(No Model.) 4 Sheets—Sheet 1.

J. F. DAGGETT.

WIRE STITCHING MACHINE.

No. 409,830. Patented Aug. 27, 1889.

Fig. 10.

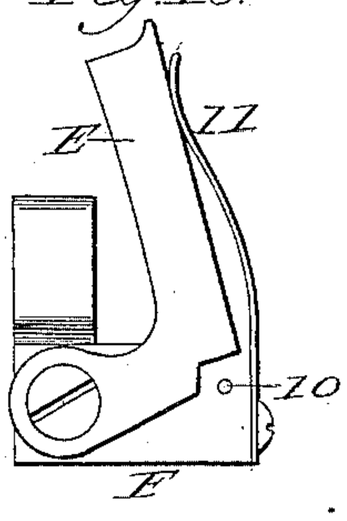


Fig. 9.

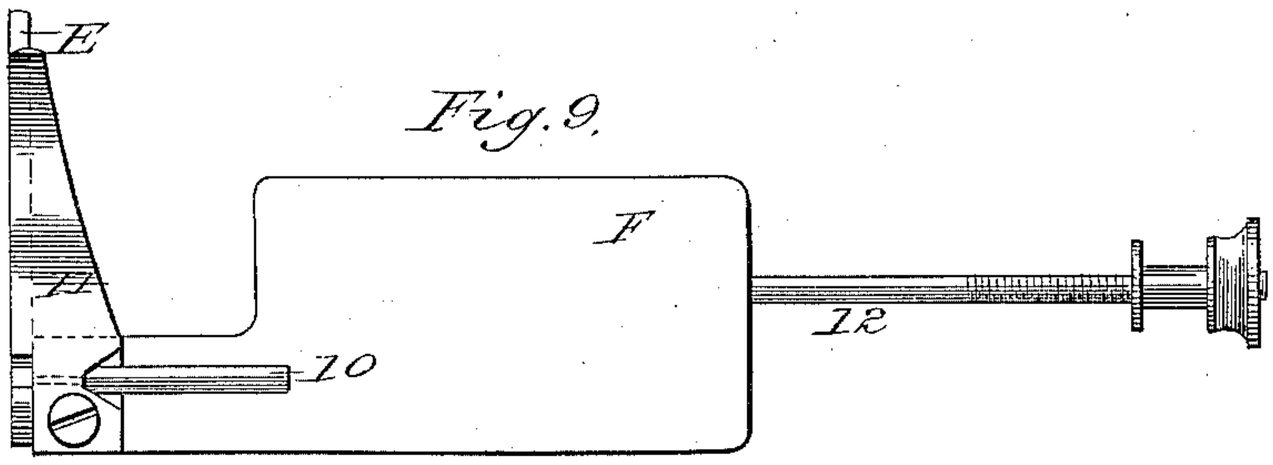
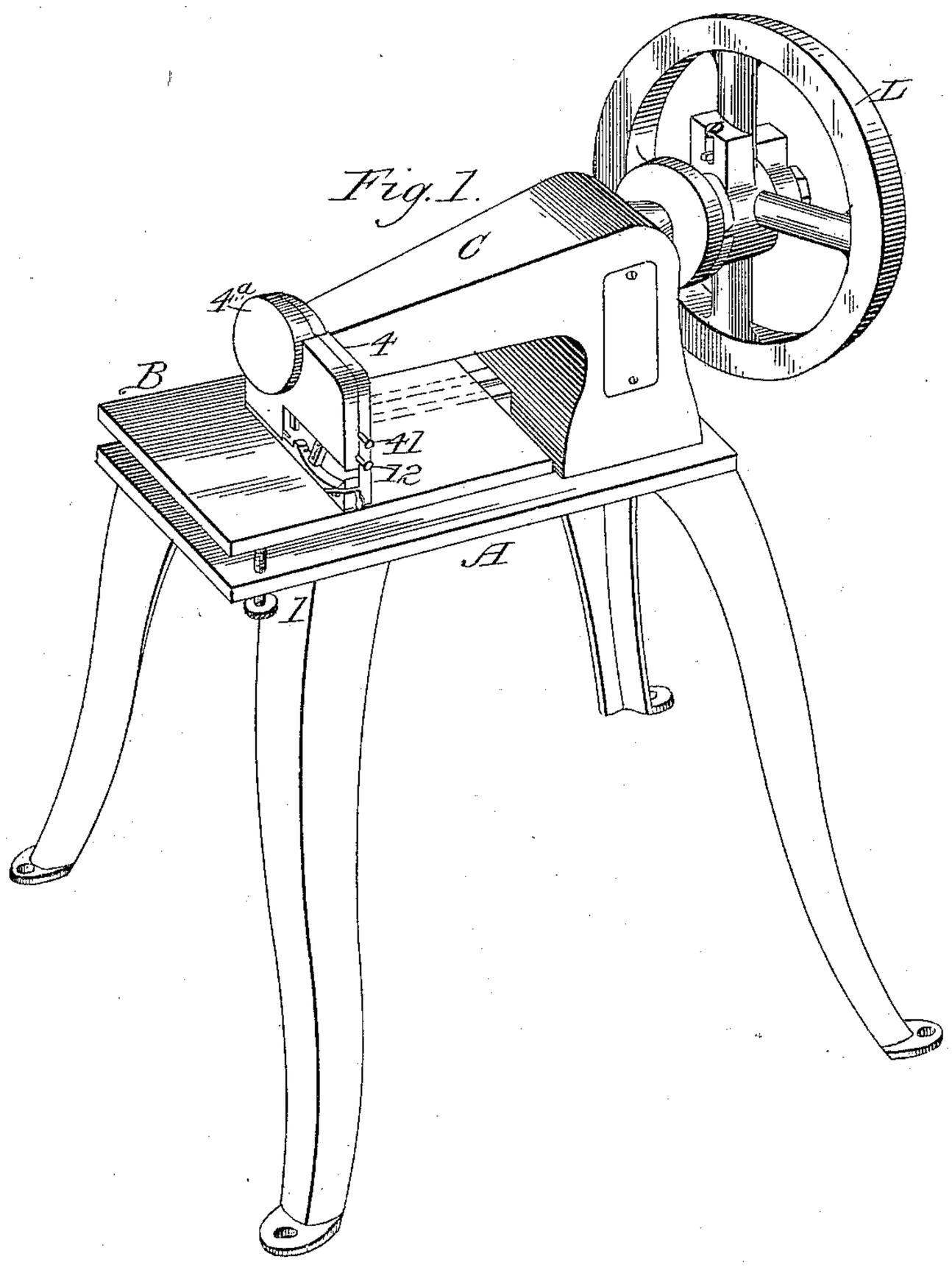


Fig. 1.



