

V. HOXIE.
STAPLE FORMING AND DISCHARGING MECHANISM.
APPLICATION FILED NOV. 15, 1909.

983,370.

Patented Feb. 7, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

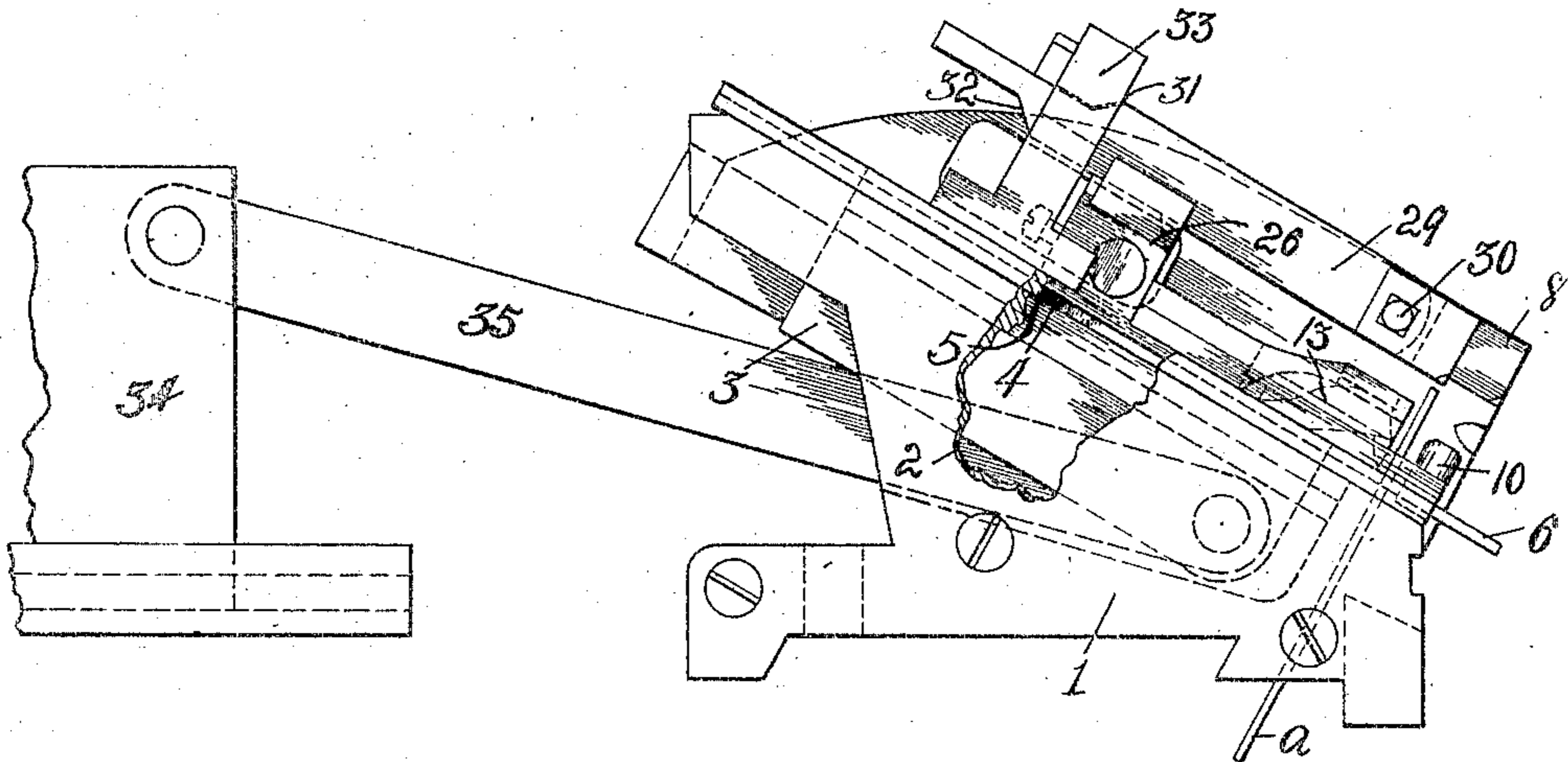


Fig. 2.

