(No Model.)

5 Sheets—Sheet 1.

C. L. LASCH.

WIRE STITCHING MACHINE.

No. 397,372.

Patented Feb. 5, 1889.

FIG. 1.

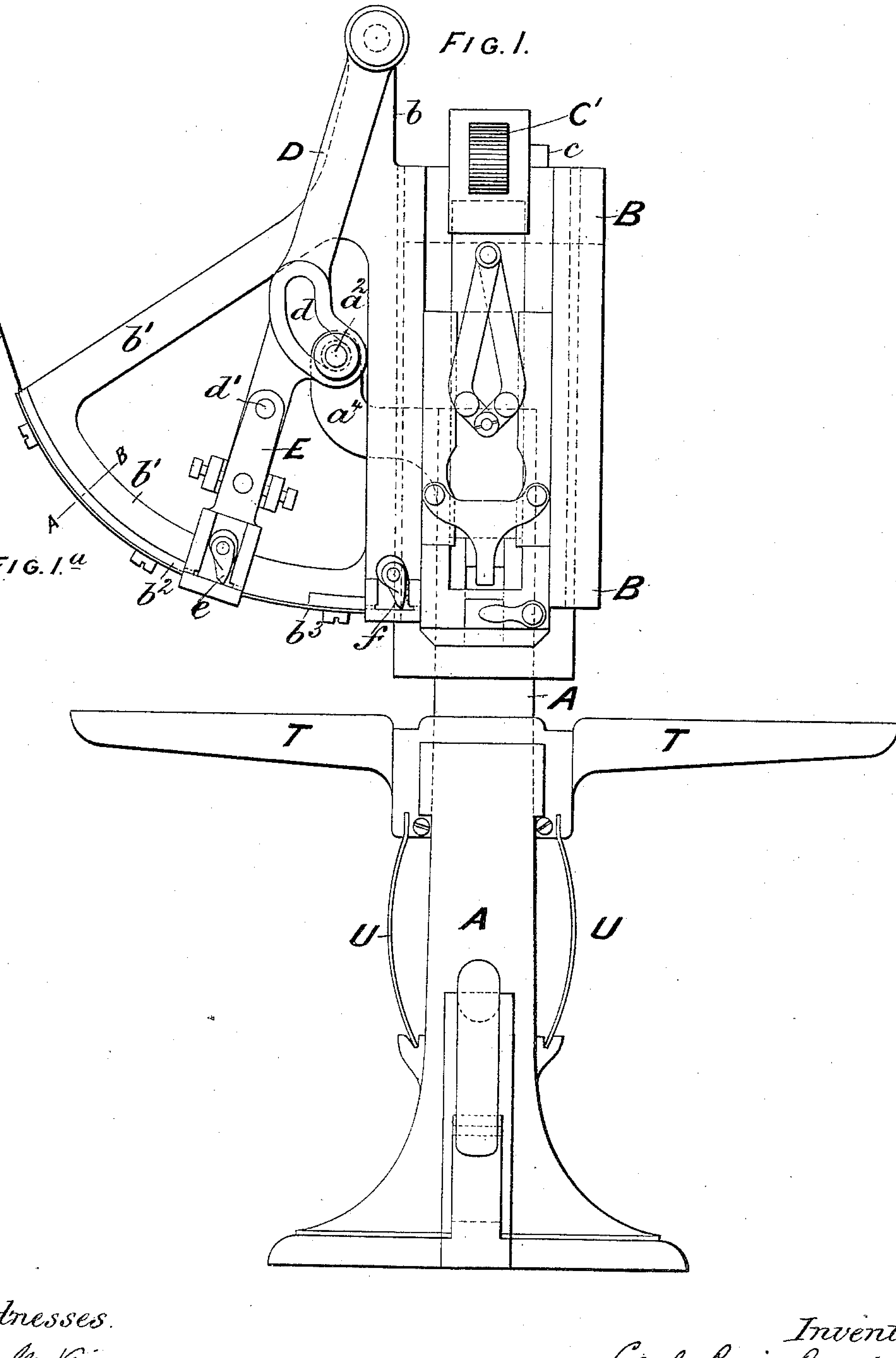

FIG. 1.a

Witnesses.

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Inventor
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per Fairfax & Wetter
Attorneys.

N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.)

5 Sheets—Sheet 2.

C. L. LASCH.

WIRE STITCHING MACHINE.

