

No. 683,113.

Patented Sept. 24, 1901.

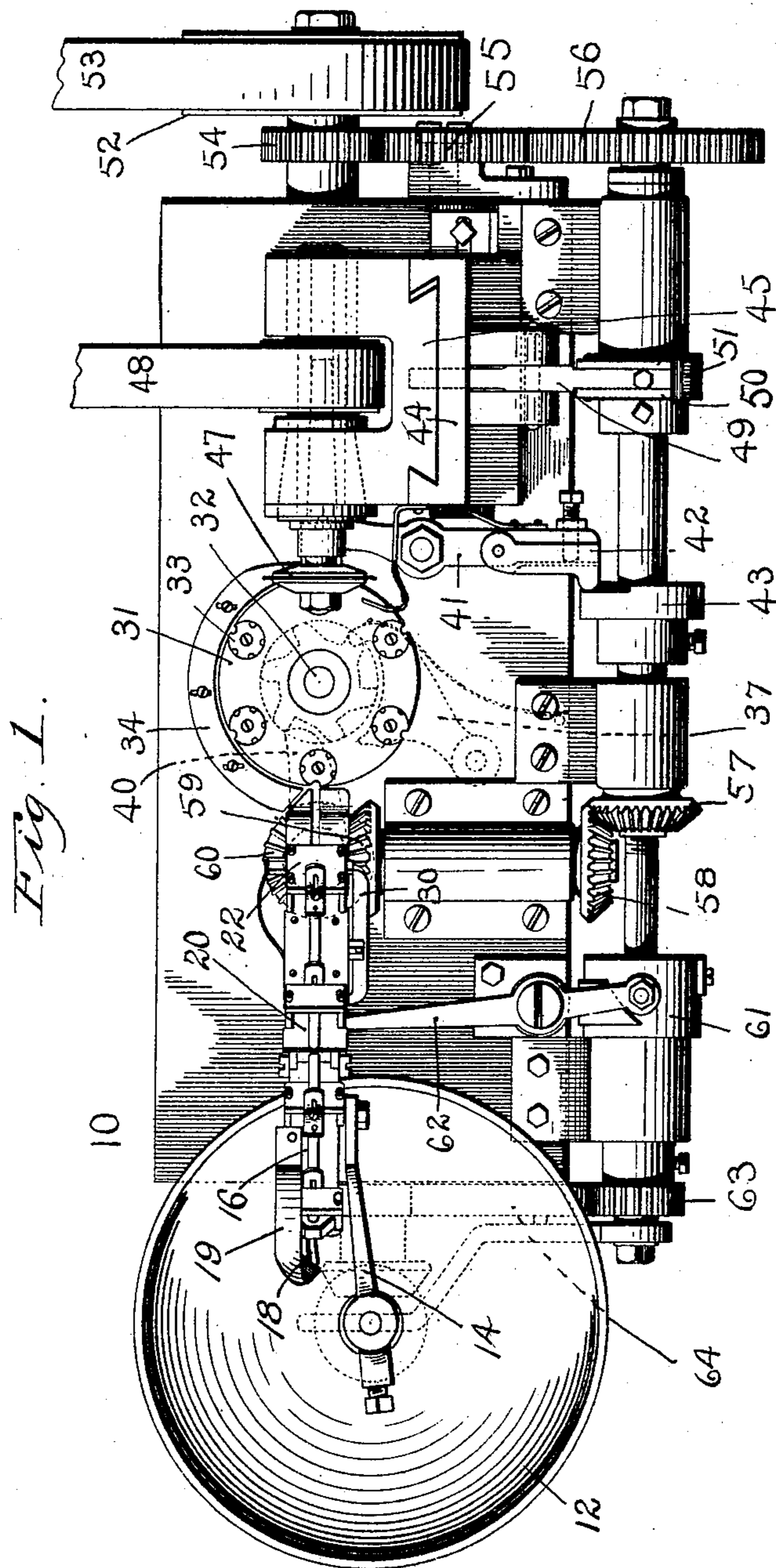
W. H. GATES.

AUTOMATIC SCREW SLOTTING MACHINE.

(Application filed June 4, 1900.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses.