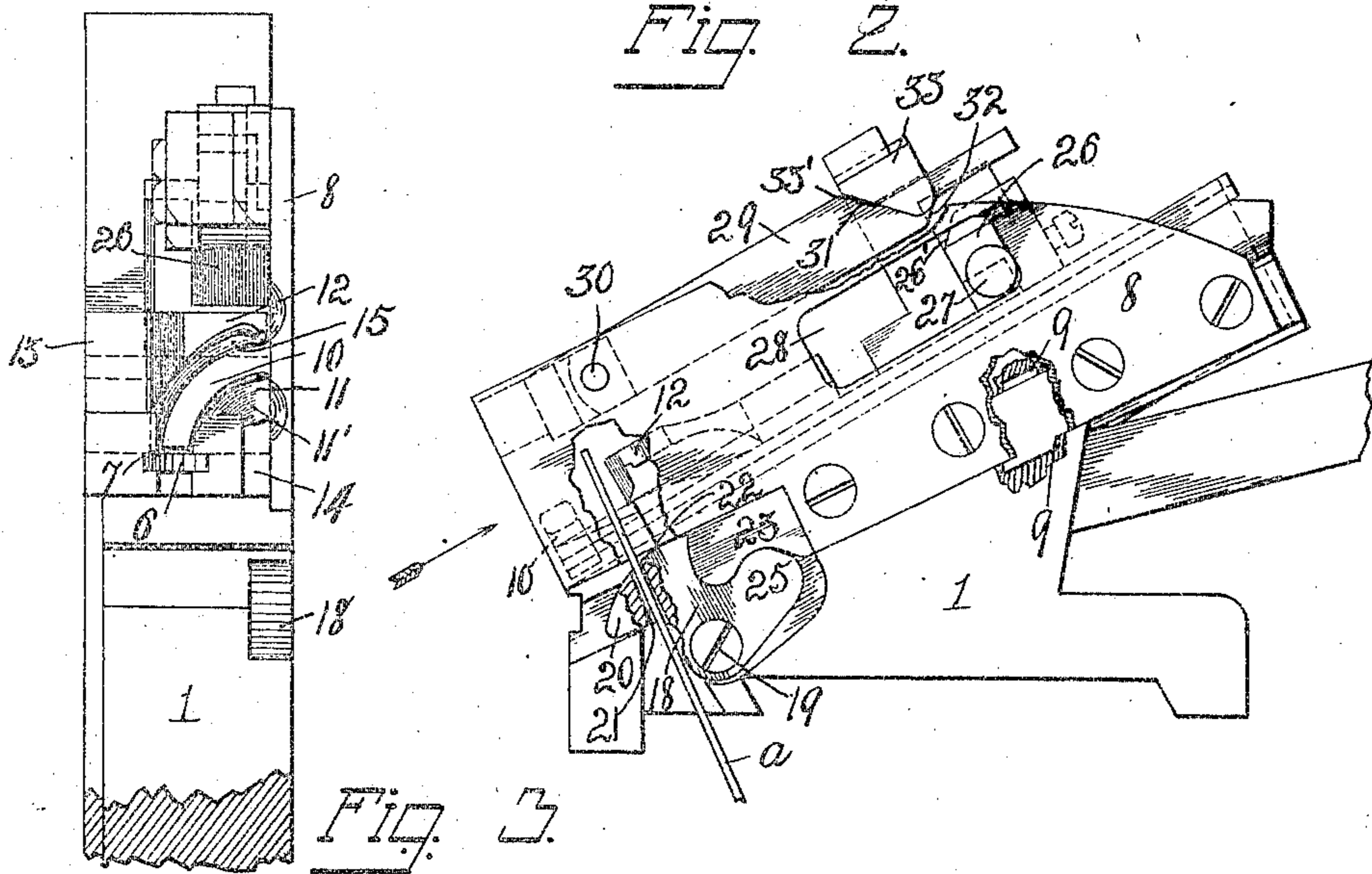


Fig. 3.

WITNESSES:
C. H. Bills.
E. E. Thomas.

INVENTOR.
Vernon Hoxie,
By Owen & Owen
his attys.

