

No. 677,739.

Patented July 2, 1901.

J. L. FIRM.
PRINTING PRESS.

(Application filed Aug. 13, 1900. Renewed Apr. 27, 1901.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 2

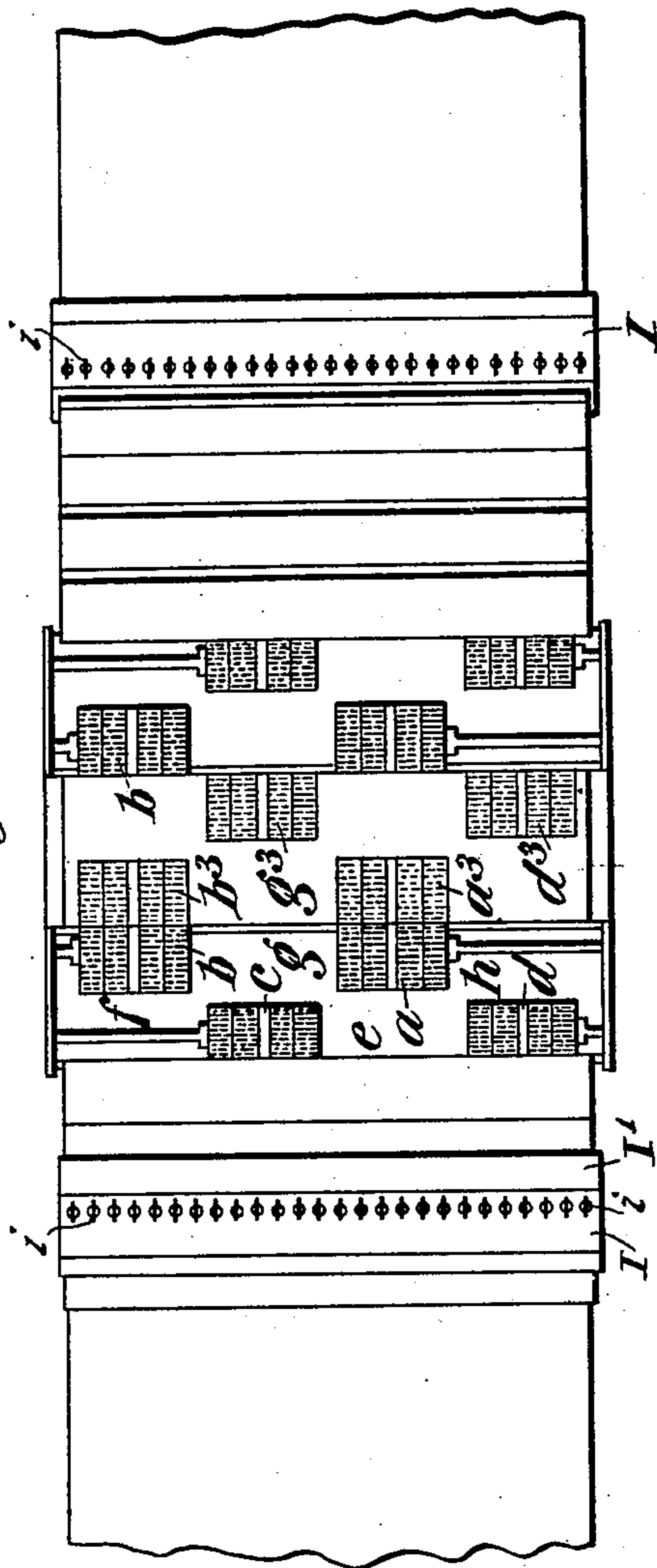
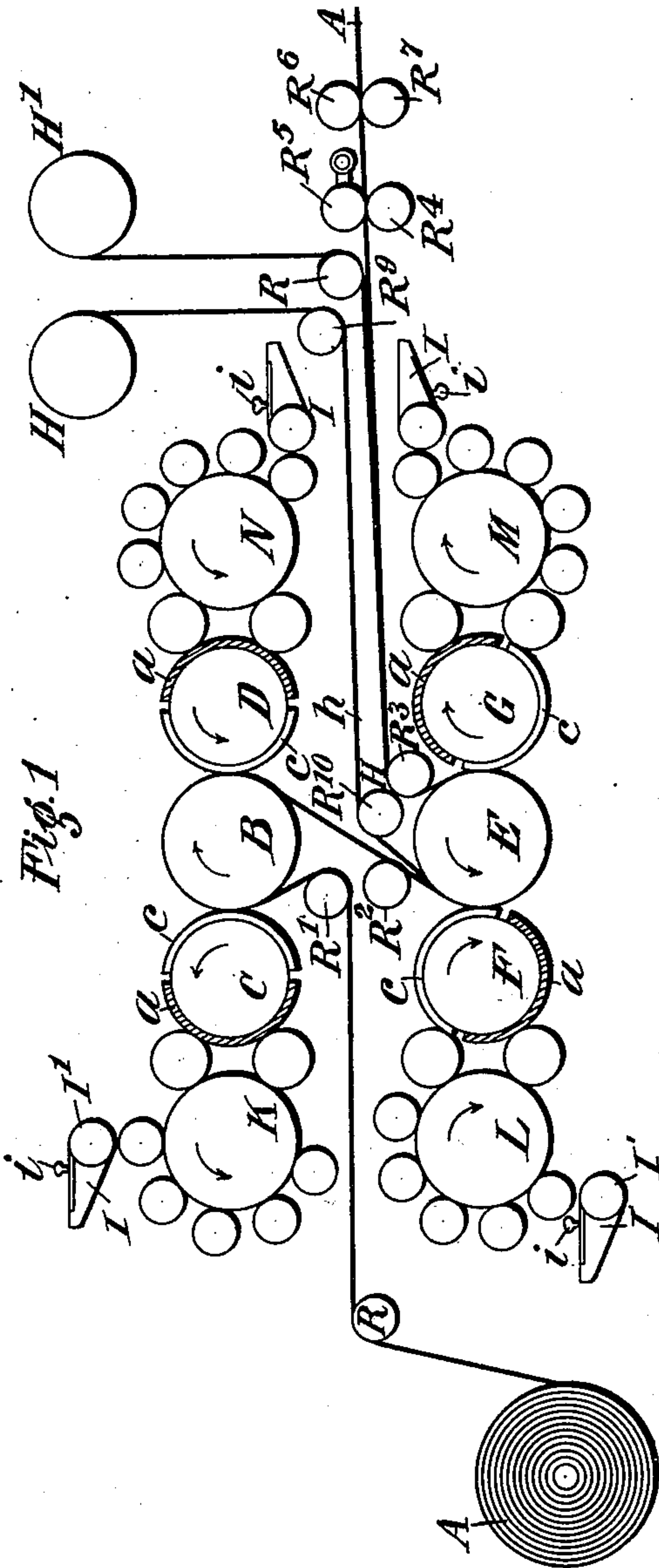


