(No Model.) 5 Sheets—Sheet 1.

L. C. CROWELL.

PRINTING MECHANISM.

No. 429,891. Patented June 10, 1890.

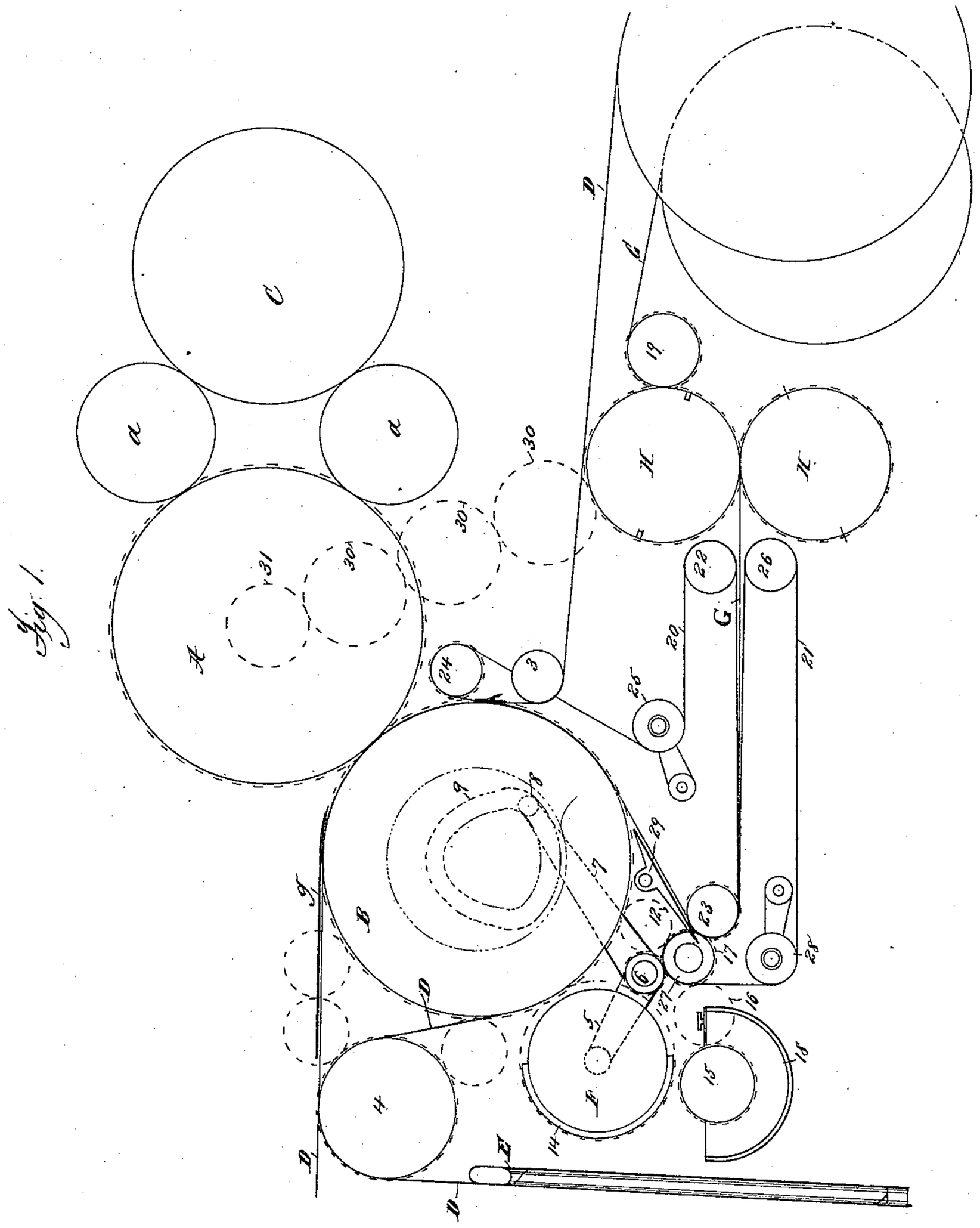


Fig. 1.

Attest:
Geo. H. Botts
J. M. Borah

Inventor:
Luther C. Crowell
By Phleger Phelps & Hovey
Attys

(No Model.)

5 Sheets—Sheet 2.

L. C. CROWELL.

PRINTING MECHANISM.

No. 429,891. Patented June 10, 1890.

