

(No Model.)

8 Sheets—Sheet 1.

E. ANTHONY & J. E. HARVEY.

PRINTING MACHINE.

No. 265,233.

Patented Oct. 3, 1882.

Fig. 1<sup>a</sup>

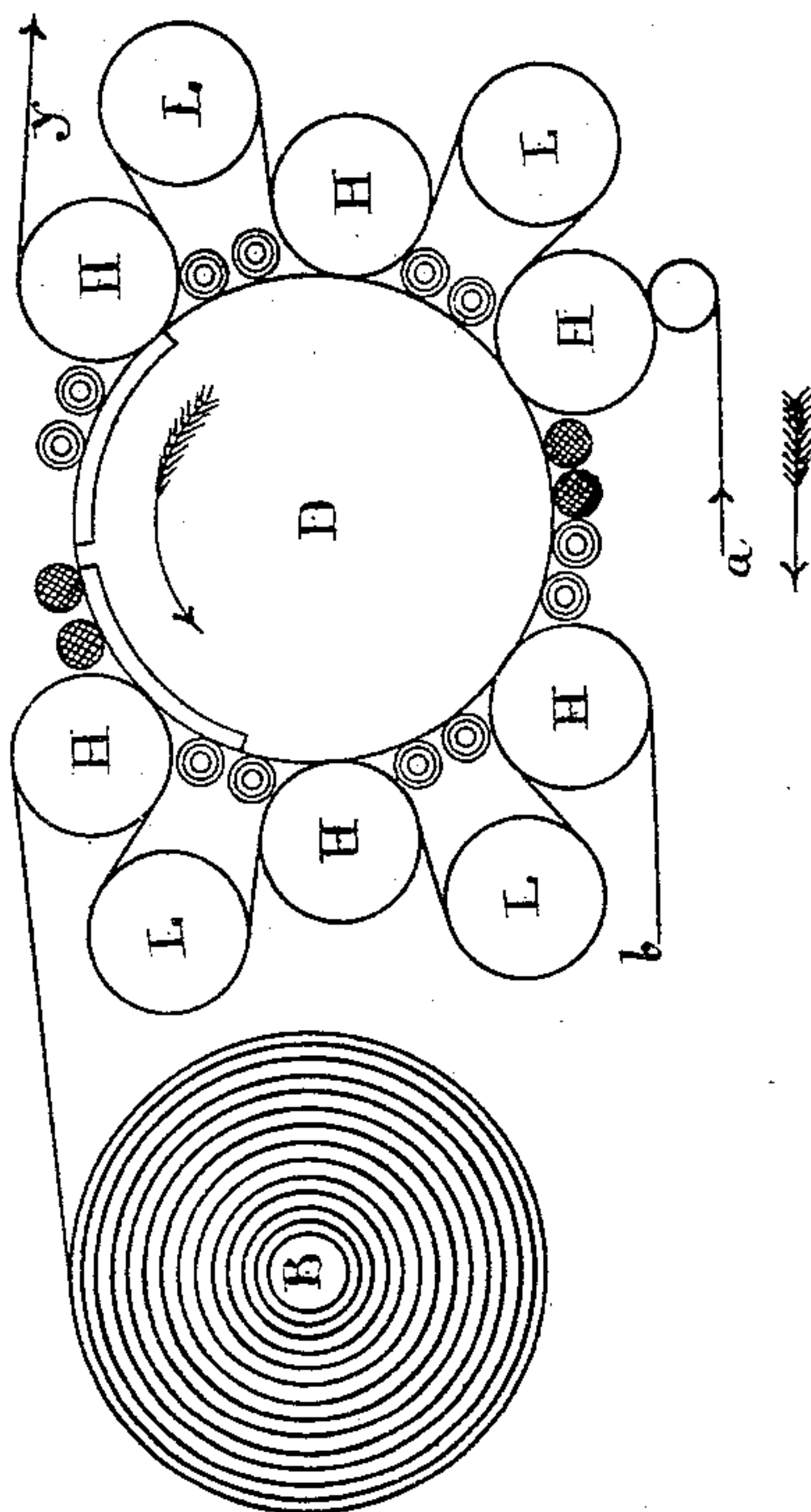
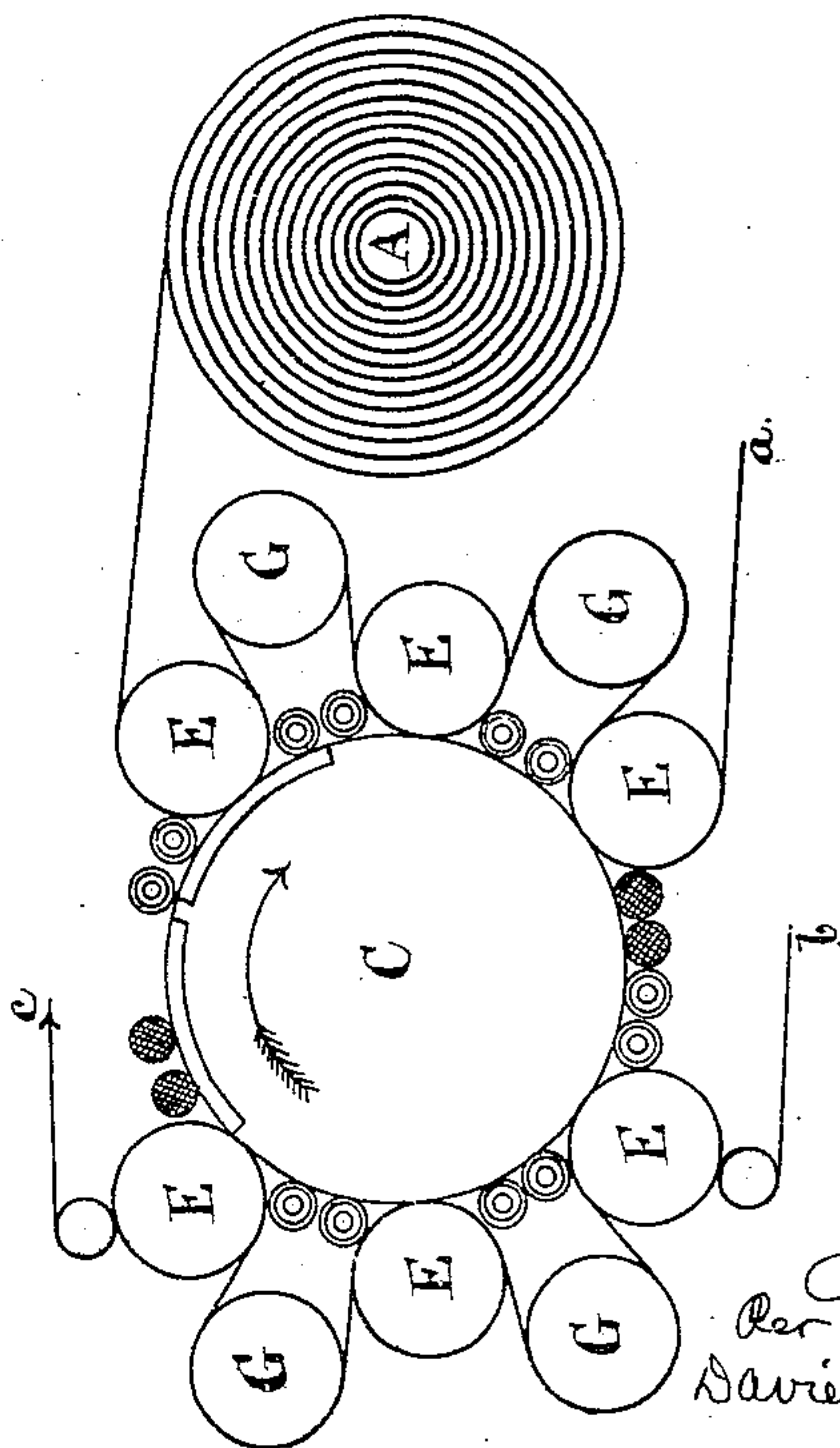


Fig. 1



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Fig. 2<sup>a</sup>.

