No. 612,829. Patented Oct. 25, 1898.

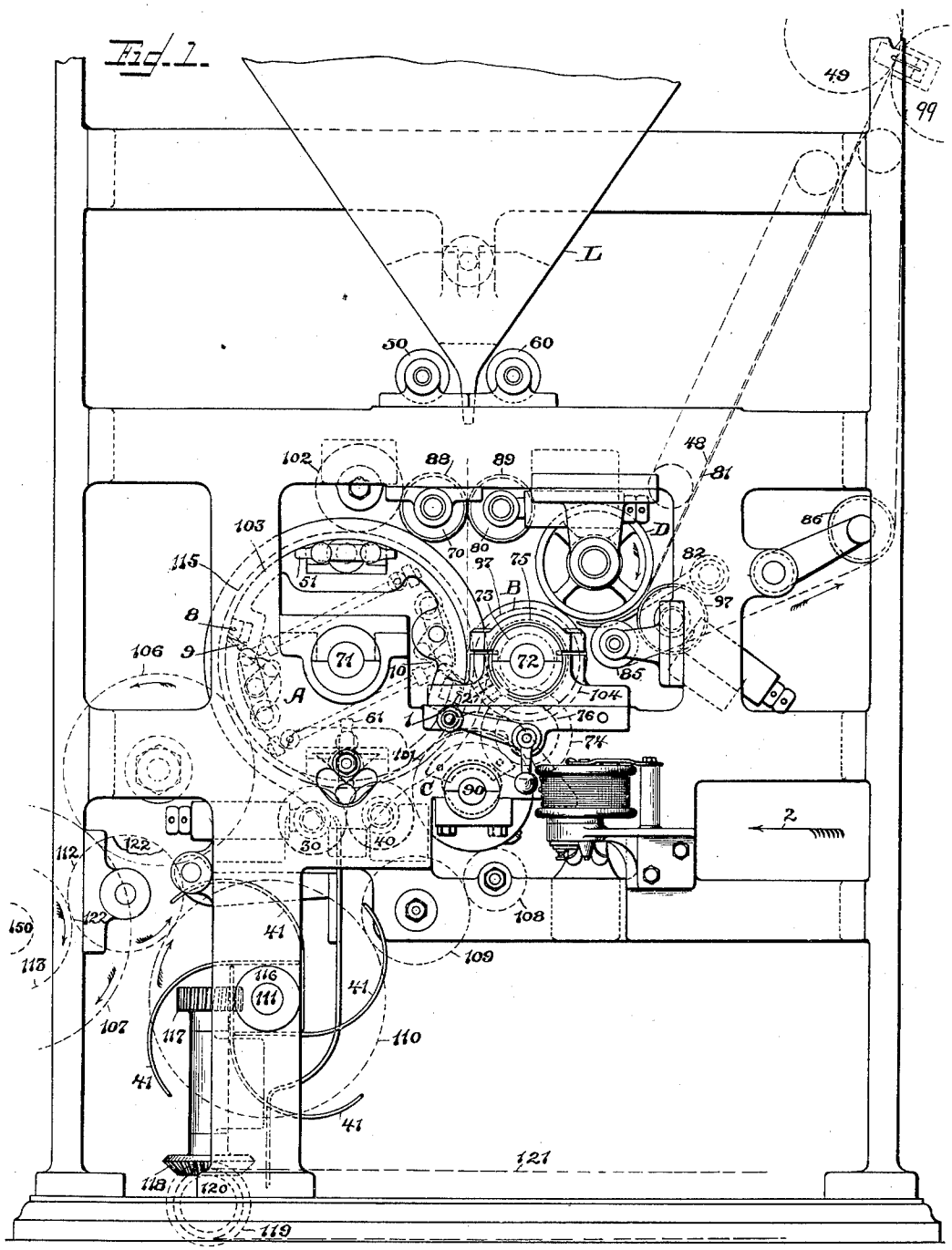
L. C. CROWELL.

NEWSPAPER FOLDING AND STAPLING MACHINE.

(Application filed Oct. 21, 1895.)

(No Model.) 12 Sheets—Sheet 1.

Fig. 1.



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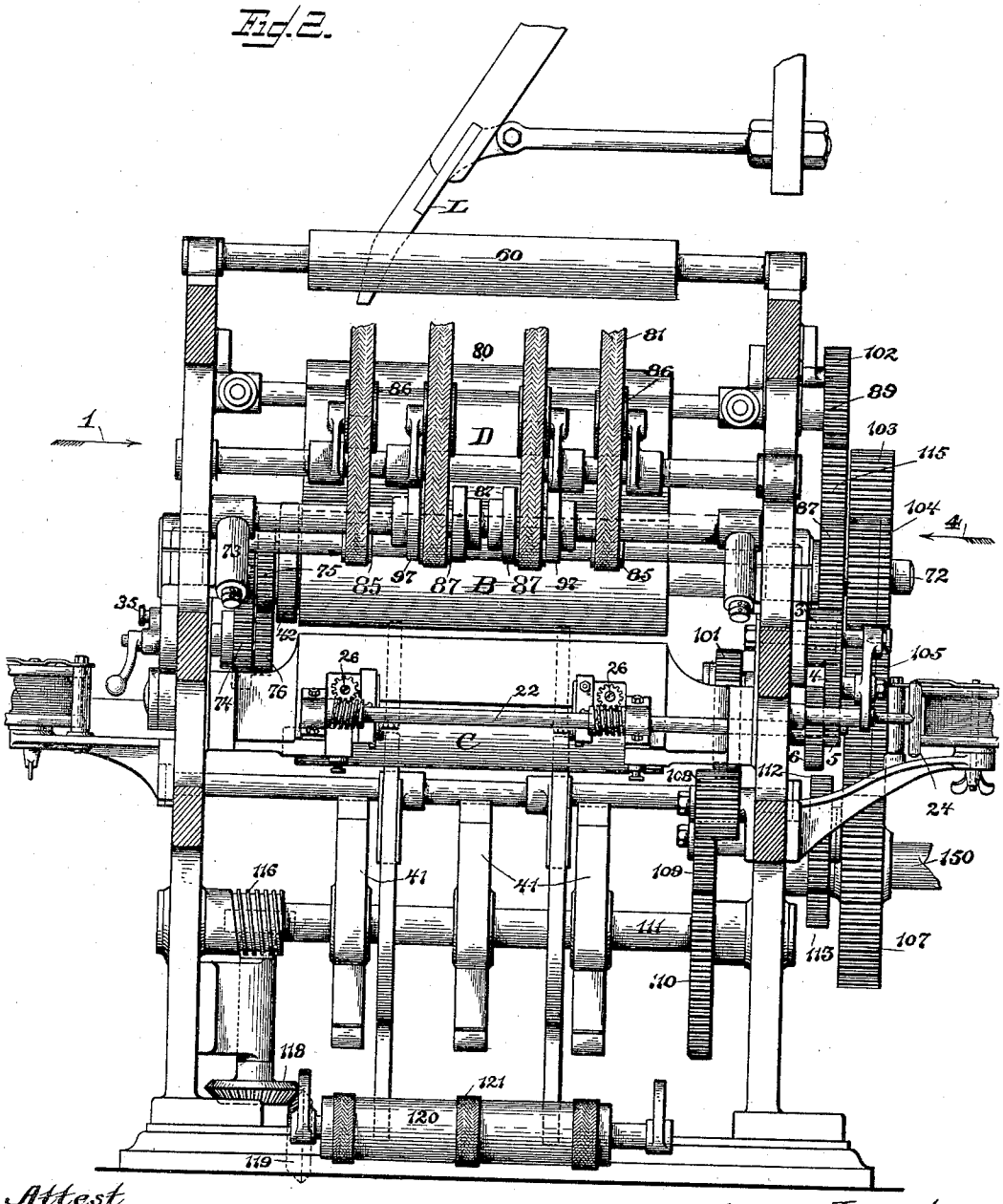
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NEWSPAPER FOLDING AND STAPLING MACHINE.

(Application filed Oct. 21, 1895.)

(No Model.) 12 Sheets—Sheet 2.

Fig. 2.



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(No Model.) 12 Sheets—Sheet 3.

