(No Model.) 11 Sheets—Sheet 1.

W. L. ALLEN.

MACHINE FOR FOLDING OR PLAITING PAPER.

No. 519,465. Patented May 8, 1894.

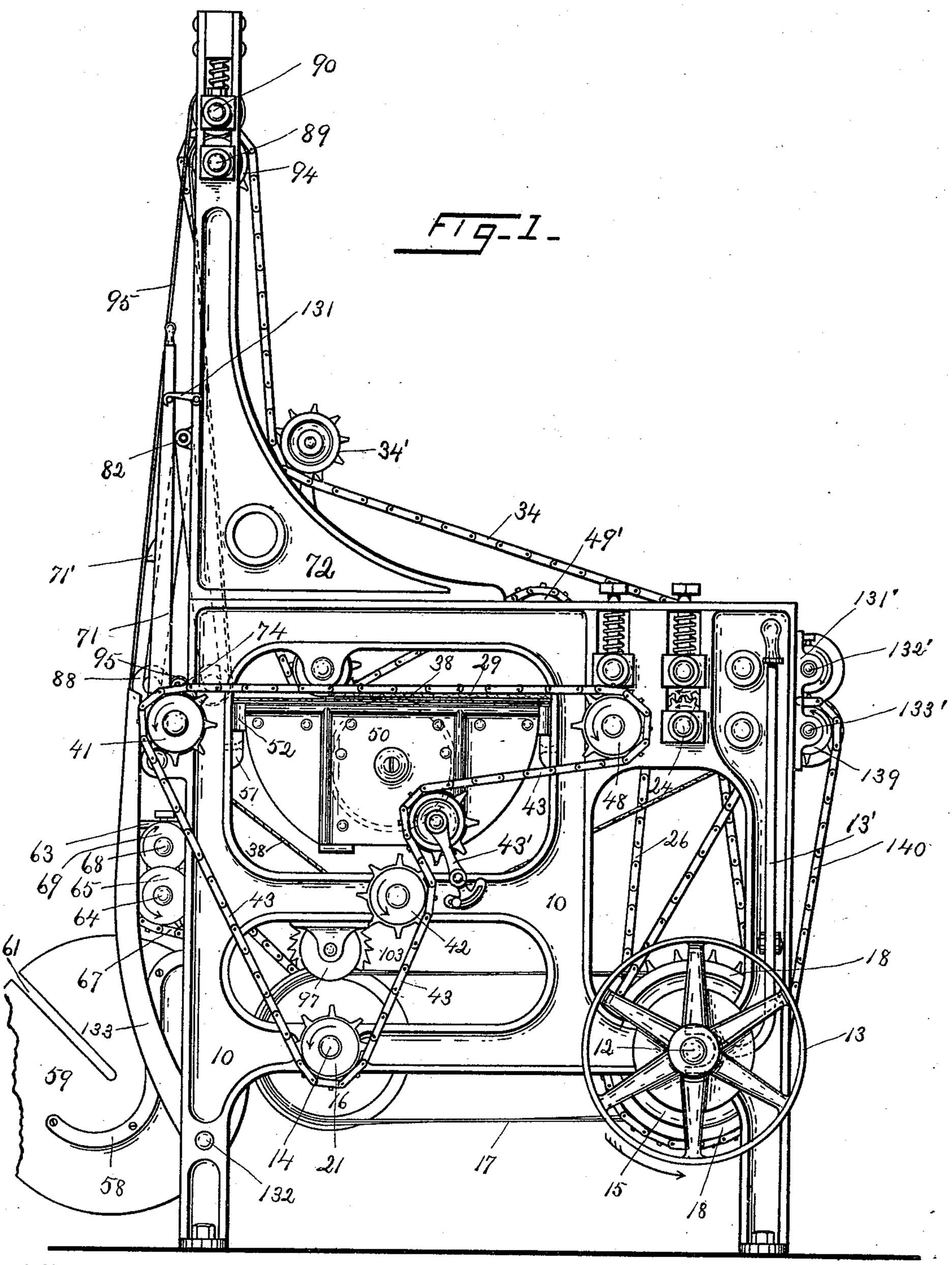


Fig. 1.

Witnesses
Abozo M. Lutter.
Allen Penny.

Inventor
Walter W. Allen.
By Attorneys
Frank H. Allen.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 11 Sheets—Sheet 2.

W. L. ALLEN.

MACHINE FOR FOLDING OR PLAITING PAPER.

No. 519,465. Patented May 8, 1894.

Fig. 32.

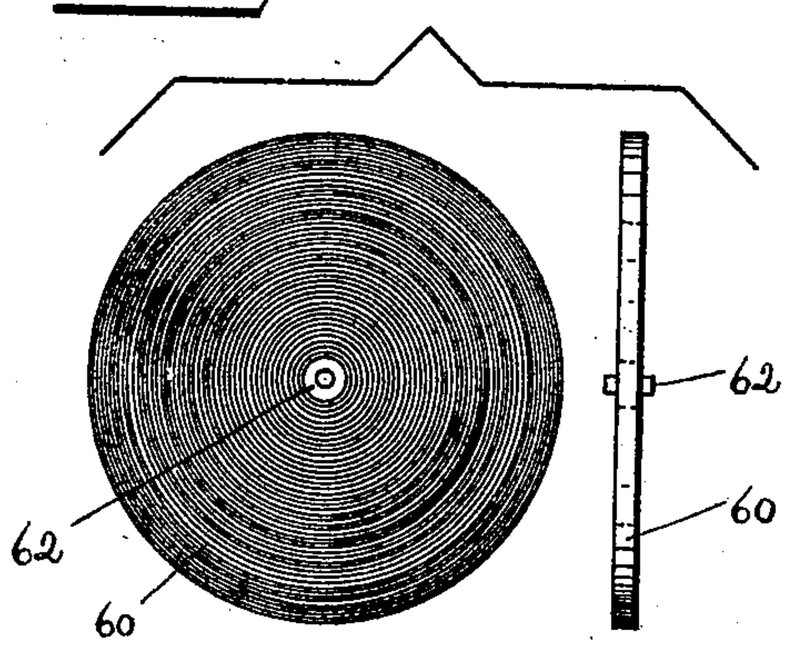


Fig. 2.

Witnesses
Aloysius L. Luther.
Allen Penny.

Inventor
Walter W. Allen.
By Attorney
Frank H. Allen.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

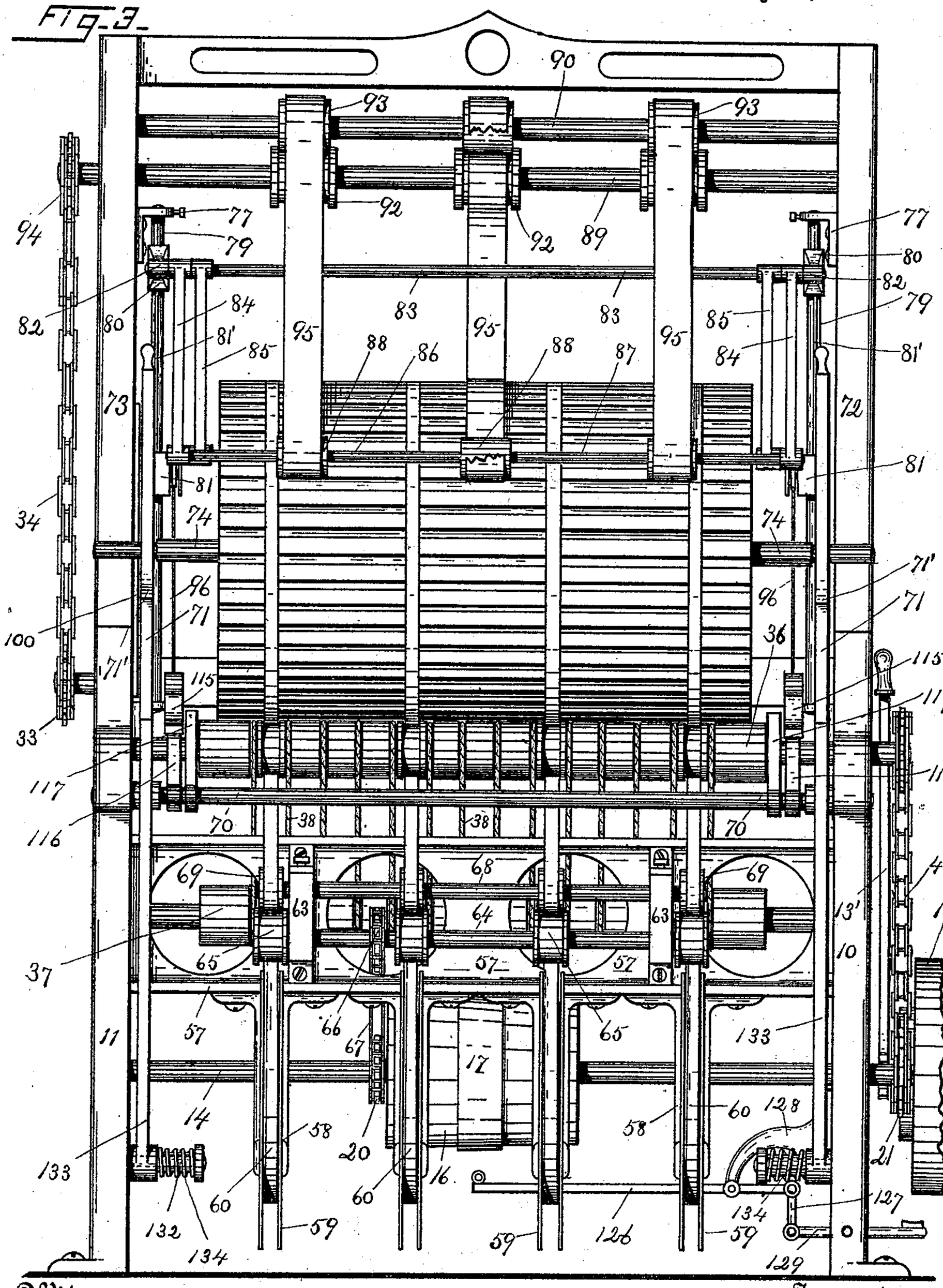
(No Model.) 11 Sheets—Sheet 3.

W. L. ALLEN.

MACHINE FOR FOLDING OR PLAITING PAPER.

No. 519,465. Patented May 8, 1894.

Fig. 3.



Witnesses
Alonzo M. Luther.
Allen Tenny.

Inventor
Walter W. Allen.
By Attorney
Frank H. Allen.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 11 Sheets—Sheet 4.

W. L. ALLEN.

MACHINE FOR FOLDING OR PLAITING PAPER.

No. 519,465. Patented May 8, 1894.

Fig 4.

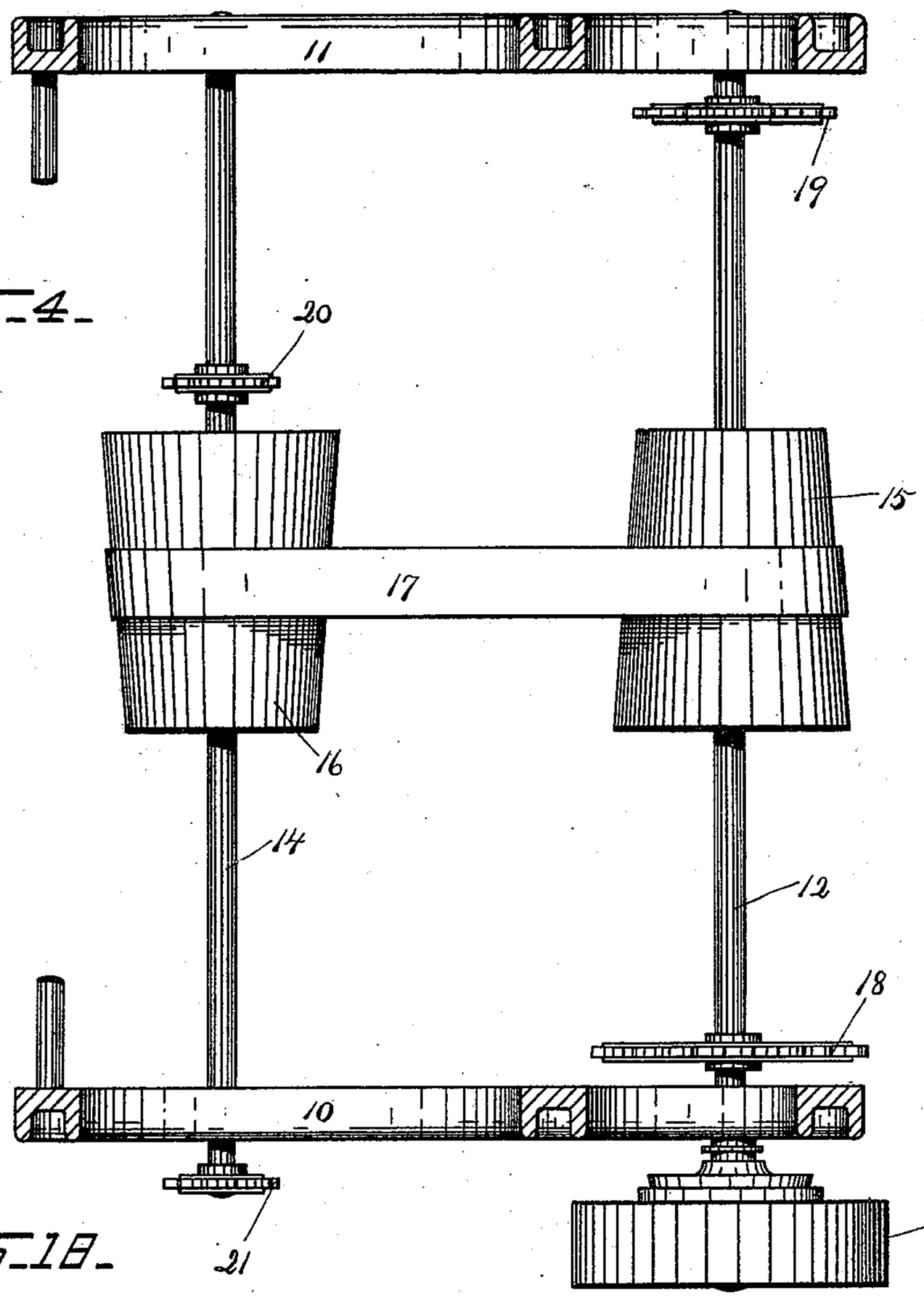
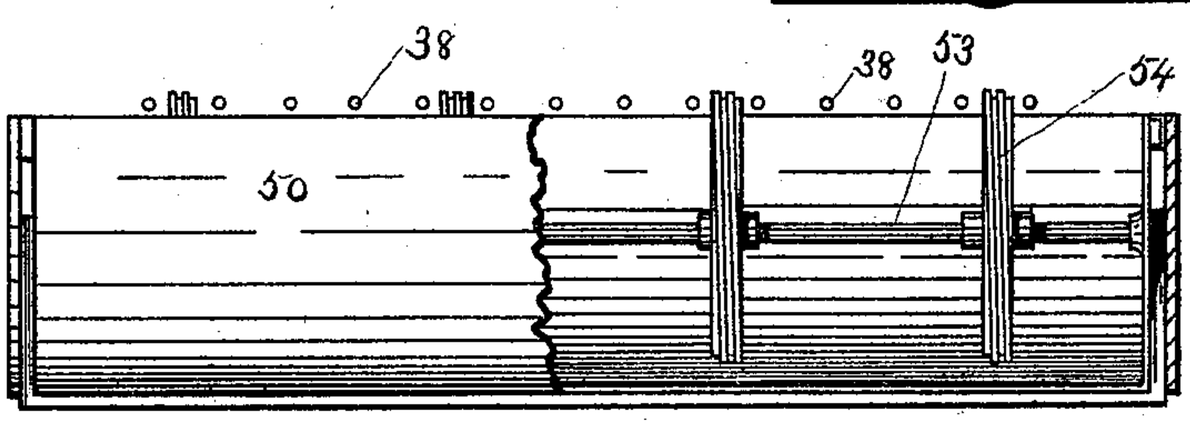


Fig 18.



