No. 613,210. Patented Oct. 25, 1898.

A. G. MACKAY & M. J. BRODER.

STAPLING MACHINE.

(Application filed Mar. 7, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 2.

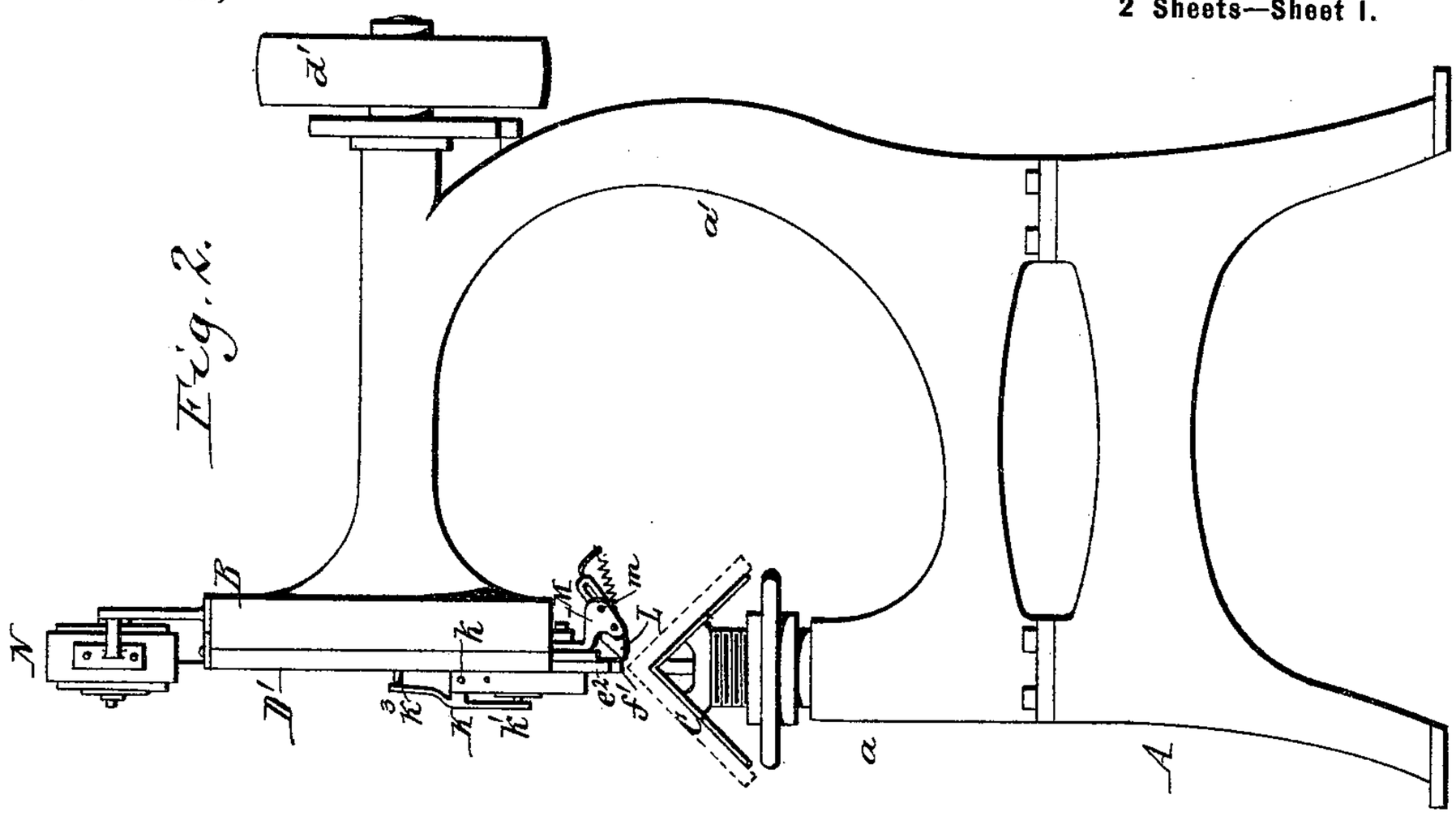

Fig. 3.