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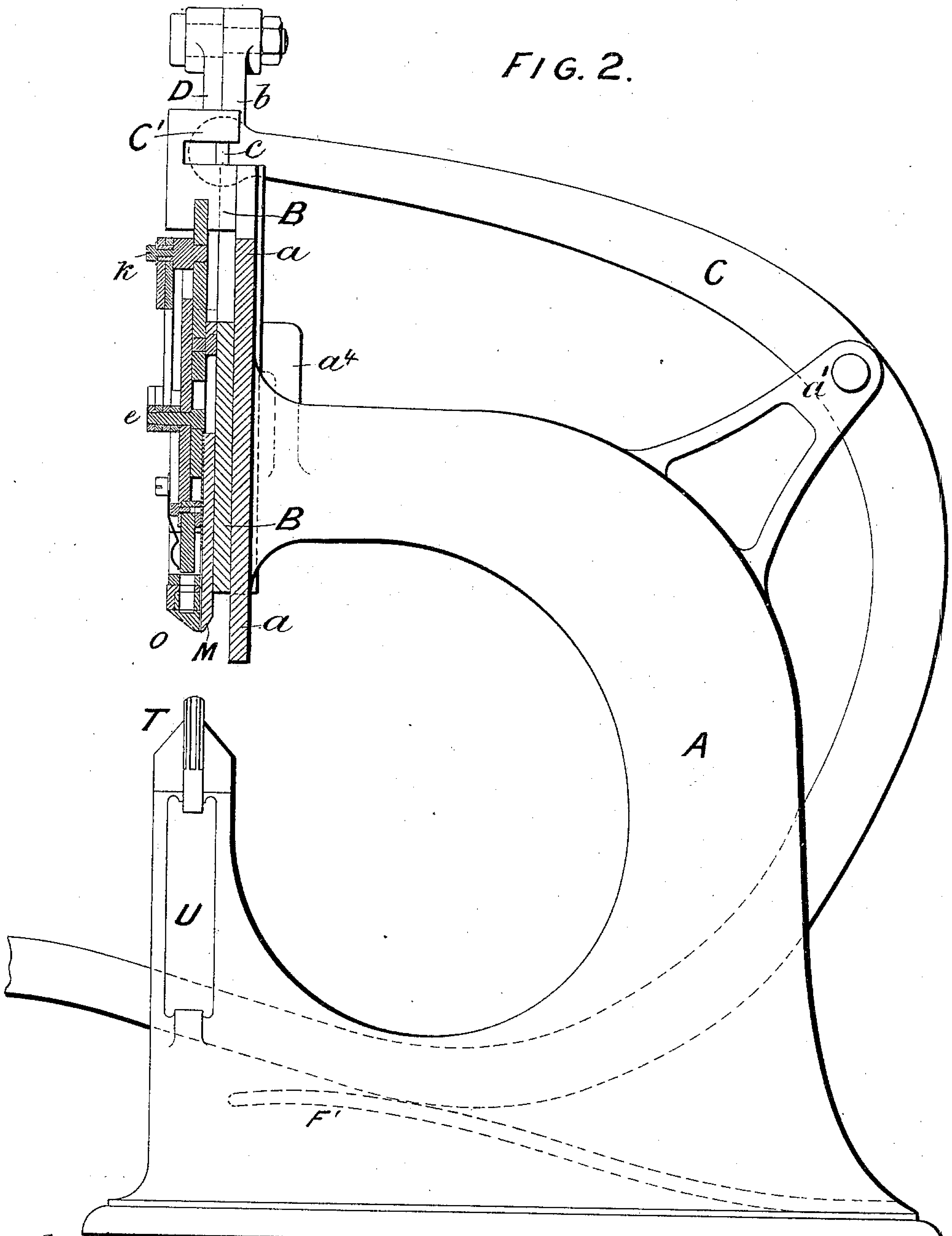
FIG. 2.



Witnesses.

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R. W. King

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N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.) 5 Sheets—Sheet 3.

C. L. LASCH.

WIRE STITCHING MACHINE.

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FIG. 5.

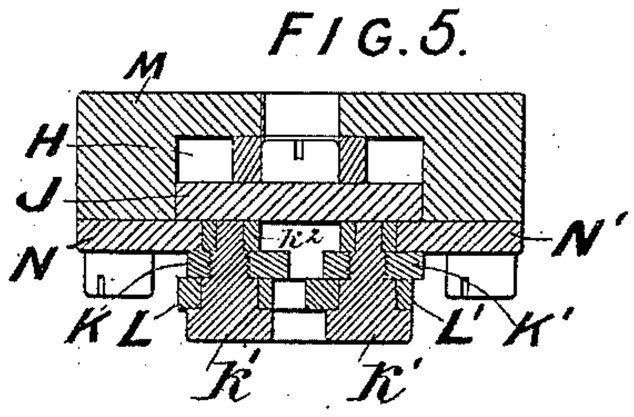
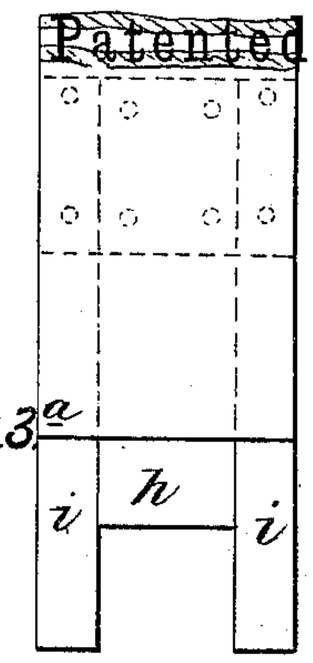


FIG. 3.