Witnesses.
Chas. G. Page.
W. Positer.

Inventor
John F. Daggett
By Jno. G. Elliott
Atty.

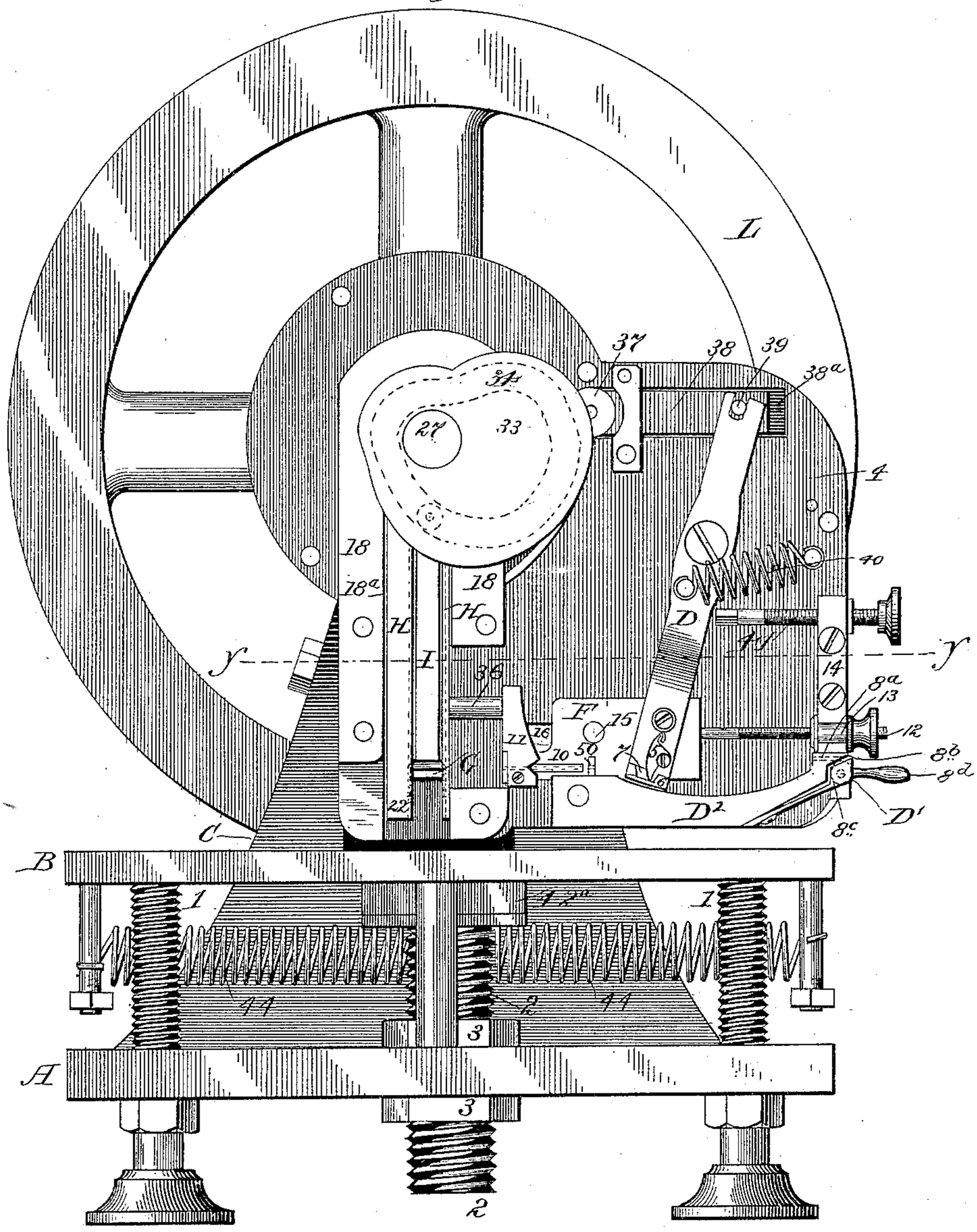
(No Model.) 4 Sheets—Sheet 2.

J. F. DAGGETT.

WIRE STITCHING MACHINE.

No. 409,830. Patented Aug. 27, 1889.

Fig. 2



Witnesses
Chas. G. Page
W. Rossiter

Inventor
John F Daggett
By Jno. G. Elliott
Atty.

(No Model.) 4 Sheets—Sheet 3.

J. F. DAGGETT.

WIRE STITCHING MACHINE.

No. 409,830. Patented Aug. 27, 1889.