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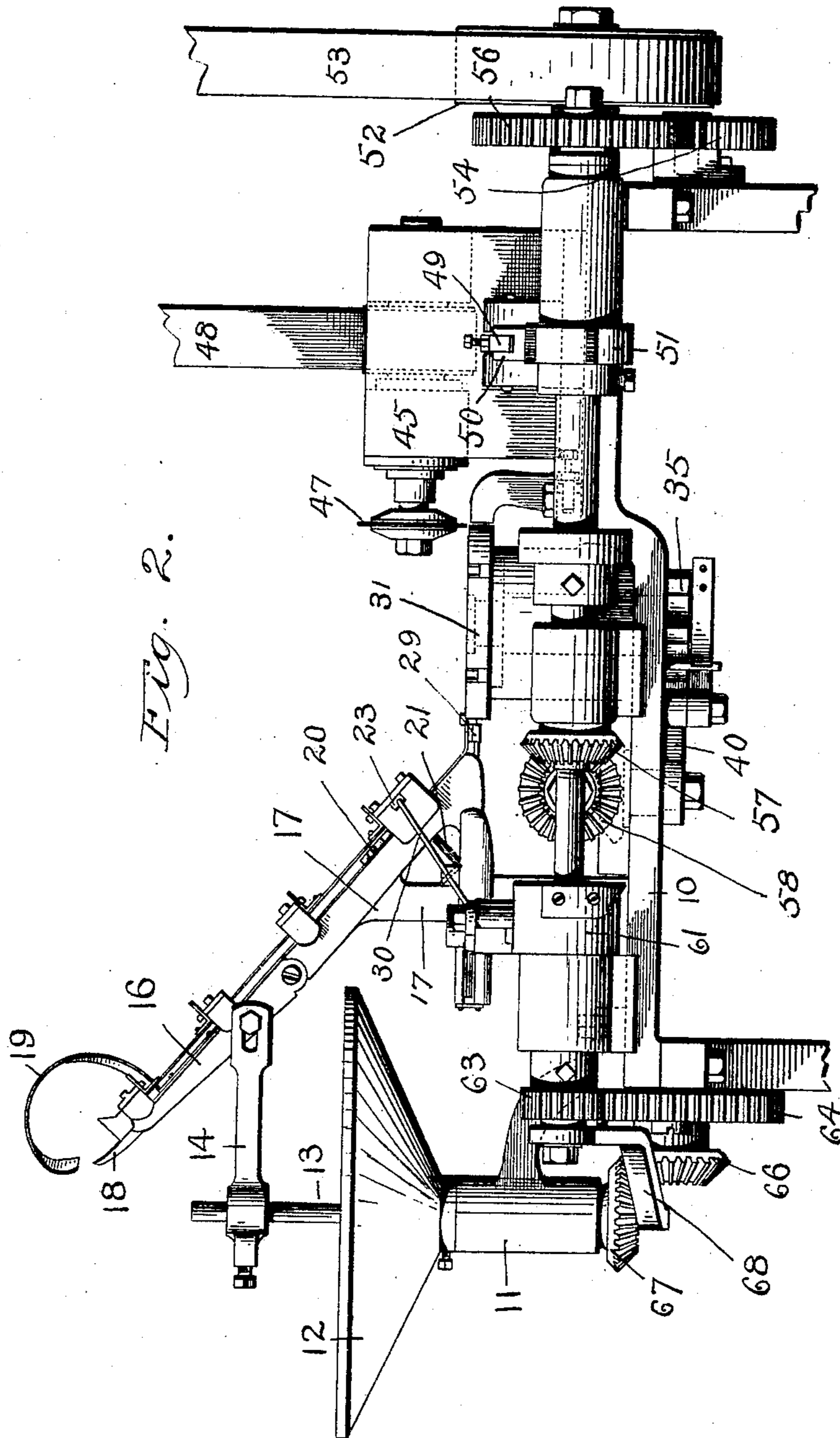
