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No. 804,322.

PATENTED NOV. 14, 1905.

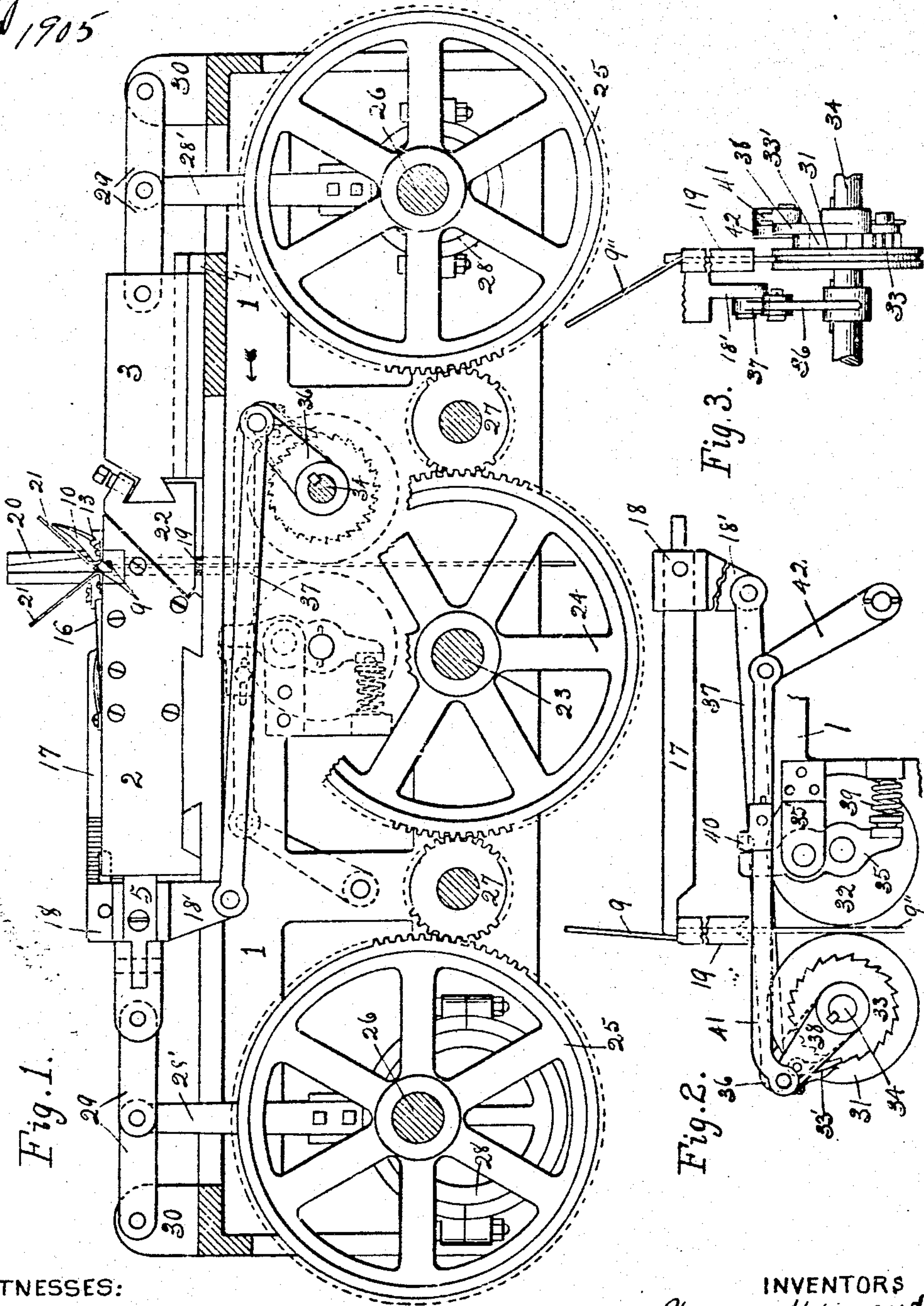
V. HOXIE & W. F. TRUMAN.

WIRE STAPLE FORMING AND DISCHARGING MECHANISM.

APPLICATION FILED JUNE 24, 1904.

4 SHEETS—SHEET 1.

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12541 of 1905*



WITNESSES:

