

V. HOXIE.
STAPLE FORMING AND DISCHARGING MECHANISM.
APPLICATION FILED MAY 29, 1909.

942,906.

Patented Dec. 14, 1909.
2 SHEETS—SHEET 1.

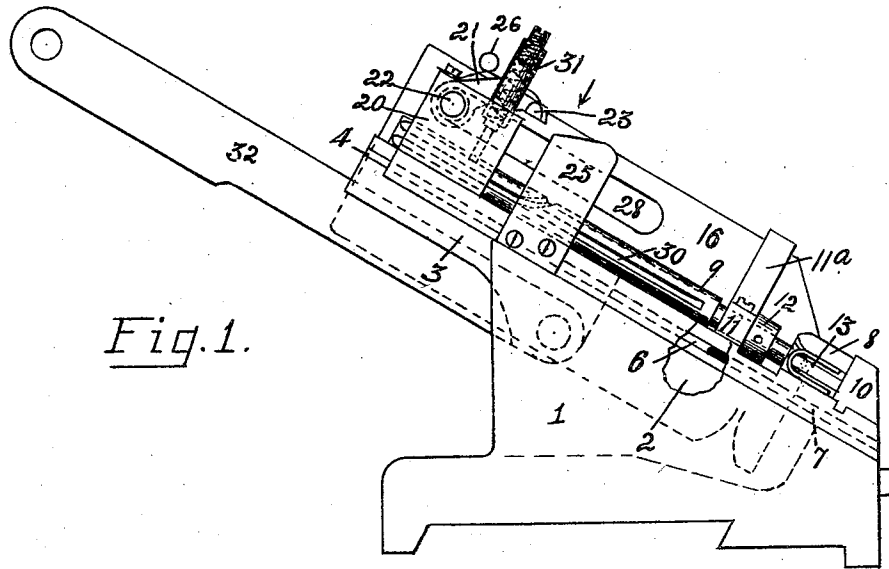


Fig. 1.

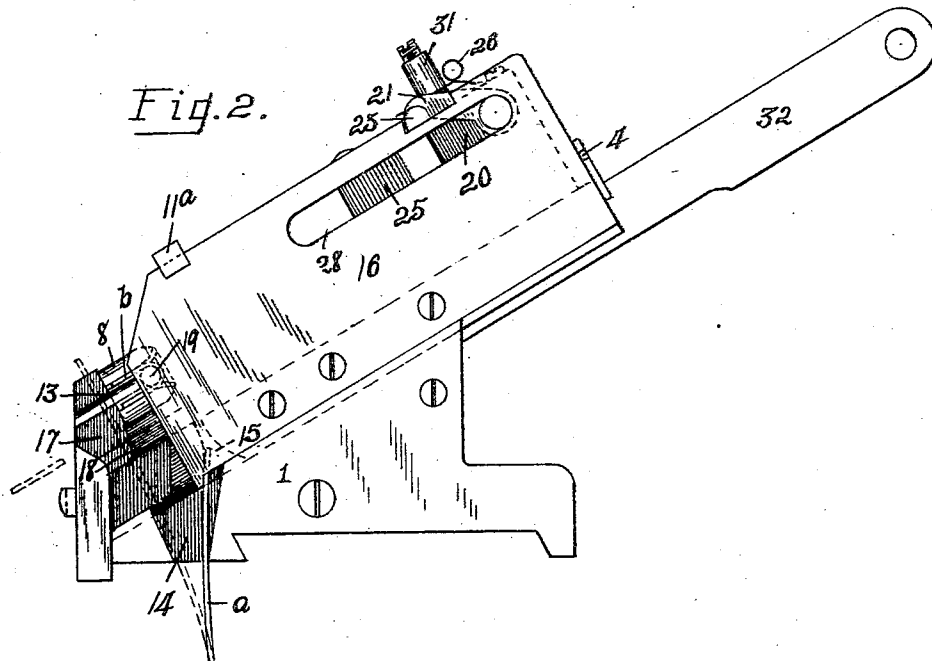


Fig. 2.

