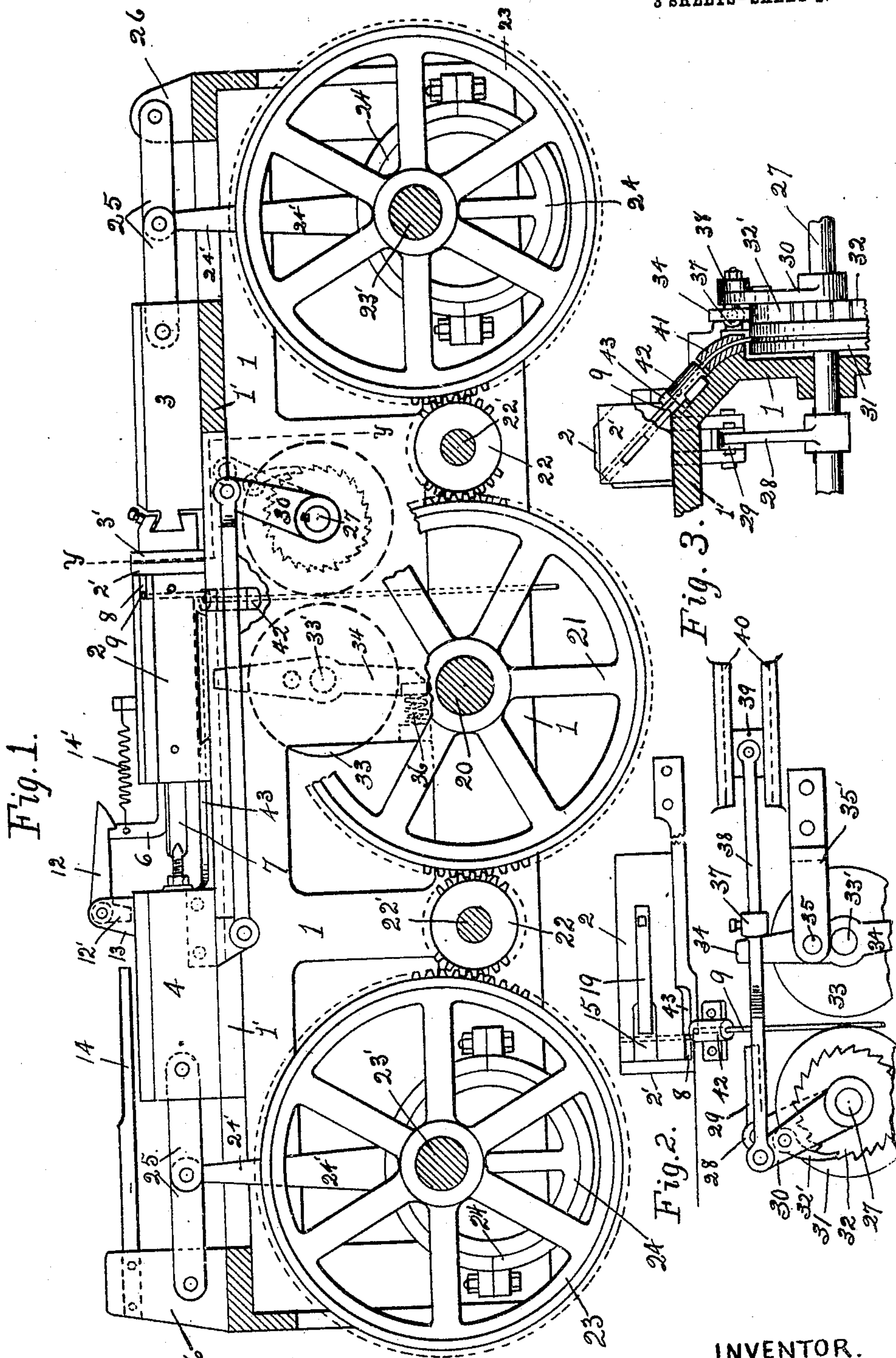


V. HOXIE.

WIRE STAPLE FORMING AND DISCHARGING MECHANISM.

APPLICATION FILED APR. 23, 1904.

3 SHEETS—SHEET 1.



WITNESSES:

David C. Walter
Lowell Schreiber.

INVENTOR.

