

No. 724,997.

PATENTED APR. 7, 1903.

E. E. FLORA.
PRINTING PRESS.

APPLICATION FILED APR. 27, 1900. RENEWED SEPT. 13, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

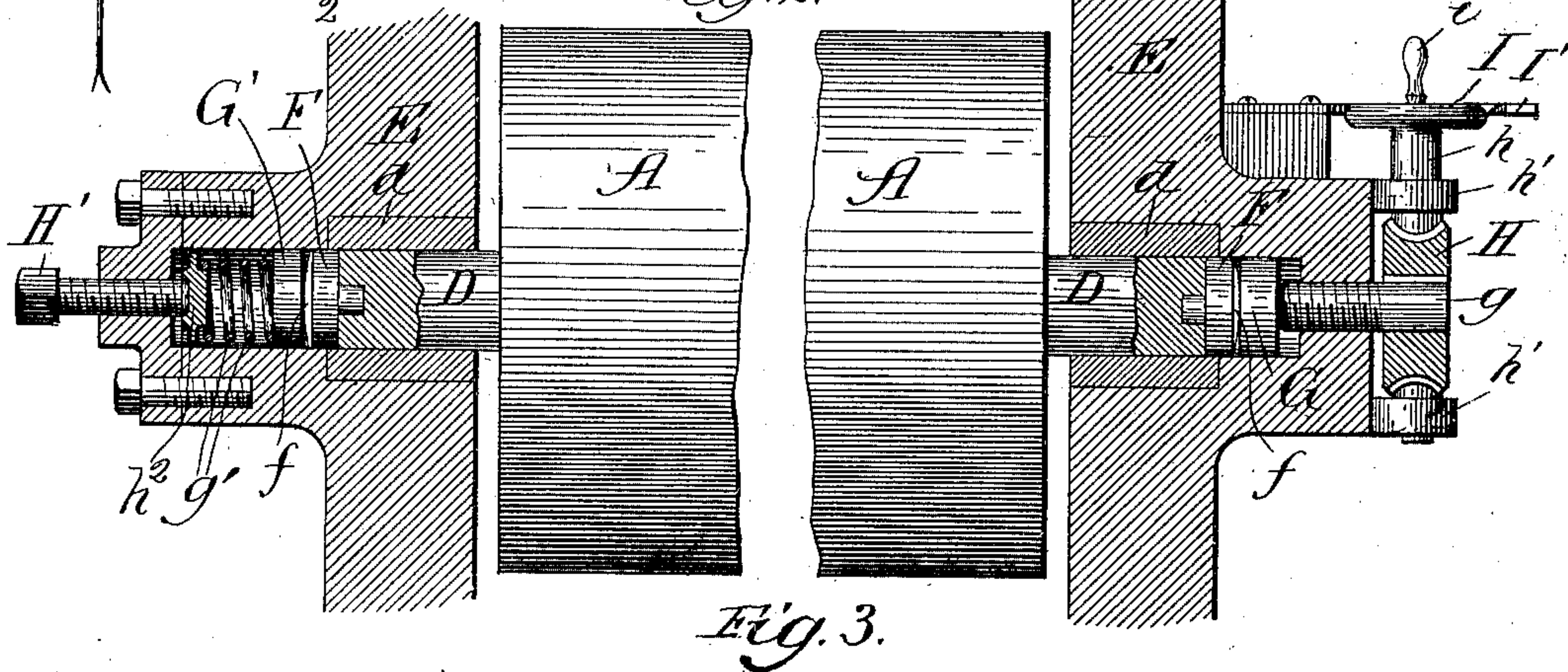