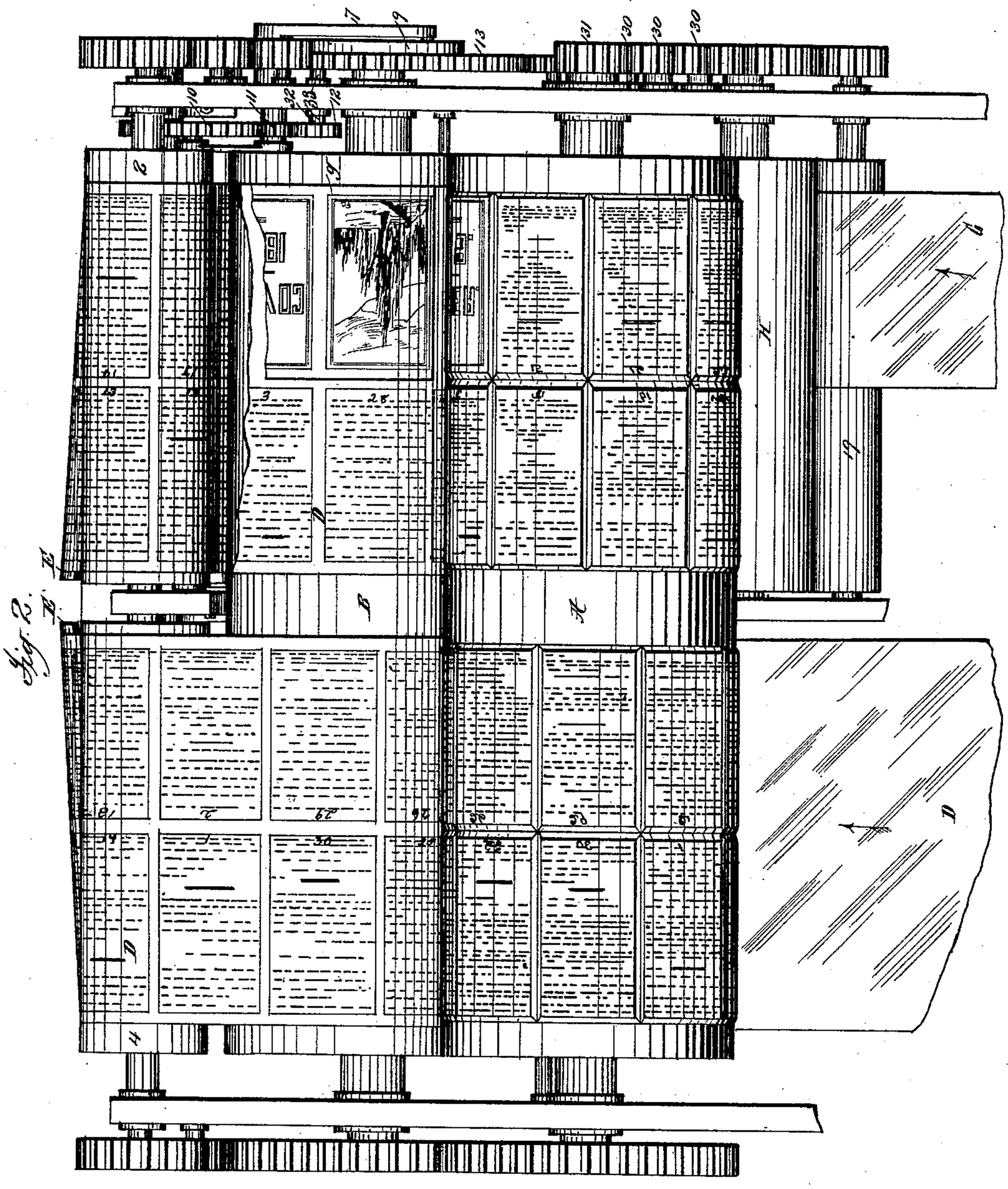


Fig. 2.

Attest:
Geo. H. Bolts
J. McBorough

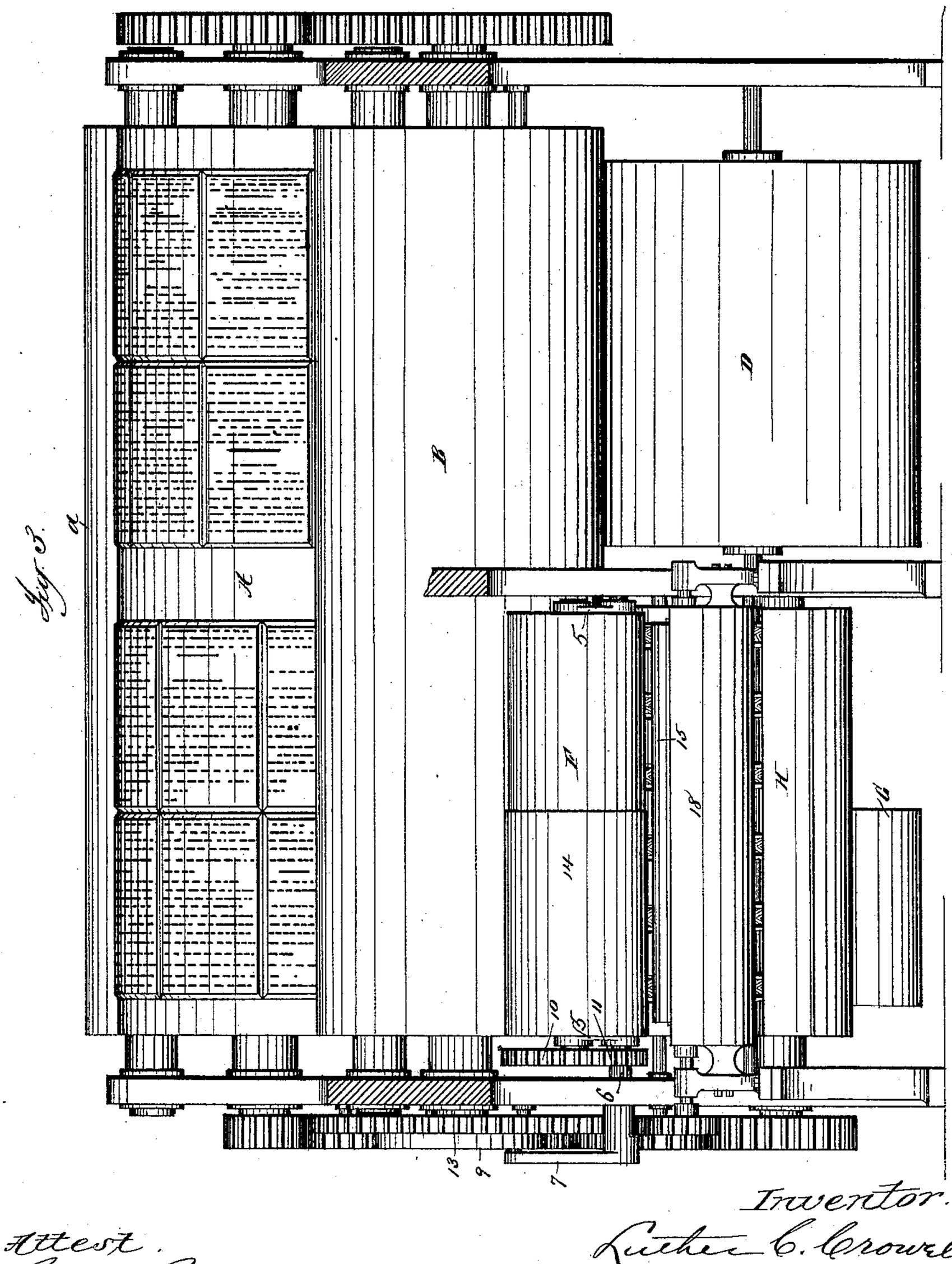
Inventor:
Luther C. Crowell
By Philipp Phelps & Hovey
Attys

