No. 612,831. Patented Oct. 25, 1898.

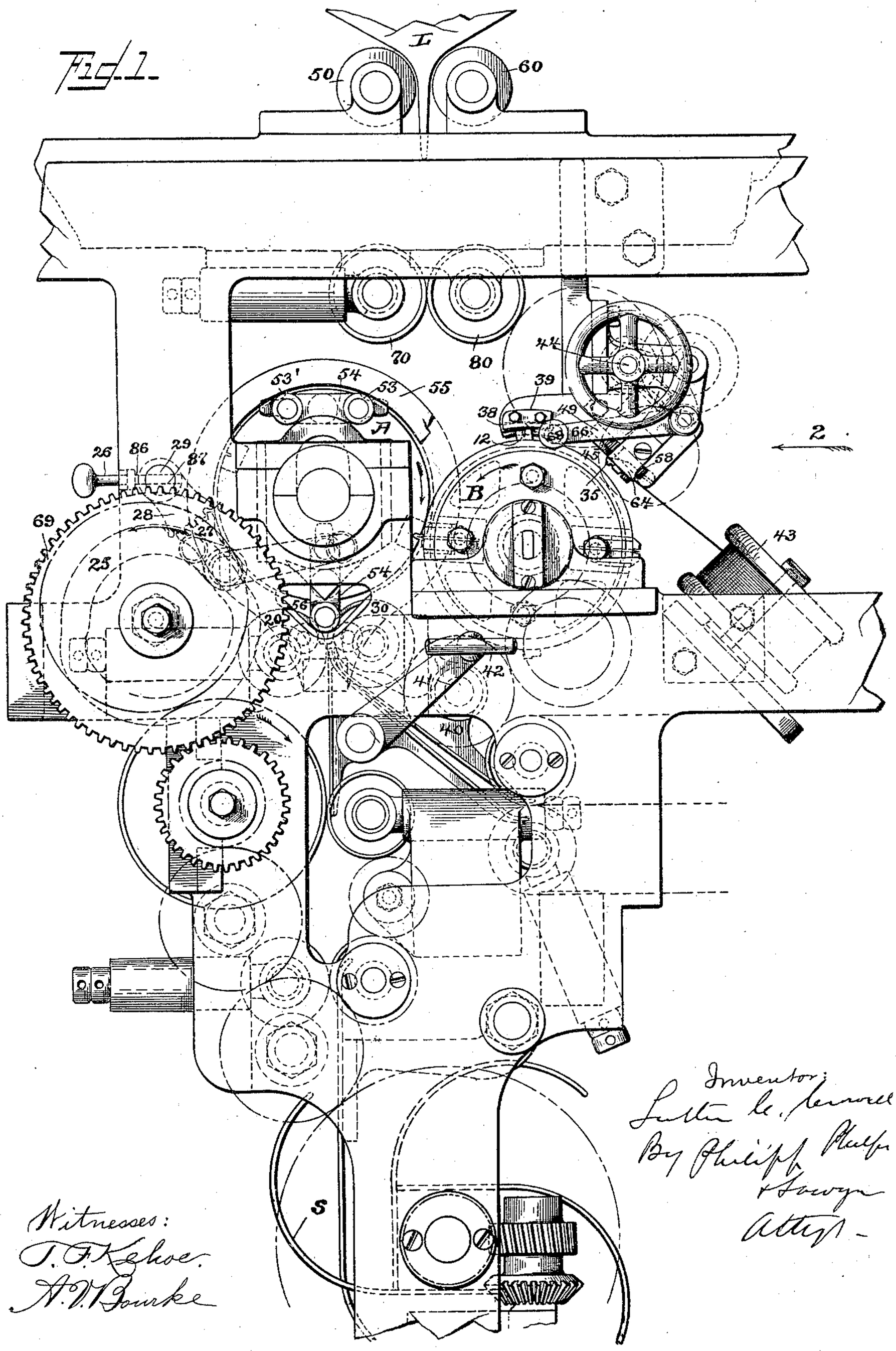
L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

(No Model.) 18 Sheets—Sheet 1.

Fig. 1.



Witnesses:
T. F. Kehoe.
A. W. Bourke

Inventor:
Lucius C. Crowell
By Philipp, Phelps
& Sawyer
Attys.

No. 612,831. Patented Oct. 25, 1898.

L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

(No Model.) 18 Sheets—Sheet 2.

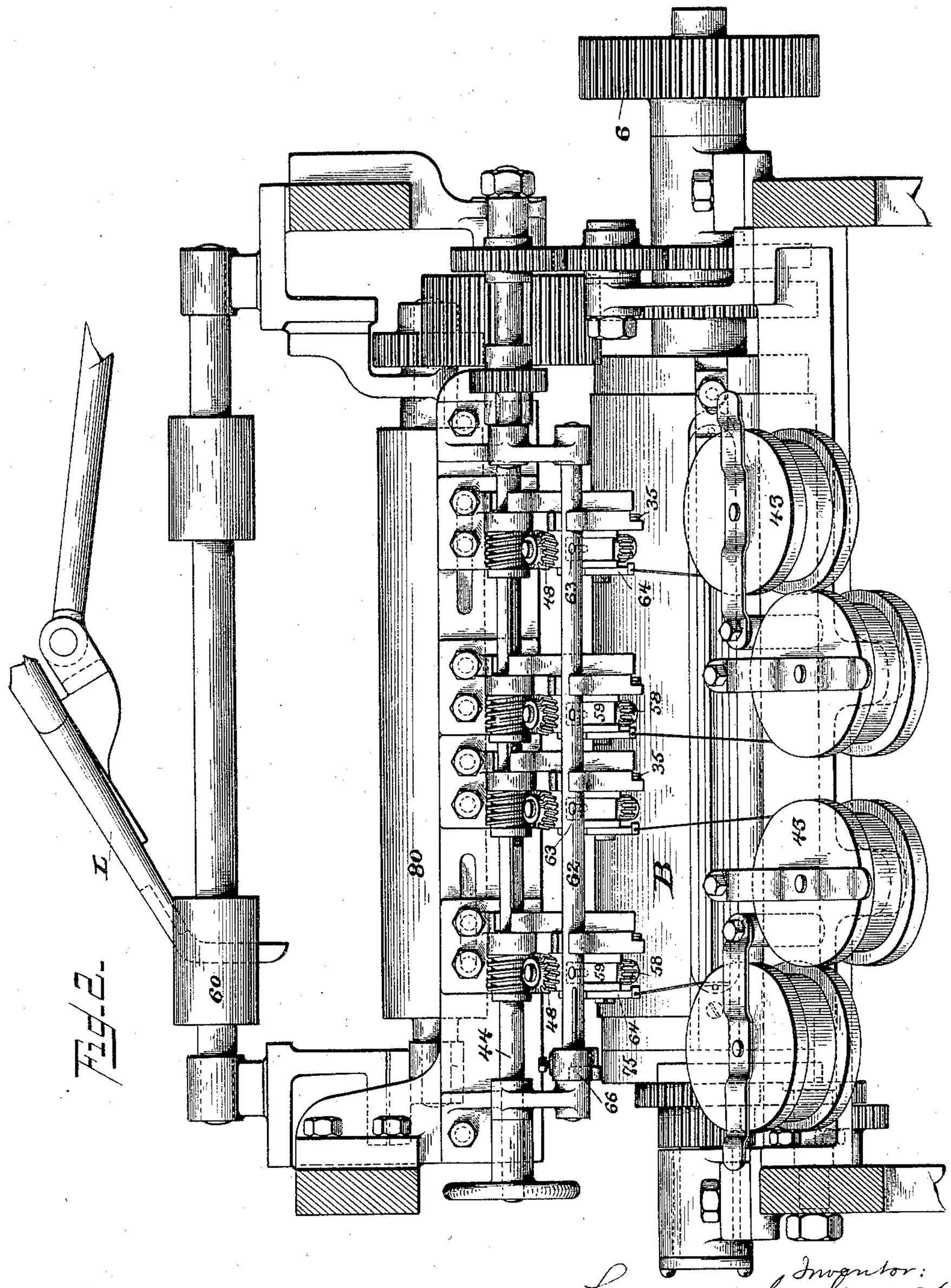


Fig. 2.

Witnesses:
T. D. Lehoe
A. V. Bourke

Inventor:
Lucius C. Crowell
By Philipp Philipp
& Sawyer
Attys.

No. 612,831. Patented Oct. 25, 1898.

L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

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(No Model.) 18 Sheets—Sheet 3.

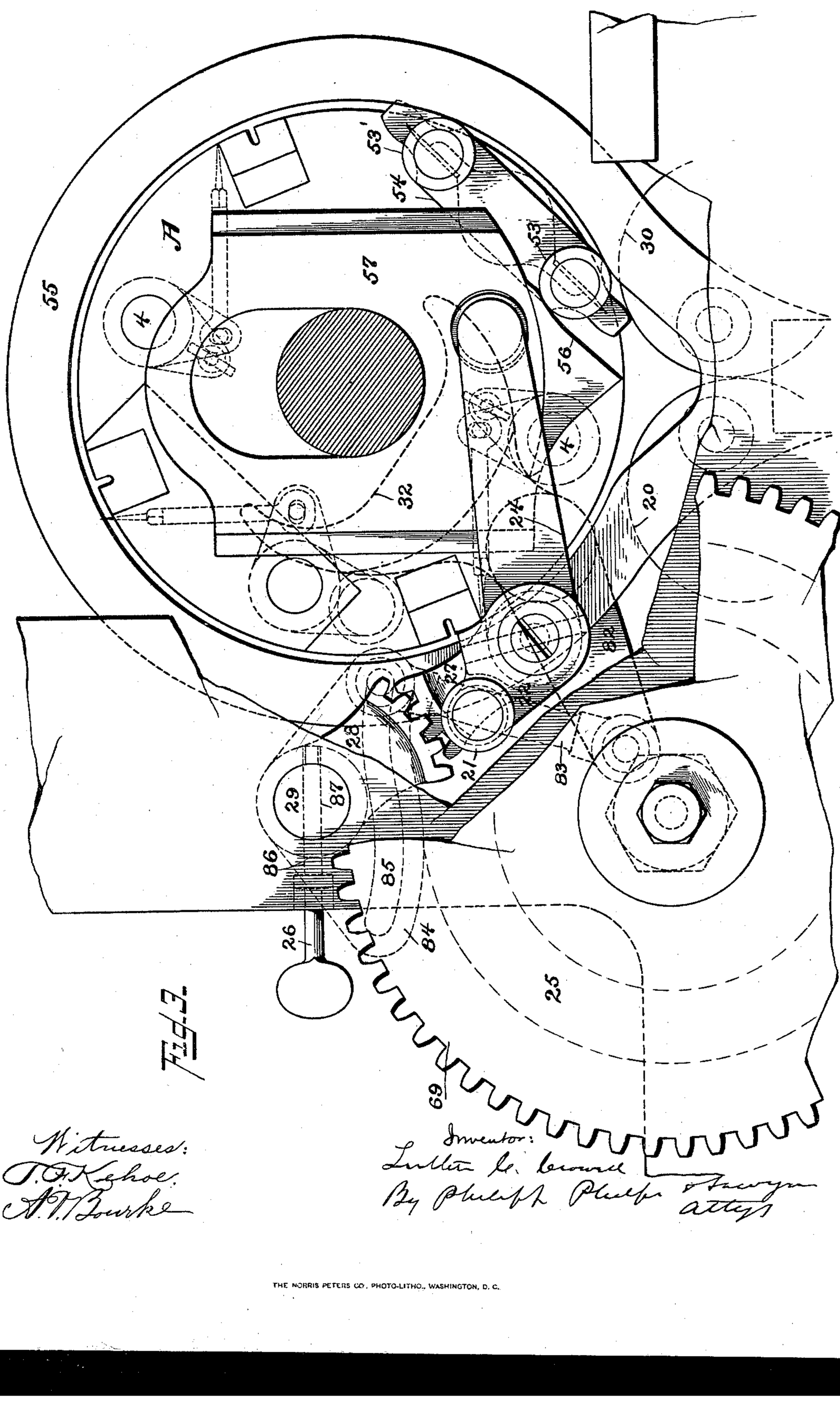


Fig. 12.

Witnesses:
T. D. Kehoe.
A. V. Bourke

Inventor:
Lucius C. Crowell
By Philip P. Plumb & Thorpe
Attys

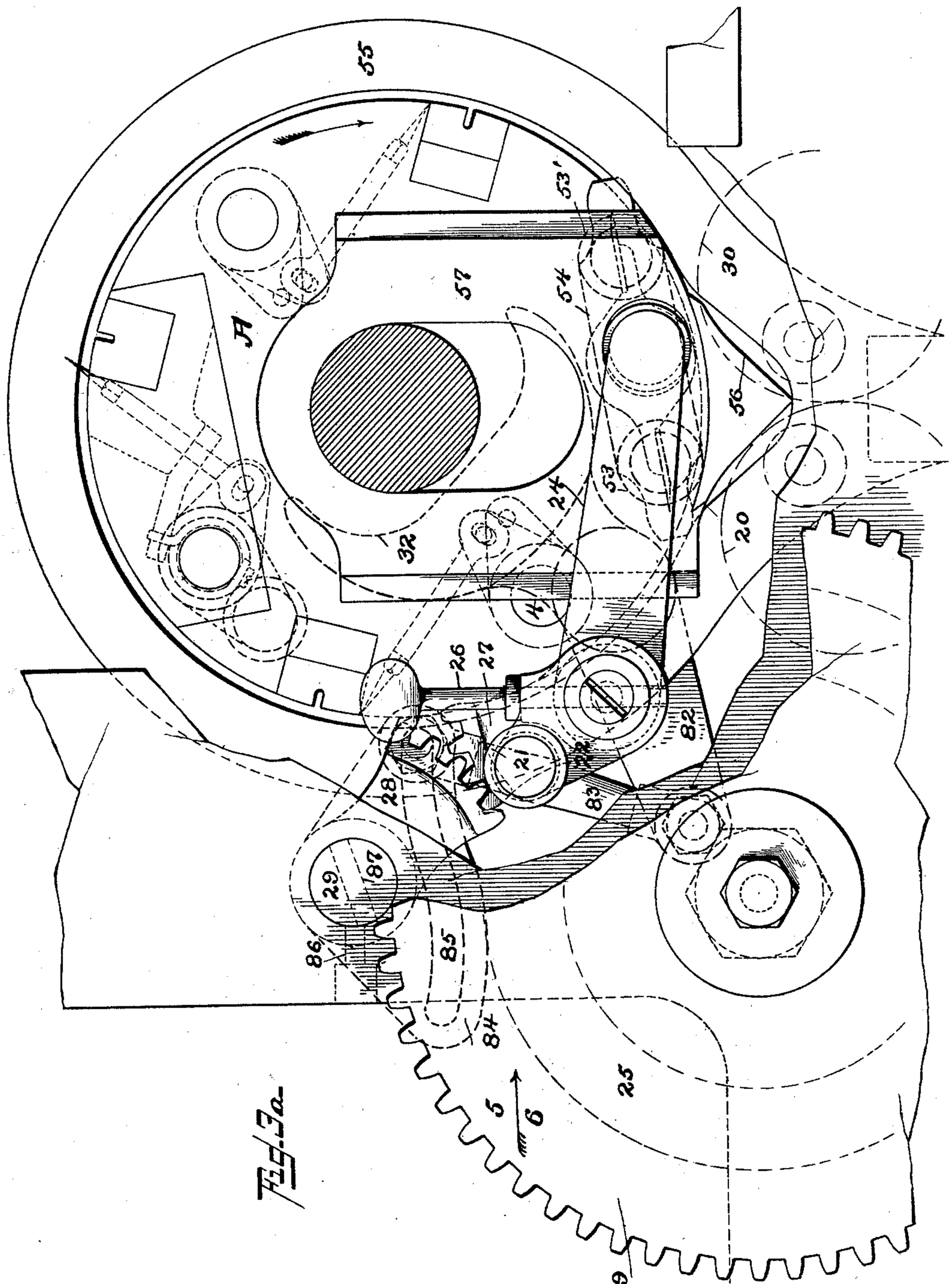
No. 612,831. Patented Oct. 25, 1898.