V. HOXIE.
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2 SHEETS—SHEET 2.

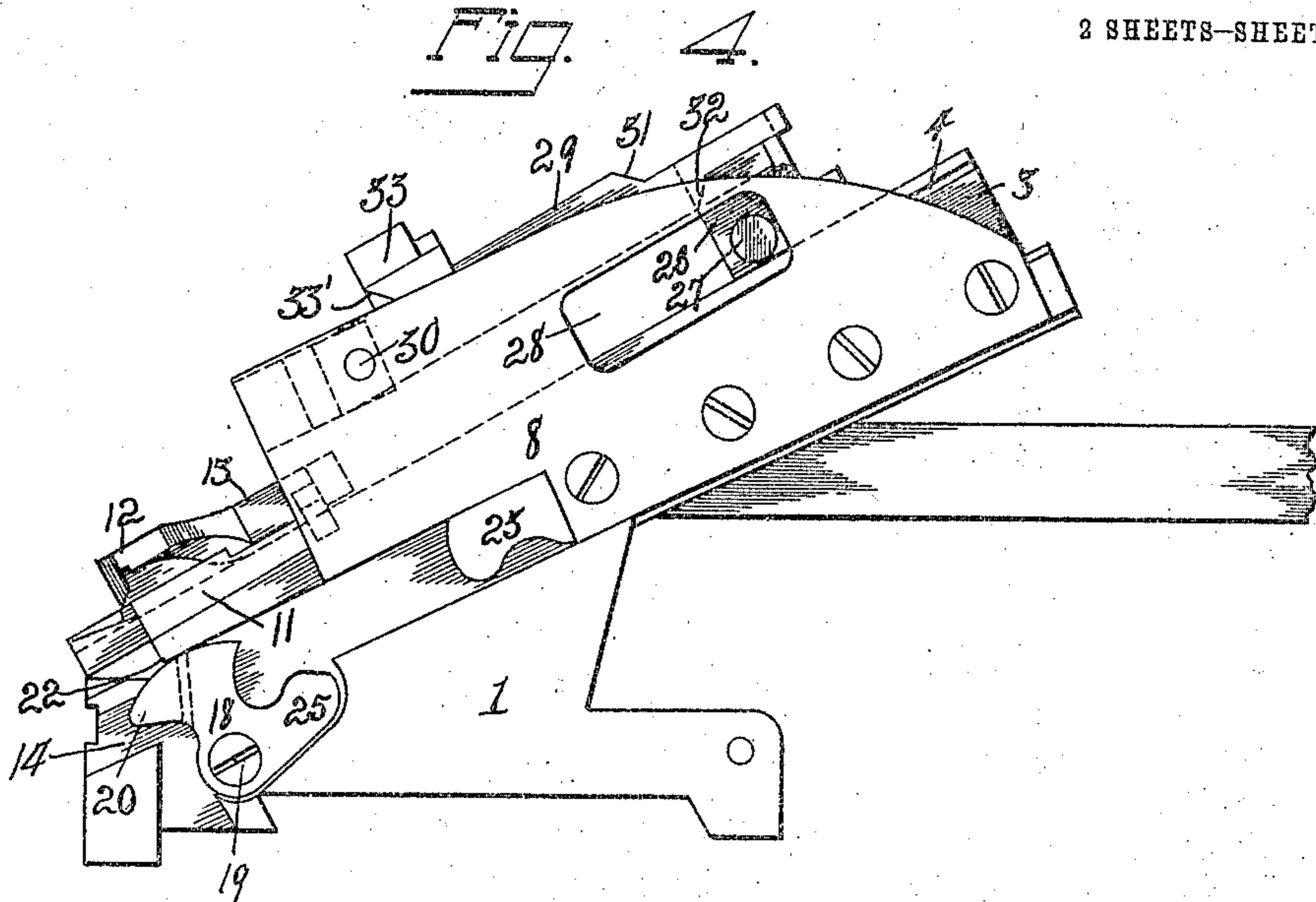


Fig. 5.

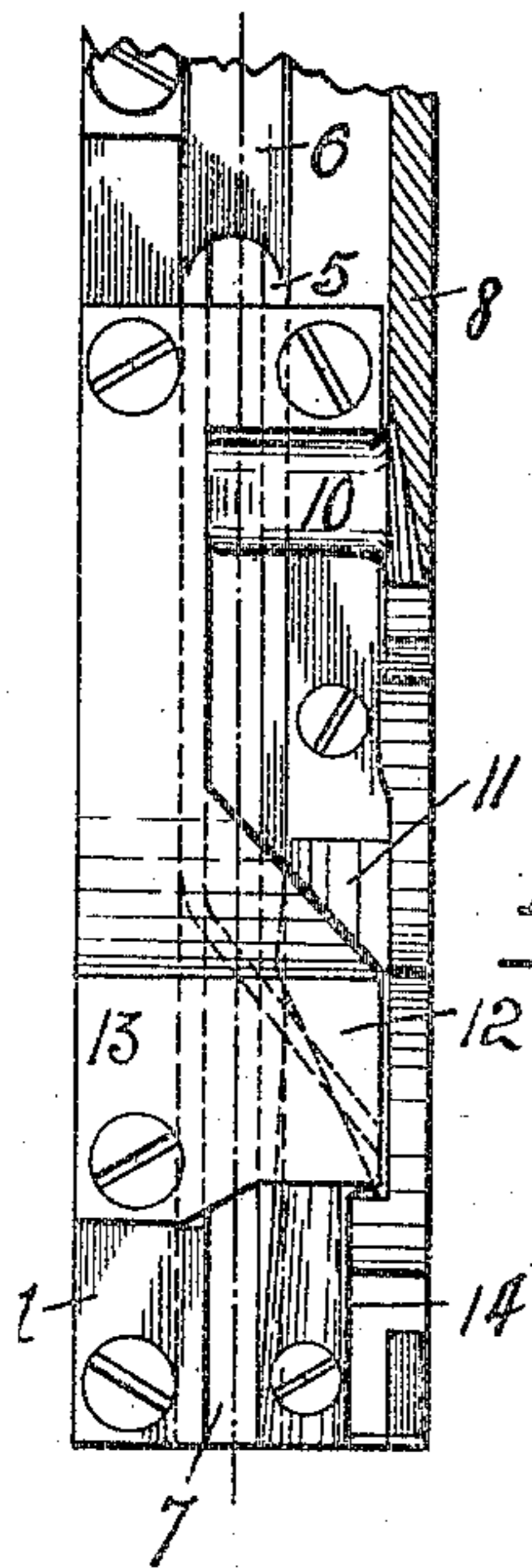


Fig. 6.