Fig. 3

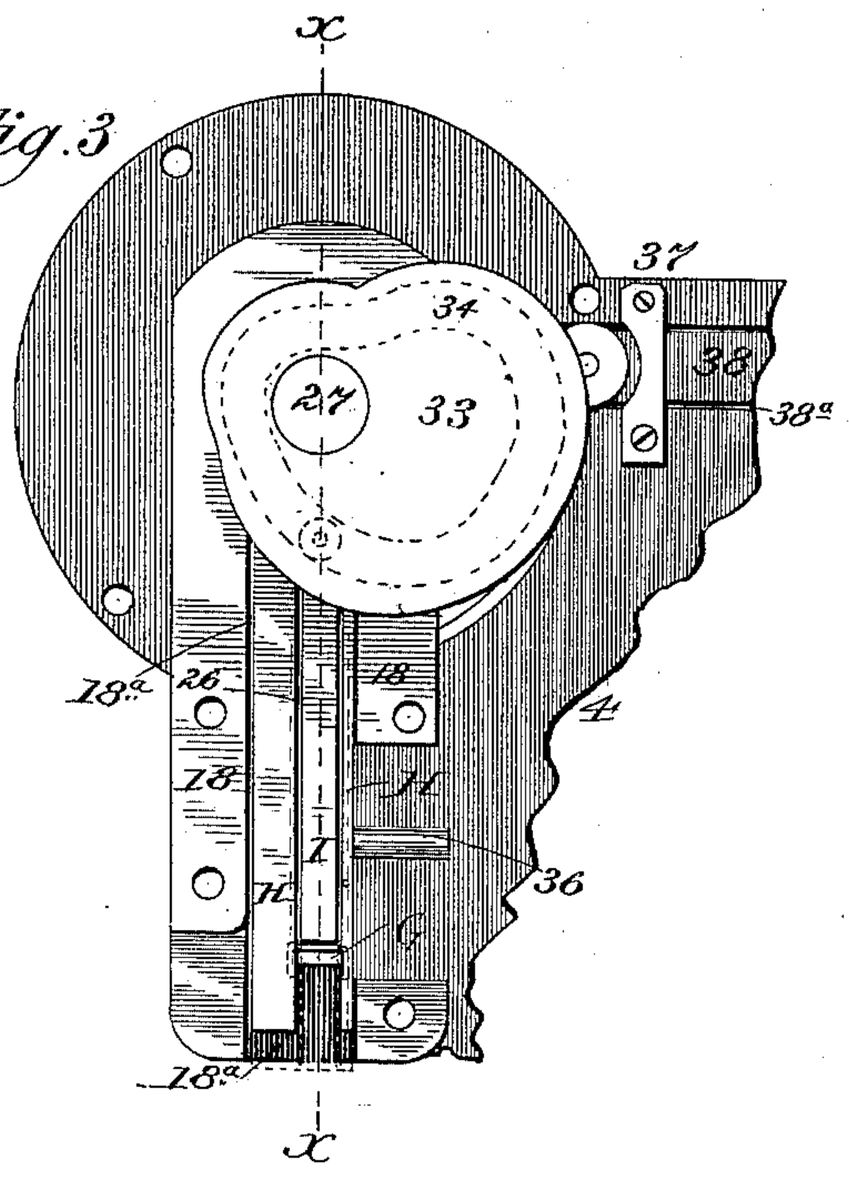


Fig. 4.

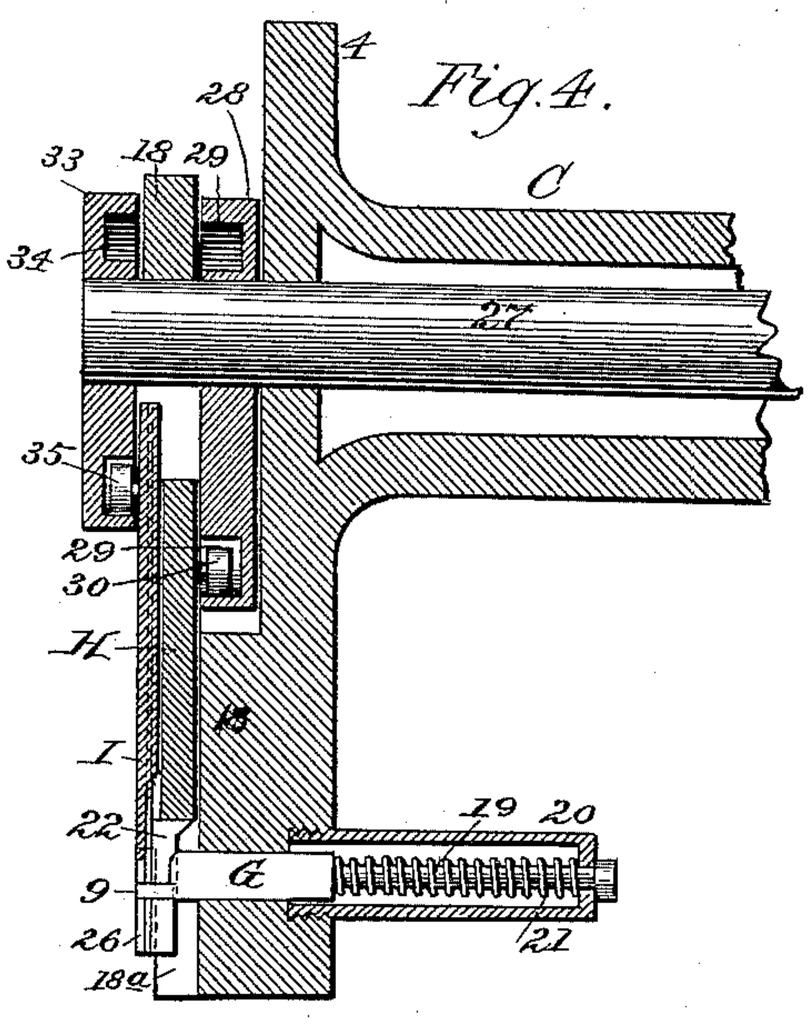


Fig. 5.

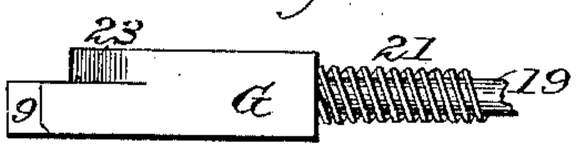


Fig. 6.

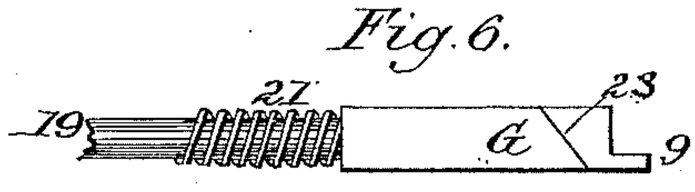


Fig. 7.