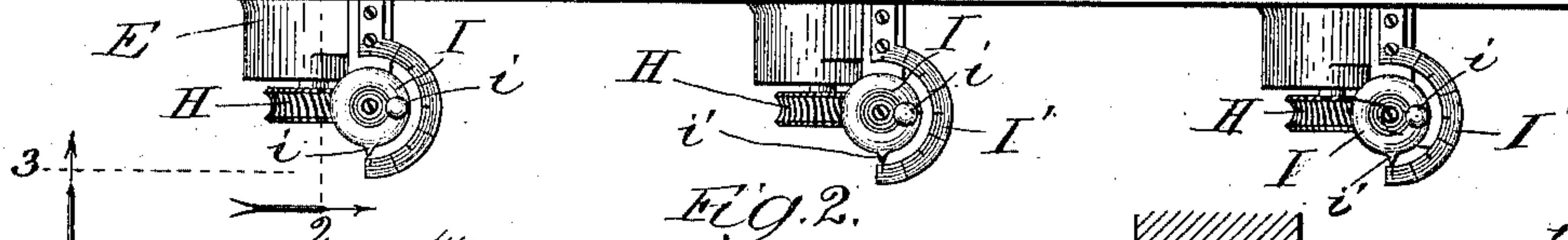
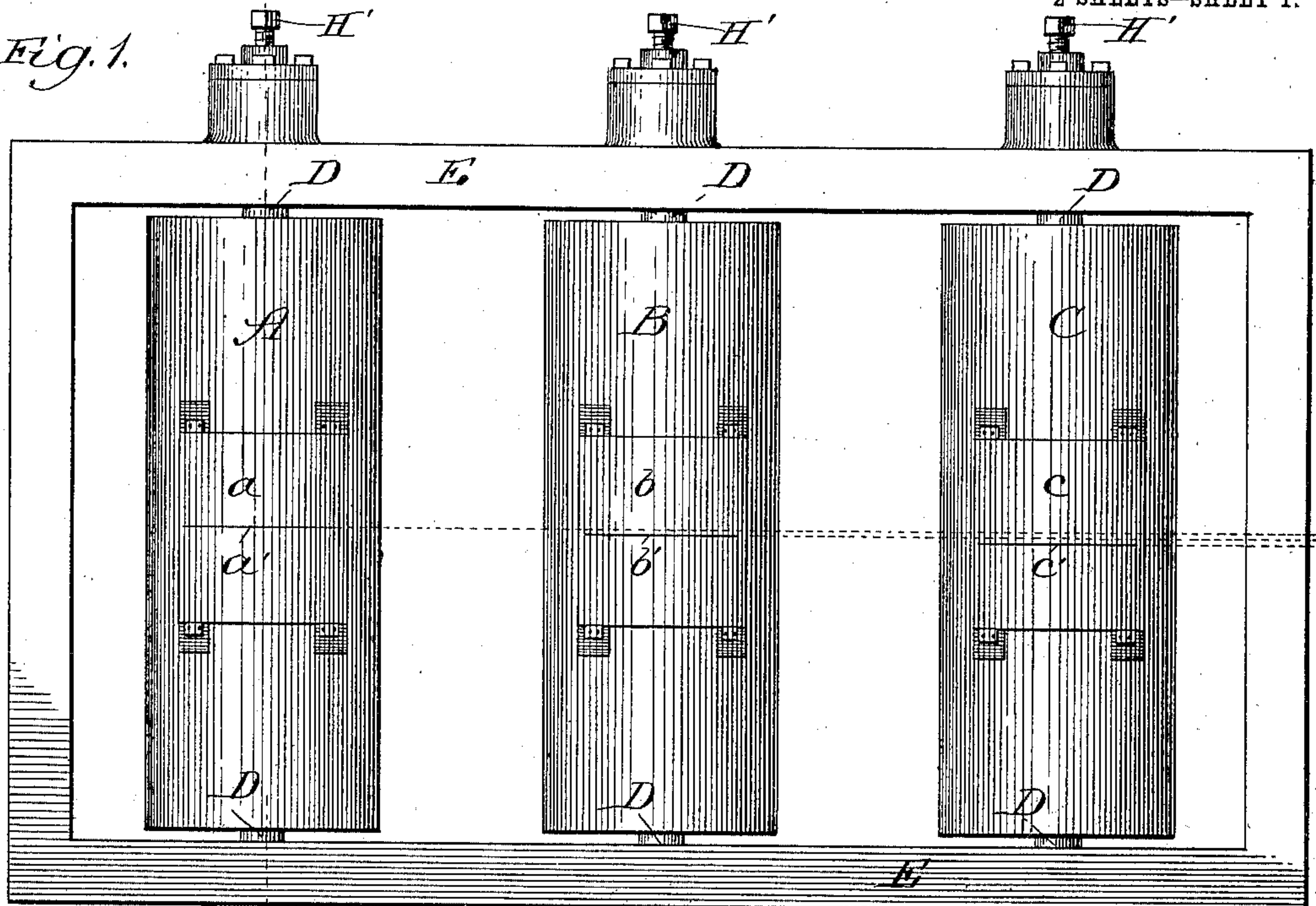
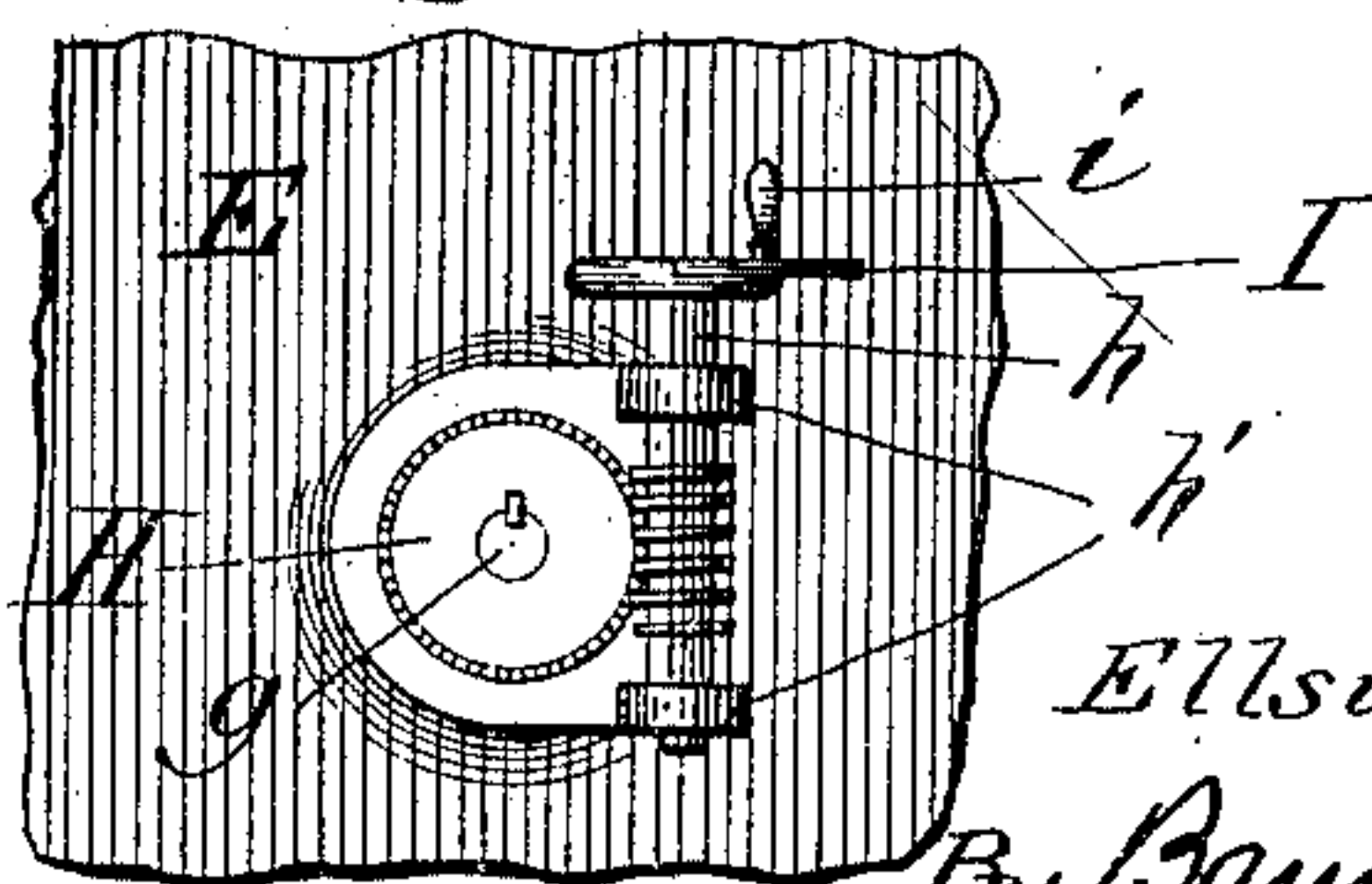