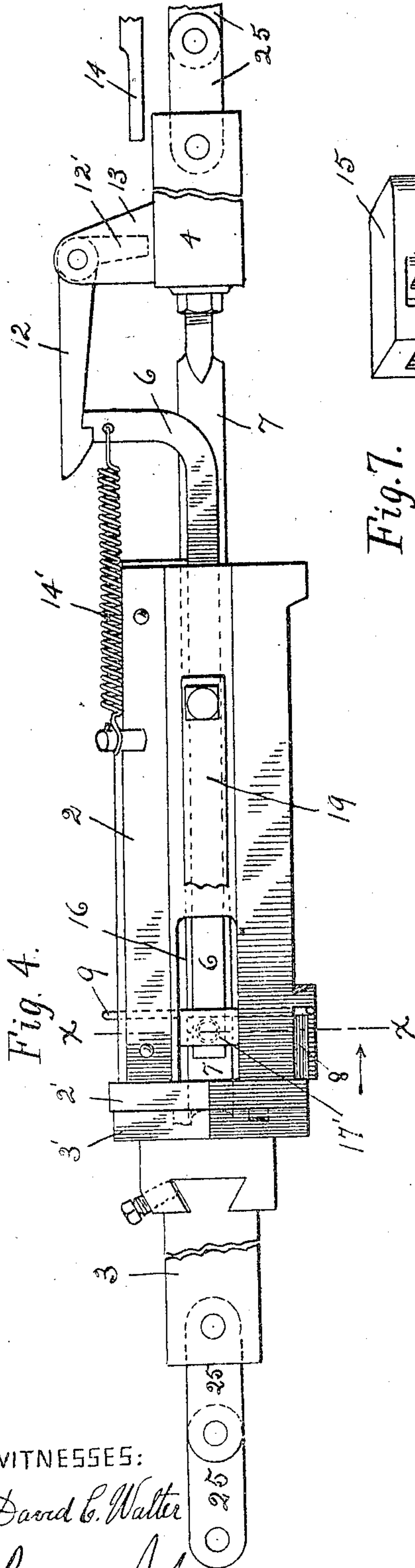
Vernon Hoxie,
By Owen & Owen
His attorneys.

V. HOXIE.

WIRE STAPLE FORMING AND DISCHARGING MECHANISM.

APPLICATION FILED APR. 23, 1904.