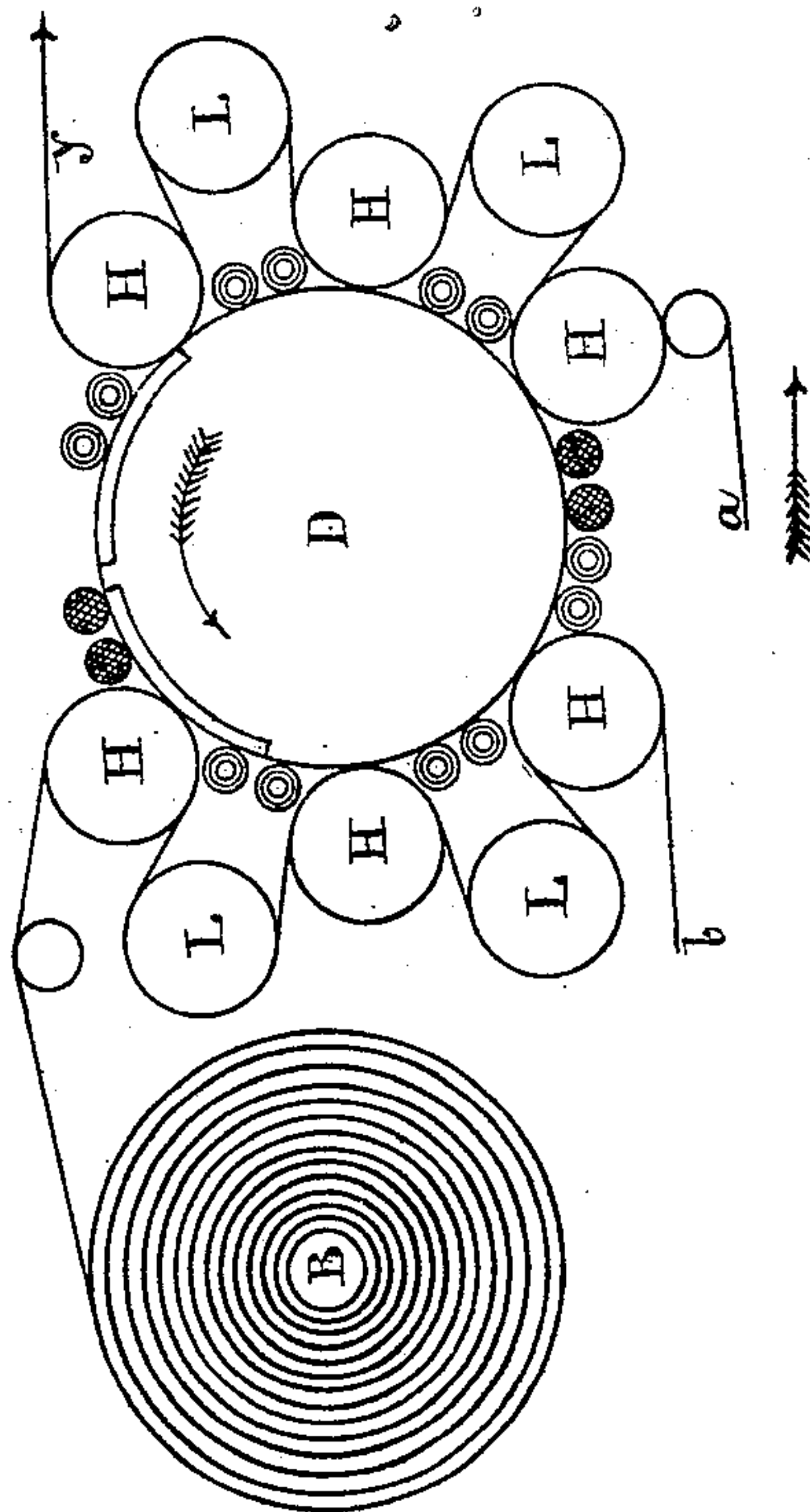
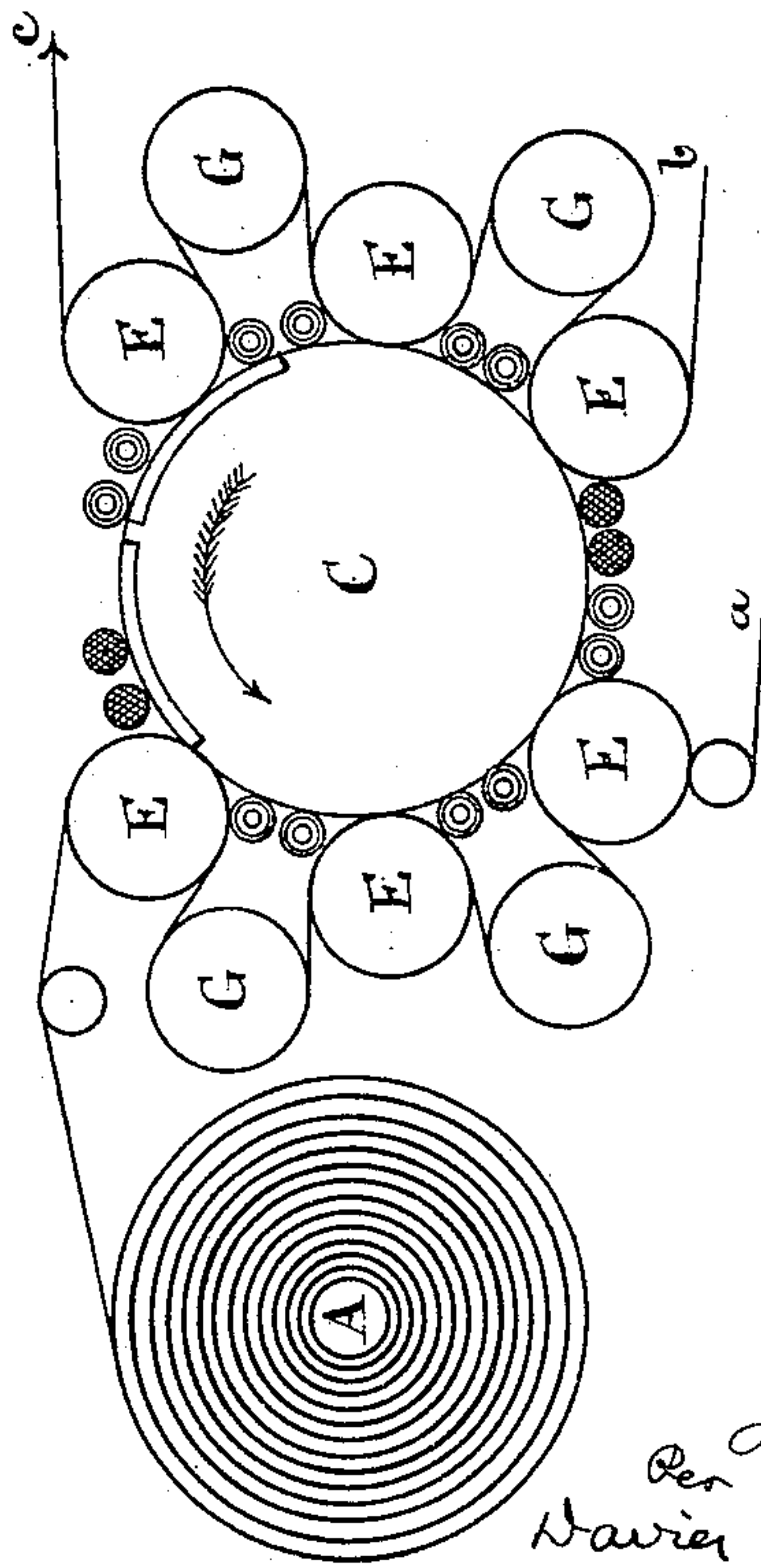