Witnesses
Alonzo W. Sutter
Allen Tenny.

Inventor
Walter L. Allen.
By Attorney
Frank H. Allen.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 11 Sheets—Sheet 5.

W. L. ALLEN.

MACHINE FOR FOLDING OR PLAITING PAPER.

No. 519,465. Patented May 8, 1894.

Fig. 5.

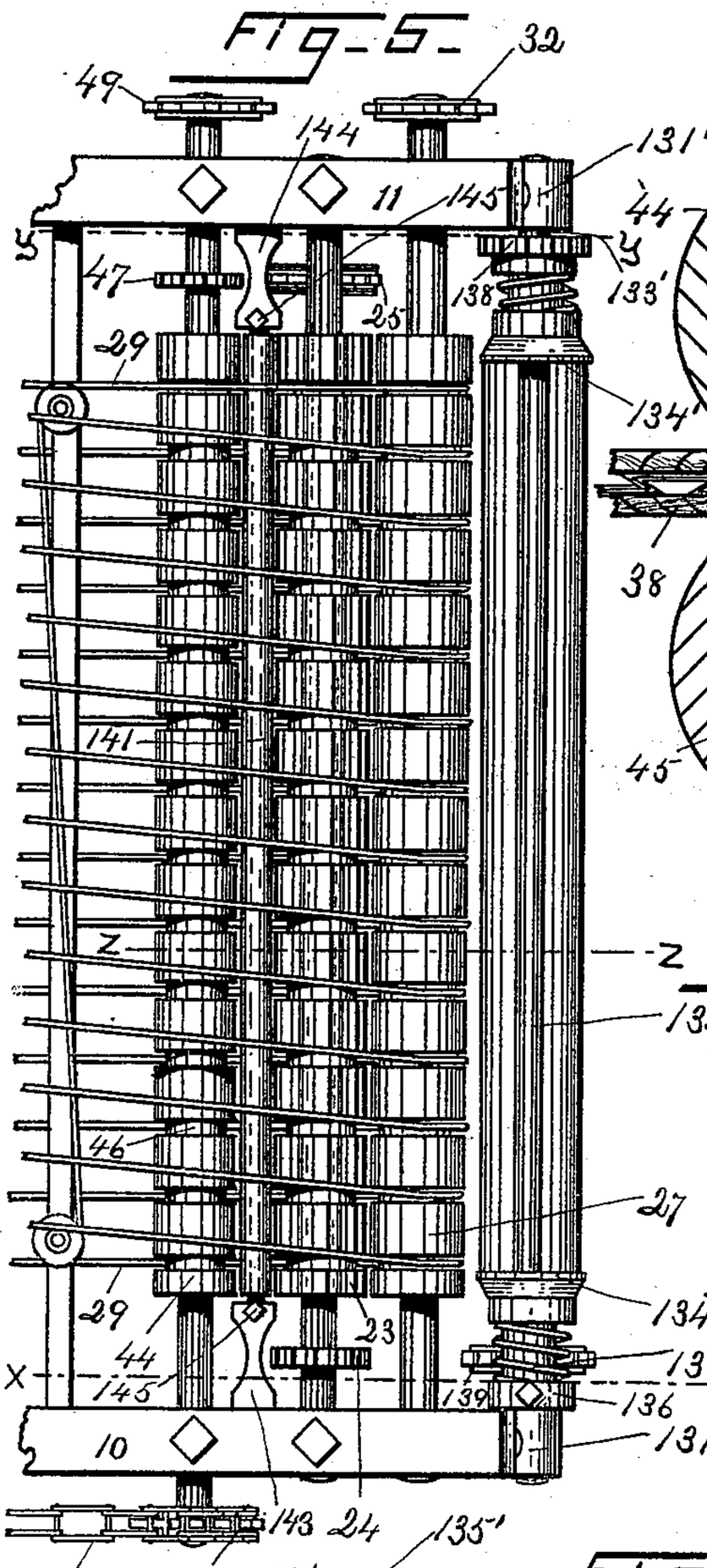


Fig. 13.

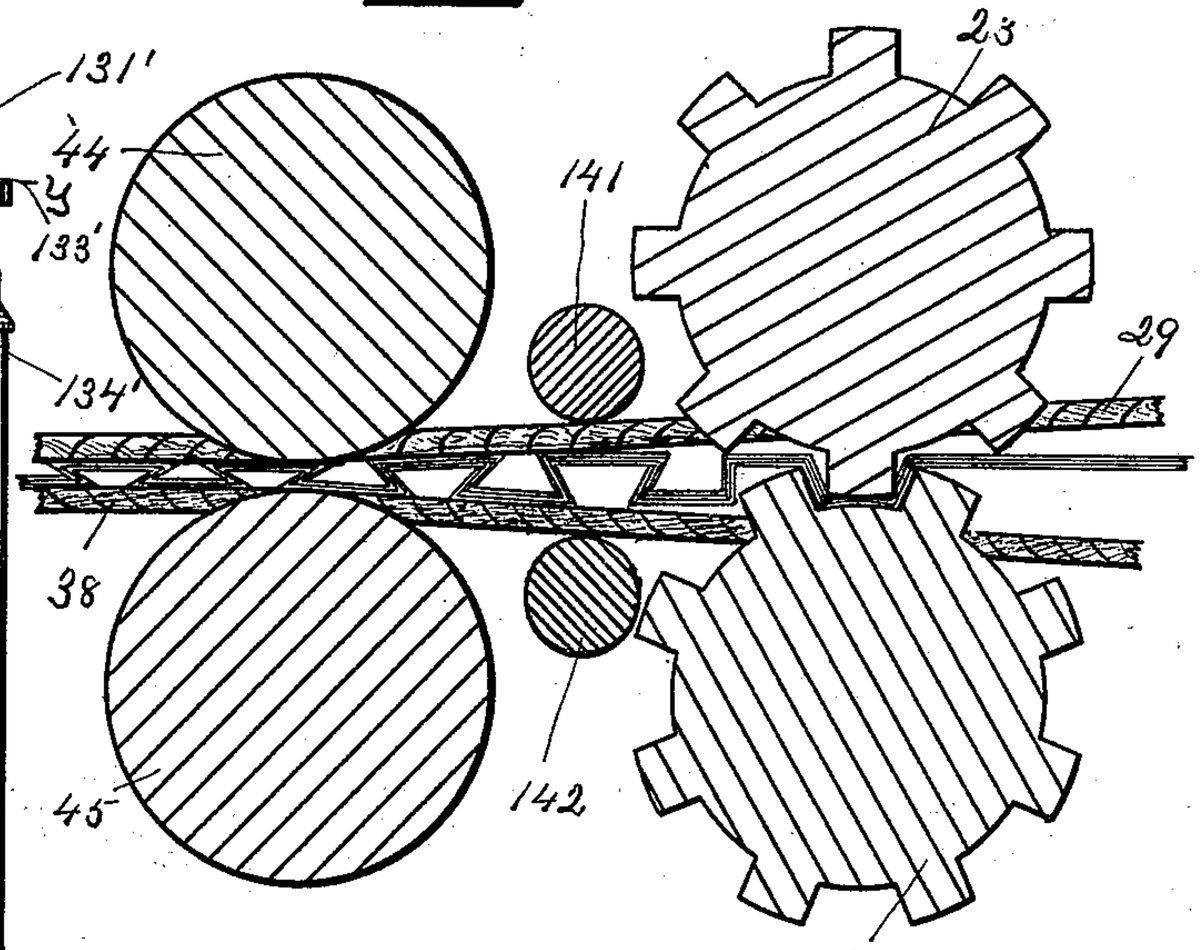


Fig. 33.

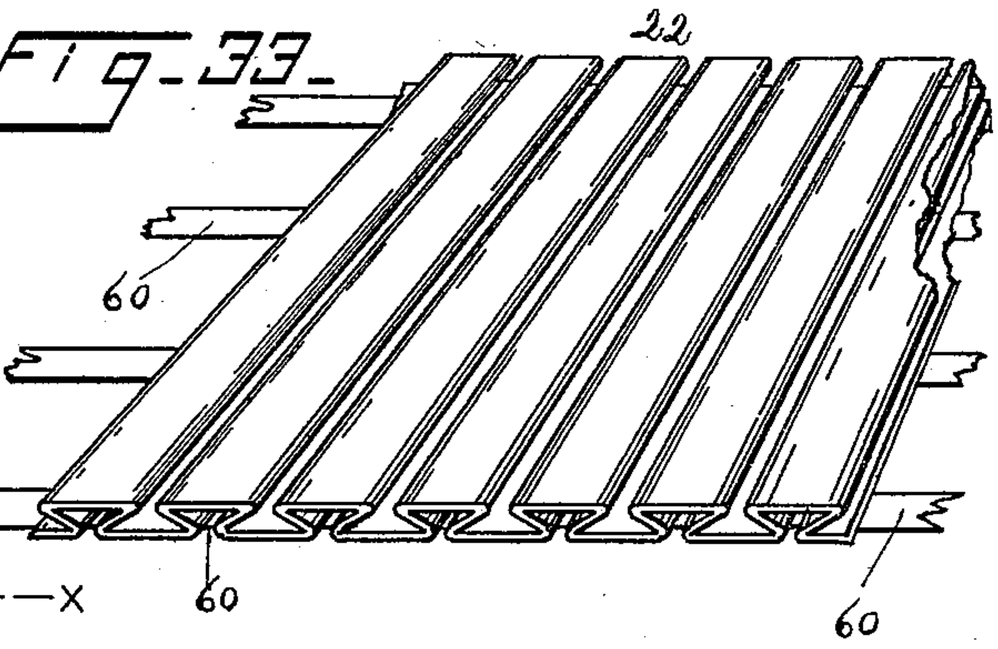


Fig. 11.

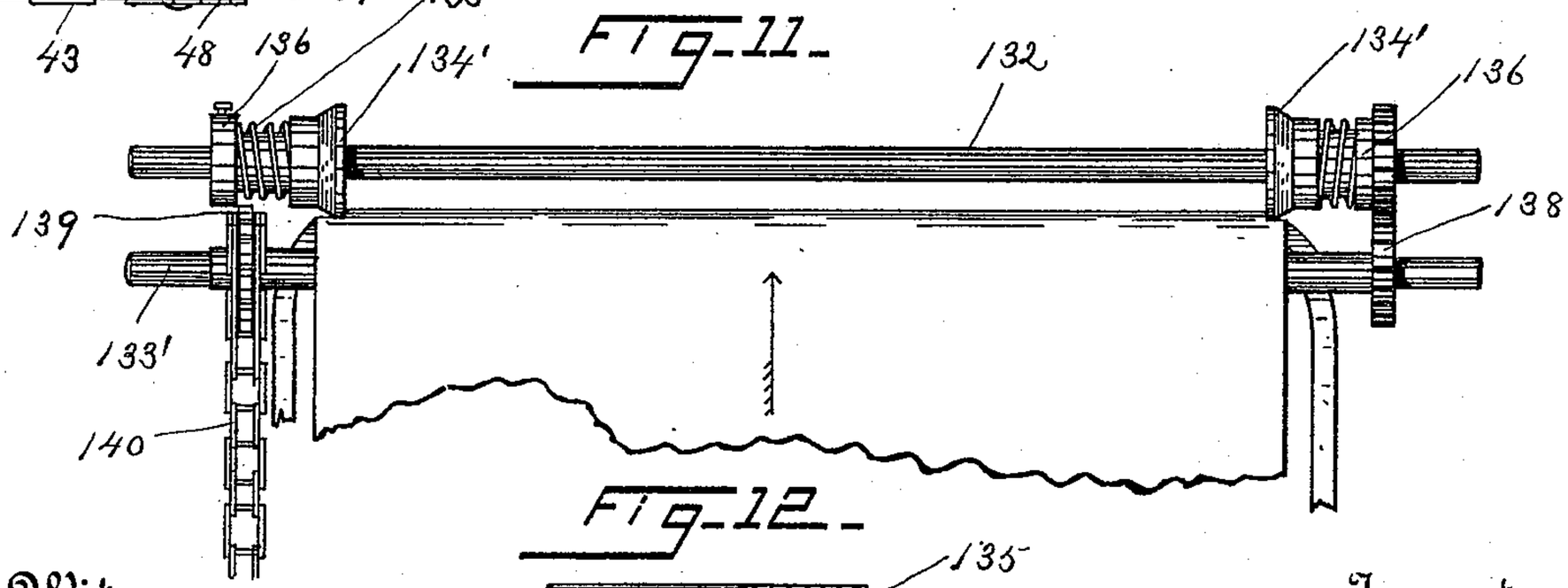
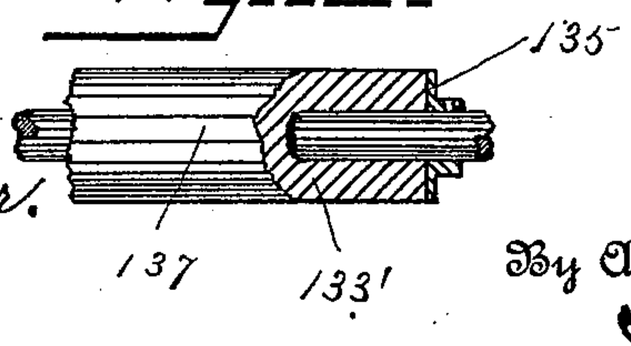


Fig. 12.



Witnesses

Alonzo W. Luther.

Allen Penny.

Inventor

Walter W. Allen.

By Attorney

Frank H. Allen.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 11 Sheets—Sheet 6.

W. L. ALLEN.

MACHINE FOR FOLDING OR PLAITING PAPER.

No. 519,465. Patented May 8, 1894.