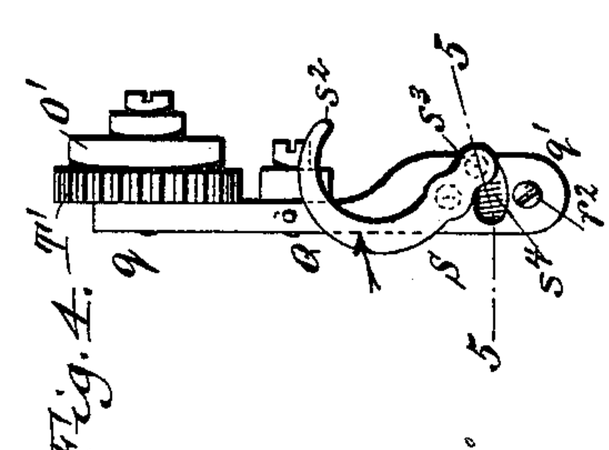

Fig. 4.

Fig. 5.

Fig. 1.

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Fig. 9.

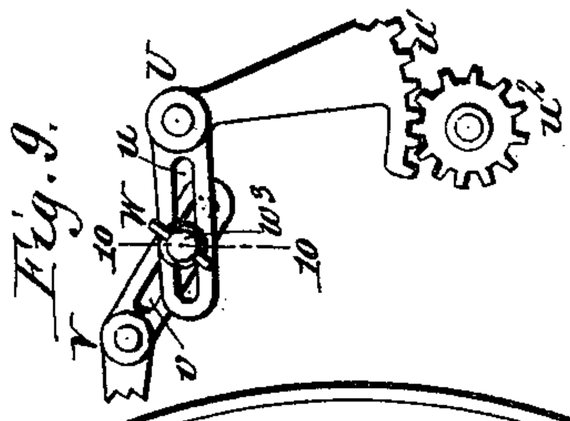


Fig. 10.

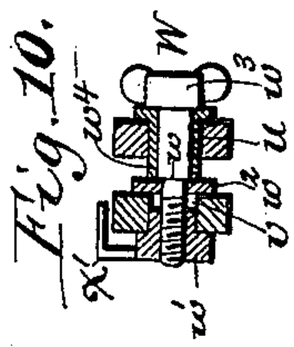


Fig. 8.