Fig. 2.



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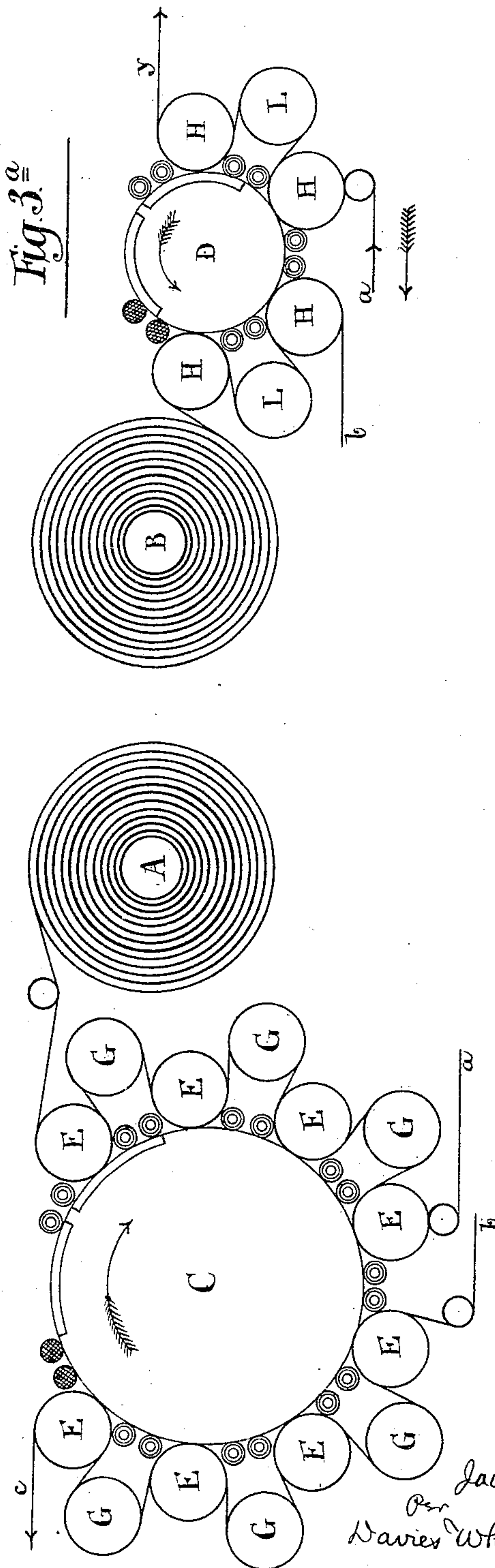
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Fig. 4<sup>a</sup>.