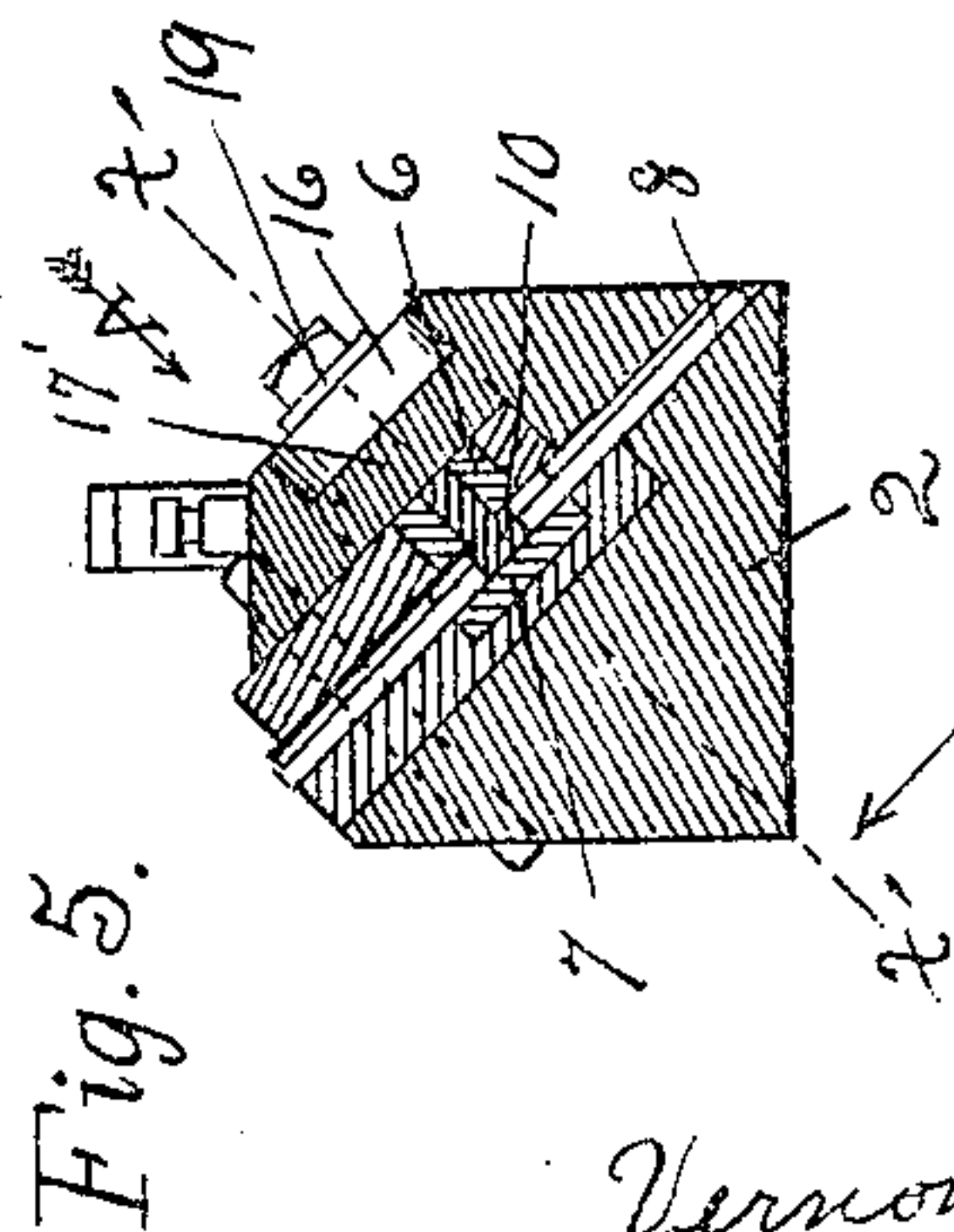
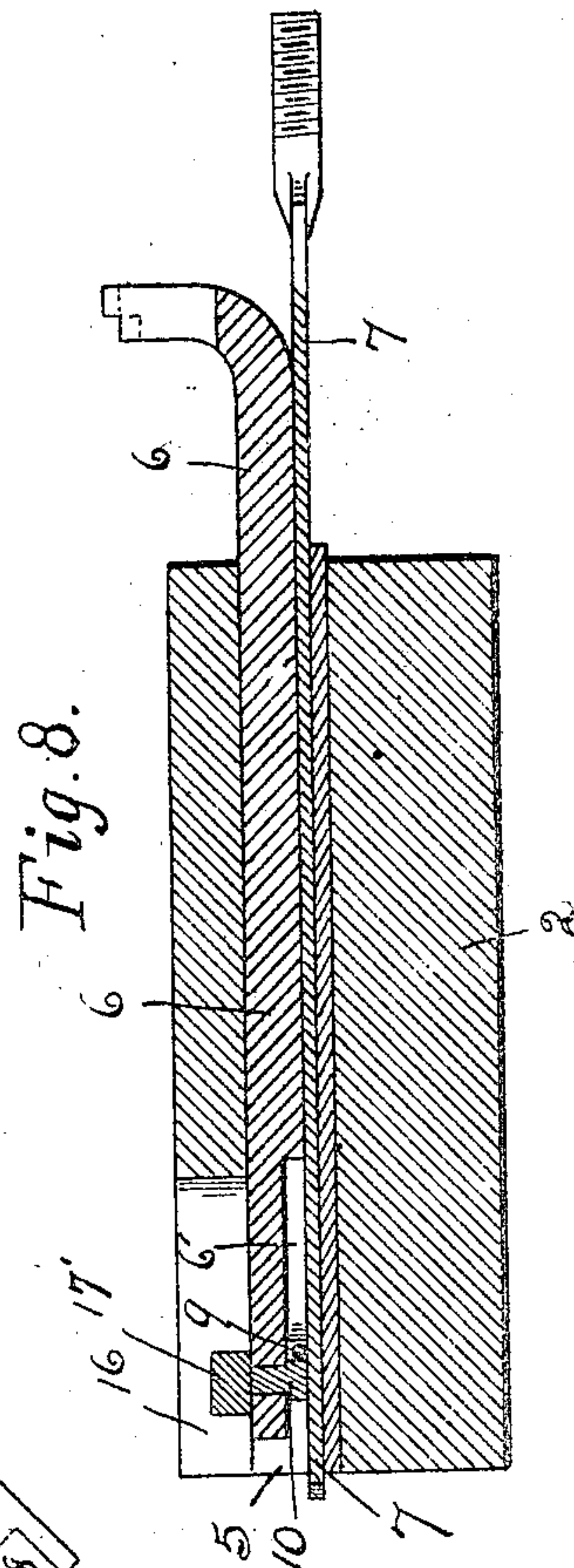
