

V. HOXIE.  
STAPLE FORMING AND DISCHARGING MECHANISM.  
APPLICATION FILED FEB. 26, 1909.

948,448.

Patented Feb. 8, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

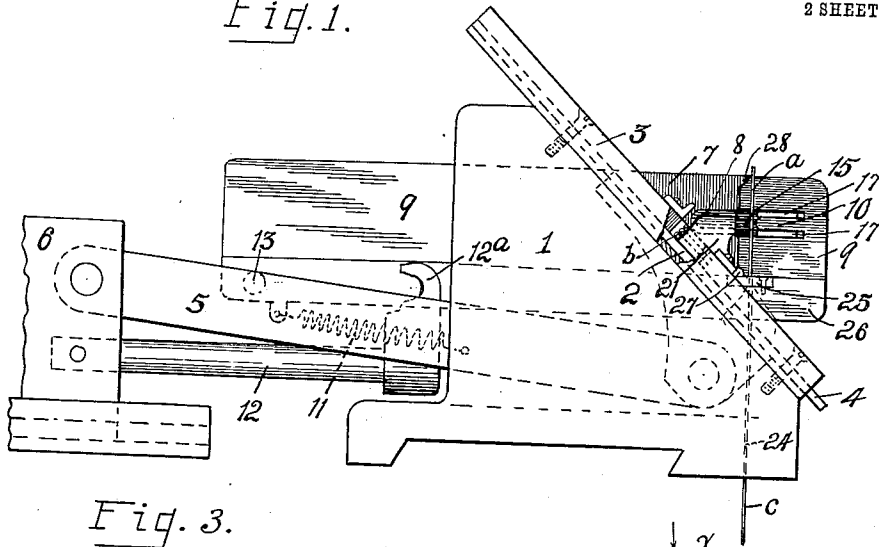


Fig. 3.

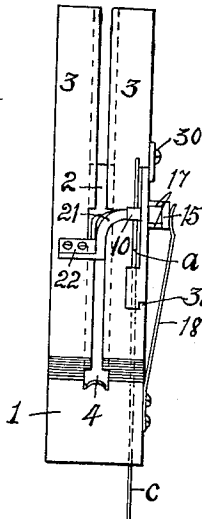
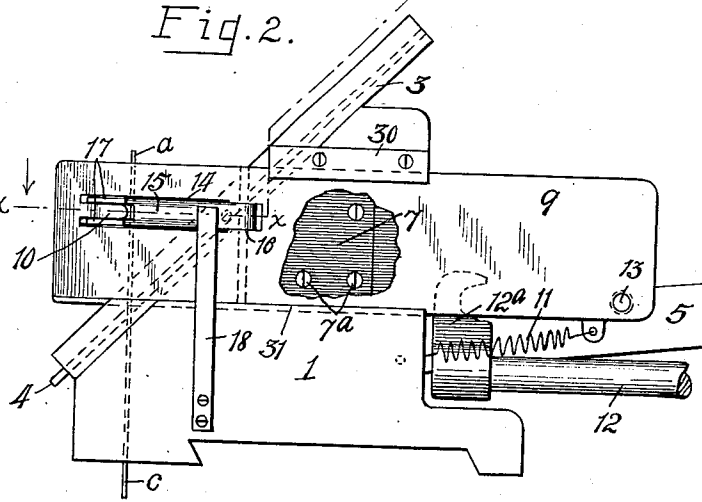


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 4.