Fig-6-

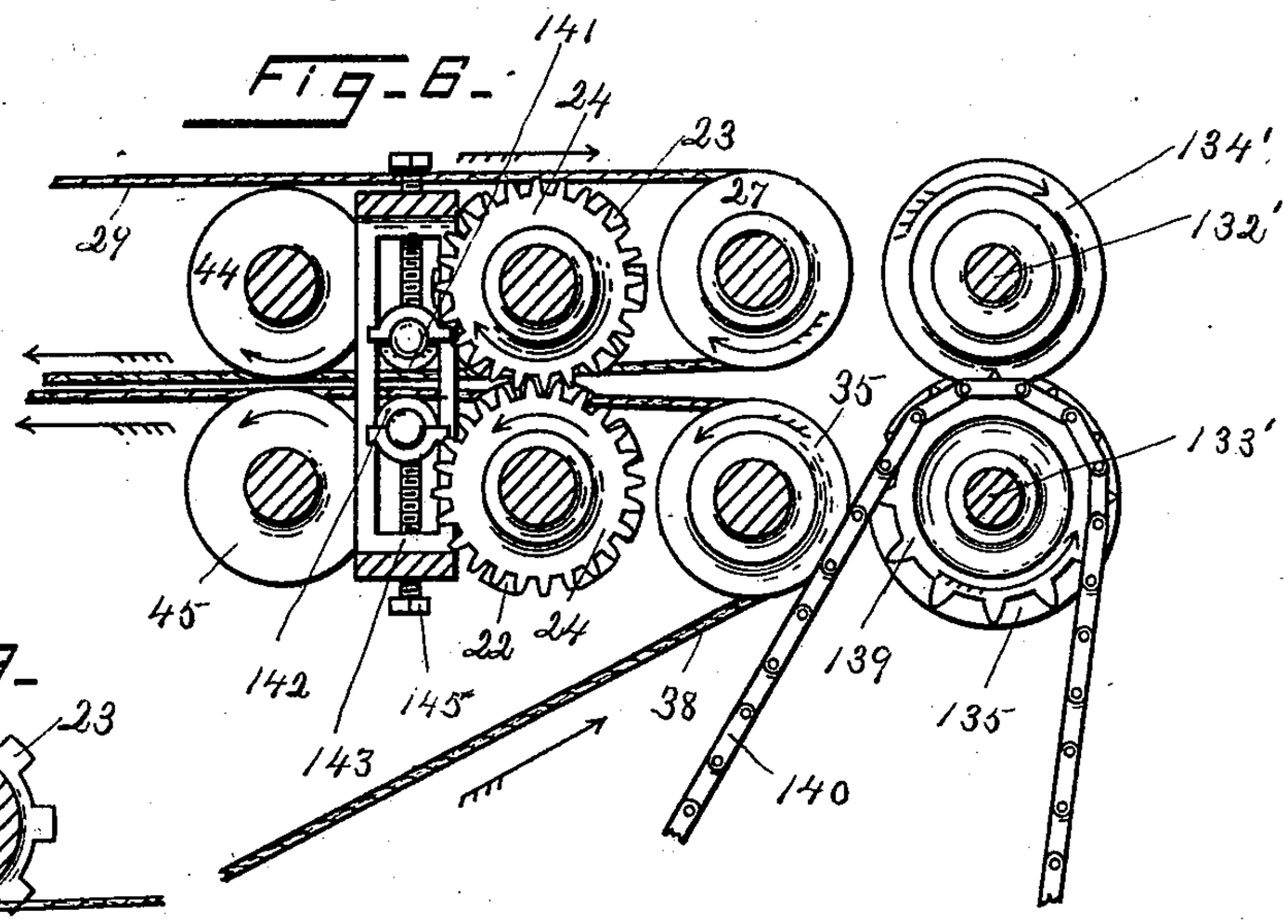


Fig-9-

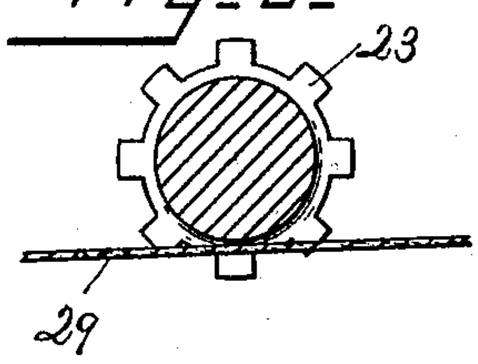


Fig-7-

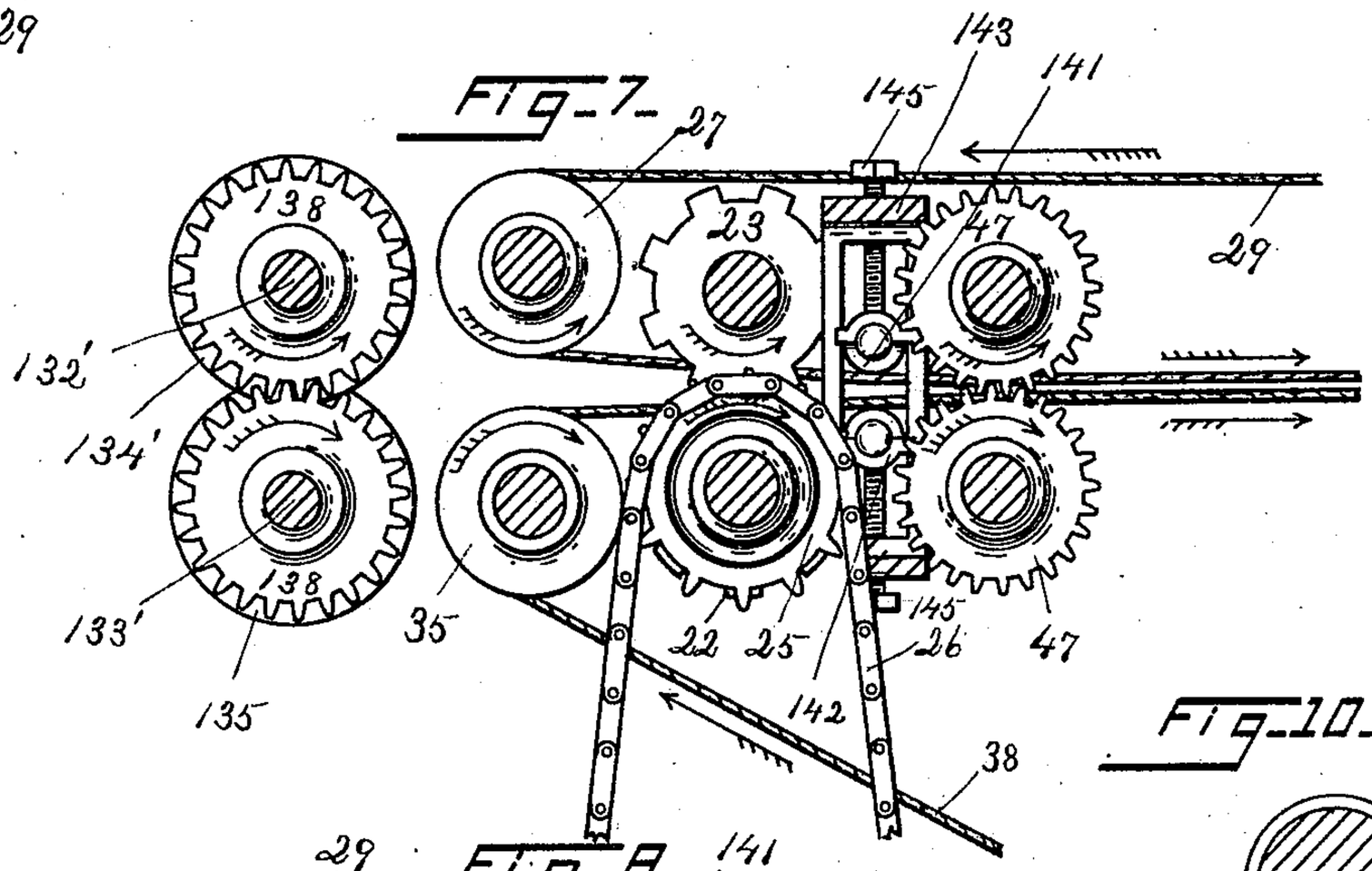


Fig-10-

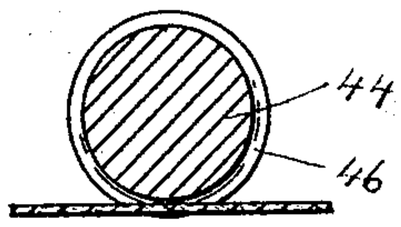
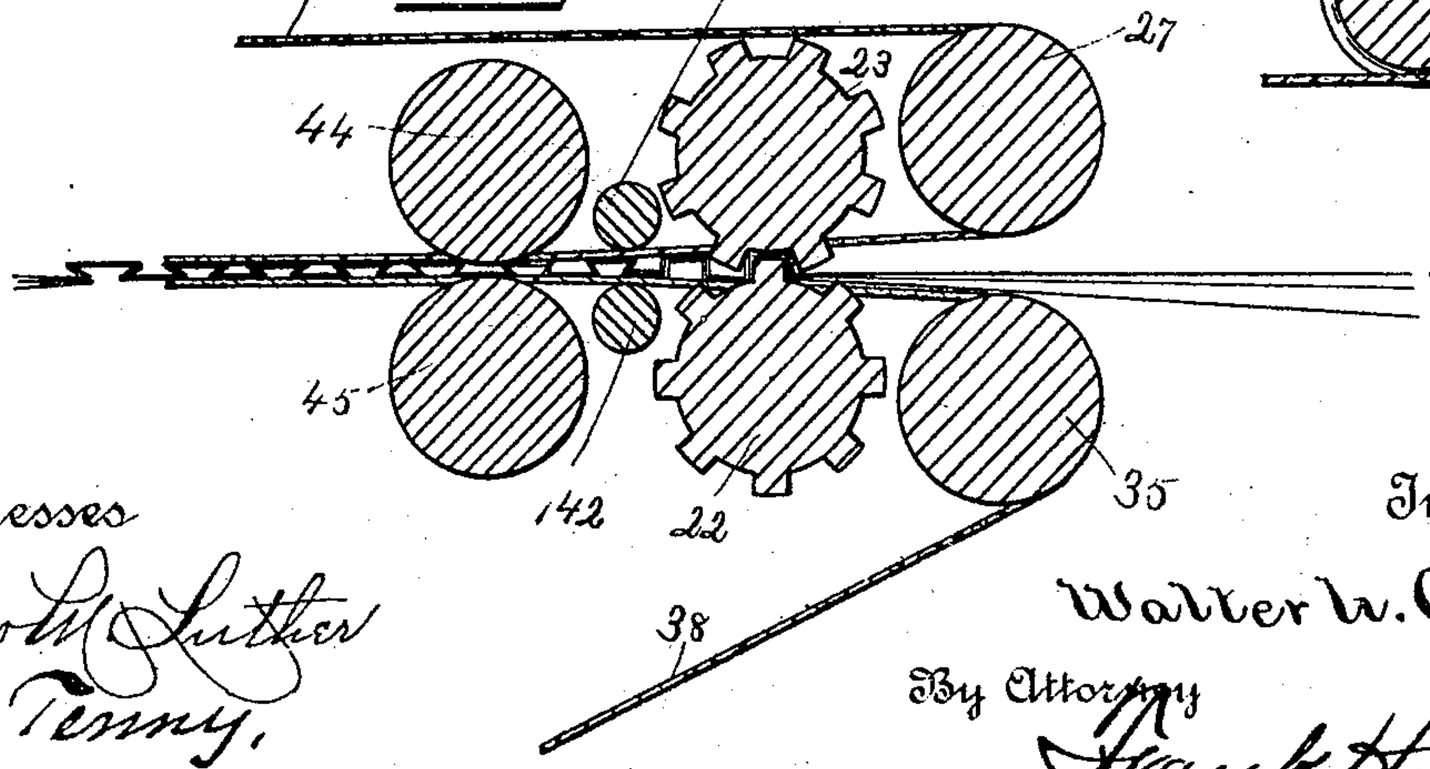


Fig-8-



Witnesses
Alonzo W. Lutter
Allen Tenny.

Inventor
Walter W. Allen.
By Attorney
Frank H. Allen.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 11 Sheets—Sheet 7.

W. L. ALLEN.

MACHINE FOR FOLDING OR PLAITING PAPER.

No. 519,465. Patented May 8, 1894.

Fig. 14.

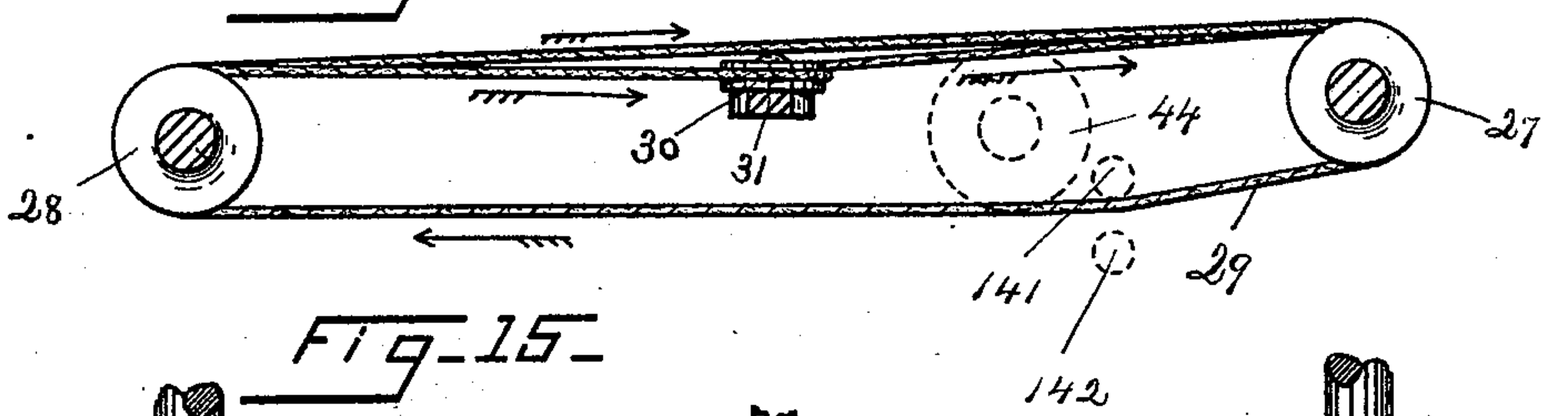


Fig. 15.

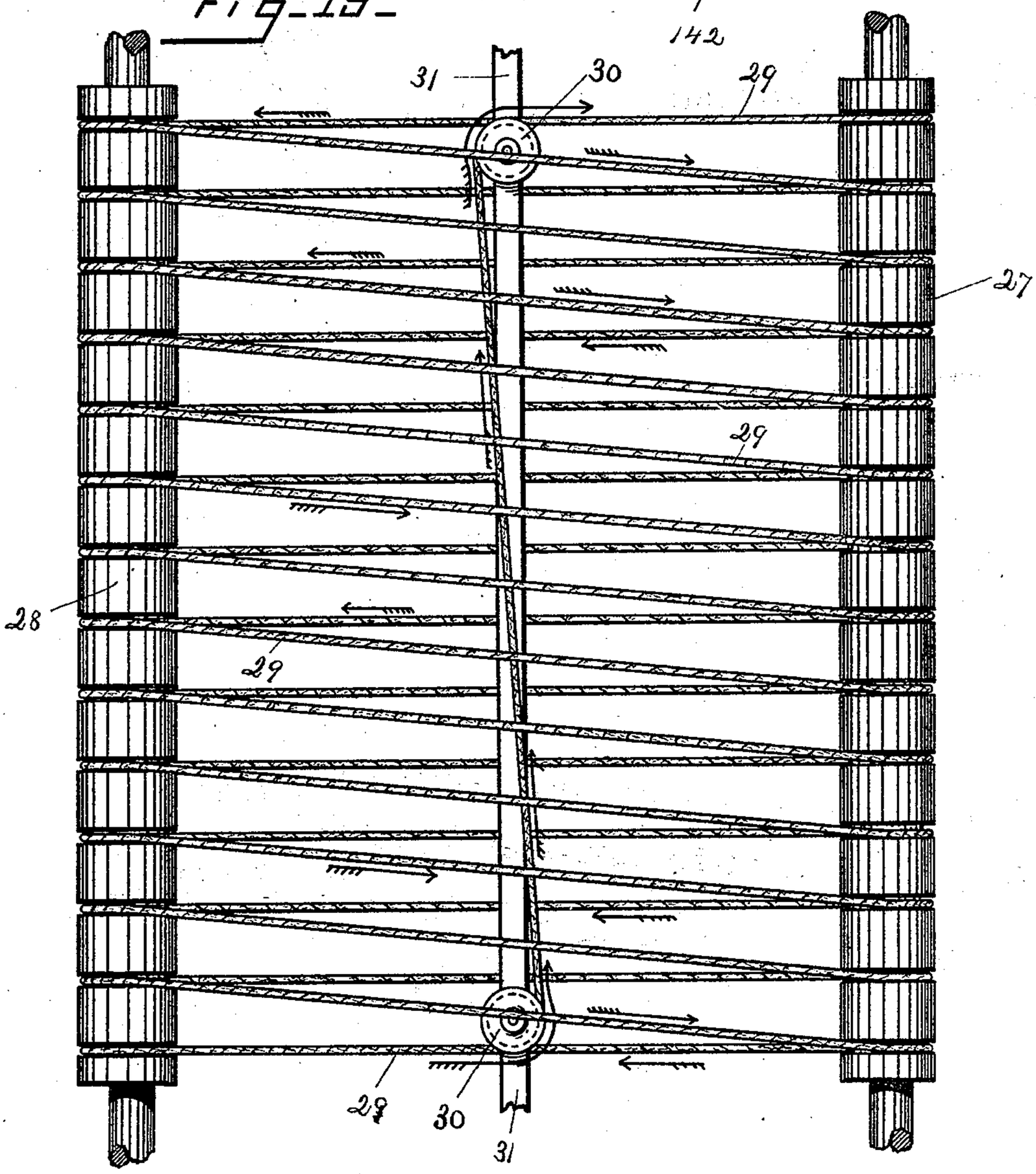


Fig. 17a.