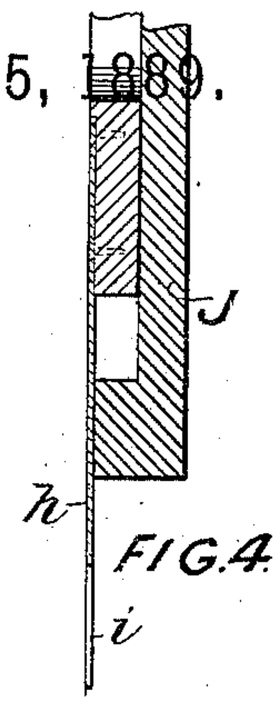


FIG. 4a.

FIG. 3.

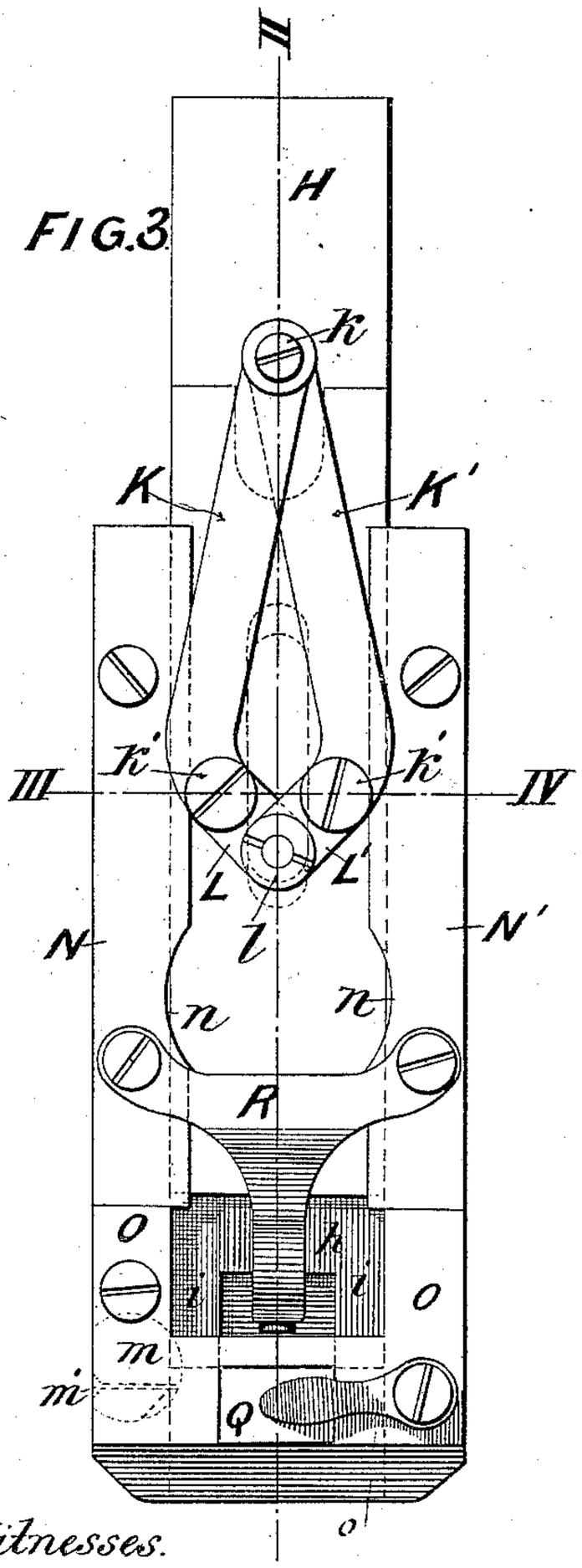


FIG. 4.