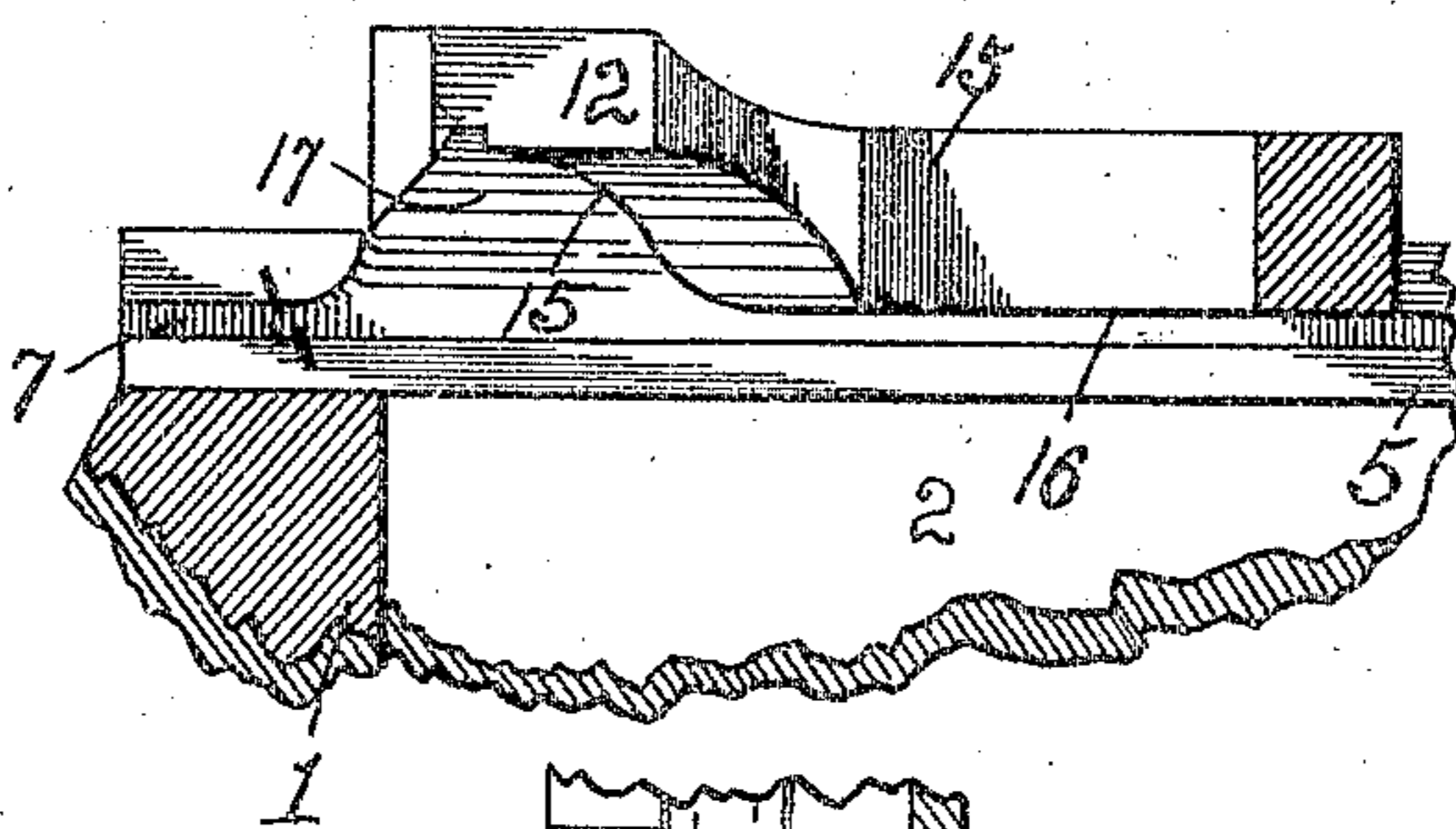


Fig. 7.