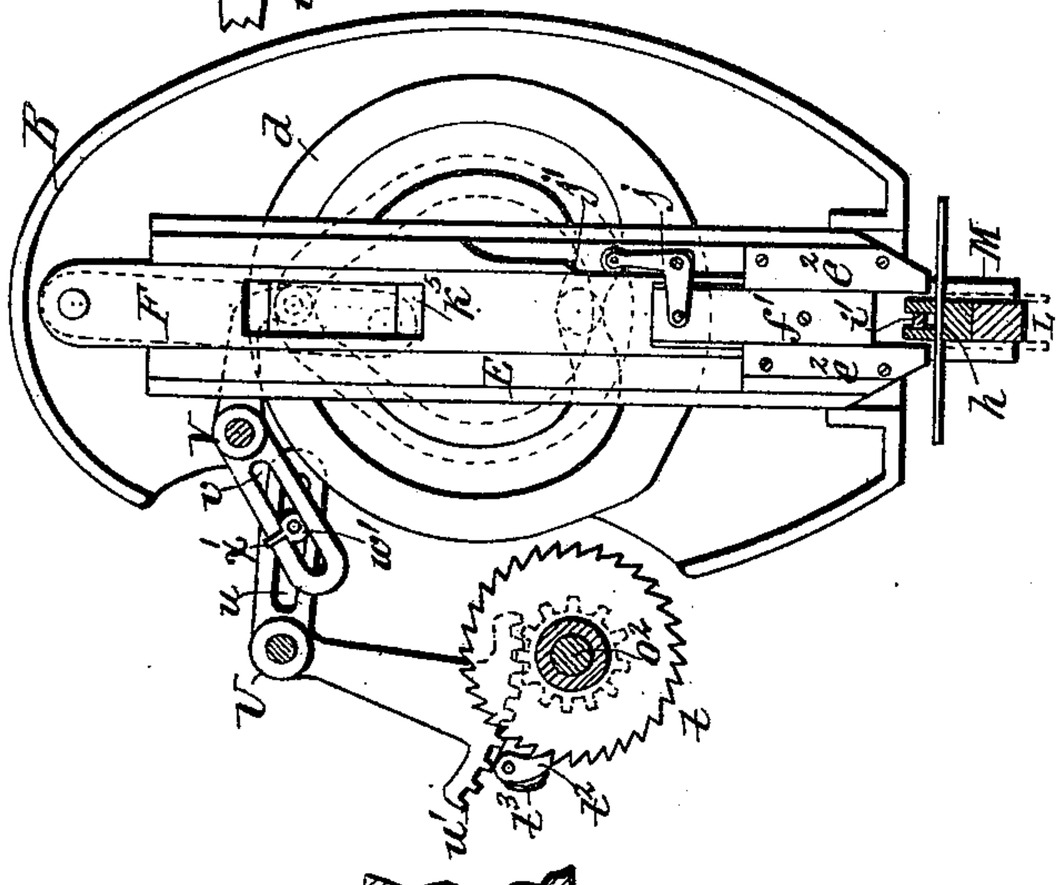


Fig. 13.

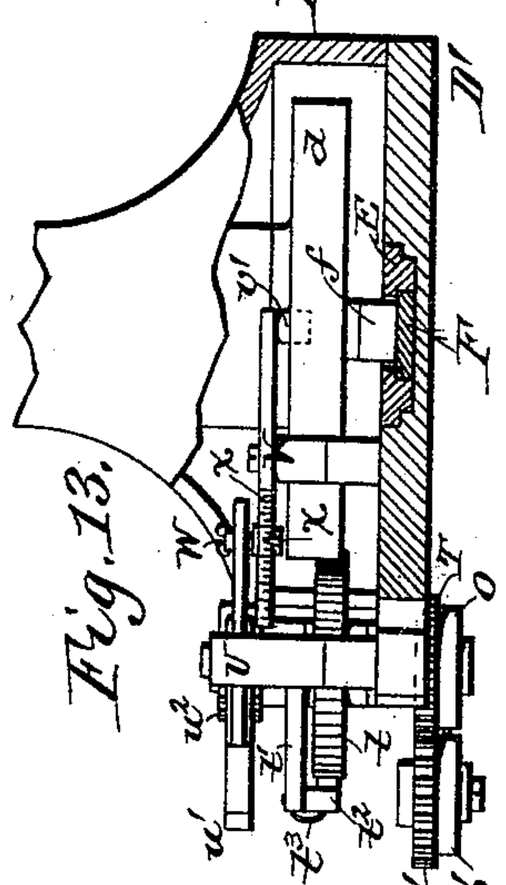


Fig. 7.