(No Model.) 5 Sheets—Sheet 3.

L. C. CROWELL.

PRINTING MECHANISM.

No. 429,891. Patented June 10, 1890.



Attest.
Geo. H. Bolte.
J. M. Borst

Inventor:
Luther C. Crowell
By Phillips Phelps & Berry
Attys.

(No Model.) 5 Sheets—Sheet 4.

L. C. CROWELL.

PRINTING MECHANISM.

No. 429,891. Patented June 10, 1890.

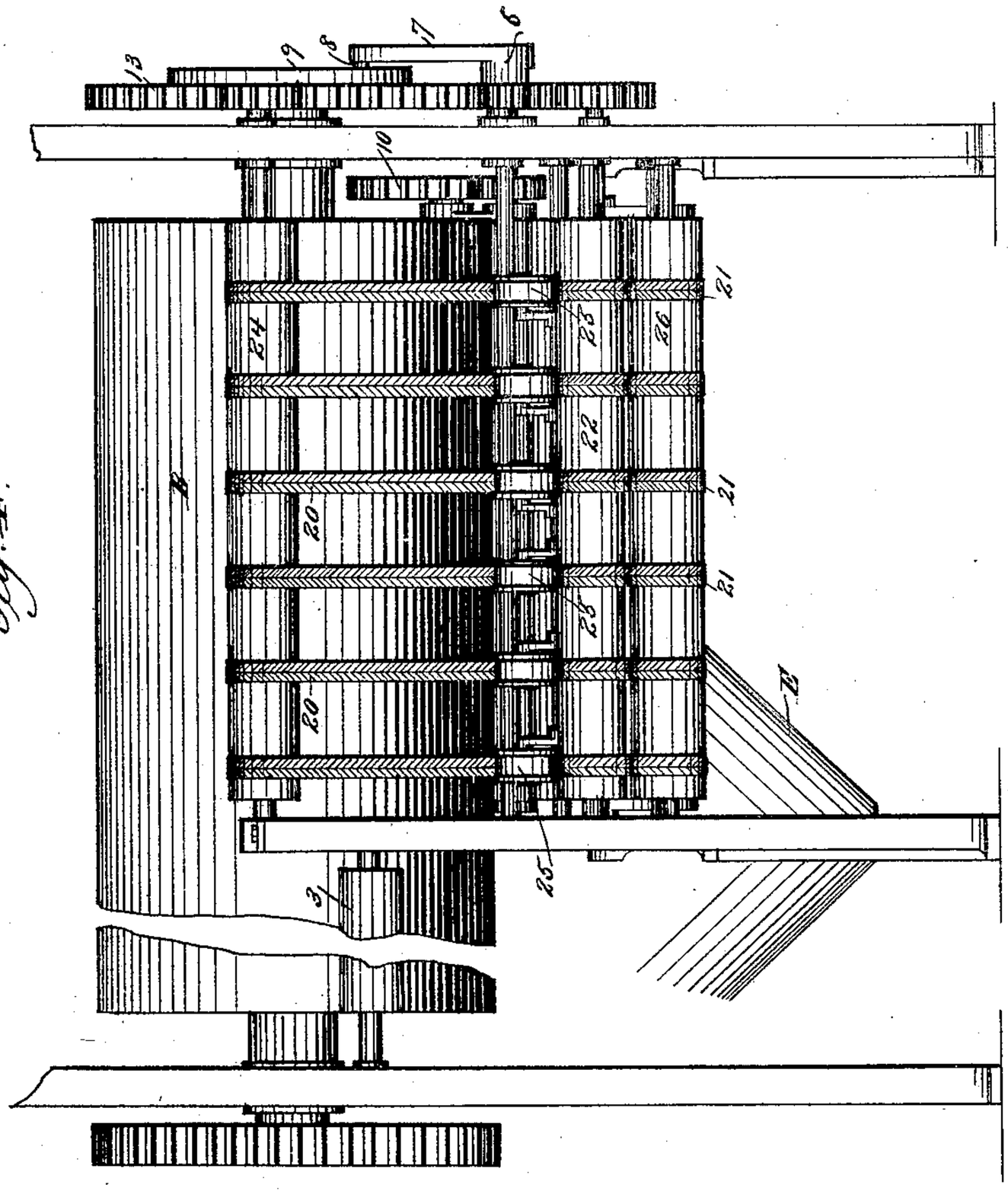


Fig. 4.

