

(No Model.)

2 Sheets—Sheet 1.

E. T. GREENFIELD.  
STAPLING MACHINE.

No. 572,420.

Patented Dec. 1, 1896.

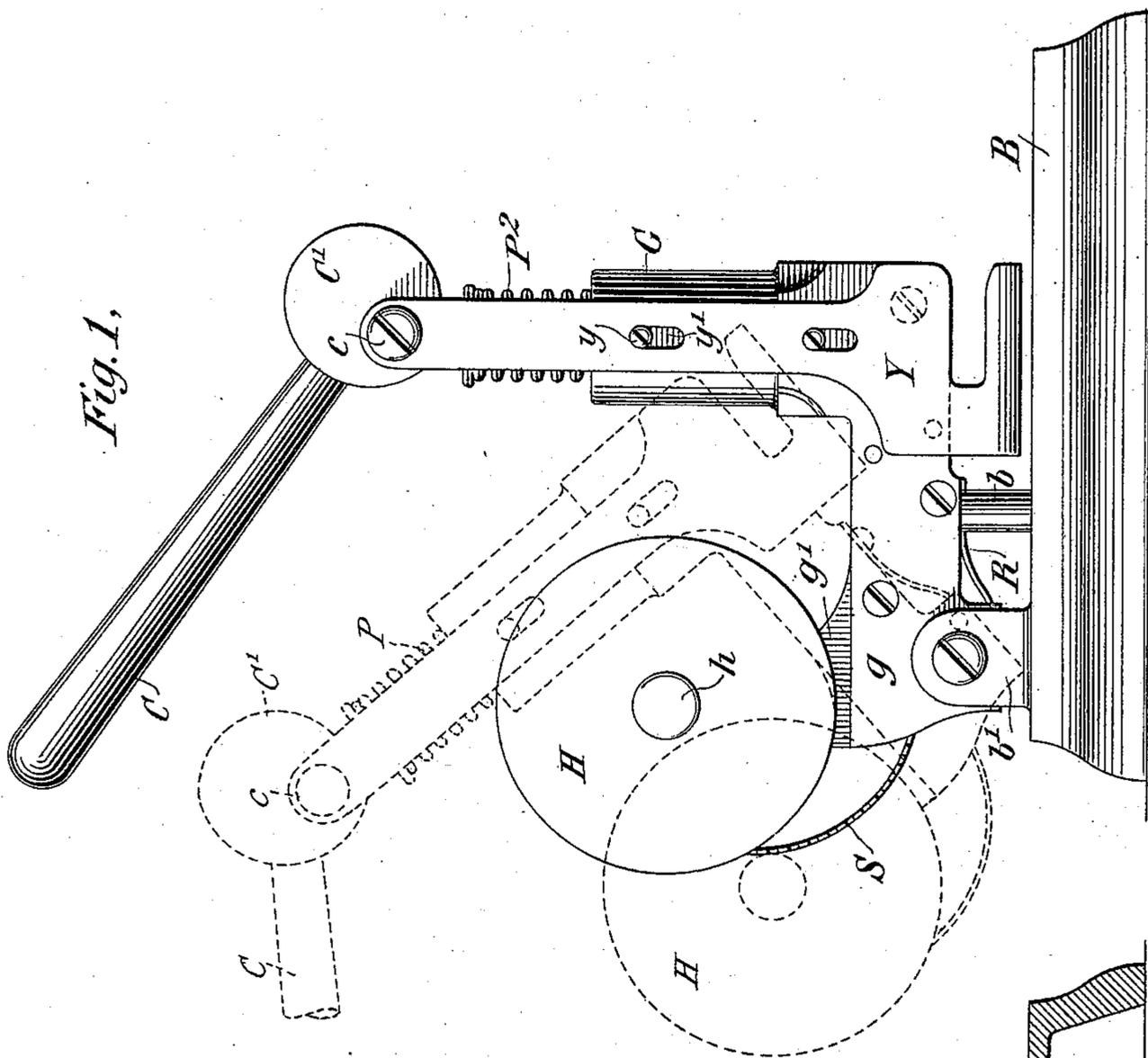


Fig. 1.