Fig. 1



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3 Sheets—Sheet 2.

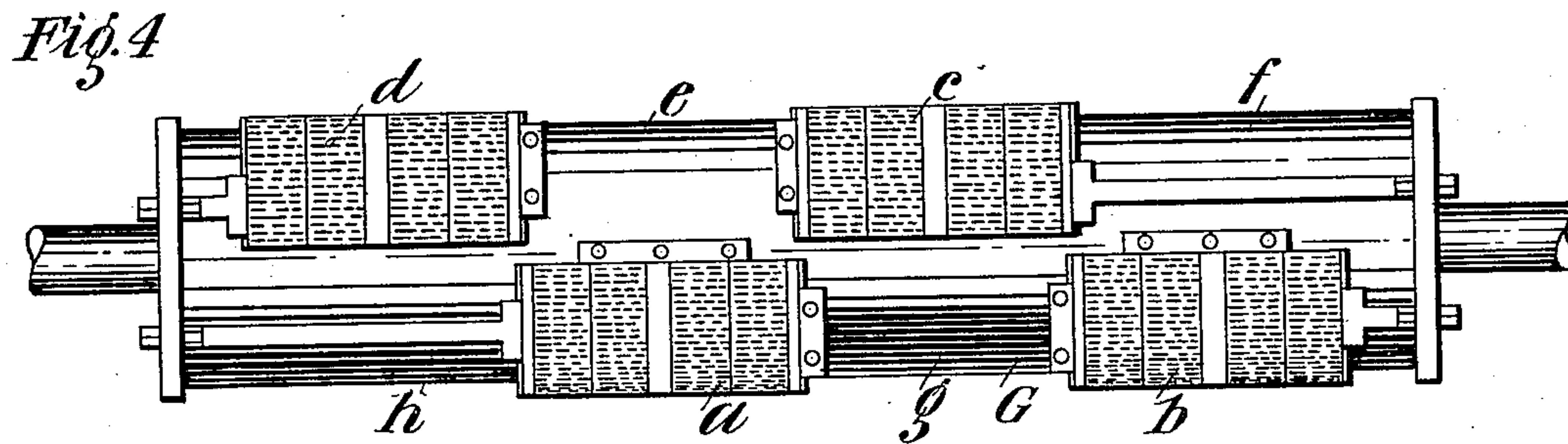
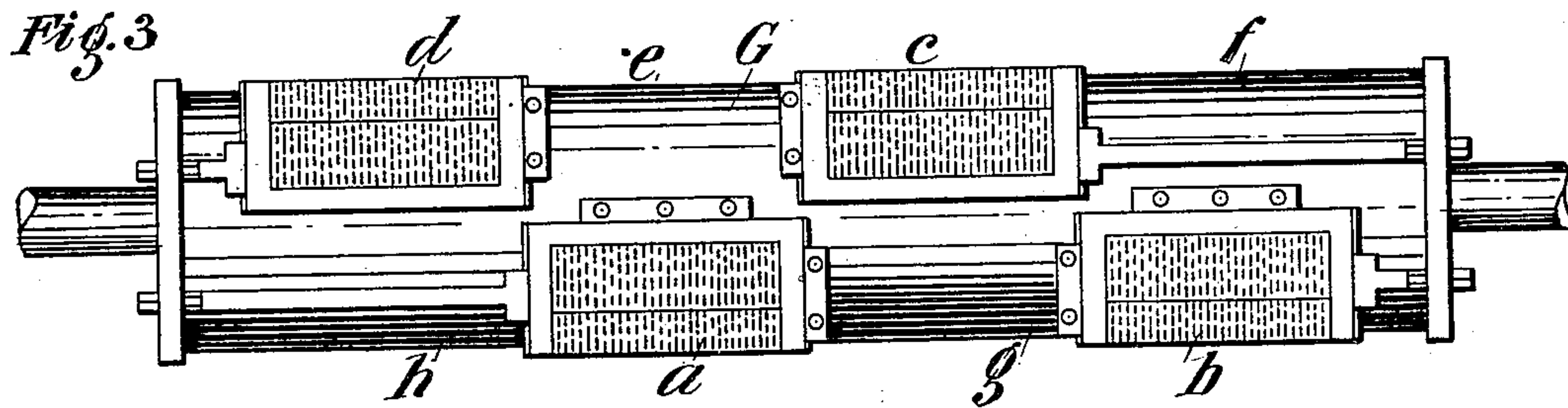


Fig. 5

C

| | | | |
|---|----|----|---|
| L | | 11 | |
| | 15 | | 3 |

Fig. 9

C

| | | | |
|---|----|----|---|
| 7 | | 11 | |
| | 15 | | 3 |
| 7 | | 11 | |
| | 15 | | 3 |

Fig. 11

F

| | | | |
|---|----|----|---|
| 8 | | 12 | |
| | 16 | | 4 |
| 8 | | 12 | |
| | 16 | | 4 |

Fig. 6

D

| | | | |
|---|----|----|---|
| | 01 | | 9 |
| 2 | | 14 | |

Fig. 7

F

| | | | |
|---|----|----|---|
| 8 | | 11 | |
| | 16 | | 4 |

Fig. 10

D

| | | | |
|---|----|----|---|
| | 10 | | 6 |
| 2 | | 14 | |
| | 10 | | 6 |
| 2 | | 14 | |

Fig. 12

G

| | | | |
|---|---|----|---|
| | 9 | | 5 |
| 1 | | 13 | |
| | 9 | | 5 |
| 1 | | 13 | |

Fig. 8

G

| | | | |
|---|---|----|---|
| | 6 | | 9 |
| 1 | | 13 | |

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(No Model.)