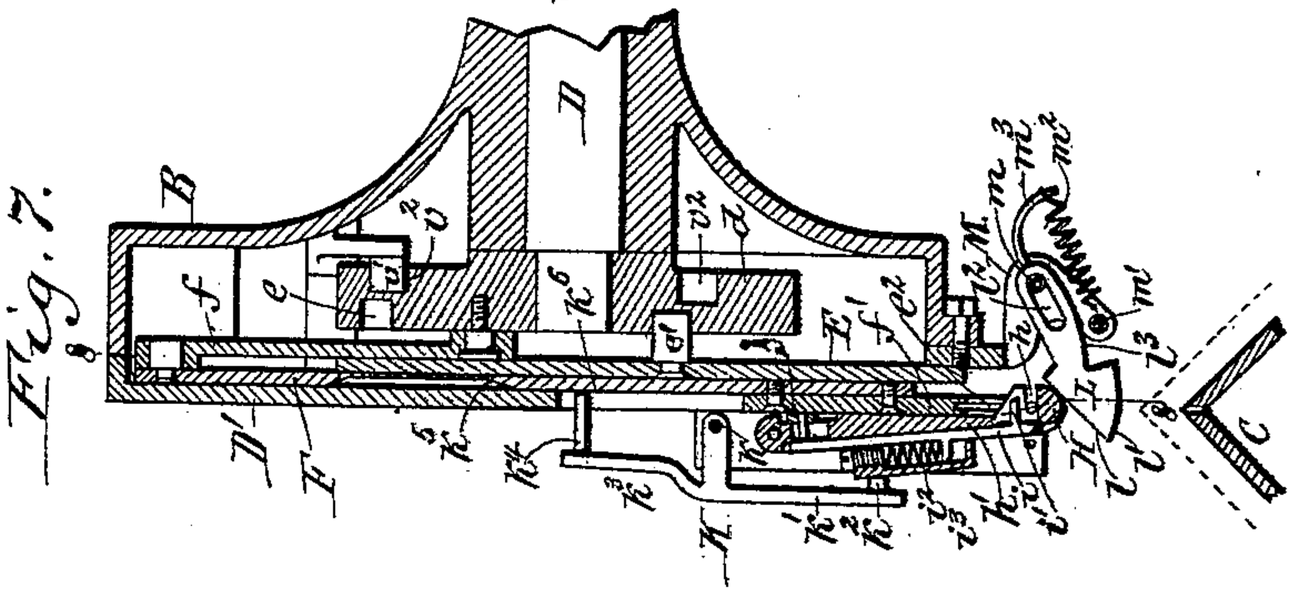


Fig. 12.

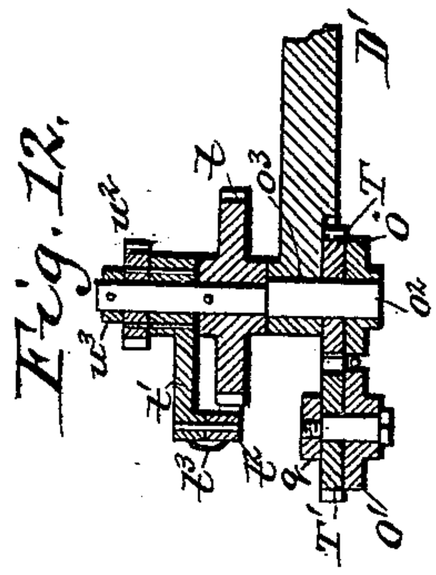


Fig. 6.

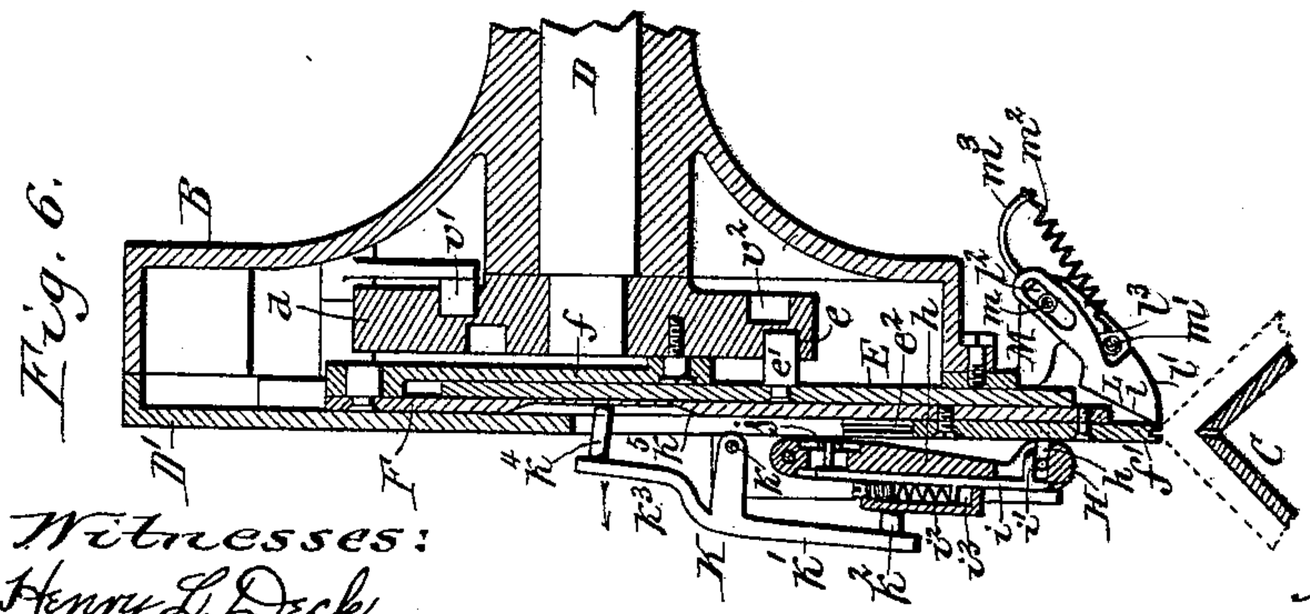
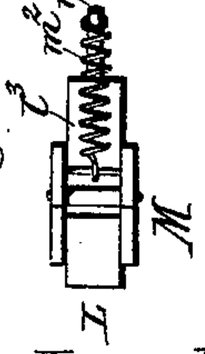