Fig. 3.

Witnesses:

Chas. C. Gaylord,
Geo. C. Davison.



Inventor:

Ellsworth E. Flora,

By Banning & Banning,

Attorneys.

No. 724,997.

PATENTED APR. 7, 1903.

E. E. FLORA.
PRINTING PRESS.

APPLICATION FILED APR. 27, 1900. RENEWED SEPT. 13, 1902.

NO MODEL.

2 SHEETS—SHEET 2.

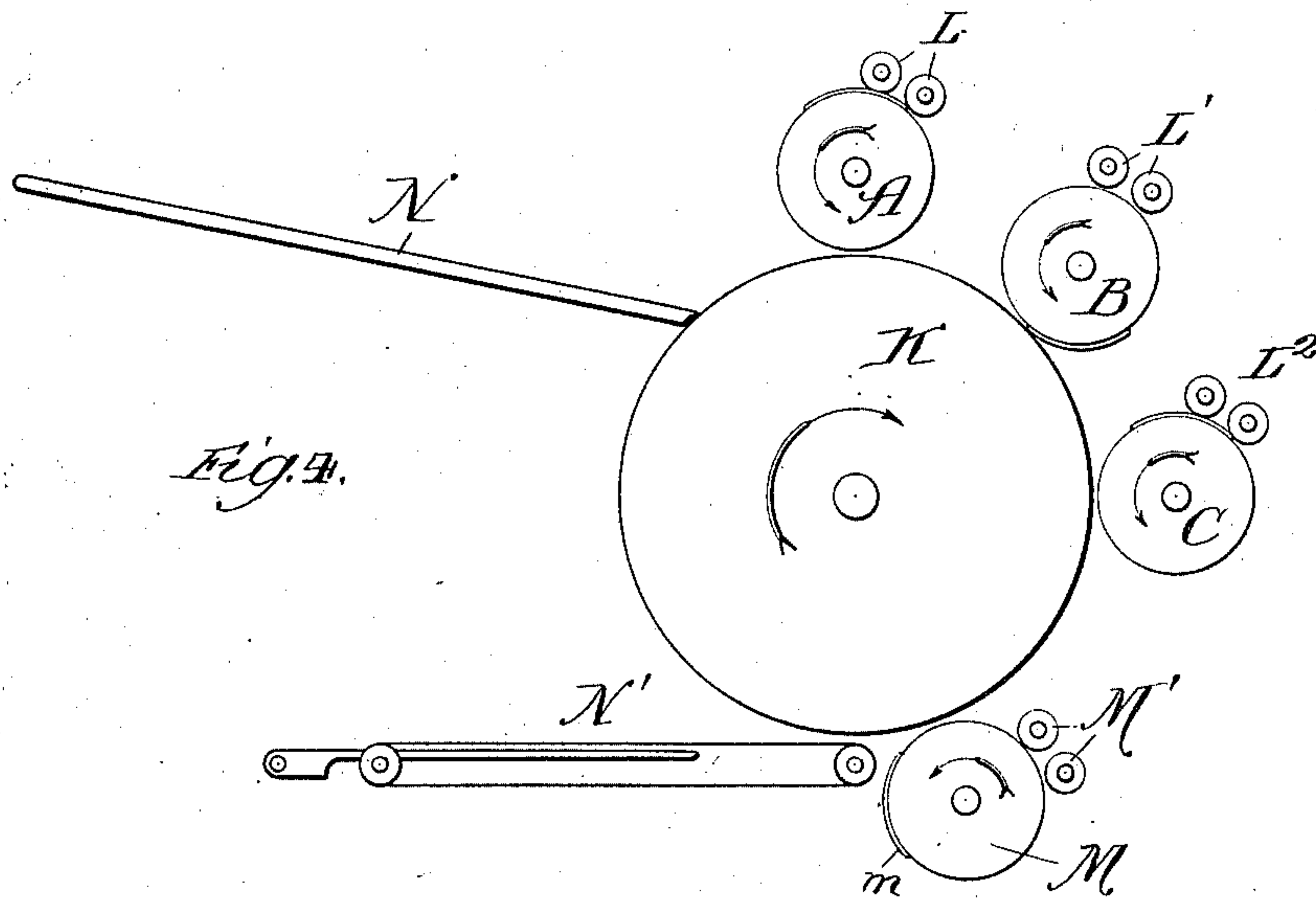
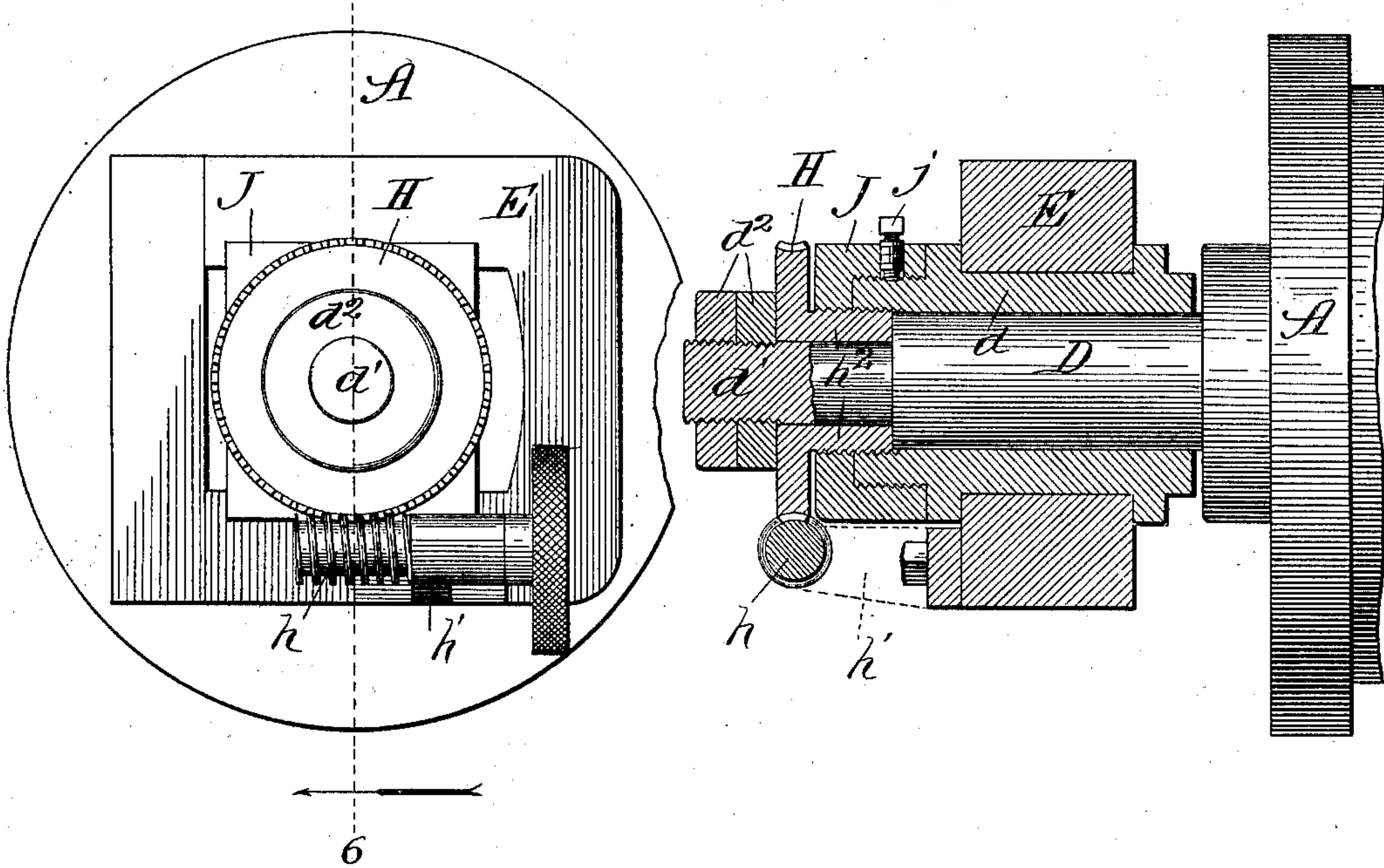


Fig. 5.

Fig. 6.