3 Sheets—Sheet 3.

Fig. 13

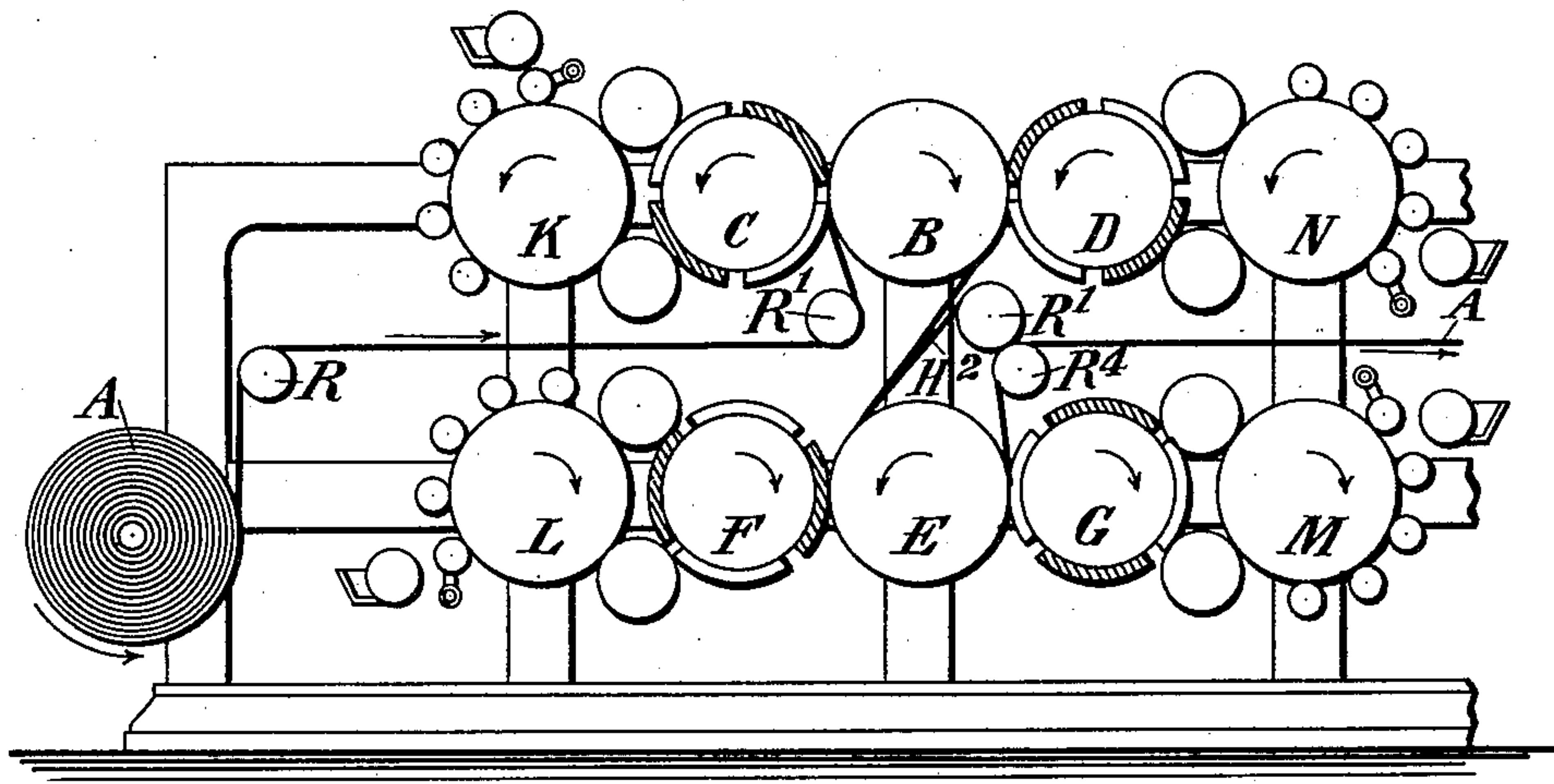