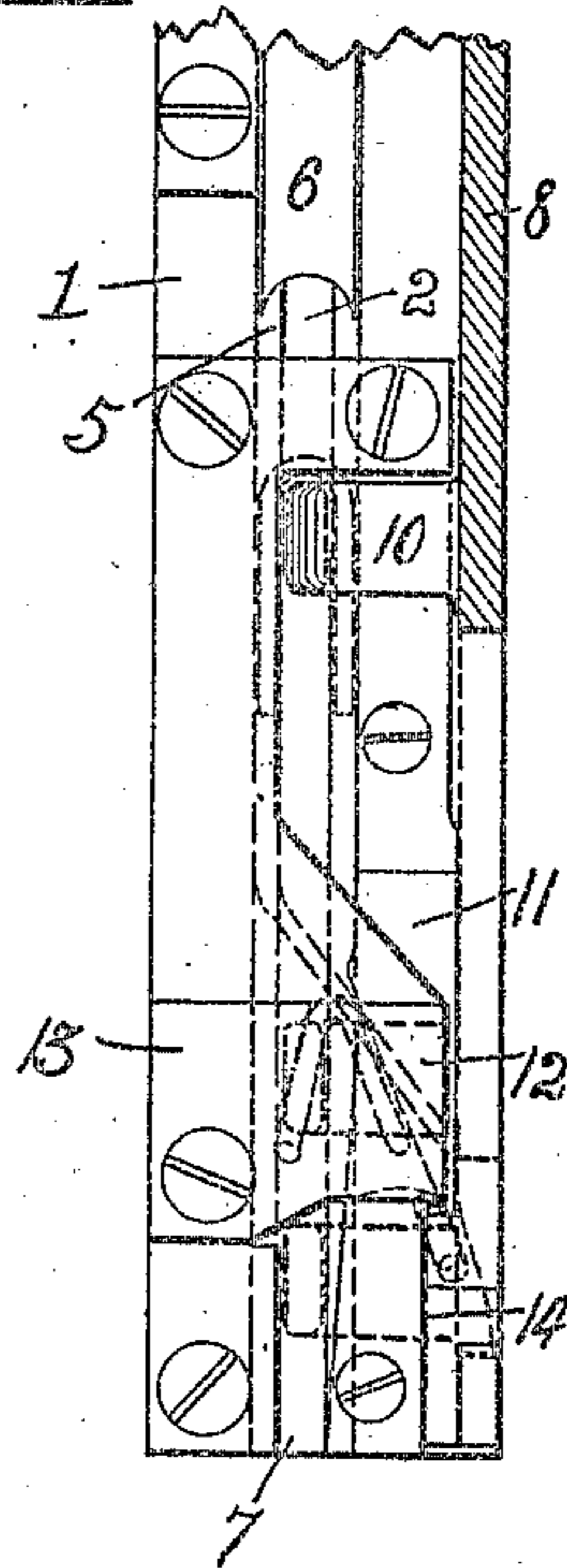
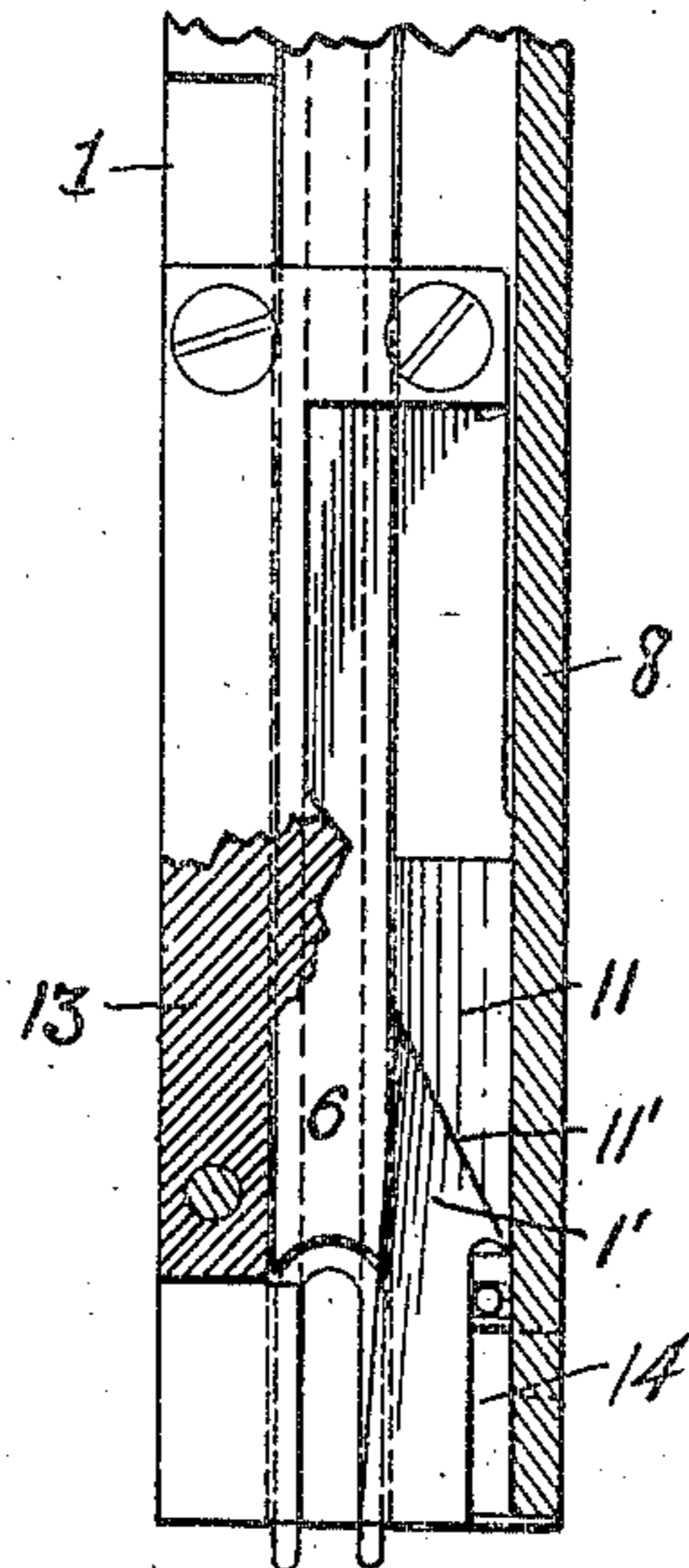