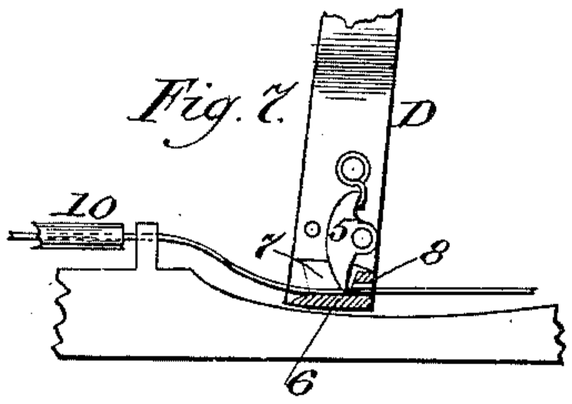
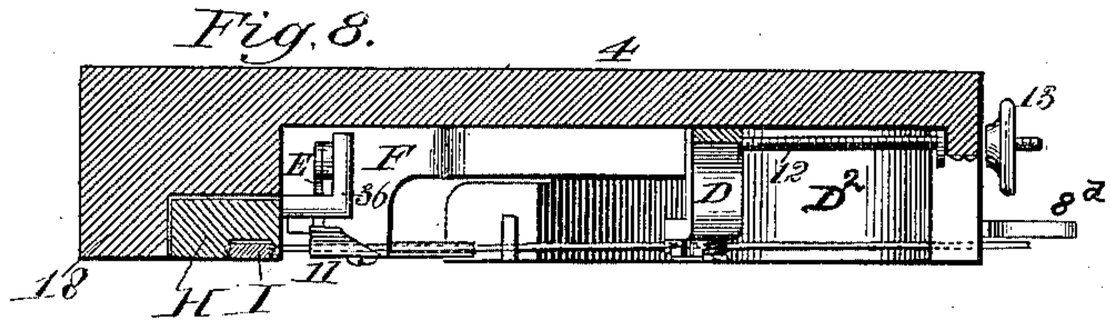


Fig. 8.



Witnesses
Chas. G. Page
W. Positer.

Inventor
John F. Daggett
By Jno. G. Elliott
Atty.

(No Model.) 4 Sheets—Sheet 4.

J. F. DAGGETT.

WIRE STITCHING MACHINE.

No. 409,830. Patented Aug. 27, 1889.

Fig. 11.

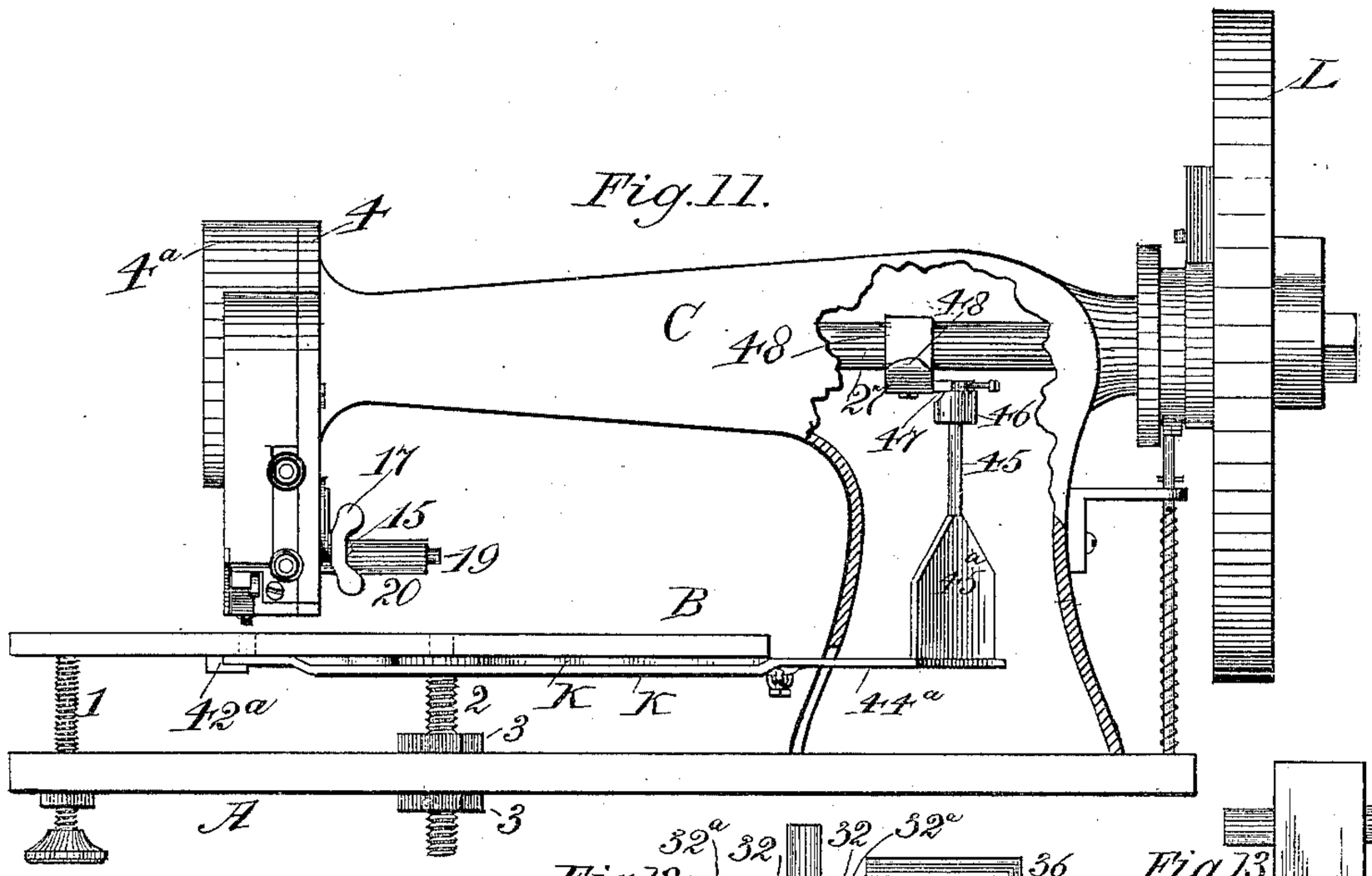


Fig. 12.