L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

(No Model.) 18 Sheets—Sheet 4.



Witnesses:
J. F. Kehoe.
A. D. Bourke

Inventor:
Lucius C. Crowell
By Philipp Philipp & Sawyer
Attys

No. 612,831. Patented Oct. 25, 1898.

L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

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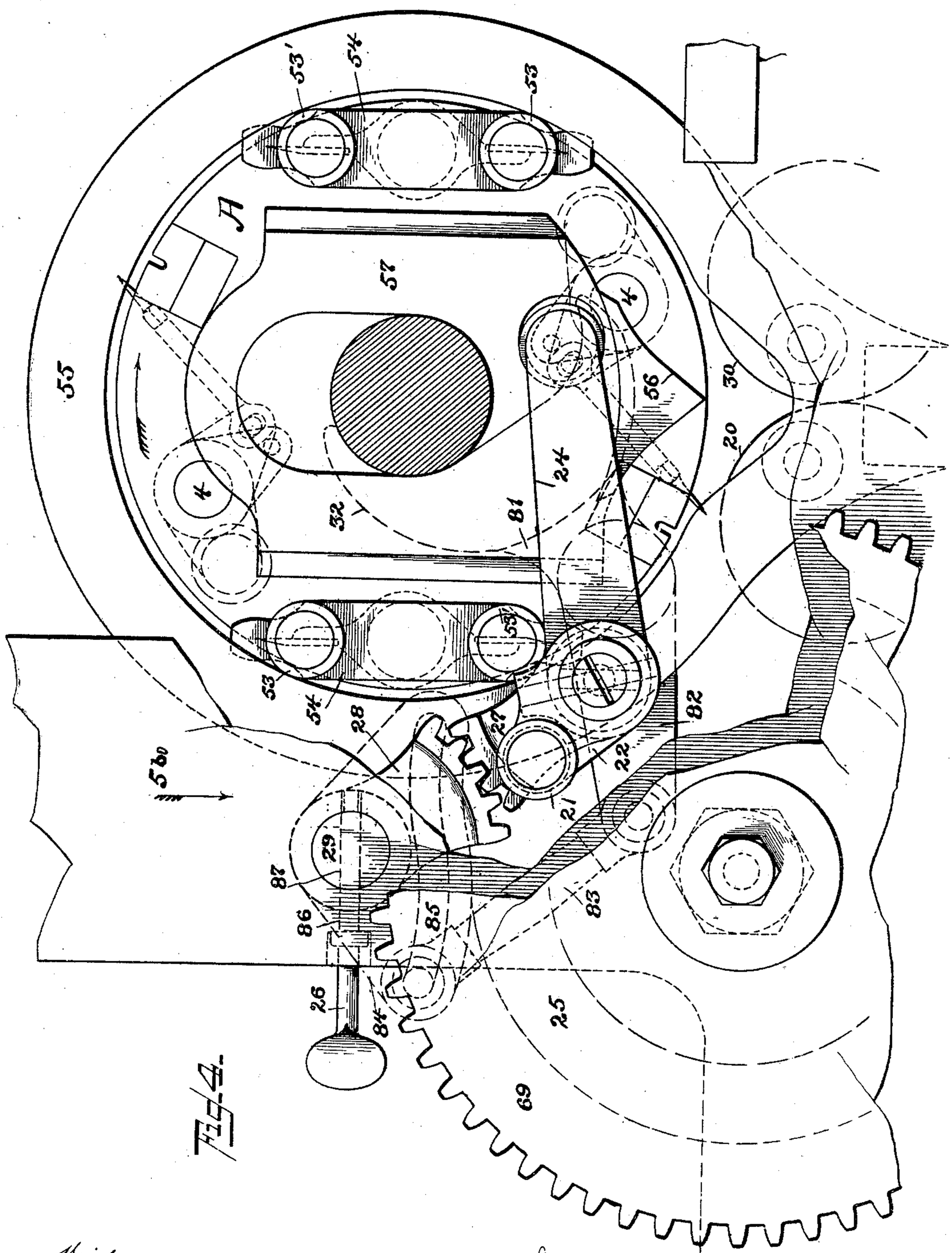


Fig. 4.

Witnesses:
F. F. Kehoe.
H. V. Bourke.

Inventor:
Lester C. Crowell
By Philipp Philipp & Lawyer
Attys.

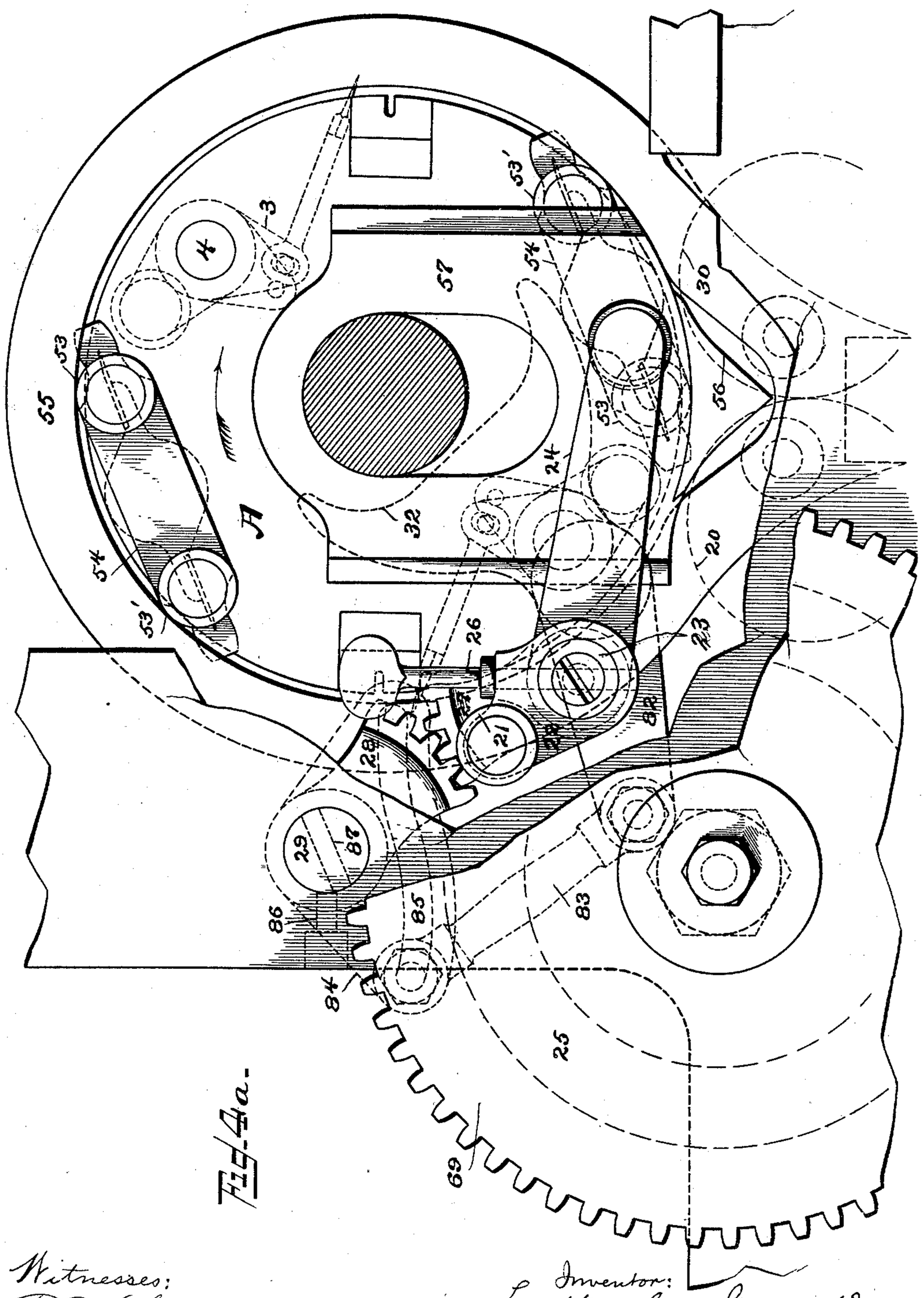
No. 612,831. Patented Oct. 25, 1898.

L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

(No Model.) 18 Sheets—Sheet 6.



Witnesses:
T. O'Keefe.
A. V. Burke

Inventor:
Lucius C. Crowell
By Philipp Philipp & Lamp
Attys

No. 612,831. Patented Oct. 25, 1898.

L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

(No Model.) 18 Sheets—Sheet 7.

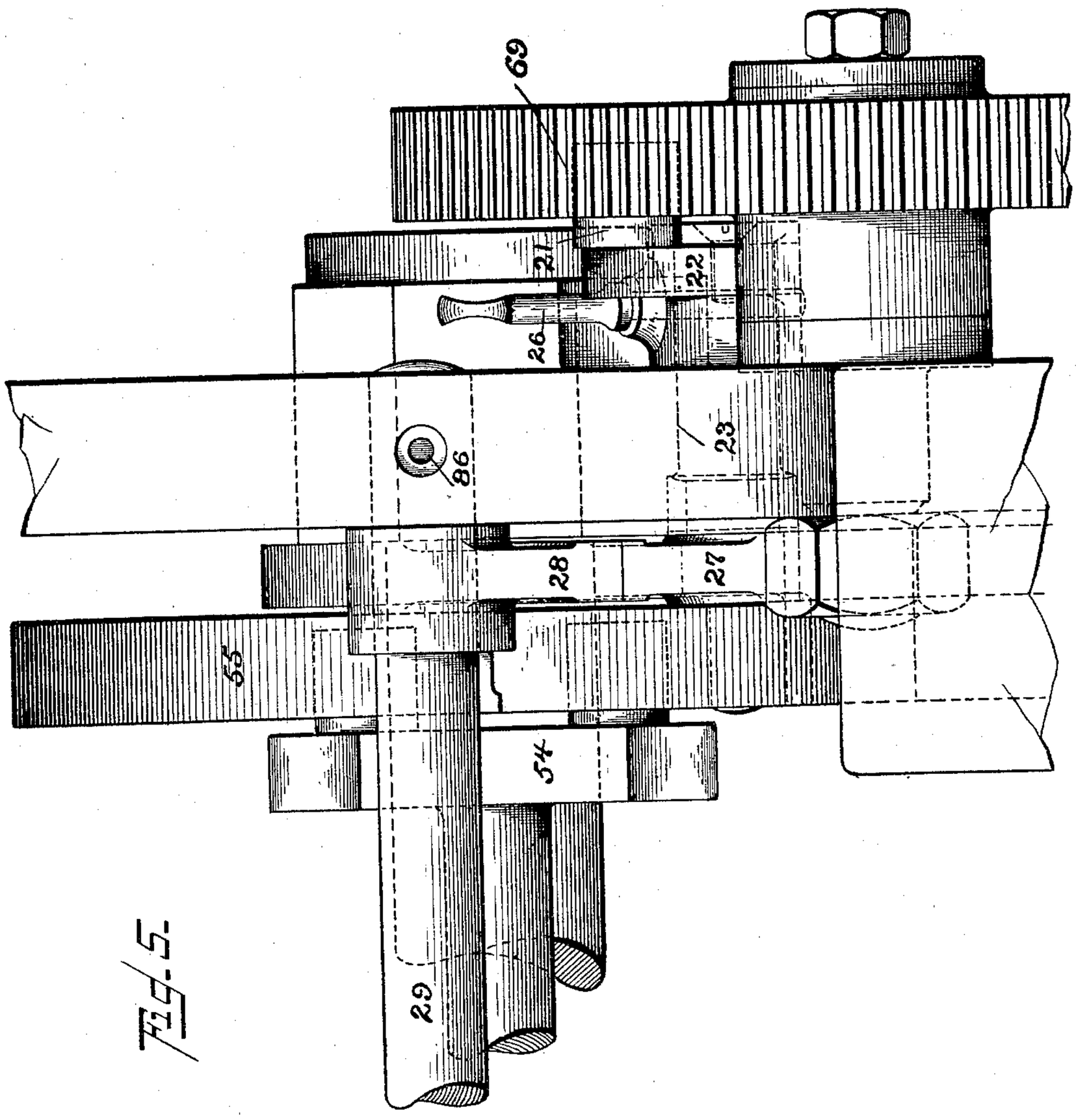


Fig. 5.