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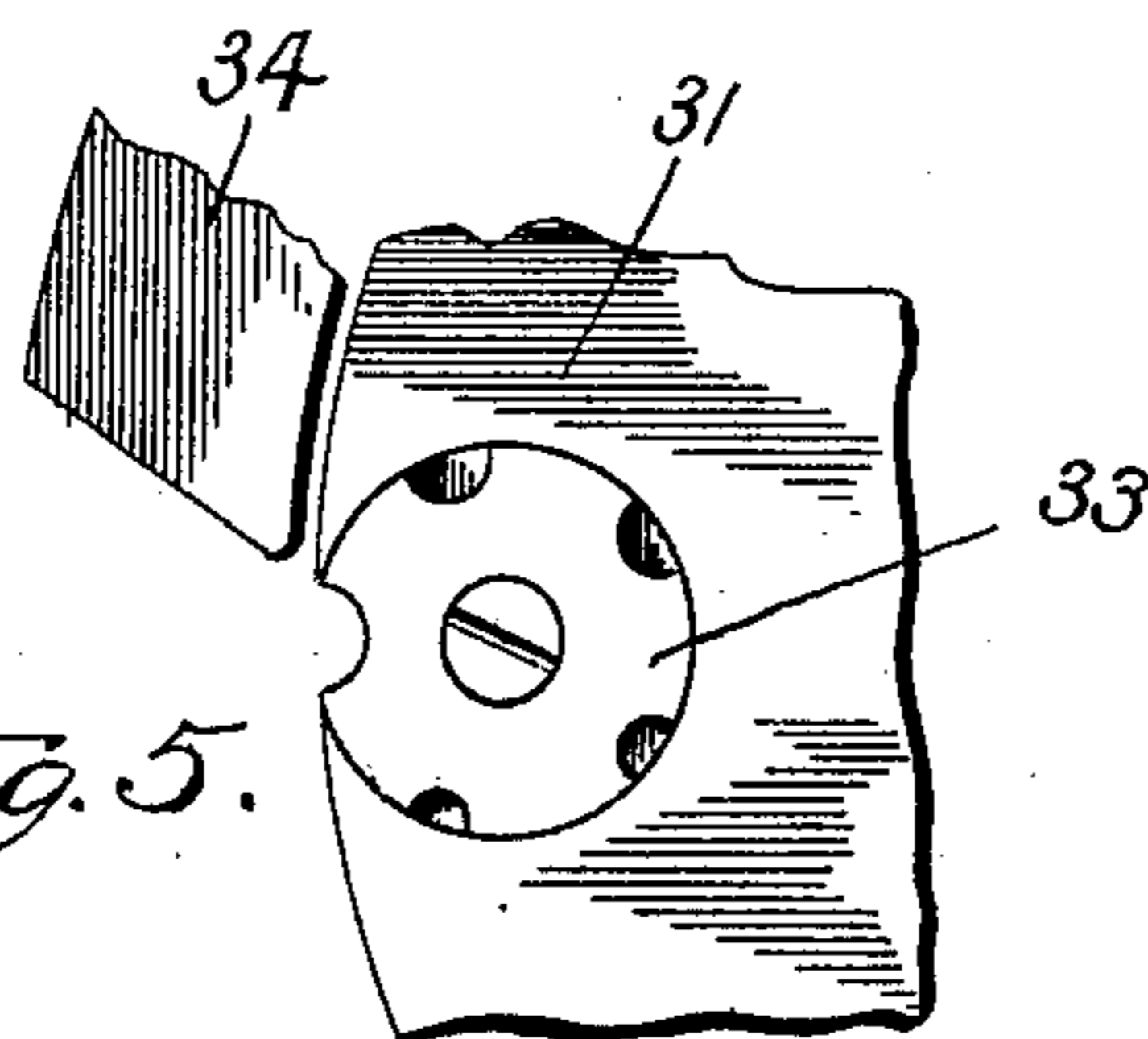
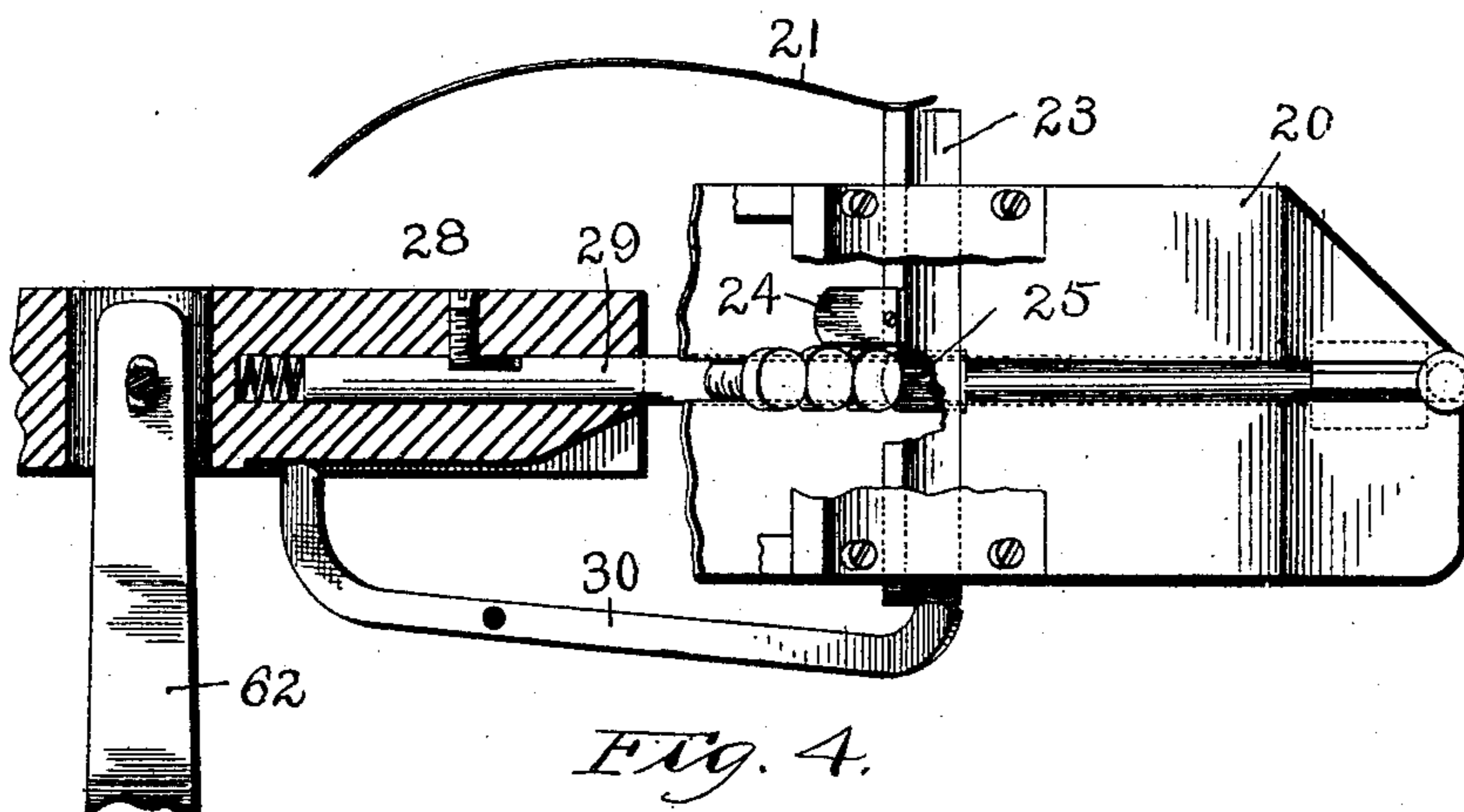