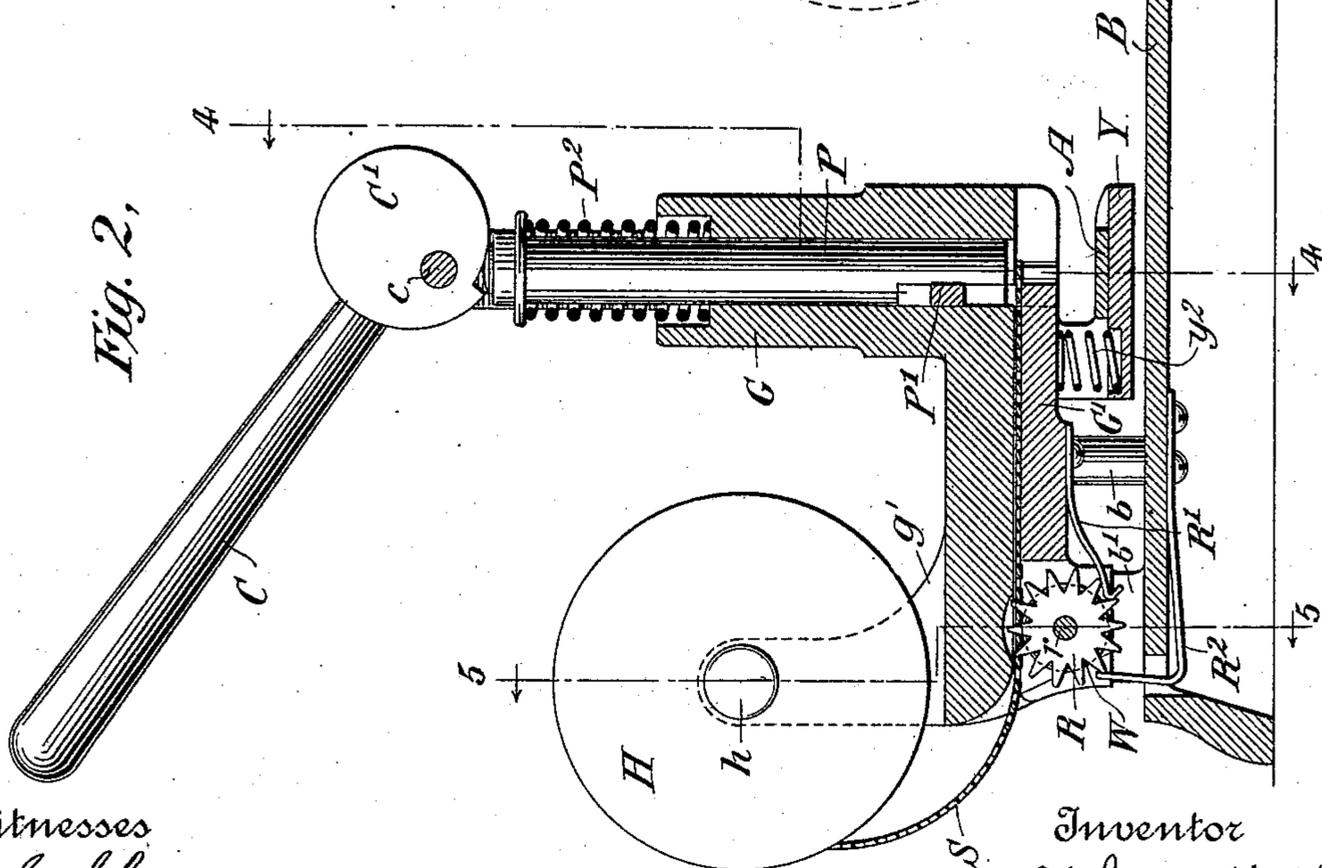


Fig. 2.