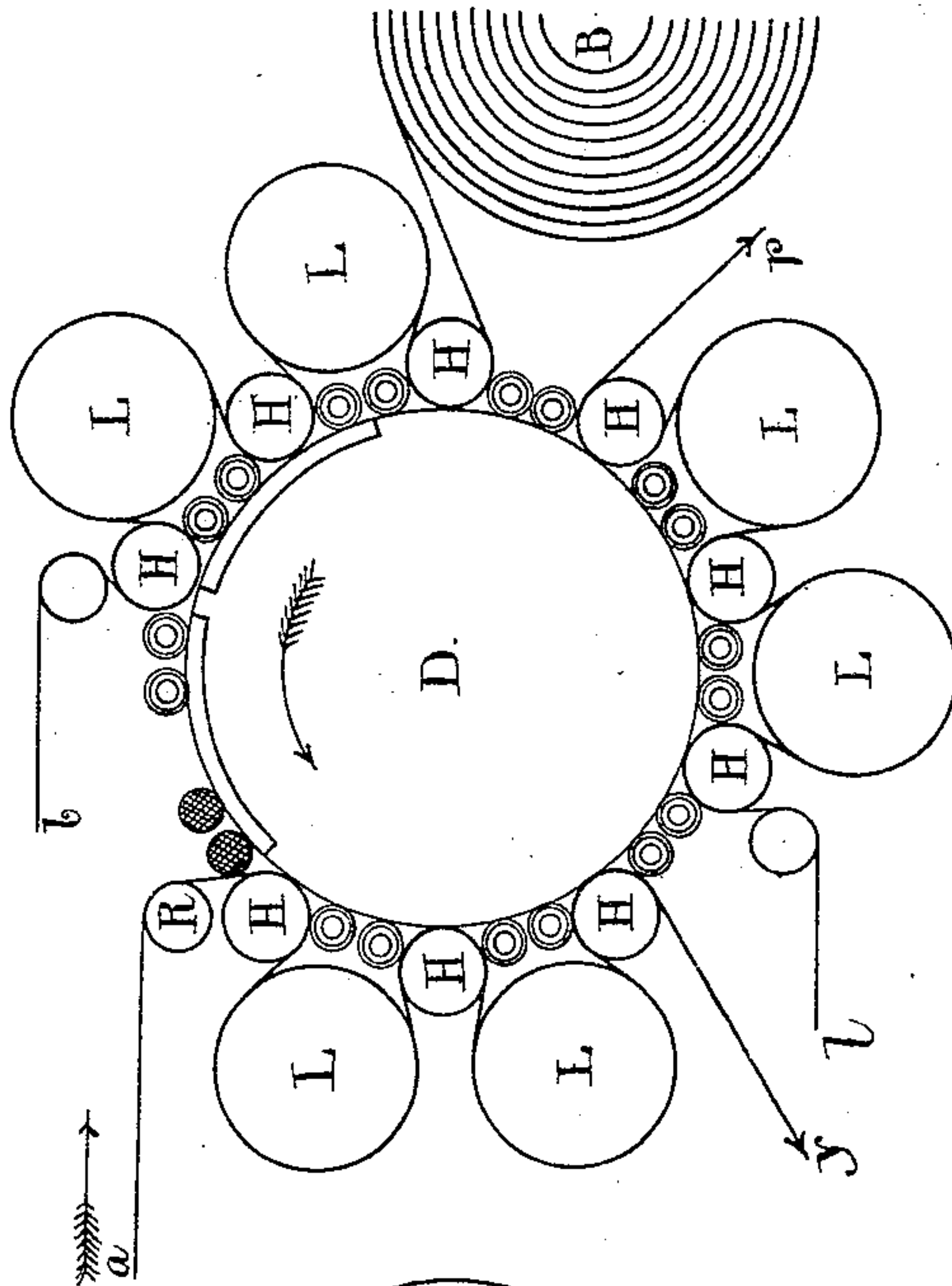
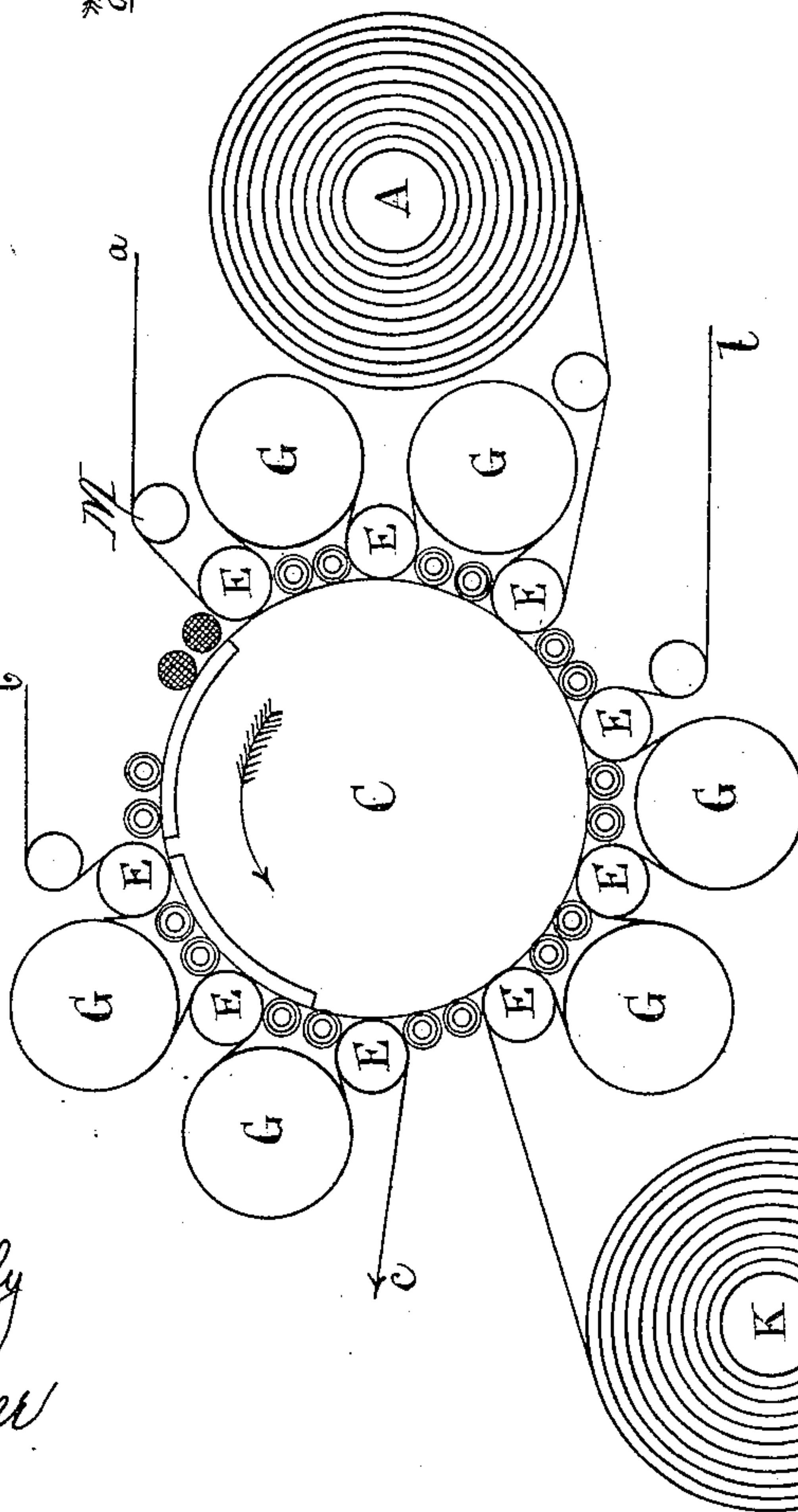


Fig. 4.



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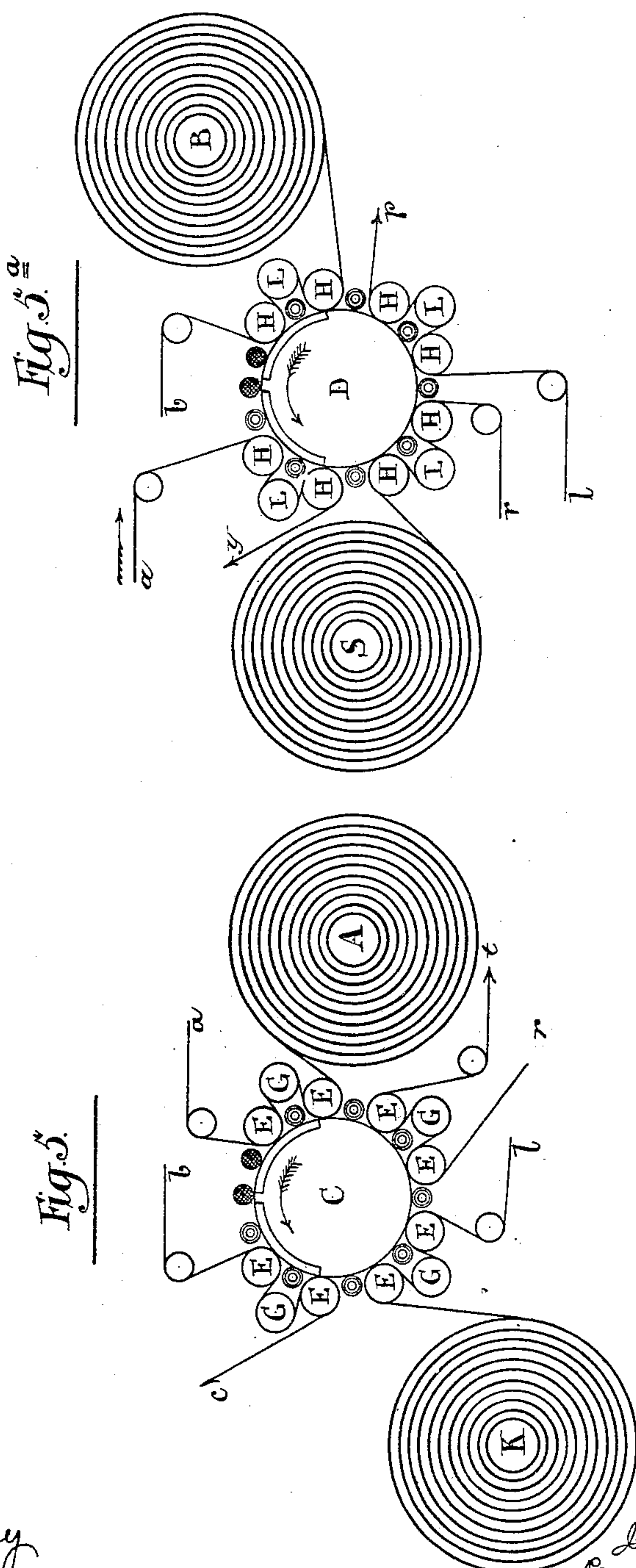
8 Sheets—Sheet 5.