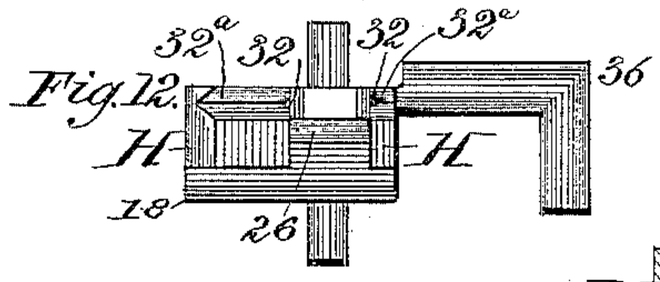


Fig. 13.

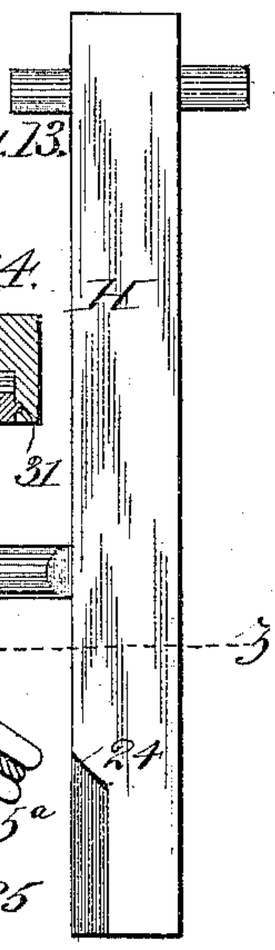


Fig. 14.

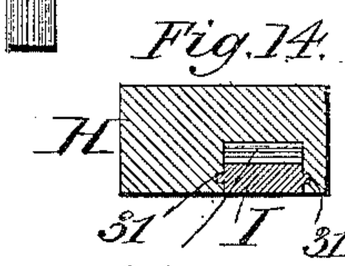
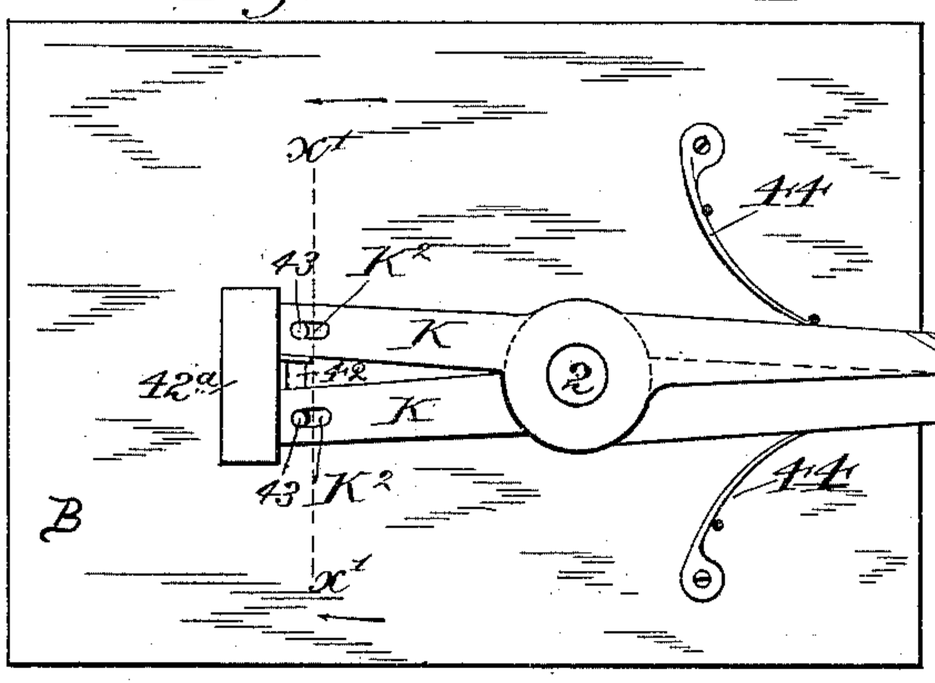


Fig. 15.



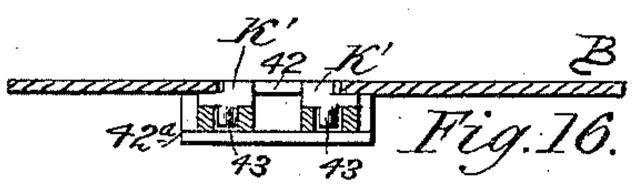


Fig. 16.

WITNESSES.

Chas. G. Page

W. Rossiter

INVENTOR.

John F. Daggett

By: Jno. G. Elliott

Atty.

UNITED STATES PATENT OFFICE.

JOHN F. DAGGETT, OF ELGIN, ILLINOIS.

WIRE-STITCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 409,830, dated August 27, 1889.

Application filed April 19, 1884. Serial No. 128,494. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. DAGGETT, a citizen of the United States, residing in Elgin, county of Kane, and State of Illinois, have invented certain new and useful Improvements in Wire-Stapling Machines, of which the following is a specification.

This invention relates to wire-stitching machines in which the wire is cut and bent into staples and the latter forced through and clinched upon the book or other article to be stitched or secured, and has for its objects to provide improved mechanisms for intermittingly feeding forward the wire, for cutting and bending the wire into staples, for forcing the staples through the article to be stitched, and for clinching the staples upon the article after they have been forced through the same. These objects I attain by the devices hereinafter described and claimed, and illustrated in the annexed drawings, in which—