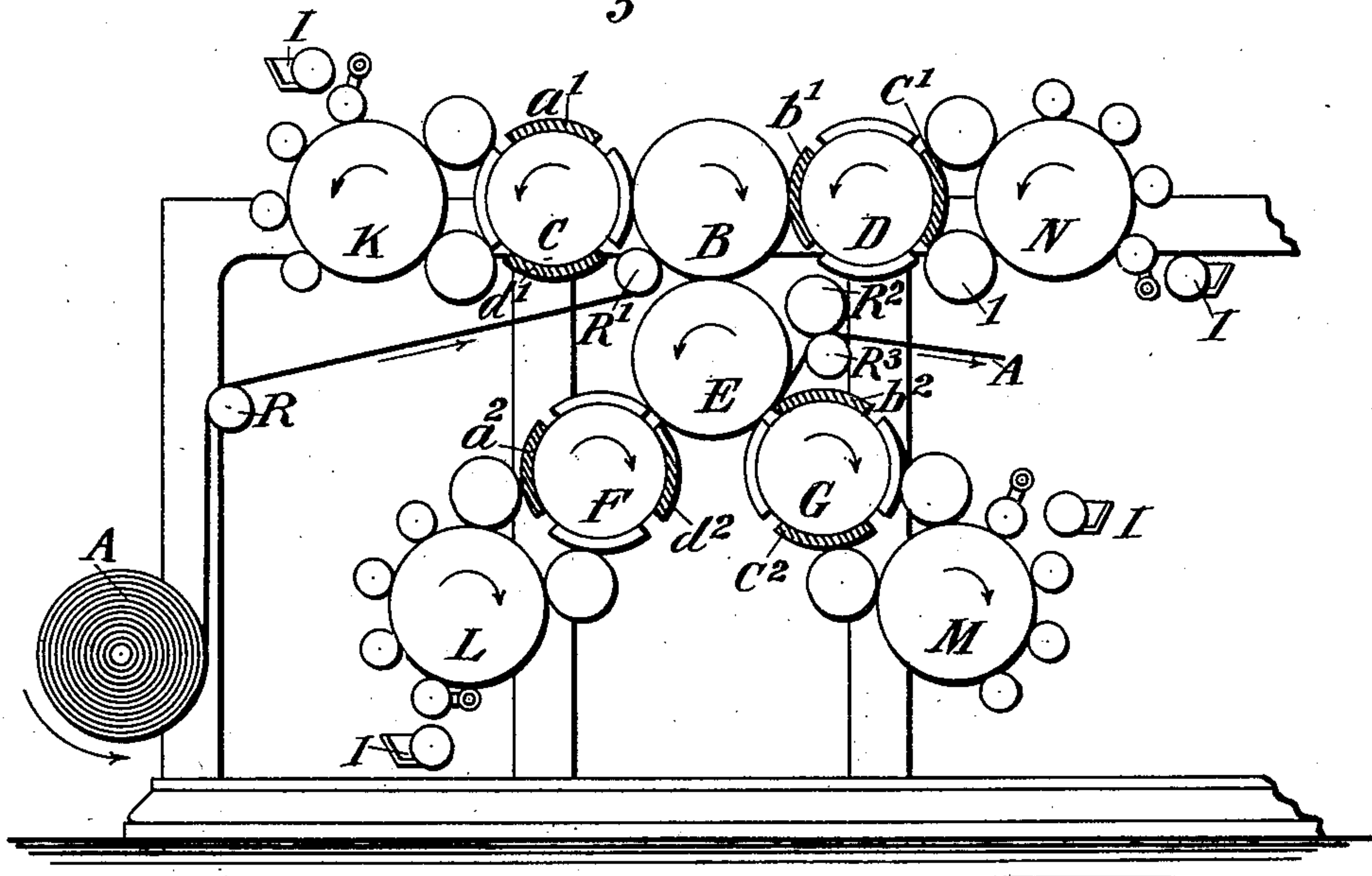