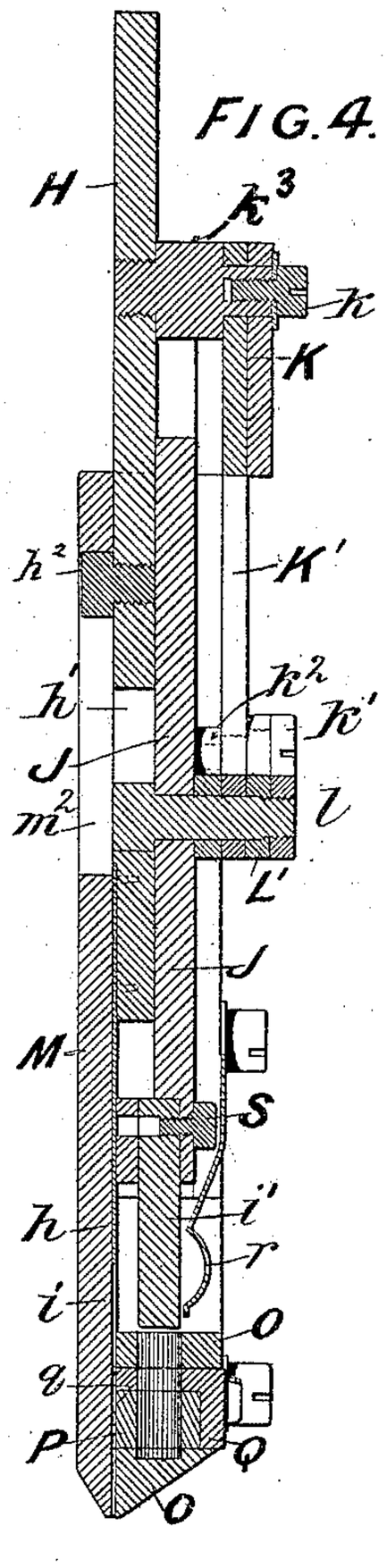
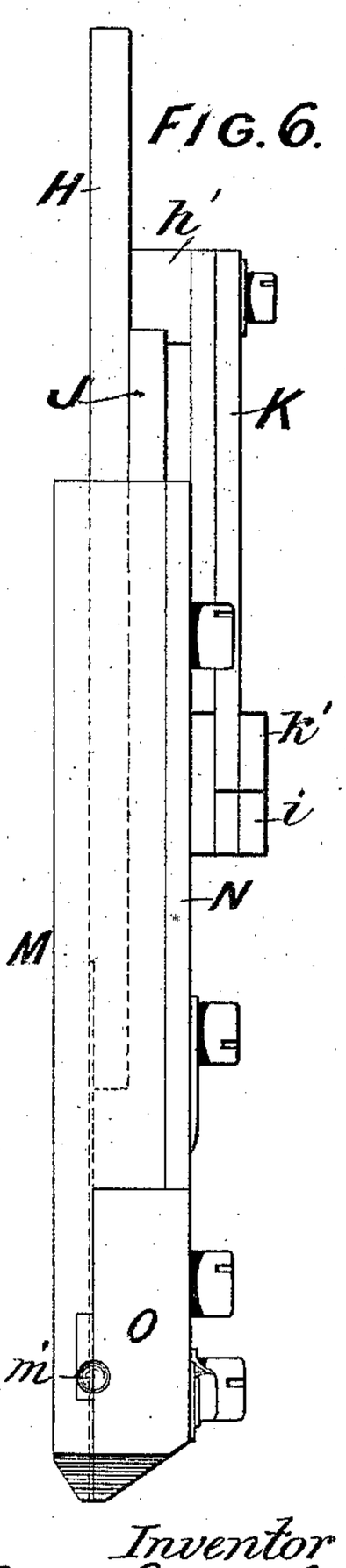


FIG. 6.



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(No Model.) 5 Sheets—Sheet 4.

C. L. LASCH.

WIRE STITCHING MACHINE.

No. 397,372. Patented Feb. 5, 1889.

FIG. 8.

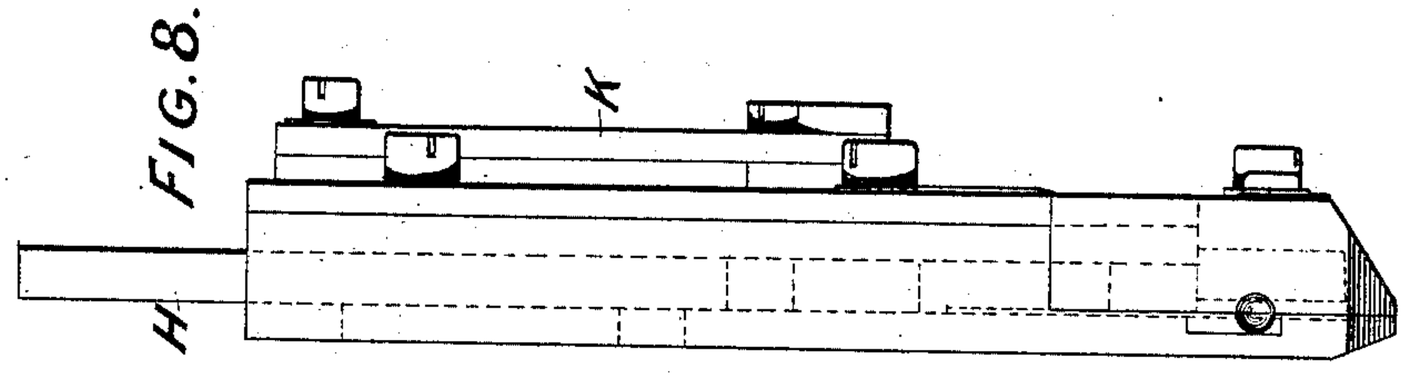
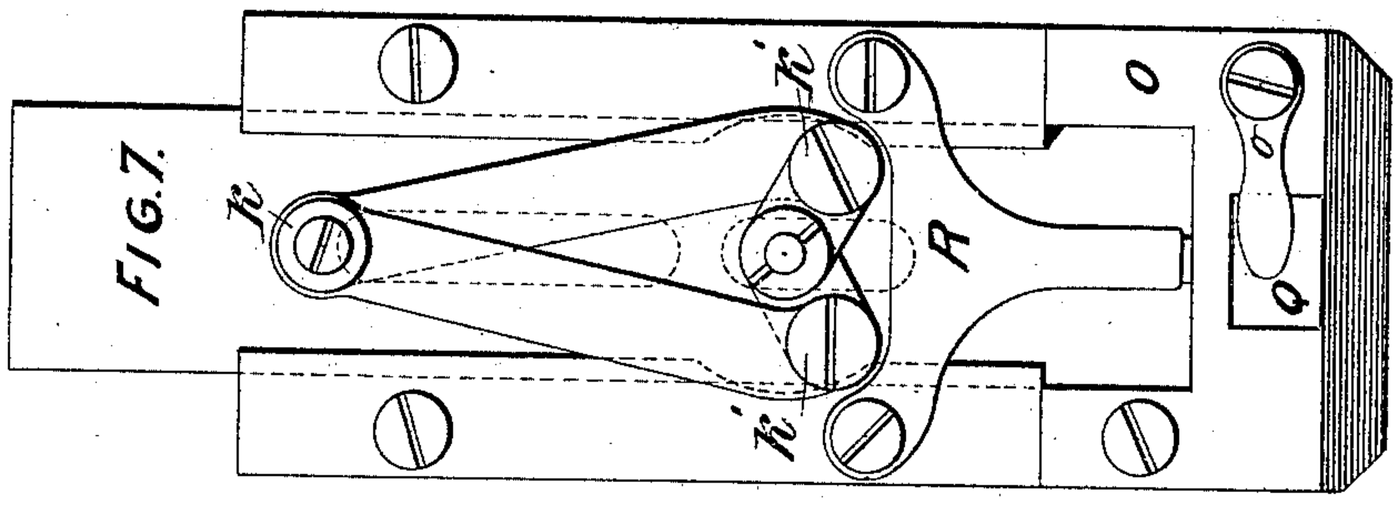