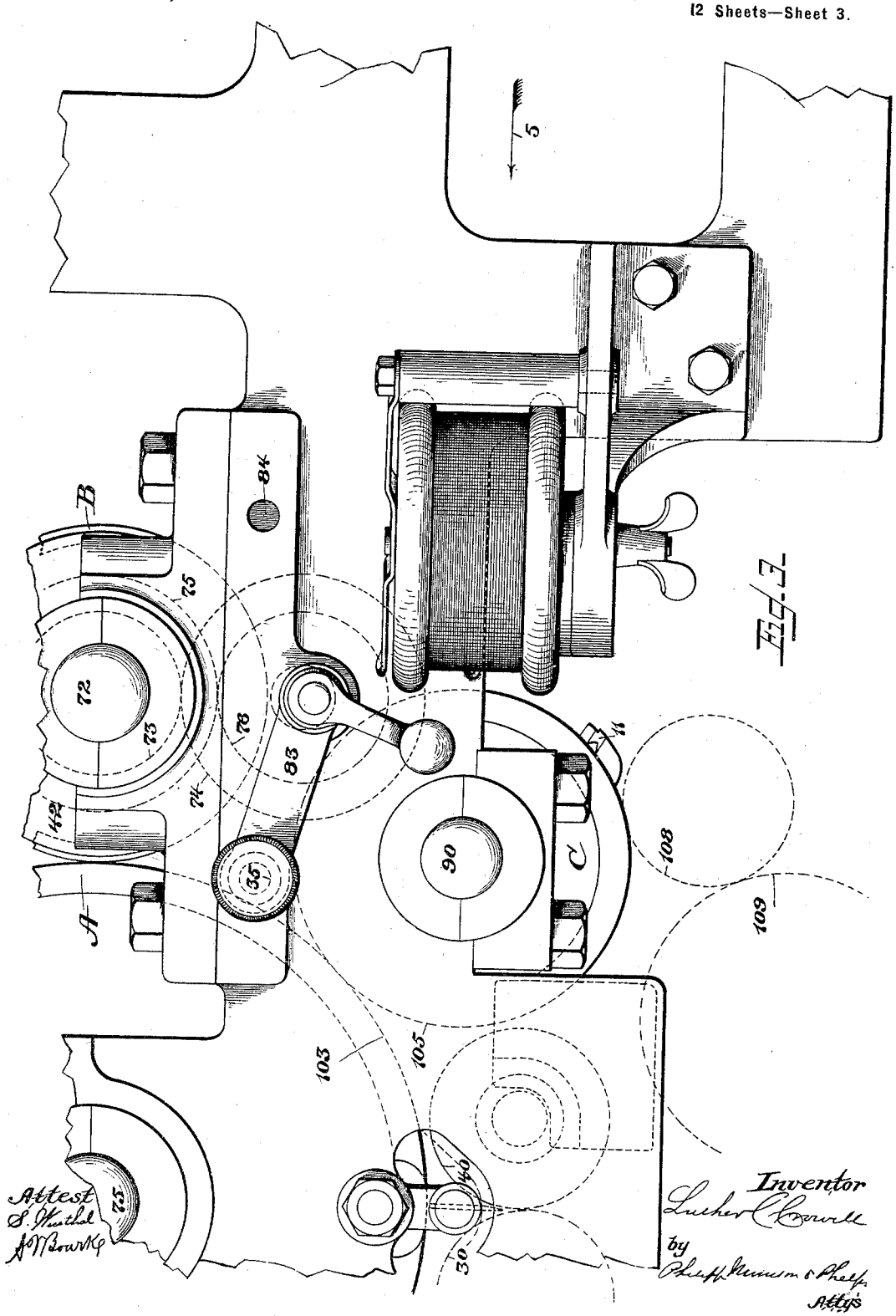


Fig. 3.

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(No Model.) 12 Sheets—Sheet 4.

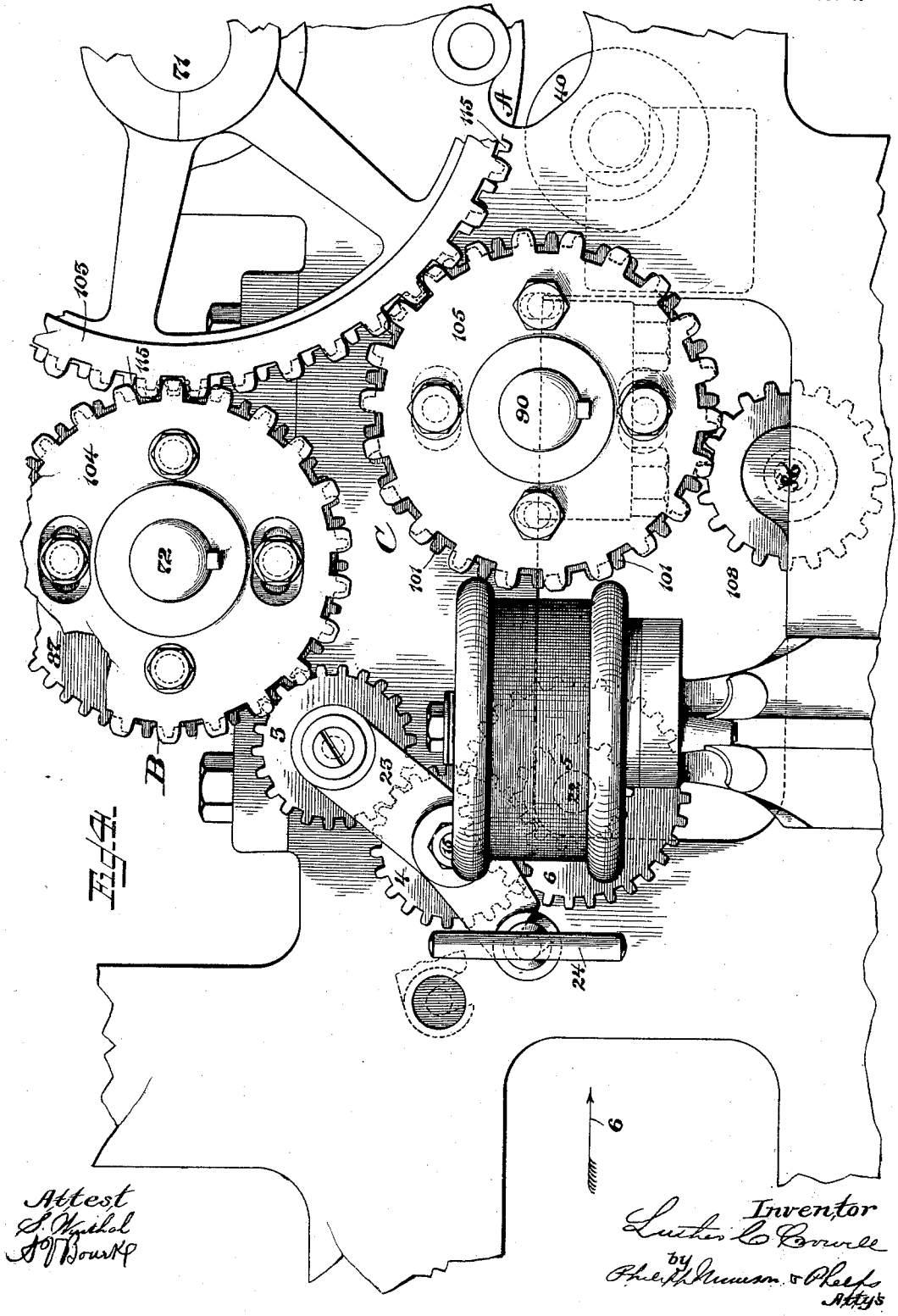


Fig. 4.

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(Application filed Oct. 21, 1895.)

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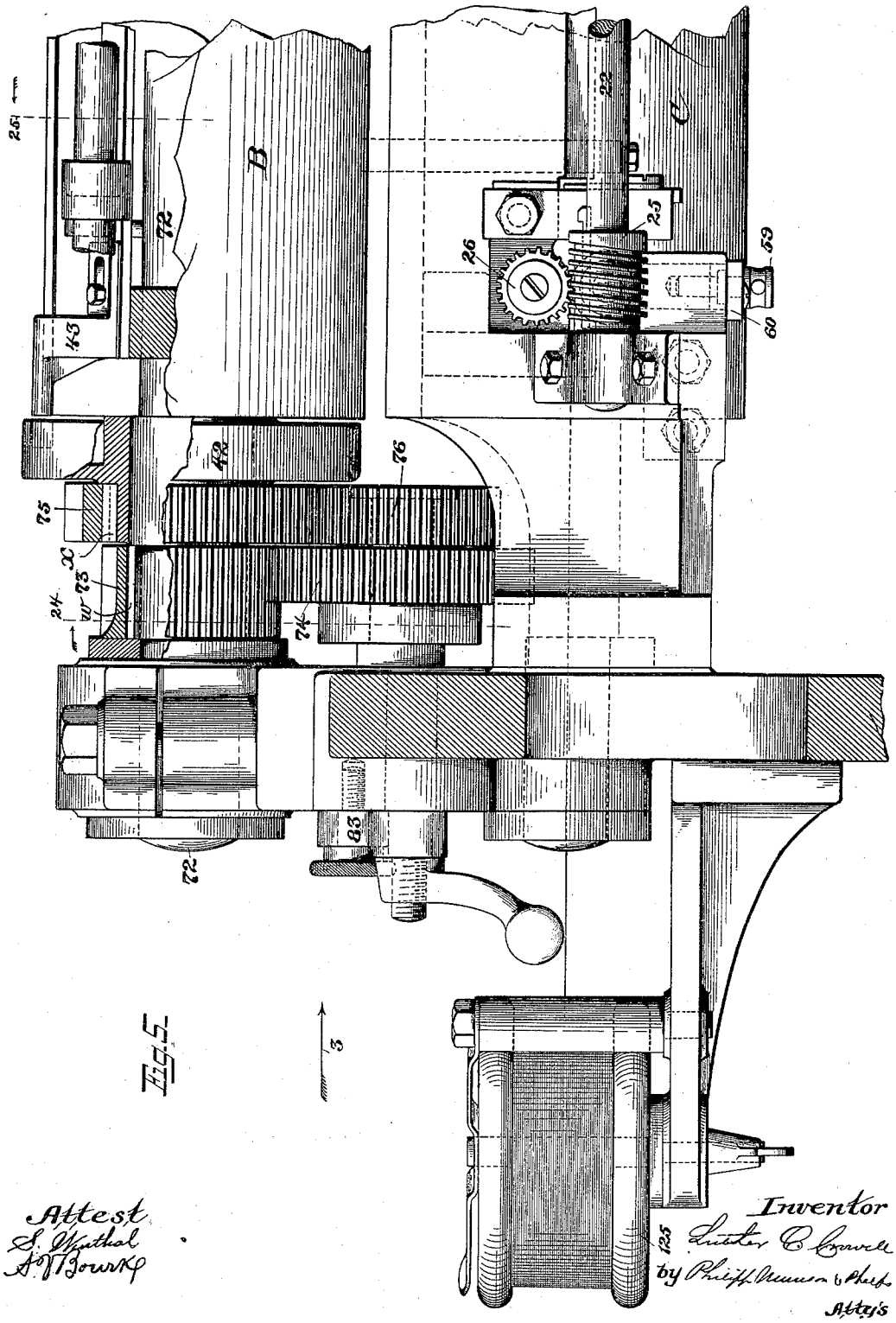


Fig. 5.