Fig. 14



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UNITED STATES PATENT OFFICE.

JOSEPH L. FIRM, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE GOSS PRINTING PRESS COMPANY, OF SAME PLACE.

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 677,739, dated July 2, 1901.

Application filed August 13, 1900. Renewed April 27, 1901. Serial No. 57,837. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH L. FIRM, a citizen of the United States, and a resident of Chicago, Cook county, Illinois, have invented
5 a new and Improved Printing-Press, of which the following is a full, clear, and exact description.

My invention relates to rotary printing-presses, more particularly perfecting-presses,
10 and comprises certain improvements therein having for their object to produce the finer grades of printing, such as is usually done only on flat-bed presses, in a manner equal to and a quantity vastly greater than can be
15 done on the flat-bed presses.

An illustration of one class of work which my improved press is designed to handle is the printing of books and magazines in which both printed matter and cuts are used. This
20 kind of work presents very great difficulties when attempted upon rotary presses as ordinarily constructed, due largely to the inability to vary the quantity of ink for different characters of printing-surfaces.

25 In the drawings accompanying herewith and illustrating a form of construction now preferred by me similar characters of reference are used to indicate similar parts in the different figures.

30 Figure 1 is a sectional side elevation of my improved press. Fig. 2 is a top plan view of the same. Figs. 3 and 4 show two styles of form-cylinders for use in my press, one cylinder having forms with column-rules parallel the axis of the cylinder and the other with column-rules extending about the cylinder, or circumferentially thereof. Figs. 5, 6, 7, and 8 show the imposition of the pages upon cylinders having forms extending substantially
35 half around them, each figure showing the pages carried by one cylinder only. Figs. 9, 10, 11, and 12 are like Figs. 5, 6, 7, and 8, except that each form extends over only one-quarter the circumference of the cylinders.
40 Figs. 13 and 14 show slightly-modified constructions.

One great trouble in the operation of rotary presses for producing fine printing of the character hereinbefore mentioned was that they
50 require the services of an expert pressman to make the forms ready so as to produce work

which would be at all passable. One cause of this was that forms containing illustrations and those containing printed matter, which required different quantities of ink, were made
55 to follow each other about the same cylinder, and in consequence the ink had to be equalized between the different forms, none of the forms getting the amount of ink adapted to produce the best results. Another trouble
60 was that the forms lying side by side lengthwise the cylinder had a tendency to bear each other off, thus causing unequal pressures and unequal printing. In my improved press either only a single form is secured upon any
65 circumferential zone of the cylinder or if more than one form is secured upon the same zone the forms are duplicates of each other, so that the degree of inking which suits one form suits all others upon the same zone. The forms
70 are also made to alternate, both circumferentially and longitudinally of the cylinder, with blank spaces substantially equal in size with the spaces covered by the forms, so that only half of the surface of any form-cylinder is
75 covered by forms, and two form-cylinders are used to print one side of the web, the forms of the second cylinder printing in the spaces left blank by the first cylinder.

Referring to Figs. 1 and 2 of the drawings, 80 A represents the web, which is mounted as a roll on journals at one end of the machine and passes over guide-rolls R and R' to the impression-cylinder B, about which it passes, being in the meanwhile printed upon one side
85 successively by the forms upon the form-cylinders C and D. The web then passes about impression-cylinder E and is printed upon its other side successively by the forms upon the form-cylinders F and G. It then passes
90 over guide-rollers R³ and R⁴ and between guide-rollers R⁶ and R⁷, after which it may be acted upon by any of the usual forms of folding mechanisms. In passing over the guide-roller R⁴ it may be acted upon by a slitter R⁵,
95 if desired. In passing about the second impression-cylinder E it is preferably combined with an offset-web, which is mounted as a roll H in suitable journals and passes thence over guide-rolls R⁹ and R¹⁰ to the impression-cyl-
100 inder E, where it unites with the web A, which it accompanies until it reaches the

guide-roller 9, where the two webs are separated, the offset-web being rewound as the roll H'.

In Figs. 3 and 4 are shown form-rolls alike, except that the column-rules run lengthwise one cylinder and about the other. The forms *a, b, c,* and *d* alternate with the blank spaces *e, f, g,* and *h.* In Fig. 1 the forms, as *a* and *c,* are shown as each extending half about the cylinder, while in Figs. 13 and 14 they are shown as each extending through one-quarter of the circumference. It is evident that they may be made of a size corresponding with any even fraction of the circumference, as one-half, one-quarter, one-sixth, &c. Where plural forms are on any zone, these should all be duplicates.

K, L, M, and N are the inking devices, which may be of any approved construction. The ink-fountains should, however, be so constructed that the ink-feed may be varied at different points in the length thereof. A form is shown in Fig. 1, which consists of the reservoir I, closed at one side by the feed-roll I', which is turned by any suitable mechanism. The pressure of the plates upon the roll and the amount of ink delivered at any point are regulated by a series of bolts *i,* which extend throughout the length of the fountain. By loosening the bolts opposite any section or zone of the rollers the amount of ink delivered to that zone will be increased.

The diagrams Figs. 5, 6, 7, and 8 show how the forms for printing a sixteen-page pamphlet or signature are arranged. The first cylinder C will have the forms for pages 7, 11, 15, and 3 in the relative position shown in Fig. 5. The next cylinder D will contain forms for pages 6, 10, 2, and 14, as shown in Fig. 6, these forms registering with the spaces left blank upon the first cylinder C. These forms print the inside of the web. The third cylinder F will carry forms for pages 8, 12, 16, and 4 in the position shown in Fig. 7, and the fourth cylinder G will carry forms for pages 5, 9, 1, and 13 in the position shown in Fig. 8, these forms registering with the blank spaces of the third cylinder F. These forms print the outside of the web. Of course the exact position of the forms for the different pages would depend upon how the product was to be folded. This arrangement is such as might be used where forms extended half about the cylinders and there was no duplication of forms on the same zone.