Figure 1 is a perspective view of my improved wire-stitching machine. Fig. 2 represents, on a larger scale, the front end of said machine in elevation, with the legs for supporting the machine and the cap-plate for covering the staple forming and driving mechanism omitted. Fig. 3 is a like view, showing, however, only a portion of the machine illustrated in Fig. 2, and representing in dotted lines the reciprocating former and plunger in their lowest position. Fig. 4 represents a vertical central section taken on the line *x x*, Fig. 3, with a portion of the bracket-neck and the driving-shaft broken away, which latter is shown in elevation. Fig. 5 is a top or plan view of the sliding former-block with a portion of its stem broken away. Fig 6 represents a side edge view of the said sliding former-block. Fig. 7 is a detail mainly showing the lower end of the vibratory feed-lever carrying a spring-controlled pawl or dog by which the wire is gripped when the said end of the feed-lever is swung forward, said view also showing a part of the end of said lever in section, so as to illustrate a passage for the wire. Fig. 8 is a transverse section through the upper front portion of the machine, said section being taken on a horizontal plane indicated by dotted lines *y y*, Fig. 2. Fig. 9 represents in side elevation a block carrying the spring-controlled cutter, the same being on a scale slightly larger than in Fig. 2. Fig. 10 is an end view of the same, and illustrates more clearly the cutter carried by the said block. Fig. 11 represents a side elevation of my improved machine with the legs removed and a portion of the goose-neck support for the staple-forming mechanism broken away in order to expose the devices for operating the jaws by which the staple is clinched. Fig. 12 is a plan view, on a different scale, of the lower ends of the reciprocating former and plunger, and is mainly made with a view to show the grooves in the lower end of the reciprocating former. This view also shows an arm connected with the reciprocating former and provided for actuating the cutter. Fig. 13 represents one side of the reciprocating former, and illustrates the incline formed in the rear side of the same. Fig. 14 is a section taken transversely through the reciprocating former on line Z Z, Fig. 13, and also through the plunger, which is arranged to slide in a grooved way formed longitudinally in the reciprocating former. Fig. 15 is a plan view of the under side of the staple-clinching mechanism located under the table, and shows springs for the clinching-jaws differing in construction from the springs shown in Fig. 2. Fig. 16 represents a section taken transversely through Fig. 15, looking in the direction of the arrows, said section being taken on a vertical plane indicated by line *x' x'*, Fig. 15, and serving to illustrate the sliding jaws for clinching the ends of the wire staple after the latter has been forced through a book or other like article.

Referring by letter to the several figures of the annexed drawings, in which like letters denote like parts, A indicates a substantial bed, above which is arranged a table B, for supporting a book or other article to be stitched. The table is susceptible of a vertical adjustment, so as to accommodate it to books varying in thickness, and to such end some suitable adjusting mechanism is provided for varying its height—as, for example, an arrangement of set-screws 1 1, passing through the bed and supporting the table at one end, and a screw-threaded bolt or standard 2, extending downwardly from the center of the table through the bed and provided

with nuts 3 above and below the bed, which said nuts can be adjusted upon the standard when the set-screws are operated to raise or lower the table.

Upon the bed is mounted a goose-neck support C, providing in its horizontal arm or neck portion suitable bearings for the driving-shaft and carrying at the end of its said arm or neck a vertical bracket-plate 4, upon which are supported the mechanisms for forming the wire into staples and for forcing the staples through the article to be stitched.

The wire, which is drawn from any suitably-located spool, is fed forward at regular intervals toward the stitching mechanism by means of a vibratory feed-lever D, pivoted upon the bracket-plate 4 and carrying at a point near its lower end a spring-controlled pawl or dog 5, arranged to bite the wire when the lower end of the lever is swung forward toward the stitching mechanism and to release its hold upon the wire when the lower end of the lever is swung back. To such end the vibratory feed-lever (see Fig. 7) is provided at its lower end with a lateral projection 6, upon which the wire is gripped and held by the spring-dog when the said lower end of the feed-lever is swung forward toward the cutter. This lateral projection extends upwardly at one end, so as to provide a short vertical extension through which a horizontal passage 8 is formed for guiding the wire forward and between the dog and the lateral projection. When the feed-lever, however, is swung back, the spring-dog releases the wire, so as to allow the lever to pass back along the latter, and hence prevent the wire from being retracted.

As a means for holding the wire stationary when the lever is thus swung back, so that the resistance of the wire shall open or swing up the gripping end of the spring controlled dog or pawl, I provide at one of the lower corners of bracket-plate 4 a spring-jaw D′, consisting of a block having an inclined upper side and provided with a spring-stem attached to a bearing or block D^2, which is secured to the bracket-plate 4. This jaw carries at one side a cam or eccentrically-pivoted disk 8^c, (shown in dotted lines, Fig. 2,) provided with a handle 8^d for operating the same.

The jaw D′ is arranged to open or close a short horizontal passage 8^a (also shown in dotted lines) for the wire, which said passage is formed through one end of the curved block D^2, secured to the bracket-plate. The inclined top face of the jaw is arranged parallel with a like inclined surface 8^b at the end of block D^2, said parts being so arranged that when the jaw is open the wire passing between the jaw and the block and entering passage 8^a shall be slightly bent, so that, while capable of being drawn freely forward, it yet will take a bite between the jaw and the block at any attempt to push the wire back. The jaw can be opened by operating the cam or eccentric 8^c, so as to cause the latter to act against the incline 8^b, and hence force the jaw D′ away from the entrance of passage 8^a, which commences at the said incline.

The next feature in order is the vibratory cutter E, by which the wire, after having been fed forward by the feed-lever, is severed into the required length for a staple. This cutter is pivoted upon a block F, provided with a horizontal guide-tube 10, or other suitable guide-passage, through which the wire passes on its way to the staple-forming mechanism. The cutter is arranged to sever the wire at a point where the latter emerges from said tube 10 at one end of the block and has its upper end normally maintained by a spring 11 on the block in the path of an arm 36, projecting from a vertically-moving former, which will be presently described. This arm 36 is arranged to strike and operate the cutter during the descent of the said reciprocating former, whereby the wire shall be severed at the proper moment, and as soon as the reciprocating former rises, so as to allow its arm to release the cutter, the cutting-edge at the lower end of the latter will swing up out of the way of the wire.

In order to admit of the wire being cut into different lengths for different sizes of books or other like articles, the cutting mechanism is rendered adjustable with relation to the stitching or staple-forming devices, and to such end the block F, carrying the cutter, is mounted so as to be susceptible of a horizontal adjustment, and thereby allow the cutter to be moved toward or away from the stitching or staple forming-mechanism. For this purpose the block, which is arranged to slide along one of the sides of bracket-plate 4, carries at one of its ends a horizontal rod 12, having a screw-threaded portion on which is arranged a nut or internally screw-threaded collar 13, turning in a suitable bearing or block 14 on the bracket-plate. By turning this nut or collar the block carrying the cutter can be readily adjusted, and in order to maintain the said block in its adjustment on the bracket-plate, I provide on the rear side of the block a laterally-projecting horizontal screw-threaded bolt 15, passing through a horizontal slot 16 in the bracket-plate and carrying a thumb-nut 17, which, when tightened up against the bracket-plate, serves to hold block F securely in position.