Witnesses:
T. F. Kehoe.
A. V. Bourke

Inventor:
Lucius C. Crowell
By Philipp Phillips
& Lawyer
Attys

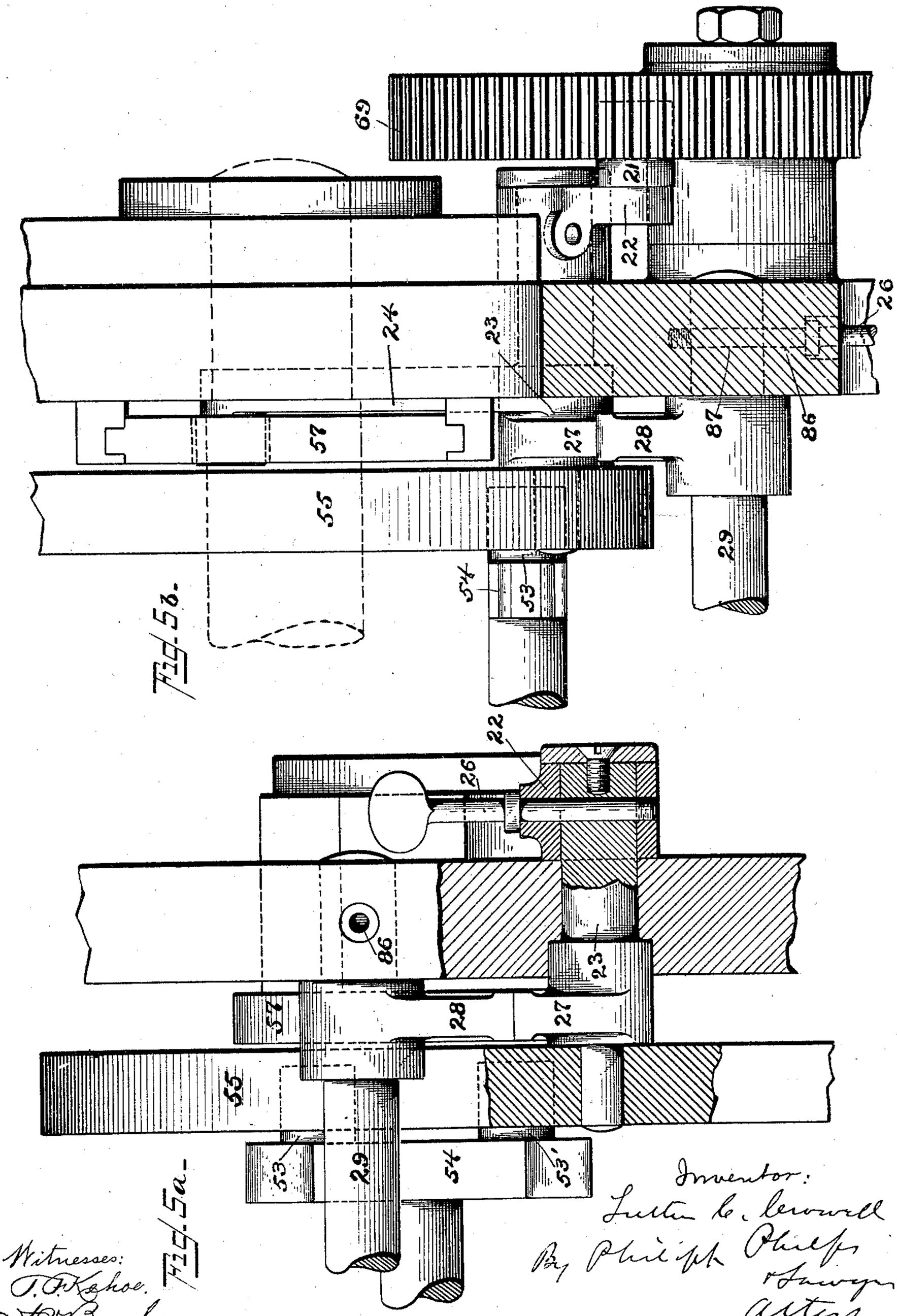
No. 612,831. Patented Oct. 25, 1898.

L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

(No Model.) 18 Sheets—Sheet 8.



Witnesses:
T. D. Kellogg
A. D. Burke

Fig. 5a.

Inventor:
Lucius C. Crowell
By Philipp Philipp
& Simpson
Attys

No. 612,831. Patented Oct. 25, 1898.

L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

(No Model.) 18 Sheets—Sheet 9.

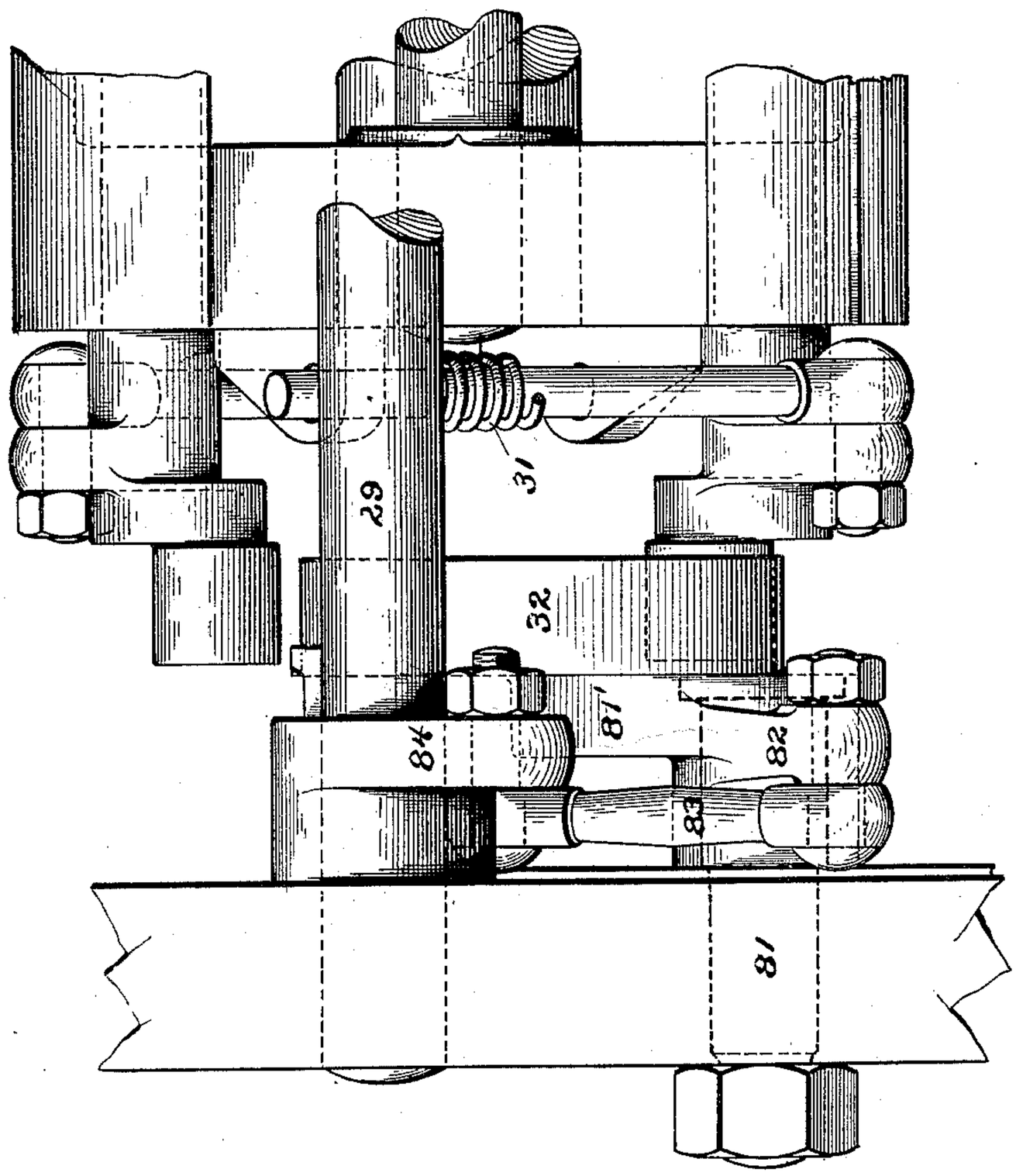


Fig. 6.

Witnesses:
C. F. Kehoe
A. D. Bourke

Inventor:
Lucius C. Crowell
By Philipp Philipp & Dwyer
Attys.

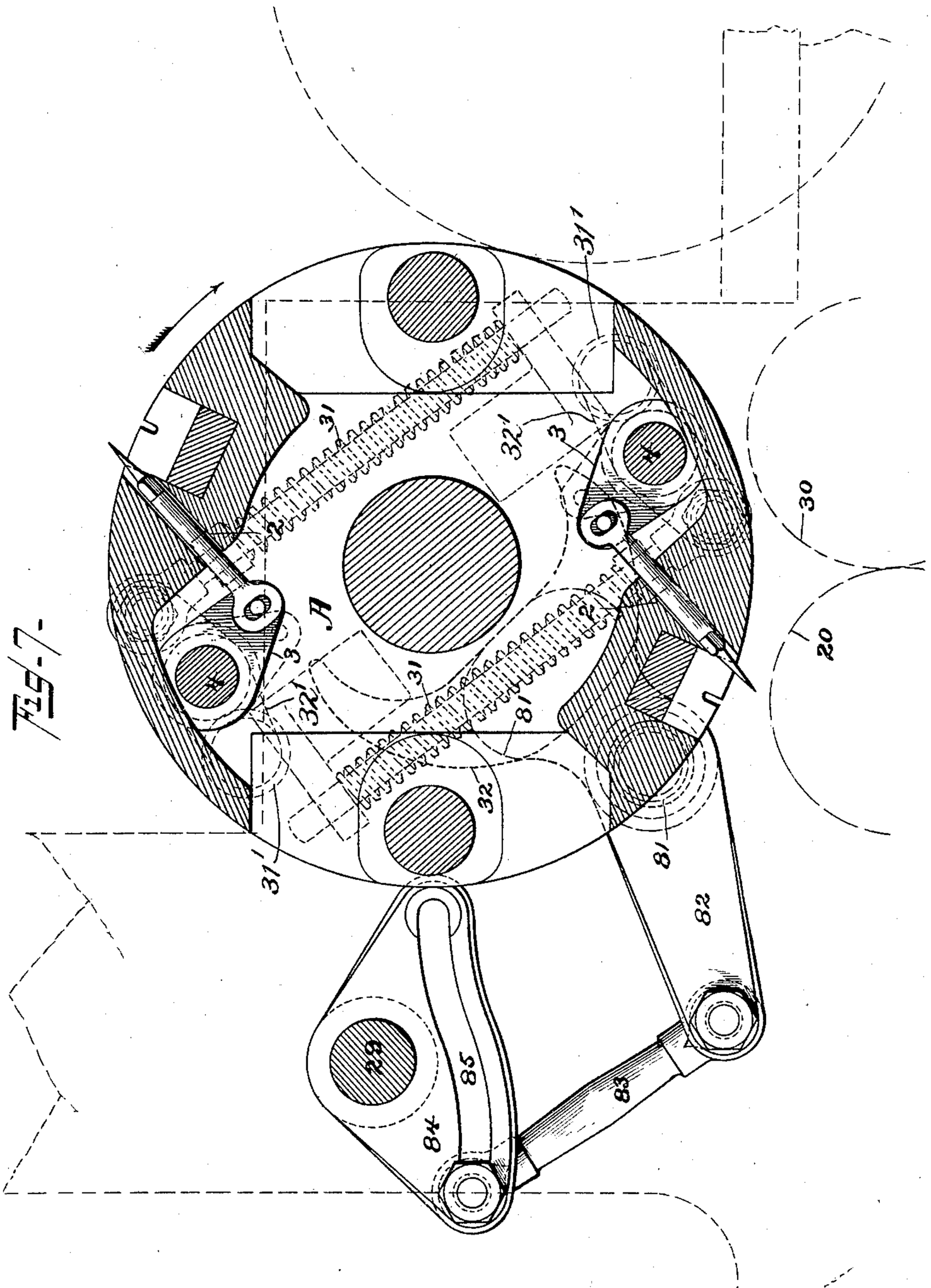
No. 612,831. Patented Oct. 25, 1898.

L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

(No Model.) 18 Sheets—Sheet 10.



Witnesses:
T. F. Kehoe.
A. V. Bourke

Inventor:
Lucius C. Crowell
By Philipp & Philipp
Attys

No. 612,831. Patented Oct. 25, 1898.

L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

(No Model.) 18 Sheets—Sheet 11.

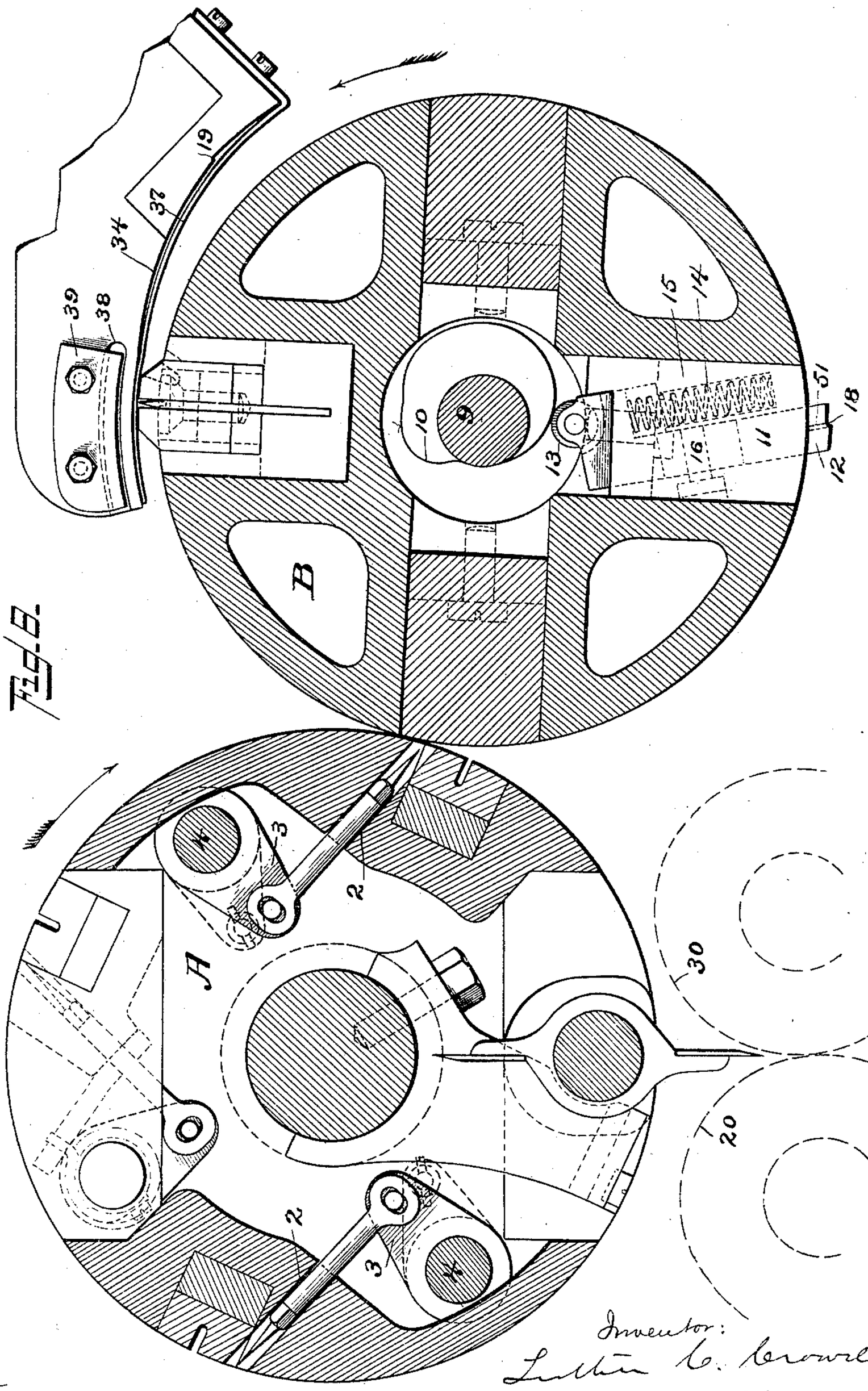


Fig. 12.

Witnesses:
T. F. Kehoe.
A. V. Bourke

Inventor:
Lucius C. Crowell
By Philipp Philips & Sanger
Attys

No. 612,831. Patented Oct. 25, 1898.

L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

(No Model.) 18 Sheets—Sheet 12.