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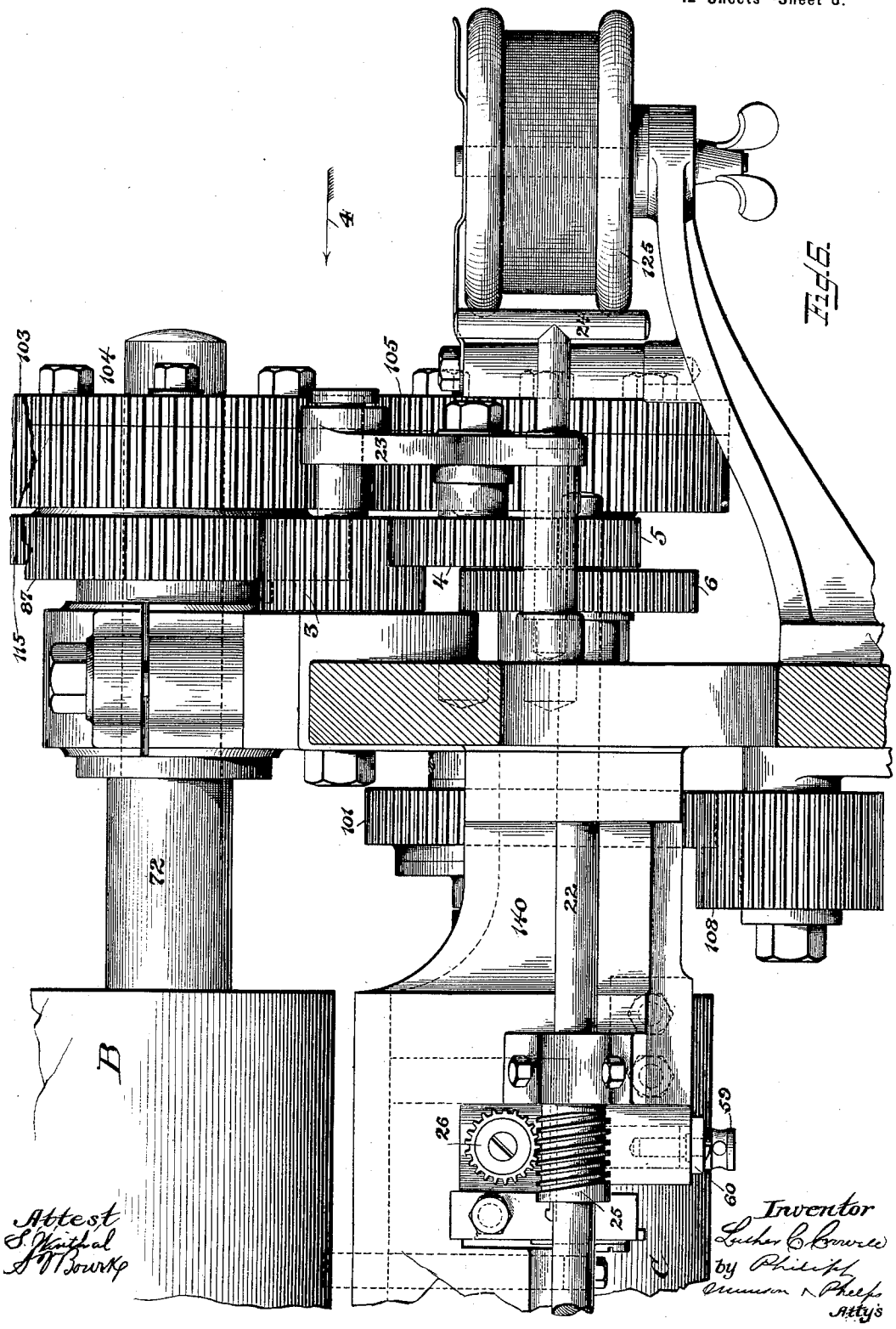
No. 612,829. Patented Oct. 25, 1898.

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(Application filed Oct. 21, 1895.)

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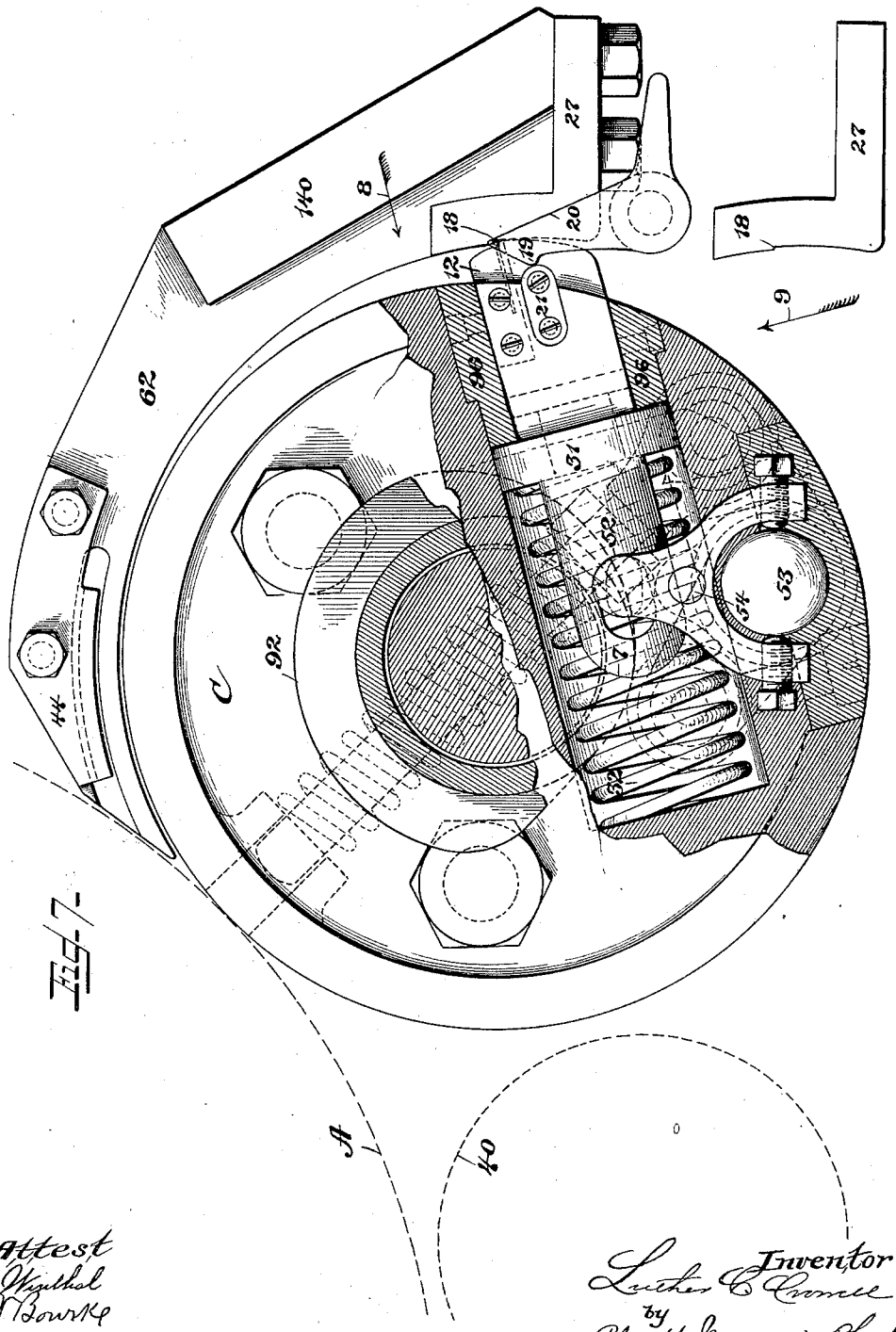


Fig. 7.

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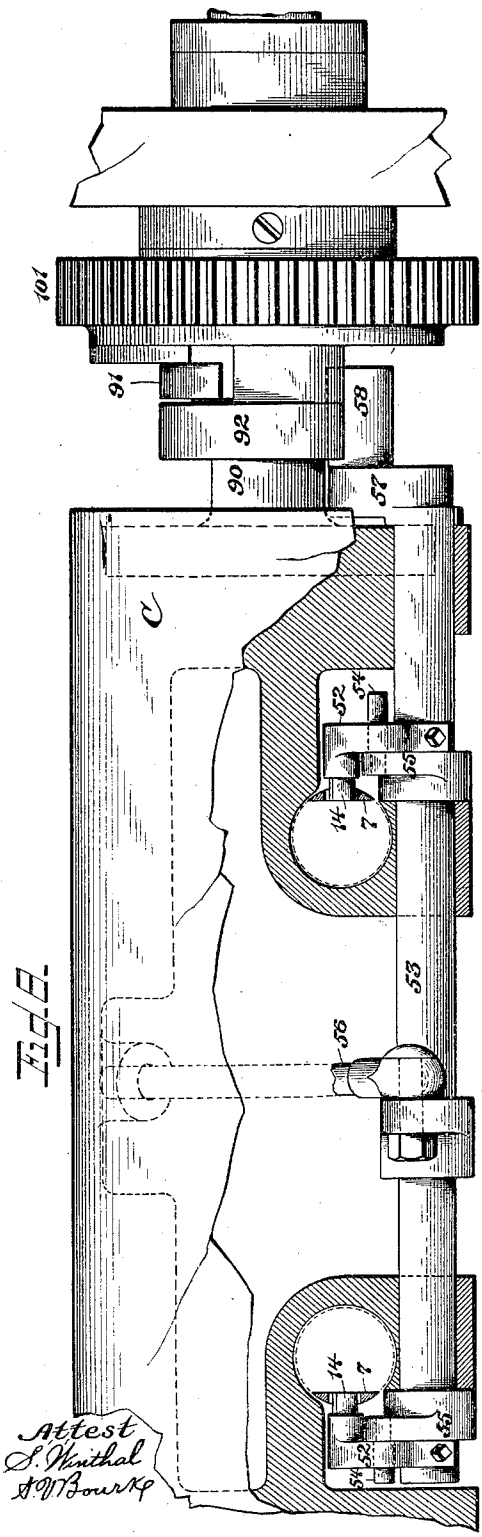


Fig. 8.