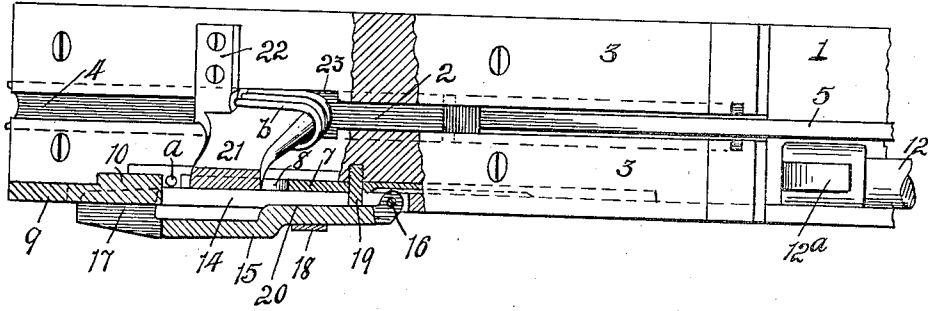


Fig. 5.

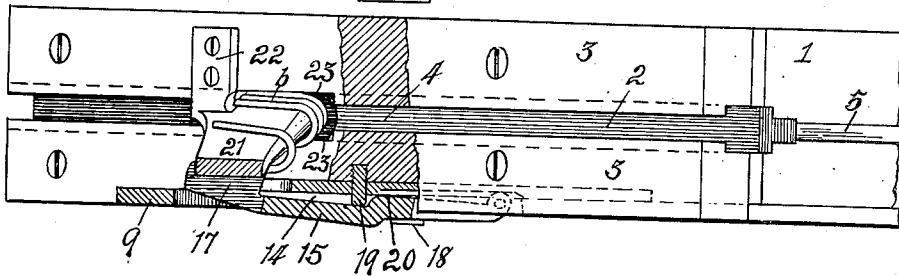


Fig. 7. Fig. 8.

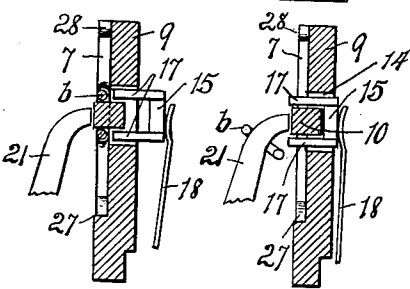
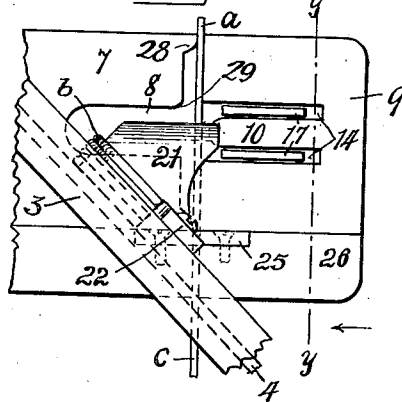


Fig. 6.



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# UNITED STATES PATENT OFFICE.

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STAPLE FORMING AND DISCHARGING MECHANISM.

948,448.

Specification of Letters Patent.

Patented Feb. 8, 1910.

Application filed February 26, 1909. Serial No. 480,256.

*To all whom it may concern:*

Be it known that I, VERNON HOXIE, a citizen of the United States, and a resident of Adrian, in the county of Lenawee and State of Michigan, have invented a certain new and useful Staple Forming and Discharging Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures and letters of reference marked thereon, which form a part of this specification.

My invention relates to mechanism which is more especially intended for use in wire-fabric machines and which is adapted to form staples from sections of wire intermittently fed thereto, and to discharge and clamp the same about portions of a fabric or other object being woven.

The object of my invention is the provision of an improved mechanism of this class which is simple and efficient in its operation, and which is particularly adapted for use in narrow spaces, or in connection with machines adapted for the weaving of narrow mesh fabric.

The operation, construction and arrangement of the parts of the invention are fully described in the following specification, and a preferred embodiment thereof illustrated in the accompanying drawings, in which,—

Figures 1 and 2 are opposite side elevations of the mechanism comprising the invention. Fig. 3 is a front elevation thereof. Fig. 4 is a section on the line  $x-x$  in Fig. 2, with the staple forming and discharging parts at the limit of their forward movements. Fig. 5 is a similar section with said operative parts at the limit of their rearward movements. Fig. 6 is a side elevation of a portion of the staple forming parts. Fig. 7 is a section of the male staple forming member taken on the line  $y-y$  in Fig. 6 with a staple formed thereon and the staple ejecting shuttle held retracted, and Fig. 8 is a similar section with the shuttle released and moved inward to eject a staple from the forming parts.