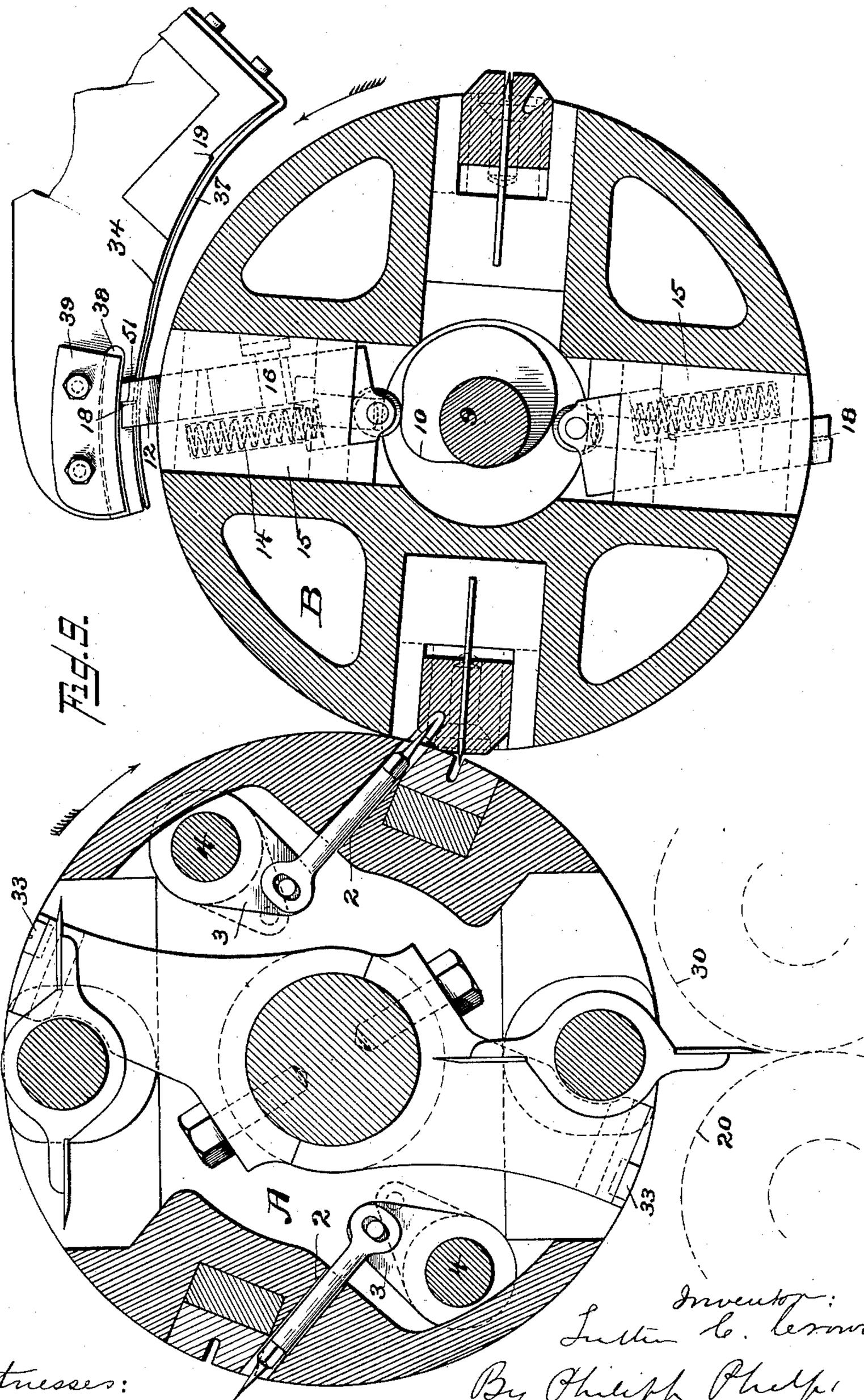


FIG. 12.

Witnesses:
J. F. Kehoe
A. V. Bourke

Inventor:
Lester C. Crowell
By Philipp Philipp & Sawyer
attys.

No. 612,831. Patented Oct. 25, 1898.

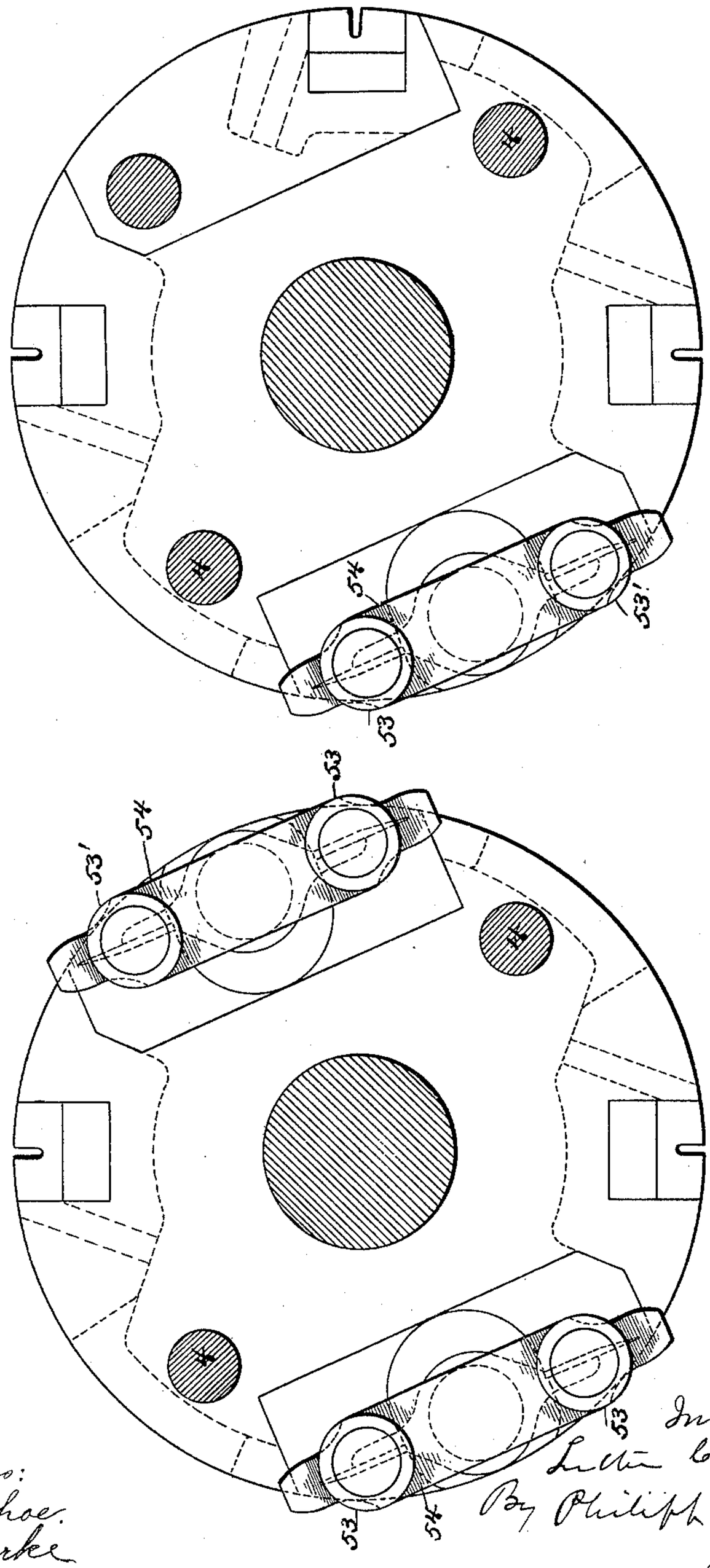
L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

(No Model.) 18 Sheets—Sheet 13.

Fig. 11.



Witnesses:
T. F. Kehoe.
F. P. Bourke

Inventor:
Lucius C. Crowell
By Philipp Philipp
& Lawyer
Attys

No. 612,831. Patented Oct. 25, 1898.

L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

(No Model.) 18 Sheets—Sheet 14.

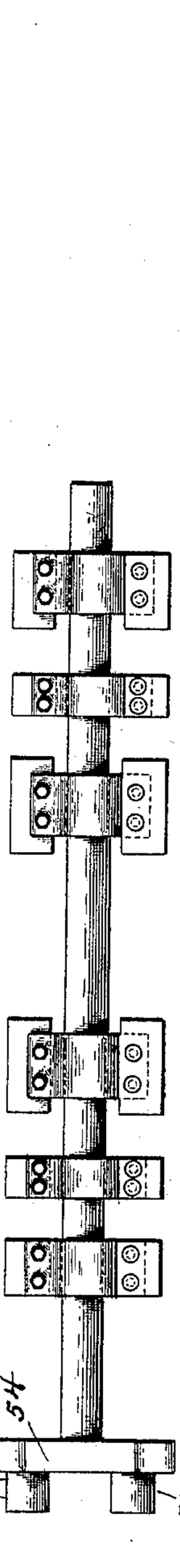


Fig. 15.

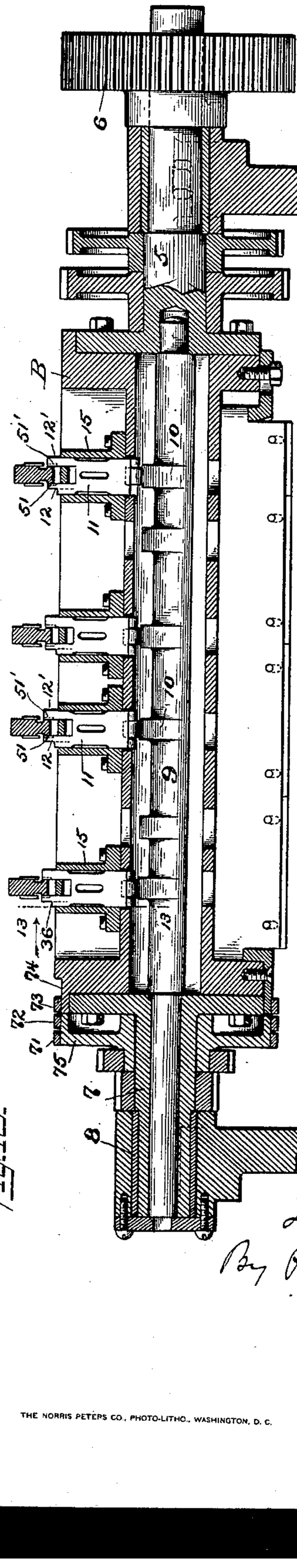


Fig. 12.

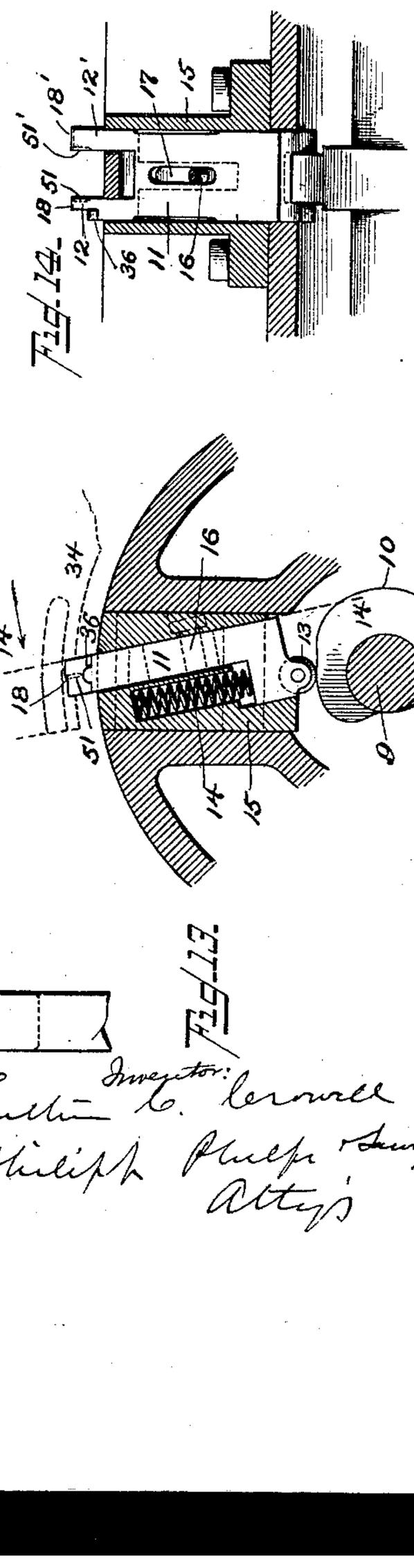


Fig. 14.

Fig. 17.

Witnesses:
T. F. Kehoe
A. W. Bourke

Inventor:
Lucius C. Crowell
By Philipp Philipp & Thum
Attys

No. 612,831. Patented Oct. 25, 1898.

L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

(No Model.) 18 Sheets—Sheet 15.

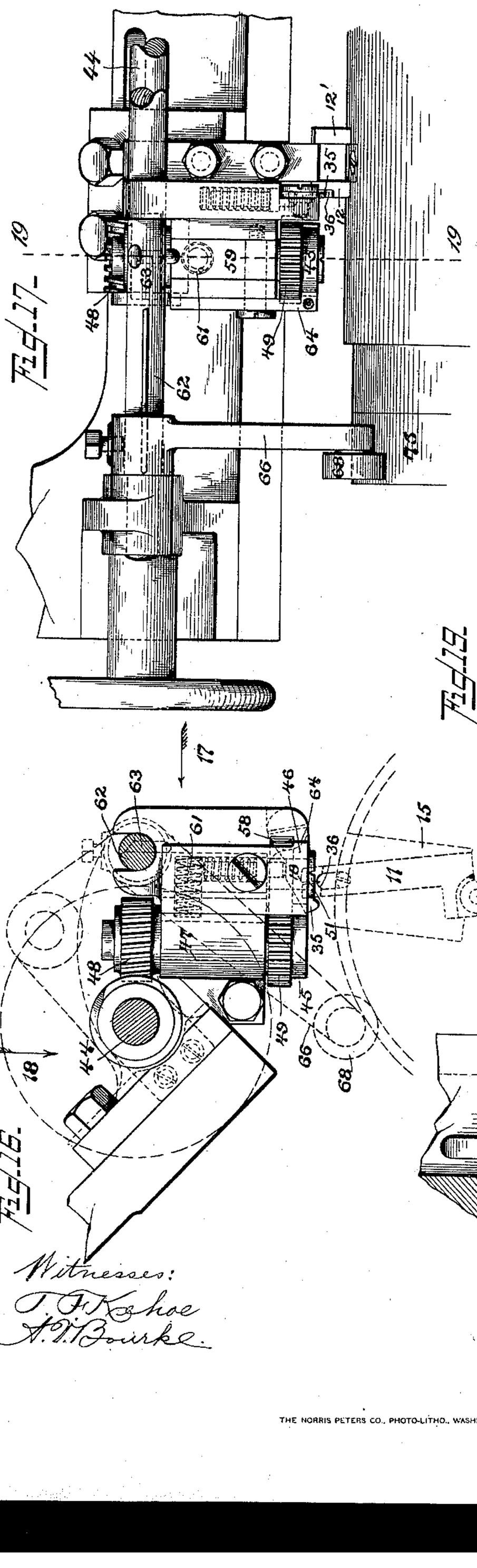
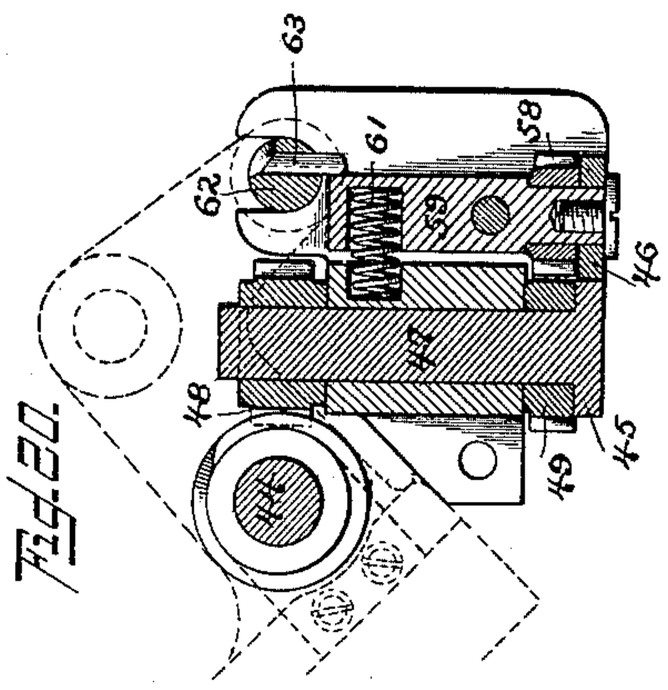


FIG. 17.