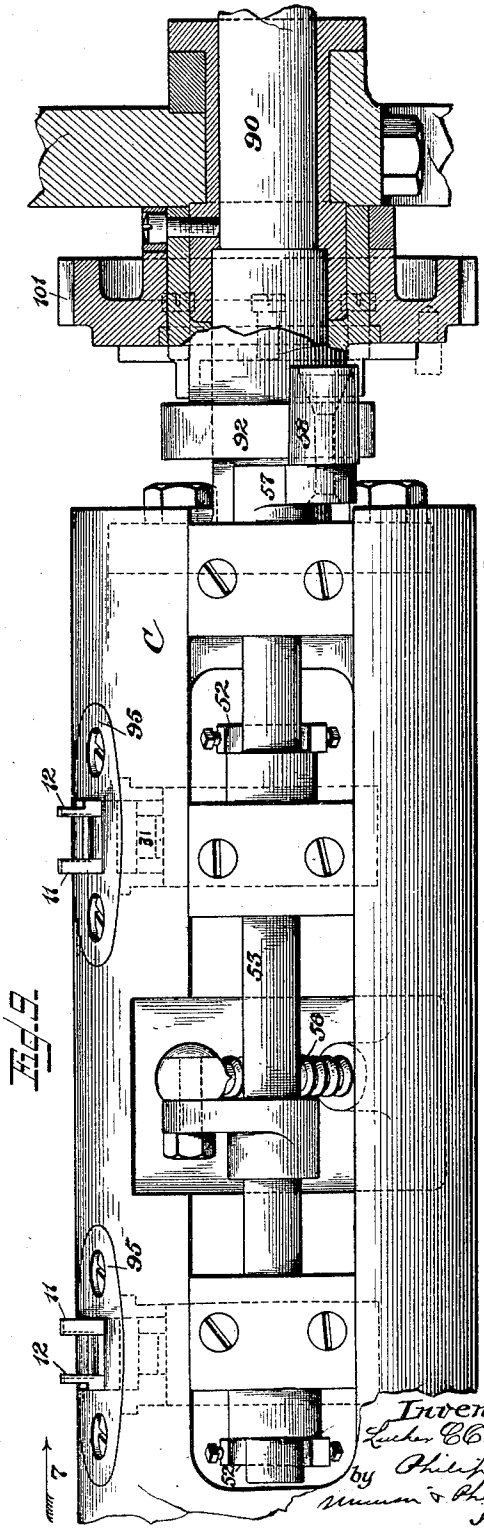


Fig. 9.

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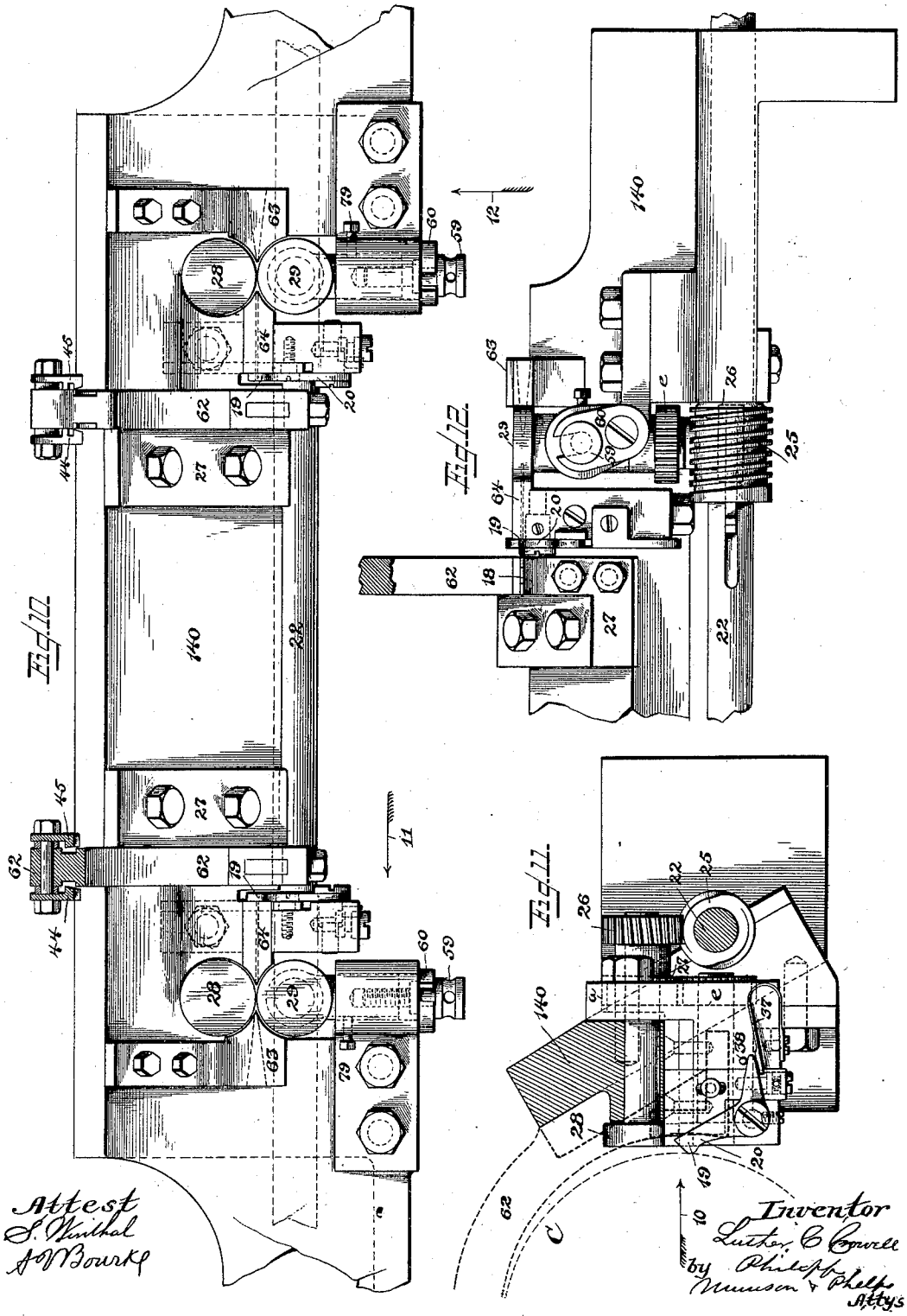
No. 612,829. Patented Oct. 25, 1898.

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(No Model.) 12 Sheets—Sheet 9.



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NEWSPAPER FOLDING AND STAPLING MACHINE.

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(No Model.) 12 Sheets—Sheet 10.

Fig. 15.

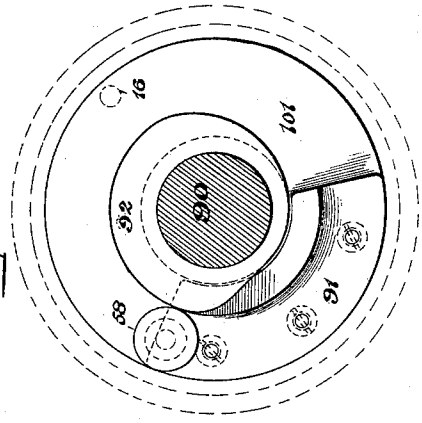


Fig. 16.

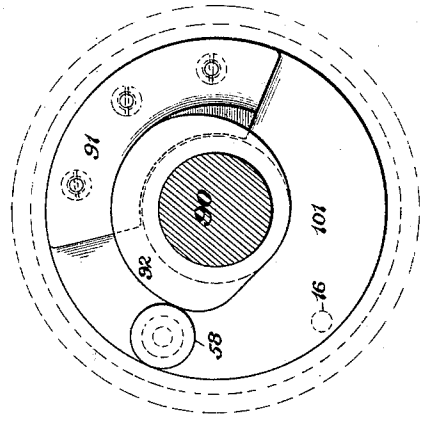


Fig. 14.

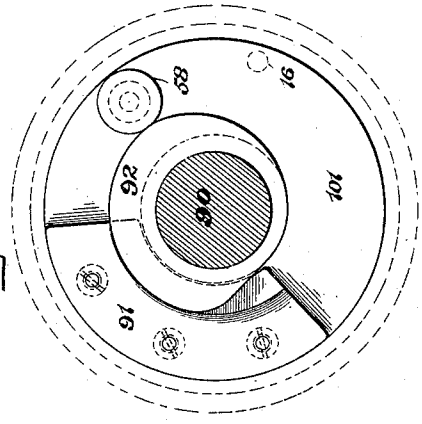


Fig. 17.