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INVENTORS

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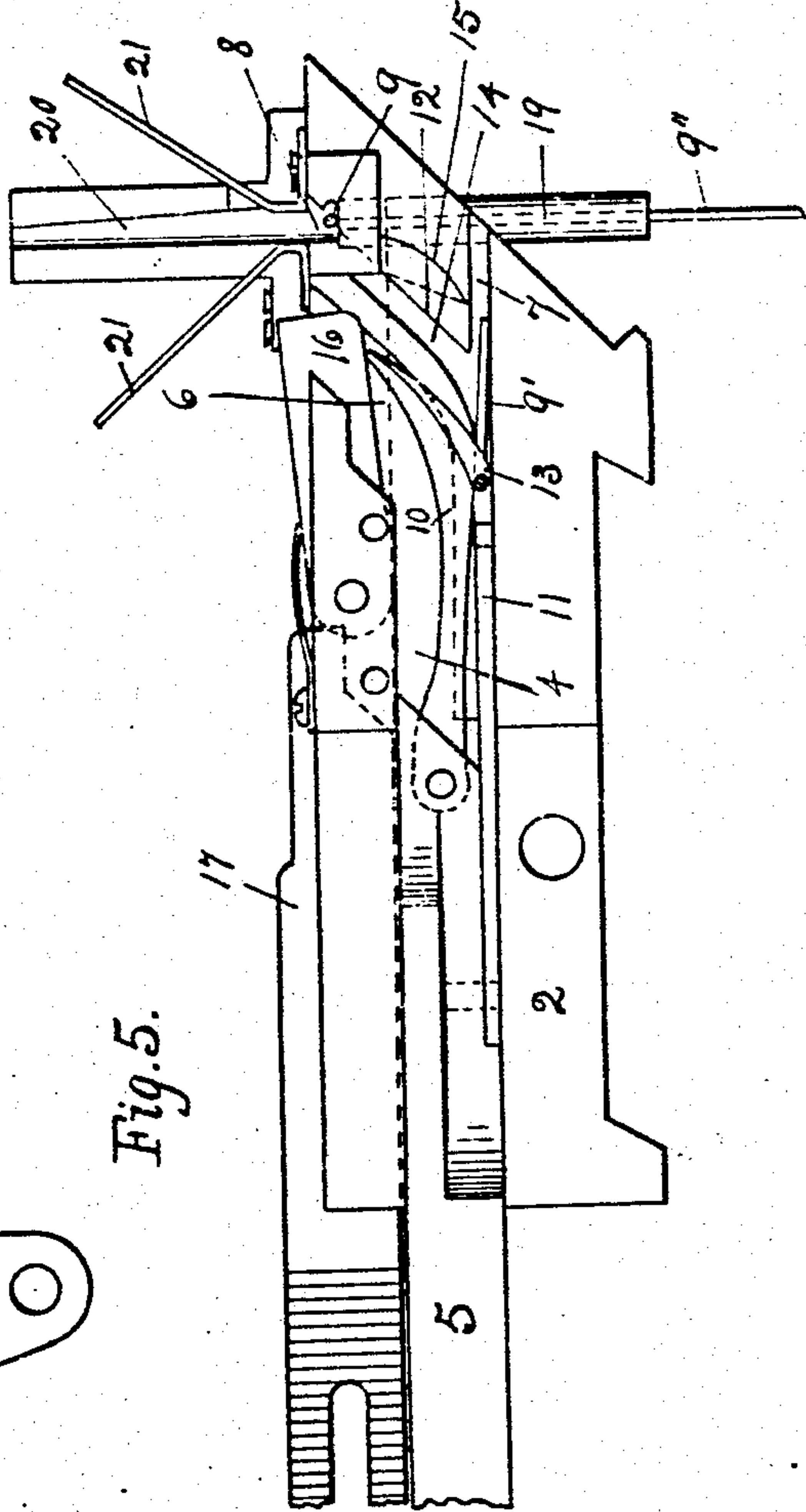