Referring to the drawings, 1 designates the holder of my mechanism, which has its top inclined to suit the angle at which it is desired to discharge the formed staple therefrom, and is provided with a vertical groove or recess (not shown) extending from its rear end forwardly for the plunger 2 to work in. The plunger 2 is guided in its reciprocatory movements by guide-bars 3, 3, which are secured in laterally spaced relation to the inclined face of the holder and have their inner faces longitudinally grooved to receive complementary ribs on the sides of the plunger and to provide a staple discharge-way in which the staple discharge-nose 4 of the plunger works.

5 designates a bar or link which attaches at one end to the plunger 2, and at its other end to a movable table or other actuating member 6, which has requisite reciprocatory movements imparted thereto by any suitable mechanism.

Secured to one side of the holder 1, as by screws 7<sup>a</sup> (Fig. 2), is a female staple-forming die or plate 7, which is shown as having its forward end projected in advance of the guide-bars 3 midway of their ends and provided with the staple forming notch or incut 8. A reciprocatory plate 9 is suitably carried by the holder 1 at the outer side of the female die 7 in parallel position therewith and is formed on its inner face near its forward end with a staple-forming boss 10 which registers with the notch 8 in the die 7 and is intended to enter the same and to cooperate therewith to form an interposed length of wire  $a$  into a staple  $b$  when the plate 9 is moved rearwardly.

A coiled contraction-spring 11 is attached at its opposite ends to the rear end of the plate 9 and to the holder (see Fig. 1) and acts on the plate to normally retain it at its limit of forward movement, or with its boss 10 disposed slightly in advance of the forward end of the die 7, as shown in Figs. 1, 2 and 4. The plate 9 is not moved from such position until the plunger 2 is within a short distance of its limit of rearward movement, when the hooked end 12<sup>a</sup> of the rod or bar 12, which is attached to the table 6 and moves in unison with the bar or link 5, en-

gages the stud 13 on the rear end of the plate 9 and causes the plate to move with it the remainder of its rearward throw.

Provided in the side-plate 9 is a slot 14, which extends rearwardly from the boss 10 and has continuations at its forward end disposed on either side of such boss, and in this slot is pivotally mounted a staple ejecting shuttle 15. This shuttle has its rear end pivoted in the rear end of the slot, as at 16, and has its forward end formed with the laterally projecting blade-like staple-ejecting parts 17, 17, which work through the portions of the slot 14 at the sides of the boss 10, as shown. A spring 18, which is secured to the side of the holder 1, acts on the shuttle 15 to influence its inward movement. The shuttle is held in retracted position or with its staple contacting parts 17 out of the forming plane of a staple, except when the plate 9 is substantially at its limit of rearward movement, due to a pin 19 (see Figs. 4 and 5) projecting from the die-plate 7 and abutting against a cam or laterally offset portion 20 of the shuttle-bar. When the plate 9 reaches its limit of rearward movement the portion 20 of the shuttle has receded from contact with the pin 19 (see Fig. 5), thus permitting the free end of the shuttle to move inwardly under the influence of the spring 18 and to effect an ejection of the formed staple from the boss 10. The staple on leaving the boss 10 is caught by a slide-bar 21 and guided thereby into position to be ejected from the holder by the discharge-nose 4 of the plunger 2 on a forward movement thereof. This slide-bar rises from between the guide-bars 3, 3, being secured at its forward edge to one of said bars, as shown at 22, and has its upper end curved laterally to substantially abut against or register with the face of the boss 10 when the plate 9 is at its limit of rearward movement. The inner upper edges of the guide-bars 3 are cut-away, at the sides of the lower end of the slide-bar 21, as at 23, Figs. 4 and 5, to permit the staples to move into the staple discharge-way of such bars. In practice a plurality of staples *b* are preferably stored on the slide-bar during the operation of the device, the lower one being taken therefrom by the plunger at each forward stroke thereof. This insures a staple being clamped to the fabric at each operation of the device even though a miss should occur in the forming of a staple.