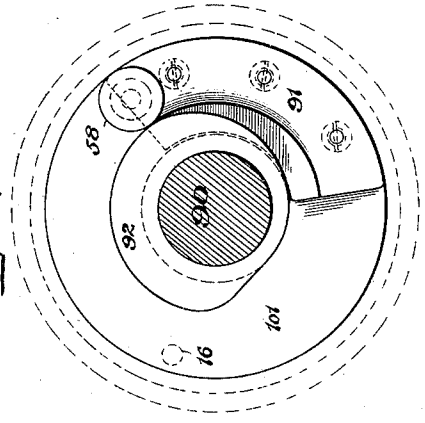


Fig. 13.

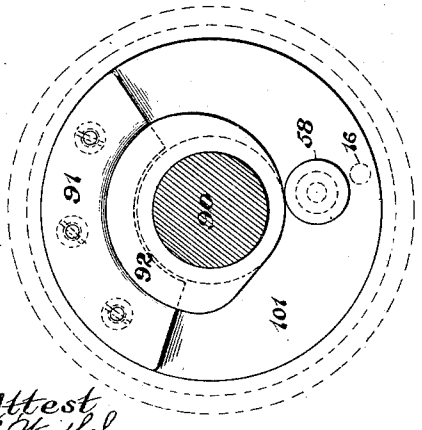
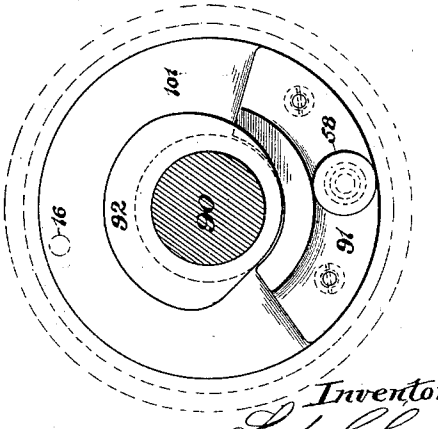


Fig. 18.



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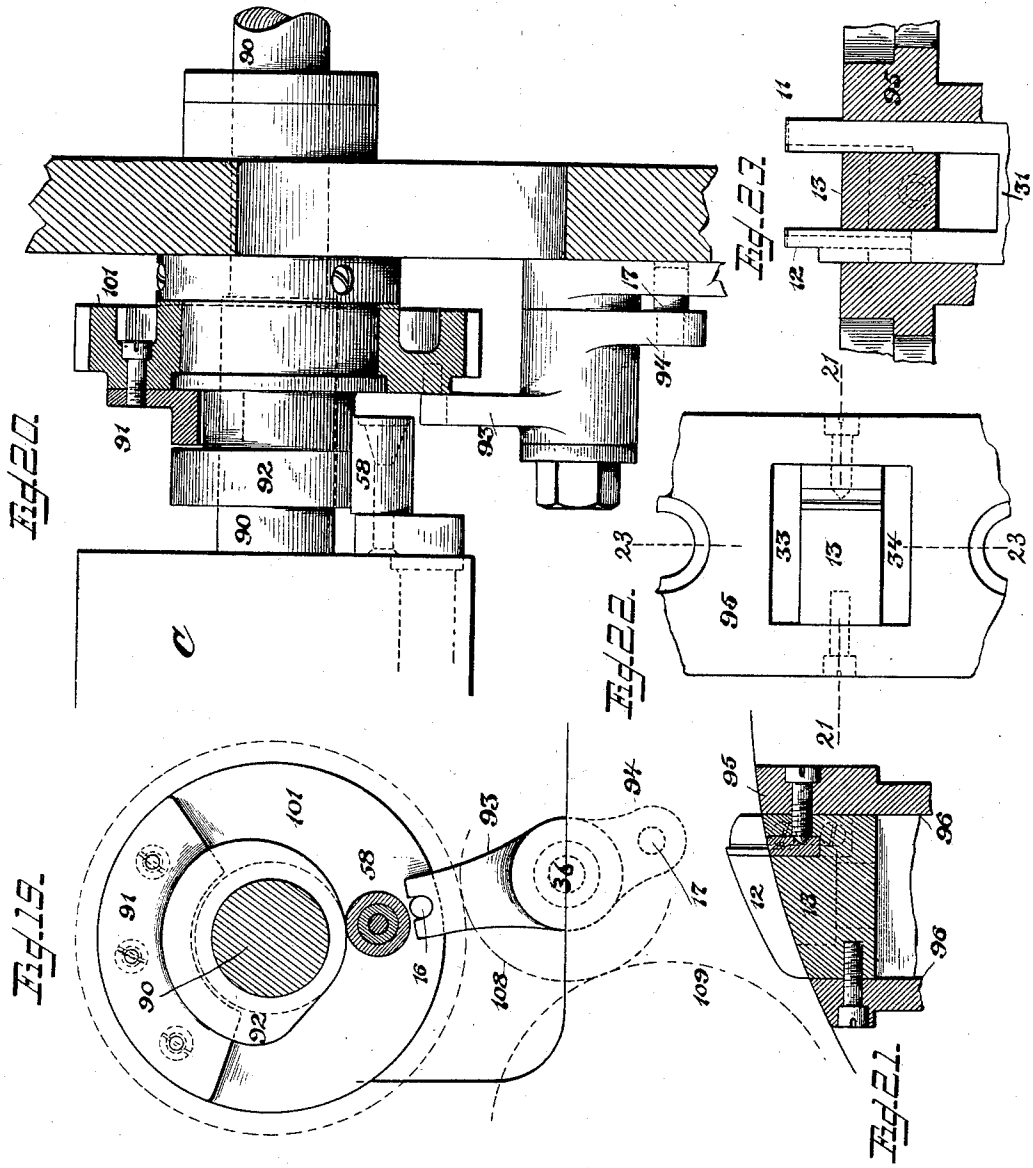
No. 612,829. Patented Oct. 25, 1898.

L. C. CROWELL.

NEWSPAPER FOLDING AND STAPLING MACHINE.

(Application filed Oct. 21, 1895.)

(No Model.) 12 Sheets—Sheet II.



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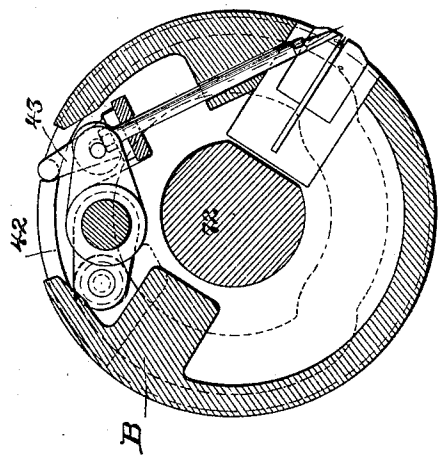


Fig. 25.

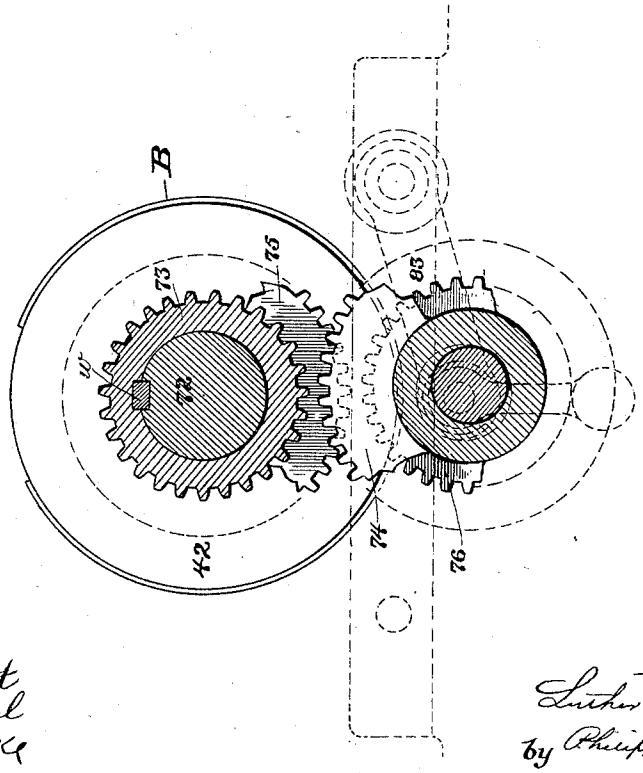


Fig. 24.

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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.

NEWSPAPER FOLDING AND STAPLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 612,829, dated October 25, 1898.

Application filed October 21, 1895. Serial No. 566,347. (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 Newspaper Folding and Staple Binding Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The improvements constituting the invention embraced herein relate to that class of newspaper folding and staple binding machines broadly comprehended in Letters Patent No. 510,528, dated December 12, 1893, and more specifically to that modified structure of this class of machines also embraced in Letters Patent No. 510,840, dated December 12, 1893.

The features of the present invention comprehend staple-forming mechanisms in such coöperative combinations with sheet-collecting mechanisms as to bind together on appropriate lines various packs of collected sheets and means for capacitating said stapling mechanisms to operate on successive sheets or packs of sheets.

The invention embraces improvements in the structure of the stapling mechanisms and the wire-feeding devices, all of which are hereinafter fully explained and claimed.