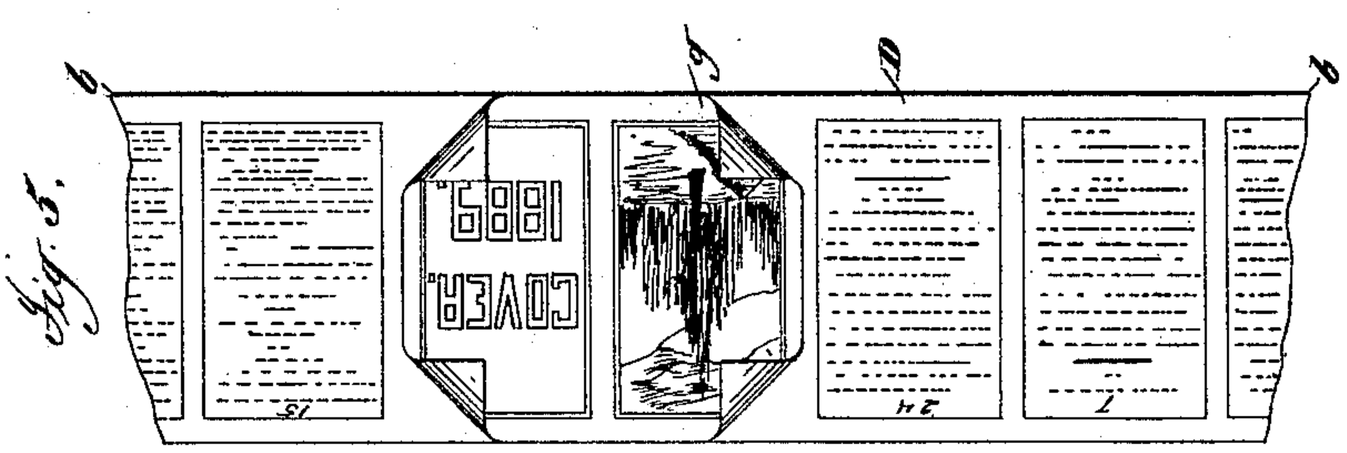


Fig. 5.

Witnesses:
Geo. H. Bolte.
J. M. Bowers.

Inventor:
Luther C. Crowell
By Philip Phelps & Hovey
Attys.

(No Model.) 5 Sheets—Sheet 5.

L. C. CROWELL.

PRINTING MECHANISM.

No. 429,891. Patented June 10, 1890.

Fig. 6.

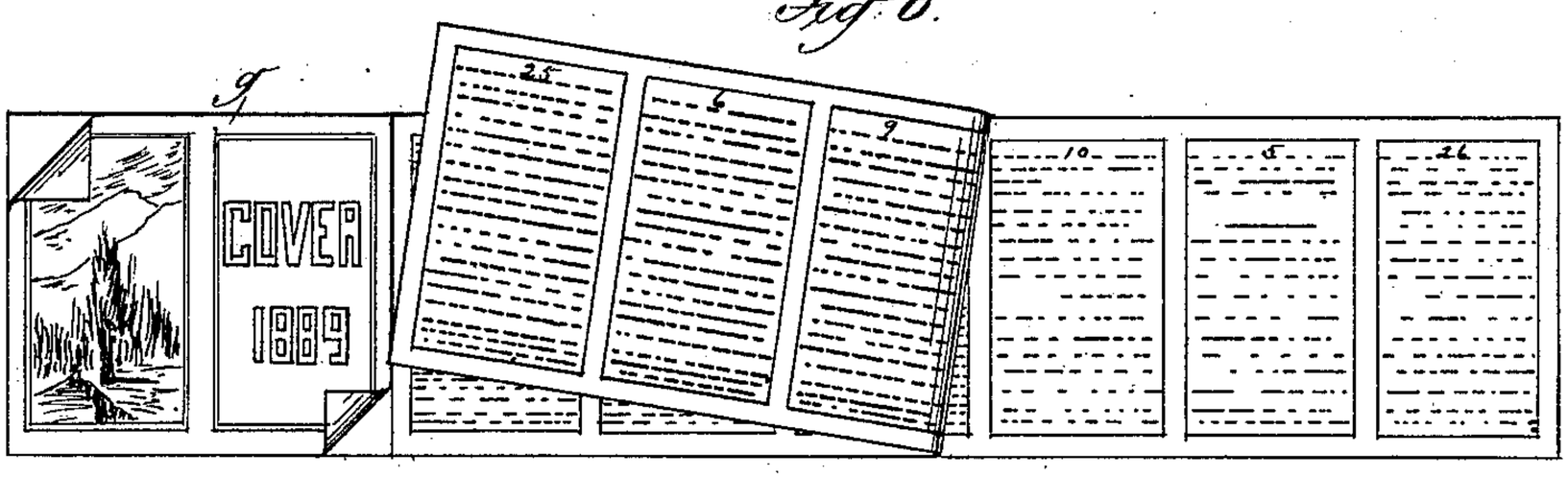


Fig. 8.