The wire which is fed forward by the feed mechanism, and which passes under the cutter, also passes across and rests upon a ledge 9 at one end of a former-block G, Figs. 5 and 6, upon which said end of the cutter a length of wire suitable for forming a staple will be supported at its middle portion, while the unsupported end portions of the said wire will extend beyond opposite sides of the former-block. This former-block consists of a horizontal slide arranged to work in a suitable way or mortise formed through the bracket-plate, which at this point is provided with a block

or enlargement 18, adapted to afford suitable guide for the reciprocating former H, by which latter the ends of the wire extending out at the sides of the former-block are turned down alongside of the latter, so as to form a staple. The former-block is normally projected by spring-pressure out from the bracket and under the reciprocating former during such time as the latter is raised above the former-block, and also until the ends of the wire have been turned down to form a staple. To such end the former-block is provided at its rear end with a stem 19, extending into a case 20, which projects from the rear side of the bracket-plate, and within this case is located a spring 21, arranged to act on said rod for the purpose of throwing the former-block forward. The former-block is pushed back against this resistance at the proper moment by the reciprocating former H, so as to allow the staple to be forced downwardly into and through the book by means of a reciprocating plunger I, which commences its downstroke as soon as the staple has been completed. The reciprocating former H is forked or recessed at its lower end, as at 22, Fig. 4, so as to allow it during its descent to straddle the former-block, and thereby turn down the ends of the wire along the vertical sides of the former-block, as in dotted lines, Figs. 2 and 3.

As a means for pushing back the former-block from under the staple after the latter has been formed on said block by the descending former, I provide at one end of the former-block a bevel or incline 23, Figs. 5 and 6, and upon the rear side of the reciprocating former is provided a similar bevel or incline 24, Fig. 13, arranged at such height above the lower end of the reciprocating former that it will at the proper moment during the downstroke of the reciprocating former strike the incline in the former-block, and thereby push back the former-block, and hence leave the staple free to be forced into the book. This incline on the reciprocating former can be conveniently made by recessing the reciprocating former in its rear sides, as at 25, and forming the top end or wall of the recess so as to provide the incline 24.

The reciprocating former is conveniently made in the shape of a rectangular bar provided in its front side with a longitudinal channel 26, in which the plunger I for driving the staple is arranged to slide. The reciprocating former is reciprocated at the proper moments from the driving-shaft 27 by means of a cam-grooved disk 28, secured on the said shaft, as in Fig. 4. This disk is provided in one of its sides with a cam-groove 29, in which latter a wrist-pin carrying a roller 30 and projecting from the rear side of the reciprocating former is received.

The plunger or driver I is guided in the channel in the reciprocating former by means of vertical ribs 31, (see Fig. 14,) formed along opposite edges of the plunger and working in vertical grooves 32, which are formed in the opposing side walls of the way or channel in the plunger, as in Fig. 12, and also shown in dotted lines, Figs. 2 and 3. These grooves in the reciprocating former, while serving as guides for the plunger, also constitute guides for the wire staple after the latter has been formed by the reciprocating former and while it is being forced down by the plunger. Thus when the ends of the wire are turned down by the descending former said turned-down ends are received in the grooves in the reciprocating former, as shown in dotted lines, Figs. 2 and 3, and hence when the former-block is pushed back by the descending former the staple is retained at its sides in the grooves until pushed down by the plunger below the lower end of the former.

The plunger is reciprocated at the proper moments from the drive-shaft by a cam-grooved disk 33 on the latter. This disk is fixed on the driving-shaft and provided in its rear side with a cam-groove 34, (shown in Fig. 4, and also indicated in dotted lines, Figs. 2 and 3,) in which said groove a wrist-pin carrying a roller 35 on the upper end of the plunger is received.

The reciprocating former carries at one side an arm 36, which at the beginning of the downstroke of said reciprocating former strikes the top end of the cutter, and thereby operates the latter so as to cause it to sever the wire.

The vertical guide block or enlargement 18 of the bracket-plate has a suitable vertical way 18^a for the reciprocating former, and at its lower end terminates at a point above the table, so as to allow a book to be placed on the latter in position for stitching. Said block or enlargement is also appropriately slotted or recessed to allow the wrist-pin on the rear side of the reciprocating former to engage the cam-groove in disk 28, and also to allow said disk to turn with the driving-shaft, as in Fig. 4.

The vibratory feed-lever is operated from the periphery of the disk 29 on the drive-shaft, for which purpose the disk, having a cam-groove in one side for operating the reciprocating former, is eccentrically mounted on the driving-shaft and adapted at the proper moment during its revolution to act as a cam against a small roller 37, carried by a stud on a slide-bar 38, arranged to work horizontally in a way 38^a, formed in the vertical bracket-plate. This slide carries a pin 39, engaging the upper end of the vibratory feed-lever, and hence when the slide is shifted in one direction by the cam the feed-lever will be operated so as to feed forward the wire. The feed-lever is swung back after being released by the cam by means of a suitable spring 40, connecting the feed-lever with a stud upon the vertical bracket-plate.

As a means for limiting the back swing of the feed-lever, I provide an adjustable stop

41, consisting of a screw-rod arranged to turn in bearing 14 on the bracket-plate and having one end lying in the path of the feed-lever.

As a means for clinching the ends of the wire staple upon the book after the staple has been forced through the latter by the plunger, I provide under the table a pair of pivoted levers K, provided at their forward ends with clinching-jaws, which are held open until the staple has been forced through the book or other article to be stitched, after which the jaws are closed, so as to force the ends of the staple projecting below the book toward each other and bend or clinch said ends upon the book or other article. These levers K are pivoted together under the table by means of the pin or standard 2.