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PRINTING MACHINE.

No. 265,233.

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(No Model.)

8 Sheets—Sheet 6.

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Patented Oct. 3, 1882.

Fig. 6.<sup>a</sup>

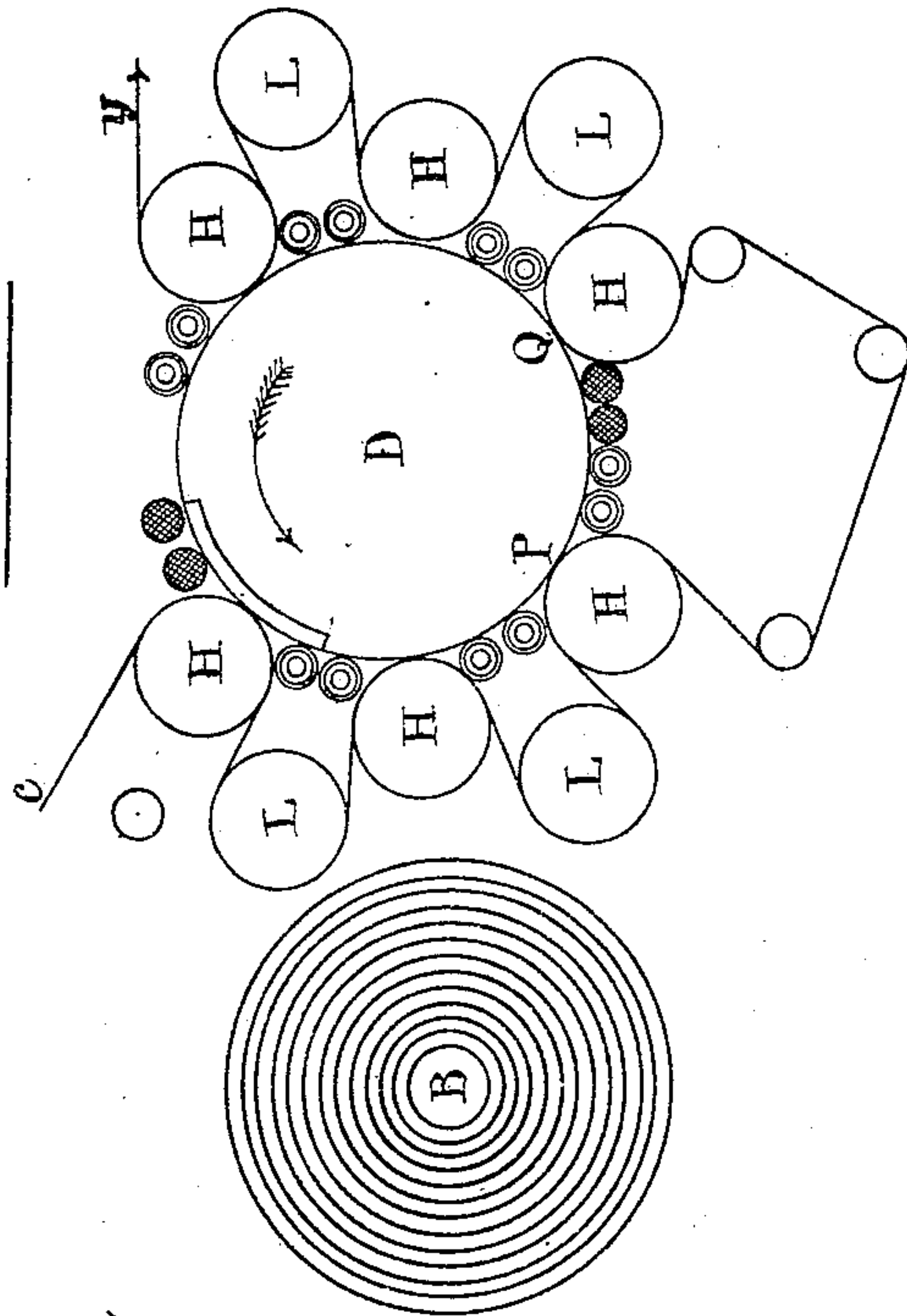
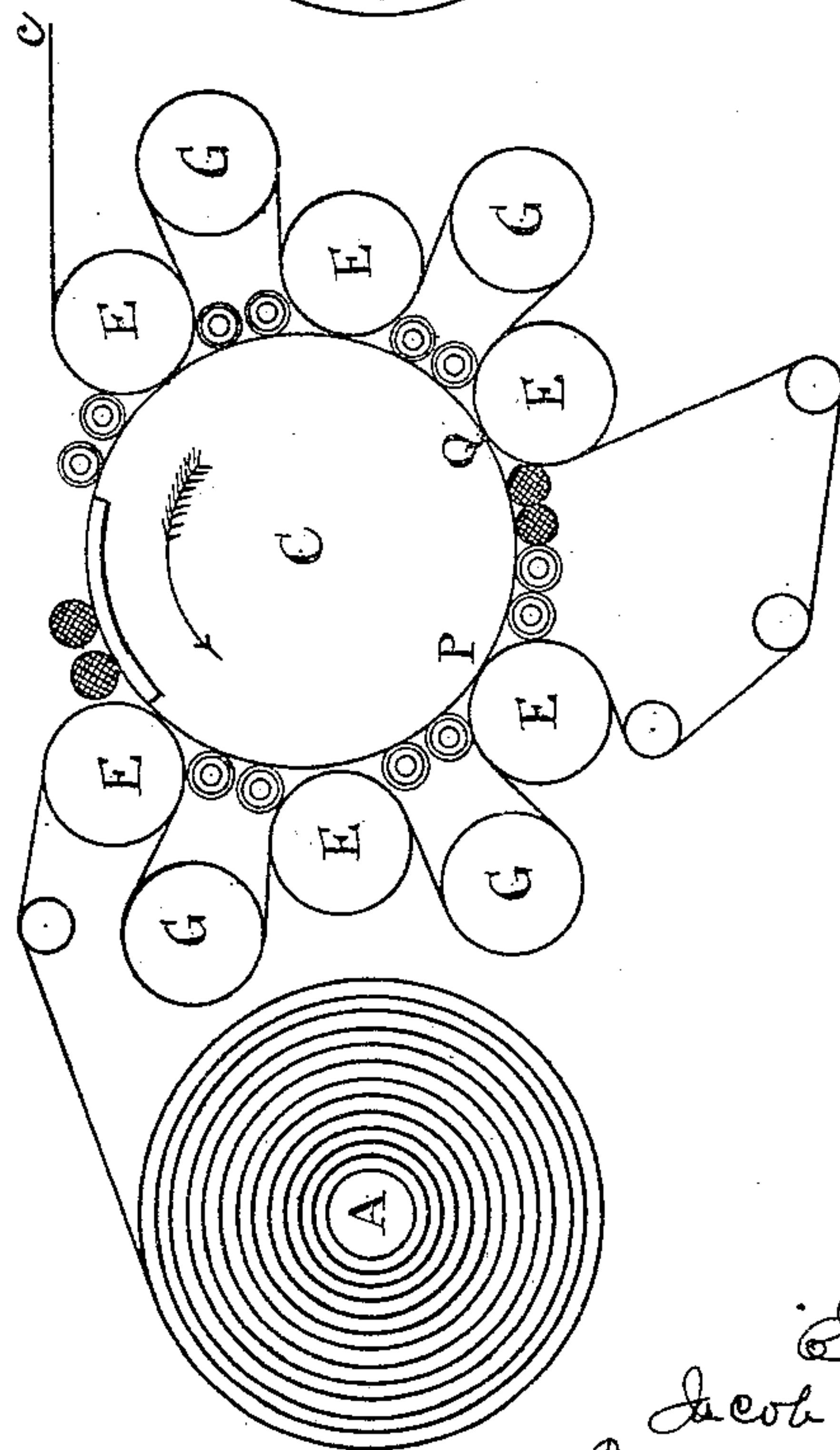