Practical embodiments of the various features of invention are illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation as seen looking in the direction of the arrow 1 in Fig. 2, and Fig. 2 a side elevation, with framing removed, as seen looking in the direction of the arrow 2 in Fig. 1, each showing a delivery apparatus for printing-machines provided with stapling mechanisms whereby plies or sheets of the product are bound together in a book-like package. Fig. 3 is an elevation, on a larger scale, of so much of said delivery apparatus (seen in the direction of arrow 1 in Fig. 2 and arrow 3 in Fig. 5) as is necessary to illustrate certain details of the present improvements in the stapling mechanism. Fig. 4 is an elevation, on the scale of Fig. 3, seen in the direction of arrows 4 in Figs. 2 and 6 and showing a portion of the gear side of said delivery apparatus. Figs. 5 and 6 are elevations, on the scale of Fig. 3, (which may be read together,) of a portion of the parts at one side of said delivery apparatus, seen in the direction of the arrow 2 in Fig. 1 or as the arrow 5 points in Fig. 3 and the arrow 6 points in Fig. 4. Fig. 7 is a front end elevation, on a still larger scale, partly in section, of the stapling-tool carrier or cylinder as seen looking in the direction of the arrow 1 in Fig. 2 or arrow 7 in Fig. 9. Figs. 8 and 9 are elevations, on the scale of Fig. 3, each partly in section, of the stapling-tool carrier or cylinder as seen looking, respectively, in the direction of the arrows 8 and 9 in Fig. 7. Figs. 10, 11, and 12 are elevations, on the scale of Fig. 3, of the wire feeding and cutting mechanisms as seen, respectively, looking in the direction of the arrow 10 in Fig. 11, arrow 11 in Fig. 10, and arrow 12 in Fig. 10. Figs. 13 to 18, inclusive, are diagrams, on the scale of Fig. 7, showing the various positions of fixed and moving cams necessary in the operation of collecting sheets. Fig. 19 is a view, on the scale of Fig. 7, of the fixed positions of said cams with the moving cam locked in the position when only a single product is made. Fig. 20 is an elevation, partly in section, of same and associated parts. Fig. 21 is a central sectional elevation of the upper portion of the stapling-tools and holder in the carrier C, the same being taken on the line 21 of Fig. 22. Fig. 22 is a plan view of the same with the bending-arms removed. Fig. 23 is a longitudinal central sectional elevation of the upper portions of the setting-tools and holder therefor, the view being taken on the line 23 of Fig. 22. Fig. 24 is a sectional elevation on the line 24 of Fig. 5, and Fig. 25 is a similar view on the line 25 of Fig. 5.

The present invention relates to improvements in and in connection with stapling mechanism whereby plies or sheets of material fed within the range of action thereof from any source will be bound together by means of staples formed from short portions severed from a long length of wire and converted into staple form, which staples are presented to and inserted in said material and then have their legs projecting therefrom

clenched down to complete the binding of the product in book-like form, all of which operations are performed by what is generally called the "stapling" mechanism; but this stapling mechanism is especially adapted for conjoint operation with a printing-machine and its delivery apparatus, whereby webs of paper are printed, severed into short sheets, and the sheets folded into book form, so that the sheets composing said book are bound together by staples set in or near the binding-line. Such a delivery apparatus is quite fully illustrated in Figs. 1 and 2 and will first be described, so that the coöperation therewith of the stapling mechanism may be the better understood and the advantages of its many novel parts and combinations thereof will more fully appear.

Of the principal mechanisms comprised in the delivery apparatus shown a longitudinal folder for plicating a web or webs by doubling the same lengthwise is constructed in substantial accordance with Letters Patent No. 331,280. Its internal guide or former is marked L, its external turners or guide-rollers 50 60, and its fold-laying rollers 70 80.

The cylinders or carriers A B, between which the material passes from the rollers 70 80, carry several mechanisms. The carrier B is provided with a cutting-blade 2 in the ordinary manner, which blade coöperates with cutting-slots 1 8, supported by the carrier A, which is a common cutting mechanism. The carrier B is provided with means for collecting many sheets thereon and delivering the collected pack therefrom, as will be more particularly hereinafter described, and the carrier A is provided with rotary folding-blades 51 61, that coöperate with folding-rollers 30 40 to impart transverse folds to the sheets severed by the said cutting mechanism, and the carrier A also supports sheet-impaling pins 9 10, which hold and carry the forward end of the sheet lengths past the folding devices and release the same for such folding operation as is common in this art.

A carrier C, located beneath the carriers A B, is arranged for coöperation with carrier A. This carrier C is provided with stapling mechanisms, as will hereinafter be fully described, which coöperate with staple-leg-clenching devices supported by the carrier A, and the products made in this apparatus are finally delivered by means of a rotary fly, consisting in the main of curved arms 41, which fly is also a structure well known in this art.

There is also provided a rotary carrier D, by means of which and suitable tapes 81 and conductors 82 a supplemental web is delivered to the carrier B to be united to the body of the product as a cover, as will be hereinafter explained.

The various mechanisms are geared together, so as to be properly moved in the timely relation necessary, and are hereinafter referred to. Some of this gearing is necessarily omitted to render the illustrations perspicuous; but such gearing, part of which is shown, is as follows:

The carrier A is provided on its shaft 71 with a wheel 103, that is driven through an intermediate 106 from the wheel 107 on the driving-shaft 150, and the wheel 103 drives the carrier B (see Fig. 4) through a wheel 104 on its shaft 72 and the carrier C through a wheel 105 on its shaft 90. The rollers 70 80 are geared together, as is usual, by pinions 88 89, the former being driven by an intermediate 102 from a gear-wheel 115, that is fast upon the shaft 71 of carrier A, between the frame and the exterior gearing. This wheel 115 meshes with a gear-wheel 87, fast on shaft 72 of the carrier B, which wheel 87 drives the intermediates 3 4 5 and pinion 6, which constitute the train of gearing driving the wire-feeding shaft 22, and this wheel 115 also drives the gears rotating the folding-rollers 30 40.

When sheet lengths, as two, are collected to form the product to be bound by stapling, the wire must be fed and staples formed therefrom and set only half as fast as when the cylinder B is not collecting, in the former case one length of wire being fed for two revolutions of that cylinder and in the latter case one length of wire being fed for each revolution of that cylinder. Of course the wire feed and staple making and setting when three or more sheets are collected will require this action to be changed to suit the period at which the united pack is delivered to be stapled; but from the arrangement of mechanisms for the stapling of two sheets will be understood the modified action for a greater number of collected sheets.

There are two stapling mechanisms supported in the carrier C, (see Fig. 9,) which, being duplicates, both may be understood from a description of one, like letters and numerals of reference applying to both. One stapling mechanism will now be described. (See Figs. 7, 9, 21, 22, and 23.)

The staple-bending arms 11 12 project from a guide or plunger 31 and stand a distance apart equal to the length of the crown of the staple. This guide or plunger 31 has a round body, adapting it to be entered into and guided in a circular socket formed for it in the carrier C, in which it is seated upon a spiral spring 32 and normally pressed outwardly. Its position therein is maintained by means of a closing-cap 95, having an extension 96, that fits within an enlarged recess in the cylinder, so that its lower end will afford a limiting-stop for the upward thrust of the guide or plunger carrying said arms, and this closing-cap 95 also carries a setting-bed 13, which is a piece fitted in a squared central socket in the closing-cap 95, wherein it is centrally held by set-screws, as shown in Fig. 22.

The face of the cap 95 coincides with the periphery of the carrier C, being curved to

conform thereto, and the sides of its socket constitute, with the outer sides of the setting-bed 13, guiding-ways 33 34 (see Fig. 22) for the bending-arms 11 12. The withdrawal movement of the bending-arms 11 12 is controlled by means of a compound rock-arm, the adjustable member 52 of which is secured to the fixed member 55, which is fast on rock-shaft 53, said member 52 being hung on a pivot 54, projecting from the member 55, the said member 52 being branched to embrace the shaft 53 and its branches being provided with adjusting set-screws to fix the position of the member 52 on the pivot 54, and thus secure the relation of the compound arm to the shaft 53. (See Fig. 7.) The operating end 14 of this compound rock-arm plays in an elongated slot formed in a shank 7, projecting from one side of the plunger 31, which carries the bending-arms. (See Fig. 8.) This slot admits of free action at times of the springs 32 upon said plunger and admits of the withdrawing action being accomplished slowly by a long cam 92 of easy pitch. This rock-shaft 53 is normally so held by means of the spring-seated rod 56 as to allow the plunger 31 and the bending-arms it carries to be pressed outwardly to the full extent of the operation of their sustaining actuating-spring 32 and the limitation by the stop 96. The rock-shaft 53 is rocked against the pressure of its spring-rod 56 by means of a rock-arm 57 at one end of the carrier C, which rock-arm 57 is provided with a friction-roll 58, that is in contact with and rides upon the periphery of the cam 92 and at times on the cam-segment 91.

The staple-bending arms 11 12 are provided in their inner faces with longitudinal grooves that coincide in position with the wire-groove across the said bed 13 and the arm 12. This arm 12 (see Fig. 7) is cut away on its outer side to form a recess (see Fig. 23) to enable it to pass by the wire-cutter 20 and is provided with a steel tappet 21, projecting into said recess to vibrate said cutter in severing a wire length, as will be presently explained. The bending-arms 11 12 when protruded embrace and sweep over a curved forming-anvil 62, generally in like manner as is shown in said Patent No. 510,840, which anvil and accessories may be of any suitable construction, though, as illustrated, they are constructed and operate as is set forth in an application, Serial No. 566,348, filed of even date herewith and which will be explained herein in the course of the description of the operation of the mechanisms.