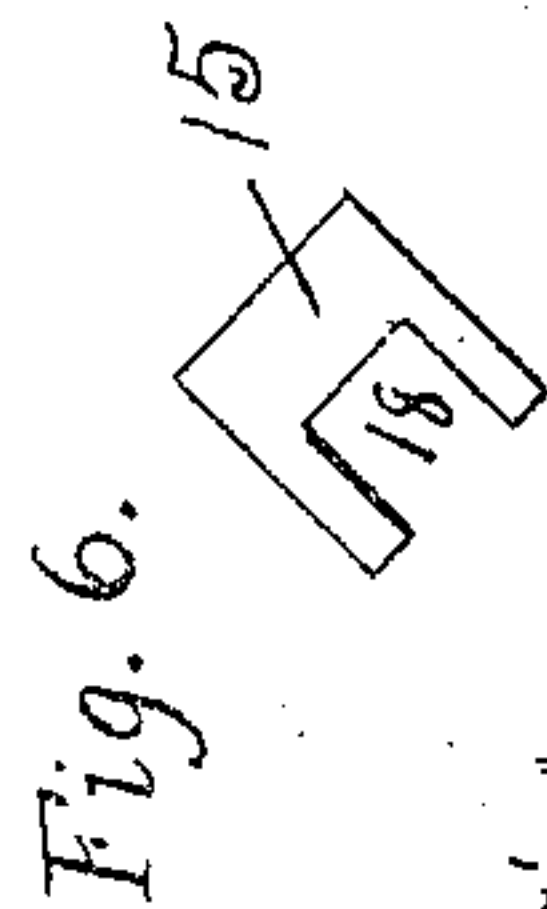
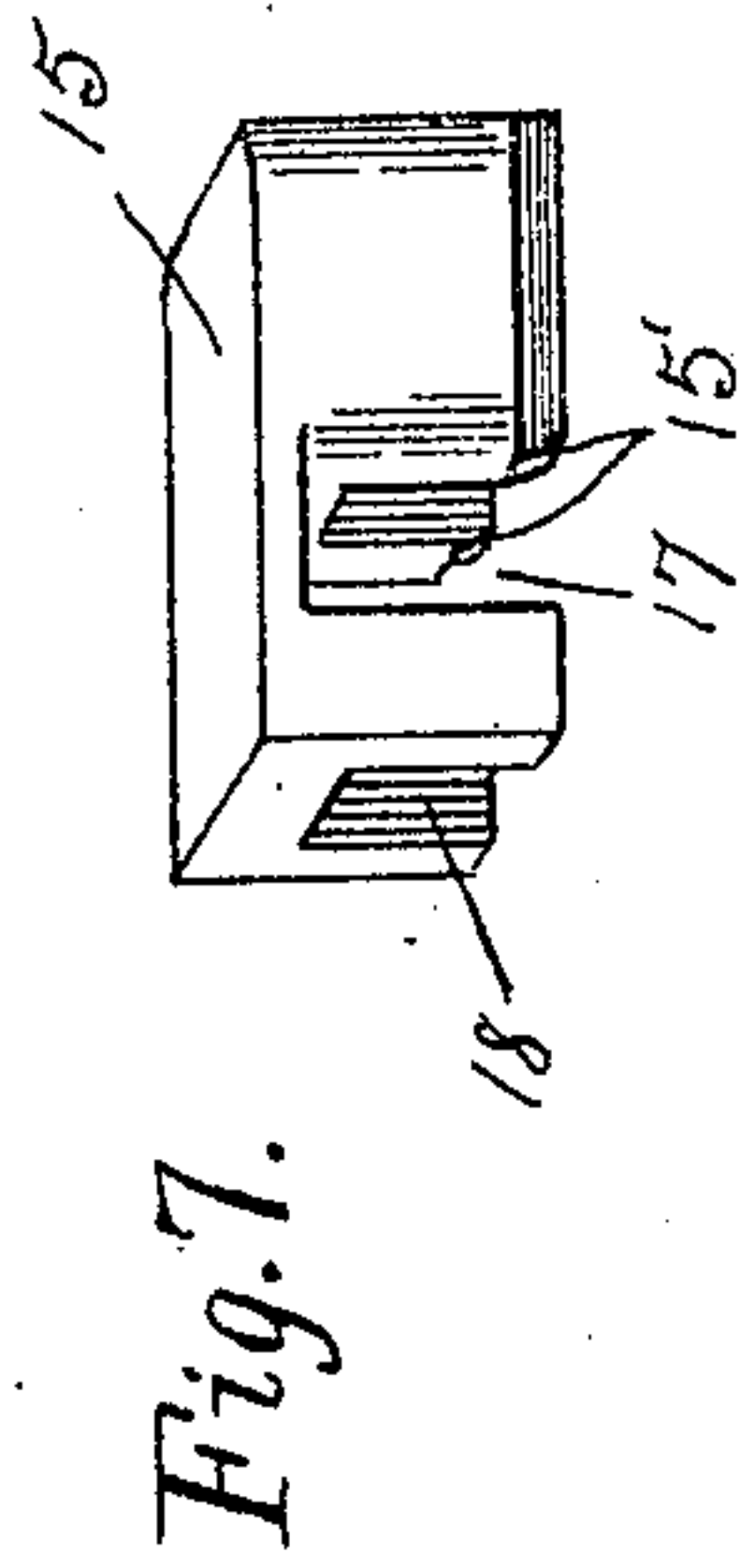
3 SHEETS—SHEET 2.