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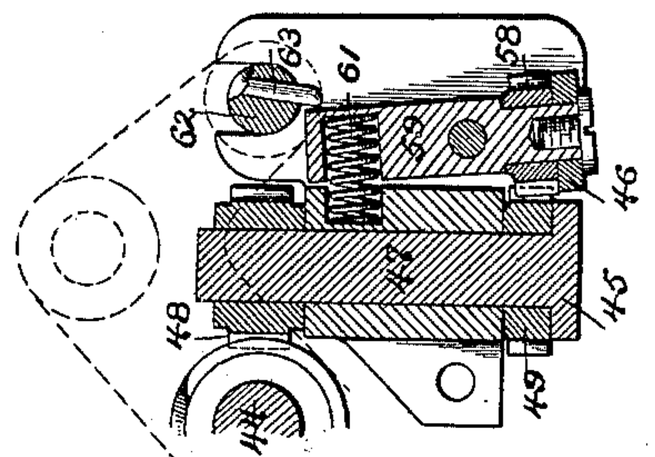


FIG. 19.

FIG. 16.

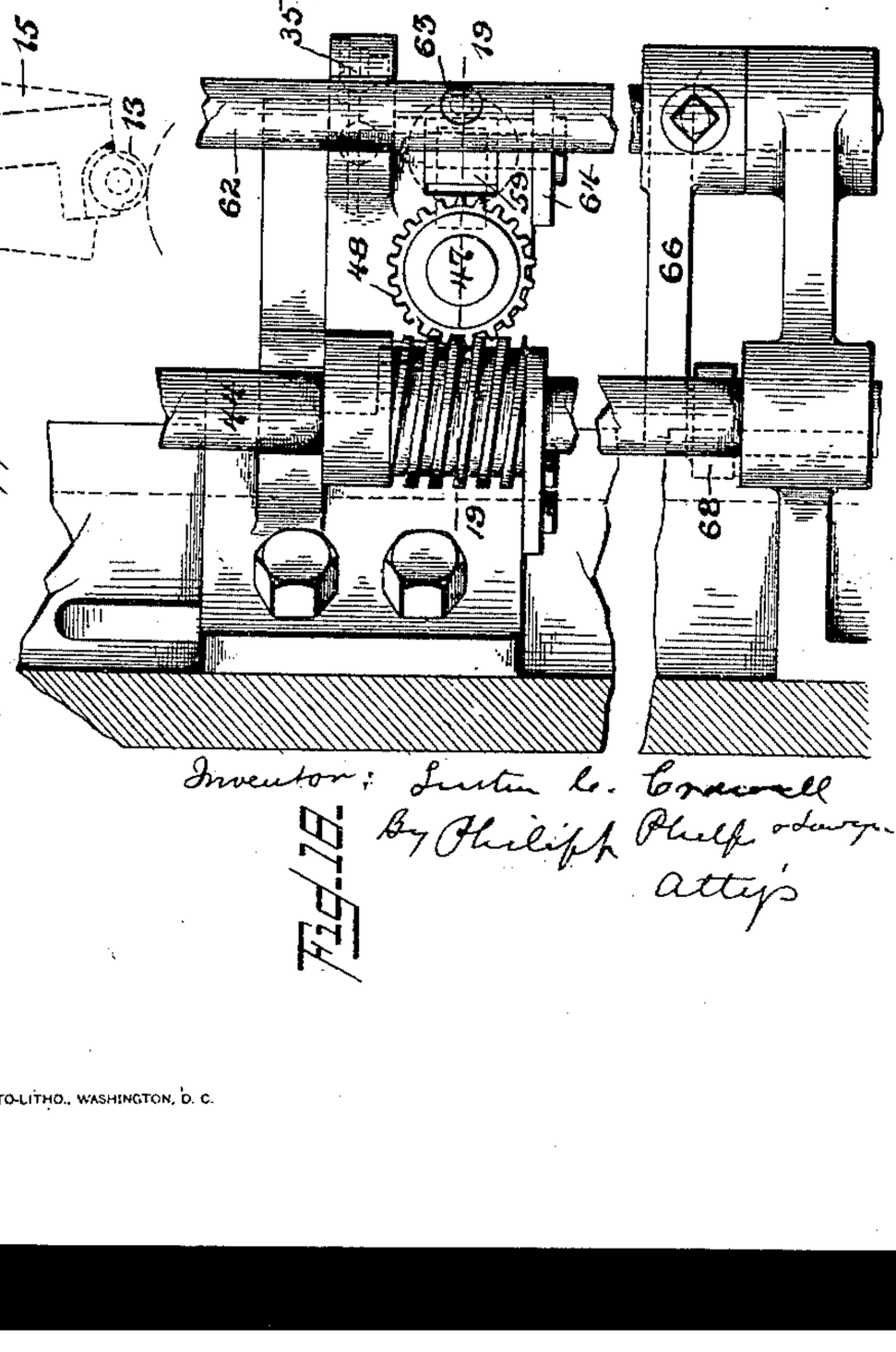


FIG. 18.

Witnesses:
T. F. Kehoe
A. D. Bourke.

Inventor: Lester C. Crowell
By Philipp Philipp & Thorpe
Attys

No. 612,831. Patented Oct. 25, 1898.

L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

(No Model.) 18 Sheets—Sheet 16.

Fig. 25. (4)

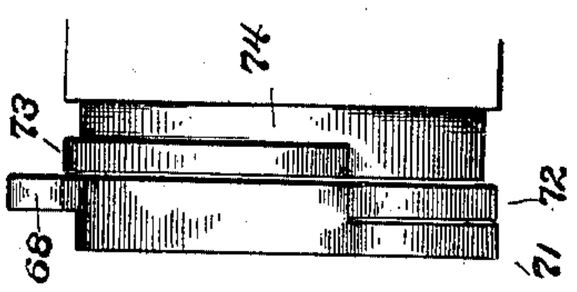


Fig. 31. (3)

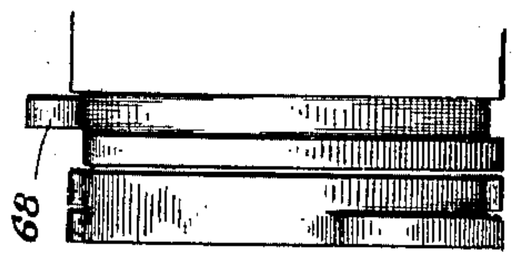


Fig. 24. (4)

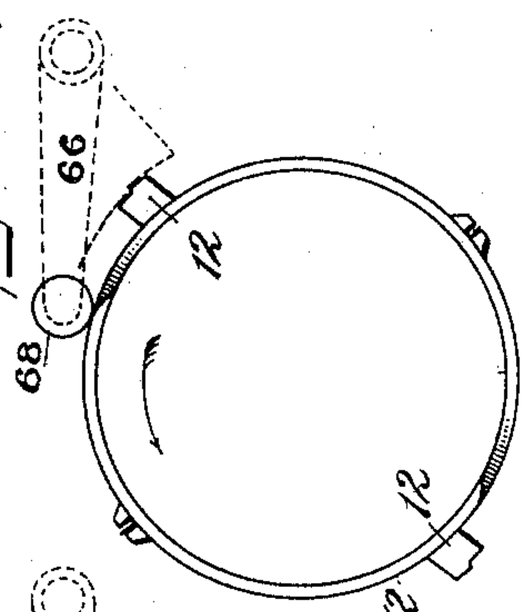


Fig. 30. (1)

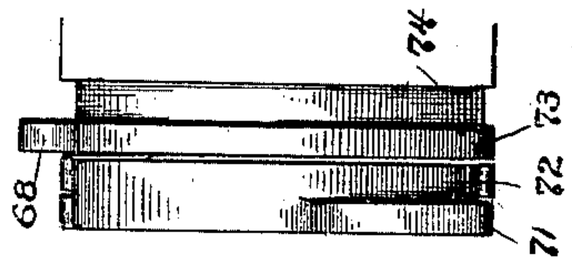


Fig. 23. (4)

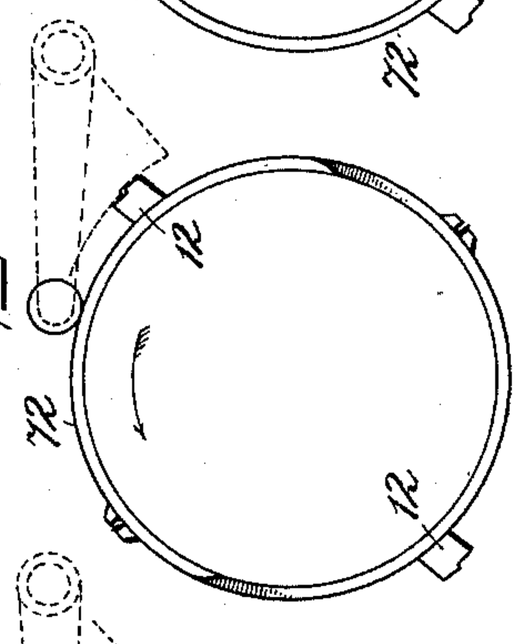


Fig. 29. (1)

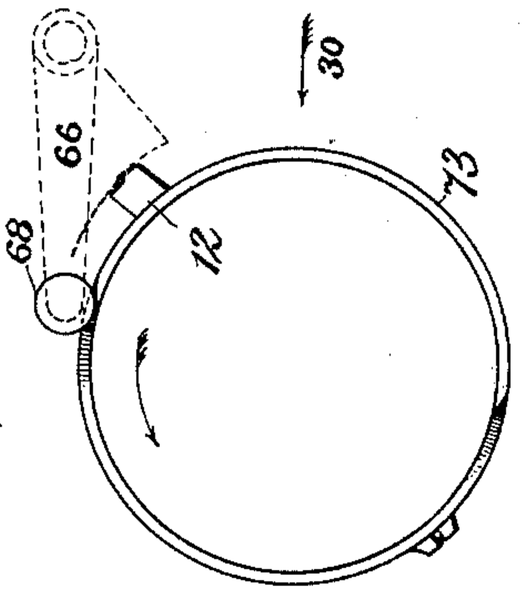


Fig. 22. (#4)

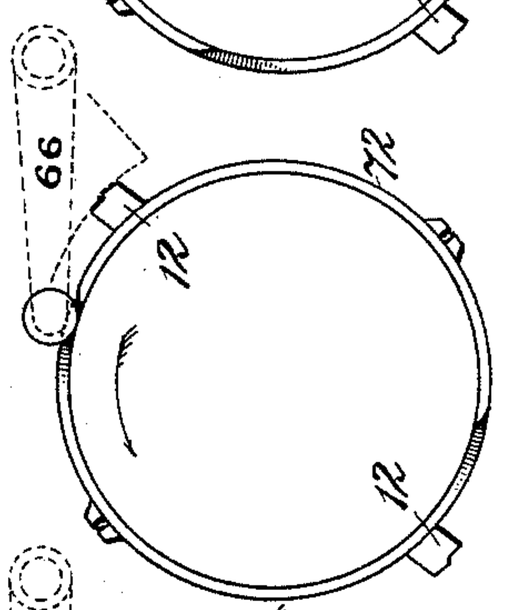


Fig. 28. (2)

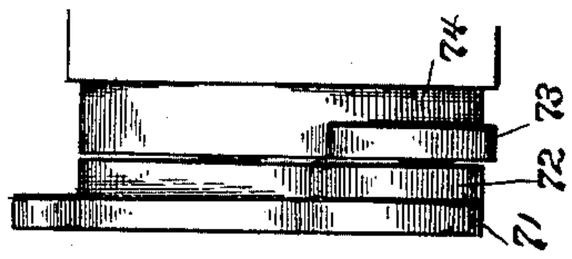


Fig. 27. (2)

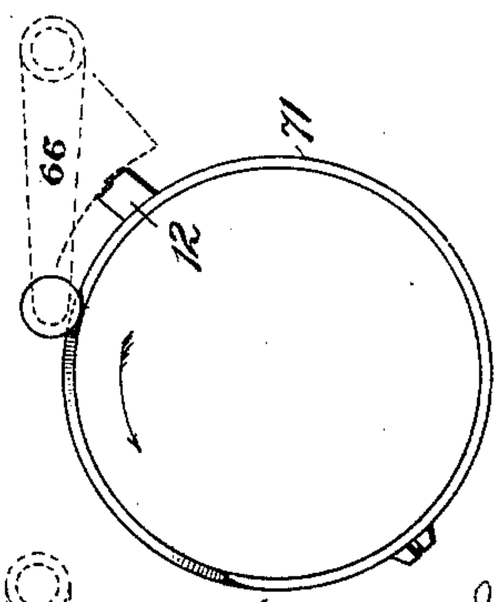


Fig. 21. (#4)

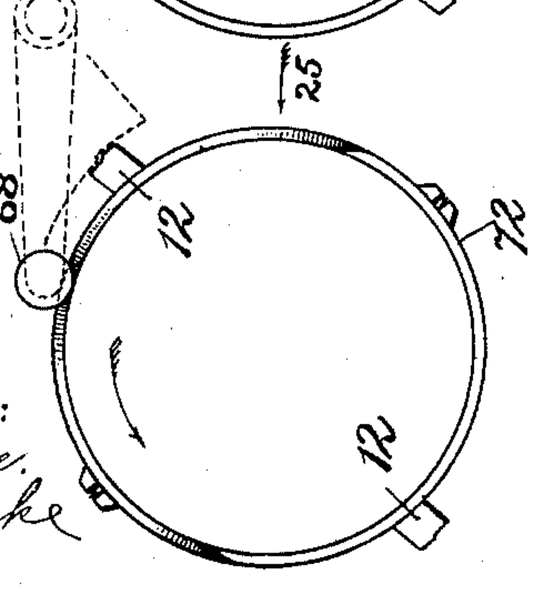
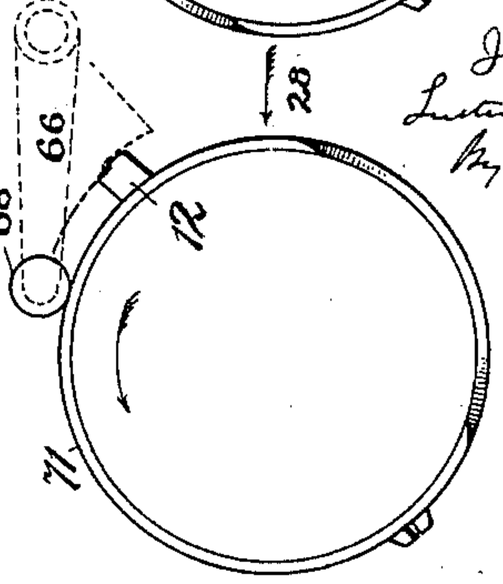


Fig. 26. (2)



Witnesses:
T. F. Kehoe.
A. D. Bourke

Inventor:
Lester C. Crowell
By Philipp Philipp & Lawyer
Attys

No. 612,831. Patented Oct. 25, 1898.

