumference of the form cylinder B<sup>2</sup>. To adjust this distance equally and to compensate for the shrinking or expansion of the paper, the bearings for the roller F are made adjustable as hereinbefore mentioned. In the adjustment for this purpose both of the bearings are adjusted together but a separate adjustment of the two bearings is also desirable to correct any tendency to sidewise movement of the web. These adjustments are provided for in the following manner: One of the lever arms I which contain the bearings for the said roller F, is fastened to the fulcrum shaft I' and the other is loose thereon, the said shaft being fitted to turn in bearings in the framing A. The third arm K of the said lever is fast on the said shaft and so is the fourth arm M. The arm M has in it a slot at 10, as shown in Fig. 1, to receive a projection 11 on the loose arm I, and adjusting screws 12 are screwed into the slotted portion of the arm M on opposite sides of the projection 11 of the loose arm I. By setting up one or other of these screws, the loose arm I may be adjusted backward or forward relatively to the corresponding arm which is fast to the fulcrum shaft I'. This adjustment of the loose arm I enables the roller to be set more or less askew to correct any tendency to sidewise movement of the web. The adjustment of the roller to compensate for the shrinking or expansion of the paper is provided for by a screw 13 which is fitted to turn but confined longitudinally in the arm K of the lever and which screws through a swiveling nut 14 attached to the framing.

It might happen that with the arrangement of rollers shown in Fig. 1 and hereinabove described for conducting the web enough ink would be pressed on to the clean web at the point N from the first printed side to leave an offset on the tympan of the first impression cylinder C' as it passes the point O on the said cylinder. To guard against this, the arrangement of rollers shown in Figs. 2 and 3 may be employed. With this arrangement of rollers the web E passes from the roller D first over the roller H, thence to and around the first impression cylinder C' to angle bars P Q R S, thence to and around a roller F', whence the path is similar to that shown in Fig. 1. The distance measured on the path of the web from the first impression cylinder C' around the angle bars to the second impression cylinder C<sup>2</sup>, must be such as to bring the offset in such relation to that produced at N, that it will be covered when it again reaches the point O. To make this distance right and to provide for shrinking and stretching

of the web, means of adjustment may be made at some point, for instance, at the point T. (Figs. 2 and 3.) Fig. 4 is a diagram of such means of adjustment. In this figure, 17 represents rollers in fixed bearings over which the web passes to an intermediate roller 18 carried by a lever 15 adjustable by a screw 16 to depress the web more or less between the rollers 17.

To carry the web from the second impression cylinder C<sup>2</sup>, in the example illustrated in Fig. 1, angle bars similarly arranged to those shown in Figs. 2 and 3, may be used instead of rollers F G H.

I will now, with reference to Figs. 5 to 13, describe my invention as applied in connection with and performed by a flat bed perfecting machine. C' C<sup>2</sup> designate respectively the first and second impression cylinders and V the feed board which is arranged to feed the sheets first to the second impression cylinder. i' i<sup>2</sup> are respectively the first and second forms.

Referring now particularly to Figs. 9, 10, and 11, U is a portion of the gripper edge of the second impression cylinder C<sup>2</sup>. W are gripper pads and tympan fingers combined. X is the first gripper rod; Y Y, the first set of grippers; c, the second gripper rod, and Z Z the second set of grippers. These grippers are shown separately in Figs. 12 and 13. a a are depressing fingers which, when the second set of grippers Z Z are closed, depress the edge of a sheet b between the grippers Y Y so that the sheet b' may be taken by the delivery reel grippers without disturbing the sheet b. The depressing fingers a a are held down by the grippers Z Z bearing at the points p. When the grippers Z Z are opened, the springs e lift the depressing fingers to their normal position as shown in Fig. 9, in which case the sheet b may be delivered to the first impression cylinder C' which is farther from the feed board.