WITNESSES:

David C. Walter

Lowell Schreiber.



INVENTOR.

Vernon Hoxie,
By Owen & Owen
His attorneys.

No. 804,404.

PATENTED NOV. 14, 1905.

V. HOXIE.

WIRE STAPLE FORMING AND DISCHARGING MECHANISM.

APPLICATION FILED APR. 23, 1904.

3 SHEETS—SHEET 3.

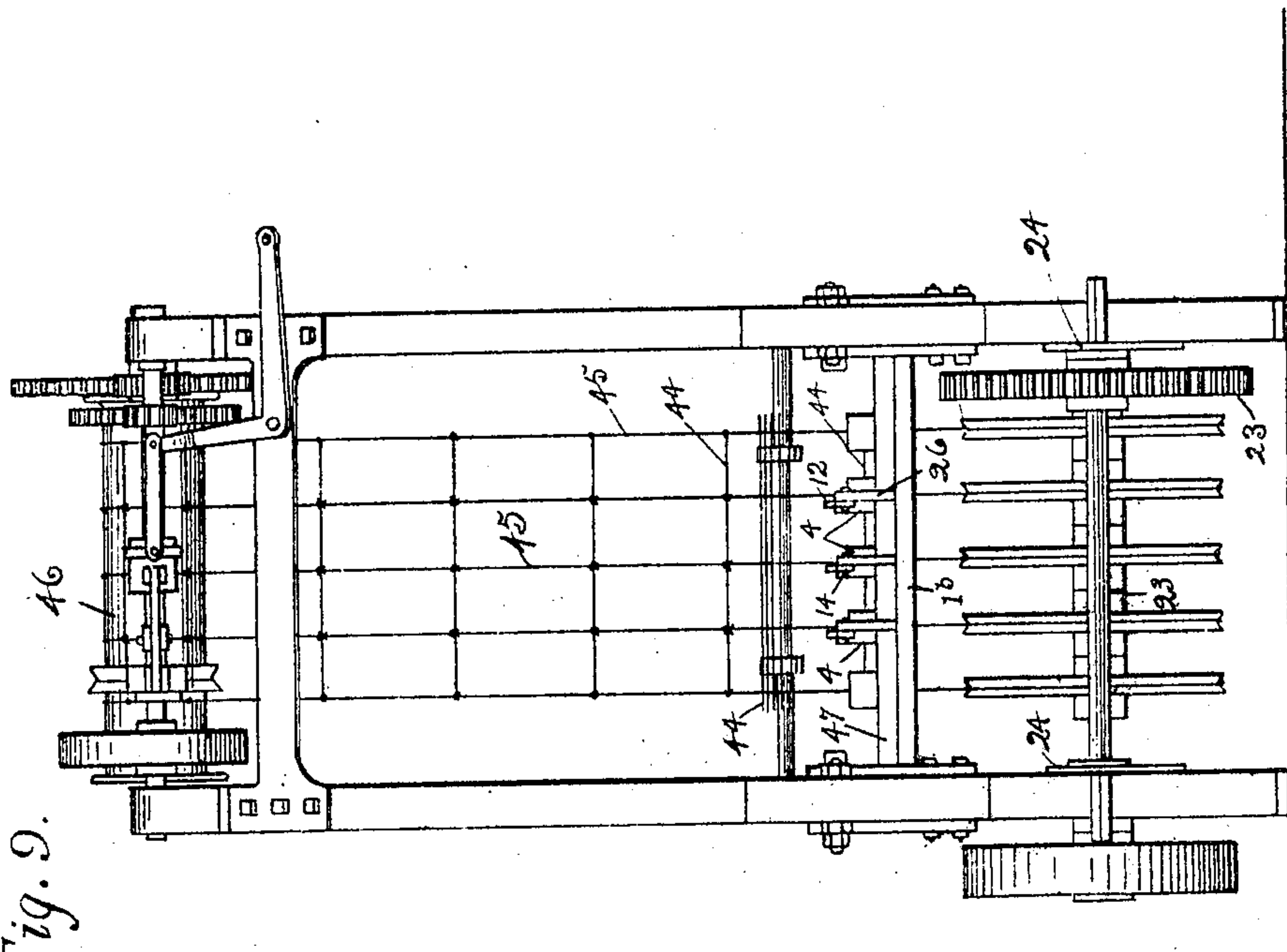


Fig. 9.

WITNESSES:

David C. Walter
Lowell Schreiber.

INVENTOR.

Vernon Hoxie,
By Owen & Owen
His attorneys.

UNITED STATES PATENT OFFICE.

VERNON HOXIE, OF ADRIAN, MICHIGAN, ASSIGNOR TO LAMB WIRE FENCE COMPANY, OF ADRIAN, MICHIGAN, A CORPORATION OF MICHIGAN.

WIRE-STAPLE FORMING AND DISCHARGING MECHANISM.

No. 804,404.

Specification of Letters Patent.

Patented Nov. 14, 1905.

Application filed April 23, 1904. Serial No. 204,654.

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 Wire-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 of reference marked thereon, which form a part of this specification.

My invention relates to mechanism for use in wire-fabric machines that is adapted to form and clamp a staple about the intersecting wires of a fabric conjointly with the weaving operation thereof.

The object of my invention is to provide a staple forming and clamping apparatus that is operatively associated with the weaving mechanism of wire-fabric machines, automatic in its operation, and adapted to cause a wire which is intermittently fed thereto by any suitable mechanism to be cut into predetermined lengths, formed into U-shaped staples, and then clamped about the intersecting portions of the oppositely-disposed wires of the fabric as they are drawn into alinement with said staple-forming mechanism.

The invention is fully described in the following specification and shown in the accompanying drawings, in which—

Figure 1 is a vertical elevation of my invention in operative position and showing a form of mechanism for operating the staple-forming mechanism and intermittently feeding a wire to the same. Fig. 2 is a detail elevation of a portion of the wire feed and cutting mechanism. Fig. 3 is a detail elevation taken on the dotted lines *yy* in Fig. 1 and looking in the direction of the arrow. Fig. 4 is an elevation of the staple-forming mechanism looking in the direction of the arrow A in Fig. 5 and showing the staple-forming block removed. Fig. 5 is a cross-section taken on the dotted line *xx* in Fig. 4. Fig. 6 is an end view of the staple-forming block. Fig. 7 is a perspective view of said block. Fig. 8 is a longitudinal sectional view of the staple-forming mechanism, taken on the dotted line *xx'* in Fig. 5 and showing the end die removed; and Fig. 9 is an end ele-

vation of a wire-fabric-weaving machine, showing the relative positions of the staple-forming parts with respect to the fabric being woven.

Referring to the drawings, 1 represents a portion of the frame of a loom provided with a horizontal bed 1' on its upper portion. Mounted on said bed 1' are a stationary block 2, in which the staple-forming parts of my invention are located, a longitudinally-sliding table 3, carrying a die 3' for coacting with a die 2' on said block 2, and a second longitudinally-sliding table 4, which is disposed at the opposite end of the block 2 to that of the table 3 and adapted when moved to operate mechanism for forming and clamping the staples to the alining intersecting portions of the fabric being woven, as hereinafter described.