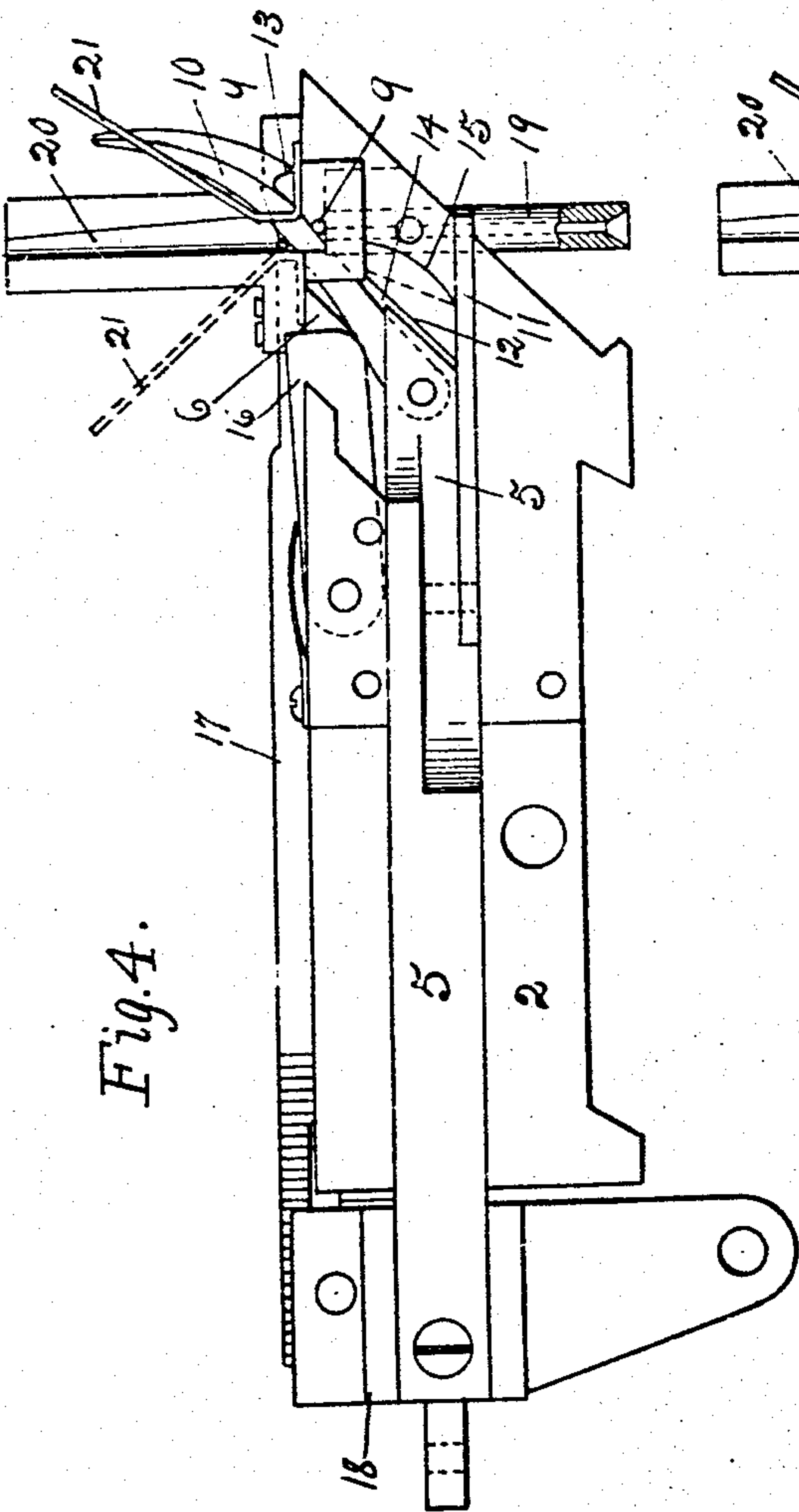
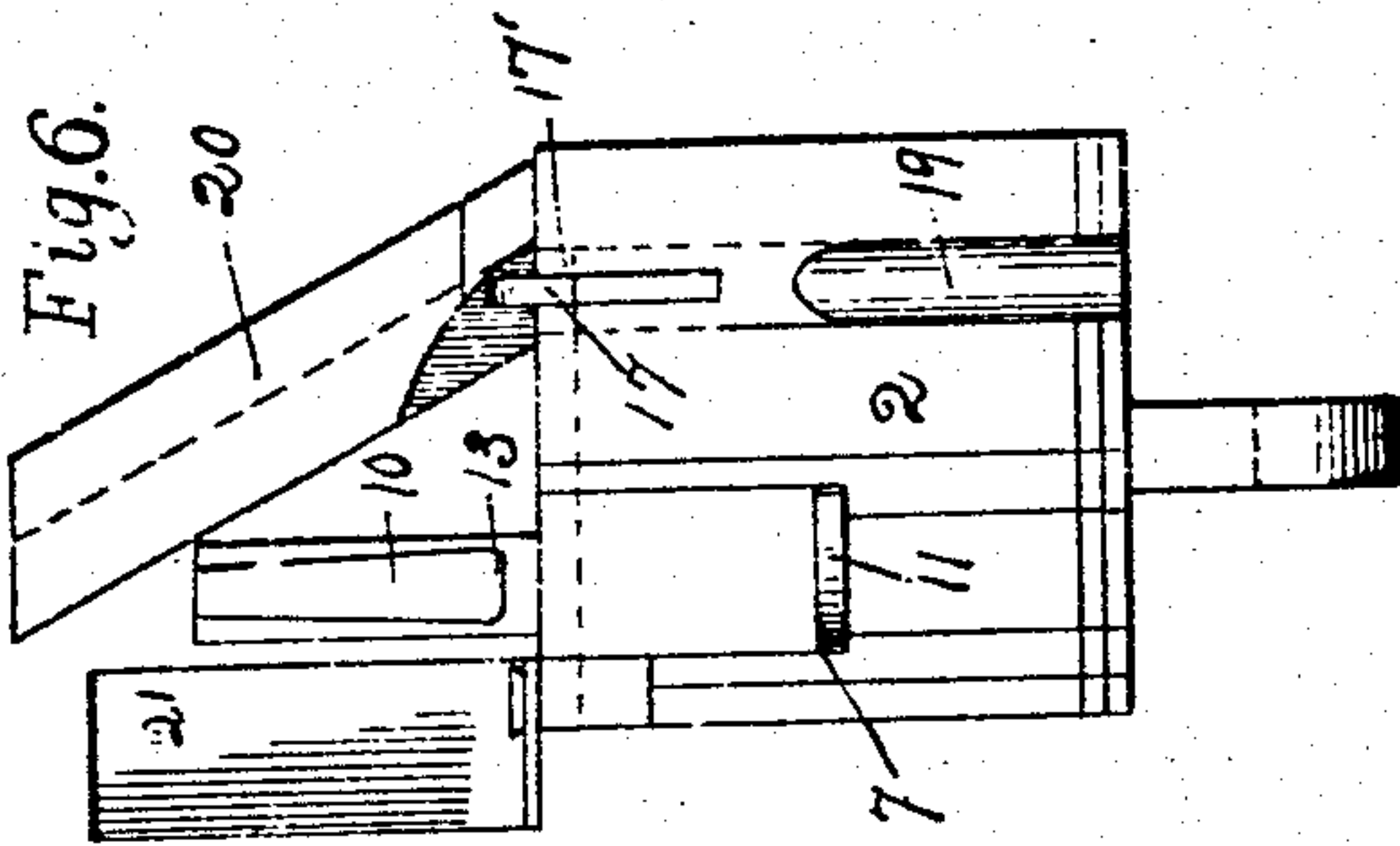
Staple Forming and Setting
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4 SHEETS—SHEET 2.