There is provided a wire-cutter 20, which (see Fig. 11) is pivoted so that it may be vibrated against the face of the wire-guide 64 and across the pathway of the wire through said guide. It consists of two arms, one constituting the cutting-blade and the other acting as a bearer to correctly position the blade, said bearer being seated upon a spring 37, constantly pressing it against stop 38, which devices thus normally hold the edge of the cutting-blade close to the pathway of the wire. This cutting-blade carries a cam projection 19, which normally projects into the pathway of the tappet 21, carried on one side of the bending-arm 12, (see Fig. 7,) where the result of the contact of this tappet-arm in its rotary course of travel carried by said bending-arm with the projection 19 is to quickly vibrate the cutting-blade 20 and sever the wire length protruded across the face of the anvil 62 while the same is lying in the seat 18 of said anvil, thus resting against an abutment which, coacting with the slightly-projecting faces of the arms 11 12, constitutes with them a means of nipping the wire and holding the same while it is being severed into a staple length and said staple length of wire when it is thus detached by severance from the long length of wire. The anvils 62 are fastened to a bracket 140, secured to the framework, and they are adjusted so that their curved under faces shall be concentric with the periphery of the carrier at their forward portions and so that their rear portions shall be eccentric thereto. The width of the anvils is equal to the inside length of the crown portions of the staples. The rear portion is provided with the wire-seat 18, and the forward portion has the recessed sides and the leg-bending plates 44 45, none of which features are broadly claimed herein, since the same are embraced in said companion application and therein claimed. As here shown, however, the abutment 18 is fixed, and the inward movement of the arms 11 12 against the spring tension is depended on for freeing the staple length of the wire from the abutment 18, the wire-engaging face of the abutment being beveled or sloping, as shown best in Fig. 7, so that while serving to hold the wire securely for severing yet as the arms 11 12 move onward the wire will ride beneath the abutment, moving the arms slightly inward and then being advanced by the arms beneath the anvil.

The mechanisms for controlling the stapling action where two sheets are the number collected will now be explained.

A cam 92, which is shaped to so rock the staple-bending-arm shaft as to allow said arms to protrude at each revolution of their carrier, is fixed by means of a sleeve encircling the shaft 90 of carrier C and secured to the framework. A cam-segment-carrying wheel 101 is loosely mounted on this sleeve, (see Figs. 9 and 20,) said wheel being driven from a wheel 113 on the main driving-shaft 150 (see Fig. 1) at half the speed of carrier C or appropriate speed through intermediates 112 and a companion 122 of like size on the same stud, but inside the frame and engaging a wheel 110 on the shaft 111 of the rotary fly, said wheel 110 driving intermediates 109 108, the latter being geared with the wheel 101, which is within the side frame and carries upon its inner face said cam-segment 91,

(see Figs. 8 and 13 to 19,) which segment is flanged to coincide with the high part of the fixed cam 92.

As the example being described is the stapling of two sheets, it will be understood that the proportions of the gearing driving the carrier C and the cam-carrying wheel 101 are such as to impart to the latter half the speed of the former—that is, although the wheel 101, driven by the wheel 113, and the wheel 105, driven by the wheel 107, are of the same size the wheel 105 is but half the size of its driver, and hence the wheel 105 will make two turns to one of the wheel 101. The stationary cam 92 rocks the arm 58 of the shaft 53, so that the low part of that cam allows the spring 56 to protrude the staple-bending arms for action during each revolution of their carrier, the high part of that cam when acting holding said arms within the carrier. When, however, the carrying-wheel 101 rotates, the cam-segment is so moved as to prolong the high part of the cam 92 during each alternate revolution, so as to prevent said bending-arms from being protruded during the whole of each alternate revolution of the carrier C. These devices thus operate to hold the staple-bending arms within the carrier C during one revolution and permit them to be protruded and operate through the cutter-actuator to sever the wire length and by their own action, in connection with the staple-forming anvil, to convert said length into a staple, carry said staple to the setting-point, and in connection with the die to clench its legs, all at the proper times or during the second revolution of the carrier C. This wheel 101, (see Fig. 19,) carrying cam-segment 91, is arranged to be locked stationary in such a relation to the fixed cam 92 as to coincide with the high part of that cam, and thus be inactive when the staple-arms are to operate at each revolution. The locking of this wheel and cam-segment is accomplished by taking off the half-speed wheel 108 (shown in position in Figs. 4 and 6) and mounting on the same stud 36 a stop-piece, one arm 93 of which is forked so as to embrace a stud 16 on said wheel 101, while another arm 94, projecting from the same hub, has a locking-pin 17 securing it to the framework, said wheel being thus secured motionless and its cam-segment in correspondence with the cam 92, or, in other words, inoperative. (See Figs. 19 and 20.)

The arrangement of mechanisms for feeding the wire at a uniform length (the cylinder C making either one or two revolutions) is as follows: The shaft 22 of the wire-feeding mechanism, the rotation of which is controlled by the train of gears 3, 4, 5, and 6, is provided with worms 25, that engage worm-wheels 26, that drive the upper members 28 of the wire-feeding disks 28 29, the lower member 29 being moved by means of spur-wheels *a e*, which gear their shafts together, the nip or bite of the two being controlled by means of an adjusting-screw 59, that, turning in a bearing-plate 60, has its stem engaging in the screw-threaded opening in the shank of the roller socket or bearing, the adjusted position reached being maintained by a set-screw 79. The end of the worm-shaft 22 is provided outside the frame with two wheels 6 5, whose relation is as two is to one, (it might be a different proportion, according to the number of sheets associated,) which wheels are driven through intermediates 4 3 from the wheel 87 on the shaft of carrier B. The intermediate 3 is a wide-faced wheel, and on its stud is loosely pivoted an arm 23, in which is mounted the intermediate wheel 4. This wheel 4 may be geared with the wheel 6 when it is desired to feed the wire at one speed and with the wheel 5 when it is desired to feed it at half that speed, as follows: By slacking the T-bolt 24 the arm 23 may be lifted and slid along on the stud of the wheel 3 and the intermediate wheel 4 brought in gear with the larger wheel 6 on the worm-shaft 22. A lug is provided on the frame to suit the different positions of arm and T-bolt. The end of the arm where it engages with the T-bolt is cut away, so that the arm may be raised and sustained in two positions, and thus enable the wire-feed to be operated at the appropriate speed. The wire is led from a reel 125 and is passed through the guides 63 64, which are on opposite sides of the feeding-disks 28 29 and act to direct the wire accurately across the face of the forming-anvil 62, the extended portion or leading end of said wire being thus accurately directed into a wire groove or seat 18 with which the anvil 62 is provided, (see Figs. 7 and 12,) the same being formed as a transverse abutment in a removable steel piece 27, attached to the heel of said anvil.

The collecting-cylinder B is provided with the usual sheet-impaling pins for controlling the leading ends of the sheets, so as to cause appropriate ones to be carried around upon its surface and making the transit of its circular path, and thus cause the succeeding one to lap upon it, thereby performing the operation known as "collecting." In the collection, say, of two sheet lengths it is obvious that these pins must be protruded at the point where the cylinders A B run nearest together in order to take a sheet at one revolution and be withdrawn at the same point at the succeeding revolution in order that the collected sheets may pass onward upon the surface of the cylinder A to be advanced for delivery or be delivered to the pins of cylinder A for that purpose. In order to accomplish this, said cylinder B is provided with a pin-operating cam 42, that runs loosely upon the shaft 72 of said cylinder, which pin-cam has fastened to its outer side by spline *x* a gear-wheel 75. Motion is communicated to said pin-cam gear-wheel 75 by means of a pinion 73, fastened by spline *w* on its shaft 72 through idlers 74 76, which are fastened together and revolve upon a stud that is se-

cured in the side frame. The size of the pinion 73 and wheel 75, that of the intermediate gears 74 76, and the relative proportions of said gearing are such that when the cam is rotated by this gearing it makes one revolution to two of the cylinder B, and thus presents its operating portion to the rock-arm, that moves the shaft of the impaling-pins at such times as to protrude the pins at one revolution and withdraw them at the next.

When it is desired to withdraw the pins of the collecting-cylinder, so that they shall not engage a sheet and carry it around the cylinder B, the pin-cam 42, being revolved to the point where it holds the pins within the cylinder, is fixed in place by a sliding locking-pin 43, which enters a socket for it in the cam, and the stud carrying the wheels 74 and pinion 76, which has a bearing in the side frame eccentric with it, is rocked so as to hold said gears out of engagement with their companion gears on the shaft of cylinder B. This stud holds the wheels in gear by means of an arm 83, fast to the stud and supported by means of a locking-screw 35, that takes into the side frame. (See Fig. 3.) When this arm 83 is turned into a position the reverse of that shown in Fig. 1 and maintained by the screw 35, entering the hole 84 in the side frame, the said wheels will be thrown out of gear, as in Fig. 24. When the pins are not in operation, the sheets will pass in succession to the stapling mechanisms, and when in action collection of them will take place and packs of sheets will be delivered to the stapling mechanisms.

Means are provided for introducing a cover-sheet. As shown, it consists of tapes 48 81, which are fast tapes having the surface speed of the carriers B D, and they form a conducting-pathway between cutting-cylinders 49 99 and the carrier D and its breaking-rollers 97. The tapes 48 return around pulleys near the carrier D and the tapes 81 extend into contact with the surface of the carrier D and return around pulleys 85 and stretching-pulleys 86. The pathway for the cover-sheet is constituted in part by said tapes and is extended close to the carrier B by means of conductors 82 of the usual construction. The pathway constituted by the tapes 48 81 and conductors 82 may convey a colored or unprinted web that is perforated transversely at distances a sheet's length apart, the same being fed at half-speed; but preferably, as more practical, a cover in the form of a supplement-web printed by a supplement-printing mechanism is led through cutting-cylinders, as 49 99, which run at half the surface speed of the cylinders B D, said cutting-cylinders operating to so perforate the web transversely at points the length of a sheet apart, the leading section of which when nipped between the breaking-rollers 97 and the carrier D will take up their more rapid speed and be fed onward thereby, one section being broken asunder from the web on the perforated line.