Fig. 8.



WITNESSES:

G. H. Bills.
E. C. Thomas.

INVENTOR.

Vernon Hoxie
By Owen & Owen,
His attys.

UNITED STATES PATENT OFFICE.

VERNON HOXIE, OF ADRIAN, MICHIGAN.

STAPLE FORMING AND DISCHARGING MECHANISM.

983,370

Specification of Letters Patent.

Patented Feb. 7, 1911.

Application filed November 15, 1909. Serial No. 527,974.

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

My invention relates to wire-working machinery, and particularly to mechanism for use in wire fence making machines or the like for successively severing sections from a wire intermittently fed thereto, forming staples therefrom, discharging such staples from such mechanism and clamping them about registering intersecting portions of a fabric being woven. The invention is not restricted to use in such connection as it may be used in any connection for which it may be adapted or appropriate.

The object of my invention is the provision of an improved and highly efficient mechanism of this class, which is simple in its operation and construction, composed of a minimum number of parts, and is particularly adapted for use in narrow spaces whereby a number of the same can be placed side by side and used in machines for manufacturing fine meshed fabric, such, for instance, as chicken fabric or the like.

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,—

Figure 1 is a side elevation of the invention, with a portion broken away and the movable parts at their limit of forward movements. Fig. 2 is an opposite side elevation thereof, with a portion broken away and the discharging plunger at the limit of its rearward movement relative to the male staple forming part. Fig. 3 is an enlarged front elevation of the upper portion of the same looking in the direction of the arrow in Fig. 2. Fig. 4 is a side elevation of the

device similar to that of Fig. 2, with the movable parts in full retracted position. Fig. 5 is an enlarged top plan view of the forward portion of Fig. 4. Fig. 6 is an enlarged inner side view of the upper staple forming and guiding part, with associated portions of the holder. Fig. 7 is a view similar to Fig. 5 showing successive stages of the staple forming operation in dotted lines, and Fig. 8 is a similar view with different parts in section and the plunger in the act of ejecting a staple from the device.

Referring to the drawings, 1 designates what may be termed the holder of my invention, which is suitably secured in proper position in the machine in which it is to be used, as is well understood in the art. The upper surface of this holder is preferably inclined, as indicated, and vertically grooved or recessed from its rear end forwardly, as at 2, Figs. 1, 6 and 7, to receive the plunger 3. The recess and plunger 3 are shown as being provided in their sides near their upper edges with complementary grooves 4 and ribs 5 to guide the reciprocatory movements of the plunger in the holder, and the plunger is provided at its forward end with a staple-discharge nose 6, which is adapted to work into a staple-discharge way or shallow extension 7 in the forward end of the holder.

Mounted on one side of the holder 1 is a reciprocatory plate or member 8, which is held to the holder and guided for reciprocatory movements relative thereto due to the lower portion of such plate being broadened and flanged to slidably interlock with a complementary portion of the holder, as shown at 9. The plate or member 8 has its upper portion projecting above the top of the holder and provided at its forward end with a tongue 10, which projects laterally therefrom in a downwardly extending curve, with its free end terminating immediately over the plane of movement of the discharge nose 6 when at its limit of forward movement. The planes of movement of the plunger 3 and plate 8 slightly diverge from the forward end of the holder rearwardly to cause the end of the tongue to gradually lower into the path of movement of the plunger-nose on its rearward stroke for the purpose of forcing a staple back in the discharge-way after entering the same.

The tongue 10 which forms both the male staple-forming member and the staple-slide of my invention, when moved rearwardly

from its forward position, coöperates with a lower block or subjacent portion 11 of the holder and with the overhanging part 12 of a block or portion 13 of the holder to form into a staple a section of wire previously fed thereto and severed as hereinafter described. The block or portion 11 is disposed on the top of the holder 1 at the side of the staple discharge-way 7 which is contiguous to the plate 8 and is immediately at the rear of an incut 14 in the contiguous side of the holder, through which incut the staple wire α feeds. The forward end or nose of the block or portion 11 is tapered from its outer side edge inwardly to the edge of the discharge-way 7, as indicated at 11' Fig. 8, to guide the coacting staple-leg thereto on the rearward or staple forming movement of the plate 8.