WITNESSES:

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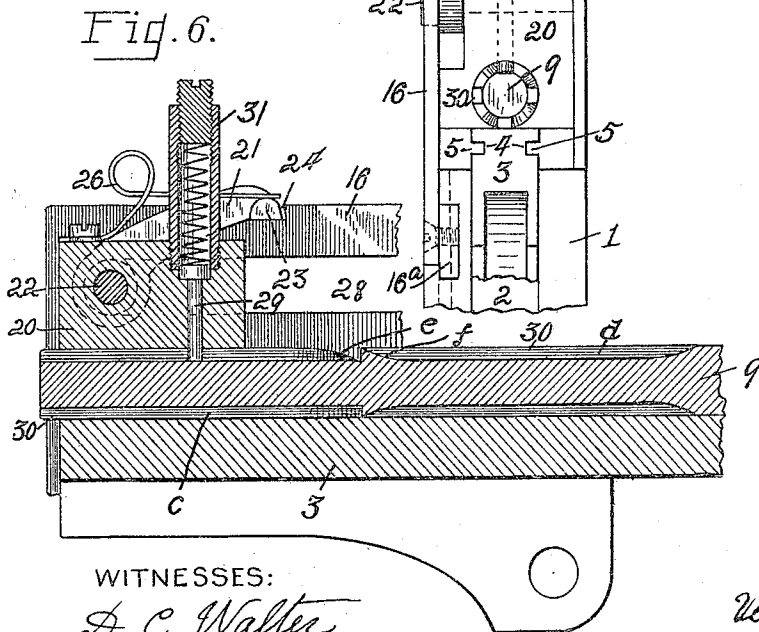
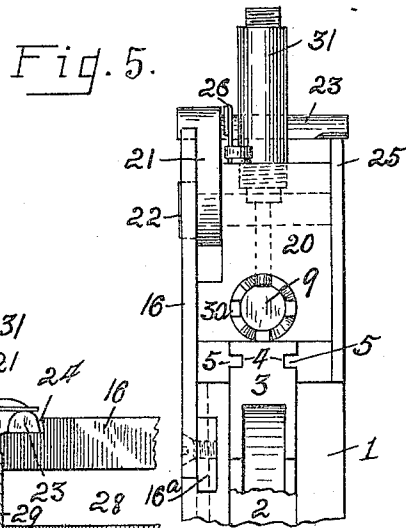
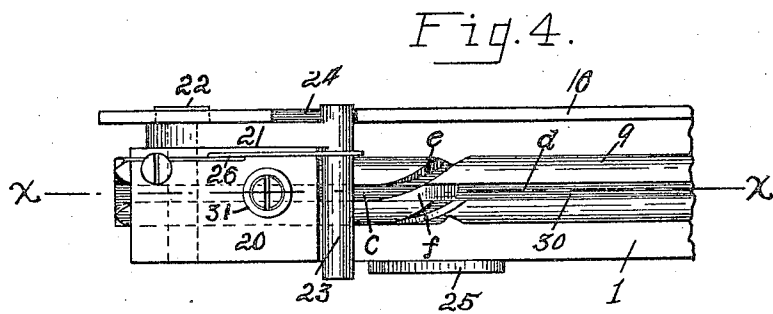
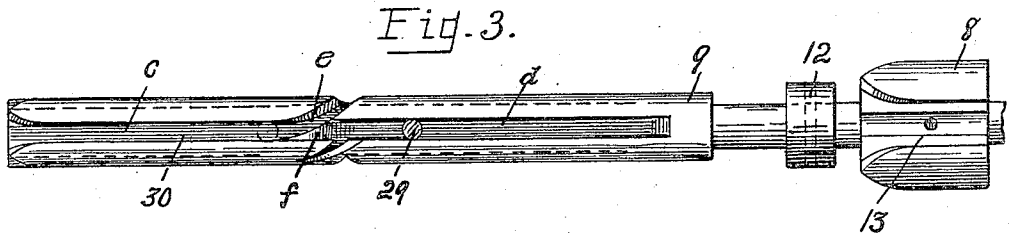
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His attys.

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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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STAPLE FORMING AND DISCHARGING MECHANISM.

942,906.

Specification of Letters Patent.

Patented Dec. 14, 1909.

Application filed May 29, 1909. Serial No. 499,206.

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 letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to mechanism for use in conjunction with wire fabric machines or the like for successively forming staples from sections of wire intermittently fed thereto, discharging the formed staples from such mechanism, and clamping them about the intersecting portions of the fabric being woven.

The object of my invention is to improve upon the mechanism described and claimed in my former application Serial No. 477,932, filed February 15, 1909, whereby to lessen the cost of manufacture and instalment thereof, to simplify its construction, and increase the efficiency of its operation.