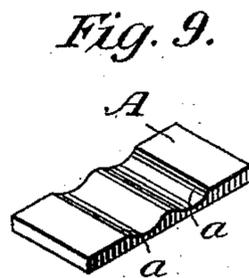
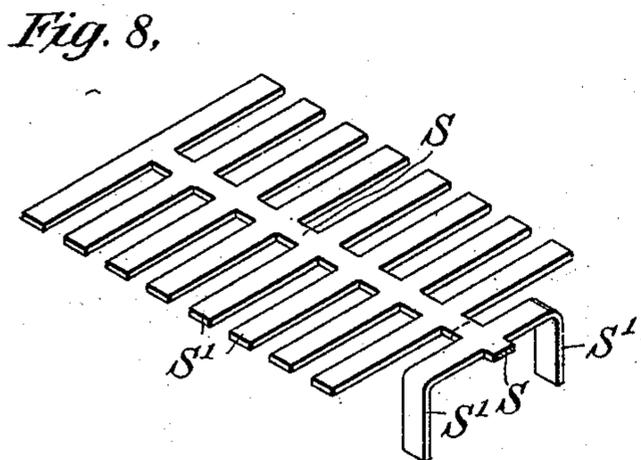
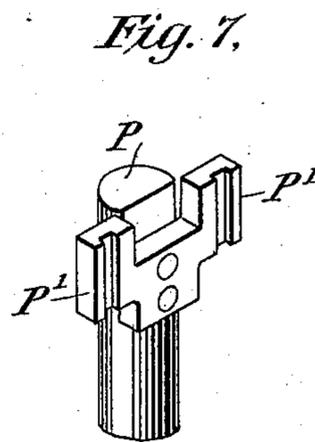
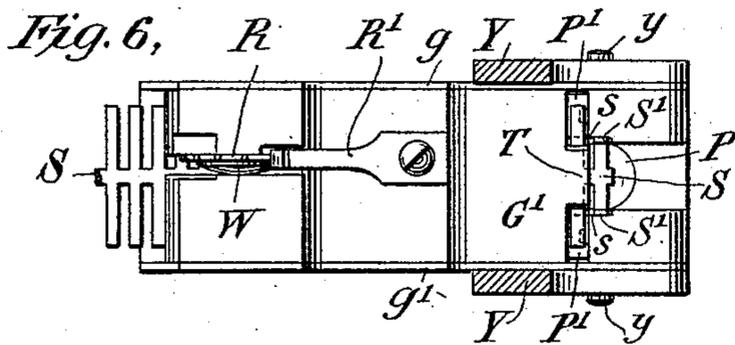