Witnesses
Alonzo W. Luther.
Allen Tenney.

Inventor
Walter L. Allen.
By Attorney
Frank H. Allen.

THE NATIONAL LITHOGRAPHING COMPANY.
WASHINGTON, D. C.

(No Model.) 11 Sheets—Sheet 8.

W. L. ALLEN.

MACHINE FOR FOLDING OR PLAITING PAPER.

No. 519,465. Patented May 8, 1894.

Fig. 16.

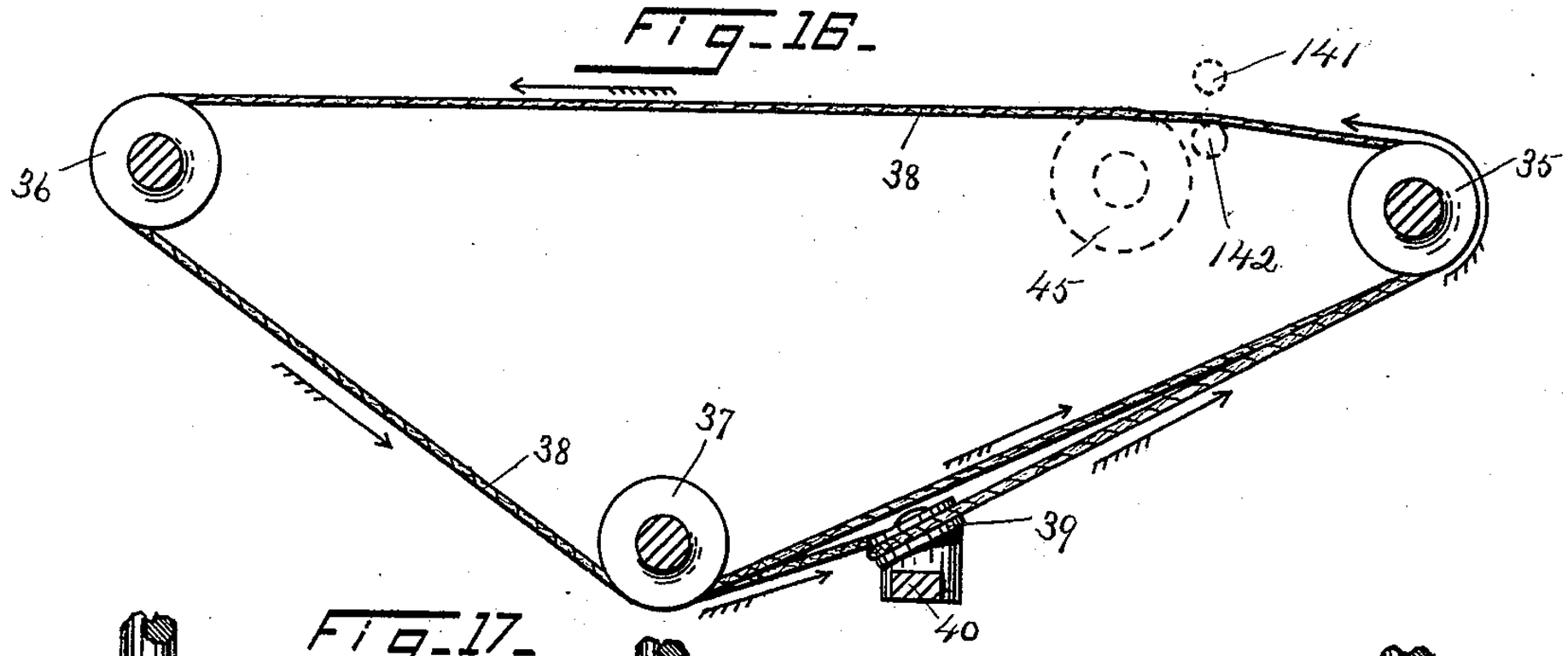
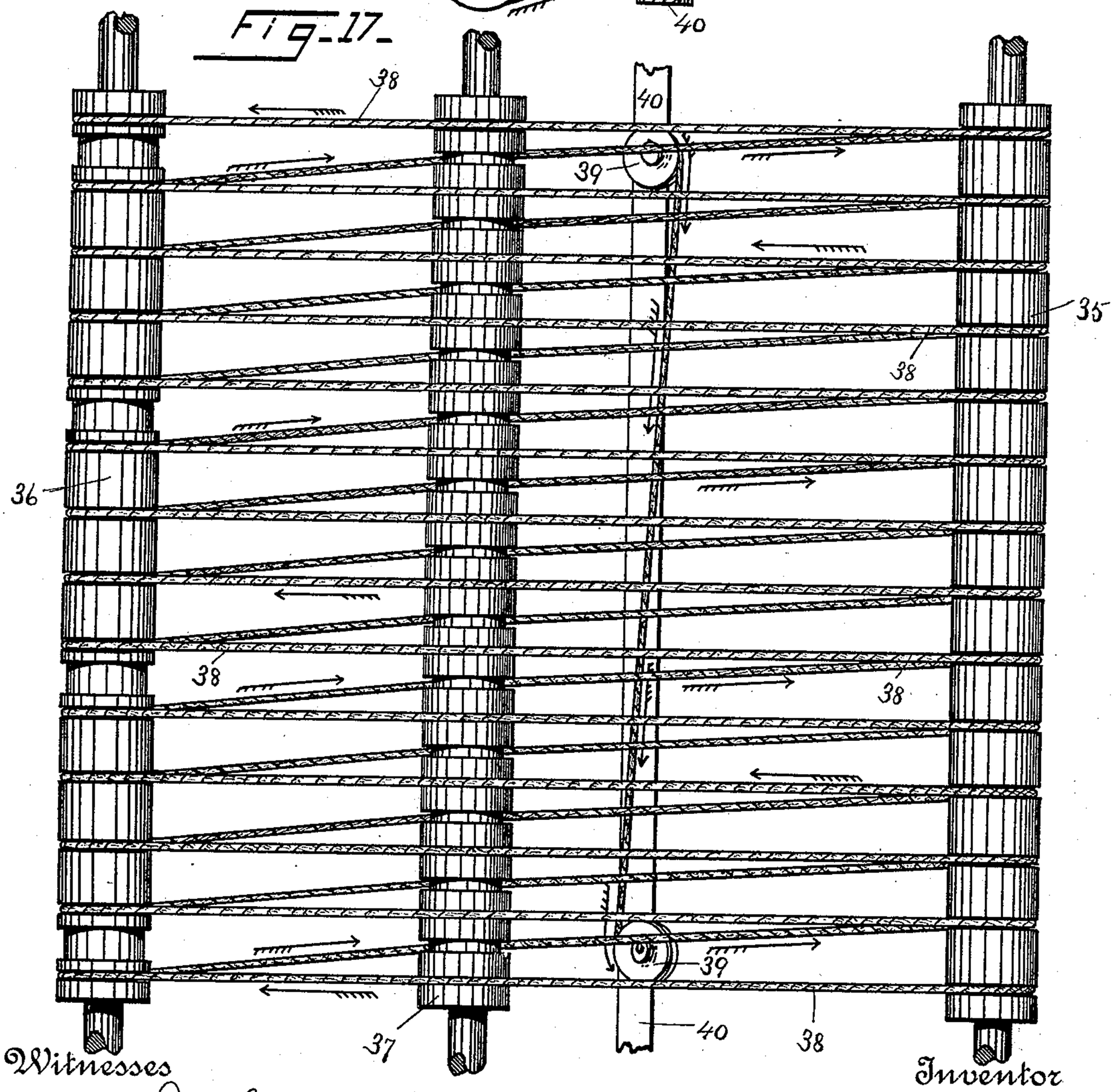


Fig. 17.



Witnesses
Alonzo M. Luther.
Allen Penny.

Inventor
Walter W. Allen.
By Attorney
Frank H. Allen

THE NATIONAL LITHOGRAPHING COMPANY.
WASHINGTON, D. C.

(No Model.) 11 Sheets—Sheet 9.

W. L. ALLEN.

MACHINE FOR FOLDING OR PLAITING PAPER.

No. 519,465. Patented May 8, 1894.

Fig-19-

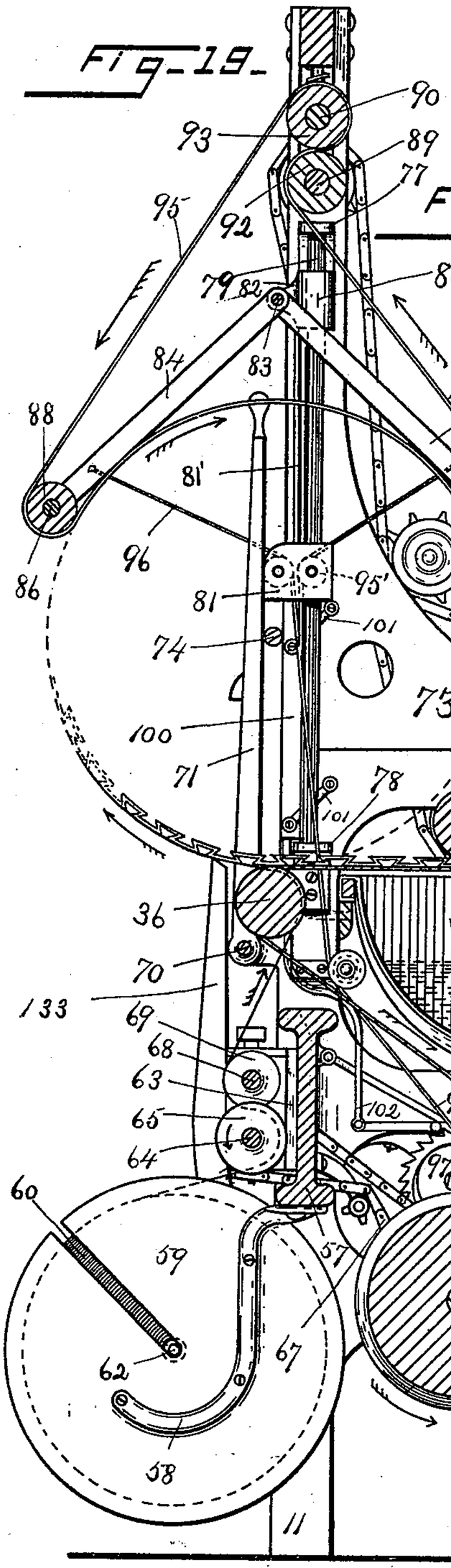


Fig-20-

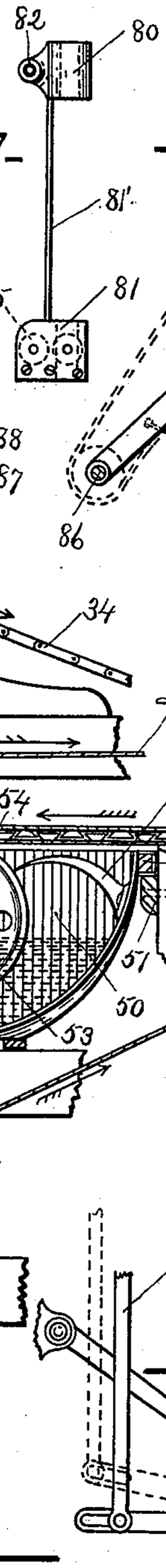


Fig-21-

Fig-22-

Fig-20a-

Witnesses
Alonzo M. Luther.
Allen Penny.

Inventor
Walter W. Allen.
By Attorney
Frank H. Allen.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 11 Sheets—Sheet 10.

W. L. ALLEN.

MACHINE FOR FOLDING OR PLAITING PAPER.

No. 519,465. Patented May 8, 1894.