The block 2 has a centrally-disposed longitudinal bore or opening 5 extending there-through, (shown in Fig. 8,) in which are suitably mounted the longitudinally-abutting plungers 6 and 7, which are for the purposes, respectively, of forming the staple-wire and then clamping it about the fabric. The plunger 6 has a recess 6', provided on the inner side of its forward end in alinement with the diagonally-disposed transverse slot or wire-feed opening 8 in said block, thus enabling the wire 9 from which the staple is formed to be passed between the contiguous faces of said plungers as it is fed to said opening 8 preparatory to its being bent in the desired form. A lug or pin 10 is secured to the end of the plunger 6 and projects into the recess 6', as shown in Figs. 5 and 8, in position to centrally engage the staple-wire 9 after it has been fed through the feed-opening 8 and cause the same to be drawn within the longitudinal opening 5 and formed into a U-shaped staple by a receding movement of the plunger 6. The outer end of the plunger 6 is bent at an angle to the body portion thereof and connected with the table 4, from which it receives its rearward movement, by means of the dog 12, which is fulcrumed to a boss 13 on said table and loosely engages the bent end of said plunger.

The dog 12 is automatically tripped from engagement with the end of the plunger 6 at a predetermined point in the receding movement thereof by means of the free arm 12' thereof coming in contact with an alining sta-

tionary finger 14, thereby permitting said plunger, which is actuated by the contraction-spring 14', to return to its normal position, as shown in the drawings.

5 The plunger 7, which is slightly wider than the plunger 6 to enable it to support the staple being formed during the receding movement of said latter plunger, has its outer end rigidly connected to the end of the table 4 in
10 any suitable manner and is adapted to have a simultaneous receding movement with that of the plunger 6. The rearward movement of the table 4 and plunger 7 continue a sufficient distance after the release of the plunger 6, as
15 above described, to permit the staple so formed, which remains in a stationary position after the release of the plunger 6, to be forced down in front of the concaved end of the plunger 7. On the return movement of the
20 plunger 7 the staple is discharged through an aligning opening in the die 2' and clamped about the portion of the fabric held between the coacting faces of the dies 2' and 3'.

In order to cause the staple to be forced
25 down in front of the plunger 7 after the latter has receded a sufficient distance for that purpose, I provide a spring-pressed block 15, which is mounted in a suitable socket or opening 16, provided above the plungers 6 and 7
30 in the forward portion of the block 2 for its reception. The block 15 is provided with the transverse recess 17, which is adapted to fit over the transverse rib 17' in the socket 16 and be held securely in place thereby, and
35 with the longitudinal recess 18, through which the plunger 6 is adapted to pass, the sides of said recess extending down on either side of said plunger and resting upon the plunger 7. The block 15 is yieldingly retained within the
40 socket 16 by means of a spring 19, which is bolted or otherwise suitably secured to the block 2. The lower rear edges of the transverse recess 17 are rounded, as shown at 15', to permit the contacting portion of the wire
45 9 to be forced under the legs of said block and raise the same as the plunger 6 recedes.

Having thus described the parts more particularly shown in Figs. 4, 5, 6, 7, and 8, in which the principal features of my invention
50 reside, I will now describe the mechanism which I have shown for intermittently feeding the wire 9 to such parts, cutting the same into sections from which the staples are formed, and imparting the requisite movement
55 to the tables 3 and 4.

Suitably mounted in a portion of the frame 1 below the bed 1' is a transverse shaft 20, which is driven by any suitable power and has keyed thereon a spur-gear 21. The gear 21
60 meshes on either side thereof with the pinions 22, which are mounted on studs 22' and adapted to communicate motion from said former gear to the gears 23, which latter are keyed to the counter-shafts 23'. Eccentrics 24 are
65 employed for communicating a reciprocatory

movement to the tables 3 and 4 from the shafts 23' and are connected with said tables through the medium of the eccentric-rods 24' and the links 25, the said links pivotally connecting the rods 24' with a boss 26 at either
70 end of the bed 1' and with the associated table, so that as the eccentrics revolve the rods 24' will be forced upward from the positions shown, thereby causing the tables 3 and 4 to have a receding movement from the block 2. 75

Mounted in the frame 1 above the horizontal plane of the shaft 20 is a rock-shaft 27, which has an arm 28 keyed to the portion thereof disposed under the bed 1' and is caused to receive its rocking movement from the re-
80 ciprocatory movement of the table 4 by reason of the rod 29 pivotally connecting said arm and table, as shown in Fig. 1. On the end of the shaft 27, projecting on one side of the frame 1, is keyed an arm 30, and loosely
85 mounted thereon are the peripherally-grooved wire-feed wheel 31 and rigidly-connected ratchet 32, which latter has its teeth engaged by a pawl 32', carried by said arm 30 and caused to be rotated a predetermined distance
90 at each forward movement of the table 4.