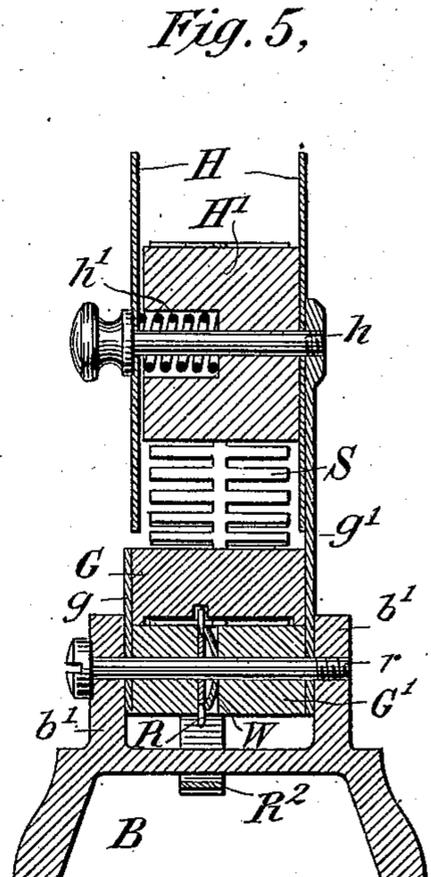
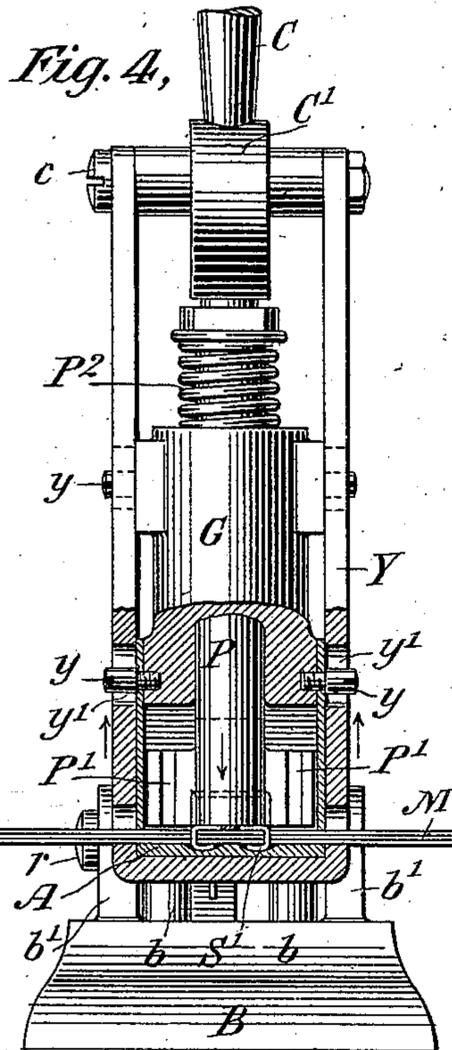
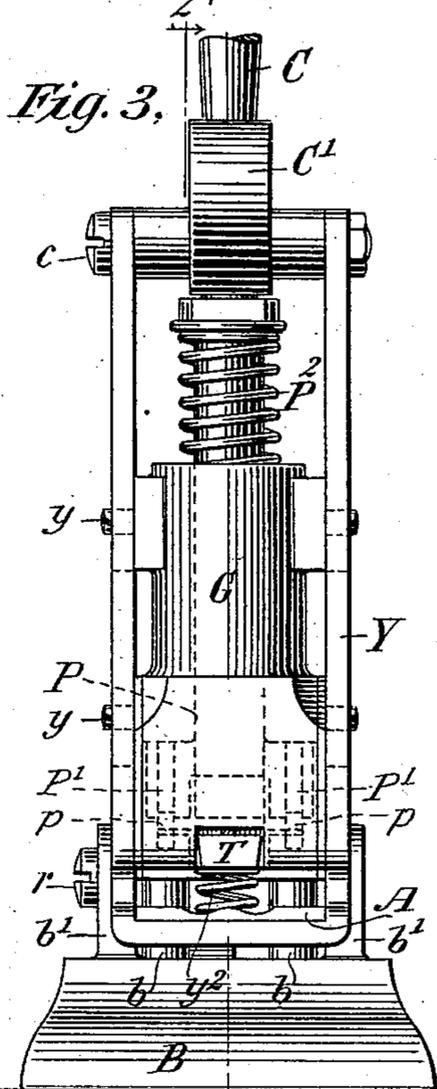
Witnesses  
C. E. Ashley  
W. W. Lloyd.