FIG-23-

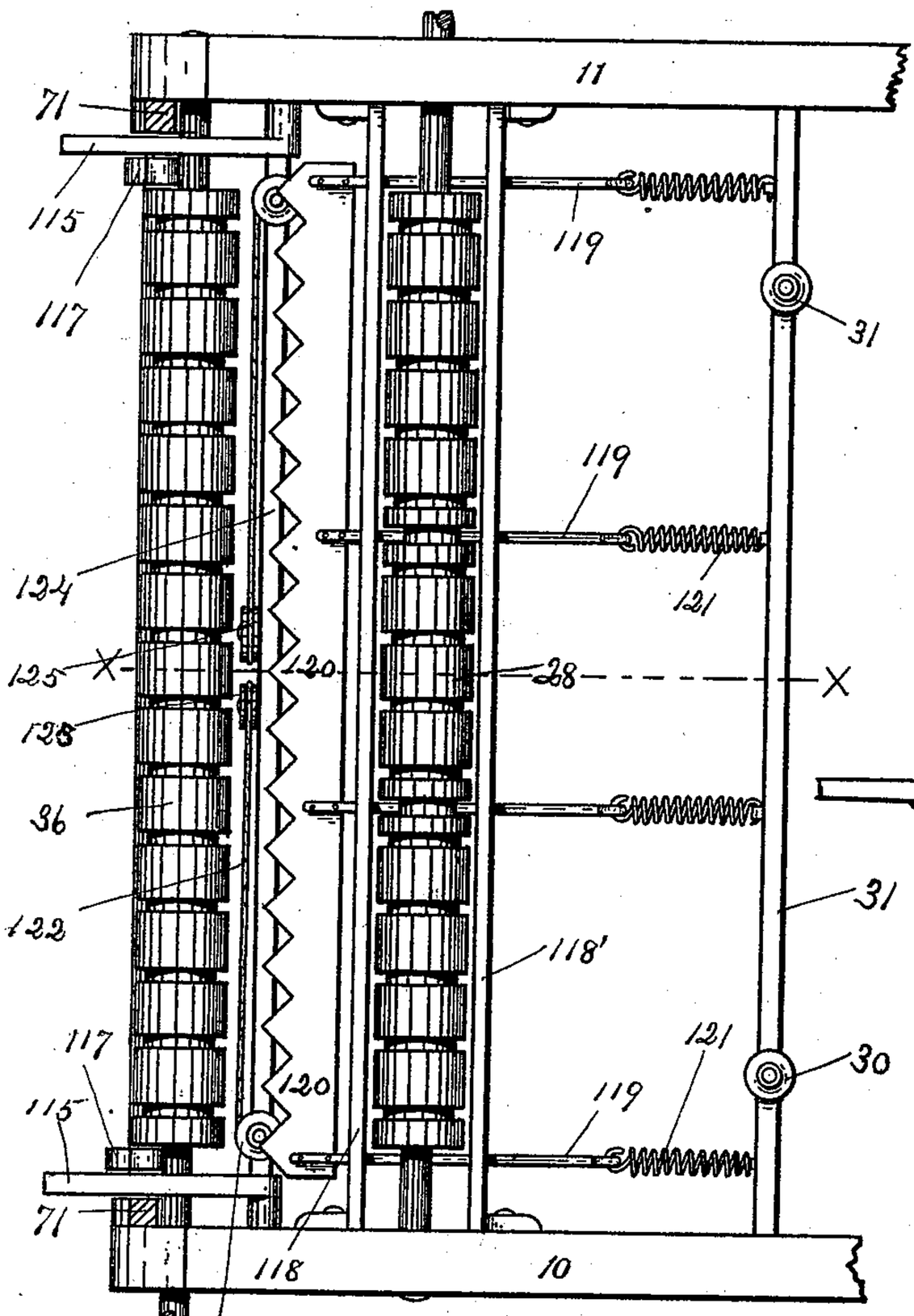


FIG-26-

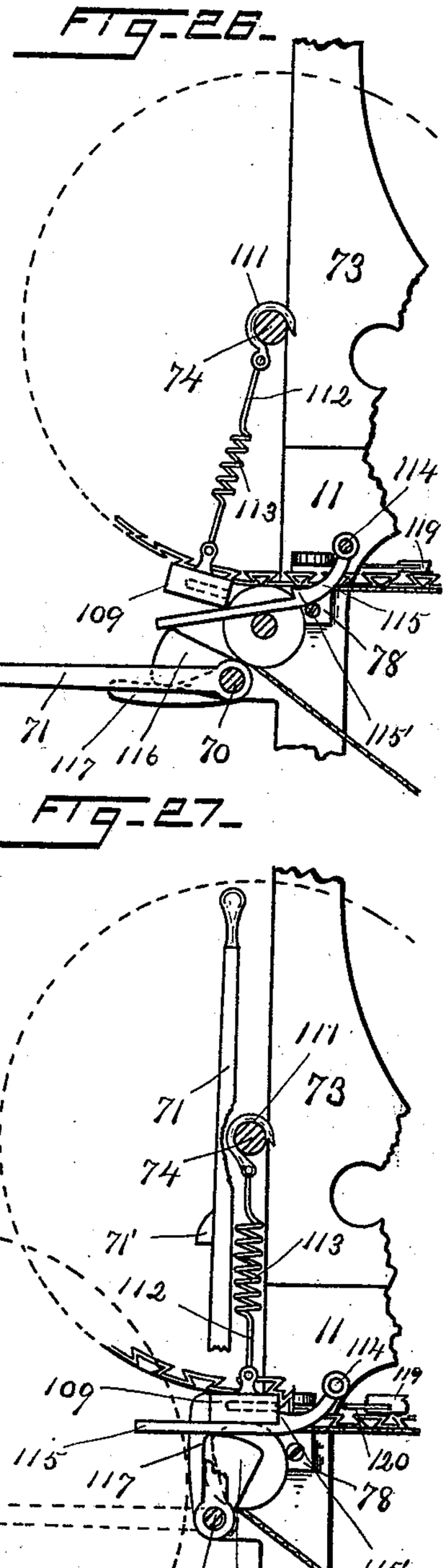


FIG-27-

FIG-24-

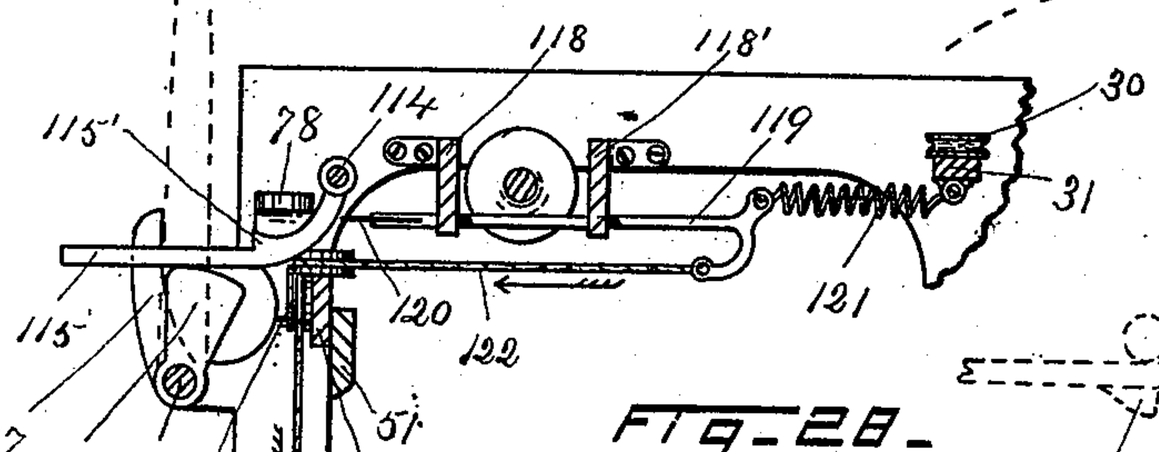
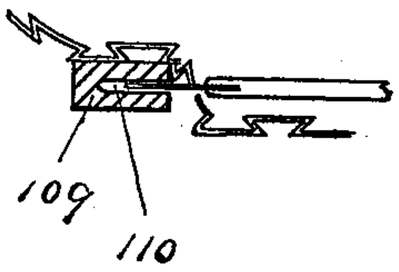
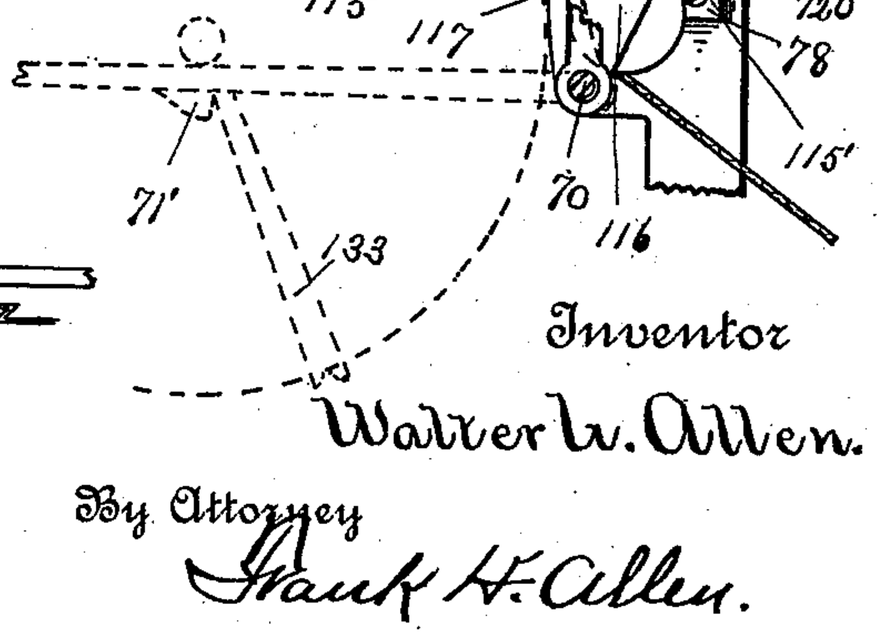


FIG-28-





Witnesses
Alonzo M. Luther
Allen Tenny

Inventor
Walter L. Allen.

By Attorney
Frank H. Allen.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 11 Sheets—Sheet 11.

W. L. ALLEN.

MACHINE FOR FOLDING OR PLAITING PAPER.

No. 519,465. Patented May 8, 1894.

Fig. 25.

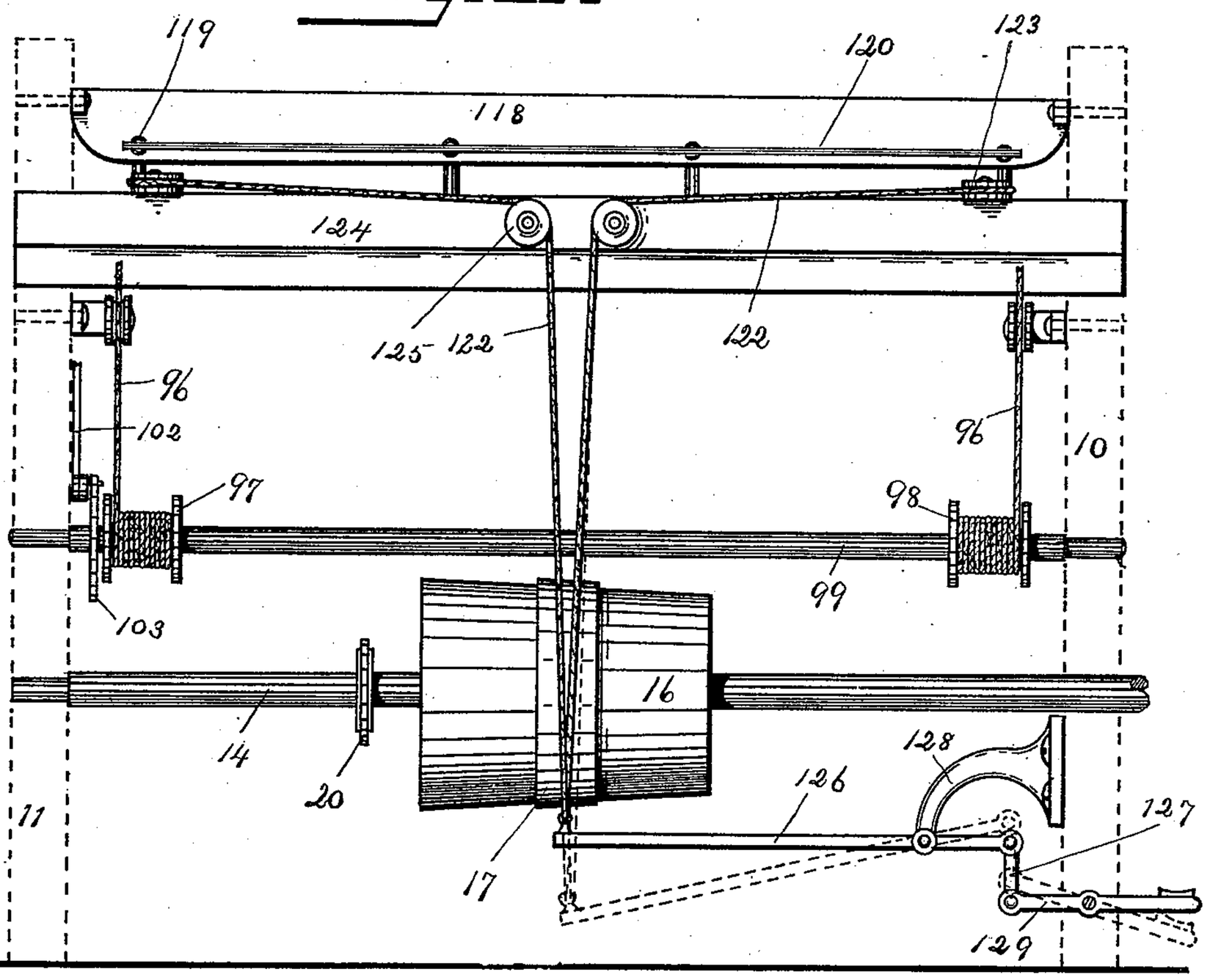


Fig. 29.

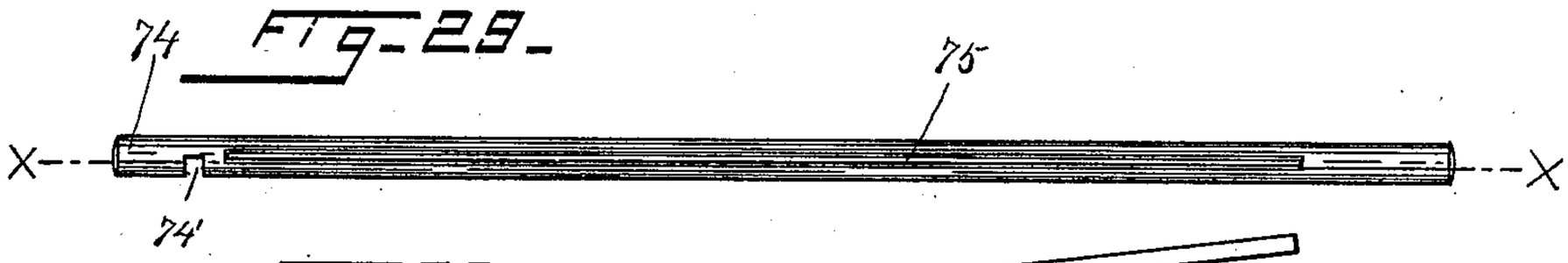


Fig. 30.

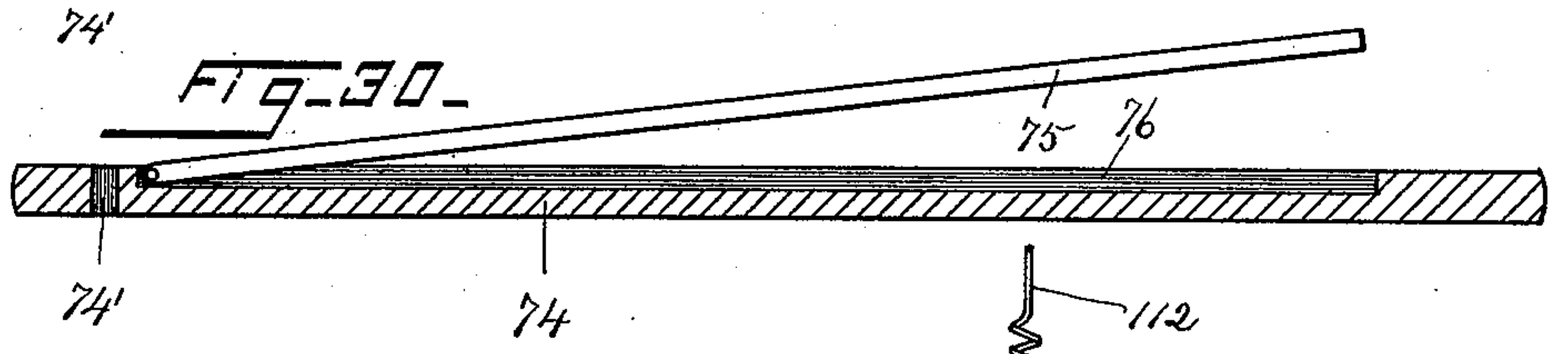
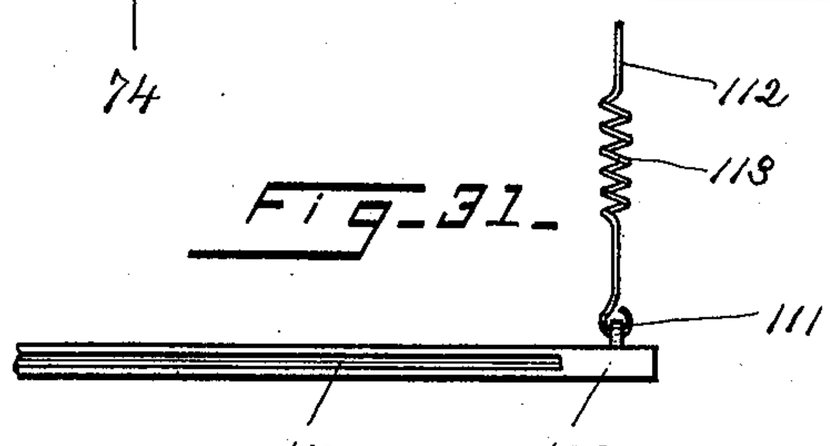


Fig. 31.