A companion feed-wheel 33 is loosely mounted on a stud 33', projecting from the face of the vertically-disposed lever 34, which latter is fulcrumed at 35 to the bracket 35',
95 secured to the frame 1, as shown in Fig. 2. The feed-wheel 33 is normally held in contact with the face of the companion feed-wheel 31 and interposed feed-wire 9 by means of an expansion-spring 36, which is retained be-
100 tween a projecting lug (shown by dotted lines on the frame 1) and the lower end of the lever 34. A proper length of wire 9 is caused to be intermittently fed to the staple-forming
105 parts by reason of the upwardly-projecting arm of the lever 34 being engaged by the button 37 on the rod 38 at a predetermined point in the movement of the plungers 6 and 7, thereby causing the lever to be oscillated on
110 its fulcrum and the feed-wheel 33 drawn out of engagement with the companion wheel 31 as soon as the required length of wire has been fed to the opening 8, as shown in the drawings. The rod 38 has one end pivotally
115 connected to the arm 30 of the shaft 27, from which it receives its motion, and its other end pivoted to the cross-head 39, which reciprocates within the ways 40, secured to the frame 1.

The course of the wire 9 as it is fed to the
120 block 2 is guided by the apertured boss 41 and spool 42, the latter having its upper end provided with a hardened cutting edge, against which the end of the knife 43 operates. The knife 43 is bolted to the end of the table 4, as
125 shown in Fig. 1, and is of sufficient length to adapt its end to pass over the apertures through the spool 42 and sever the wire just prior to the limit of the forward movement of said
130 table, as shown in Figs. 1 and 2.

Fig. 9 of the drawings shows the staple forming and discharging parts in position on the table 1^b of a wire-fabric machine to staple and secure the stay-wires 44 to the warp-wires 45 of a fabric as the former are intermittently dropped into position between the coacting faces of the dies 2' and 3' of the block 2 and movable table 3, respectively, of the staple-forming mechanism. The formed fabric is intermittently wound by any suitable mechanism upon a reel 46, which is mounted in the upper part of the machine-frame. A transverse strip 47 connects the tables 4 of the several staple-forming mechanisms and is regularly moved by the eccentrics 24 at either end of the shaft 23' to cause a reciprocal movement of said tables. The tables 3, which are mounted at the rear of the fabric, may be connected by a transverse strip and similarly moved. It will thus be apparent that separate actuating mechanism may be used for each of the staple-forming devices, as shown in Fig. 1, or that only one actuating mechanism may be employed, as above described.

In the operation of my invention the revolving of the eccentrics 24 causes a regularly-timed reciprocatory movement of the tables 3 and 4, the former receding to permit the fabric being woven to be passed between the faces of the dies 2' and 3' in order to bring next alining intersecting portion thereof in position to be stapled and the latter receding for the purpose of operating the plungers 6 and 7 to form a staple from the section of wire which has previously been fed to the rear of the pin 10. The plungers 6 and 7 are caused to recede in unison until the engaged wire-section has been drawn entirely within the opening 5 and formed into U shape, at which time the notched lever 12 is released from engagement with the plunger 6 by contact with the finger 14, thereby permitting said plunger 6, which is actuated by the spring 14', to return to its normal position. After the plunger 6 has been released the rearward movement of the table 4 and plunger 7 continues a sufficient distance to allow the staple just formed to be forced by the action of the spring-pressed block 15 down in advance of the concaved end of said plunger 7 in position to be forced out through the discharge-opening in the die 2'. On the forward movement of the table 4 the staple thus formed is forced through the opening in the die 2' and clenched about the alining intersecting portion of the fabric, which is held in position between the faces of the dies 2' and 3', and at the same time a new section of wire is fed within the opening 8 of the block 2 to the rear of the pin 10 by reason of the pawl 32' engaging the ratchet 32 on the forward movement of the arm 28 and rotating the feed-wheels 31 and 33 a distance necessary to feed the required length of wire. When the table 4 has advanced a predetermined distance, the feed of the wire is interrupted by reason of

the button 37, carried by the rod 38, coming in contact with the lever 34 and causing the feed-wheel 33 to be drawn out of engagement with the companion feed-wheel 31. The wire 9 is severed in proper length after it has been fed within the block 2 by means of the cutting-die 43, which operates against the face of the spool 42.

While it has been necessary in the description and drawings illustrating my invention to show some means for operating the staple-forming mechanism, feeding the wire thereto, and severing the same, it will be obvious that numerous methods of performing these functions might be devised without detracting from the merits of my invention, which consists more particularly in the operative association of a staple-forming mechanism with the weaving parts of a wire-fabric machine, and also that such changes in the form, proportion, and minor details of construction of the parts as fairly fall within the scope of my invention may be made without departing from the spirit or sacrificing any of the advantages thereof. It is also apparent that as many of the staple-forming machines may be employed in a loom as there are warp-wires in the fabric to be woven, one being mounted at each intersection of a warp-wire with a woof-wire.

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

1. The combination in a stapling-machine, of a block having an opening therethrough and a wire-feed opening transversely intersecting said former opening, a staple-forming plunger and a staple discharging and clamping plunger mounted in said first-mentioned opening, means for imparting a simultaneously-receding movement to the forming and discharging plungers a predetermined distance and a continued receding movement of the latter plunger to permit the formed staple to drop in advance thereof and a returning movement of said discharging-plunger, and means for releasing said forming-plunger from said former means at a predetermined point in its movement to permit a return thereof to its normal position after having formed a staple from a section of wire previously fed to said wire-feed opening.