Inventor  
By his Attorney Edwin J. Greenfield  
Charles J. Kintner

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*B. E. Ashley*  
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# UNITED STATES PATENT OFFICE.

EDWIN T. GREENFIELD, OF NEW YORK, N. Y., ASSIGNOR TO THE GREENFIELD AUTOMATIC FASTENER COMPANY, OF SAME PLACE.

## STAPLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 572,420, dated December 1, 1896.

Application filed November 16, 1894. Renewed January 9, 1896. Serial No. 574,915. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN T. GREENFIELD, a citizen of the United States, residing at New York, in the county of New York and State of New York, have made a new and useful Invention in Stapling-Machines, of which the following is a specification.

My invention is directed particularly to improvements in stapling-machines which form staples by severing them one at a time from the end of a strip or sheet of metal; and to this end it consists, first, in the novel mechanism hereinafter described for simultaneously forming a single staple and severing a previously-formed staple from the end of a metallic strip; second, in the novel form of mechanism hereinafter described for simultaneously forming one staple from the end of a strip of metal and driving a previously-formed staple, in combination with means for feeding the material forward; third, in mechanism for forming and driving staples, in combination with a clenching-anvil sustained by means operatively connected to a staple-forming and staple-driving plunger in such manner as to enable the staples to be driven and clenched through materials of different thickness; fourth, in the several details of construction hereinafter described, and particularly pointed out in the claims at the end of this specification.

For a full and clear understanding of my invention, in order to enable others skilled in the art to manufacture and use the same, reference is had to the following specification, taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevational view of a complete machine, illustrating also in dotted lines the position of the movable parts of the machine in the act of feeding the prepared strip forward after each operation. Fig. 2 is a vertical sectional view taken through the body of the machine on the broken line 2 2, Fig. 3, and as seen looking at that figure from the left toward the right hand side of the drawings, while Fig. 3 is an end elevational view of the machine as seen looking at Fig. 2 from right to left in the direction of the arrows upon that figure. Fig. 4 is a transverse sectional view taken on the broken line 4 4,

Fig. 2, and as seen looking from right to left in the direction of the arrows upon that figure, while Fig. 5 is a similar transverse sectional view taken on the broken line 5 5, Fig. 2, and as seen looking in the same direction. Fig. 6 is a horizontal sectional view taken through the body of the machine just above the base and as seen looking at Fig. 4 in the direction of the arrows upon that figure from the bottom toward the top of the drawing. Fig. 7 is a detail perspective view of the operative portion of the staple-forming and staple-driving plunger. Fig. 8 is an enlarged perspective view of a slitted or toothed strip of metal from which the staples are formed, illustrating also one of the staples after it is bent or completed preparatory to being driven. Fig. 9 is a perspective view of the clenching-anvil which clenches or turns the free ends of the staple into the under surface of the material to be bound.

Referring now to the drawings in detail, in all of which like letters of reference represent like parts wherever used, B represents the base of the machine, which is preferably of cast metal and is provided with a pair of lugs or ears  $b' b'$ , to which is pivoted, by a screw-rod  $r$ , the frame or support G for the operative portions of the machine, said frame or support consisting of an angular cast-metal piece having a vertically-disposed hole drilled through one portion, in which is fitted a sliding plunger P, normally held in its upper position by a strong spiral spring  $P^2$ , one end of which rests in a socket in the upper portion of the part G, while the other end rests under a shoulder at the upper end of the plunger P.

$C'$  is an eccentric secured to a shaft  $c$ , journaled in sliding side bars Y Y, which bars are united together in the nature of a stirrup at their lower end and constitute a seat for the clenching-anvil A. (See Figs. 1, 2, and 4.) These sliding side bars are provided with longitudinal slots  $y' y'$  and are adapted to slide upon screws  $y y$ , secured in the opposite sides of the frame or support G, as clearly shown in Figs. 1 and 4.

$y^2$  is a strong spiral spring located between the stirrup Y and the under side  $G'$  of the frame or support G and is adapted to hold said stirrup and the clenching-anvil A, car-

ried thereby, in their lower position, as clearly shown in Fig. 2.

C is an operating-handle secured to the eccentric C'.

5 *b b* are two standards or stops secured to the base B and adapted to limit the forward movement of the pivoted portion of the machine.

H is a reel for sustaining the prepared strip 10 of metal S from which the staples are to be formed and driven, said reel consisting of a pair of disks located on opposite sides of a hub H' and secured together adjustably and to a standard *g'* by a screw-rod *h* and strong 15 spiral spring *h'*, (see Fig. 5,) the arrangement being such that the reel and the prepared material S S' will be tilted about the common pivot-rod *r*, as clearly shown in Figs. 1 and 5. The material S, which is placed upon the 20 reel H, is first prepared from a strip of metal by stamping or cutting it into the form shown in Fig. 8, so that it is provided with lateral arms or strips *s*, separated from each other by sufficient material to sustain the several 25 strips when wound upon the reel.