The portion 13 is shown in the present instance as comprising a block, which is secured to the top of the holder at the side of the discharge-way 7 opposed to the plate 8 and has the part 12 projecting laterally from its inner side over the discharge-way and in contiguous position with the plate 8. The under side of the part 12 is curved in substantial parallelism with the tongue 10, as is also the top of the block 11, and suitably spaced from such block to permit the tongue 10 to freely pass therebetween. The forward portion of the part 12 is undercut or fashioned on the underside thereof to form a shoulder 15, which faces to the front and has the end thereof adjacent to the plate 8 starting near the front end of said part, thence continues laterally and rearwardly in spiral form to immediately above the plane of movement of the plunger, and terminates in the straight surface 16, which continues rearwardly for a distance in contiguous parallel relation to the plane of movement of the plunger-nose 6, as best shown in Fig. 6. It is thus apparent that on a rearward movement of the tongue 10 the undercut surface 17 of the part 12 coöperates therewith and with the surface 1' of the holder immediately in advance of the block 11 to form into U-shape a section of wire drawn therebetween, while the spiral shoulder 15 causes the upper leg of the staple to swing laterally to the horizontal plane of the lower leg during the forming operation and at the same time coöperates with the tapered nose of the block 11 to guide the staple into the discharge-way 7 in advance of the plunger-nose 6.

18 designates an oscillatory wire-cutting knife, which is mounted in an incut in the side of the holder 1 at the forward end thereof and in the path of movement of the lower forward portion of the plate 8, see Figs. 2 and 4. This knife is pivoted to the holder as at 19, and has an upper nose portion 20 provided with a vertical aperture

21 therethrough for guiding the feed of the wire-thread α to the staple-forming parts. The top edge of the knife is rounded to adapt it to continue in shearing contact with the fixed shoulder or coöperating shearing edge 22 of the holder. The oscillatory movements of the knife are limited in either direction by shoulders on the holder, and are actuated by a cam member 23 on the forward end portion of the plate 8 working in a recess and against a coöperating cam surface on the tail-piece 25 of the knife. When the knife is at the limit of its forward movement the upper end of the aperture 20 therein registers with the incut 14 in the holder side, and when in this position a length of the wire α is fed to the forming parts, as indicated in Fig. 2, by any suitable intermittent feeding mechanism, such, for instance, as that shown in my former United States Letters Patent No. 879,965 of Feb. 25, 1908.

Rising from the plunger 3 is a block or part 26, which has a lug 27 projecting from one side thereof and working in a longitudinally-extending slot 28 in the plate, which slot is shorter than the stroke of the plunger to cause the plate to move with the plunger during portions of its movements and to permit it to remain stationary relative to the plunger during the balance of its movement.

29 designates an arm, which lies parallel to the plate 8 at the inner side thereof and has its forward end pivoted, as at 30, to the forward end of such plate and has its rear end reduced on both its upper and lower edges to form the beveled shoulders 31 and 32 at the inner ends of such reduced edges, the upper shoulder 31 being in advance of the lower one, as shown in Figs. 1, 2 and 4. When the plunger is at the limit of its rear stroke the reduced end of the arm 29 rests on the top of the block or part 26 thereof with its shoulder 32 in abutment with the beveled edge 26' of such part and is held in such position by a finger 33, which rises from one side of the holder 1 near its rear end and has its upper end angled to adapt it to overhang and coact with the upper edge of the arm 20, as shown in Fig. 4. On the forward stroke of the plunger the block 26, coacting with the shoulder 32, forces the arm 29 and attached plate 8 back to their forward positions. As the plate 8 reaches its limit of forward movement, the upper reduced edge of the arm 29 moves under the overhanging portion of the finger 33 to permit the rear end of the arm 29 to raise to release the engaged beveled shoulders 32, 26', which raising is accomplished by the action of said beveled shoulders, as is apparent, thus permitting the plunger to continue its forward movement alone to discharge a staple from

the holder, as is apparent. On the rearward stroke of the plunger the lug 27 is timed to engage with the plate 8 at the rear end of the slot 28 as the block 26 moves under the lower reduced portion of the arm 29, and, on the continued rearward movement of the plunger, the beveled shoulder 31 on the arm 29 coacts with a corresponding beveled surface 33' on the finger 33 to effect a positive lowering of the finger 29 in position for its shoulder 32 to coact with the beveled edge of the block 26.

34 designates a plunger actuating table, which is slidably mounted to the rear of the holder or holders and connected to the plungers thereof by links 35. This table may be actuated in any suitable manner, or any other means may be employed to actuate the movements of the plungers of the associated holders.