L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

(No Model.) 18 Sheets—Sheet 17.

Fig. 32.

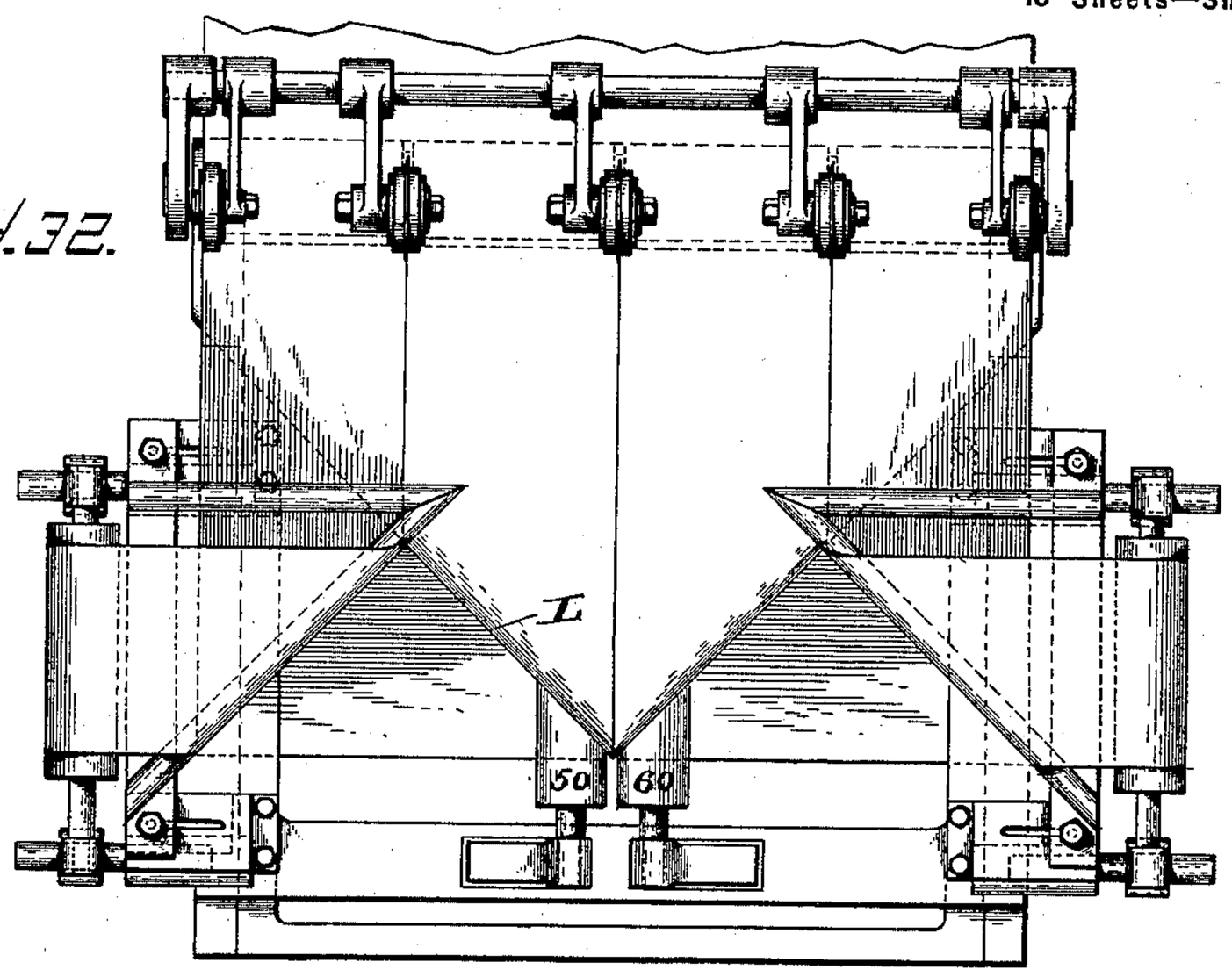


Fig. 33.

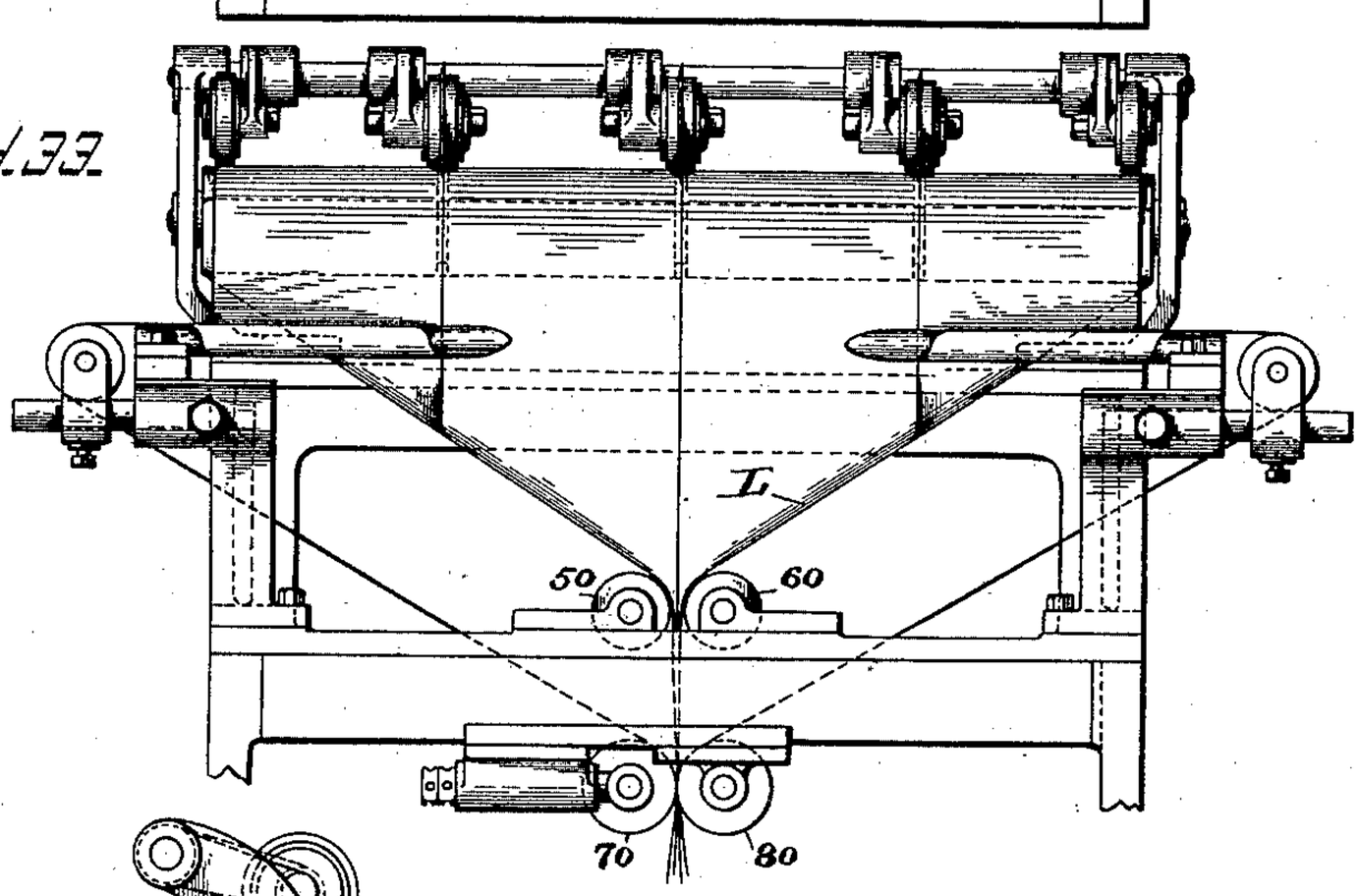
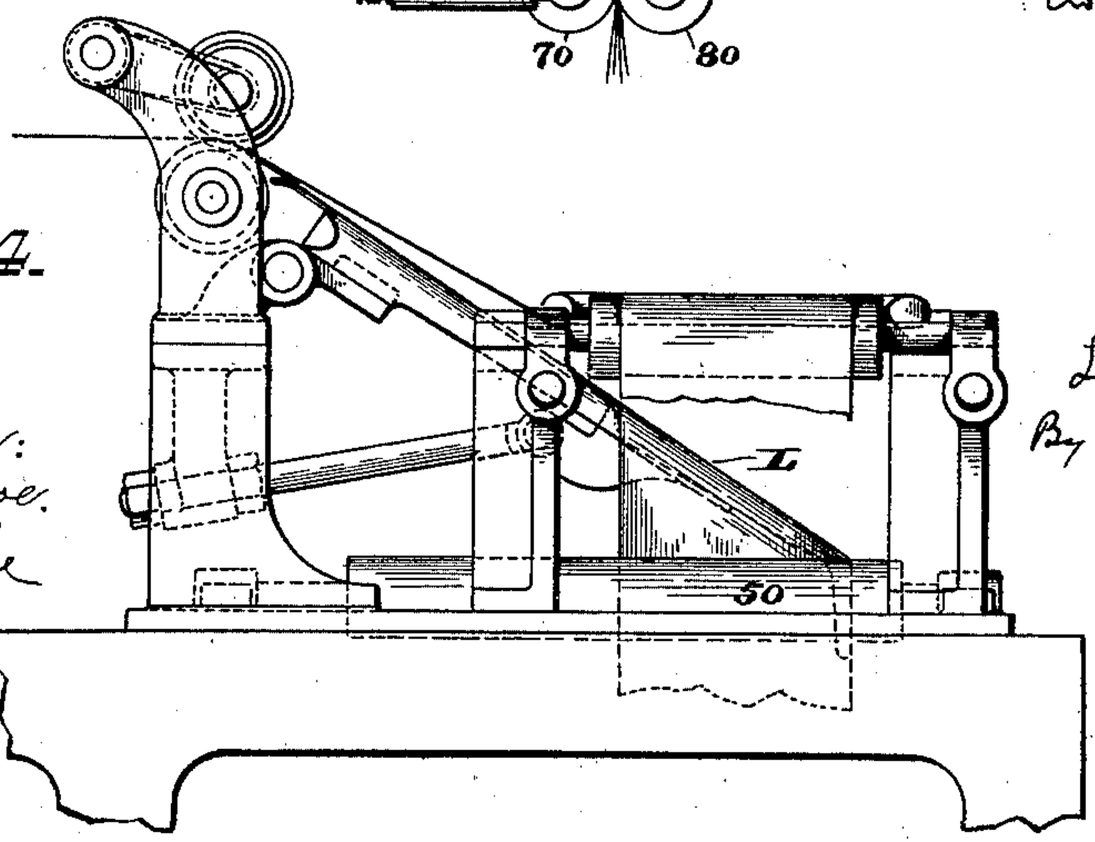


Fig. 34.



Witnesses:
J. F. Kehoe.
H. T. Bourke

Inventor:
Luther C. Crowell
By Philipp Philipp
& Sawyer
Attys

No. 612,831. Patented Oct. 25, 1898.

L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

(Application filed Dec. 13, 1897.)

(No Model.) 18 Sheets—Sheet 18.

Fig. 35. (No. 1)

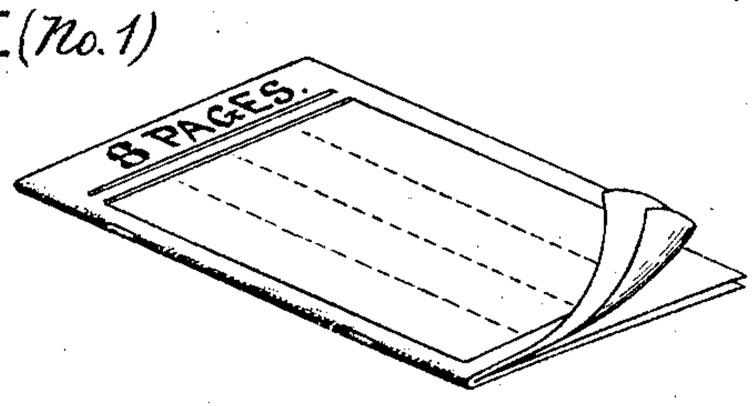


Fig. 36. (No. 3)

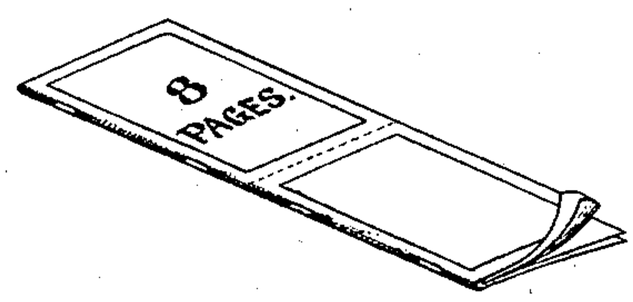


Fig. 37.

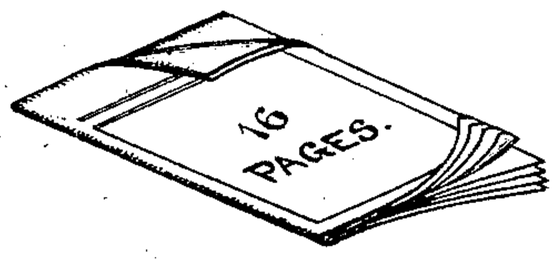


Fig. 38.

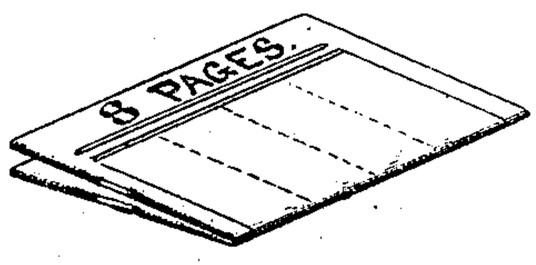
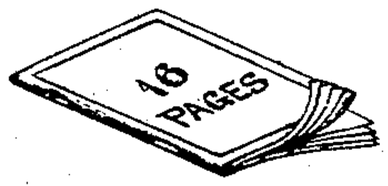


Fig. 39.