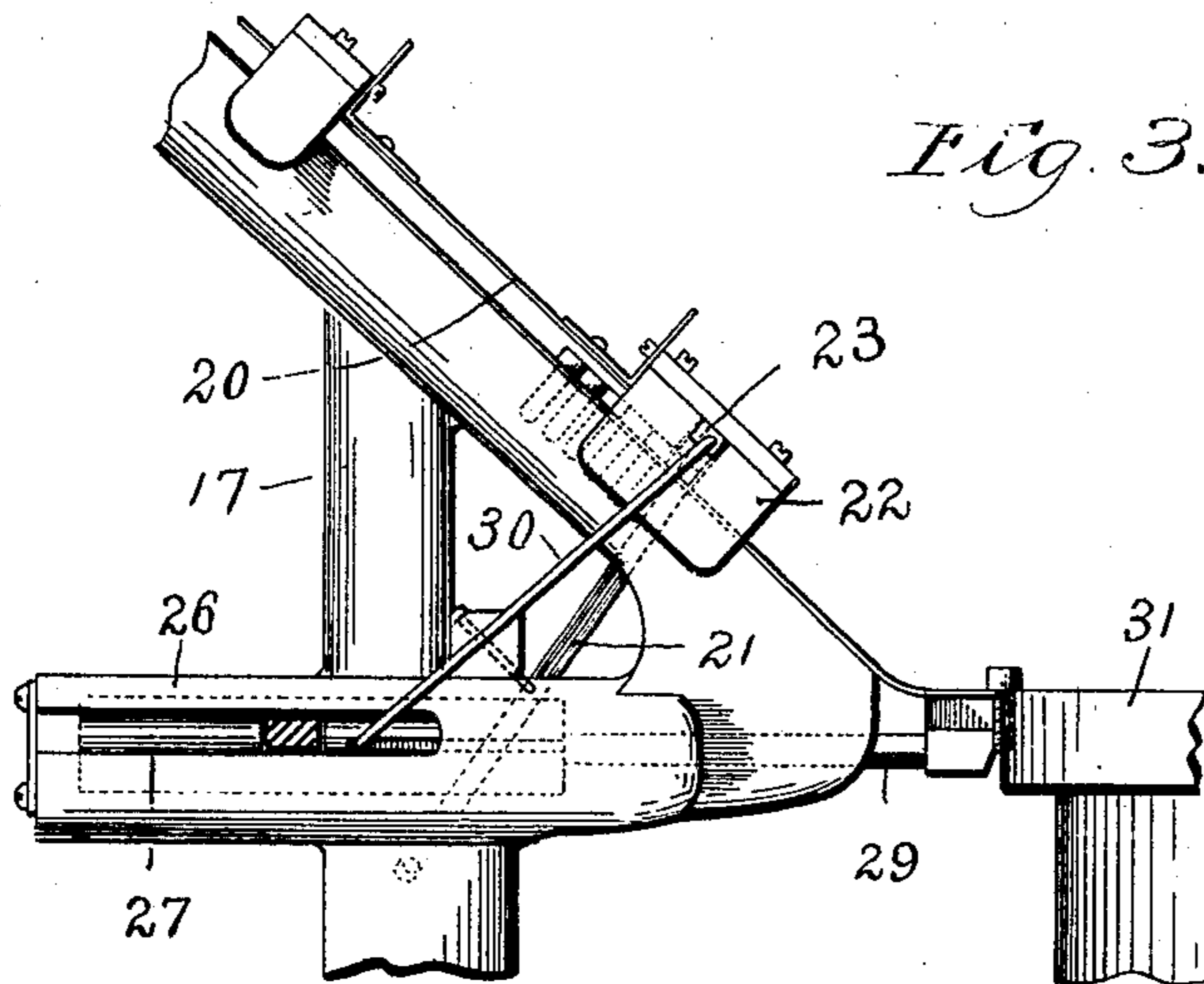
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## AUTOMATIC SCREW SLOTTING MACHINE.