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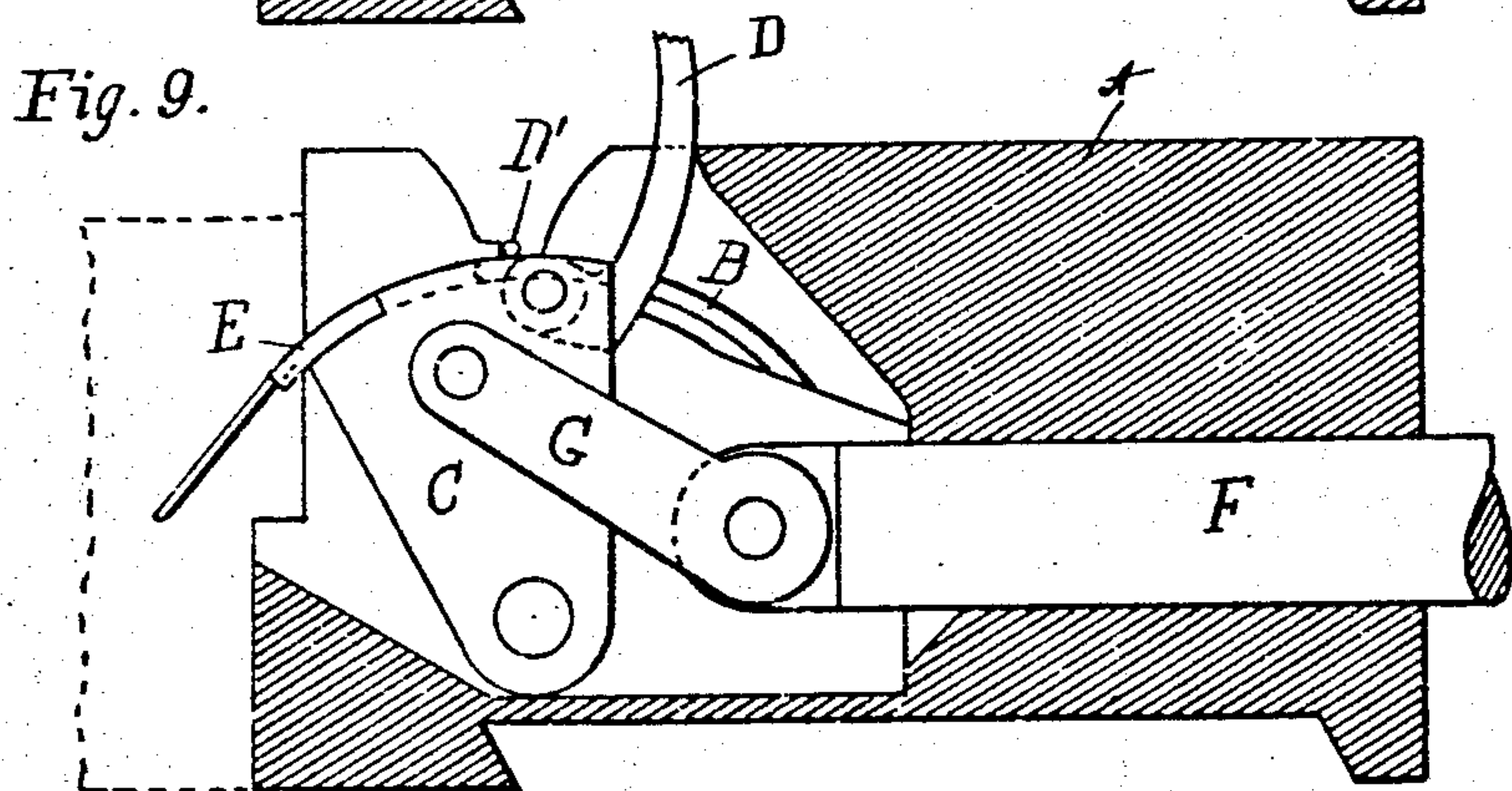
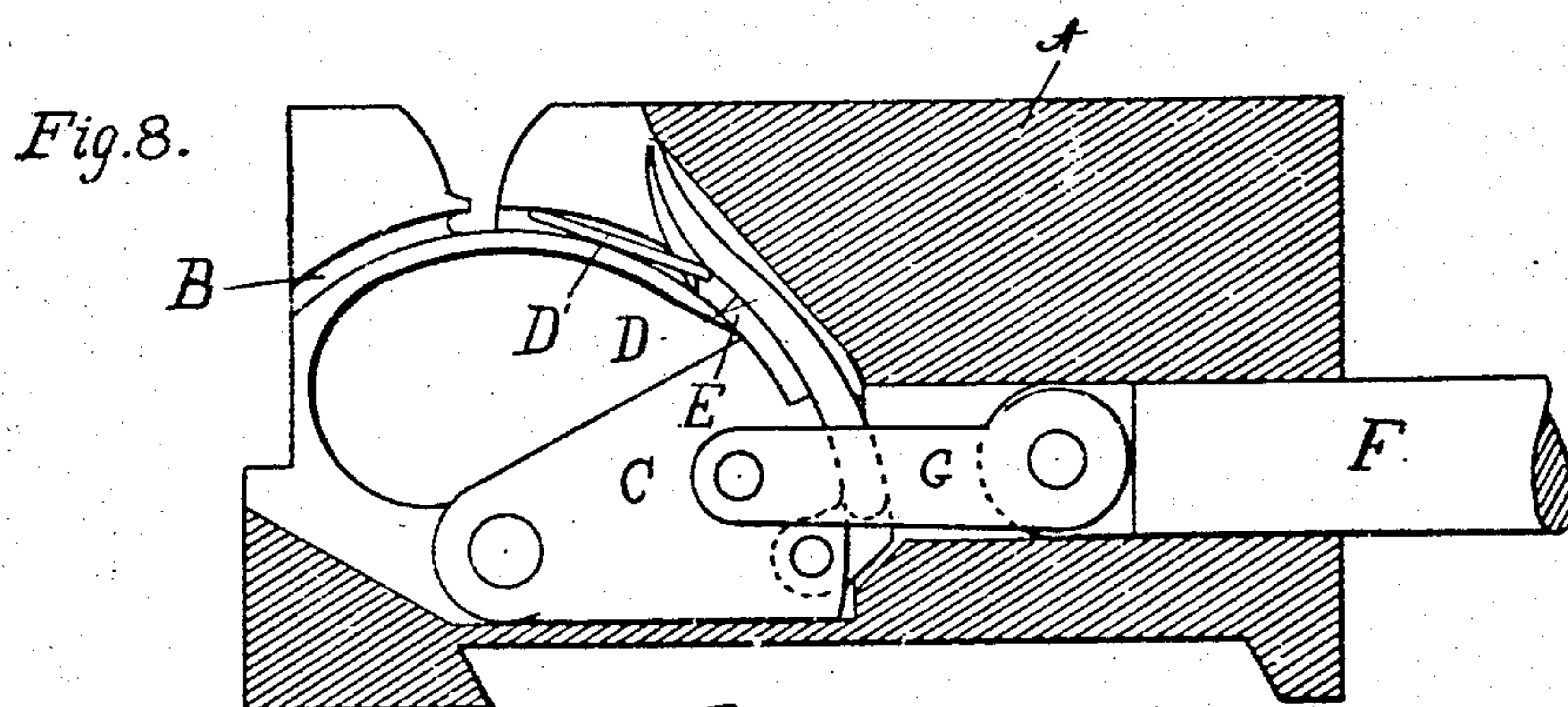
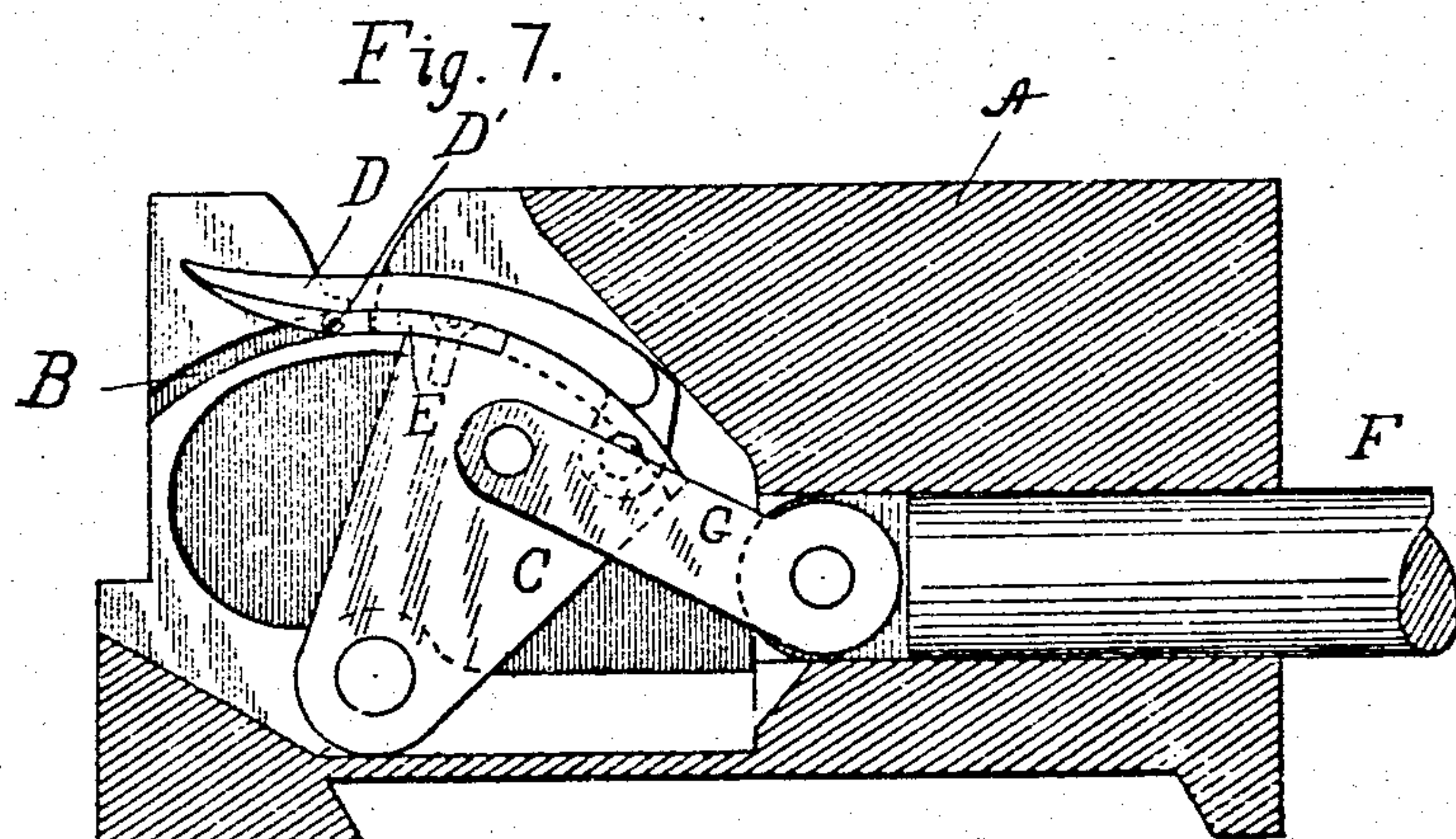
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4 SHEETS—SHEET 3.