The operation of my invention is as follows:—During the relative movements of the plunger 3 and plate 8, or while said plate is in its forward or stationary position, a predetermined length of the wire *a* is fed through the aperture in the knife 18 and up through the incut 14 in the holder to the rear of the forming tongue 10 and in advance of the female forming parts 12 and 1'. On the initial rearward movement of the plate 8, which is accomplished by the lug 27 moving into contact with the plate at the rear end of the slot 28 and moving the plate therewith, the knife 18 is oscillated, due to the coaction of the cam 23 with the cam surface of the tail-piece 25 of the knife as it recedes from the recess 24 therein, and a consequent severing of the fed section of wire accomplished by the shearing action of the knife and edge 22 of the holder. At approximately the period of severance of the section of wire, such section is gripped between the coacting forming surfaces, and on a continued rearward movement of the tongue 10 with the plate 8 is drawn between the surfaces 16 and 17 and formed into U-shape thereby. During the forming operation of the staple the lower leg thereof is moved into register with the staple discharge-way 7 due to its coaction with the tapered end 11' of the block 11, while the upper leg is caused to describe a quarter turn with the lower leg as its axis and is guided into the discharge-way in advance of the plunger nose by the action thereon of the spiral shoulder 15 and straight portion 16 of the block 14. During the continued rearward movement the staple is held in the discharge-way by said portion 16. It is thus seen that the tongue 10 both serves as the male forming member and to guide the movements of the staples to discharging position. On the forward stroke of the plunger, the staple is discharged from the way 7 and clenched about or to an aligning

object. The plate 8 is also returned to its forward position on the forward stroke of the plunger by reason of the coaction of the edge of the block 26 with the beveled shoulder 32 on the arm 29, which coaction is released as the upper reduced edge of said arm passes under the angled end of the finger 33, thus permitting the plunger to continue its forward movement alone, due to the lug 27 working in the slot 28. The forward end of the plate 8 is notched on its inner edge, as at 36, 36, to receive the legs of a staple as it assumes an angle relative to the discharge-way when being formed and turning to horizontal position.

I wish it understood that my invention is not restricted to any specific construction or arrangement of the part 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 with staple-discharging means, of mechanism having fixed female and movable male staple forming parts operative to form a staple and spirally move it to discharging position in a single operation.

2. In an apparatus of the class described, the combination with staple-discharging means, of mechanism operative to form a staple and laterally turn the same during the forming operation and move it to discharging position, such mechanism having fixed female and movable male staple forming parts, the male part being longitudinally curved.

3. In an apparatus of the class described, the combination with staple-discharging means, of spirally curved female staple forming and guiding means, and a curved finger projecting laterally relative to its direction of movement and movable through the female means, said female means and finger coöperating to form a staple and guide it to discharging position.

4. In an apparatus of the class described, the combination of staple-discharging means, and movable male and fixed female parts which are relatively movable by said means and coöperate to both form and move a staple from vertical to horizontal discharging position.

5. In an apparatus of the class described, the combination with a member having a staple discharge-way therein, of fixed female means and movable male means which coöperate to both form and laterally turn a staple from forming to discharging position, and means for relatively moving such parts.

6. In an apparatus of the class described, the combination with a member having a staple discharge-way therein, of a curved male staple forming part and a coöperating female part, said parts being relatively mov-

able and adapted to form and laterally turn a staple to discharging position, and means for relatively moving said parts.

7. In an apparatus of the class described, 5 a staple discharging member, relatively movable parts which cooperate to form a staple and to move it to discharging position during the forming operation, the female forming part having a spirally curved staple 10 forming opening, and means for actuating said member and imparting relative movements to said parts.

8. In an apparatus of the class described, a holder having a staple discharge-way 15 therein and fixed female staple forming parts, a plunger working in said way, a reciprocatory member having a part to cooperate with said female part to form a staple and spirally guide it to said way, and 20 means for operating said plunger and member.

9. In an apparatus of the class described, a holder having a staple discharge-way therein, a plunger working in such way, 25 fixed female staple forming parts associated with the holder, a member carrying a male forming part and movable to cause said male part to cooperate with the female parts to form a staple and laterally turn and guide 30 it to said way, and means for operating the plunger and said member.

10. In an apparatus of the class described, the combination with a holder, a staple discharging plunger and a movable staple

forming part, of a member attached to the 35 holder, a member movable with the plunger, and an arm pivotally attached to said movable part and adapted to cooperate with said plunger member whereby it is moved by said plunger member during a portion of its 40 movement and to cooperate with the holder member to permit its release from the plunger member at a predetermined point in the movement of said plunger, substantially as described.

11. In an apparatus of the class described, the combination of a holder having a part projecting therefrom, a plunger movable in 45 said holder, a movable staple forming member guided by said holder and an arm pivotally carried by said member and having its free end reduced and formed on its opposite edges with beveled shoulders, one of which 50 shoulders is adapted to cooperate with a part of the plunger during a portion of the movement of said plunger whereby said 55 member is moved therewith and to cooperate with the part of said holder to cause a positive engagement of the arm with the plunger part during a movement of the plunger 60 in one direction.

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

VERNON HOXIE.

Witnesses:

BYRON L. SHAW,
CHAS. G. HART.