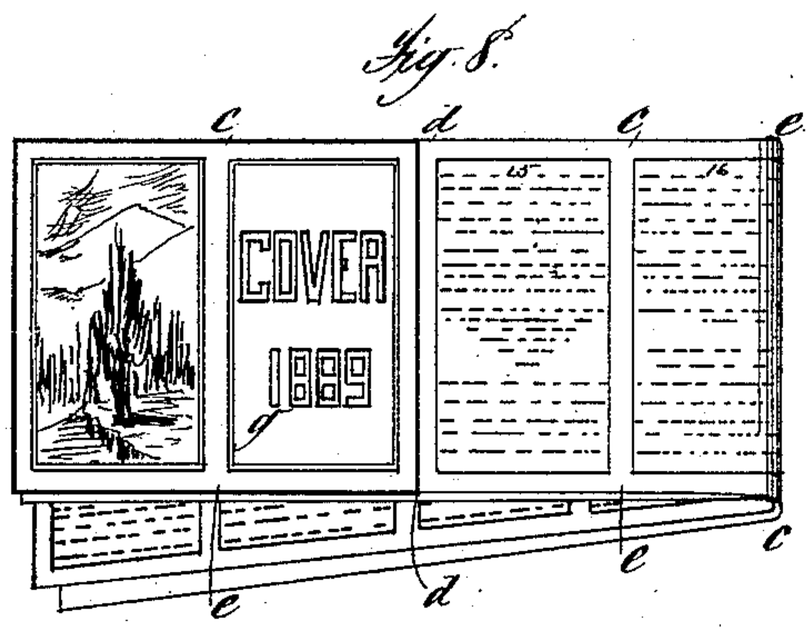


Fig. 7.

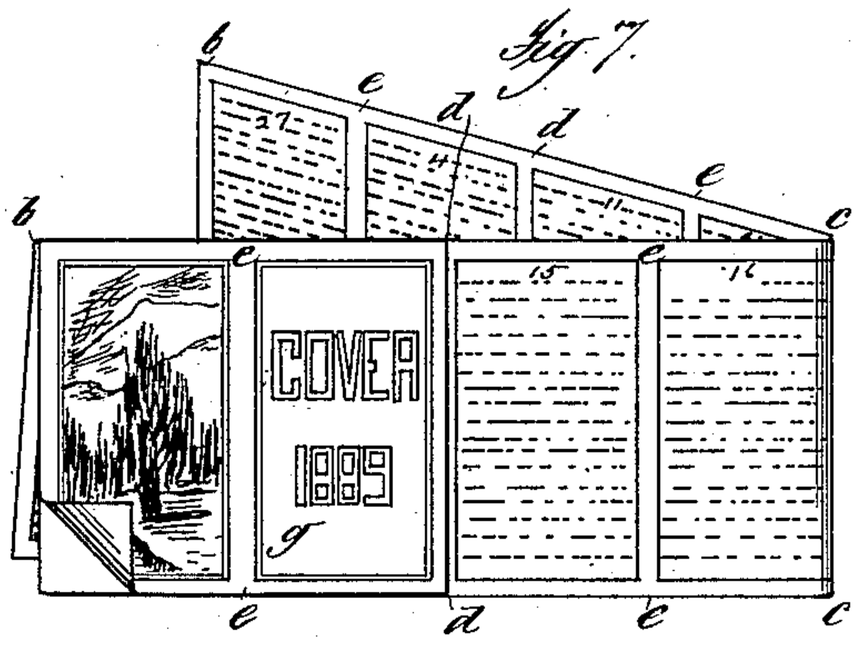


Fig. 9.

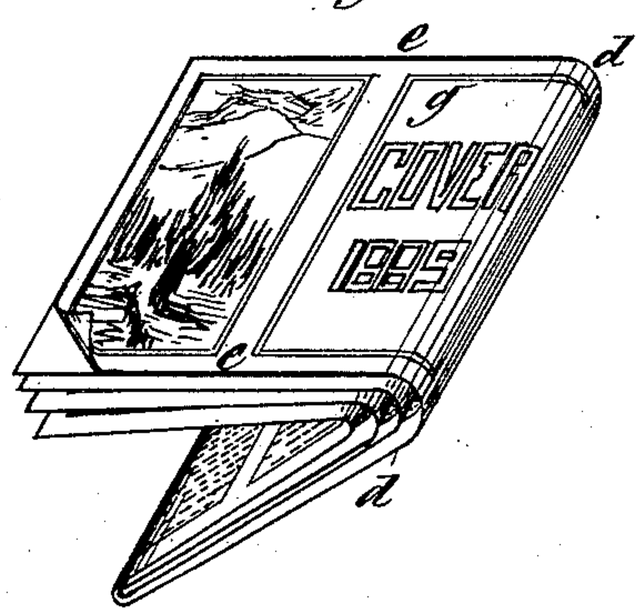
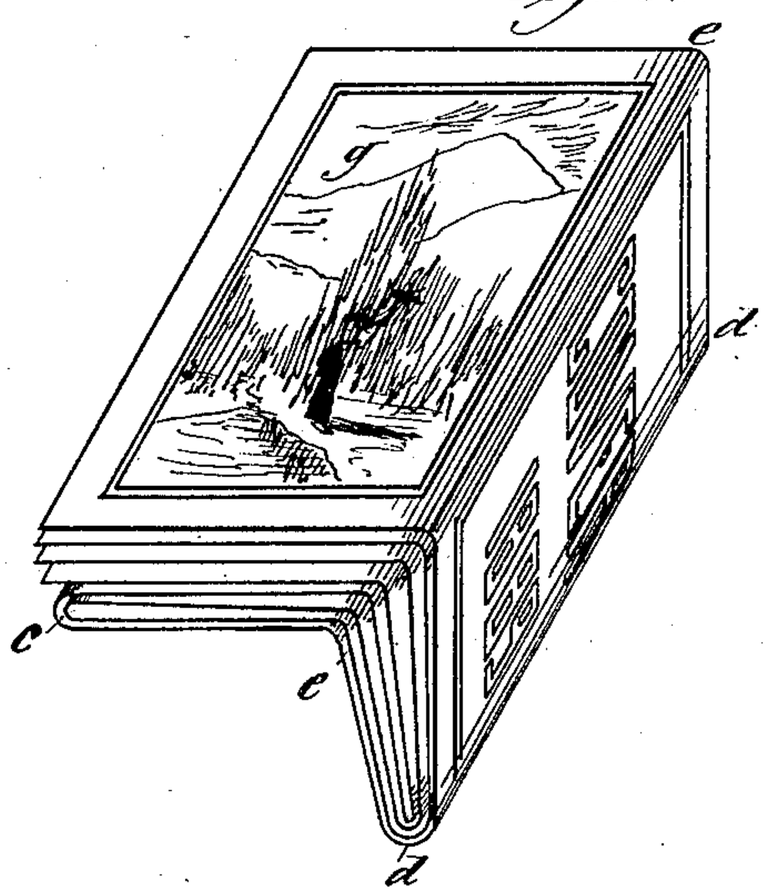