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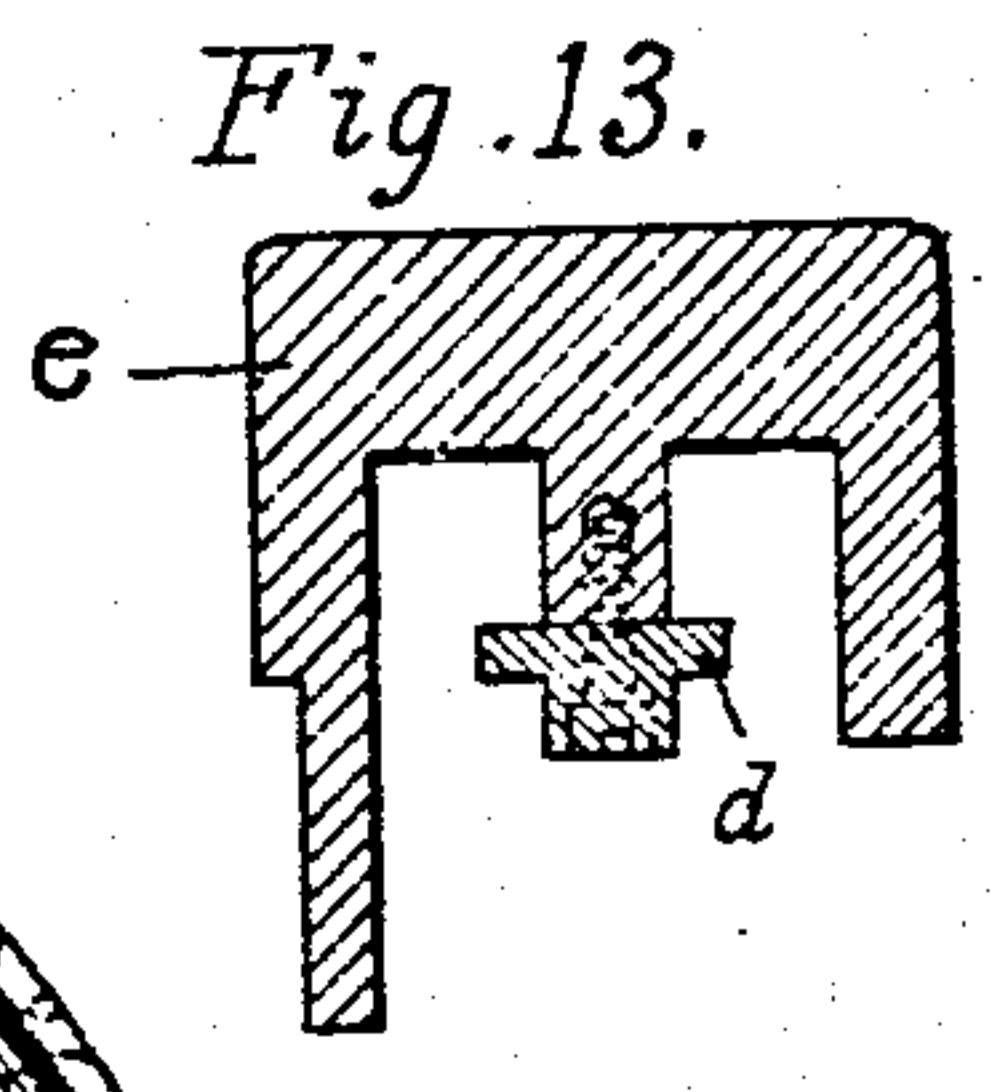
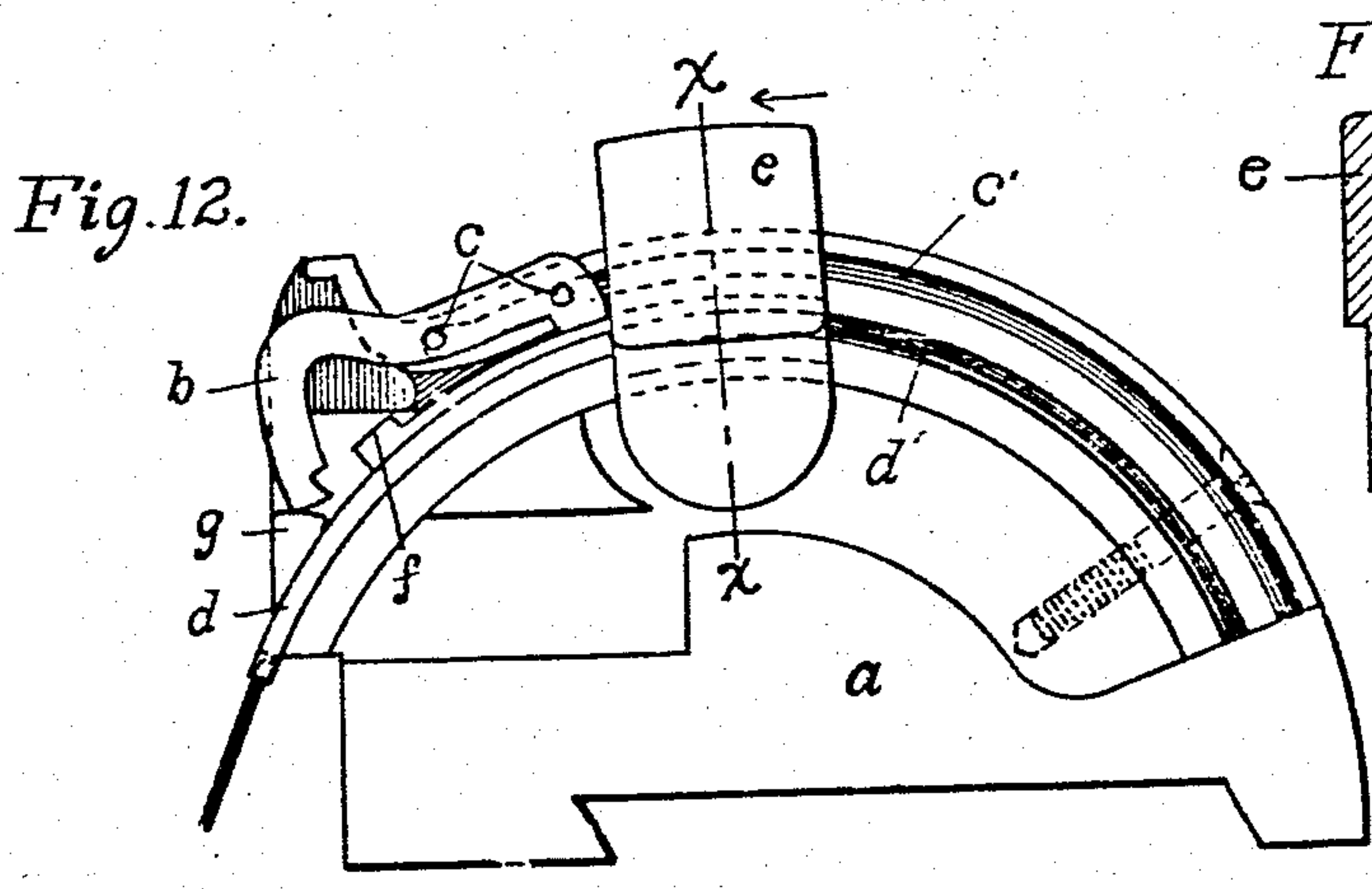