The two clinching-jaws K′ (see Fig. 16) are arranged to slide in a slot 42, formed transversely through the middle portion of the table B at a point below the plunger, and are supported on the outer ends of the pivoted levers K, so that as the said ends of the lever are opened or closed the sliding jaws shall be moved apart or brought toward each other. The clinching-jaws have a sliding connection with the levers K, so that when the latter move in the arc of a circle the jaws shall slide in a right line, and to such end each jaw has on its under side a stud or pin 43, received in a short slot K^2, formed in the lever on which the jaw is supported. The jaws are guided by the walls of slot 42, in which the jaws slide, and the forward ends of the levers K work over the horizontal portion of an angle-plate 42^a, which is secured to the under side of the table, which said plate prevents the levers from sagging at their said forward ends. The ends of the wire staple projecting below the book into which the staple has been driven by the plunger enter slot 42 and stand between the two clinching-jaws in position to be bent by the latter inwardly and against the book lying on the table as the jaws move toward each other.

The jaws are normally held open by means of springs 44 44, respectively connecting the levers with bolts depending from the table or some other stationary part of the machine, as in Fig. 2, or the springs can be made and applied as illustrated in Fig. 15. The handle or shank ends 44^a of these spring-controlled levers extend back into the vertical portion of the goose-neck support on the table, which said support is made hollow in order to conveniently contain a mechanism for operating the levers so as to close the jaws at the proper moment. This jaw-operating mechanism is actuated at intervals from the driving-shaft, and consists of a vertically-arranged rock-shaft 45, Fig. 11, arranged to oscillate in a suitable bearing 46, and provided at its lower end with a flattened or blade-shaped portion 45^a, which, when the jaws are open, stands with its sides parallel or substantially parallel with the lever or handles between which it is arranged, it being understood that when the jaws are open the ends 44^a of the levers or handles will be closed against the sides of said blade-shaped end of the rock-shaft.

The rock-shaft is provided at its upper end with an arm or analogous projection 47, which at the proper moment is engaged by a cam 48 on the driving-shaft, whereby the rock-shaft 45 during the engagement of said cam with the arm or projection 47 on the upper end of the rock-shaft 45 will turn the latter so as to cause the blade 45^a in making a part revolution to spread apart the rear ends 44^a of the levers which carry the jaws at their forward end, and hence cause the jaws to close and clinch the wire staple. As soon as the rock-shaft is released, however, the force of the springs connected with the levers K will operate the latter so as to close their ends 44^a, thus turning the rock-shaft back to its first position and opening the jaws.

The horizontal block D^2 is concaved on its upper side to allow the feed-lever to swing freely, and also to bring the passages 8^a and 50 for the wire in or on the block at the ends of its concavity to lie somewhat above the lower or feed end of the vibratory feed-lever, whereby the grip of the spring-dog on the wire during the forward swing of the feed-lever shall be insured. The staple forming and driving mechanism is preferably covered by a cap 4^a, attached to the vertical bracket-plate, and, if necessary, a plate covered by such cap can be placed over the lower front of the reciprocating former and plunger.

The driving-shaft is conveniently provided with a belt-wheel L and with some suitable clutch mechanism for connecting and disconnecting the wheel with the shaft, which said clutch can be operated from a treadle, so that the workman can at any time stop the machine—as, for example, after each book has been stitched.

The reciprocating former is provided in its lower end with transverse notches 32^a, Fig. 12, in which the ends of the wire are received at a time when the reciprocating former during its descent first strikes the ends of the wire at the sides of the former-block.

The following is a brief summary of the operation of this machine. The book or other article to be stitched is placed in position upon the table and under the reciprocating former. Power is applied and the book shifted or fed forward by hand or by any suitable mechanical means after each staple has been formed, driven through, and clinched upon the book. The feed-lever feeds the wire through the guide-passages and causes it to advance into position across the former-block. The reciprocating former then commences its downstroke, at which juncture the arm on the said reciprocating former acts upon the arm of the cutter, so as to cause the cutter to sever the wire, thus leaving on the former-block a length suitable for a stitch or staple. The descending former bends the end of the wire

downwardly and along opposite sides of the former-block, so as to form a staple, after which the shoulder or incline on the descending former engages the incline on the former-block, so as to force back the former-block, and thereby leave the staple free to be forced down by the plunger, which now descends, driving the ends of the staple into and through the book. After the staple has been thus forced into the book the jaws operate to clinch the ends of the staple against the book, during which clinching operation the plunger holds the book down upon the table. The reciprocating former and plunger then rise, so as to come into position for forming and driving the next staple, and the former-block, which has been kept back by the reciprocating former so long as the incline on the reciprocating former was below the front end of the former-block, will be thrown out by its spring as soon as the incline on the reciprocating former has reached a point above the former-block. The jaws after clinching the wire are automatically opened by the springs already described. In this way means are provided for automatically performing a succession of steps necessary to the forming, driving, and clinching of wire staples made from a continuous wire automatically fed forward at desired intervals.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a wire-stapling machine, the combination of a revolving shaft, a reciprocating former and driver, cams on said shaft in direct engagement with the former and driver, and a work-supporting table below said former and driver, substantially as described.

2. In a wire-stapling machine, the combination of a revolving shaft, a reciprocating former and driver, cams on said shaft in direct engagement with said former and driver, and an adjustable work-supporting table below said former and driver, substantially as described.

3. In a wire-stapling machine, the combination of a revolving shaft, cams on said shaft, a former and driver respectively actuated by said cams, and a wire-feed actuated by one of said cams, substantially as described.

4. The actuating-cams and shaft thereof, in combination with a former and driver projecting between and engaging said cams, substantially as described.

5. The combination, with the cutter, a support therefor, and a pivoted connection between said cutter and support, of an adjustable screw-rod for bodily moving the cutter back and forth to adapt it for cutting wires of different lengths, substantially as described.

6. The clinching-jaws and the levers pivoted together and supporting said jaws, in combination with a pivoted connection between said jaws and levers, substantially as described.

7. The table, the clinching-jaws, and levers pivoted thereto and to each other, in combination with means, substantially as described, for adjusting said jaws and table, substantially as described.

8. The levers K and the clinching-jaws thereof, in combination with the rock-shaft and a blade on said shaft projecting between said levers, and means, substantially as described, for rocking said shaft and oscillating the plate, substantially as described.

JOHN F. DAGGETT.

Witnesses:
CHAS. G. PAGE,
W. W. ELLIOTT.