Fig. 10.



Witnesses:
J. M. Boosh
Geo. H. Lotts

Inventor.
Luther C. Crowell
By Philipp Thelps & Hovey
attys

UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, ASSIGNOR TO R. HOE & CO., OF NEW YORK, N. Y.

PRINTING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 429,891, dated June 10, 1890.

Application filed March 20, 1889. Serial No. 304,002. (No model.)

To all whom it may concern:

Be it known that I, LUTHER C. CROWELL, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Printing Mechanism, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to a web-printing mechanism which is especially designed for use in producing pamphlets and similar small publications which are composed of a number of pages of comparatively small size, it being the object of the invention not only to print the entire book or pamphlet at one operation, but also to print and apply a cover which is composed of a sheet separate from the remainder of the book or pamphlet and may be of paper of a different quality or color.

In many lines of business, as conducted at the present time, large numbers or small or comparatively small books or pamphlets are required for advertising and other purposes, and the demand for pamphlets of this character is so great that it has become highly important to provide machinery by which they can be produced rapidly and at a comparatively small cost. In many cases it is very desirable, in order to give a better and more attractive appearance to such pamphlets, that they should be provided with covers composed of paper of a different or better quality from that which is used for the body of the work, and, in addition, it is in many cases desirable that this cover should be of colored or tinted paper in order to make the pamphlet more attractive. Where these conditions have been required it has heretofore been necessary to print the covers separately from the body of the work and apply them by hand or otherwise, and this has of course entailed a large amount of labor, which made the work comparatively expensive.

In order to convey a full understanding of the mechanism constituting the present invention, it will now be described in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a diagrammatic view of a printing mechanism organized according to the present invention. Fig. 2 is a plan view of the same, the inking mechanism being omitted. Fig. 3 is an end elevation of the mechanism, looking from the left of Fig. 1, certain parts being omitted in order to more clearly disclose other parts. Fig. 4 is an end elevation looking from the right of Fig. 1, showing particularly the impression-cylinder and the tapes for conveying the covers to the impression-cylinder, as will be hereinafter explained. Figs. 5 to 10, inclusive, illustrate the product of the machine.

Referring to said drawings, it is to be understood that the printing mechanism proper consists of a single form-cylinder A and a single impression-cylinder B, the form-cylinder being of sufficient length to receive the plates or forms for printing both sides of a web of the required width and the impression-cylinder being of a corresponding length, so that the web being passed between the form and impression cylinders at one end thereof will be printed upon one side, and then being turned over and passed between said cylinders at the opposite end will be printed upon its other side, all in the manner shown and described in my prior Letters Patent, No. 212,444.

The form-cylinder A, as herein shown, is of sufficient length to receive four forms lengthwise of the cylinder and eight forms circumferentially thereof, the forms being placed upon the cylinder with their columns of matter parallel with the axis of the cylinder. With the cylinder of this size the machine is capacitated to produce a product of thirty-two pages; but this, of course, can be varied by increasing or decreasing the diameter of the cylinder or by increasing or decreasing its length.

The forms upon the cylinder A are inked by the usual inking mechanism, which is represented in Fig. 1 by form-rolls *a* and a distributing-cylinder C. The web of paper D, which in the case shown is of a sufficient width to receive the impressions of two forms abreast, is led from a roll suitably supported in the frame-work of the machine, and after

passing beneath a leading-roll 3 is led between the form and impression-cylinders A B, where it is printed upon one side by the forms at one end of the form-cylinder. After being thus printed upon one side the web passes over a leading-roll 4 and downward around the turning-bars of a web-turner E, of substantially the form shown in the Letters Patent before referred to, by which the web is transferred laterally and at the same time turned over, after which it is led upward over a roll 2 and downward around the impression-cylinder B, and again passed between the form and impression cylinders A B, with its unprinted side presented to the forms upon the cylinder A. Owing to the lateral transfer of the web by the web-turner E, it is, as it passes the second time between the form and impression cylinders, presented to the forms upon the opposite end of the form-cylinder, thus printing the two sides of the web with different matter to properly perfect it. The distance traveled by the web between the printing of its opposite sides is so adjusted that the impressions upon the opposite sides of the web will be in proper register. After being thus perfected the web is led from the impression-cylinder B to any suitable form of delivery mechanism, by which it is severed into sheets of the proper length, which sheets being longitudinally folded and then folded transversely three times, as indicated in Figs. 7 to 10, will produce pamphlets of thirty-two pages each. The edges of the pamphlets may of course be properly trimmed and the several pages secured together by sewing or otherwise in any suitable manner.