Witnesses:
T. F. Lahoe.
H. V. Bourke

Inventor:
Lucius C. Crowell
By Philip Pfeiffer
Atty

UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF NEW YORK, N. Y., ASSIGNOR TO ROBERT HOE, THEODORE H. MEAD, AND CHARLES W. CARPENTER, OF SAME PLACE.

STAPLE-BINDING DELIVERY MECHANISM FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 612,831, dated October 25, 1898.

Application filed December 13, 1897. Serial No. 661,598. (No model.)

To all whom it may concern:

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

This invention relates to that class of printing machinery wherein webs of paper after being perfected are delivered from the machine not only in book form, which books are stapled for binding them together, but in various-sized products both as to the area of the pages and also as to the number of the pages bound together.

In order that this invention may the more readily be understood, the construction and arrangement of the mechanism will first be explained and then the various modes of operation in the production of multifarious products of which it is capable will be set forth.

So much of a web-perfecting printing-machine as is necessary to an understanding of the present invention is shown in the accompanying drawings, in which—

Figure 1 is a side elevation of so much of the delivery end of such a machine as includes the mechanisms composing its delivery apparatus, which mechanisms include a longitudinal folder, a transverse-cutting and a transverse-folding cylinder, which cutting-cylinder carries stapling mechanisms. Fig. 2 is an elevation of the principal parts shown in Fig. 1 as seen looking in the direction of the arrow 2 in Fig. 1. Fig. 3 is an enlarged elevation of the folding-cylinder, portions of the frame and other parts being broken away, showing the position of the mechanism when it is adjusted for full-sheet non-collected products. Fig. 3ª is a similar view showing the mechanism when it is adjusted for full-sheet collected products. Fig. 4 is a like view of the same parts when the mechanism is set for half-sheet non-collected products. Fig. 4ª is a like view of the same parts when the mechanism is set for half-sheet collected products. Fig. 5 is a side elevation of the forward end of the parts connected with the folding-carrier as seen looking in the direction of the arrow 5 in Fig. 3ª. Fig. 5ª is a similar view, partly in section. Fig. 5ᵇ is a plan view of the parts shown in Fig. 5, the position being that shown in Fig. 4 and the point of view being that indicated by arrow 5ᵇ in Fig. 4. Fig. 6 is a side elevation of the parts connected with the folding-carrier at the rear end thereof as seen looking in the direction of the arrow 6 in Fig. 3ª. Fig. 7 is a transverse sectional elevation taken near the rear end of the folding-cylinder and showing the position of the pin-cam as set for the first revolution for half-sheet collected products. Fig. 8 is a transverse sectional elevation of the folding and cutting and staple-tool carrying cylinders with their mechanisms set for the first revolution for producing full-sheet collected and non-collected products. Fig. 9 is a similar view of the same cylinders with the mechanism set for half-sheet collected and non-collected products. Figs. 10 and 11 are respectively end elevations of the folding-cylinder as set for half and full sheet products. Fig. 12 is a longitudinal sectional elevation, on a reduced scale, of the cutting and stapling cylinder. Fig. 13 is a sectional elevation on the line 13 of Fig. 12 as seen looking in the direction of the arrow. Fig. 14 is a sectional elevation on the line 14 of Fig. 13 as seen looking in the direction of the arrow. Fig. 15 is a detail view of the rotating folding-blade. Fig. 16 is a side elevation of the wire-feeding mechanism as seen from the front end of the stapling-cylinder. (Compare with Fig. 1.) Fig. 17 is a perspective of the wire-feeding mechanism as seen looking in the direction of the arrow 17 in Fig. 16. Fig. 18 is a perspective view thereof as seen looking in the direction of the arrow 18 in Fig. 16. Fig. 19 is a sectional view taken on the line 19 of Fig. 17, showing the rolls for feeding the wire as out of engagement. Fig. 20 is a similar view, but showing the wire-feeding rolls as in wire-feeding engagement. Figs. 21 to 31, inclusive, are views of the end of the stapling-cylinder and cams for regulating the wire-feed. Fig. 32 is a plan view, Fig. 33 an end elevation, and Fig. 34 a side elevation, of the arrangement and operation of the longitudinal folder and the turning-guides coöper-

ating therewith in the production of the narrow and short page products shown in Fig. 39. Figs. 35 to39, inclusive, are perspective views of the several products produced by the machine as the same is herein shown.

My invention is shown herein as applied to the delivery apparatus of a web-printing machine. One of the principal parts of this delivery apparatus is a longitudinal folder consisting of an internal guide L, external turners 50 60, and fold-laying rollers 70 80, as is common. The longitudinally-folded web is delivered between rotary carriers A B, which are provided with cutting mechanisms to sever the web transversely into sheet lengths, sheet or web controlling pins by which the paper is carried to proper position to be acted upon and released as required, and rotating folding-blades mounted in the carrier A, that coöperate with folding-rollers 20 30 to give transverse folds to the sheets. The carrier A is also provided with mechanism whereby it is made capable of collecting many sheets upon its surface. These carriers are further provided with means for stapling together the plies of the product which they aid in making. From the folding-rollers there are provided two pathways for the delivery of the product, one of which is directly vertical to the arms of the rotary fly S and the other in a lateral direction, whereby the transverse-folded products may be conveyed to a second folding mechanism to receive other folding, if desired, these two pathways being controlled by means of a switch 40, whose exact position is determined by the position of the adjusting-arm 41, which is regulated as desired by the pin 42.

The moving mechanisms of this delivery apparatus are geared and driven in proper direction and relative speed by ordinary gearing, enough of which is illustrated to indicate the movements and which needs no especial description beyond such as is hereinafter made in order to explain peculiar constructions.

This delivery apparatus is designed, as above pointed out, to cut, fold, staple, and deliver various products. The products which are produced by the special construction of delivery here shown (leaving out of view for the present the variations produced by the use of the switch 40 and the additions to the machine shown in Figs. 32, 33, and 34) are—

1. The product shown in Fig. 35—that is, consisting of eight pages of full width.

2. The product consisting of sixteen pages of the size shown in Fig. 35.

3. The product consisting of eight pages such as are shown in Fig. 36, the pages being of half the width of products 1 and 2.

4. The product consisting of sixteen pages of the same width as shown in Fig. 36 or product No. 3.

The web is severed longitudinally at the center, as shown in Fig. 32, and the two halves associated and carried to the carriers A and B. The length of the products numbered 1, 2, 3, and 4 is the width of this severed web. The width of the pages of these products depends upon the cutting and other mechanisms provided in the carriers A and B. The width of the page presented by products 1 and 2 is one-half the circumference of the carrier A, the sheet being the full circumference of this cylinder, and in making this product the cutting mechanism is arranged to sever the web once in each revolution of the carrier A. The width of the pages in products 3 and 4 represents one-quarter of the circumference of the carrier A, the full sheet of these products being half of the circumference of the carrier A and the cutting mechanisms being arranged to sever the web twice during each revolution of the carrier A to produce this product.

Product No. 1 will be, it is seen, made up of the two associated sheets of paper severed at each revolution of the carrier A, once folded transversely and united at the fold by staples.

Product No. 2 consists of two sets of two sheets, each set similar to the two sheets of product No. 1, collected, stapled, and folded once transversely.

Product No. 3 will be, it is seen, made up of the two associated sheets of paper, two sets of which are severed at each revolution of the carrier A, once folded transversely and united at the fold by staples.

Product No. 4 consists of two sets of two sheets, each set similar to the two sheets of product No. 3, collected, stapled, and folded once transversely.

In order to produce these several products, it is evident that two changes of condition are to be provided for—first, the change from the non-collected to the collected product, or vice versa, whatever may be the width of the sheet, and, second, the change from the wide to the narrow product, or vice versa, whether the sheets be collected or non-collected. The mechanism which I have devised for meeting the requirements of these changes will now be described.

The carrier A is provided with two sets of folding-blades, two sets of pins, and parts of two sets of cutting devices to provide for the severing of sheets twice during each revolution of the carrier and the manipulation of these sheets, this construction being illustrated in Fig. 9. The coacting cylinder B has a corresponding construction, as is also shown in this figure, it being provided with two knives, which coact with the notched plates in the carrier A, and with two sets of stapling devices. In order to adapt these cylinders to the production of the wide as well as the narrow product, the folding-blades are mounted upon a removable frame, as indicated in Fig. 9, and when it is desired to change from a wide to a narrow product one of the sets of folding-blades is removed and in place thereof a set of pins carried by a similar frame is inserted, as shown in Fig. 8.

The two sets of pins originally in the cylinder are now locked in their withdrawn position and the cylinder, equipped as shown in Fig. 8, is adapted to manipulate and fold sheets of the length of the circumference of the carrier. A corresponding provision for such a change is made in carrier B by mounting the knives and stapling mechanisms upon removable blocks. When it is desired to change the mechanism to the cutting and stapling of sheets of full width, the two knives are removed and replaced by dummies and one of the stapling mechanisms is removed and replaced by a block carrying a knife. The cylinder B is then in a condition to staple and cut sheets of full width, as shown in Fig. 8.

The pins reciprocate, as usual, in slots 2 in the frame of the carrier and are connected with arms 3 on rock-shafts 4. The usual springs 31 are provided, as indicated in Fig. 7, for holding the pins normally in a projecting position, and they are withdrawn by the contact of bowls 31′ on cross-heads 32′ with a cam 32, which will be hereinafter described.

The folding-blades are mounted upon a shaft, as best shown in Fig. 15, and are made in sections in order to clear the staple-benders as the two pass at and near the point at which the carriers A B are in closest proximity to each other. The shaft of the folding-blades is provided at one end with a cross-head 54, which carries bowls that travel within a circular guard 55 and engage at the proper times with cam 56 to throw the blades out to fold the sheets, as will be hereinafter explained.

The stapling devices will now be described.

Referring to the vertical cross-section of the carrier B, (shown in Fig. 12,) it will be seen that the shaft of this cylinder 5, upon which its driving gear-wheel 6 is mounted, is short, it being bolted to the exterior framework of the end of the cylinder. The bearing of the cylinder at the other end is secured by a hollow sleeve 7, bolted to the cylinder at that end and revolving in a bushing 8. Within the cylinder and supported at one end in the interior of the sleeve 7 and at the other end in a recess in the end of shaft 5 is a stationary shaft 9, provided with cams 10 for operating the mechanism which forms the staple and presents it to the paper. This shaft has a flat end (see Fig. 1) which enters a hole of corresponding shape in a cap-piece connected to the frame.

The stapling-tools 11 have bending-arms 12 12′ projecting through the carrier-shell for forming the staple and are provided at their inner ends with rollers 13, which bear upon the cams 10, the tools being pressed inward by springs 14, seated in the carrier-frame or in the blocks 15, carrying the stapling-tools. The stapling-tools are held in position by screws 16, which pass through slots 17 in the tools.

The faces of the arms 12 12′ may be provided with an abutment 18 18′, as shown, for holding the wire length in contact with a corresponding abutment 19 in the face of the curved stationary anvil 34, thus holding it firmly while the wire is being cut by the pivoted knife 35, forced upward at the proper time by contact therewith of the shoulder 36 upon the stapling-tool. These parts operate in substantially a similar manner to that of the corresponding parts in my application, Serial No. 566,347, filed October 21, 1895.

The staple is formed by the stapling-tool sweeping the wire length along the eccentric curve of the face of the anvil 34. In order to hold the staple securely in its position while it is being swept forward by the stapling-tool, I provide the spring or guide piece 37, lying along the face of the anvil. The front end of the anvil is formed with the grooves 38 and provided with the bending-plates 39, which incline the legs of the staples inward beyond a right angle, as described and claimed in my application, Serial No. 566,348, filed October 21, 1895. The staple having been thus formed over the anvil remains in the grooves 51 51′, formed for the reception of the legs of the staple in the interior faces of the arms 12 12′, until the staple meets the paper and is forced through the same and clenched against the clenching-die 33, carried by the carrier A, the stapling-tool being at the same time forced back by its spring 14, it being permitted to reënter the carrier by the low part of cam 10.

There are in the construction shown four stapling mechanisms. The shaft 9 is provided with two additional cams, and provision is made for removing the two outer stapling-tools inward, in order to change the distance apart at which the staples are set, in accordance with the product desired.

The wire is fed from a spool 43 to each of the stapling mechanisms. The feeding mechanisms for the wire are four in number and are driven from the worm-shaft 44. Each consists of two feeding-disks 45 and 46, the disk 45 being mounted upon a shaft 47, which on one end carries a worm-wheel 48 and on the other a gear 49, which engages with a gear 58, mounted on the hub of disk 46, the gear and disk constituting one piece journaled upon a rounded portion of the block 59. This block 59 is pivoted to the frame, as shown, and its upper end is pressed outward from the shaft 47 by the spring 61, so as to bring the disks into nipping contact, as shown in Fig. 20.

Just above the block 59 is mounted in the frame and extending across the machine a rock-shaft 62, provided with pins 63, which project downward below the top of the blocks 59. When the blocks are tilted into the position shown in Fig. 19, the pins 63, through their engagement with the blocks 59, tilt the latter until the disks 45 46 are out of feeding engagement. The wire passes from the spool 43 to the guide 64, thence around the feed-disk 46 and between it and the feed-disk 45, and thence under the anvil 34 and just be-

hind the abutment 19 and above the spring 37, where the wire length is severed by the action of the knife 35 and formed into a staple by the action of the stapling-tool, as heretofore described.

It will be seen that whether or not the wire-feeding mechanism feeds the wire depends upon the position of the rock-shaft 62, and this is determined in accordance with the requirements of the machine by the arm 66, of suitable weight to hold it in proper position, having a roller 68, which runs upon one or the other of the cams 71 72 73 or upon the surface of the cylinder at the point 74, the arm 66 being adjustable lengthwise of the shaft for the purpose of regulating the feed of the wire.

When the machine is forming a product made up of half-width non-collected sheets—viz., product No. 3, above referred to—the feed of the wire is continuous, and to permit it to be so the roller 68 runs on the surface of the carrier, as shown in Fig. 31. The shaft 62 is, therefore, not rocked, the block 59 is not tilted by the pin 63, and the disks 45 46 are in their feeding position. (Shown in Fig. 20.)

When the machine is producing the product No. 1, above mentioned, from full-width sheets not collected, but half of the wire needed for half-sheets not collected is required, and consequently to suspend the feed of the wire half the time of each revolution, the cam 73 is provided, extending half-way around the cylinder, and the roller 68 runs on this cam in this position of the press, which rocks the shaft 62 during half of each revolution and throws the feeding-disks out of feeding engagement during this time. Figs. 29 and 30 show the relative position of the cam 73, the roller 68, and the arm 12 of the stapling-tool at the moment of cutting the wire in this adjustment of the press.