The operation, construction and arrangement of the parts of the invention, are fully described in the following specification, and while in its broader aspect it is susceptible of numerous modifications, a preferred embodiment of the same is illustrated in the accompanying drawings, in which,—

Figures 1 and 2 are reverse side elevations of the mechanism comprising my invention, with the reciprocatory staple-forming and driving parts at the limit of their rearward movements. Fig. 3 is an enlarged plan view of the staple-forming cylinder and its shaft. Fig. 4 is an enlarged top plan view of the rear end portion of the mechanism looking in the direction of the arrow in Fig. 1. Fig. 5 is a rear end elevation of the same, and Fig. 6 is a vertical longitudinal section on the line *x x* in Fig. 4.

Referring to the drawings, 1 designates the holder thereof, which has its upper surface preferably inclined, as shown, and vertically grooved or recessed from its rear end forwardly, as at 2, to receive the plunger 3. This plunger is shown as being provided in its sides with longitudinal grooves 4 for re-

ceiving complemental guide ribs 5 formed on the walls of the groove 2, and is provided at its forward end with the staple-discharge nose 6, which works into a staple-discharge way or shallow extension 7 of the groove 2.

Mounted at the forward end of the holder 1 immediately above the staple-discharge way 7 therein is a staple cylinder or rotary staple magazine 8, which is disposed longitudinally of said discharge-way and is carried by a shaft 9. This shaft has its forward end journaled in bearings 10 and 11, which rise from the top of the forward end portion of the holder 1 and are disposed on opposite sides of the cylinder 8. A collar 12 on the shaft to the rear of the cylinder coacts with the forward side of the bearing 11 to prevent rearward movements of the shaft relative to the bearings. The cylinder 8 is provided around its circumference with a plurality of equidistantly-spaced longitudinally-extending grooves 13, in the present case four in number, the side walls of which are preferably concaved or half rounded to adapt each to hold a staple drawn therein against lateral withdrawal therefrom. When the cylinder is turned as hereinafter described these grooves successively move into register with the staple-discharge way 7.

The wire thread from which the staples are formed is shown at *a* in Fig. 2, and feeds upwardly through a cutaway portion or feed-opening 14 in one side of the holder 1 at the forward end thereof and an opening 15 through a broadened portion 16^a at the lower inner edge of a bar or plate 16, and thence through an opening or cutaway portion 17 in advance of a groove 13 in the contiguous side of the cylinder 8. The bar 95 or plate 16 is carried by one side of the holder for reciprocatory movements in a plane parallel to the axis of the cylinder 8, being held to the holder for such movements by an arm 11^a rising from the bearing 11 and hooking over the upper edge of the bar and by a complemental tongue and groove engagement at the lower edge of the bar, as shown in Figs. 2 and 5. On a rearward movement of the bar 16 from its limit of forward movement a section of wire, which was previously fed by any suitable mechanism to the opening 17 of the holder in advance of a registering groove 13 in the cylinder 8, is severed from its thread due to the opposed shearing action of the upper end of the wall of the opening 15 in the bar 16

and the fixed cutter-die 18 at the lower end of the opening 17, see Fig. 2. As the section is severed from its thread it is engaged midway between its ends by a stud 19, projecting inwardly from the forward end portion of the bar 16 and drawn thereby within the registering groove 13 in the cylinder side and formed into a staple *b* by the cooperating action of such stud and the side walls of the groove.

Rising from the rear end portion of the plunger 3 and movable therewith is a block 20, which carries a pawl 21 at the side thereof contiguous to the bar or plate 16. This pawl is mounted on a stud 22 for vertical oscillatory movements, and has its free end provided with a cross-head 23, one end of which is adapted to cooperate with a notch 24 in the upper edge of the bar 16 to force such bar forward during a portion of the forward movement of the plunger, while its other end is adapted to ride over a cam 25 which effects a release of such cross-head from the notch 24 at a predetermined point in a forward stroke of the plunger. The cam 25 rises from the side of the holder 1 opposed to the bar 16 and is positioned to effect a release of the pawl 21 from the notch 24 when the bar 16 has completed its forward movement, which is less than that of the plunger 3. A spring 26 is carried by the block 20 and acts on the pawl 21 to normally hold it in engagement with the notch 24.

The rearward movements of the bar 16 are actuated from the plunger 3 by reason of the head of the stud 22, which carries the pawl 21, working in the longitudinally-extending slot 28 in such bar and engaging the rear end thereof at a predetermined point in the rearward movement of the plunger whereby to move the bar therewith during the remainder of such rearward movement.