In Figs. 9, 10, 11, and 12 an arrangement is shown which might be used where forms were of lesser extent, as where they extended over a quarter of the circumference. In this case each page is duplicated at each revolution of the cylinder and two complete pamphlets produced for each revolution of the press. The arrangement shown in Figs. 9, 10, 11, and 12 is the same as that of Figs. 5, 6, 7, and 8, except that the former is in duplicate. Each of these diagrams is intended to show

what would be produced by a single revolution of a cylinder.

In Fig. 13 an offset-web H² of different style is shown, the same consisting of an endless web H², which passes over the impression-cylinder E and guide-roller R¹¹. In Fig. 14 a different arrangement of cylinders is shown, the same principle, however, being employed.

By the arrangement herein described each page or duplicate pages may be inked independently, and it is not necessary to "make-ready" or specially prepare each page, thus saving a great deal of time.

It is preferred that the impression-cylinder be so proportioned in size to the form-cylinders that the forms are always opposed to the same surfaces of the impression-cylinders. This may be done by making the form and impression cylinders of the same size, as shown in the drawings, or by making the circumference of one a multiple of the other. This proportion might be secured either by making the circumference of the form-cylinders two, three, or more times that of the impression-cylinder or by making the circumference of the impression-cylinder two, three, or more times that of the form-cylinders. This feature is, however, not considered an essential one.

I do not wish to be limited to the exact construction and operation of parts herein shown and described where it is possible to change them without changing the principles of their operation, but desire to claim all modifications of such nature, whether they have been herein specifically referred to or not.

I do not herein desire to claim a construction in which blank spaces are left in a page of type-matter to be filled with a cut printed from another form-cylinder, as I know this to be old; but what I desire to claim is a construction in which each page is completed at a single impression; but where alternate pages only are printed from each cylinder the second cylinder of a pair printing the pages which were omitted by the first cylinder.

I claim—

1. A printing-press having an impression-cylinder and a pair of form-cylinders for printing one side of a web, each form-cylinder having forms secured thereto upon alternating and substantially equal spaces both circumferentially and longitudinally thereof, whereby only half the surface of the web is printed on one cylinder, each form-cylinder of a pair printing upon the spaces of the web left blank by the other cylinder of the pair, substantially as described.

2. A printing-press having an impression-cylinder and a pair of form-cylinders for printing one side of a web each form-cylinder having forms secured thereto upon alternating and substantially equal spaces both circumferentially and longitudinally thereof, whereby only half the surface of the web is printed on one cylinder, each form-cylinder of a pair

printing upon the spaces of the web left blank by the other cylinder, and the impression-cylinder being proportioned to oppose the same surfaces to the same forms at all times, substantially as described.

3. A printing-press having an impression-cylinder and a pair of form-cylinders for printing one side of a web, each form-cylinder having forms of substantially equal size secured thereto so that both circumferentially and longitudinally each form is adjacent to a space of substantially equal size, whereby only half the surface of the web is printed on one cylinder, each form-cylinder of a pair printing upon the spaces of the web left blank by the other cylinder of the pair, substantially as described.

4. A printing-press having form-cylinders and forms secured thereto upon alternate and substantially equal spaces both circumferentially and longitudinally thereof, whereby only half the surface is covered by forms, all the forms upon any circumferential belt or zone being duplicates, substantially as described.

5. A printing-press having an impression-cylinder and a pair of form-cylinders for print-

ing one side of a web, each form-cylinder having forms of substantially equal size secured thereto so that both circumferentially and longitudinally each form is adjacent to a space of substantially equal size, whereby only half the surface of the web is printed on one cylinder, each form-cylinder of a pair printing upon the spaces left blank by the other cylinder of the pair, and all the forms upon the same circumferential zone being duplicates, substantially as described.

6. A printing-press employing two form-cylinders for perfecting each side of the web, said form-cylinders having forms secured thereto to alternate with blank spaces substantially equal thereto in size, both circumferentially and longitudinally thereof, and the forms of the second cylinder of each pair printing in the spaces left blank by the first cylinder of said pair.

In testimony whereof I have signed my name to this specification in the presence of the two subscribing witnesses.

JOSEPH L. FIRM.

Witnesses:

H. L. REYNOLDS,
CHAS. J. RATHJEN.