Witnesses:
E. E. Gaylord,
Geo. C. Davison

Inventor:
Ellsworth E. Flora,
By Banning & Banning,
Attys.

UNITED STATES PATENT OFFICE.

ELLSWORTH E. FLORA, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO GEORGE FARNSWORTH, OF CHICAGO, ILLINOIS.

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 724,997, dated April 7, 1903.

Application filed April 27, 1900. Renewed September 13, 1902. Serial No. 123,354. (No model.)

To all whom it may concern:

Be it known that I, ELLSWORTH E. FLORA, a citizen of the United States, residing at Chicago, Illinois, have invented certain new and useful Improvements in Printing-Presses, of which the following is a specification.

My invention has relation more particularly to multicolor-printing presses; and it has for its object the making of a printing-press in which to produce the paper and carry out the process of multicolor printing described in Letters Patent of the United States No. 611,457, issued September 27, 1898, to the International Color-Photo Company as the assignee of James W. McDonough; and my invention consists in the features, details of construction, and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is a diagrammatic view of three form-cylinders applicable for use either in platen or cylinder presses. Fig. 2 is an enlarged side elevation, partly in section, of one of the form-cylinders. Fig. 3 is an end view of the same. Fig. 4 is a diagrammatic view of an impression-cylinder of a rotary press with the form-cylinders in place. Fig. 5 is an end view of modified means for effecting the adjustment of a form-cylinder, and Fig. 6 is a side sectional elevation taken in line 6 of Fig. 5.

In producing the paper and carrying out the process of multicolor printing described and claimed in the McDonough patent above mentioned it is necessary to provide the paper with colored inks or substances arranged according to regular recurring patterns—as dots, lines, figures—of such colors and proportions as to cause each to absorb such colors as are transmitted by each and all the others. These regular recurring patterns can most conveniently be made in the form of lines, and I shall hereinafter use the term “lines” to designate them, without meaning, however, to restrict myself to lines literally, so long as regular patterns are employed. These lines can most conveniently be formed of red, green, and blue colored inks or substances, though the complementaries of such colors may be used, and I shall hereinafter use the terms “red,” “green,” and “blue” inks to designate my colored inks

without meaning, however, to restrict myself to these specific colors literally, so long as colors are used which are mutually absorptive, as above explained. It is necessary also in placing the lines of red, green, and blue inks on the paper according to the McDonough process that they be placed side by side in close juxtaposition, so as to cover the entire surface of the paper without, however, superposing them upon each other. This requires a fine adjustment or registration of the plates by which the lines are placed. Furthermore, after the paper has been prepared with the colored lines it is necessary to employ a half-tone or other suitable plate for printing on them with black or ordinary printers' ink, and I shall hereinafter use the term “half-tone plate” to designate the plate, without, however, intending to limit myself to half-tone plates technically and literally made from a negative taken through a screen having red, green, and blue lines on its surface corresponding in number and dimension to all the lines on the paper and to register such half-tone plate so that its lines will fall upon and cover the lines on the paper. This requires a fine registration or adjustment of the half-tone plate, so that its lines in printing will fall exactly into the right position. It is to secure these various results and effects that my invention is intended.

In making my press for producing the paper and carrying out the McDonough process of multicolor printing I employ three form-cylinders A, B, and C, mounted in suitable journals to support them in proper relation to the impression-printing surface and to permit them to be rotated. I mount on these form-cylinders printing-plates *a*, *b*, and *c* (any desired number, though I have shown but one on each roller) which may be fixed and held on the form-cylinders in the usual or other desired way. These plates are provided with a desired number of raised lines *a'*, *b'*, and *c'* transversely of the surface of the plate. I prefer to provide each plate with, say, a hundred of these raised lines each, although of course a greater or lesser number may be used, according to the fineness of the lines of color desired to be impressed upon the paper. These raised lines

are intended to lay or place lines of colored inks or dies on the paper side by side, so as to entirely cover the surface of the paper without the lines being superposed on each other.