Witnesses
Alonzo W. Luther.
Allen Tenny.

Inventor
Walter W. Allen.
By Attorney
Frank H. Allen.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WALTER L. ALLEN, OF NORWICH, CONNECTICUT, ASSIGNOR OF TWO-THIRDS TO FRANK W. BROWNING, OF SAME PLACE.

MACHINE FOR FOLDING OR PLAITING PAPER.

SPECIFICATION forming part of Letters Patent No. 519,465, dated May 8, 1894.

Application filed September 8, 1893. Serial No. 485,124. (No model.)

To all whom it may concern:

Be it known that I, WALTER L. ALLEN, a citizen of the United States, residing at Norwich, New London county, State of Connecticut, have invented certain new and useful Improvements in Machines for Folding or Plaiting Paper, which improvements are fully set forth and described in the following specification, reference being had to the accompanying eleven sheets of drawings.

This invention relates to mechanism for automatically producing folded or plaited paper of the kind commonly used as carpet lining, bottle packing, &c., and substantially like that described in Patent No. 379,571, issued March 20, 1888.

The object of said invention is to provide machinery that shall be more simple than that now in use and which will allow a continuous forward movement of the plaited material, during its passage through the machine, instead of an intermittent movement, as in machines now most commonly used.

My improved machine is constructed to receive one or more webs of paper which, being fed into and through said machine, is delivered plaited, pasted, and rolled up ready for shipping. In said machine are embodied several important mechanisms which, as they successively act upon the paper passed therethrough, perform distinct operations and, working in harmony, serve together to produce the finished product. These various mechanisms are fully illustrated in the annexed drawings and described in the following specification. Said mechanisms, briefly described, consist, first:—of cutting knives between which the strips of paper from which the completed product is to be produced, are first introduced. These knives serve to trim the ragged or otherwise imperfect edges of said paper and reduce it to a uniform width, thereby adding materially to the appearance of the completed product. The paper from which the product is manufactured may be fed into the machine in any practicable manner but, preferably, from rolls revolving on spindles hung in suitable bearings adjacent to the machine proper. Second:—a system of forming or crimping dies, designed to take said paper, after it passes the above mentioned trimming knives, and to crimp the same into a form or shape hereinafter fully described. Third:—means for conveying said crimped or folded paper through the machine to bring the same into contact with certain press rollers and pasting mechanism, leaving the completed product in condition to be formed into rolls of desired size. Fourth:—the just mentioned press rollers, which receive the crimped paper from the forming dies and press the same firmly together. Fifth:—pasting mechanism to, and over, which the folded paper is carried by the conveying mechanism and which deposits on the under side of said folded paper one or more continuous narrow lines of paste. Sixth:—mechanism for placing on the under side of the folded paper one or more strips of paper, these strips being equal in number to the lines of paste previously placed on the under side of the folded paper by means of the above mentioned pasting mechanism; the conveying mechanism meanwhile carrying said pasted paper forward to receive the retaining strips, which strips, after becoming thoroughly adhered to the crimped paper, serve to prevent the paper from departing from its crimped or plaited form. Seventh:—mechanism for causing the now completed product to form into a roll of desired size for convenience in handling and shipping and eighth:—means for severing said completed roll, thus completing the various operations necessary to produce a roll of desired size of the said folded or crimped paper and leaving the said roll free to be removed from the machine.

In connection with this specification, and to assist in explaining my invention, I have provided the accompanying drawings.

In order to illustrate in a proper manner the various elements of my machine I have found it advisable not to confine the drawings to a single scale but, for the purpose of better illustrating some of the parts, to follow these several scales: viz:—Figures 1, 2, 3, 4, 5, 11, 12, 18, 19, 20, 20ª, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31 and 32 being one eighth size. Figs. 14, 15, 16, and 17 are one sixth size. Figs. 6, 7, 8, 9, 10 and 22 are one fourth size. Fig. 13 is one half size and Fig. 17ª full size.

In these drawings, Figs. 1 and 2 are elevations taken from the opposite sides of my ma-

chine. Fig. 3 is an elevation of the same looking toward its delivery end showing in position therein a roll of crimped paper nearly completed. Fig. 4 is a plan view of the lower portion of my machine showing the means provided for driving the various mechanisms of the same. Fig. 5 is a plan view of a portion of that end of the machine into which the paper is fed, said view showing the cutters, forming dies and press rolls as well as a portion of the hereinafter described belt conveyer. Fig. 6 is a sectional view taken just inside the side frame, on line *x*—*x* of Fig. 5, showing clearly the manner in which the cutters are driven, and how the forming dies are geared together, as hereinafter described; said view shows also the ends of the press rollers and a portion of the belt conveyers, as well as two idle guide rolls to be referred to below. Fig. 7 is a view similar to Fig. 6 (reversed) taken on line *y*—*y* of Fig. 5 and shows the opposite ends of said cutters, forming-dies, press rolls and idle rolls referred to in the description of Fig. 6, also the manner in which the cutters are geared together to secure their revolution at a uniform speed and also the gears by means of which the press rollers are caused to revolve in unison. Said view further explains the manner in which the forming dies are driven. Fig. 8 is a sectional view taken on line *z*—*z* of Fig. 5. Figs. 9 and 10 are transverse sectional views of one of the forming-dies and press-rollers, respectively. Fig. 11 is a view of the edge-trimming cutters looking toward the end of my machine at which the paper is introduced and shows the paper as passing into the machine, its edges being meanwhile trimmed by the cutters, as will be clearly seen by reference to the said figure. Fig. 12 is a sectional view of an end of the lower cutter. Fig. 13 is a cross sectional view of the crimping dies and press-rolls showing the paper in the process of being crimped and pressed into proper shape. Figs. 14 and 15 are, respectively, elevation and plan views of the upper belt, forming a portion of the conveyer and Figs. 16 and 17 are similar views of the lower belt also forming portions of said conveyer. Fig. 17ª is a view of a short piece of spiral belting which, in my machine, I use in preference to the rope belting illustrated in the drawings, the rope belting being here shown for the reason that it may be more easily illustrated. Fig. 18 is a side elevation of the paste pan, part of the shell being broken away to expose to view its interior. Fig. 19 is a central, sectional view of the delivery end of my machine. Fig. 20 is an elevation of two certain boxes forming part of the mechanism employed in reeling up the product of the machine as fast as completed. Fig. 20ª is a plan view of the lower of said boxes. Fig. 21 is a view taken just inside the side frame 11, and illustrates a portion of the said reeling up mechanism. Fig. 22 is a view of a certain escapement device also forming a part of the reeling up mechanism. Fig. 23 is a plan view of the delivery end of my machine and illustrates the cutting-off mechanism for severing the completed roll of paper from that remaining in the machine. Fig. 24 is a vertical, sectional view taken on line *x*—*x* of Fig. 23. Fig. 25 shows an elevation (from the delivery end of the machine) of the cutting mechanism of Fig. 23 and also of the escapement device referred to in Fig. 22. Figs. 26, 27 and 28 illustrate the progressive steps of raising, cutting off and delivering from the machine the completed roll. Fig. 29 is a plan view of the spindle on which I preferably wind the roll of finished fabric and Fig. 30 is a sectional view of said spindle taken on line *x*—*x* of the said Fig. 29. Fig. 31 is a view of one end of a peculiarly constructed bar necessary for use during the process of cutting off the roll from the product left in the machine and in removing said roll from the machine. Fig. 32 shows end and edge views of one of the rolls into which the retaining strip is wound and of its axial spindle. Fig. 33 is a perspective view of the completed product.

Referring to the drawings, the reference numbers 10 and 11 indicate the side frames of my machine, in the lower portion of which frames is journaled the main shaft 12, on the end of which main shaft is located the driving pulley 13; said pulley being quickly connected or disconnected from the main shaft by means of an ordinary friction clutch.

Located somewhat to the left (as seen in in Figs. 1, and 4) of driving shaft 12, and also journaled in the side frames 10 and 11, is a shaft 14. On the shaft 12, about midway the frames 10 and 11, is located a cone pulley 15 and in line with said pulley, on the shaft 14, is a similar pulley 16, these pulleys being connected by means of belt 17 (see Fig. 4). Motion therefore from the shaft 12 will be imparted to shaft 14 through the described cone pulleys and belt. On the shaft 12, in addition to the cone pulley 15, are located adjacent to the frames 10 and 11, two sprocket wheels 18 and 19 and on shaft 14 near cone 16, is located a sprocket wheel 20. The shaft 14 extends somewhat beyond its bearings in frame 10 and bears outside said frame a small sprocket wheel 21. From the shafts 12 and 14, through the sprockets 18, 19, 20 and 21, motion is imparted to the several mechanisms of my machine, as hereinafter explained.

Journaled between frames 10—11, in the upper right hand portion of my machine, as seen in Fig. 1, and extending almost from frame to frame, are what I term forming dies 22 and 23 (see especially Figs. 5, 7, 8, 9 and 13). These forming dies are made substantially as long rollers having upon their circumferential surfaces a number of longitudinal ribs, which, when the two forming dies are properly assembled, relative to each other, interlock substantially as gear teeth, as illustrated in Figs. 8 and 13. Said ribs however are not designed as a means of transmitting

motion from one die to the other but are solely for use in crimping the paper.

On the ends of the journals of the dies 22 and 23, just inside frame 10, are meshing gears 24 which gears being of equal size cause the dies to revolve together at a uniform speed (see Figs. 1, 5 and 6). On the end of the journal of die 22, opposite that on which is the gear 24, is located a sprocket wheel 25, connected by chain 26 to the sprocket wheel 19 located on shaft 12. Any movement therefore of shaft 12 will cause motion to be imparted from its sprocket wheel 19, through chain 26, to the sprocket wheel 25 of the forming dies 22. These forming dies, being geared together by gears 24 as above mentioned, will, consequently, be set in operation. The paper to be operated upon is fed to these forming dies and, as it passes between them, is crimped as shown in Fig. 8. From the forming dies the crimped paper passes through the machine to have performed thereon the operations of pressing and pasting and to receive its retaining strips of paper. To thus carry the paper through the machine I have provided two systems of belting, between which the paper is held and by which it is carried forward through the machine, one of said systems bearing against the upper and the other against the lower side of the folded paper.

The construction of the upper system is as follows: Somewhat in the rear of the forming dies 22, and 23, and near the top of the machine frames, is journaled between said frames a roller 27 and near the opposite (front) end of the machine is located a similar roller 28. These rollers 27 and 28 have cut therein circumferential grooves to receive belts which are to run in connection with said rollers, these grooves being of such depth that the belts, when in position therein, are just flush with the circumference of said rollers. As illustrated in Figs. 14 and 15, the rollers are provided with a number of these grooves, arranged at stated distances apart. Instead of providing several separate small belts to run in connection therewith I preferably provide one continuous belt 29 passing around and around the rollers 27 and 28 as illustrated in said Fig. 15. It will be observed that this belt is so passed from roller 27 to 28 that that portion of the same which is to bear against the upper side of the paper always travels in a direction parallel to the inner face of the side frames of the machine; consequently, as but one belt is used, that portion traveling back from roller 28 to 27 must of necessity travel obliquely, or at an angle, to that part of the belt traveling from roller 27 to 28. The two ends of the belt are properly connected and said belt passes around idle pulleys 30 located on a cross rod 31 extending from frame to frame, the exact construction being most clearly seen and best understood by reference to Fig. 15. The journals of rollers 27 and 28 extend somewhat through frame 11 and bear respectively upon their ends sprockets 32 and 33 (Fig. 2). A driving chain 34, acting in connection with said sprockets, imparts motion thereto, and drives the endless belt 29. This driving chain 34 receives motion from the press-roller mechanism above referred to and, in addition to driving the belt 29, drives also the reeling up mechanism of my machine described below.

Having now described the construction of the upper belt 29, forming a part of my conveying apparatus, I will proceed to describe the lower belt, which acts upon the lower side of the crimped paper. Directly below the roller 27 is a similar roller 35 and at the extreme opposite end of the machine, on a small projection of the machine frame, is another roller 36, these rollers 35 and 36 being provided to support and drive a belt 38 the same in construction as the belt 29. That portion of the belt 38 passing from roller 35 to 36 travels directly parallel with that portion of belt 29 passing from roller 27 to 28 and consequently in a direction parallel to the general movement of the paper. After passing over roller 36 the belt 38, instead of returning immediately to roller 35, is carried down around another roller 37 of the same class, located, as shown in the drawings, about midway the floor and the top of the machine frames. The belt 38 is thus carried down to allow for the introduction into the machine, at the proper place, of the pasting mechanism hereinafter described. From roll 37 the belt 38 travels directly back to roll 35. A single belt is used, as in the case of belt 29, and the same is caused to travel from roller 36 around roller 37 to roller 35 at an angle, as seen in Fig. 17, said belt passing thence around pulleys 39 on a cross rod 40 similar to the pulleys 30 on rod 31. By referring to Figs. 16 and 17 the exact arrangement of belt 38 may be at once seen and understood.

Motion is imparted to the belt 38 as follows:—The rolls 36 and 37 extend somewhat beyond the frame 10 and bear upon their respective ends sprocket wheels 41 and 42 which sprockets are caused to revolve by a driving chain 43, actuated by the sprocket wheel 21 of shaft 14 and receives motion therefrom (Fig. 1). In addition to driving the sprockets 41 and 42 said chain also drives the press rolls. Should motion be given to the shaft 14 it will be seen that its sprocket 21, through chain 43, will cause to be set in motion belt 38 as well as the press rollers. The above system of belting does away entirely with the necessity of adjusting a large number of small belts in order to take up any slack in the same; there being but one joint in each system of belting. I preferably use spiral spring belting of the kind illustrated at 17ª thereby providing a belt which by reason of its springy nature takes care of its own slack and thus reduces to a minimum all labor in connection with the care of this part of the machine. After the paper has been crimped by the forming dies and compressed

in some degree into the desired shape by the belts as explained it is caused to pass between two press-rollers 44 and 45 journaled between frames 10 and 11 and situated a little to the left (as seen in Figs. 5, 6 and 8) of the forming dies. These press rollers have circumferential grooves 46 cut therein to receive the belts 29 and 38 (Figs. 6, 8 and 10) thus leaving the surface of said rollers free to press tightly the paper, which is fed forward between them by said belts. These rollers are set sufficiently close to compress to some extent the paper previously folded and thus help it to maintain its shape. Said rollers are connected by means of gears 47 located on their journals just inside frame 11 (Figs. 5 and 7) thus causing them at all times to revolve together. The journal of the lower roll 45 extends through the frame 10 and bears upon its outer end a sprocket wheel 48 which sprocket is driven by the chain 43 above referred to. The journal of the upper roll 44 similarly extends through frame 11 and bears upon its outer end a sprocket wheel 49 said wheel serving to drive the chain 34 above referred to, which chain drives the belt 29 as explained and the reeling up mechanism.