When the machine is making a product from collected full sheets—namely, the product referred to above as No. 2—it is obvious that sufficient wire will be fed for the staples if the wire-feeding mechanism is in operation for the time occupied by one-half of a revolution of the carrier A, which, in this case, will be one-quarter of the time which elapses between each stapling operation—that is, one-quarter of the time occupied by two complete revolutions of the carrier A. To provide for such control of the wire-feeding mechanism, a disk 75 is provided, which is loose on the sleeve 7, and is operated by an independent train of gearing, as shown, so proportioned that it makes but one revolution in the time occupied by the carrier A in making two revolutions. This disk is of the same size as the carrier and carries two cams 71 72. The cam 71 has a raised portion extending three-fourths of the way around the disk, as shown in Fig. 26. For that adjustment of the press under consideration the roller 68 is placed to run on this cam, and it therefore causes the shaft 62 to be tilted during three-fourths of each two revolutions of the carrier A and therefore interrupts the feed of the wire during the same period, permitting the wire to be fed during the time occupied by a half-revolution of each two revolutions of said carrier, which is the feed of wire required by the press in this adjustment. The relation of the cam 71 and the roll 68 when the feed of the wire has just terminated and therefore at the moment of cutting in this adjustment is shown in Fig. 27, and in Fig. 26 the relation of the parts is shown at one full revolution of the carrier A thereafter.

When the machine is engaged in producing the product, above referred to as No. 4, from narrow collected sheets, it is apparent that sufficient wire to meet the demands of the machine will be fed during a single revolution of the cylinder. The disk 75 is accordingly provided with a cam 72, of which the raised portion occupies half of the circumference of the disk, as shown in Figs. 21 to 24, and the roller 68 is placed in this adjustment of the press to ride on this cam, as shown in Figs. 21 to 25. The relations of the roller 68 and the cam 72 for this adjustment of the press is shown in Fig. 21 at the moment of cutting the first wire length, in Fig. 22 at the moment of cutting the second wire length, in Fig. 23 at the middle point of the collecting revolution of carrier A, and in Fig. 24 at the end of the collecting revolution of carrier A.

It will be observed that there is no provision for suspending the operation of the stapling-tool during the collection of sheets on the carrier A; but it will also be observed that the operation of this tool in the absence of wire for the formation of a staple will have no effect upon the operation of the machine or upon the product.

I will now describe the mechanism for operating the folding-blades and pins.

For operating the folding-blades there is provided a cam 56, with which the bowls 53 53′ of the cross-head 54 come into contact to turn the folding-blades outward. This cam 56 is attached to a block 57, which depends from the axle of the carrier A, the axle passing through an elongated hole in the block, so that the latter is free to move vertically in suitable guides fixed to the frame. It is raised and lowered at suitable times by means of a lever 24, one end of which is attached thereto by means of a roll passing freely through or into a recess in the block 57, and which lever is fast upon a shaft 23. This shaft has mounted and free to rotate thereon a rock-arm 22, the roll or stud 21 of which runs in the cam-path 25, which is formed on the inner face of a wheel 69, which rock-arm may be locked fast to said shaft 23 by a pin 26 at desired times. Said rock-shaft also carries fast upon it a segment 27, that coacts with a segment 28, that is fast upon a shaft 29.

The wheel 69 is geared to make one revo-

lution to two revolutions of the carrier A, and the cam-path 25 is so shaped, as shown in Fig. 1, that half thereof is nearer the center of the axis of the wheel 69 than the other half. Consequently during each revolution of the wheel 69 the roller 21 is for half the time occupied by the revolution drawn toward the center of the wheel and during the other half of the time is thrown farther from the center, these periods corresponding to a single revolution of the carrier A.

When the arm 22, carrying the roll 21, is locked to the arm 24, connected to the block 57 by means of a locking-pin 26, the block 57 and the cam 56 attached to it will be depressed into the position shown in Fig. 3ª during the time occupied by one revolution of the carrier A, and during the time occupied by the next revolution of the carrier A it will be raised to the position shown in Fig. 4. In the former position the bowls 53 53′ pass freely by the cam 56 and are not engaged thereby; but in the latter position the folding-blades are operated by the cam 56.

The mechanism for operating the pins consists of a cam 32, fixed upon an arm 81′, which is in one piece with arm 82 and carried by stud 81, to which arm 82 is pivoted a link 83, which link in turn is attached at the other end to a slotted triangular lever 84, fast upon the rear end of the shaft 29, which carries the segment 28. The slot 85 is provided in the lever 84 in order to permit the introduction of a bolt which is the pivot of the upper end of link 83 and the movement of this pivot from one angle of the lever 84 to the other.

The cam 32 is located outside the carrier A, at the opposite end from the cam 56, and a portion of its surface usually lies in the path of the rolls at the end of the pin-shaft rock-arms. Therefore at certain intervals in the revolution of the carrier A each normally spring protruded pin 2 will be retracted. These intervals will vary according as the sheets are of half width or of full width or as they are collected or uncollected. Therefore the cam 32 must be shifted to determine the proper interval. If the sheets are uncollected, the cam will be fixed in proper position; but if the machine is delivering collected sheets the cam 32 must at alternate revolutions be brought into a position when it will not retract the pins. This temporary position is shown in Fig. 3ª.

The position of the pin-cam 32 is controlled by the position of the triangular lever 84 and that in turn by the segment 28, and the direction of movement of the pin-cam caused by a given movement of the slotted triangular lever 84 will depend upon whether the upper end of the link 83 is attached to one or the other angle of the lever 84.

When sheets of full width uncollected are passing through the delivery, the pin-cam must be in such a position as to withdraw the pins at the rear of the sheet at the moment of folding—that is, the position shown in Fig. 3. This position is secured by so placing the parts that a circular hole 87 through the shaft 29 is in line with a circular hole 86 in the frame and introducing the locking-pin 26 into these holes. This shifts the position of the segment 28, and consequently of the segment 27 and the arm 24, which, it will be remembered, is connected rigidly thereto, so as to raise the cam 56 and hold it permanently in its elevated position. Meanwhile the arm 22, with the roll 21, is free to move as the latter engages with the cam-path 25, it being disconnected from the other parts of the machine by the withdrawal of the pin 26. The movement of the triangular lever 84 into the position shown in Fig. 3 through the link 83 and the arm 82 elevates the cam 32 to the position shown in that figure, where it remains fixed while the machine is in this adjustment.

When sheets of full width collected are being passed through the machine, the pin-cam will during the first revolution of the carrier—to wit, that revolution in which no folding operation occurs—be in the position shown in Fig. 3ª, and during the second revolution of the carrier it will be shifted to the position shown in Fig. 3, so as to withdraw the pins from the leading ends of the sheets at the same point as last above considered. This position and operation of the parts is effected by withdrawing the locking-pin 26 from the holes 86 87 and placing it in the position shown in Fig. 3ª, locking together thereby the arms 22 and 24. The cam-path 25 and cam-roller 21 are now brought into action and during the first revolution of the carrier A, the roller 21 being in the part of the cam farthest removed from the center of the wheel 69, will cause the arm 24 to be in its depressed position, and consequently the cam 56 to be beneath the path of the bowls 53 53′, so that the latter will pass by it without engaging therewith. The position of the pin-cam during this revolution of the carrier A is that shown in Fig. 3ª. On the second revolution of the carrier A the roller 21 is drawn toward the center of the wheel 69 and the arm 24 and the cam 56 are elevated into the position such that the cam 56 will operate upon the bowls of the cross-head of the folding-blade. This movement of the arm 24 carries with it through the segments 27 and 28 the triangular lever 84 and depresses the link 83 and arm 82 and raises the pin-cam 32 into the position shown in Fig. 3, so that during the second revolution of the carrier A the pin-cam will be placed to withdraw the pins at the leading end of the sheet at the moment of the folding operation.

When it is desired to pass half-width sheets uncollected through the machine, the pivot of the upper end of the link 83 is moved to the left-hand end of the triangular lever 84 and the locking-pin 26 is withdrawn from the position shown in Fig. 3ª and again inserted through the holes 86 and 87. The link 83

now draws up lever 82 and depresses the pin-cam to the position shown in Fig. 4, in which it causes the pins to be withdrawn at the proper time from the leading end of the half-sheets. In this position of the segment 28 the lever 24 will be locked thereby with cam 56 in its elevated position, when it will throw the folding-blades twice in each revolution of the carrier. The parts remain fixed in this position during this adjustment of the machine.

When it is desired to adjust the machine in order to pass through it half-sheets collected, the attachment of the lever 83 is left as it is shown in Fig. 4 and the locking-pin 26 is withdrawn from its position (shown in Fig. 4) and again inserted, so as to lock arm 22 to arm 24. The parts will now assume the position shown in Fig. 4ª during the first of each two revolutions of the carrier A, and during the second of each two revolutions, through the operation of the cam-path 25 and the roll 21, before described, the cam 56 will be raised and the pin-cam 32 depressed to the position shown in Fig. 4, and thus the sheets which are collected during the first of each pair of revolutions of the carrier A will be discharged during the second revolution.

The product shown in Fig. 37 is obtained by adjusting the press to produce the product shown in Fig. 35 and placing the switch 40, so that this product is diverted to a second folder and there given a transverse fold. In making this product the staple making and setting mechanism may be disconnected and the sheets either pasted or folded without attachment to each other, or they may be stapled, as shown in Fig. 38. A product similar to this may also of course be made of thirty-two pages by collecting.

The product shown in Fig. 39 is obtained by slitting the web into four strips, as shown in Figs. 32 to 34, and passing the two outside strips over diagonal turning-bars and associating them with the two inner strips. The four associated strips are then passed through the mechanism set in the position for making a product of narrow uncollected sheets, (shown in Fig. 4,) and the product, as will be understood from the above description, will be sixteen pages of a length equal to the width of the strips into which the web is slit and of a width equal to one-fourth of the circumference of the carrier A. A similar product may be made of thirty-two pages by collecting.

The term "collecting mechanism" is used in the claims to indicate any sort of mechanism which may be used to collect the sheets. The particular mechanism shown herein for this purpose consists of the pins and means for operating them.

What I claim is—

1. The combination of means for printing and collecting sheets of paper, means for throwing the collecting means into and out of operation, means for forming staples and inserting them into the sheets, means of feeding wire to form the staples, and means for causing said feed to be intermittent as when the sheets are collected or longer sheets are operated upon, while the staple-forming mechanism continues its operation, substantially as described.

2. The combination of a printing-press adapted to perfect webs of paper, means for cutting said web into sheets, means for collecting said sheets, means for throwing the collecting means into and out of operation, means for forming staples and inserting them into the sheets, means of feeding wire to form the staples, and means for causing said feed to be intermittent as when the sheets are collected or longer sheets are operated upon while the staple-forming mechanism continues its operation, substantially as described.

3. The combination of means for printing a web of paper, means for cutting the same into sheets, consisting in part of a carrier provided with removable and interchangeable blocks whereby the operation of the cutting mechanism may be varied, so that the sheets may be varied in length, means for stapling the sheets, and means for varying the operation of the stapling mechanism in accordance with the length of the sheets to be stapled, substantially as described.

4. The combination of means for printing a web of paper, means for cutting the same, means for varying the operation of the cutting mechanism so that the sheets may be varied in length, means for collecting the sheets, means for stapling the sheets and means for changing the times of operation of the stapling mechanism to accord with changes in the length of the sheets and the operation of the collecting mechanism, substantially as described.

5. The combination of a rotating carrier for sheets of paper, a staple-presenting tool or tools, a rotary carrier therefor and a cam mounted within the last-mentioned carrier upon a stationary shaft coincident with the axis of rotation of the carrier for causing said tool to present the staple as the last-mentioned carrier rotates, substantially as described.

6. The combination of a rotating carrier for sheets of paper, a staple forming and presenting tool, a rotary carrier therefor and a cam mounted within the last-mentioned carrier upon a stationary shaft coincident with the axis of rotation of the carrier for causing said tool to form and present staples as the last-mentioned carrier rotates, substantially as described.

7. The combination of a rotating carrier, stapling-tools mounted to reciprocate therein, and a stationary shaft substantially in the axial line of the carrier and within it provided with a cam or cams for actuating said tools, substantially as described.

8. The combination of means for printing a web of paper, means for cutting the same into sheets, consisting in part of a carrier pro-

vided with removable and interchangeable blocks whereby the operation of the cutting mechanism may be varied, so that the sheets may be varied in length, means for forming and inserting staples into the sheets, means for feeding wire to the staple-forming mechanism, and means for causing the amount of wire presented by the wire-feeding mechanism to vary to accord with the length of the sheets, substantially as described.

9. The combination of means for printing a web of paper, means for cutting the same into sheets, means for varying the operation of the cutting mechanism, so that the sheets may be varied in length, means for forming and inserting staples into the sheets, means for feeding wire to the staple-forming mechanism, and means for changing the times of operation of the wire-feeding mechanism to accord with variations in the length of the sheets, substantially as described.

10. The combination of means for printing a web, means for cutting sheets therefrom, means for varying the operation of the cutting mechanism so that the sheets may be varied in length, a mechanism for inserting staples into the sheets, means for varying the operation of the stapling mechanism to accord with variations of sheet length, folding mechanism and means for varying the operation of the folding mechanism to accord also with variations in the sheet length, substantially as described.

11. The combination of means for inserting staples into paper, means for presenting sheets of paper to said stapling mechanism to be stapled, means for varying the intervals of such presentation, means for varying the operation of the stapling mechanism to accord with the intervals of presentation of the sheets, means for folding the sheets and means for varying the operation of the folding mechanism to also accord with the intervals of presentation of the sheets, substantially as described.

12. The combination of a sheet-carrier, mechanism for causing it to revolve for the purpose of collecting sheets upon its surface, mechanism for inserting staples into said sheets coöperating with said carrier, mechanism for causing the stapling mechanism to intermit its action while the said carrier is collecting, a folding mechanism, and mechanism for causing the folding mechanism to intermit its action while the said carrier is collecting, substantially as described.

13. The combination of a sheet-carrier, mechanism for causing it to revolve for the purpose of collecting sheets upon its surface, mechanism for forming staples and inserting them into said sheets coöperating with said carrier, mechanism for causing the stapling mechanism to intermit its action while the said carrier is collecting, a folding mechanism and mechanism for causing the folding mechanism to intermit its action while the said carrier is collecting, substantially as described.

14. The combination of mechanism for forming staples and inserting them into paper, a rotating carrier, mechanism for causing the carrier to present sheets to the stapling mechanism collected or uncollected as desired, means for feeding wire to the staple-forming mechanism, and means for intermitting the feed of the wire while the said carrier is collecting, substantially as described.

15. The combination of a curved anvil, a staple-forming tool which sweeps over the surface of the same to form a staple, and a guide-piece lying along the surface of the anvil for retaining the wire length in position while being formed into a staple, substantially as described.

16. In a web-printing press the combination of means for supplying the web, a slitter or slitters by which the web is cut into two or more longitudinal strips, means for associating these strips, means for cutting them into sheets, means for collecting the sheets, means for forming staples and inserting them into the sheets collected or uncollected as desired, means for feeding wire to the staple-forming mechanism, and means for intermitting said feed while the sheets are being collected, substantially as described.

17. The combination of a rotary carrier, stapling mechanism and wire-feeding mechanism carried thereby, and a cam rotating at a slower speed than the carrier, whereby intermittent action is imparted to the wire-feeding mechanism, substantially as described.

18. The combination in a printing-press, of means for delivering sheets of a certain width uncollected, and means for adjusting said means to deliver said sheets collected or to deliver sheets of half said width collected or uncollected, whereby any one of the four products mentioned may be produced as desired, substantially as described.

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

LUTHER C. CROWELL.

Witnesses:
J. A. GRAVES,
T. F. KEHOE.