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(No Model.)

4 Sheets—Sheet 3.



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Fig. 5.

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4 Sheets—Sheet 4.

Fig. 7.

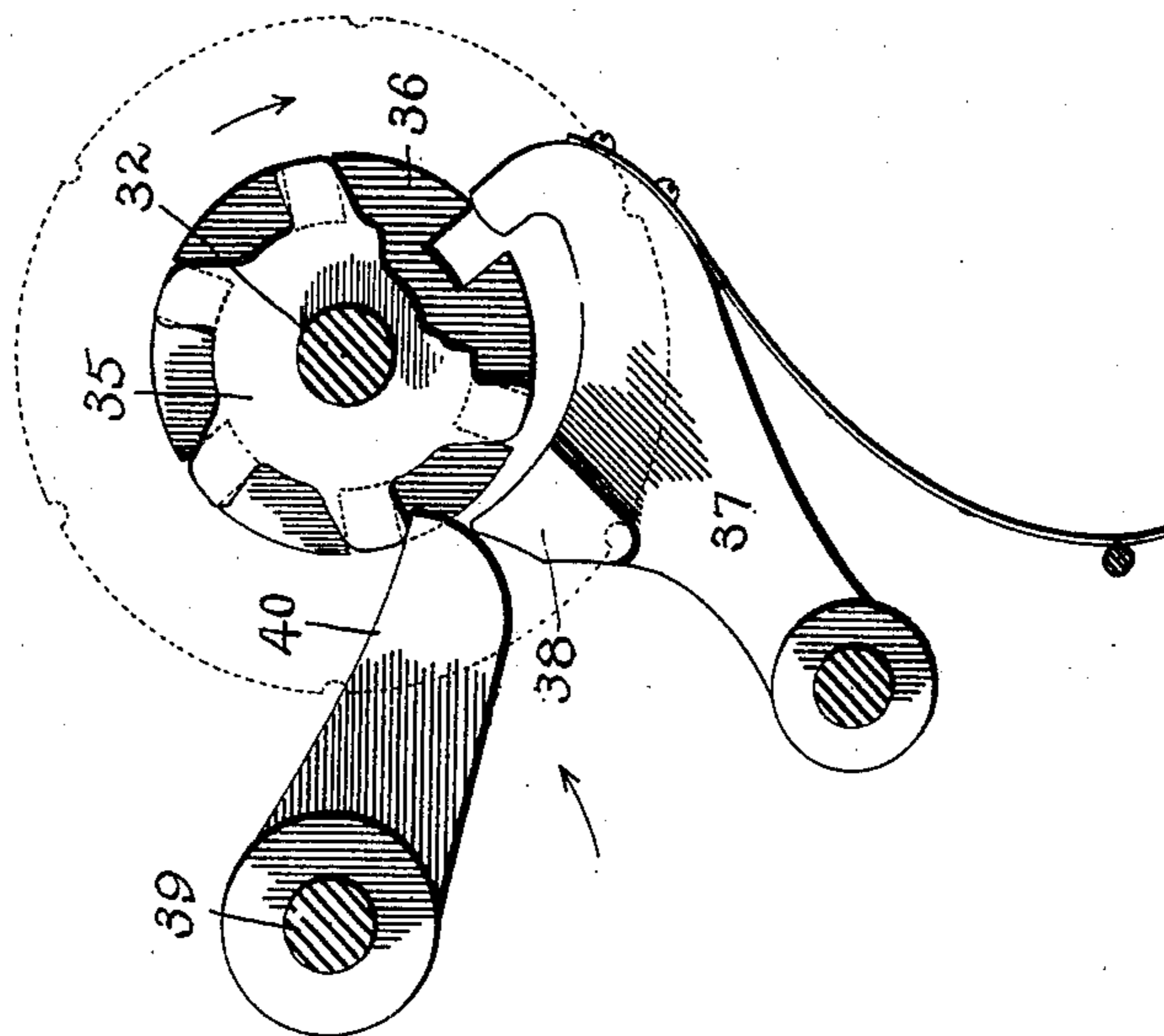
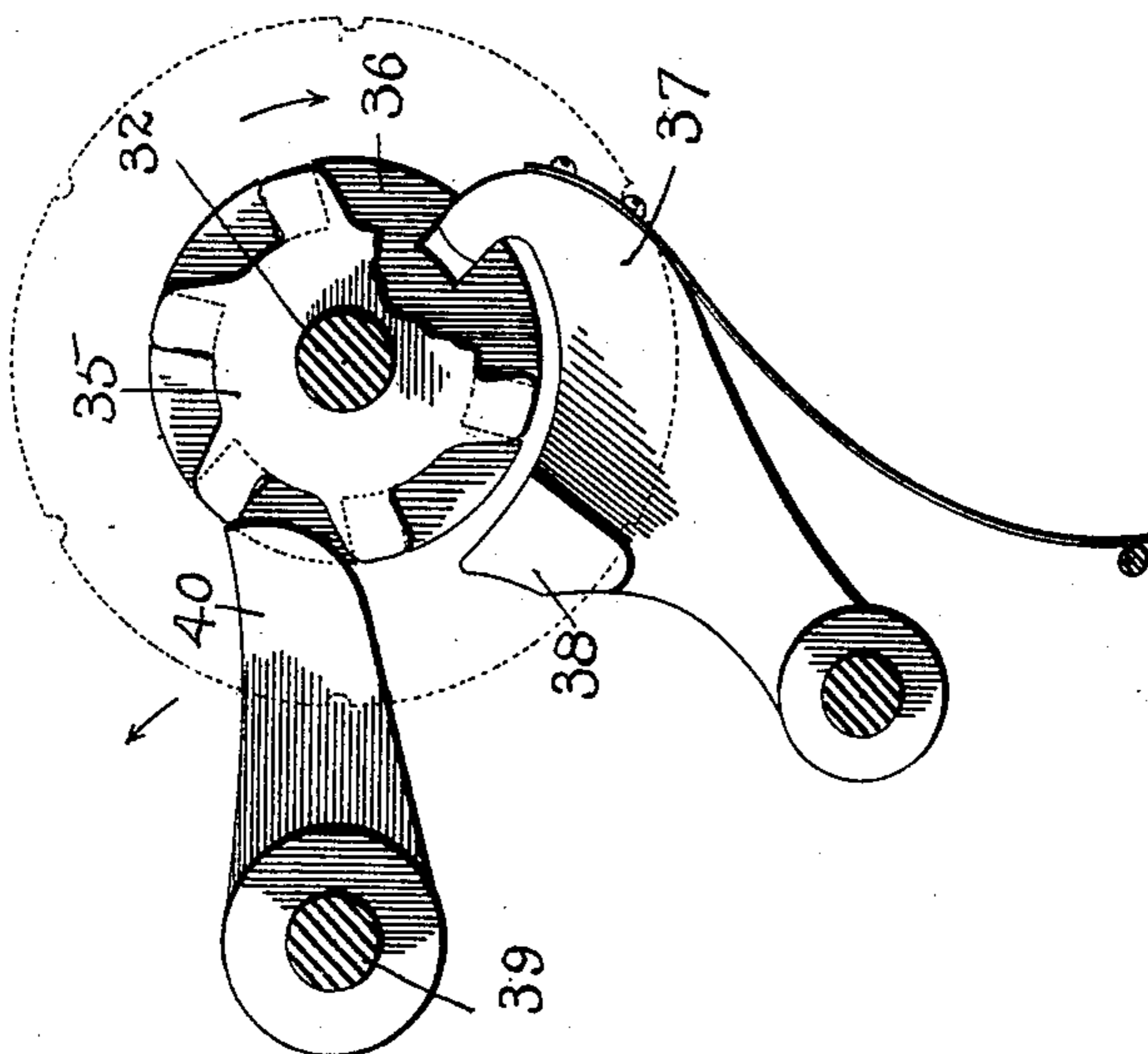