FIG. 7.



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(No Model.) 5 Sheets—Sheet 5.

C. L. LASCH.

WIRE STITCHING MACHINE.

No. 397,372. Patented Feb. 5, 1889.

FIG. 14.

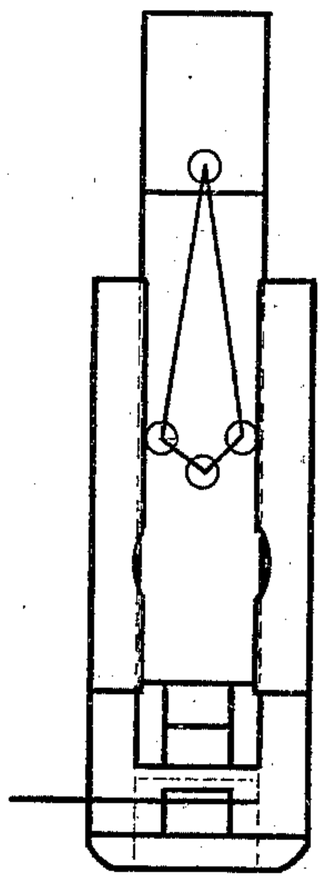


FIG. 11.

FIG. 15.

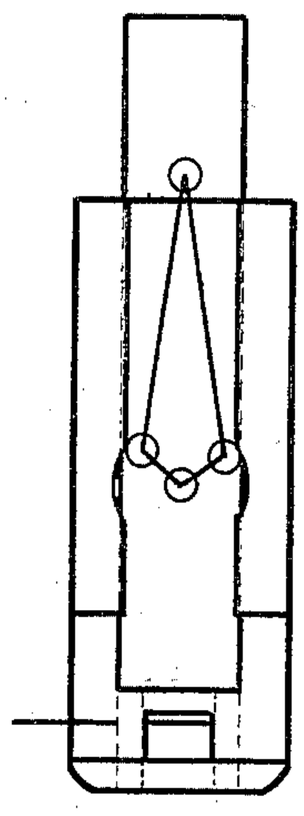


FIG. 12.

FIG. 16.

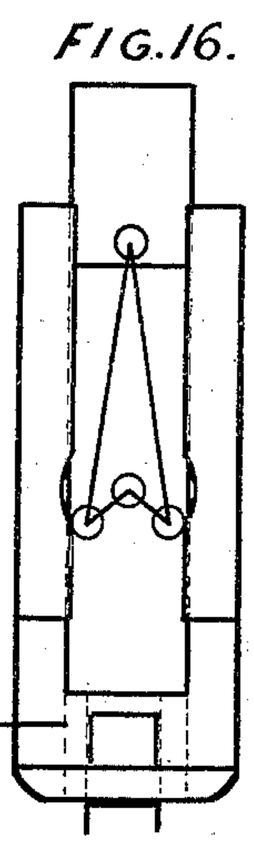


FIG. 13.

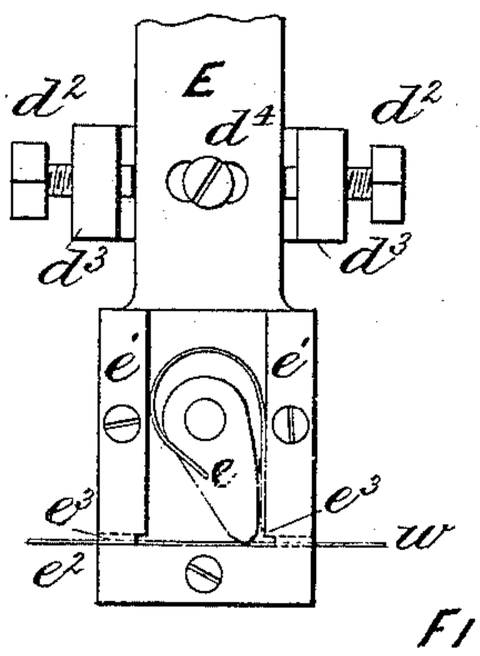
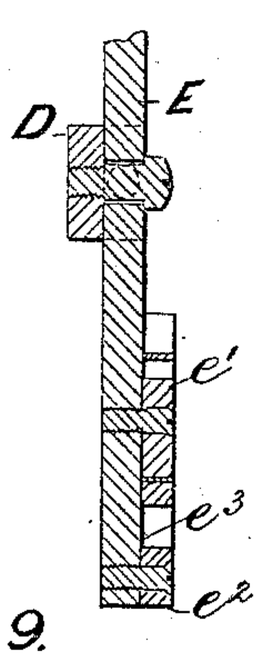


FIG. 9.