R is a toothed feeding-wheel carried also by the pivot-rod *r* and frictionally secured in a vertical slot in the end of the pivoted part 30 B by a disk-shaped friction clutch or washer W, as clearly shown in Fig. 5.

R' is a feeding-pawl secured to the lower side G' of the frame or support G, so that its free end rests against the teeth of the feeding-wheel R.

35 R<sup>2</sup> is a yielding or elastic check-pawl secured to the under side of the base by screws, with its free or yielding end resting against the teeth of the feeding-wheel R, its function being to prevent the feeding mechanism from 40 forcing the material from which the staples are formed forward after the forward end thereof has come into frictional contact with the inner faces *s s* of that portion of the frame G which constitutes a guideway for 45 the staple-forming and staple-driving plungers, as clearly shown in Figs. 2 and 6.

T represents a staple-former secured to the lower portion G' and having a lateral extension of the width of the completed staple, 50 which extension is located directly in the path of staple-forming arms P' P', secured to the plunger P. (See Figs. 6 and 7, the perspective view of the staple-forming and staple-driving plunger shown in Fig. 7 being as seen 55 looking from the bottom toward the top of the machine in Figs. 1, 2, 3, and 4.)

It will be seen upon examination of Fig. 6 that the staple bending or forming portions of the plunger, namely, the arms P' P', are 60 so located that they will form the staple about the staple-former T at the same time that the free end of the plunger P, Fig. 7, cuts off and drives the previously-formed staple past the end of said former.

65 Referring now to Fig. 9, which represents a perspective view of the clenching-anvil, *a a* are inclined faces on the upper surface of

the anvil, the function of which inclined faces is to clench or turn upward the free ends of the arms S' S' of the staple as it is 70 driven forward by the plunger P through the material M, as clearly indicated in Fig. 4.

The operation of the apparatus is as follows: The prepared metal strip S having first 75 been wound upon the hub H' the screw-rod *h* is inserted through the loose face H of the reel and properly adjusted against the pressure of the spring *h'*. The free end of the material S is then inserted through the guideway between the parts G and G' until it rests 80 against the inner faces *s s* of the lower portion of the part G, as clearly shown in Figs. 2 and 6, the feed-wheel R having been properly adjusted, so as to leave it ready to feed the material forward when desired. The operating-handle C is now actuated so that the 85 driving-plunger P is forced forward and caused to shear off the unformed staple-blank which rests against the inner faces *s s*. At the same time the staple-forming arms P' 90 P' are forced forward and caused to form or bend a staple about the staple-former T. The blank which has been cut off is now removed and the apparatus is in condition for practical operation. The parts G G' are now tilted 95 into the position shown in dotted lines in Fig. 1, thereby causing the feeding mechanism to be put in position to advance the staple-forming strip S one step when the parts G G' are returned to the position shown in full lines in 100 Fig. 1. The material M to be bound is now placed over the anvil A, which is held in its lower position by the yielding spring *y*<sup>2</sup>, and the pivoted frame or support and operative parts carried thereby are returned to the position shown in full lines and the operating-handle C is turned quickly to the right, (see Fig. 1,) thereby causing the eccentric C' to force the plunger P downward and to simultaneously 110 lift the side arms Y Y, and consequently the anvil A, into their uppermost position, thus causing said anvil to firmly grip the material M against the lower face G' of the frame or support. As the plunger P descends it simultaneously 115 shears or cuts off the already-completed staple S' S' by its shearing action past the outer face of the staple-former T, drives it through the material M, and ultimately clenches it in the manner shown in Fig. 4. At the same time the staple-forming arms P' P' form or 120 bend the next succeeding strip S' S' into a completed staple around the staple-former T. The handle C is now returned to its normal position, thereby allowing the strong spiral springs P<sup>2</sup> and *y*<sup>2</sup> to restore the plunger and 125 the anvil to their normal positions. The part G is now tilted into the position shown in Fig. 1, thereby causing the free end of the feed-pawl R' to move backward one step over the next adjacent ratchet-tooth, so that when the 130 part G is restored to the position shown in Fig. 2 said feeding-pawl R' will impart one forward step to the material S, thereby placing it in position for the driving of the com-