It has already been explained that the rolls 44 and 45 are connected by means of gear wheels 47. The following train of motion all imparted from sprocket wheel 21 may now be readily followed. When shaft 14 is caused to revolve its sprocket wheel 21 at once sets in motion chain 43 which in turn causes sprockets 41 and 42 and their respective rollers 36 and 37 to revolve, consequently setting belt 38 traveling around its rollers 35, 36 and 37. The chain 43 also sets in motion the sprocket 48 on the journal of press roller 45 (Fig. 1) and as rollers 44 and 45 are connected by gears 47, as above explained, both are simultaneously set in revolution. The motion of roller 44 at once causes the sprocket 49, fixed upon its journal, to also revolve and said sprocket 49 imparts motion to the chain 34, which chain is in contact with the sprocket wheel 49, and as a consequence of the movement of said chain, the sprockets 32 and 33 of rolls 27 and 28, respectively, are both driven (Fig. 2), thus causing belt 29 to travel around its rolls 27 and 28. To insure the driving of chain 34 by sprocket 49 an idler 49′ is provided which causes the chain 34 to engage sprocket 49 for a greater distance than it otherwise would. Chain tighteners 34′ and 43′ are provided for tightening respectively chains 34 and 43.

After leaving the press-rolls the paper is fed along between belts 29 and 38 to the pasting mechanism preparatory to receiving its retaining strip or strips of paper or cloth. This pasting mechanism consists of a long, and preferably semi-circular, tank or pan 50, end views of which may be seen in Figs. 1 and 2, an elevation partly broken away to expose its interior parts in Fig. 18, and a sectional view in Fig. 19. This paste pan or tank is placed in the machine directly under that portion of the belt 38 which carries the folded paper through the machine (Fig. 19) said belt being carried down around roller 37 to permit of the introduction of the pan into the machine as already explained. I preferably provide ways 51 extending from frame to frame, and also form ribs 52 on the upper edge of the pan throughout its entire length, thereby allowing said pan to be readily slid into the machine and supported as will be readily understood by reference to Fig. 2 or 19. Journaled between or in the ends of pan 50 is a shaft 53 bearing thereon as many paste wheels 54 as it is desired to place lines of paste upon the folded paper (here shown as four in number). The shaft 53, which bears these paste wheels, should turn freely in its bearings in the ends of the paste can, and the paste wheels 54 should be so located on said shaft as to extend upward at the proper points between the sections of belt 38 (see Fig. 18). As the paper is carried forward by belts 29 and 38 into frictional contact with the circumference of paste wheels 54 the latter are caused to revolve, and should paste have been previously placed in pan 50 the circumference of wheels 54, as they revolve will leave at their point of contact with the paper continuous lines of paste on the under side of the latter. To prevent said paste from being left in too large quantities on the paper I have provided scrapers 55 extending from the inner side of the paste pan and bearing lightly upon or nearly touching, the circumference of paste wheels 54, so hung as to remove the bulk of the paste picked up by the paste wheels and thus preventing large and lumpy quantities from being deposited upon the surface of the paper. After depositing the lines of paste upon the plaited paper the next operation is to stick thereon the retaining strips of paper or cloth and the mechanism for doing this work may be best seen in Figs. 3 and 19. Connecting the frames 10 and 11, at the delivery end of the machine, is a cross frame 57, having secured to its underside, downwardly extending arms 58 which arms support, as here shown, four pairs of circular disks 59, the disks of each pair being sufficiently far apart to allow the insertion between them of a roll of the paper 60 into which the retaining strip has been previously wound (views of said retaining strip roll being seen in Fig. 32). Cut inward from the circumferential edge of these disks, to the centers thereof, are parallel slots 61 just wide enough to receive the shouldered down ends of the mandrel or spool 62 on which the roll is wound. When the rolls 60 are introduced between the pairs of disks 59 the ends of the spools rest in the slots 61 and serve to support the rolls between each pair of the disks. The cross frame 57 supports on each side of the center of the machine, journal boxes 63, in the lower portions of which is journaled a comparatively short shaft 64 bearing thereon (over each pair

of disks 59) a flanged pulley 65. This shaft 64 has located thereon a sprocket wheel 66 driven by a chain 67 from sprocket 20 on shaft 14. Journaled in boxes 63, above shaft 64, is another shaft 68 bearing pulleys 69 driven by frictional contact with the pulleys 65, or by the intervening strip of paper. This shaft 68 is adjustable in its bearings to allow the same to be readily raised to permit of the insertion between the pulleys 65 and 69 of the retaining strips (Figs. 3 and 19). When motion is imparted to the pulleys 65 and 69 the retaining strips between said pulleys are caused to unwind from their respective rolls 60 and from these pulleys or rolls 65 and 69 the strips are fed upward to the previously pasted paper; the above described mechanism being so timed as to feed the retaining strips at the same rate of speed as the paper is traveling forward through the machine. From the rolls 65—69 the strips pass upward to and partially around the roller 36 (Fig. 19) and meet the pasted paper on the top side of said roller directly beneath the center of a spindle 74, on which the product is wound, as fast as completed. The strips at once adhere to the pasted paper and prevent it from leaving its folded form. After the paper receives these retaining strips it is wound into rolls of the desired size (usually fifty yards) the mechanism for thus reeling up the same being most clearly seen in Figs. 1, 2, 3, 19 and 21. I have already referred to an extension located on the delivery end of each of the side frames 10—11, between which extensions the roller 36 is journaled. These extensions also provide bearings for a shaft 70 extending entirely across the delivery end of the machine (Fig. 3). Supported by this shaft 70, just inside each of the frames 10 and 11, are two levers 71; these levers being rigidly secured to shaft 70 so that any motion given to either of them will, through the shaft 70, impart similar motion to its companion. On the top of the frames 10 and 11 are rigidly secured by bolts, or in any other practicable manner, two smaller upright frames 72 and 73 respectively. It will be seen that the frames 72 and 73 are so formed that when they are properly secured in place on their respective frames 10 and 11, they are in vertical alignment with and form a perpendicular continuation of the delivery end of the machine frames 10 and 11. The described levers 71 are so constructed that, when they are in their upright position, their edges next the frames 72 and 73 are parallel with the described perpendicular edge of said frames and form, in connection therewith and with frames 10 and 11, suitable ways in which is arranged to travel as hereinafter described, the spindle, on which the plaited paper is wound as fast as it is finished. The spindle is illustrated in Figs. 29 and 30 and is denoted by the reference number 74. It is necessary, or at all events desirable, to provide in connection with said spindle some means by which the end of the paper to be wound thereon may be secured thereto so that when the spindle is caused to revolve the paper will at once commence to wind thereon. To thus secure the paper to the spindle, the latter is provided with a blade 75 hinged near one end and arranged to lie in a groove 76. Should the end of the paper be placed over said groove and the blade forced down into the groove, the paper will also be forced into and held tightly therein. Assuming now that the paper in the machine has been fed forward until the point is reached at which it is necessary to reel up the same; the spindle 74 is introduced between the vertical ways formed, as above explained, by the levers 71 and the machine frames, and the end of the paper is secured to said spindle in the manner also just explained. When the spindle is thus in position its axial center is directly over the axial center of the roller 36, and said spindle 74 is supported by and upon said roller, and when the spindle is caused to revolve, as next explained, the paper will commence to wind thereon. As the roll begins to grow in size, the spindle will at once commence to travel upward in its ways increasing the distance between the spindle and roller 36, and this upward movement of the spindle continues so long as finished stock is being wound upon the roll. The spindle is shown in Figs. 1 and 2 in its lowest position and in Figs. 3 and 19 in approximately its highest position, the roll being indicated by dotted lines in Fig. 19.

To cause spindle 74 to revolve, and also to wind its roll tightly thereon, I have provided the following described mechanism: Located on the inner sides of the upper frames 72 and 73 are brackets 77 and directly beneath said brackets, on the inner sides of frames 10 and 11, are similar brackets 78. Each pair of brackets 77—78 is arranged to support rods 79 on each of which rods is arranged to slide a box 80; also beneath the same a box 81 for a purpose hereinafter described. Supported by and between boxes 80, in suitable bosses 82, is a rod 83 most clearly shown in Fig. 3 and it will be noticed by reference to Fig. 19 that the axial center of said rod is directly over the center of the spindle 74 and that of the roller 36. Hinged to each end of the rod 83, just inside the boxes 80, is a pair of arms 84—85 which may swing freely from said rod 83. Supported by and between the arms 84 of each pair is a rod 86 and by and between the arms 85 of each pair a rod 87 (Figs. 3, 19 and 21). The rods 86 and 87 form shafts for a number of loose pulleys, each of said rods being here shown as provided with three such pulleys, indicated by reference number 88. Journaled near the top of frames 72 and 73, and extending across the machine from frame to frame, are two shafts 89 and 90, that respectively bear fixed pulleys 92 and 93; those on the lower shaft 89 being preferably provided with flanges, and these pulleys 92—93 correspond in number and position with the

pulleys 88 on shafts 86 and 87. The end of lower shaft 89, supported by frame 73, extends somewhat beyond its bearings in said frame and supports upon its end a sprocket wheel 94 which receives motion from the already described sprocket chain 34. Shaft 90 is driven by frictional contact of its pulleys 93 with those 92 of shaft 89, adjustable bearings being preferably provided for this shaft 90 to permit of the same being raised somewhat when it is desired to place between the pulleys 92—93 a belt as next explained. Passing around, and between, each pair of pulleys 92—93 is a belt 95 which belt also drives one of the pulleys 88 on each shaft 86—87. From this it will be seen that each belt 95 comes in contact with four pulleys, viz: 92 and 93 and two of the pulleys 88 (see Figs. 3 and 19), and that motion will be imparted to said belts 95 by the pulleys 92 when the latter are set in revolution by their shaft 89. It will also be understood that when the boxes 80 are caused to travel, either upward or downward, on their respective rods 79, they will carry with them all those parts suspended on the rod 83 and supported by and between said boxes 80, viz: two pairs of arms 84—85, the rods 86 and 87, supported by the free ends of said arms, and the pulleys 88 located on rods 86—87.

All the parts necessary for the revolving of the spindle having now been described we will assume that the said spindle has been placed in its ways, in proper position to be wound, and that the end of the paper to be thereon wound has been secured thereto. The boxes 80 are first lowered as explained until such a point is reached as will permit of the free ends of arms 84—85 being brought together until the pulleys 88 carried by rods 86 and 87 will bear on opposite sides of the spindle 74 (see dotted lines Figs. 1 and 2). It will be seen that just sufficient slack is provided in belt 95 so that when the pulleys 88 are in this, their lowest position, and bearing against either side of spindle 74, the slack of said belt may bear against and encircle that portion of the circumference of the spindle between the pulleys 88. Means hereinafter described are provided to cause the pulleys 88 to always bear with a considerable degree of pressure against spindle 74 or the roll wound thereon, and it will be readily seen that should motion be imparted to the belts 95 said belts, by their frictional contact with the spindle, will cause the same to revolve and thus to wind thereon the completed product as fast as the latter is delivered from the machine. As already explained, the spindle 74 rests on roller 36 and this roller, which is always in motion when the machine is in operation, will also, by friction, assist to cause the spindle and its load to revolve. As the revolving of spindle 74 is continued, the roll thereon must of necessity grow in size thus forcing apart the arms 84—85 while at the same time the spindle travels slowly upward in its ways. As the arms 84 are forced gradually apart it, of necessity, requires a greater length of the belt 95 to encircle that portion of the roll between the pulleys 88 bearing against the side of the roll, and to provide this additional portion of belt the boxes 80 are forced to travel slowly upward on the rods 79 thus reducing the distance between the pulleys 92—93 and the pulleys 88, consequently providing continually a small amount of slack which as fast as it is supplied is at once taken up between the pulleys 88 by the roll as it increases in size. As the roll continues to grow in size it will of course require a greater amount of power to revolve the same but this want is met by the fact that the larger the roll the greater is that portion of the belt encircling the same and lying between the pulleys 88 thus providing a greater amount of frictional power.

To cause the pulleys 88 to bear against the spindle 74, or its roll, with considerable pressure, the following mechanism is provided: Certain boxes 81 located beneath the boxes 80 and arranged to slide on the rods 79 have already been referred to. These boxes 81 are connected to boxes 80 by rods 81′ so that the boxes 80—81 always maintain the same position relative to each other. These boxes 81 contain score pulleys 95′ that form guides for cords 96, the upper portion of which may be formed in two sections and the ends of which are fastened to the arms 84—85 respectively. Somewhat below the boxes 81 the two sections of cord are united and, from boxes 81, cords 96 are guided to certain drums 97—98 located on each side of the machine on a shaft 99 journaled in the frames 10—11. It will be readily seen that as the respective cords 96 are paid out from or wound on the drums 97—98, the arms 84—85 will be allowed to open, or caused to close, as the case may be. These drums 97—98 are operated as follows to cause them to pay out cord to the arms 84—85 as the same is required by said arms: On the inner side of the frame 73 is a bar 100 (Fig. 19) hinged to and supported by two links 101 in such manner that said bar may swing slightly outward and upward, this bar 100, in connection with its links 101, presenting an appearance not unlike that of the well known parallel ruler. One edge of the bar 100, when the same is in its lowest position is just flush with that portion of the frame 73 which forms part of the vertical ways of the spindle 74. Bar 100 is provided with a spring 101′ or other suitable means, which may act with a constant tendency to force the same into the path of the spindle. The spindle 74 has cut near one end a notch 74′ (Fig. 29), so located thereon that when the spindle is properly placed in its ways the notch 74′ is coincident with the bar 100. At each revolution of the spindle 74 the bar 100 springs forward into the notch 74′, as seen in dotted lines in Fig. 21, but as the revolution of the spindle 74 is continued the bar 100 is

forced back again into the position shown in Fig. 19. The bar 100 is of sufficient length to be operated upon by the spindle when the same is in both its extreme highest and lowest positions in its ways. Secured to the lower end of the bar 100 is an extension of the same 102. As already described, at each outward movement of bar 100 said bar swings upward somewhat and of course carries with it the extension 102 which extension is connected with and operates a suitable escapement mechanism connected with the drums 97—98, thus allowing these drums to pay out to the arms 84—85 the proper amount of cord to permit the said arms to gradually swing open to accommodate themselves to the roll as the latter slowly increases in size.

The let off mechanism, as here illustrated and provided for use in connection with these drums, is as follows (see Fig. 22): Fixed on the end of shaft 99 near the frame 11 is a ratchet wheel 103. Hinged at 104, at the end of an arm 105 extending from the cross frame 57, is a lever 106. On the lever 106, on either side of its pivotal point 104 with rod 105, are located studs 107 and 108 which may engage the teeth of the ratchet 103. The extension 102 of rod 100 is so bent as to clear the cross frame 57 (Fig. 19) and its end is pivotally connected to the end of lever 106. When the lever 106 is drawn into the position indicated by dotted lines in Fig. 22, by the upward movement of rod 100 and its extension 102, the stud 107 will be raised from engagement with the teeth of the ratchet. The constant tendency of the cords 96 is to unwind from their drums caused by the forcing apart of the arms 84—85 by the roll. Therefore so soon as the stud 107 is removed from the ratchet the shaft 99, on which the drums are located, causes the ratchet disk 103 to at once move forward until its teeth bring up against the stud 108 (Fig. 22) and the ratchet will have then revolved one half tooth. When the lever 106 is again forced down the stud 108 is withdrawn from the teeth and the ratchet again starts forward until it engages and is checked by stud 107. It will thus be seen that through the described escapement mechanism at each complete revolution of spindle 74 the ratchet on the drum shaft 99 will move forward one tooth, the drums as a consequence being correspondingly rotated, thus paying out small quantities of cord from said drums to the rods 84—85 as the same is required by reason of the ever increasing roll.