5 These lines are intended to lay inks or dies of different colors. The lines a' are intended to lay red ink, the lines b' green ink, and the lines c' blue ink, although of course it is im-

10 particular color, so long as the three sets lay the three different colors side by side. This requires a nice adjustment of the position of the form-cylinders endwise, so that the lines will be laid or placed exactly in the desired

15 position side by side on the paper, as shown by dotted lines in Fig. 1, and means for effecting the endwise adjustment of the form-cylinders and holding them in their proper desired positions when adjusted. To effect

20 this end adjustment of the form-cylinders, different means may be employed, of which I have illustrated two in the drawings. In Figs. 1, 2, and 3 I have shown a form-cylinder A, it being understood that each of the

25 form-cylinders is similarly mounted on a journal or shaft D, supported in journal-boxes d , arranged in a frame E, so that they may be properly rotated therein. To arrange for the end wear on the journal or

30 shaft D, I provide the ends with hardened blocks F, preferably provided with a rounded end f to minimize the wear and friction between the ends and the means bearing against the ends to effect the endwise adjustment.

35 To adjust the form-cylinders in one direction, I employ a block G, bearing against the rounded end of the hardened block, against which an adjusting-screw g bears and on which is mounted a worm-wheel H, properly

40 keyed or fastened to the adjusting-screw, so that the two will rotate together. This worm-wheel is adapted to be rotated by a worm-screw h , journaled in the ears h' , extending out from the frame E. This worm-screw, as

45 shown in the drawings, carries a hand-wheel I, adapted to be turned or rotated by a handle i , so that it may be turned in the one direction or the other to move the adjusting-screw in or out. I mount on the hand-wheel

50 a pointer or needle i' and mount in proper relation to it a calibrated or scaled arc I' , so that the needle may be turned opposite to any desired mark on it, and thus indicate the exact extent of adjustment made from time to

55 time in effecting the endwise adjustment of the form-cylinders to secure the proper alignment and placement of the lines of ink or dies on the paper. By turning the screw in or advancing it a desired distance the form-

60 cylinder will be moved a corresponding distance endwise. In order to effect the movement of the form-cylinders in the opposite direction when the adjusting-screw is moved out, I arrange at the other end of the shaft a

65 block G' , bearing against the rounded end of the hardened block F, arranged at that end

of the shaft, and immediately back of this block G' , I arrange a spring g' , whose tension may be adjusted by a screw H' , bearing against a follower h^2 , abutting against the outer end 70 of the spring. This spring exercises its tension or force against the end of the cylinder journal or shaft, so that as the adjusting-screw g is advanced or moved in the roller can only be moved to the extent that the screw 75 is advanced, and as the screw is retracted or moved out the cylinder will be pushed back to follow the screw, and thus insure the end movement of the cylinder in that direction to the extent that the screw is retracted. 80

In Figs. 5 and 6 I have shown a somewhat-modified means for effecting the end adjustment of the form-cylinder to show that it may be effected in different ways. In this case the journal or shaft D is provided with an extension 85 d' of smaller diameter than the diameter of the shaft, so as to present an end face of the shaft at the commencement of the extension. The outer end of the extension is provided with external screw-threads, on which are arranged lock and jam nuts d^2 . The end of the 90 journal-box d is internally and externally screw-threaded, as shown in Fig. 6. Engaging the external threads is a cap J, having a central hole or bore through it internally screw- 95 threaded and corresponding to the hole or bore of the internally-threaded end of the journal-box, so that when the cap is in place its internal screw-threads and the internal screw-threads in the end of the journal-box form 100 one set or series of threads, as shown in Fig. 6. The worm-wheel H is provided with an externally-threaded hub h^2 , adapted to be screwed into the internal screw-threads of the cap J and the end of the journal-box d and 105 bear against the end face of the shaft, so that as it is moved in or advanced by the worm-shaft h it will force the shaft and the cylinder a corresponding distance. The lock and jam nuts d^2 bear against the outer face of the 110 worm-wheel, so that as the worm-wheel is moved out or retracted the shaft will be positively drawn or moved with it. This enables the spring g' to be dispensed with for effecting the end movement of the shaft and cyl- 115 inder as the worm-wheel is retracted or moved out. The cap J may be adjusted and held in any desired position by a set-screw j , so that compensation may be provided for any wear that may take place between the surfaces of 120 the internal screw-threads of the cap and journal-box and the external screw-threads of the hub h^2 of the worm-wheel.