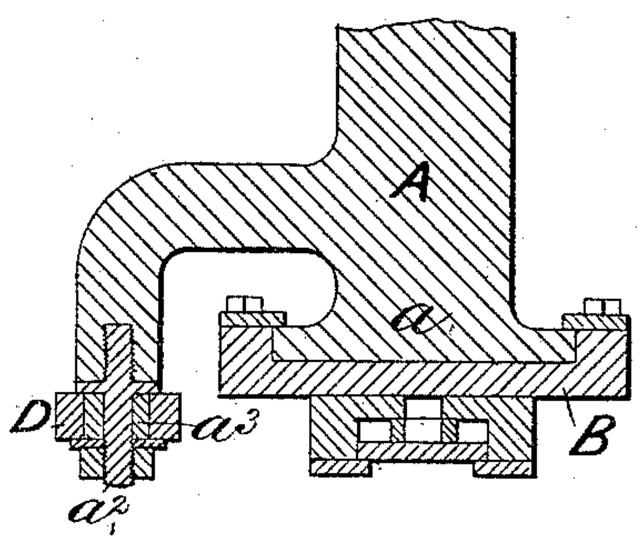
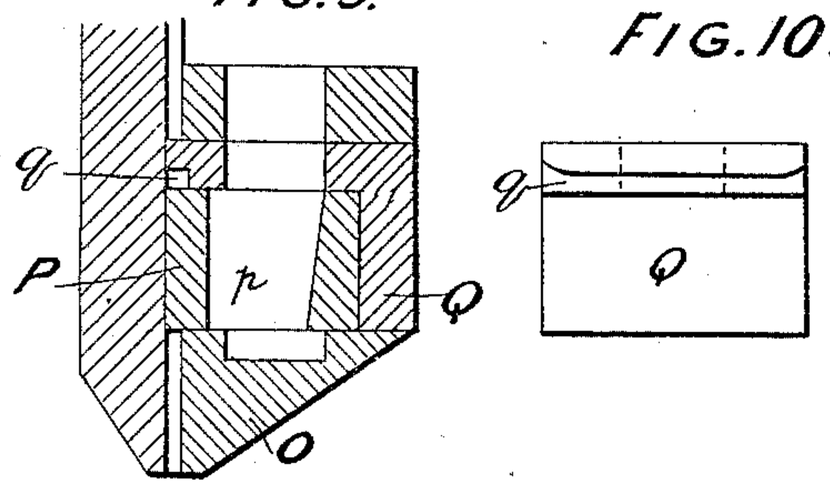


FIG. 10.



Witnesses:
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M. Carpenter

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C. L. Lasch
by Fairfax & Wetter
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UNITED STATES PATENT OFFICE.

CARL LOUIS LASCH, OF REUDNITZ, LEIPSIC, SAXONY, GERMANY.

WIRE-STITCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 397,372, dated February 5, 1889.

Application filed March 16, 1887. Serial No. 231,187. (No model.)

To all whom it may concern:

Be it known that I, CARL LOUIS LASCH, a subject of the Emperor of Germany, and a resident of Reudnitz, Leipsic, Saxony, Germany, have invented certain new and useful Improvements in Wire-Stitching Machines, of which the following is a specification.

My invention relates to machines for stitching pamphlets or books by means of metallic staples formed automatically in the same machine which stitches the pamphlet.

The principal features of novelty are the mechanism for introducing the wire from the coil or reel into the staple-forming head and the mechanism for producing the motion of the slide which cuts off the wire.

In the following description reference will be made to the accompanying drawings, of which—

Figure 1 is a front elevation, and Fig. 2 a side elevation and partial section, of a complete machine embodying my invention. Fig. 3 is a front elevation of the staple-forming head on a larger scale. Fig. 4 is a section of the same along line I II of Fig. 3. Fig. 5 is a section along line III IV of Fig. 3, and Fig. 6 a side elevation. Figs. 7 and 8 show the staple-forming head in a different position. Fig. 9 is a vertical section showing the lower part of Fig. 4 on a larger scale, and Fig. 10 is an elevation of the bending-anvil Q shown in Fig. 9. Figs. 11 and 12 illustrate details of the wire-feeding mechanism. Fig. 13 is a horizontal section through the staple-forming head and the adjoining parts of the machine-frame. Figs. 14, 15, and 16 are diagrams illustrating three consecutive stages of the formation of the staple.