2. The combination in a stapling-machine, of a stationary block having a longitudinal bore therein, longitudinally-abutting staple-forming and staple-discharging plungers movable in said bore, the former having its forward end recessed and formed with a wire-engaging pin, means for causing a simultaneous movement of both plungers a predetermined distance and a continued and returning movement of the discharging-plunger, and means for releasing the forming-plunger from its moving force to permit it to return to its normal position.

3. The combination in a staple-machine, of an inclosing element, independently-movable forming and discharging plungers disposed in parallel planes therein, the forming-plunger having a portion shaped to engage and draw a section of wire into U shape within said inclosing element, means having connection with each of said plungers for causing a simultaneous movement of both a fixed distance and a continued and returning movement of the discharging-plunger for the purpose described, and means for causing a release of the forming-plunger from its moving force to permit it to return to a position to receive a newly-fed section of wire.

4. The combination in a staple-machine, of a member having a longitudinal bore therein, independently-movable forming and discharging elements movable in said member, the former having a portion shaped to engage and draw a section of wire into U shape within said member, means having connection with each of said plungers for causing a simultaneous receding movement of both a fixed distance and a continued and returning movement of the discharging-plunger, means for breaking the connection between the forming-plunger and its moving force to permit said plunger to return to its normal position, and a U-shaped member having its legs normally in engagement with the face of the discharging-plunger adapted to force a formed staple from the plane of operation of the forming-plunger to that of the discharging-plunger when the latter has moved from under the staple.

5. The combination in a staple-machine, of a support, a member fixed to said support and having a longitudinal bore therein, a table reciprocally mounted on the support at one end of said member, forming and discharging plungers independently movable in the bore of said member and having connection at their outer ends with the table, means for breaking the connection between the forming-plunger and the table at a fixed point in its movement, means for returning the forming-plunger to its normal position when released from its moving force, a member adapted to force a staple into the plane of movement of the discharging-plunger when said plunger has receded from under the same, and means for reciprocating said table.

6. The combination in a staple-machine, of a fixed member having a longitudinal bore therein, a reciprocatory element mounted at one end of said fixed member, a forming-plunger and a discharging-plunger mounted in parallelism in said bore and capable of independent longitudinal movement and having connection with the reciprocatory element, means for breaking the connection between the forming-plunger and said moving element at a fixed point in its movement whereby the

discharging-plunger is permitted to recede from under the formed staple, and means for moving the staple in advance of said latter plunger in position to be discharged on its forward movement.

7. The combination in a staple-machine, of a fixed member having a portion bored, a staple-forming plunger having a portion shaped to engage and draw a wire into U shape within said fixed member, a discharging-plunger independently movable in a plane parallel to that of the forming-plunger, a moving element having connection with the outer ends of said plungers, means for causing a release of the forming-plunger prior to the limit of rearward movement of the discharging-plunger, means for causing a return of the forming-plunger when released, means for moving a formed staple in advance of the discharging-plunger, and mechanism operated by said moving element for causing an intermittent feed of the staple-wire to said fixed member.

8. A staple-machine comprising a fixed member having a longitudinal bore therein, a staple-forming and a staple-discharging plunger mounted in said bore in parallel juxtaposition, a reciprocatory element having rigid connection with the outer end of the discharging-plunger, a dog mounted on said element for engaging and imparting movement to the forming-plunger, means for releasing the dog from engagement with the forming-plunger at a fixed point in its movement, means for causing a return of the forming-plunger when released to its normal position, and means for moving a formed staple from the plane of one plunger to that of the other.

9. The combination in a staple-machine, of a stationary member having a wire-feed opening therein, a staple-forming plunger operating in said member and adapted to be normally retained in one position, a second plunger operating in parallelism with said first plunger and adapted to discharge from said member the staples formed by said first plunger, means for moving the staples in advance of said second plunger after being formed, mechanism for feeding a wire to said opening and severing the same, means for moving said plungers as required, means for releasing the forming-plunger from said moving means at a predetermined point in its movement, and means for actuating the forming-plunger to return to its normal position.

10. In a staple-forming machine, a stationary member having a wire-feed opening therein, a plunger mounted in said member in a plane intersecting said opening and having a portion shaped to receive and engage a wire fed to said opening and form it into U shape, a second plunger mounted in parallelism with said first plunger, a spring-pressed block mounted in said member and adapted to move a staple, when formed, in advance of said sec-

ond plunger in position to be discharged from
said member, an element having connection
with said plungers for imparting movement
thereto, means for breaking the connection
5 between said element and forming-plunger at
a predetermined point in their rearward move-
ment whereby the movement of the second
plunger is continued to recede from under the
formed staple and to discharge the same, and

means for causing a return of the forming- 10
plunger to its normal position.

In testimony whereof I have hereunto
signed my name to this specification in the pres-
ence of two subscribing witnesses.

VERNON HOXIE.

Witnesses:

ARCHIE E. PALMER,
W. H. BURNHAM.