Fig. 11.



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UNITED STATES PATENT OFFICE.

ANGUS G. MACKAY AND MICHAEL J. BRODER, OF NEW YORK, N. Y.; SAID BRODER ASSIGNOR TO SAID MACKAY.

STAPLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 613,210, dated October 25, 1898.

Application filed March 7, 1898. Serial No. 672,825. (No model.)

To all whom it may concern:

Be it known that we, ANGUS G. MACKAY, a subject of the Queen of Great Britain, and MICHAEL J. BRODER, a citizen of the United States, residing at New York, in the county and State of New York, have invented new and useful Improvements in Wire-Stitching Machines, of which the following is a specification.

This invention relates to wire-stitching machines whereby books, pamphlets, or blanks are bound by driving wire staples through the books, pamphlets, or blanks along the line of binding.

The objects of our invention are to improve the construction of the staple forming and driving devices, to provide means for shifting the wire-feed mechanism quickly into an operative or inoperative position, and to simplify the means for operating and adjusting the feed mechanism.

In the accompanying drawings, consisting of two sheets, Figure 1 is a front elevation of a wire-stitching machine provided with our improvements. Fig. 2 is a side elevation thereof. Fig. 3 is a fragmentary vertical section, on an enlarged scale, of the wire-feed mechanism. Fig. 4 is an edge view of the same. Fig. 5 is a horizontal section in line 5 5, Fig. 4. Fig. 6 is a vertical longitudinal section, on an enlarged scale, in line 6 6, Fig. 1, showing the position of the parts when a staple has been driven into the book. Fig. 7 is a similar view showing the position of the parts when the anvil presents a wire blank to the staple former and driver. Fig. 8 is a sectional front view of the head of the machine with the face-plate and connecting parts removed, the section being taken substantially in line 8 8, Fig. 7. Fig. 9 is a fragmentary rear elevation of the wire-feed mechanism. Fig. 10 is a vertical section, on an enlarged scale, in line 10 10, Fig. 9. Fig. 11 is a bottom plan view of the staple shoe or support. Fig. 12 is a horizontal section, on an enlarged scale, in line 12 12, Fig. 1. Fig. 13 is a sectional top plan view, on an enlarged scale, of the head of the machine and connecting parts.

Like letters of reference refer to like parts in the several figures.

The frame of the machine consists, essentially, of a base A, a pedestal *a*, rising from the front portion of the base, an arm *a'*, rising from the rear portion of the base and overhanging the pedestal, and a hollow supporting-head B, arranged at the front end of said arm.

C represents the saddle or table, which is mounted on the pedestal and upon which the books or blanks to be stitched are placed.

D represents the horizontal driving-shaft, which is journaled in the upper portion of the overhanging arm and which is provided at its front end within the supporting-head with a driving-wheel *d* and at its rear end with a driving-pulley *d'* for receiving a belt.

D' represents the removable face-plate, which closes the front side of the hollow supporting-head.

E represents the vertically-reciprocating staple-former, which is guided between the supporting-head and its face-plate and which is operated by a cam-groove *e*, arranged on the front side of the driving-wheel and receiving a roller or projection *e'* on the rear side of the former. The former is provided on the front side of its lower end with two bending-jaws e^2 e^2, which are adapted to bend the legs of the staple.

F represents the vertically-reciprocating staple-driver, which is guided on the staple-former and which is operated by a link *f*, connecting the upper end of the driver with a crank-pin on the driving-wheel. The lower end of the driver is provided with a hammer or head *f'*, which slides between the jaws of the former.