pleted staple and the preparation of the next staple at the next action. The yielding pawl  $R^2$  is designed to prevent any feeding of the material after its forward end comes into frictional contact with the inner faces  $s s$  should the operator tilt the machine into the position shown in dotted lines in Fig. 1 when the material has already been fed forward into operative position, and this result is effected as follows: When the material has already been fed forward, the free end of the yielding pawl has sufficient bearing upon that tooth just under it to cause the feeding-wheel  $R$  to rotate in a reverse direction, so that when the machine is tilted this feeding-wheel will move backward and prevent the free end of the feeding-pawl  $R'$  from coming into operative contact with the next tooth in advance. In other words, the action of the feeding-pawl is positive in its propulsive movement when it becomes necessary to feed the material and is prevented from acting when the material has already been fed forward by the action of the yielding spring  $R^2$ .

I do not limit myself to the special mechanism herein shown and described. I believe that it is broadly new with me to form a staple from a metal staple-blank and to simultaneously sever and drive an additional staple which was previously formed in the same manner, and my claims are therefore broadly to mechanism adapted to perform these simultaneous independent functions.

I am aware that mechanism has heretofore been devised for simultaneously forming and severing a completed staple during each forward movement of a single plunger, as shown and described in patent to Ludlow, No. 439,077, granted October 21, 1890, and I make no claim hereinafter broad enough to include such a structure, my most generic claim being directed, as above indicated, to mechanism which simultaneously forms one staple and severs and drives a previously-formed staple.

I make no claim in the present application to the staple-blank hereinbefore described, as this feature constitutes a separate and distinct invention in the nature of an article of manufacture upon which I propose to file in the United States Patent Office a separate and independent application for a patent, the novelty in the present application being directed to the mechanism hereinbefore described and particularly pointed out in the claims which follow.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A stapling-machine adapted to cut and

drive staples from a strip or sheet of metal and consisting of a staple-bending and a staple-driving plunger, rigidly connected together and adapted the one to bend or form a staple and the other to sever and drive a previously-formed staple, substantially as described.

2. A stapling-machine adapted to form and drive a staple from a strip or sheet of metal consisting of mechanism which forms one staple, and additional mechanism which severs and drives a previously-formed staple.

3. A machine provided with means for holding a supply of staple-blanks united together, additional means for feeding said staple-blanks forward as they are used, in combination with a two-part plunger adapted to form a staple from one of said blanks and simultaneously sever and drive a previously-formed staple, substantially as described.

4. A stapling-machine provided with mechanism for successively feeding forward the material from which the staples are formed, additional mechanism for preventing said forward feed unless a staple is used, in combination with a two-part plunger adapted the one part to form the staples one at a time and the other to simultaneously sever and drive a previously-formed staple.

5. A stapling-machine provided with mechanism for successively feeding forward the material from which the staples are formed, a two-part plunger adapted to simultaneously form one staple and drive a previously-formed staple, and a clenching-anvil adapted to clench the driven staple through the material to be bound.

6. In a stapling-machine a staple-forming and staple-driving plunger in combination with a clenching-anvil carried by a stirrup and means for forcing the staple-forming and staple-driving plunger forward, said stirrup being operatively connected to the same.

7. In a stapling-machine a staple-forming and staple-driving plunger operatively connected to mechanism for forcing said plungers forward, in combination with a clenching-anvil carried by a stirrup or support and so connected to the mechanism which drives the plunger forward that the anvil is simultaneously moved upward, thereby adapting the machine to bind different thicknesses of material.

In testimony whereof I have hereunto subscribed my name this 15th day of November, 1894.

EDWIN T. GREENFIELD.

Witnesses:

C. J. KINTNER,  
M. M. ROBINSON.