Fig. 6.



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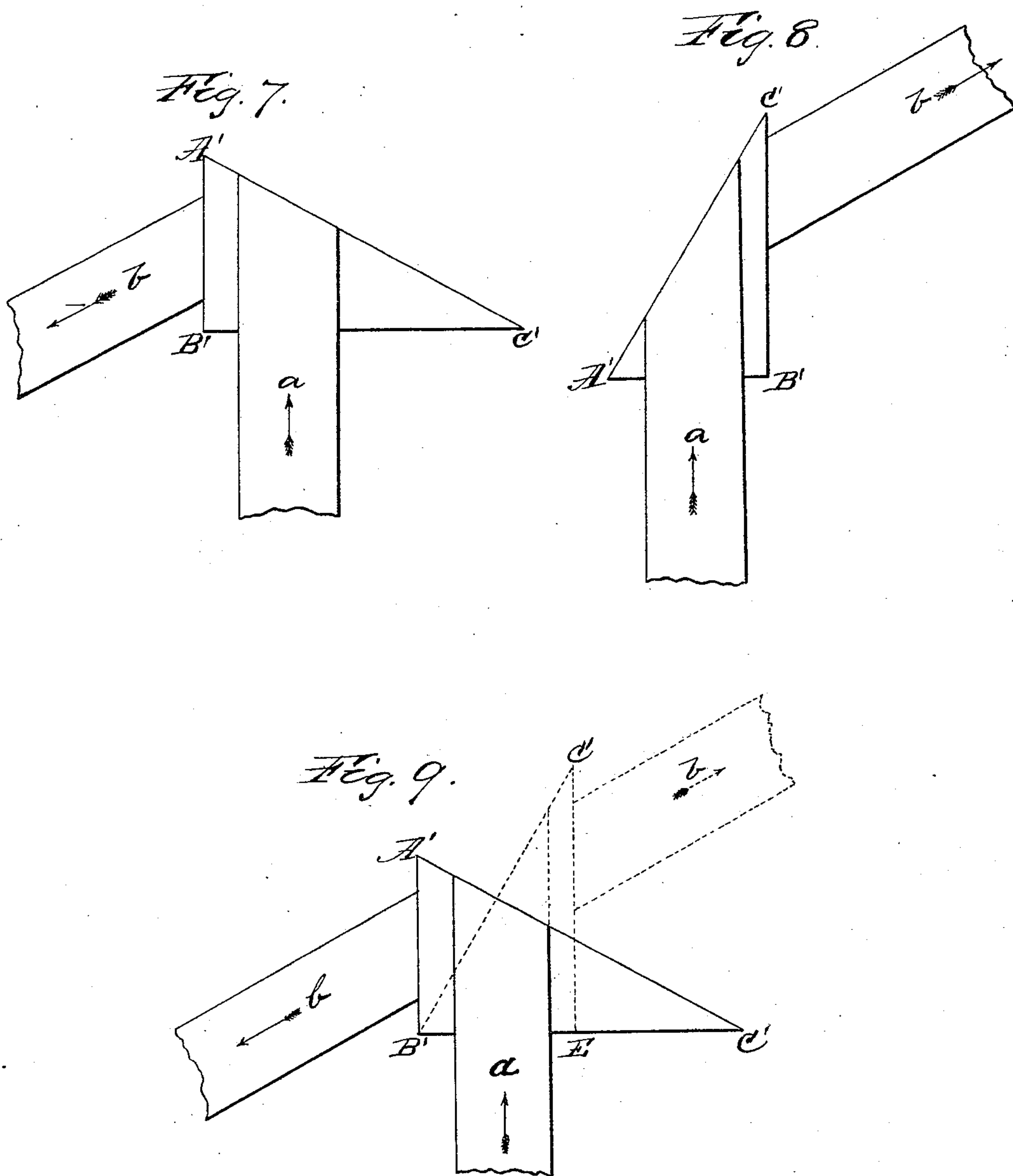
8 Sheets—Sheet 7.

E. ANTHONY & J. E. HARVEY

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No. 265,233.

Patented Oct. 3, 1882.