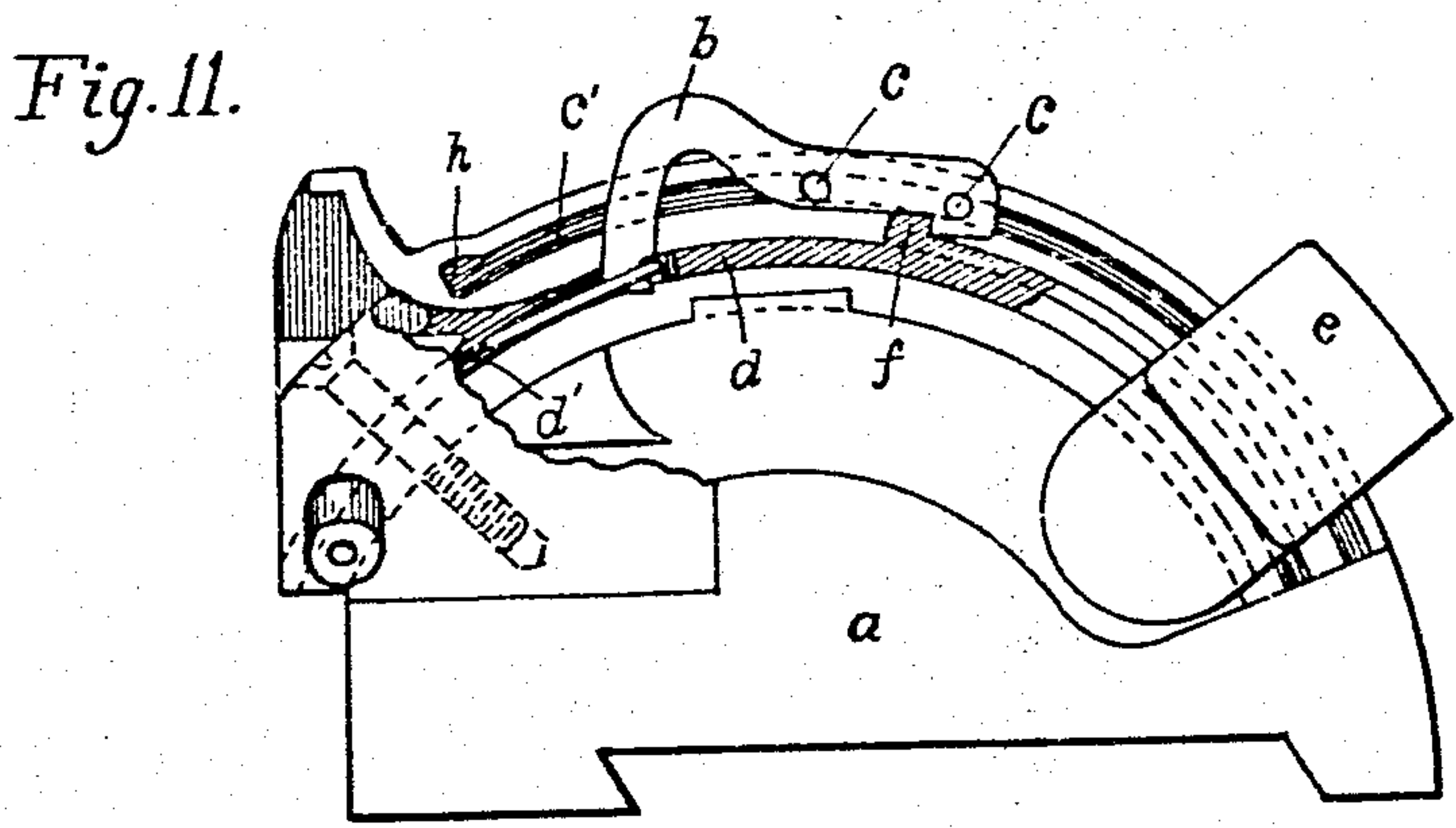
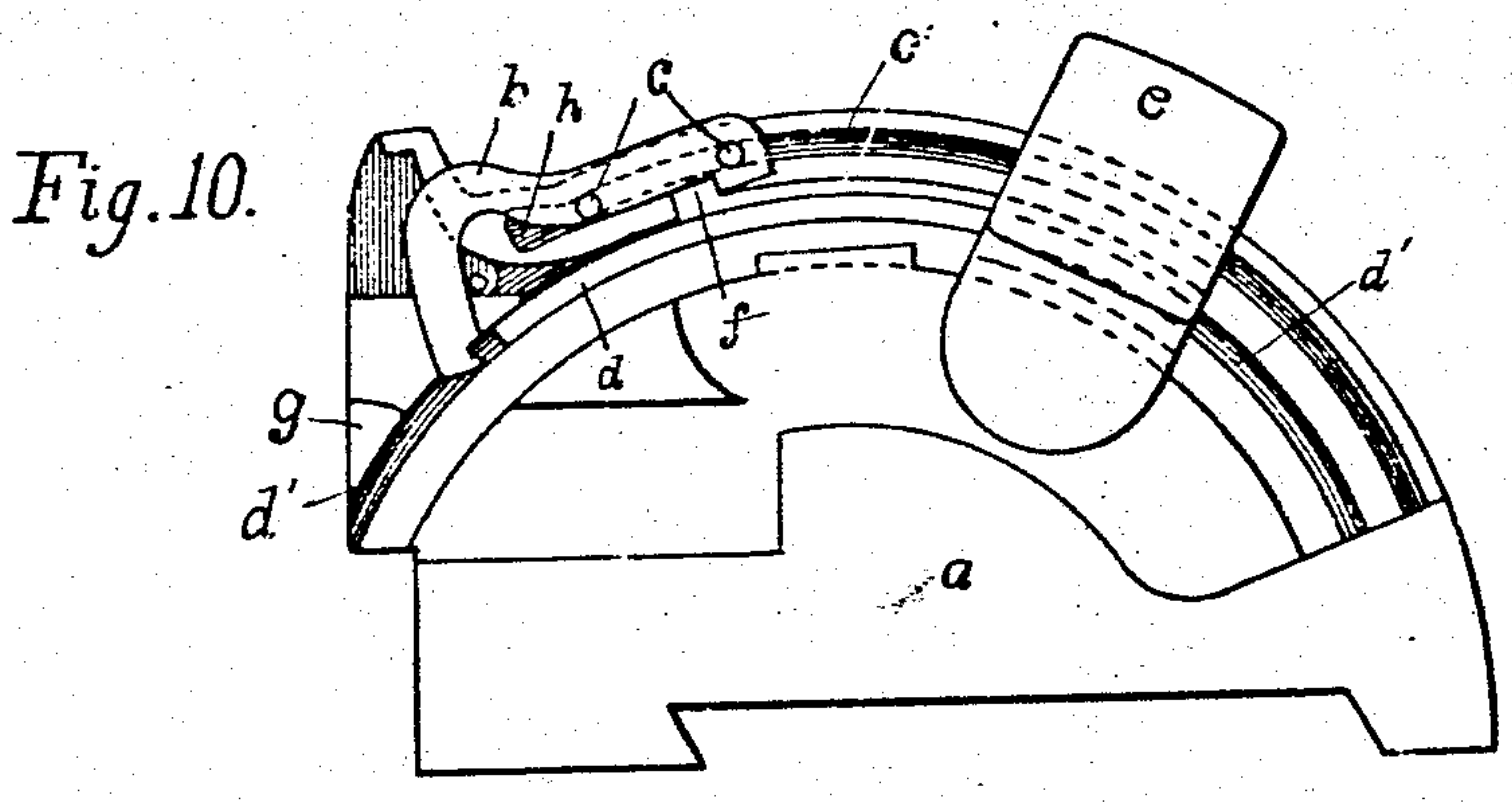
Vernon Hoxie and
William F. Truman,
By Owen & Owen,
Their attorneys.