The means employed for imparting intermittent rotation to the cylinder for the purpose of successively moving the grooves 13 thereof into register with the discharge-way 7, consists in extending the rear end of the shaft 9 loosely through the block 20, whereby such block has longitudinal movements thereover, and providing a spring-pressed pin 29 in the block above the shaft and a series of grooves 30 longitudinally in the surface of the shaft for such pin to successively travel in as it is moved backward and forward thereon. The grooves 30 correspond in number to the number of grooves 13 in the cylinder 8, and each comprises the two straight longitudinally-extending portions *c* and *d* and the intermediate laterally-curved connecting portion *e*. The forward portion *d* of each groove is disposed one-quarter of a turn around the shaft from the rear portion *c* thereof, should four grooves be provided

as in the present case, and stands in longitudinal alinement with the rear portion *c* of the successive groove. On a forward stroke of the plunger the pin 29 on passing through the curved portion *e* of a groove effects a sufficient turning of the shaft 9 and cylinder 8 to move one groove 13 of the cylinder out of register with the discharge-way 7 and the successive groove 13 in register therewith, it of course being understood that the curved portion *e* of each groove 30 is so disposed that a turning of the cylinder 8 is not effected until the bar 16 has moved forward sufficiently to move the staple-forming stud 19 thereon out of a groove 13 in the cylinder. On a rearward movement of the plunger, the pin 29 instead of following the curved portion *e* of the groove in which it is disposed rides up the incline *f* at the rear end of the portion *d* of the groove and then drops into the portion *c* of the succeeding groove and continues its rearward movement therein. The pin 29 has its head mounted in a socket 31 and is yieldingly held depressed by a coiled compression-spring in such socket, as shown in Fig. 6.

32 designates a link which connects the plunger 3 with any suitable actuating means.

In the operation of my invention a length of wire is fed to the holder 1 while the bar or plate 16 is at the limit of its forward movement, or during the period of relative movements of such bar and the plunger 3, which is permitted by reason of the pawl 21 being released from the notch 24 in the bar and the stud 22 working in the slot 28 therein. On a rearward movement of the plunger the pin 29 passes up the incline *f* at the rear end of the portion *d* of the groove 30 in which it is traveling and drops into the portion *c* of the succeeding groove, and during the last portion of such movement the stud 22 carried by the block 20 coacts with the rear end of the slot 28 in the bar 16 and moves such bar therewith. As the bar 16 moves rearwardly with the plunger the fed length of wire is severed from its thread *a* by the shearing action of the cutter 18 and apertured face of the bar 16, and the stud 19 engages such severed section and draws it within the registering groove 13 of the cylinder 10 thereby cooperating with the walls of such groove to form the wire into U-shape. On the reverse or forward movement of the plunger the bar 16 is caused to move forward therewith due to the engagement of the pawl 21 with the notch 24 in the bar, and when such bar has reached the limit of its forward movement the pawl is released from engagement with the notch by the action of the cam 25 on the cross-head 23 of the pawl, thus permitting the plunger to continue the remainder of its forward stroke alone to discharge a staple from the registering groove 13 of the cylinder 10 and from

the discharge-way 7 and clamp it about the fabric being woven. After the stud 19 has moved out of a groove 13 of the cylinder and before the discharge nose 6 of the plunger has entered a groove 13 in the cylinder, the pin 29 passes through the curved portion *c* of the groove 30 in the extended end of the shaft 9, thus effecting a partial rotation of the cylinder 10 to move the succeeding staple-carrying groove 13 thereof into register with the advancing discharge-nose 6 and at the same time moving an empty groove 13 into register with the staple-forming stud 19 to permit a staple to be drawn therein on the next rearward movement of the bar 16.

I wish it understood that my invention is not limited to any specific construction or arrangement of the parts except in so far as such limitations are specified in the claims. Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is,—

1. In an apparatus of the class described, the combination of a staple-discharging member, a rotary staple magazine, a shaft carrying said magazine and having longitudinally-extending grooves provided with laterally curved portions and with straight portions connected by such curved portions, each groove having one straight portion in longitudinal register with a straight portion of the succeeding groove, and a pin yieldingly carried by the discharging member and adapted to travel in a groove during one direction of movement of the discharging member and to cooperate with such groove to effect a partial rotation of the magazine and to move from such groove to the succeeding groove during the movement of such member in the opposite direction.

2. In an apparatus of the class described, a holder having a staple discharge-way therein, a shaft mounted adjacent to such discharge-way and parallel thereto, a magazine carried by such shaft and adapted to carry and move staples from forming to discharging position, means movable to cooperate with said magazine to form staples therein, and means movable in said discharge-way for discharging staples from such magazine and having a part adapted to cooperate with said shaft to impart intermittent movements to the magazine when said discharging means is operated.