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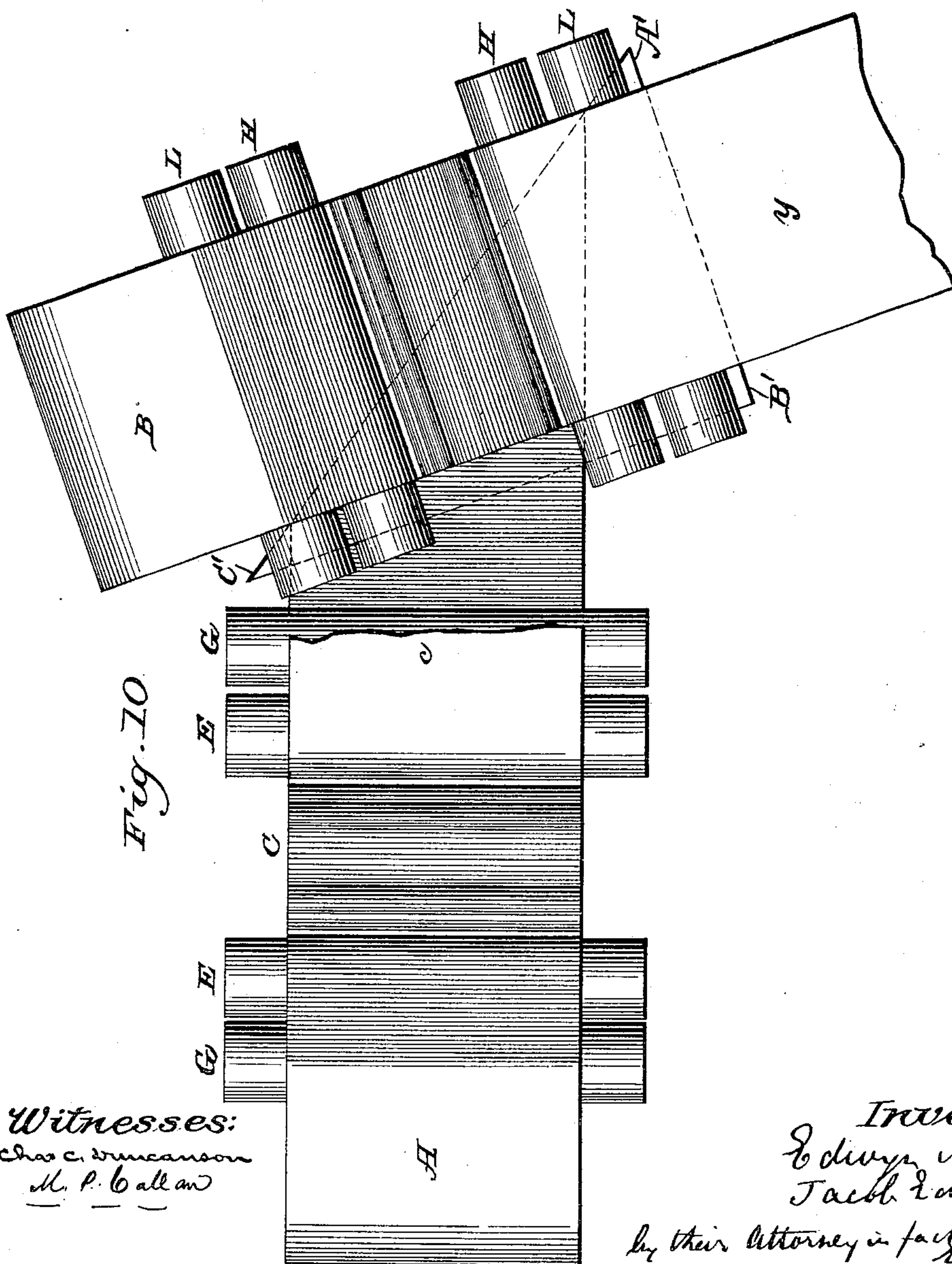
8 Sheets—Sheet 8.

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No. 265,233.

Patented Oct. 3, 1882.



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Edw. Anthony  
Jacob Edward Harvey  
by their attorney in fact Edw. Anthony



# UNITED STATES PATENT OFFICE.

EDWYN ANTHONY AND JACOB E. HARVEY, OF NEW YORK, N. Y.

## PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 265,233, dated October 3, 1882.

Application filed May 12, 1882. (No model.)

*To all whom it may concern:*

Be it known that we, EDWYN ANTHONY and JACOB EDWARD HARVEY, subjects of the Queen of Great Britain, residing in the city of New York, in the State of New York, have invented a new and useful Improvement in Printing-Machines, of which the following is a specification.

Our invention consists of a means of printing on two or more rolls of paper from type, stereotype, or a mixture of both.

Figures 1 and 1<sup>a</sup> represent different portions of the same machine, the portion of the machine shown in Fig. 1 being inclined at an angle to the portion shown in Fig. 1<sup>a</sup>. Figs. 2, 2<sup>a</sup>, 3, 3<sup>a</sup> represent similar machines for two rolls, but differing in number of impression-cylinders, &c. Figs. 4, 4<sup>a</sup> show a machine for printing from three, and Figs. 5, 5<sup>a</sup> for printing from four, rolls. Figs. 6, 6<sup>a</sup> show the machine represented in Figs. 1 1<sup>a</sup> as used when printing from half the number of forms that the latter figure illustrates. Figs. 7, 8, and 9 show the devices for turning the various webs from one portion of the machine to the other; and Fig. 10 is a plan view of the machine illustrated by Figs. 2 2<sup>a</sup>.

We place the forms (whether type, stereotype, or a mixture of both) on two cylinders, C D, their axes being inclined to one another at any convenient angle. The forms for printing one side of the web are placed on cylinder C and the forms for the other side on cylinder D. The circumference of these cylinders is taken so that they are some multiple of the portions thereof occupied by the forms, plus suitable margins. The aliquot part occupied by the forms may be one-half, one-third, one-fourth, or any other, the object being to make the circumference large enough for type to be placed on it, and the aliquot part necessary for this purpose will depend upon the size of the particular paper to be printed. Nor is it necessary for the cylinders to be of the same size. Thus in Figs. 3, 3<sup>a</sup> the circumference of the cylinder C is four times, and that of D twice, the breadth of the forms. In Figs. 1, 1<sup>a</sup>, 2, 2<sup>a</sup>, 4, 4<sup>a</sup> both of them are three times, and in Figs. 5 5<sup>a</sup> twice, the same breadth. Round each of the form-bearing cylinders impression-cylinders (E E, &c., round C, and H H, &c., round D)

are placed equal in number (for each roll) to the said multiple.

When it is wished to print from as many rolls as possible the circumference of the impression-cylinders may be one-half of the breadth of the forms, as shown in Figs. 4, 4<sup>a</sup> and 5, 5<sup>a</sup>. The web is conveyed from one impression-cylinder to the next by suitable conveying roller or rollers, as G, &c., its distance of travel from one impression-cylinder to the next being of course fixed, so that the same part of the web shall not be printed on twice. After any roll has been completely printed on one side by one of the form-bearing cylinders it is conducted by any suitably-placed rollers to a fixed triangular plane, cylinder, cone, or other surface equivalent thereto, for the purpose in view, and it is thus deflected from its course, so that it may be conducted by rollers to the other type-bearing cylinder to receive an impression on its other side.

Details of the inking, cutting, folding mechanism, &c., are not shown in the drawings, because they may all be constructed in any usual and suitable way.

Figs. 1 to 6 show the type-cylinder C and its appendages, and Figs. 1<sup>a</sup> to 6<sup>a</sup> the type-cylinder D and its appendages, each pair of figures (1, 1<sup>a</sup>, 2, 2<sup>a</sup>, &c.) representing a complete machine, or, rather, the portions of it necessary for the explanation of this invention. The axes of the rollers and cylinders in any figure are all parallel to one another, and they are inclined at an angle to the axes of those in the corresponding figure. A triangular plane is a convenient surface for deflecting the web, and its position may be fixed as follows: Let (Figs. 7, 8, and 9) A' B' C' be a triangle, made of wood, metal, or other suitable material, and of convenient thickness. The edge A' C', over which the web passes, must be rounded, and the surface A' B' C', on which the web slides on entering, and the corresponding surface on which it slides on entering the triangle, may be either parallel or inclined to one another. The angle at B' is a right angle, and the angle at A' any convenient angle. Taking the case of the axes of the type-cylinders C and D to be at an angle of sixty degrees to one another, and the aforesaid surfaces of the triangle to