Fig. 6.



Witnesses.

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# UNITED STATES PATENT OFFICE.

WILLIAM H. GATES, OF WORCESTER, MASSACHUSETTS.

## AUTOMATIC SCREW-SLOTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 683,113, dated September 24, 1901.

Application filed June 4, 1900. Serial No. 18,930. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. GATES, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Automatic Screw-Slotting Machine, of which the following is a specification.

This invention relates to a machine for automatically slotting screws; and the object of this invention is to provide a simple, efficient, durable, and inexpensive machine which may be economically operated to produce larger quantities and a higher grade of work than have heretofore been produced by the machines employed for slotting screws.

To this end this invention consists of the screw-slotting machine and of the combinations of parts therein, as hereinafter described, and more particularly pointed out in the claims at the end of this specification.

In the accompanying four sheets of drawings, Figure 1 is a plan view of an automatic machine for slotting screws constructed according to this invention. Fig. 2 is a side view of the same. Fig. 3 is an enlarged side view of the inclined guideway and the devices for separating successive screws and delivering them to the rotary head or turret. Fig. 4 is a plan view, partially broken away, of the parts shown in Fig. 3. Fig. 5 is a fragmentary view, on an enlarged scale, showing one of the adjustable dies which are mounted in the rotating head or turret; and Figs. 6 and 7 are detail sectional views illustrating different relative positions of the driving mechanism for the rotating head or turret of the machine.

A screw-slotting machine constructed according to this invention has been especially designed with a view of providing an automatic mechanism in which the screws are selected and delivered one at a time to a rotating head or turret which has a series of pockets or recesses for receiving screws and carrying them successively into position to be engaged by the saw or cutter. When a screw has been brought to position to be engaged by the saw or cutter, it is clamped and held rigidly in place, the cutter then being actuated or brought down to engage with and slot the stationarily-held screw. In most of the automatic screw-slotting machines with which

I am familiar the screws are moved past the saw or cutter, so that the motion of the advancing movement of the screws themselves causes them to be slotted. This arrangement in practice I have found to be objectionable, not only for the reason that it is difficult to hold a moving part carrying the screw with that degree of rigidity or firmness which is essential for the production of high grades of work, but also objectionable because the screws when slotted in this manner will either have slots of uniform depth or slots which are more or less convex toward their centers, while for the best results it is desirable to provide screws, especially the smaller sizes, with slots which are concaved or hollowing to a slight extent, so as to afford a better grip to a screw-driver blade.