G represents a wire-cutter of any suitable construction which is arranged on the front side of the face-plate and which receives the wire and cuts the same up into proper lengths for producing the staples.

H represents the anvil whereby the wire blanks are carried from the cutter rearwardly underneath the former and driver and holds the blank during the operation of bending the legs thereon and partly driving the same. This anvil is provided with a rearwardly-opening jaw *h* and is arranged on the lower end of a hanger *h'*, which is pivoted at its upper

end to the face-plate, so that the anvil can swing backwardly and forwardly. The wire blank is firmly held in the jaw of the anvil while being carried from the cutter to the former and driver by a sliding presser rod or bar i, having a presser-toe i'. While the anvil is carrying the wire blank backwardly from the cutter to the former and driver the presser-toe is pressed down on the wire blank by a spring i^2, arranged in a pocket i^3 in rear of the anvil-arm and bearing with its upper end against an adjusting-screw, while its lower end bears against a shoulder on the presser-rod. During the downward movement of the former the presser-rod is lifted from the wire blank by an elbow-lever j, pivoted on the face-plate and having one of its arms connected with the upper end of the presser-rod, while its opposite end is engaged by a cam j' on the former, as shown in Figs. 6, 7, and 8. All of the foregoing mechanism may be of any well-known or usual construction.

The anvil is moved forwardly by the driver, which latter in its downward movement for driving the staple into the book engages with the inclined upper side of the anvil and deflects the same forwardly, so that the jaw of the anvil is in line with the wire stock in the cutter. The backward movement of the anvil is produced by a rock-lever K, which is pivoted by a horizontal bolt k to the face-plate, so as to swing lengthwise of the machine. This lever is provided on its lower arm k' with a pin k^2, which bears against the front side of the anvil-arm, and its upper arm k^3 is provided with a pin k^4, which is adapted to be engaged by a cam or incline k^5 on the front side of the driver. During the last portion of the upward movement of the driver its cam k^5 turns the rock-lever in the direction of the arrow and the latter moves the anvil backwardly, whereby the wire blank which has been severed from the wire stock is carried from the cutter underneath the driver and former. The driver is provided below the incline k^5 with a straight portion k^6, which engages with the projection k^4 of the rock-lever and holds the rock-lever and anvil rigidly in position until the former in its subsequent downward movement engages with the wire blank and bends the same into a staple. This means of moving the anvil under the driver is positive and causes the anvil to be held rigidly in place while the former is bending the wire blank into a staple.

L represents a support or shoe whereby the staple is supported and guided while being driven into the book or blank and which is arranged to move backward and forward across the path of the driver. This staple-support is provided on its front portion with an upper inclined side l, which rises from the front end of the staple-support, and a lower convex curved side l', which descends from the front end of the staple-support. The rear portion of the staple-support is provided with a longitudinal slot l^2 and a convex curved under side l^3.

M represents a bifurcated hanger or bracket whereby the staple-support is supported. This hanger is secured with its upper end to the lower portion of the supporting-head, and its arms are connected by a horizontal pin or roller m, which passes transversely through the slot of the staple-support, and a horizontal pin or roller m', which is arranged transversely below the rear curved under side of the staple-support. The staple-support is normally moved forwardly and elevated with its front end by a spring m^2, which is connected at one end to the lower portion of the hanger, while its other end is connected with a downwardly-curved arm m^3 on the rear end of the staple-support. As the driver rises after driving a staple into the book the anvil moves underneath the former and carries a wire blank horizontally underneath the former and driver, and the staple-support is moved forwardly and pressed with its upper inclined side against the under side of the anvil, as represented in Figs. 7 and 8. The former now descends and bends the ends of the wire blank downwardly on opposite sides of the anvil and the front portion of the staple-support, as shown in dotted lines, Fig. 8. During the first portion of the subsequent downward movement of the driver the latter in deflecting the anvil forwardly strips the staple from the anvil and presses the cross-bar thereof against the inclined upper side of the staple-support. During the continued downward movement of the driver the latter strips the staple from the inclined side of the staple-support and forces the same through the book. As the staple is stripped from the staple-support the driver by its engagement with the incline of the staple-support first forces the shoe downwardly until the rounded under side of the front portion of the staple-support rests on the blank and the rounded under side of the rear portion thereof rests on the pin or roller m', after which the continued downward movement of the driver forces the staple-support rearwardly out of the path of the driver. As the staple-support moves rearwardly it slides with its slotted rear portion on the roller m of the hanger and with its curved rear under side on the roller m' and strains the spring m^2. The position of the roller m' is such that it arrests the descent of the staple-support just as the latter reaches the book to be bound. This prevents the staple-support from being pressed excessively against the book, thereby avoiding marring of the same or displacing the sheets of the book as the staple-support withdraws rearwardly.