The various mechanisms are mounted on a stand or main frame, A, forming in front a bed-plate, *a*, for a vertically-movable slide, B, Figs. 2 and 13, and at the back a fulcrum-support, *a'*, for the operating-lever C. This lever is operated by a treadle situated in front of the machine, and sets in motion the staple-forming head, as well as the wire-feeding mechanism.

The vertical slide B B, Figs. 1 and 13, is provided at the entrance side of the machine with a fulcrum-support, *b*, for an oscillating lever, D, and with a frame, *b' b'*, which has the shape of a sector and serves to guide the wire *w* on its way to the staple-forming head. Consequently any up or down motion of the slide B is also imparted to the guiding-frame *b'* and to the lever D. Fig. 1^a is a section through sector *b'* along line A B of Fig. 1.

The feed-lever D is intended to grip the wire at the beginning of the operation and to carry it toward the staple-forming head until the latter has received the quantity necessary for the formation of a staple.

As shown by Figs. 11 and 12, the wire passes through a pair of grooves, e^3 e^3, formed by the plates *e' e'* and e^2, screwed onto the extremity of the feed-lever, and comes in contact with a spring-pawl, *e*, situated between the plates *e' e'*. This spring-pawl is arranged so as to grip the wire when traveling toward the staple-forming head and to release the same when traveling backward. The oscillation of the feed-lever is limited by the flanges or stops b^2 and b^3, formed on the sector-frame *b'*. To prevent the wire from going back on the return motion of the feed-lever, another guide with spring-pawl *f*, similar to that described above, is attached to the slide B, immediately before the staple-forming head.

The oscillating motion of the feed-lever D is derived from its up and down motion in the following manner, (see Figs. 1 and 13:) The machine-stand A has a laterally-projecting arm, a^4, carrying at its extremity a fixed stud, a^2, on which is mounted a friction-roller, a^3, Fig. 13. This roller fits into a curved slot, *d*, formed by the lever D, Fig. 1. When the slide B, with lever D, moves up and down, the friction-roller a^3, being and guided in the slot *d*, causes the lever to oscillate on its fulcrum.

To insure that the correct length of wire will be fed to the staple-forming head, even when the wear and tear between the pivot of the lever D and its bearings interferes with the accuracy of its motion, the lower end of the lever D is made of a separate piece, E, pivoted to the upper part at *d'* and rendered adjustable by a pair of set-screws, d^2 d^2, Fig. 11, passing through flanges d^3 d^3 at the lower end of the upper part, D. The oscillation of the lever D is made larger than would be necessary and allowable if the lower arm, E, were rigidly attached to it. Consequently the lower arm, E, will move until it comes into contact with the flange b^3, Fig. 1, after which the up-

per arm, D, continues to move for a short distance.

In Fig. 11, d^4 is the head of a screw passing through a slot of the arm E and secured in the arm D. This screw serves to keep the arm E in contact with the arm D while turning on its pivot d'.

The down motion of the operating-lever C is transmitted to the slide B by a stud, c, Figs. 1 and 2, projecting from the side of the lever C and pressing upon the narrow upper end of the slide. During the down motion of the lever C, the stud c, being constrained to describe a curved path, will slide forward on the upper extremity of the slide B until the rear edge of the stud c has reached the upper front edge of the slide B, after which the stud c will slip off and allow the slide to stand still while the lever C continues its down motion. During this further down motion the head C′ of the lever C, being situated in a slot at the top of the staple-forming head, (see Fig. 1,) presses the latter down independently of the slide B, while the slide B, and therefore the feed mechanism, remains stationary.

Suitable means must be provided for replacing the lever C into its starting position after it has been depressed. For this purpose the lower part of frame A incloses a bent leaf-spring, F. (Shown in Figs. 1 and 2.) As will be seen from Fig. 2, which shows the spring in dotted lines, the lower end of the spring is attached to the frame A, while the upper end is in contact with the lower part of lever C. The downward motion of the lever is produced by pressure on a treadle (not shown in the drawings) acting in opposition to the pressure of the said spring F, while the return or upward motion is produced by the spring.

The staple-forming head, Figs. 1, 2, 3, 4, and 5, comprises a base-plate, M, fixed to the slide B, and forming a guide and bed for the vertically-movable cutting-slide J and staple-driver H. The inlet side of this base-plate contains a circular block, m, Fig. 3, having on its outside a mouth, m', Figs. 3 and 6, for introducing the wire, and on its inside a sharp edge, which acts as a support and stationary knife-edge when the cutting-knife i descends to cut off the wire. The cutting-slide J has at its lower end a pair of vertical tongues, i i, and the staple-driver H has at its lower end a driving-plate, h, situated between the said tongues and in the same plane. (See also detached views, Figs. 3^a and 4^a.)

The cutting-slide is made to move in unison with the bending-slide by means of a peculiar mechanism composed chiefly of a pair of knee levers or links, K L and K′ L′, connected with each other, so as to form a variable quadrilateral. The two upper links, K K′, are pivoted to the same stud k, fixed in the face of the slide H. The two lower links, L L′, are pivoted at their lower ends to the same stud l, fixed in the face of the cutting-slide J. The right and left corners of the quadrilateral are formed by pins k' k', which join the lower ends of the links K K′ to the upper ends of the links L L′, and are provided with friction-rollers k^2, situated below the links K K′. These friction-rollers roll up and down along the inner edges of two parallel guide-plates, N N′, screwed to the base-plate M, and forming a pair of covers for the right and left edge of the cutting-slide J. These guide-plates N N′ have at their lower part a pair of curved recesses, n n', placed symmetrically to each other, and allowing the quadrilateral to expand sidewise as soon as the friction-rollers reach the said recesses.