The last operation to be performed by my machine upon the paper is to sever the roll from the paper still in the machine and to remove the completed roll from the machine. Before describing these operations in detail however, and the mechanisms for performing the same, it will be necessary to mention and describe the construction of a certain rod used in the performance of these operations. This rod 109 is preferably made of wood and is of a length somewhat greater than the width of the paper being used in the machine. A slot 110, extending almost throughout its entire length, is cut therein for a purpose to be hereinafter explained. A hook 111 is connected with each end of rod 109 by a wire or cord 112 a spiral spring 113 being located midway the hook and rod 109, one end of rod 109, and its connected parts being clearly shown in Fig. 31. On the inner sides of each of the frames 10—11, near the brackets 78, are hinged, on studs 114, lever-arms 115, their free ends resting upon and being actuated by cams 116 fixed upon shaft 70. When levers 71 are rocked, these cams are also caused to rock therewith as shown in Fig. 26. When the levers 71 are raised the cams 116, fixed on shaft 70, force the levers 115 into the position shown in Fig. 24 and when said levers 71 are lowered the lever arms 115, resting upon cams 116, assume the position of Fig. 26. Short arms 117 are also fixed upon shaft 70 next the cams for a purpose hereinafter explained. The necessary elements for placing the roll in proper position to be cut from that portion of the paper still in the machine having been now described I will describe the cutting off mechanism. Secured to the inner sides of the frames 10 and 11 on each side of the roller 28, and extending from frame to frame, are rods 118—118′ which are drilled to form bearings for a number of rods 119. To the ends of the rods 119 nearest the delivery end of the machine is secured a knife 120 preferably of the serrated form shown. This knife is located near the roll 36. The free ends of rods 119 are connected by springs 121 to the cross rod 31. These springs act with a tendency to pull the knife away from the roll but the rearward movement of the knife is limited by rod 118. Connected to the knife, or as here shown to its two outer rods 119, are cords 122. These cords lead around guide pulleys 123 located on the top of a cross rod 124 and from thence to guide pulleys 125 located near the vertical center of the machine on the said cross rod 124. From the pulleys 125 the cords lead to the end of a lever 126 (Fig. 25) to the end of which they are connected. It will be seen that the cords 122, connected to the rods 119, are on either side of belt 29 (running over roller 28) and consequently will not interfere in any way with the said belt. When the knife 120 is supported by a number of the rods 119, as in Fig. 23, it becomes necessary to groove the roller 28 so that said rods 119 will not come into conflict therewith. The lever 126, is seen in Figs. 3 and 25 and has secured to its inner end the cords 122. This lever 126 is shown as hung in a bracket 128 secured to frame 10 and the outer end of said lever is connected by a link to a lever 129 (hung in frame 10) whose free end extends outside the machine in a convenient position to be operated by the foot. Should said outer end be forced downward by the foot, as just mentioned, it

will be seen by reference to Figs. 3 and 25 that, through link 127, the free end of lever 126 will be forced into the position shown in dotted lines in Fig. 25 thus drawing with it cords 122 which running on the pulleys 123 and 125 draw forward knife 120. As soon as pressure is removed from lever 129 the springs 121 (connecting rods 119 with cross rod 31) cause the knife to at once resume the position shown in Fig. 23. Assuming now that the roll is completed, and that it is desired to sever the same from the paper still in the machine, the levers 71 are first lowered to the position shown in Fig. 26 and when said levers are thus lowered the roll is prevented from leaving its ways by the arms 84 and 85, supporting pulleys 88, which pulleys bear with considerable pressure against said roll, as already explained. The rocking of levers 71 also rocks the cams 116 located on the shaft 70, thus lowering the free ends of levers 115 to the position shown in Fig. 26. The rod 109 is then placed beneath the completed roll and the hooks 111 are secured to the spindle 74 on each side of said roll; the springs 113, located between the hooks 111 and rod 109, serving then to draw and hold rod 109 tightly against the roll. When the various parts are in the positions shown in Fig. 26 it will be seen that the free ends of levers 115 are directly beneath rod 109. The levers 71 are now again brought into their upright position consequently rocking shaft 70 and, the cams 116 engaging the under side of the free ends of levers 115, force said levers upward, carrying with them the rod 109 resting thereon. As above referred to, short arms 117 are located near each of the cams 116 which arms are also rocked by shaft 70. When shaft 70 is rocked the ends of these arms 117 come in contact with rod 109 and push it before them, thus causing the said rod 109 to slide upon levers 115.

It will now be understood that the various parts just described have assumed the positions shown in Fig. 27, in which figure a portion of lever 71 is broken away to expose clearly to view said parts. It will also be seen, by reference to said figure, that the complete roll has been elevated somewhat the escapement mechanism being released at the proper time to allow the drums 97 98 to pay out sufficient cord to allow for such elevation and it will also be noticed that the slot 110 in rod 109 is in alignment with the cutting knife 120. A latch 131 may be provided to lock one of the levers 71 with frames 72 and 73 thus preventing the rocking of shaft 70 and when the parts are thus in position it will be seen, by reference to Fig. 26, that the rod 109 is prevented from displacement in one direction by shoulders 115′ on each of the levers 115 and in the opposite direction by arms 117. The knife 120 is then moved forward entering slot 110 in rod 109 and thus completely severing the paper (Fig. 28). The levers 71 are now again lowered to the position shown in dotted lines in Fig. 27 thus allowing the now completed roll (the pressure of pulleys 88 having been removed from the same) to drop down upon the levers 71 the latter being supported on and between said levers by its spindle 74; the rod 109 during this time preventing the roll from unwinding. The rod and spindle may now be removed and the roll is ready for wrapping and shipping. To support the levers 71 when the completed roll is resting thereon I have hinged beneath said levers, on studs 132 projecting inward from the frames 10 and 11, levers 133 which act with a constant tendency (caused by springs 134 on said studs) to bear against the lower portion of the levers 71 (Figs. 1 and 2). When levers 71 are lowered they force outward the upper, free, ends of these levers 133 which continue to travel outward during the downward movement of levers 71 until their upper ends abut shoulders 71′ on the levers 71 which shoulders provide suitable stops against which the ends of levers 133 may rest. (See Fig. 27.)

I have already referred to cutting knives for trimming the edges of the strip or strips of paper fed into the machine and I will now proceed to describe them more fully. On the frames 10 and 11, near the rolls 27 and 35, are boxes 131′ in which are journaled shafts 132′ and 133′. Each of these shafts has located thereon circular cutting knives; those on the upper shaft 132′ being indicated by reference number 134′ and on the lower shaft by number 135. The knives 135 are secured fixedly on shaft 133′ at such distance apart as it is desired to have the width of all trimmed paper fed into the machine. The cutters 134′ are splined on shaft 132′ and are caused to bear against cutters 133′ by springs 135′ located between the cutters 134′ and collars 136 secured to shaft 132′. A roller 137 is loosely located between cutters 135 on shaft 133′. The shafts 132′ and 133′ are connected by gears 138 and the shaft 133′ has secured thereto, on the end opposite the gears 138, a sprocket wheel 139 driven by a chain 140 receiving motion from the sprocket 18 on shaft 12. Motion imparted to sprocket 18 by its shaft 12 will, through its chain 140, impart motion to shaft 133′ and this shaft 133′, through gears 138, will impart motion to shaft 132′ thus causing the two sets of cutters 134′ and 135 to revolve.

I have already described briefly the dies 22 and 23 which fold or crimp the paper as it is fed between the same, but I wish now to describe more fully the manner in which the crimped paper is flattened and formed into the desired shape. From the dies 22 and 23 the paper passes to the conveying belts as explained, and the arrangement of these belts where the paper is introduced between the same forms an important element in shaping up the paper. It will be noticed by reference to Figs. 6, 7 and 8 that the roller 27 is located sufficiently high to carry that portion of belt 29 leading from the top of roller 28 to the top

of roller 27, above and clear of the before mentioned press-rollers and forming-dies, as also clearly shown in Fig. 5. It will thus be seen that that portion of the belt 29 leading from the bottom of roller 27 to the under side of upper pressure roller 44 travels at an angle to the horizontal direction taken by that portion of the same belt leading from the under side of the upper pressure roller 44 to the under side of the roller 28. A corresponding angle is also made in that portion of belt 38 leading from roller 35 to the upper side of pressure roller 45. This angle may be somewhat increased by placing between the pressure rollers and forming dies two small rollers 141 and 142 driven by frictional contact with the belts 29 and 38. These rollers are adjustably supported in brackets 143 and 144 located on the inner side of the frames 10 and 11 (see Figs. 5, 6 and 7). When rollers 141 and 142 are forced together, by means of their adjusting screws 145, they will force before them the belts 29 and 38 bearing respectively against the said rollers. Fig. 6 shows the rolls 141 and 142 forced together slightly to form an angle in the belts between the rollers and the dies 22 and 23, while Fig. 13 shows the rollers 141 and 142 forced apart to allow that portion of the belts forming the sides of said angle to lead directly from the forming dies to the press rollers. I preferably provide the rollers 141 and 142 although the same are not absolutely necessary to the successful working of the machine.

It will be seen by reference to Figs. 1, 4 and 7 that the sprocket 19 on shaft 12 which drives, through chain 26, the forming dies is somewhat larger than the sprocket 21 on shaft 14 which, through chain 43, drives the belt 38; the belt 29 and the pressure rollers being timed to travel at the same rate of speed as the belt 38. From this it will be seen that the dies 22 and 23 will travel considerably faster than the belts 29 and 38. Referring now particularly to Fig. 13 it will be seen that the paper fed to forming dies 22 and 23 will first be formed by said dies into the shape shown; and from these dies the paper is at once carried forward by said belts. As the space between the belts grows less the crimped paper is crowded together by said belts and is flattened and compressed into the desired shape. The flattened paper is then carried forward between the pressure rollers which press the same together, thus helping it to retain its folded and flattened shape, and from the pressure rolls the paper is carried forward through the machine to have performed thereon the various other operations necessary to its completion.

The friction clutch driving pulley 13 is provided with a suitable operating lever 13′ shown in Figs. 1 and 3.

Assuming now that we have a machine constructed as described, with the parts properly assembled and that the machine is in readiness to be started; the operating lever 13′ is grasped and shifted to cause the driving wheel to impart motion to the various mechanisms of my machine. Shaft 12 rotated by its driving pulley 13 will, by its sprocket wheel 18, located thereon, drive through its sprocket chain the cutting mechanism and by sprocket wheel 19, through its sprocket chain, drive the forming dies. The cone pulley 15 also located on shaft 12 will, through belt 17, drive its companion cone 16 on shaft 14. Shaft 14 by its sprocket wheel 21 located thereon will, through sprocket chain 43, drive the pressure rolls and the lower conveying belt. The lower press roller being geared to the upper companion roller will, by the sprocket 49 on the shaft of said upper roller, through the sprocket chain 34, drive the upper belt and the reeling up mechanism. The sprocket wheel 20 on the shaft 14 will, through its chain, drive the retaining strip mechanism. The various mechanisms of my machine being now in motion one or more strips of paper (usually three in number and wound into large rolls supported by a rack suitably located in relation to the machine) are fed between the cutting knives and into the machine, where the various operations now fully described of crimping, pressing, pasting, receiving retaining strips, reeling up and cutting off are quickly performed and the completed roll removed from the machine.

My machine as a whole is small in size, very simple in its construction and may be cheaply produced in comparison with machines now in existence for doing this class of work.

Having described my invention, I claim—

1. In a plaiting machine, in combination, longitudinally fluted crimping dies, and conveyer belts leading from the delivery side thereof; said belts being so guided that they gradually approach each other and pressure rolls adapted to compress the crimped paper as it leaves said dies; all being substantially as described.

2. In combination with a pair of meshing crimping dies, edge trimming cutters operating in advance of said dies, and conveyer belts as set forth extending from a point between said edge trimmers and dies to a point beyond said dies, and rolls for forcing together the said belts, as and for the purpose specified.

3. In combination with a pair of meshing crimping dies, edge trimming cutters operating in advance of said dies, conveyer belts as set forth rolls 141—142 located respectively above and below said belts, means for adjusting said rolls and, pressure rolls in the rear of said dies, substantially as and for the purpose specified.

4. In combination with a pair of meshing crimping dies, and pressure rolls operating in the rear thereof, a conveyer consisting of upper and lower endless belts as set forth; the said dies and pressure rolls being formed

with circumferential grooves for the passage of said belts, whereby the upper dies and rolls may be forced into close engagement with the companion, or lower, dies and rolls for the object stated.

5. In combination with a pair of meshing crimping dies, conveyer belts operating immediately in the rear of said dies, to partially flatten the crimped paper as set forth, pressure rolls operating in succession to receive and compress the partially flattened paper, and pasting mechanism consisting of a paste-pan having revolubly mounted therein rolls whose circumferential faces lie in the path of the plaited product of the machine; substantially as and for the purpose specified.

6. In combination with a pair of meshing crimping dies, conveyer belts operating in the rear of said dies to gradually flatten the crimped paper as set forth, pasting mechanism consisting of a pan having journaled therein rolls whose circumferential faces are in the path of the plaited product of the machine, and axial supports for reels of binding strips corresponding in number and position with said paste rolls, all substantially as specified.

7. In combination with mechanisms for crimping, pasting and binding a web of paper, a roll upon which the finished product is wound, vertical ways between which said roll is supported one of said ways being of lever form, adapted to be lowered to release the roll and its load and a roll 36 located immediately beneath the said roll and adapted to revolve the latter and the finished product wound thereon, substantially as and for the purpose specified.

8. In combination with mechanisms for crimping, pasting and binding a web of paper, and mechanism as set forth for rolling up the finished product, frictionally acting belts 95 engaging portions of the circumference of said roll, said belts being supported, and guided, by fixed rolls at the top of the machine and by pulleys 88 journaled in the free ends of arms mounted to slide vertically, as described.

9. In combination with mechanism for rolling up a web of plaited paper, frictionally acting belts engaging portions of said roll of paper, said belts being supported and guided by fixed rolls at the top of the machine and by pulleys 88 journaled in the free ends of arms mounted to slide vertically and spread laterally, mechanism for controlling the lateral movements of said arms consisting of cords having one end attached to said arms and the other ends coiled upon drums as set forth, and mechanism substantially as described for releasing said cord from the drums at stated times, for the purpose specified.

10. In combination with a pair of meshing crimping dies, pressure rolls, conveyer belts, pasting and binding mechanisms and mechanism for forming the finished product into a marketable roll as described, a grooved rod 109, devices for securing said bar to the roll of paper, a knife coincident with the groove of said bar, and mechanism for moving said knife; all being substantially as described.

11. In a plaiting machine, in combination with a spindle 74 on which the finished product may be rolled, vertical ways for said roll, one of said ways 71 being of lever form, adapted to be dropped to a horizontal position, a rod 109 and means for suspending the same from the spindle 74, and arms 117 connected and movable with said lever and adapted to engage the rod 109 and force it underneath the roll of finished paper when lever 71 is raised to a vertical position; all being substantially as specified.

12. In combination with a spindle 74 on which a web of plaited paper may be rolled, clamping rod 109 having secured to each end a spring terminating with a hook adapted to embrace the said roll 74, in the manner, and for the purpose specified.

WALTER L. ALLEN.

Witnesses:
ALONZO M. LUTHER,
ALLEN TERMY.