A predetermined length *a* of the wire *c* from which the staples are formed is fed to the forming parts during the initial portion of the rearward movement of the plunger 2, or while the slide-plate 9 is in its normal position, by any suitable wire feeding mechanism, such for instance as that disclosed in my former United States Letters Patent No.

879,965, dated February 25, 1908, and the mechanism for imparting reciprocatory movements to the table 6 may be similar to that shown in said patent for imparting movements to the corresponding part contained therein. The wire thread *c* feeds upwardly through an opening 24 in the holder 1 and an apertured die 25, which is carried by a ledge or inwardly offset portion 26 at the lower edge of the plate 9 near the forward end of such plate, and thence upwardly in rear of the boss 10 and in advance of the female die-plate 7 in the plane therewith, as shown. On the initial portion of the rearward movement of the plate 9 the fed length *a* is severed from its thread due to the shearing action of the cutter point 27 of the die-plate 7 across the apertured die 25, and on the continued rearward movement of the plate 9 the boss 10 therein centrally engages the severed length and draws it into U-shape within the cooperating groove 8 of the fixed die-plate 7. The initial bend is imparted to the wire length *a* by reason of the cutter point 27 and a lip 28 at the opposite edge of the die-plate 7 engaging the end portions of the section before the concaved rounded corners 29 at the entrance of the groove 8 of said plate have contact therewith to complete the forming operation. The plate 9 is shown as being set into the side of the holder 1 and as being retained therein by a guide-plate 30, which is secured to the holder at the upper edge of the plate 9, and by a cooperating rib 31 at the lower edge of the plate 9.

In the operation of my improved mechanism, a length of wire from which a staple is to be formed is fed to the forming parts intermediate the boss 10 and the forward end of the female die-plate 7 during the first portion of the rearward movement of the plunger 2, or during the period of movement of the hooked end of the bar 12 from its forward position to the point where it engages the stud 13 on the plate 9. The engaging of the hooked-bar 12 with the stud 13 causes the plate 9 to move in unison with the plunger 2 for the remainder of its rearward throw. During this movement, the fed length of wire is first severed from its thread by the shearing action of the dies 25—27 and is then forced into the groove 8 of the female die-plate 7 and formed into a staple by the entrance of the boss 10 into such groove. As the boss 10 moves into register with the upper end of the slide-bar 21 the cam or offset portion 20 on the shuttle 15 has receded from contact with the pin 19 projecting from the plate 7, thus permitting an inward movement of the parts 17, 17 of the shuttle, under the influence of the spring 18, and a consequent ejection of the formed staple from the boss 10 and groove

7 onto such slide-bar, as shown in Figs. 5 and 8, it of course being understood that the shuttle is held retracted from staple ejecting position, as shown in Figs. 4 and 7, except  
 5 when the plate 9 is at its limit of rearward movement. When the plunger nose 4 has receded from under the base of the staple slide-bar or magazine 21 which is substantially at the limit of its rearward throw,  
 10 the lower staple *b* on said slide drops into the discharge-way of the holder in advance of the plunger nose and is discharged therefrom on the succeeding forward throw of the plunger. On the forward movement  
 15 of the plunger, the plate 9 moves back to its normal position under the influence of the spring 11, and the shuttle is forced outwardly to its retracted position due to the contact of the pin 19 with the cam portion  
 20 20 of the shuttle, as shown in Fig. 4.