The slide H is set in motion by the head C′ of the operating-lever C, for which purpose the top of the slide H is enlarged and provided with a slot, as indicated by Figs. 1 and 2, but not shown in Figs. 3 to 8.

If the slide H is pressed downward by the lever C, the friction-rollers k^2 will at first roll along the parallel inner edges of the guide-plates N N′, and the quadrilateral will be rigid and force the cutting-slide J to take part in the motion of the slide H; but when the friction-rollers reach the recesses n n' the further down motion of the slide H will only cause the quadrilateral to expand, while the cutting-slide J remains stationary.

On the lower part of the base-plate M is screwed a cover-plate, O, containing the bending-anvil P. (See Figs. 9 and 10.) This anvil is surmounted by an angle-plate, Q, and adapted to move with the latter perpendicularly to the slides H and J. The angle-plate Q has a horizontal groove, q, Figs. 4, 9, and 10, which serves to guide the wire placed on the anvil, and is situated on the same vertical plane as the cutting-tongues i and driving-plate h. The anvil and angle-plate are pushed forward out of the way of the driving-plate h at the proper moment by means of a stud or pin, i', projecting downward from the cutting-slide J, the said pin entering a slightly-oblique hole, p, in the anvil and angle-plate, and thereby pushing the latter forward. As indicated by Fig. 9, the hole p is not circular from end to end, but slightly oval at the top, where the pin i' enters, thereby forming an incline, against which the stud i' acts, so as to push the anvil P and Q outward during the down motion of the pin. The return motion of the anvil is produced by a spring, o, screwed to the cover-plate O. To prevent the cutting-slide J from moving upward during the first part of the up motion of the staple-driver when the friction-rollers are still in the recesses n n', a stationary break-spring, R, is screwed to the plates N N′, and a pin, S, is fixed to the face of the cutting-slide J. In the lowest position of the slide J the pin S is situated in a cup-shaped recess, r, at the lower end of the spring R, and forms an obstacle to the lifting of the slide J. The resistance thus produced is greater than the effort required for stretching the variable quadrilateral K L K′ L′; consequently the

latter will be stretched before the slide J begins to ascend.

In the diagram, Fig. 14, the wire has just been fed into the staple-forming head, the cutting-tongues *i i* are situated immediately above the wire *w*, the down motion of the slides H and J begins, and the wire is being cut off.

In Fig. 15 the ends of the staple have been bent down over the bending-anvil by the tongues *i i*, the friction-rollers have arrived at the recesses *n n'*, the quadrilateral begins to expand, and the cutting-slide stops.

In Fig. 16 the bending-anvil has been moved out of the way, the driving-plate *h* has driven the staple out of the staple-forming head, and the slides H and J have reached their lowest position.

The head of the bolt *l* moving in the vertical slot *h'* of the slide H serves to limit the motion of the slide J, and the head of the pin h^2 moving in the vertical slot m^2 serves to limit the motion of the slide H, as shown in Fig. 4.

The stud *k*, screwed into the slide H, has an enlargement or collar, k^3, which maintains the distance between the links K K and the slide H. This collar fits into a vertical recess in the upper end of slide J, as shown in Fig. 3 by dotted lines, and serves to limit the down motion of slide H relatively to slide J.

The apparatus for clinching the staples after they have been driven through the sheets of paper laid upon the saddle T T, Fig. 1, is the same as described in the specification of the British Letters Patent No. 16,138, dated December 8, 1884, and will not therefore require a detailed description. U U are the springs which support the saddle T T and allow the same to move up and down.

What I claim is—

1. In a machine for forming and applying metallic staples, the combination, with the main frame or machine stand, of a feed-lever, D, having a movable gripping-piece, E, a slide, B, carrying a guide, *b'*, and pawl *f* for the wire, as well as the fulcrum-support *b* and the stops b^2 b^3 for the lever D, mechanism, substantially as described, for producing a pivotal motion of the lever D by the up-and-down motion of the slide B, operating-lever C, adapted to press the slide B downward until the lever D has completed its travel, and means for automatically replacing the lever C into its starting position.

2. In a machine for forming and applying metallic staples, mechanism for operating the cutting-slide J in unison with the staple-driver H, said mechanism comprising a double knee-joint formed by links K K' L L', a pair of lateral guides, N N', provided with recesses *n n'*, and a pair of friction-rollers adapted to slide along the said guides, substantially as described.

3. The combination of the base-plate M, with bending-slide or staple-driver H, cutting-slide J, links K K' L L', pivots *k k' l*, guide-plates N N', having recesses *n n'*, and brake mechanism R S, the whole constructed and adapted to operate substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 25th day of January, 1887.

CARL LOUIS LASCH.

Witnesses:
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J. EBERHARDT.