If it is not desired to provide the pamphlet with a cover composed of paper of any different quality or color from that which composes the remainder of the pamphlet, then, of course, all that is necessary is to locate the plates or forms for printing the two pages for the cover upon the form-cylinder in such position that the impressions made by those plates constitute the cover-pages when the product has been folded into pamphlet form, as described. In many cases, however, it is desirable, as before explained, to provide the pamphlets with covers of a different quality or color from that of the remainder of the pamphlet. This result is accomplished by the mechanism constituting the present invention in the following manner: The form-cylinder A is provided with two forms containing whatever matter it is desired to print upon the pages constituting the cover of the pamphlet, and these forms are so located upon the cylinder as to deliver their impressions upon the web D at such points that when the web is severed into sheets and the sheets folded these impressions will be upon the outside or cover of the folded product or pamphlet.

Located adjacent to that end of the impression-cylinder B around which the web D is led, after having been led around the web-turner E and transferred laterally, is a pasting-roll F, which is mounted to turn freely in the ends of arms 5, extending from a rock-shaft 6, which is journaled in the frame of the machine, and is provided with an arm 7, having a bowl or stud 8, which enters the groove of a cam 9, mounted upon the shaft of the impression-cylinder B. The cam 9 is so shaped that at each revolution of the impression-cylinder B the shaft 6 is rocked, so as to vibrate the roll F into contact with the impression-cylinder and retain it in such contact during about a half-revolution of the roll F. The roll F is provided at one end with a gear 10, which engages with a gear 11, mounted loosely upon the shaft 6, and is driven through a gear 12, mounted upon the inner end of a short shaft 33, (see Fig. 2,) which shaft carries at its outer end a similar gear, which engages with a gear 13 upon the shaft of the impression-cylinder, so that the two move at the same surface speed.

The paste-roll is provided at a suitable point with a raised portion 14, which is formed of rubber or any other material suitable for receiving and applying paste, and is of an area equal to two pages of the pamphlet which is to be produced, and this raised portion is so positioned upon the roll that when the latter is rocked toward the impression-cylinder the raised portion 14 will be brought into contact with the cylinder. The portion 14 may be channeled or otherwise suitably roughened to cause it to properly receive and apply the paste. When the roll F is vibrated in the opposite direction away from the cylinder B, the raised portion 14 is carried into contact with a fountain-roll 15, which receives paste from a fountain 18, and is driven through gears 16 17 from the gear on the outer end of the shaft 33. By this means the raised portion 14 is supplied with paste at each vibration of the roller F, which paste is, as the roll is vibrated in the opposite direction, applied to the web D as it passes around the impression-cylinder B, and the parts are so timed that the paste thus applied to the web D will be applied upon the space which is in position to receive the impressions from the two forms upon the cylinder which contain the matter for printing the cover of the pamphlet.

Located at the end of the roll from which the web D is drawn, or in any other convenient position, is a second roll containing a narrow web G, of suitable width and of the desired quality or color for the cover of the pamphlet. The web G, as it is led from its roll, passes over a feeding-roll 19 and thence between a pair of cutting-cylinders H, which are provided with co-operating blades and grooves, and operate in the usual manner to partly sever the web G at suitable intervals to divide it into sheets of the proper dimensions for the cover. The web G after being thus partly severed enters the control of two series of accelerated tapes 20 21, which are

arranged as follows, and which operate to complete the severance of the sheets from the web G and deliver them to the impression-cylinder B in proper position to be imposed upon the web D at the points covered by the paste applied by the roll F. The tapes 20 pass around a roll 22, located adjacent to the upper one of the cylinders H, thence forward around a roll 23, and upward for a short distance in contact with the impression-cylinder, after which they return around a roll 24 and stretching-pulleys 25. The tapes 21 pass around a roll 26, located beneath the roll 22, thence forward around the roll 23, and returning around a roll 27 and stretching-pulleys 28. The space between the roll 27 and the impression-cylinder is bridged by a series of guides 29, which co-operate with the tapes 20 to convey the sheets from the roll 23 to the impression-cylinder.

The cutting-cylinders H are geared together and are driven through intermediate gears 30 from a gear 31, mounted upon the shaft of the form-cylinder A, the several gears being so proportioned that the web G will be advanced a distance equal to the length of one of the sheets required for the cover of the pamphlet at each revolution of the form and impression cylinders A B.