While a screw-slotting machine constructed according to this invention is especially designed with a view of slotting the smaller-sized screws, it is to be understood that machines constructed according to this invention may be equally well employed for slotting many of the larger-sized screws, any one of said machines themselves being capable of adjustment to accommodate screws which vary not only in size, but also in the height and shape of their heads.

The machine illustrated in the accompanying drawings, as showing the best form of the invention known to me, comprises a rotating conical hopper, in which a quantity of screws may be placed in undetermined order. Co-operating with the conical hopper is a selecting device arranged to pick up a number of screws from the hopper so that said screws will be supported by their heads and delivered to an inclined guideway. The inclined guideway is provided with a releasing mechanism or escapement which releases one screw at a time and allows the same to slide down into position to be engaged by a spring plunger or pusher which carries the screw into one of the notches or recesses of the rotating head or turret of the machine. The rotating head or turret of the machine is provided with a number of recesses or notches, and coöperating with the rotating head or turret is a curved guide or retainer for holding the screws in place in the turret-notches. The rotating head or turret of the machine is turned by

special driving connections which impart a step-by-step rotation to the said rotating head or turret and which also act to lock the same accurately in position. Coöperating with the rotating head or turret is a movable clamp which is adjusted to clamp each screw and hold the same rigidly in place when the same is brought to position to coöperate with the saw or cutter. The saw or cutter is mounted on an arbor which is journaled in a movable carriage, and the working parts of the machine are all preferably driven from a single cam-shaft, except the cutter-arbor, which may be driven by separate belt from any suitable counter-shaft.

Referring to the accompanying drawings and in detail, the screw-slotting machine herein illustrated comprises a base-piece or frame 10, which may be supported on legs in the usual manner. Secured to one end of the base-piece 10 is a bracket 11, journaled in which is a sleeve which carries the conical receptacle or hopper 12. Mounted in and vertically movable through the sleeve of the hopper 12 is an operating-rod 13, having an extending arm 14, which is connected by a pin-and-slot connection to a selecting-arm 16, which is pivoted in an arm or bracket 17. The selecting-arm 16 is provided with receiving-fingers 18, coöperating with which is a deflector 19. These parts may be of substantially the ordinary construction and are adapted and arranged so that when the selecting-arm 16 is lowered into the hopper or receptacle 12 the rotation of said hopper 12 will cause a number of the screws contained in said hopper to be supported by their heads on the fingers 18, so that when the selector is raised, as illustrated in Fig. 2, the screws will be delivered to an inclined guideway 20. Coöperating with the inclined guideway 20 are devices for separating the screws and for delivering one screw at a time to the rotating head or turret of the machine. These devices are most clearly illustrated in Figs. 3 and 4. As shown in these figures, a box or bearing-piece 22 is secured to the inclined guideway 20, and movable through the bearing-piece 22 is a transverse slide or piece 23. As shown most clearly in Fig. 4, the slide 23 is provided with offset separating blades or fingers 24 and 25. The fingers 24 and 25 are arranged so that as the slide 23 is moved back and forth one screw at a time will be permitted to pass down the inclined guideway 20, the blades 24 and 25 acting in this particular substantially in the same manner as the parts of an ordinary escapement.

Movably mounted in a casing 26, carried by the bracket 17, is a slide or plunger 27. Movably secured to the slide or plunger 27 by a pin 28 is a spring-pressed bar or pusher 29. The plunger 27 is provided at one side with an inclined groove or recess, which is engaged by the lower end of a pivoted lever 30, which operates the slide 23, the slide 23 being normally forced in the opposite position by

a spring 21. By means of this construction when the plunger 27 is reciprocated the escapement or separating device will act to permit one screw at a time to slide down the inclined guideway 20, which screw will then be carried forward by the pusher 29 until the same is brought into a notch in the rotating head or turret of the machine.

As shown in Figs. 1 and 2, the rotating head or turret 31 of the machine consists of a disk secured on the upper end of a vertical shaft 32. The head or turret 31 is preferably provided with a plurality of dies or small movable sections 33, which are provided with notches of different depths, any one of which can be turned to operative position, as desired, as shown most clearly in Fig. 5. Coöperating with the rotating head or turret of the machine is a guide-piece or retainer 34, which may be set or adjusted to accommodate screws having shanks of different diameters and which acts to hold the screws in the notches of the rotating head or turret of the machine while the same is turned.

The special driving mechanism which I preferably employ for imparting an intermittent motion to the head or turret of the machine is most clearly illustrated in Figs. 6 and 7. As shown in these figures, the shaft 32 is provided with a geared section 35 and below the geared section with a notch or locking-section 36. One of the notches of the locking-section 36 is normally engaged by a spring-pressed swinging detent 37, so as to lock or hold the rotating head or turret of the machine in a fixed position. The spring-detent 37 is provided with a cam-face 38, and coöperating with the geared section 35 and cam-face 38 is a rotating driver 40, secured on a vertical shaft 39. These parts are so arranged that the rotating driver 40 first engages the cam-face 38 of the detent 37 to release said detent, as most clearly illustrated in Fig. 7, the continued rotation of the driver 40 bringing the same into engagement with one of the gear-teeth, so as to impart a partial turn to the rotating head or turret of the machine, which is then again locked in position by the detent 37.