The wire from which the staples are made is unwound from a spool N, which is supported on the upper end of the head, and passes thence through a guide n on the face-plate, thence between a pair of feed-rollers O O', which turn on horizontal parallel pivots,

thence through a curved guide p on the face-plate, thence between the blades of the cutter, and into the jaw of the anvil. The inner feed-roller O is mounted on a shaft o^2, which is journaled in a fixed bearing o^3 in the face-plate, and the outer feed-roller O′ is pivoted on the upper arm q of a rock-lever Q, whereby the outer feed-roller may be moved toward and from the inner feed-roller. The outer feed-roller is yieldingly held in engagement with the inner feed-roller by a spring r, which bears with one end against the bottom of a socket r' in the face-plate and with its other end against an adjusting-screw r^2, which is arranged on the lower arm q' of the rock-lever. Upon turning the screw r^2 the pressure of the feed-rollers on the wire may be regulated.

S represents a trip or throw-off lever whereby the action of the wire-feed rollers may be stopped. This lever is arranged on the outer side of the roller rock-lever and is pivoted on the face-plate by a pivot-pin s, which passes through an opening s' in the lower arm q' of the rock-lever. The upper arm s^2 of the throw-off lever is provided with a handle for turning the same, and its lower arm s^3 is provided with a pin or projection which engages with an incline or cam face s^4 on the adjacent portion of the feed-roller lever. When the throw-off lever is in the position shown in Figs. 4 and 5, its lower arm stands opposite the base of the incline s^4 of the roller-lever, in which position of the parts the feed-rollers are in operative engagement. Upon turning the throw-off lever in the direction of the arrow in Fig. 4 the lower arm thereof engages with the incline of the roller-lever and turns the latter, so that the outer feed-roller is moved away from the inner feed-roller and the feeding action of these rollers is arrested. This means of shifting one feed-roller toward or from the other roller permits of stopping and starting the feeding action of these rollers quickly and without disturbing the adjustment of the spring m^2, and it also permits of conveniently inserting the wire between the feed-rollers.

The feed-rollers are rotated intermittently by a driving mechanism which is capable of adjustment for varying the feed of the wire and which is constructed as follows: T T′ represent two intermeshing gear-wheels, which are connected, respectively, with the feed-rollers O O′ and whereby these rollers are caused to turn in unison. t represents a ratchet-wheel which is secured to the shaft o^2 in rear of the face-plate. t' is a ratchet-lever turning loosely on the shaft o^2 and provided with a pawl t^2, which is held in engagement with the ratchet-wheel by a spring t^3. U represents an outer rock-lever pivoted on the rear side of the face-plate and provided in one of its arms with a longitudinal slot u and on its other arm with a gear-segment u', which meshes with a gear-pinion u^2, secured to the ratchet-arm. The gear-pinion and ratchet-arm are confined on the shaft o^2 by a collar u^3 on the rear end of the shaft. V represents an inner rock-lever pivoted on the rear side of the face-plate and provided in one of its arms with a longitudinal slot v and on its other arm with a roller or projection v', which engages with a cam-groove v^2 in the driving-wheel d. The slotted arm of the inner rock-lever is arranged lengthwise of the slotted arm of the outer rock-lever and is coupled therewith by a coupling or clamping bolt W. This bolt is arranged in the slotted arms of both rock-levers and is provided with a shoulder w between the arms. One end of the coupling-bolt is screw-threaded and is clamped to the arm through which it passes by a screw-nut w', engaging with the screw-thread of the bolt and bearing against one side of the arm and a washer w^2, arranged between the shoulder w of the bolt and the other side of the respective arm. The opposite end of the bolt is provided with a thumb-piece w^3 for turning the bolt and with a roller w^4, which is arranged in the slot of the other rock-arm. During each rotation of the main shaft the cam v^2 oscillates the inner rock-lever, and this movement of the latter is transmitted by the coupling-bolt to the outer rock-lever and from the latter by the segment, pinion, and ratchet mechanism to the feed-rollers, whereby the wire is fed forward sufficiently for producing one staple. As the rock-levers U and V rock with reference to each other the roller of the coupling-bolt slides back and forth in its respective slotted arm. Upon adjusting the coupling-bolt lengthwise in the slotted arms of the rock-levers the relative throw of these levers may be varied for changing the feed of the rollers in accordance with the length of staple which is desired. For convenience in determining the correct position of the coupling-bolt for producing the desired feed of the wire a graduated scale x is arranged on the slotted arm of one of the levers, and a pointer x', which traverses said scale, is mounted on some part connected with the bolt—for instance, on the clamping-nut.