3. In an apparatus of the class described, the combination of a holder having a staple discharge-way therein, a rotary staple carrying magazine mounted adjacent to such discharge-way and having a part projecting axially therefrom in parallelism with such way, a member movable to cooperate with such magazine to form staples therein, a plunger movable in said discharge-way to discharge staples from such magazine and from said way, said plunger having connec-

tion with said member whereby to impart operative movements thereto and having a part which cooperates with the part projecting from such magazine to intermittently rotate the magazine as the plunger is operated whereby to successively move staples into register with such plunger.

4. In an apparatus of the class described, the combination of a holder having a staple discharge-way therein, a shaft mounted adjacent to such discharge-way in parallelism therewith, a staple magazine carried by such shaft, and mechanism operative to cooperate with said magazine to form staples therein and to cooperate with such shaft to intermittently rotate such magazine to move staples from forming to discharging position and having a part working in said discharge-way to discharge staples from the magazine.

5. In an apparatus of the class described, the combination of a holder having a discharge-way therein, a staple magazine carried by such holder adjacent to such discharge-way and having peripheral grooves therein adapted to successively move into register with such discharge-way when the magazine is rotated, a part projecting axially from such magazine in parallelism with such discharge-way, a member operative to cooperate with said magazine to form staples in the grooves thereof, and a plunger movable in said discharge-way to discharge staples from such magazine and having means movable therewith and cooperating with said part to impart intermittent rotary movements to the magazine as the plunger is operated.

6. In an apparatus of the class described, the combination of a holder having a discharge-way therein, a shaft carried by the holder and paralleling such discharge-way, a magazine carried by such shaft and adapted to move staples from forming to discharging position, a part adapted to cooperate with such magazine to form staples therein, a plunger movable to discharge staples from the magazine, means carried by the plunger for cooperating with the shaft to impart intermittent rotary movements to the magazine when the plunger is operated, and means for communicating movements from the plunger to said staple forming member.

7. In an apparatus of the class described, the combination of a holder having a discharge-way therein, a magazine mounted adjacent to such discharge-way and having its axis parallel to said discharge-way, said magazine being adapted to move staples from forming to discharging position, a reciprocatory member for cooperating with said magazine to form staples therein, a plunger movable in said discharge-way to discharge staples from such magazine and way, means movable with said plunger and

acting on said member to move it in one direction, means movable with said plunger for moving said member in the opposite direction, and means for coöperating with
 5 such latter means at a predetermined point in the movement of said member whereby to release such means from engagement with said member to permit a relative movement
 10 of said plunger and member, and means for intermittently rotating the magazine to successively move the staples carried thereby into register with the discharge-way.

8. In an apparatus of the class described, the combination of a holder having a discharge-way therein, means for moving
 15 staples from forming to discharging position, a reciprocatory member coöperating with such means to form staples therein, a plunger movable in said discharge-way to
 20 intermittently discharge staples from said means, means actuated by said plunger for moving said member in one direction, means actuated by said plunger for moving said
 25 member in the opposite direction, and means adapted to coöperate with said latter means at a predetermined point in the movement of said member to effect a disconnection of
 30 said latter means and member to permit the plunger to move independently of such member.

9. In an apparatus of the class described, the combination of a holder having a discharge-way therein, a magazine carried by
 35 such holder adjacent to said way and having a part projecting axially therefrom in parallelism with said way, said part having longitudinal and interconnecting grooves, a member operative to coöperate with said

magazine to form staples therein, a plunger movable in such discharge-way to discharge
 40 staples from said magazine, and means movable with said plunger and coöperating with the grooved portion of said part to impart intermittent rotary movements to the magazine when the plunger is operated.

10. In an apparatus of the class described, the combination of a holder having a discharge-way therein, a rotary staple carrying
 45 magazine mounted adjacent to such way, means for intermittently rotating such magazine, a member reciprocally movable and adapted to coöperate with such magazine to form staples therein, said member
 50 having a longitudinal slot, a plunger movable in said discharge-way to discharge staples from such magazine, a part carried by said plunger and movable in said slot
 55 and adapted to act on said member to move it in one direction, a latch member carried by said plunger and adapted to engage said
 60 member and impart movement thereto from the plunger in the opposite direction to the movement imparted to such member by said
 65 part, and means for acting on said latch to release its engagement at a predetermined point in its movement whereby to permit a
 70 movement of the plunger independent of said member.

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

VERNON HOXIE.

Witnesses:

E. A. BALLENGER,
 C. E. CLEMENT.