be parallel to one another, then the angle at A' should be an angle of sixty degrees. The triangle should be fixed so that one of its sides (B' C', Fig. 7, A' B', Fig. 8) be parallel to the axes of the cylinder C, and that its surface B' A' C' produced may touch the roller (say M, Fig. 4) by which the web is conducted to the triangle. The side, B' C' (or A' B', as the case may be) must be placed at such a distance from the roller M as to cause the web to issue from the triangle facing the cylinder D, and a roller, such as R, Fig. 4<sup>a</sup>, must be fixed so that it will touch the web in the plane in which it issues from the aforesaid triangle. Care must be taken to place the triangle so that the web after passing over it may be traveling in such a way that its unprinted side can be brought into contact with the type-cylinder D. The position for effecting this object will depend upon the relative directions of rotation of the cylinders C and D. Fig. 7 gives its position for the cases of Figs. 2, 2<sup>a</sup>, 4, 4<sup>a</sup>, 5, 5<sup>a</sup>, and 6, 6<sup>a</sup>, and Fig. 8 its position for the cases of Figs. 1, 1<sup>a</sup>, and 3, 3<sup>a</sup>. Fig. 9 is intended to exhibit the two positions of the triangle, the position A' B' C' corresponding to Fig. 7, and B' E C'' to Fig. 8, the edge A' C' in Fig. 8 being perpendicular to its position in Fig. 7. For example, in Fig. 2 the web issues at *a* in the direction there indicated, and if it thus runs onto the triangle the latter should be fixed as in Fig. 7, so that the web after issuing from it shall be traveling toward Fig. 2<sup>a</sup>, as indicated by the arrow at *a*, Fig. 2<sup>a</sup>. Fig. 10, which is a plan view of Figs. 2, 2<sup>a</sup>, indicates the position of one of the triangles, (the one over which the web A passes.) The triangle for the web B is similarly placed with reference to that web, and is not shown in the figure; but in Figs. 1, 1<sup>a</sup>, and 3, 3<sup>a</sup>, (the relative rotations of C D being the reverse of those in Figs. 2, 2<sup>a</sup>), then the web running onto the triangle in the direction indicated at *a*, Fig. 1, it must be fixed, as in Fig. 8, so that the web shall issue from it, traveling away from Fig. 1<sup>a</sup> or Fig. 3<sup>a</sup>, as shown by the arrow at *a*, Figs. 1<sup>a</sup>, 3<sup>a</sup>. It must then be conducted by a roller or rollers to the impression-cylinders H, and it will be found that its unprinted side will be presented to the type-cylinder D.

We do not claim the method of thus changing the path of a traveling web by means of a triangle, cylinder, or other surface, because those devices are shown in Rose's British specification No. 12,715; year 1849, and in Sandeman's British specification No. 3,319, year 1870.

The course of the webs is as follows: The web A, Figs. 1, 2, 3, 4, 5, passes round the impression-cylinders E and conveying-cylinders G, coming out at *a* completely printed on one side. It is then taken (either direct or after passing over one or more rollers, as may be most convenient) to the said triangle, which is fixed, as before stated, (see Figs. 7 or 8, as the case may be,) so that the web will issue

from it, as shown by the arrow at *a*, Figs. 1<sup>a</sup>, 2<sup>a</sup>, 3<sup>a</sup>, 4<sup>a</sup>, 5<sup>a</sup>. It then (usually after passing over one or more rollers, as may be most convenient) goes to the impression-cylinders H and conveying-cylinders L, and issues at *y* completely printed on both sides. Similarly the roll B issues at *b*, Figs. 1<sup>a</sup>, 2<sup>a</sup>, 3<sup>a</sup>, 4<sup>a</sup>, 5<sup>a</sup>, printed on one side, is conveyed by rollers and triangle to *b*, Figs. 1, 2, 3, 4, 5, and issues at *c* completely printed on both sides. Instead of as in the figures, the two rolls may be arranged so that they both receive their first impression from the same instead of from different type-cylinders.

In Figs. 4, 4<sup>a</sup> there are three rolls. The roll K issues at *l*, Fig. 4, is conveyed by rollers and triangle to *l*, Fig. 4<sup>a</sup>, and issues at *p* completely printed. In Figs. 5, 5<sup>a</sup> there are four rolls. The course of K is lettered, as in Figs. 4, 4<sup>a</sup>. The roll S issues at *r*, Fig. 5<sup>a</sup>, is conducted by rollers and triangle to *r*, Fig. 5, and comes out completely printed at *t*.

After the rolls have been printed on both sides they may be cut, folded, &c., in any suitable way.

It will be observed that in the figures sometimes a web which was above another web before either were deflected from their path becomes below it when both have been deflected. Thus in Fig. 1<sup>a</sup> the web at *a* is below that at *b*; but in Fig. 1 it is at *a* above the corresponding position of *b*. By taking the web to suitably-placed rollers before and after conducting it to the triangle there will be no difficulty in conveying the web, as above shown.

By placing one form only on each printing-cylinder a two-page paper may be printed. For example, in Figs. 6, 6<sup>a</sup>, which show Figs. 2, 2<sup>a</sup> arranged to print a two-page paper, the roll B is not used. The roll A is passed under all the six impression-cylinders E, then proceeds similarly to when printing with two rolls from *c*, Fig. 6, to *c*, Fig. 6<sup>a</sup>, whence it passes round the six impression-cylinders H, and issues at *y* completely printed on both sides. The distance of travel of the web must be arranged as follows: If in Figs. 2, 2<sup>a</sup> the distance of travel from one impression-cylinder to the next is made equal to the breadth of the forms plus the length of the arc of the printing-cylinder between the points in which the said two impression-cylinders touch it, then the webs will be properly printed on when the two rolls are used, as in Figs. 2, 2<sup>a</sup>. To arrange for printing, as in Figs. 6, 6<sup>a</sup>, all that is necessary is to make (in both Figs. 6 and 6<sup>a</sup>) the distance of travel of the web from P to Q equal to the arc P Q plus one-half, or one and a half, or two and a half, or three and a half, &c., times the breadth of the forms. In all cases the distance of travel of a web from the one type-cylinder to the other must be adjusted so that the impressions on opposite sides of the web may properly back one another.

All the foregoing is applicable to the case of cutting before printing, the sheets after cut-



ting of course being conveyed in tapes, and the circumferences of the type-cylinders being multiples of the breadth of a sheet—*i. e.*, of the portion occupied by the forms plus suitable margins—plus the interval between successive sheets at the time of printing.

We do not claim the placing of forms on two cylinders at an angle to one another when the forms occupy the whole circumference of the cylinders, because that is disclosed in Rose's specification, before mentioned; nor do we claim the placing impression-cylinders round a form-bearing cylinder in the manner herein directed, because that is disclosed in Green's British provisional specification No. 1,845, year 1853, and in Bond and Foster's British specification No. 774, year 1871, and we have already disclaimed the devices herein

indicated for changing the path of the web or webs.

20

What we do claim is—

The combination of two printing-cylinders inclined at an angle to one another, the forms on each of them not occupying the whole surface, with impression and carrier cylinders and devices for deflecting the path of the webs, whereby a plurality of webs of paper may be simultaneously printed on both sides from type, stereotype, or a mixture of both, all substantially as described.

25

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