The delivery-tapes, which coöperate with the rotary fly, receive their motion through a worm 116 on the fly-shaft 111 and worm-wheel 117, which is on a vertical shaft carrying at its lower end a bevel-wheel 118, that meshes with a bevel-wheel 119 on the shaft of the tape-pulleys 120. The paper arrives at this delivery apparatus in web form. It may be folded if it has passed over a longitudinal folder, as L, and if slit on its central line, as is a common practice, it will be two associated webs. The web or webs pass between the carriers A B, the cutting devices whereof sever the same transversely into sheet lengths which may be collected together by means of the described devices or other appropriate ones, causing the cylinder B to operate as a collecting-cylinder. The sheets are carried onward by means of the pins of carrier A and ultimately are folded off from said carrier by its folding-blades and folding-rollers in the usual way. These sheets as they pass the carrier C receive a line of staples set on the line of folding. If this staple-bound product is to be provided with a cover, the same is brought to cylinder D by the tapes 48 81 and delivered to the pins of the cylinder B, being carried around it at full speed and laid thereon, so as to underlie the sheets received from the main apparatus, so that it will come on the outside of the collected pack of sheets when the same is transferred to cylinder A and carried to the stapling mechanisms.

In order to show the various operations of which this apparatus is capable, I will first describe the simplest operation it may have, and that is, uniting two webs together, which may be the folded product of the longitudinal folder L, whether that product be united by a single fold at the head or be divided at its head by a slitting device operating in the usual way. In both cases it will present two webs passing between the carriers A B. In this arrangement the pins of the collecting-cylinder B will be held out of action by separating the wheels 74 76 from their companions 73 75, as in Fig. 24. The wheel 101 will be locked stationary, so as to hold its cam-segment in a position corresponding with the fixed cam 92 by means of the arms 93 94, as in Fig. 20. Thus arranged the collecting-cylinder B will cease to operate as such, and the stapling mechanisms in carrier C will be active at each revolution thereof, the result of which is that each pair of associated sheets in passing between the carrier C, supporting the staple bending and presenting tools, and the carrier A, which is provided with the setting-die in the usual manner, as shown in the art, as well as in my companion application, Serial No. 566,348, be stapled widthwise upon its ultimate binding-line, upon which said sheets will be folded by the action of the folding-blades of carrier A by being tucked into and passing through the folding-rollers 30 40, which staple-folded sheet, descending into the rotating fly, will be laid

upon the tapes 121 and delivered. If it is desired to add to said two sheets a cover-sheet and staple the whole together, this may be done by throwing the cutting-cylinders 49 99 out of action and leading the cover in the form of a continuous web into the control of the carriers A B, whereupon the three associated sheets will be manipulated, as has been described with respect to the two. In order, however, to attain the greatest practical usefulness of a nachine of this character, the collecting-cylinder B will be thrown into operation, its collecting devices being, as has heretofore been intimated, capacitated to collect two or more sheets, (which is but a modification of the apparatus shown and described,) its collecting devices being set into operation as follows: The sheet-impaling carrying-pins belonging to said cylinder will be made to operate appropriately for the collection of two sheets from the main source of supply by uncoupling its cam 42 from the cylinder and throwing the wheels 74 76 into operative position, as is shown in Fig. 5, whereupon said cylinder will carry the first sheet coming within the range of action of its pins around the cylinder to be overlapped by the succeeding sheet length and withdrawn appropriately to allow the associated pair to be moved onward for delivery. The stapling mechanisms are set into operation so as to staple the successive collected packs of sheets brought within the range of its action by adjusting the wheel 108 into its active relation with the train, which drives the cam-segment-carrying wheel 101, as in Fig. 6, whereupon the cam 92 will at every second revolution of the carrier C have that cam elongated by the cam-segment 91 at the proper periods of time during the rotation of its carrying-wheel 101, as in Figs. 14 to 18, so as to hold the staple-bending arms within the cylinder at each repeated revolution thereof, said stapling mechanisms therefore being operative only at such periods of time as a pack of collected sheets is brought within their range of action. To add to the number of sheets collected and especially add a sheet of differing characteristics, as color or quality, from the main pack of sheets, the half-speed cover-introducing mechanism described is brought into action to deliver such cover-sheet to the cylinder B beneath the pack of sheets from the main apparatus, whereupon the mechanisms adjusted as last described will so operate upon the collected pack of three sheets as to staple the same together and deliver the stapled product in book-like form. In all of these operations described the train of gears 3 4 5 6 will be appropriately adjusted to supply the wire to the stapling mechanisms, according as the same are making one or two sets of staples.

I wish it understood that I do not limit myself in this application to the use of staple-forming mechanism as well as of staple-setting mechanism.

What is claimed is—

1. The combination with a cylinder having means for collecting a plurality of sheets thereon and discharging them in a single pack therefrom, of a staple-setting mechanism to which said pack of sheets is delivered, and means for rendering said stapling mechanism inactive during the collecting of the sheets and active during the reception of the collected body of sheets, substantially as described.

2. The combination with a cylinder having means for collecting a plurality of sheets thereon and discharging them in a single pack therefrom, of a staple bending and setting mechanism to which said pack of sheets is delivered, and means for rendering said stapling mechanism inactive during the collecting of the sheets and active during the reception of the collected body of sheets, substantially as described-

3. The combination with a cylinder having means for collecting a plurality of sheets thereon and discharging them in a single pack therefrom, of a staple-setting mechanism to which said pack of sheets is delivered, means for rendering said stapling mechanism inactive during the collecting of the sheets and active during the reception of the collected body of sheets, and means for independently supplying a cover-sheet in association with said pack of sheets so that all the sheets may be united by one stapling operation, substantially as described.

4. The combination with a cylinder having means for collecting a plurality of sheets thereon and discharging them in a single pack therefrom, of a staple bending and setting mechanism to which said pack of sheets is delivered, means for rendering said stapling mechanism inactive during the collecting of the sheets and active during the reception of the collected body of sheets and means for independently supplying a cover-sheet in association with said pack of sheets so that all the sheets may be united by one stapling operation, substantially as described.

5. The combination with the staple-forming anvil, of a rotating carrier for the staple-bending arms, and means whereby the interval between the successive operations of the bending-arms may be varied without varying the speed of rotation of the carrier, substantially as described.

6. The combination of a rotating carrier, staple-setting mechanism carried thereby, means for delivering sheets continuously or intermittently to the carrier, and means whereby the interval between successive operations of the staple-setting mechanism may be varied without varying the speed of rotation of the carrier, substantially as described.

7. The combination of a rotating carrier, staple-setting mechanism carried thereby, means for delivering sheets continuously or intermittently to said carrier, and means for causing the operation of the staple-setting

mechanism once in each rotation of the carrier or less frequently as desired, substantially as described.

8. The combination with means for delivering sheets continuously or intermittently to the rotating stapling-mechanism carrier, of means for protruding the staple-bending devices into active position at each revolution of said carrier or less frequently as desired, substantially as described.

9. The combination with a sheet-collecting mechanism, the staple-bending arms and the rotating carrier, of means for protruding the arms therefrom into active position during that rotation of said carrier corresponding with the delivery movement of the collected sheets to it, substantially as described.

10. The combination with a staple-forming anvil and staple-bending arms and a rotating carrier therefor, of a fixed cam 92 for operating said arms and a revolving wheel carrying a cam-segment for coöperation therewith, and means for rendering said cam-segment active or inactive whereby the staple-bending arms are caused to be protruded at each revolution of said carrier or less frequently as desired, substantially as described.

11. In a stapling mechanism whose reciprocating staple-bending arms move to and from the surface of their rotating carrier and coöperate with a curved stationary forming-anvil, a setting-bed coinciding with the surface of the carrier and fixed relatively thereto, substantially as described.

12. The combination with a cylinder carrying staple-bending arms, of a socket therein to receive the plunger 31 and a closing-cap 95 having guiding-ways for said arms and providing a recess between said ways for a setting-bed, which bed is fixed stationary therein and facially alined with the surface of the cylinder, substantially as described.

13. The combination with a cylinder carrying staple-bending arms, of a socket therein to receive the plunger 31 and a closing-cap 95 having guiding-ways for said arms and providing a recess between said ways for a setting-bed, which bed is fixed stationary therein and facially alined with the surface of the cylinder and being provided with means for adjusting it in said recess, substantially as described.

14. The combination with means for delivering sheets continuously or intermittently to the rotating stapling-mechanism carrier and means for protruding the staple-bending devices into active position at each revolution of said carrier or less frequently as desired, of a wire-feeding mechanism, the feeding-shaft whereof is provided with change-gearing whereby staple lengths of wire are appropriately fed thereto according as the stapling mechanisms operate at each revolution of their carrier or less frequently, substantially as described.

15. The combination of a forming-anvil upon whose face a wire length is swept in forming a staple, said anvil having a fixed abutment or seat 18 extending transversely of the face of the anvil, said abutment having a beveled wire-engaging face, wire-feeding devices, means for severing staple lengths from the wire, and a spring-pressed staple-bending tool traveling over said anvil whereby the wire length is held against said abutment during the severing and then advanced over the face of the anvil, substantially as described.

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

LUTHER C. CROWELL.

Witnesses:
H. T. MUNSER,
A. L. KENT.