Referring now to Figs. 5, 6, 7, and 8, m is the delivery reel; n, the delivery grippers of the said reel; g, the grippers of the first impression cylinder C'. The gripper motions may all be the same as usually employed on two-revolution printing machines. In the cylinder C<sup>2</sup> having two sets of grippers, one set may be operated from each end of the cylinder. The cylinders make each two revolutions to each sheet printed.

The operation is as follows: A sheet b' is fed to the grippers Y Y of the second impression cylinder C<sup>2</sup> (see Fig. 5) which cylinder should be tripped from descending so as not to print this first sheet but to deliver it to the grippers g of the first impression cylinder C' when, after having made about one and a quarter revolutions with the second impression cylinder C<sup>2</sup>, the said sheet comes for a second time to the point f. The grippers g of the first impression cylinder C' take the sheet b' and the latter receives an impression from the first type form i', and as the grip-



pers Y come for the third time to the point of feeding, they take a second sheet *b* and shortly afterward the two cylinders reach the position shown in Fig. 5, the first impression cylinder *C'* having the sheet *b'* printed on its outer side and the second impression cylinder *C''* having a clean sheet *b*. When the gripper edges of the impression surfaces of the two cylinders reach the point *f*, the grippers *Z* of the second impression cylinder *C''* seize the front edge of the sheet *b'* which is at the same released by the grippers *g* of the first impression cylinder and this sheet *b'* is now taken by the second impression cylinder *C''* and receives its second impression, on the opposite side, from the form *i''*, (Fig. 6) after which it is taken by the grippers *n* of the delivery reel *m* and released by the grippers *Z*, while the sheet *b* held by the grippers *Y*, goes on (see Fig. 7) to be taken to the cylinder *C'* on which it receives its first impression from the form *i'*. (See Fig. 8). It will be understood by reference to Fig. 6, that the freshly printed side of the sheet *b'* is pressed against the sheet *b* while the said sheet *b'* is receiving its second impression. Thus some of the letters of the second form *i''* will show on the sheet *b*. When the grippers *Y* (see Fig. 8) reach the feeding position, they take a sheet *b''* and in about a quarter of a revolution later the grippers *Z* take the sheet *b* from the cylinder *C'* and give it its second impression on the form *i''*, and being on the outside will now receive print over the same places which receive the offset when it was under the sheet *b'* while the latter received its second impression. The sheet *b* is then delivered to the delivery reel and the sheet *b''* will go to the cylinder *C'* to receive its first impression. This operation is repeated, each sheet receiving the offset from the second impression on a previously printed sheet and afterward taking its own second impression on the said offset.

The depressing fingers *a a* and the means of operating them herein described with reference to Figs. 9, 10 and 11, constitute no part of the present invention but are part

of the subject-matter of my application for United States Patent, Serial No. 539,551, filed February 25, 1895.

What I claim as my invention is—

1. The improvement in the art of printing on both sides of the same section of a web during a continuous movement thereof, consisting in first making such web section serve as an offset sheet to receive the offset of a preceding printed impression and afterward taking a succeeding printing impression upon the offset so received, substantially as herein set forth.

2. The improvement in the art of printing on both sides of the same section of a web, consisting in causing such web section to pass twice between the printing and impression surfaces which produce the impression on one side of it, the said web section in its first passage between the said surfaces acting as an offset sheet and in its second passage between the said surfaces having the printed impression produced on the offset produced on it in its first passage, substantially as herein set forth.

3. The improvement in the art of printing on both sides of the same section of a web, consisting in first causing such web section to pass between a printing surface and an impression surface to be printed on one side, next causing the said web section to pass between a second printing surface and second impression surface to be printed on the other side and at the same time causing the passage of a second and clean web section to pass between the web section first printed and the said second impression surface and afterward causing the said second web section to pass first between the first mentioned printing and impression surfaces and afterward between the second printing and impression surfaces, substantially as herein set forth.

JAMES C. HEMPHILL.

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A. C. WHITFORD.