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4 SHEETS—SHEET 4.



WITNESSES:
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UNITED STATES PATENT OFFICE.

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WIRE-STAPLE FORMING AND DISCHARGING MECHANISM.

No. 804,322.

Specification of Letters Patent.

Patented Nov. 14, 1905.

Application filed June 24, 1904. Serial No. 213,925.

To all whom it may concern:

Be it known that we, VERNON HOXIE and WILLIAM F. TRUMAN, citizens of the United States, and residents of Adrian, in the county of Lenawee and State of Michigan, have invented certain new and useful Improvements in Wire-Staple Forming and Discharging Mechanism; and we 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.

Our invention relates to mechanism that is more especially designed for use in wire-fabric machines and adapted to sever into predetermined lengths a wire fed thereto, successively form the severed sections of wire into staples, and clamp the staples so formed about the intersecting portions of a fabric, the wires of which are intermittently fed by suitable mechanism in a plane intersecting the plane of discharge of said staples.

The object of our invention is to simplify and improve upon the construction and operation of mechanism of this class by the provision of an apparatus in which a single plunger is operated to form into the desired shape a severed section of wire previously fed thereto, discharge the same therefrom, and clamp it about the crossing portions of a fabric being woven by a machine with which said mechanism is associated.

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

Figure 1 is a longitudinal vertical elevation of our invention, showing the operating parts in position and the supporting-frame in vertical section. Fig. 2 is a detail elevation of the wire feed and cutting mechanism; Fig. 3, an end elevation of the wire-feed mechanism looking in the direction of the arrow in Fig. 1; Fig. 4, a longitudinal elevation of the mechanism comprising the features of our invention, showing a portion removed to illustrate the inner workings thereof. Fig. 5 is a similar view thereof, showing the position of the operative parts after the staple has been formed and previous to its discharge; Fig. 6, an end elevation of said mechanism. Figs. 7,

8, 9, 10, 11, and 12, respectively, are longitudinal vertical sectional views of modified forms of the staple forming and discharging mechanism of our invention, showing the operative parts of each form in different positions; and Fig. 13 is a cross-section of the block shown in Figs. 10, 11, and 12, to which the staple forming and discharging parts are attached.

Referring to the drawings, 1 represents a portion of the frame of a loom, on the upper portion of which are mounted the stationary block 2 and the longitudinally-movable table 3, which latter slides on a suitable bed 1', provided on said frame. The block 2 is oblong in shape and is provided with a longitudinal bore or main opening 4, in which is mounted the reciprocatory plunger 5. The forward end of the bore 4 terminates in the diagonally-disposed upwardly-extending auxiliary opening 6 and with the restricted staple-discharge opening 7, the latter being disposed in a continuing plane with that of said bore. The upper end of the diagonal opening 6 is intersected by an elongated transverse groove or recess 8, into which the sections of wire 9 from which the staple is formed are adapted to drop after being severed, as hereinafter described.

Secured to the forward end of the plunger 5 is the pivotally-mounted finger 10, which is adapted to change its position to accommodate itself to operate in the bore 4 and opening 6, and the fixed longitudinally-projecting tongue 11, which is adapted to engage a staple when formed and discharge it through the opening 7. The finger 10 has its free end curved upwardly to adapt its course to be freely directed through the opening 6 as the convexed surface thereof comes in contact with the inclined abutment 12 on the forward movement of the plunger 5, the said abutment forming one of the walls of said opening 6. A hook 13 is formed at the lower portion of the convexed surface of the finger 10 to enable it to centrally engage and draw a section of wire 9 which has been previously deposited in the groove 8 within the opening 6 and bore 4 on the receding movement of the plunger 5 and connected parts, thereby forming the section 9 into U shape and moving it into position to be engaged by the forward concaved end of the tongue 11 and discharged

through the opening 7 on the return movement of the plunger 5.

The sides of the opening 6 and the forward portion of the bore 4 are provided with grooves 14, as shown in Fig. 5, to form ways for guiding the movement of the staples 9' as they are drawn within the opening 6, the said grooves communicating at one end with the transverse groove 8 and terminating at their other end at a point in the plane of the bore 4. To enable the legs of a staple 9' to have a circular movement as the head thereof follows the course of the grooves 14, the longitudinally-alining portions of the abutment 12 are suitably bored to a depth indicated by the curved line 15, thereby enabling the ends of said legs to drop into the opening 7 in advance of the lower edge of said abutment, as shown in Fig. 5.

The finger 10 is adapted to be held in proper position within the member 2 by means of the spring-pressed dog 16, which is pivoted in said member and has its free end bearing against the upper side of said finger.

A knife 17, which is mounted in and has its movement guided by a longitudinal groove 17', provided in the upper surface of the block 2, in parallelism with the bore 4, has one end rigidly attached to the outer end of the plunger 5 by a connecting-block 18 and its other end provided with a cutting edge which is adapted to operate over the end of the apertured plug 19, through which the wire 9" is fed, and to sever said wire just prior to the limit of forward movement of the plunger 5. As the desired length of wire is fed through the plug 19 its upper end is deflected laterally of the block 2 by means of the inclined way 20, in position to fall into the groove 8 as soon as it is severed by the knife 17. Inclined guides 21 are provided at the outer end of the groove 8 to insure the severed section of wire falling therein.

A die 22, which has its clamping-surface tapered to adapt it to coact with the tapered discharge end of the block 2, is carried by the movable table 3 and caused to be moved into and out of engagement with the end of said block as the weaving operation requires.

Having thus described the parts comprising our invention, we will now describe the mechanism shown in the drawings for intermittently feeding a wire thereto and actuating the movable parts thereof.

Motion is transmitted to the shaft 23, which is mounted in the frame 1, and to the spur-gear 24 thereon from any suitable power and is communicated from said gear to the gears 25 and shafts 26, which are mounted at either end of said frame through the medium of the idler-pinions 27. Eccentrics 28 are employed for communicating a reciprocatory movement from the shafts 26 to the block 18, to which the plunger 5 and knife 17 are attached, and to the table 3 and are connected to said

block and table through the medium of the eccentric-rods 28' and the links 29, the latter pivotally connecting said rods with a boss 30 at either end of the frame 1 and the associated block or table. As the receding movement of the table 3 and die 22 need be only sufficient to enable the fabric being woven to freely pass between the coacting faces of the block 2 and said die as it is intermittently wound, we employ an eccentric for that purpose having a less radial swing than the one employed for reciprocating the plunger 4 and knife 17.

The wire 9" is caused to be intermittently fed to the block 2 by the feed-wheels 31 and 32, the former, together with the rigidly-connected ratchet 33, being loosely mounted on the rock-shaft 34 and the latter being mounted on the oscillatory lever 35, as shown. An oscillatory movement is imparted to the shaft 34 from the block 18 through the medium of the arm 36 on said shaft and the rod 37, which latter connects with a boss 18' on said block. The proper movement is in turn imparted to the feed-wheel 31 from the shaft 34 by means of a pawl 33', which is carried by an arm 38 on said shaft, engaging the teeth of the ratchet 33 and causing it to be rotated a predetermined distance at each forward movement of the block 18. The lever 35, on which the feed-wheel 32 is mounted, is fulcrumed to a bracket 35', secured to the frame 1, and is caused to normally hold said feed-wheel in contact with the companion wheel 31 by reason of the expansion-spring 39, which is interposed between the end of said lever and a portion of the frame 1, as shown in Fig. 2.

A proper length of wire 9" is caused to be intermittently fed to the staple-forming parts by reason of the upper end of the lever 35 being engaged by a button 40 on the rod 41 at a predetermined point in the movement of the block 18, thereby causing the lever to be oscillated and the feed-wheel 32 drawn out of engagement with the companion wheel 31 as soon as the required length of wire has been paid out. The rod 41 has one end pivotally connected to the arm 38 on the shaft 34, from which it receives its reciprocatory motion, and its other end secured to the swinging arm 42, which is pivoted to the frame 1.