We claim as our invention—

1. The combination with the reciprocating driver and the movable anvil, of a rock-lever which moves the anvil across the path of the driver and which is operated by the driver, substantially as set forth.

2. The combination with the reciprocating driver and the pivoted anvil provided with an incline which is engaged by the driver for moving the anvil out of the path of the driver, of a rock-lever having one of its arms engaging with the anvil, and an incline or cam arranged on the driver and adapted to engage with the other arm of the rock-lever for turning the latter and moving the anvil into the path of the driver, substantially as set forth.

3. The combination with the reciprocating driver and the anvil, of a movable staple-support adapted to engage with said anvil

and driver, and a support on which said staple-support slides away from the anvil and driver, substantially as set forth.

4. The combination with the reciprocating driver and the anvil, of a movable staple-support, a support on which said staple-support slides away from the anvil and driver, and a spring whereby the staple-support is pressed against the anvil and the driver, substantially as set forth.

5. The combination with the reciprocating driver and the anvil, of a staple-support adapted to bear against the anvil and driver and provided with a longitudinal slot, a support or roller arranged in the slot of the staple-support, and a spring whereby the shoe is yieldingly held in engagement with the anvil and the driver, substantially as set forth.

6. The combination with the reciprocating driver and the anvil, of a staple-support adapted to bear against the anvil and driver and provided with a longitudinal slot, a support or roller arranged in the slot of the staple-support, a support or roller arranged below the staple-support, and a spring whereby the staple-support is yieldingly held in engagement with the anvil and the driver, substantially as set forth.

7. The combination with the wire-stitching mechanism, of a pair of wire-feed rollers, a stationary bearing in which one of said rollers is journaled, a rock-lever upon which the other roller is journaled, a spring whereby the lever is turned for engaging the feed-rollers, and a trip-lever whereby the rock-lever is turned for disengaging the feed-rollers, substantially as set forth.

8. The combination with the wire-stitching mechanism, of a pair of wire-feed rollers, a stationary bearing in which one of said rollers is journaled, a rock-lever upon which the other roller is journaled, a spring whereby the lever is turned for engaging the feed-rollers, and a trip-lever which engages with an incline or cam on the rock-lever and whereby the latter is turned for disengaging the feed-rollers, substantially as set forth.

9. The combination with the wire-stitching mechanism, of a pair of wire-feed rollers, a stationary bearing in which one of said rollers is journaled, a rock-lever upon which the other roller is journaled, an adjusting-screw arranged on the rock-lever, a spring engaging with said adjusting-screw for turning the rock-lever and engaging the feed-rollers, and a trip-lever provided with a pin or projection which engages with an incline or cam on the rock-lever and turns the latter for disengaging the feed-rollers, substantially as set forth.

10. The combination with the driving-shaft and the feed mechanism of two slotted actuating rock-levers which are interposed between the driving-shaft and the feed mechanism, and which project from their respective fulcra toward and past each other, and an adjustable coupling-bolt passing through the slots of both levers, whereby the effective length of one lever is shortened and that of the other increased by adjusting the bolt in said slots, substantially as set forth.

Witness our hands this 1st day of March, 1898.

ANGUS G. MACKAY.
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Witnesses:
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