It is apparent that I have provided a simple and efficient staple forming and discharging mechanism in which the staples are formed on one part and then ejected  
 25 therefrom onto another part, which is adapted to hold a plurality of staples in position to be successively taken therefrom by the discharging plunger and clamped about portions of an alining object.

30 I wish it understood that my invention is not limited to any specific arrangement or construction of the parts, except in so far as such limitations are specified in the claims.

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

1. In a device of the class described, the combination of a holder having a discharge-way therein, a member operative to inter-  
 40 mittently discharge staples from said way, relatively movable male and female staple forming parts associated with said holder and adapted to form a staple in a plane which is angled relative to the plane of discharge of  
 45 the staples, a shuttle member associated with the forming parts and operative to eject a formed staple therefrom at a predetermined point in a relative movement of said parts, means for guiding the ejected staples from  
 50 the forming parts to said discharge way, said means beings capable of holding a plurality of staples, and means for operating the forming parts.

2. In a device of the class described, the  
 55 combination of a holder having a staple discharge way therein, a plunger operative in said way to intermittently discharge staples therefrom, a female staple-forming die fixed to said holder, a plate reciprocally  
 60 carried by said holder and having a staple forming part adapted to coöperate with said female die to form a staple when the plate is moved in one direction, means acting on said plate to influence its movements in the

other direction, said plate and die having  
 65 parts adapted to coöperate to sever a length of wire fed thereto when a forming movement is imparted to said plate, a shuttle for ejecting a formed staple from the forming  
 70 parts, a staple slide-bar for guiding the ejected staples to said discharge way, and means movable to operate the plunger and to impart forming movements to said plate at predetermined points in the movements  
 75 of said plunger.

3. In an apparatus of the class described, the combination of a holder having a staple guide way therein, a female staple forming member secured to said holder at one side  
 80 of said guide way, a male staple forming member movably carried by said holder at the side of said female member and movable to coöperate with said member to form into a staple a section of wire fed thereto, a  
 85 shuttle member carried by and movable with said male staple forming member and operative to eject a formed staple from said male member, a guide-bar for directing the ejected staples to said guide-way, a plun-  
 90 ger movable in said guide-way to discharge staples therefrom, and means for actuating the movements of said plunger and male staple forming member.

4. In an apparatus of the class described, the combination of a staple discharging  
 95 plunger, a movable male staple-forming part and a fixed female staple-forming part, a shuttle pivotally carried by and movable with said male forming part and automatically operative at a predetermined point in  
 100 the movement of such male part to eject a formed staple therefrom, a member for guiding the movements of the ejected staples to discharging position, and means for actuating the movements of said male forming  
 105 part.

5. In an apparatus of the class described, the combination with a holder having a  
 110 discharge way therein, and a plunger movable in said way to discharge staples therefrom, of a female staple forming part fixedly carried by said holder, a male staple forming part movably carried by said holder, means for actuating the movements of said male part, a shuttle pivotally carried  
 115 by and movable with said male part and operative at a predetermined point in the movement of said male part to eject a formed staple therefrom, and means for guiding the ejected staples to said discharge  
 120 way, said guiding means having its lower end terminating over said discharge way immediately above the plane of movement of said plunger.

6. In an apparatus of the class described, 125 the combination of a holder having a guide way therein, a plunger movable in said way, a female staple forming member fixed to

said member, a male staple forming member  
movably carried by said holder, a shuttle  
pivoted to and movable with said male  
member and having its free end forked to  
5 straddle the staple forming part of said  
member, means controlling the movements  
of said shuttle for causing it to eject a  
formed staple from the forming parts at a  
predetermined point in the movement of  
10 the male member, means for moving said

male member, and a staple guide leading  
from the staple forming parts to said way to  
guide the movements of the staples thereto.

In testimony whereof I have hereunto  
signed my name to this specification in the 15  
presence of two subscribing witnesses.

VERNON HOXIE.

Witnesses:

E. W. BALLEMBERGER,  
C. E. CLEMENT.