In Fig. 4 I have shown the form-cylinders A, B, and C in their relative positions when 125 employed with a cylinder impression-surface K, with inking-rolls L, L', and L² in place for applying the red, green, and blue inks to the raised lines of the plates a , b , and c . In conjunction with the plates for laying or placing 130 the lines of color on the paper I employ a form-cylinder M, having a half-tone plate or

printing-block *m*, to which is applied black or ordinary printers' ink through means of inking-rolls *M'*. This form-cylinder *M* is also adapted to be adjusted endwise, the same as in the case of the form-cylinders *A*, *B*, and *C*. This endwise adjustment of the cylinder *M* is required from the fact that the half-tone plate or printing-block is made from a negative taken through a screen having lines of red, green, and blue inks on it corresponding in size, number, and position to the total number of lines of colored inks laid on the paper, so that in printing to secure the natural colors of the object photographed it is necessary that the lines in the half-tone plate shall register with the lines laid on the paper by the plates *a*, *b*, and *c*. Of course it will be understood that the sheets of paper are applied so that the lines of colored inks are laid or placed on it before it is reached by the half-tone plate or printing-block, so that the impression of such block in black or ordinary printers' ink will produce the natural colors of the object photographed. For this purpose I have shown a feed-table *N* and a delivery belt and fly *N'*, which are intended to be used and operated in the ordinary way.

What I regard as new, and desire to secure by Letters Patent, is—

1. In a printing-press, the combination of an impression-surface, a series of form-cylinders arranged in such relation to the impression-surface as to contact with paper placed thereon, such cylinders carrying plates having lines for printing lines of color, a journal at each end of each cylinder and on which the cylinder is rotatably mounted, and means for moving the cylinders endwise and securing the lateral adjustment of the plates to insure the side-by-side placement of the lines of color, substantially as described.

2. In a printing-press, the combination of a cylindrical impression-surface, a series of form-cylinders arranged peripherally around the cylindrical impression-surface so as to contact with paper placed thereon, such cylinders carrying plates having lines for printing lines of color, a journal at each end of each cylinder and on which the cylinder is rotatably mounted, and means for moving the cylinders endwise and securing the lateral adjustment of the plates to insure the

side-by-side placement of the lines of color, substantially as described.

3. In a printing-press, the combination of an impression-surface, a series of form-cylinders arranged in such relation to the impression-surface as to contact with paper placed thereon, a desired number of such cylinders carrying plates having lines for printing lines of color and one of such cylinders carrying a half-tone printing-plate having lines corresponding in number and dimension to the total number of lines of color printed, a journal at each end of each cylinder and on which the cylinder is rotatably mounted, means for moving the cylinders carrying the plates having the lines for printing lines of color endwise and securing the lateral adjustment of the plates to insure the side-by-side placement of the lines of color, and means for moving the cylinder carrying the half-tone plate endwise and securing the lateral adjustment of the half-tone plate to insure the registration of its lines with the lines of color printed, substantially as described.

4. In a printing-press, the combination of a cylindrical impression-surface, a series of form-cylinders arranged peripherally around the cylindrical impression-surface so as to contact with paper placed thereon, a desired number of such cylinders carrying plates having lines for printing lines of color and one of such cylinders carrying a half-tone printing-plate having lines corresponding in number and dimension to the total number of lines of color printed, a journal at each end of each cylinder and on which the cylinder is rotatably mounted, means for moving the cylinders carrying the plates having the lines for printing lines of color endwise and securing the lateral adjustment of the plates to insure the side-by-side placement of the lines of color, and means for moving the cylinder carrying the half-tone plate endwise and securing the lateral adjustment of the half-tone plate to insure the registration of its lines with the lines of color printed, substantially as described.

ELLSWORTH E. FLORA.

Witnesses:

THOMAS A. BANNING,
THOMAS B. MCGREGOR.

It is hereby certified that Letters Patent No. 724,997, issued April 7, 1903, upon the application of Ellsworth E. Flora, of Chicago, Illinois, for an improvement in "Printing Presses," was erroneously granted to "George Farnsworth, his heirs or assigns," whereas said Letters Patent should have been granted to said *George Farnsworth, as Trustee, his successors or assigns*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 18th day of September, A. D., 1906.

[SEAL.]



E. B. MOORE,

Acting Commissioner of Patents.