The operation of the machine thus organized is as follows: The web is led from its roll between the printing-cylinders A B, so as to be printed upon its upper side by the forms at one end of the form-cylinder, the forms for printing the first side of the web being in the case illustrated at the left-hand end of the cylinder, as shown in Fig. 2. After being printed upon its upper side the web is led downward around the roll 4, and around the web-turner E, being thereby turned over and transferred laterally, after which it is led upward around the roll 2, and thence downward around the impression-cylinder with its printed side next to said cylinder. In passing around the impression-cylinder the unprinted side of the web receives paste at regular intervals, which is applied by the raised portion 14 of the vibrating paste-roll F, the movement of the pasting-roll being so timed that the fields of paste thus applied to the web will correspond in position and register with the forms upon the form-cylinder which print the pages for the cover of the pamphlet. After receiving paste in this manner the web continues upward around the impression-cylinder and again passes between the form and impression cylinders, so that its unprinted side, which is now uppermost, is presented to the forms upon the other end of the form-cylinder. The narrow cover-web G is led from its roll, and after passing between the feeding-roll 19 and the upper cutting-cylinder H is led between the two cutting-cylinders, where it is partially severed at regular intervals, the end of the web then passing into the control of the tapes 20 21, but moving at a speed considerably less than that of the tapes. When the leading end of the web G is advanced a certain distance between the tapes, it will be nipped by the tapes, so that the first cover-sheet which is partially severed from the web will be completely severed therefrom and will be then advanced at a speed corresponding to the speed of the printing-cylinders and will arrive at the impression-cylinder B at the proper time to be imposed upon the web D in position to exactly cover the field to which paste has been applied by the roll F, and which is in position to receive the impressions for the cover of the pamphlet, so that as the web D passes between the printing-cylinders the second time, and is printed upon its second side, the impressions of all of the forms upon the cylinder A for that side of the web will be given to the web D, except those forms which contain matter for the cover, and the impressions of these two forms will be given to the sheet *g*, which has been severed from the web G and pasted to the web D, and so the operation will be repeated at each revolution of the printing-cylinders. The sheets *g* as they pass with the web D between the printing-cylinders will be pressed into contact with the web D, so that the paste will be firmly set to secure the two together. After the printing is thus accomplished the web D, with the sheets *g* pasted to it at proper intervals and in proper position, is led to any suitable form of delivery mechanism, by which it is severed into main sheets of proper size, and these sheets are then longitudinally folded upon the line *b b*, as indicated in Fig. 7, and then transversely folded upon the lines *c c*, *d d*, and *e e*, as indicated in Figs. 8, 9, and 10, thus producing a thirty-two-page pamphlet with the cover-sheet *g* upon the outside. It will of course be readily seen that the web D may be longitudinally folded before being severed into sheets, if preferred, as indicated in Fig. 5, or it may be split upon the line *b b* and the two parts associated by web-turners, as indicated in Fig. 6, after which it will be severed into main sheets of the proper length and the main and cover sheets folded transversely as before, or the main sheets may be severed into smaller sheets and these collected by a sheet-collecting mechanism.

From the foregoing it will be seen that by the mechanism that has been described the complete pamphlets are produced with great rapidity and economy, and are provided with covers which may be of any suitable color or quality different from the color or quality of the paper of which the remainder of the pamphlet is composed; and it will further be seen that the cover of the pamphlet will always be two plies in thickness, the two plies being pasted together, thus making the cover comparatively stiff, which adds to the appearance and durability of the pamphlet; and it will also be further seen that where the body of the pamphlet is printed upon paper of one color—white, for example—and the cover upon

paper of another color, the inside and outside of the cover-sheet in the completed pamphlet will be of different colors, which will still further add to the attractiveness of the work.

To produce pamphlets of eight pages, or one-half the volume of those illustrated, it is only necessary to omit one-half the forms and use a web of half-width; or by duplicating the forms and using a full-width web, and then splitting the web or the sheets severed therefrom, duplicate side by side streams of eight-page pamphlets can be produced. In such case the form and position of the raised portion 14 of the pasting-roll will be changed, so as to apply the paste in the proper position, and the cover-web G will be of a width equal to the web D. It will of course be readily understood that the size or volume of the product may be increased by increasing the length or circumference of the printing-cylinders, or both, and also that the pasting-roll F may be so formed as to apply the paste in lines or spots, if preferred. So, also, the cover-sheets may be imposed upon the main sheets before the first impression, if preferred, and the paste may be applied to the cover-sheets instead of to the main sheets.

The particular form of web-printing mechanism which is herein shown has been selected merely for the purpose of illustration, and it is to be understood that other forms of printing mechanism may be employed without departing from the invention.

What I claim is—

1. The combination, with a pair of type and impression surfaces for printing a main sheet and its cover, of a sheet-feeding mechanism, substantially as described, for associating a cover-sheet with the main sheet prior to the operation of the printing mechanism thereon and in position to be printed thereby, substantially as described.

2. The combination, with a pair of type and impression surfaces for printing a main sheet and its cover, of a sheet-feeding mechanism, substantially as described, for associating a cover-sheet with the main sheet prior to the operation of the printing mechanism thereon and in position to be printed thereby, and a pasting mechanism for applying paste to unite the cover and main sheets, substantially as described.

3. The combination, with a pair of type and impression surfaces for printing a main sheet and its cover, of a web feeding and cutting mechanism for severing cover-sheets from a cover-web, and a sheet-feeding mechanism, substantially as described, for associating said cover-sheets with the main sheets prior to the operation of the printing mechanism thereon and in position to be printed thereby, substantially as described.

4. The combination, with a pair of type and impression surfaces for printing a main sheet and its cover, of a web feeding and cutting mechanism for severing cover-sheets from a cover-web, a sheet-feeding mechanism, substantially as described, for associating said cover-sheets with the main sheets prior to the operation of the printing mechanism thereon and in position to be printed thereby, and a pasting mechanism for applying paste to the cover and main sheets, substantially as described.

5. The combination, with a pair of type and impression cylinders for printing a main web, of a sheet-feeding mechanism, substantially as described, for associating cover-sheets with the main web prior to the passage of the main sheets between the type and impression cylinders and in position to be printed by the latter, substantially as described.

6. The combination, with a pair of type and impression cylinders for printing a main web, of a sheet-feeding mechanism, substantially as described, for associating cover-sheets with the main web prior to the passage of the main sheet between the type and impression cylinders and in position to be printed by the latter, and a pasting mechanism for applying paste to unite the cover-sheets to the main sheet, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LUTHER C. CROWELL.

Witnesses:
T. H. PALMER,
J. J. KENNEDY.