In the operation of our invention the revolving of the eccentrics 28 causes a properly-timed simultaneous receding movement of the table 3 and plunger 5, the former receding to permit the fabric being woven to be passed between the coacting faces of the block 2 and die 22 in order to bring the next alining intersecting portion thereof in position to be stapled and the latter receding for the purpose of operating the finger 10 to draw an engaged section of wire within the opening 6 in advance of the tongue 11 in position to be discharged through the opening 7 and clamped about the alined intersecting portion of the

fabric on the return movement of said plunger. During the discharge and clamping of the staple 9' about the fabric being woven a section of wire 9'' is fed to the inclined way 20 and severed by the knife 17 just prior to the limit of forward movement of the plunger 5, the severed section 9 falling across the upper side of the finger 10, which is then in the position shown in Figs. 1, 4, and 6. It will thus be seen that as soon as the finger 10 has retreated within the opening 6, carrying the previously-severed section 9 therewith, the upper wire 9 will drop into the groove 8 in proper position to be engaged by said plunger on its return movement. The interruption of the contact of the feed-wheels 31 and 32 and the movement of the knife 17 are so timed that the feed of the wire 9'' will be stopped just prior to the contact of the knife therewith.

In Figs. 7, 8, and 9 of the drawings are shown different operative positions of one modified form of our invention, in which—

A represents the stationary block containing the staple forming and discharging parts; B, a circular way or opening into which the section of wire is drawn for the purpose of forming it into U shape; C, an oscillatory sector or member that is pivoted to the block A at a point below said circular way B and concentric therewith; D, a wire-engaging finger which is pivoted to the outer portion of the member C and adapted to engage and draw a section of wire D' within the way B on the rearward movement of said member and form it into U shape, and E a tongue that is secured to the member C substantially as shown and adapted to be operated in the way B for discharging the formed staple from the block A and clenching it about an alining object on the return movement of said member. A properly-timed oscillatory movement is imparted to the member C from a reciprocatory rod F, which connects therewith through the medium of the link G and receives its movement from any suitable means.

A somewhat similar construction to that just described is illustrated in Figs. 10, 11, 12, and 13 of the drawings. In this construction a represents the stationary block in which the operative parts of the invention are mounted; b, the staple-forming finger, which is formed with the laterally-projecting pins c for riding in the grooves c', provided in the block a at either side of the path of movement of said finger; d, the plunger, which operates within the circular way d' to discharge and clench the staple when formed, and e a block which has connection with said finger and plunger and is actuated by suitable mechanism (not shown) to communicate the required movements thereto. In the operation of this latter device the wire-feed mechanism is timed to begin to feed the wire to the rear of the hook of the finger b in an intersecting

plane therewith as soon as said finger has reached its limit of forward movement, which is prior to the limit of forward movement of the plunger d. By the time the plunger d has reached its limit of forward movement and returned a distance sufficient for the lug f, formed on its upper surface, to engage an alining projection on said finger, as shown in Fig. 10, a proper length of wire for forming the staple has been fed to the block a and severed and left in position to be drawn within the circular way d' and formed into U shape on the receding movement of said finger, as shown in Fig. 11. On the forward movement of the finger b and plunger d the wire-engaging end of the former remains in advance of the end of the plunger, as shown in Fig. 11, until the forward end of said finger engages the alining abutment g on the block a and is forced thereby out of the path of the plunger, a slight oscillatory movement of said finger being permitted at this point by reason of the forward pins e thereon entering the enlarged portion h of the grooves c', as shown by dotted lines in Fig. 12.

While it has been necessary in the description and drawings illustrating our invention to show and describe 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 several functions might be devised without detracting from the merits of our invention, which consists of the provision of a single-plunger staple forming and discharging mechanism and the operative association of such 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 our 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 being woven, one being mounted at each intersection of a freshly-fed woof-wire with a warp-wire.

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

1. A staple-machine, comprising a fixed member having a main opening therein and an auxiliary opening diverging from the main opening, a tool movable in said main opening to discharge a formed staple, an oscillatory staple-forming element movable in said main opening by said tool and adapted on the rearward movement of said tool to engage a section of wire fed transversely to the mouth of the auxiliary opening and draw it into the main opening in advance of the discharging-tool in the form of a staple, and means for imparting movement to said tool.

2. A staple-machine, comprising a fixed member having an elongated main opening therein and an auxiliary opening diverging from said main opening, a tool operative in said main opening to discharge a formed staple therefrom, a staple-forming member connected to and movable by said tool within said auxiliary opening and for a portion of its length of movement within said main opening and adapted on its receding movement from said auxiliary opening to engage a section of wire fed transversely to the mouth of said latter opening, draw it into U shape therein and deposit it in the main opening in advance of the discharging-tool, and means for imparting movement to said tool.

3. A staple-machine, comprising a fixed member having a grooved way therein, a staple-discharging tool movable in said way, a hooked member movable by said tool in the way therewith to form a section of wire into U shape and deposit it in advance of said tool, and means for causing the hooked end of the staple-forming member to be oscillated out of the path of the discharging-tool at a fixed point in its movement.

4. In a staple-machine, a member having an opening therein and a portion shaped to receive a wire section and communicating with said opening, a tool operative in said opening to discharge a formed staple therefrom, a staple-forming attachment movable by said tool in the opening therewith and adapted on its forward movement to move out of the line of discharge of said tool and in position to engage a wire section and on its rearward movement draw it in advance of the discharging-tool, and means for imparting movement to said tool.

5. In a staple-forming machine, a fixed member having communicating main and auxiliary openings therein, a plunger movable in said main opening, mechanism for feeding and depositing a severed section of wire in a plane intersecting said auxiliary opening, an element pivotally attached directly to said plunger and movable in said auxiliary opening and in the opening with said plunger and adapted to draw a severed section of wire

within said auxiliary opening, form it into U shape and deposit it in advance of said plunger in position to be discharged from said member on the return movement of the plunger.

6. In a staple-machine, a fixed member having an elongated opening therein and a staple-forming way diverging from said opening, means for depositing a section of wire at the mouth of said staple-forming way, a staple-discharging element movable in said opening to discharge a formed staple and having an oscillatory attachment movable in the opening therewith adapted to engage and form a staple from a section of wire by drawing it through the diverging way.

7. In combination, a fixed member having a main and a diverging opening therein, means for depositing a wire section at the mouth of the diverging opening, a discharging-plunger, and a forming member pivoted to said plunger adjacent to its free end and having a hooked portion for engaging a wire section, the said plunger being adapted to move in the main opening and the forming member to move in both the main and diverging openings for the purpose described.

8. In a wire-working machine, a member having a main opening therethrough and a communicating branch opening, a tool operative in said main opening to clamp a staple placed in advance thereof about the object formed by the machine, and an element pivotally attached to said tool and movable in said branch opening a portion of its distance of travel to form a staple from a section of wire fed in an intersecting plane therewith and in said main opening to place the staple in advance of said tool, and means for operating said tool.

In testimony whereof we have hereunto signed our names to this specification in the presence of two subscribing witnesses.

VERNON HOXIE.
WILLIAM F. TRUMAN.

Witnesses:

W. A. HOISINGTON,
H. P. STEARNS.