The clamp 41, which acts to clamp or hold a screw rigidly while the same is being slotted, is pivoted on the base-plate and is provided with an adjustable tailpiece 42, engaging a cam 43 on the cam-shaft of the machine, as most clearly illustrated in Fig. 1. The clamp 41 is normally held in its opened or released position by a spring, as shown, and is turned in position to hold successive screws in place by the action of its cam, the adjustable tailpiece of the clamp permitting the same to be adjusted to coöperate with screws having shanks of different diameters.

Adjustably mounted on the base-plate of the machine is a bracket 44, vertically movable in which is a carriage 45, carrying an arbor, secured on which is a cutter or saw 47. The cutter-arbor is driven or rotated by a belt

48 from any suitable source of power. The vertical movement of the cutter 47 is controlled by a lever 49, which has an adjustable tailpiece 50, engaging a cam 51 on the cam-shaft of the machine. By means of this construction the screws are successively brought to position by the rotating head or turret of the machine will be first rigidly clamped or held and will then be slotted by the downward motion of the cutter or saw 47. The fact that the screws are held stationary while being acted upon insures the production of work of uniform quality, and as the cutter acts to produce slots which are slightly concave at their centers I have found that a better grade of work can be produced on a machine constructed according to this invention than on other machines with which I am familiar.

Any desired arrangement of gearing may be used to drive the moving parts of the machine. As herein illustrated, a main driving-pulley 52 may be driven from a belt 53 from any suitable source of power. Turning with the pulley 52 is a pinion 54, which meshes with and drives an intermediate gear 55, meshing with a gear 56 on the main cam-shaft of the machine. Secured on the cam-shaft of the machine is a bevel-gear 57, which meshes with and drives a bevel-gear 58, secured on a shaft which is provided at its opposite end with a bevel-gear 59, which meshes with and drives a bevel-gear 60, secured on the shaft 39, which carries the driver 40, as illustrated in Figs. 6 and 7. Also secured on the cam-shaft of the machine is a cam 61, which operates the pivoted lever 62, which is connected at its opposite end to the slide or plunger 27. Near its outer end the cam-shaft of the machine is provided with a pinion 63, which acts through an intermediate gear 64 to drive a pinion secured on a shaft carrying a bevel-gear 66, which meshes with and drives the bevel-gear 67 for turning the rotating hopper or receptacle 12. Journaled loosely on the outer end of the cam-shaft of the machine is an arm 68, which has a pin or roller engaging a cam on the intermediate gear 64 to raise the operating-rod 13.

The operation of the several parts and devices employed in the slotting-machine herein illustrated have been so fully explained in describing the parts in detail that a description of the operation of the machine as a whole is believed to be unnecessary.

I am aware that numerous changes may be made in the construction of slotting-machines by those who are skilled in the art without departing from the scope of my invention as expressed in the claims. I do not wish, therefore, to be limited to the construction herein shown and described; but

What I do claim, and desire to secure by Letters Patent of the United States, is—

1. In a machine for slotting screws, the combination of an inclined guideway, a horizontal guideway leading therefrom, an escape-

ment comprising a transversely-movable piece having offset blades or fingers for permitting one screw at a time to pass down the inclined guideway to the horizontal guideway, a rotary head or turret having notches or recesses for receiving screws, a horizontally-movable slide, a spring-pressed pusher or plunger operated by said slide for carrying screws along the horizontal guideway into the notches or recesses of the rotary head or turret, and a lever actuated by a cam on the horizontally-movable slide for operating the escapement, substantially as described.

2. In a machine for slotting screws, the combination of a receptacle for receiving a quantity of screws in undetermined positions, a rotary head or turret having a plurality of adjustable sections which may be set to different positions to present notches or recesses of different sizes for receiving screws, a slotting-saw, a selecting and separating mechanism for transferring screws from the receptacle to the rotary head or turret, and means for turning the rotary head or turret to present screws in position to be acted upon by the slotting-saw, substantially as described.

3. In a machine for slotting screws, the combination of a rotary head or turret, adjustable dies or rotatable sections mounted in said turret, so that the same can be set to present notches or recesses of different sizes for the reception of screws, a guard-plate for holding screws in position in said notches, a pusher or plunger movable transversely with respect to the axis of the rotary head or turret for forcing successive screws into place in the notches or recesses, and means for intermittently turning the rotary head or turret, substantially as described.

4. In a machine for slotting screws, the combination of a receptacle for receiving a quantity of screws in undetermined positions, a rotary head or turret, means for selecting screws from the receptacle and transferring them to notches or recesses in the rotary head or turret, a slotting-saw, and driving connections for intermittently turning the rotary head to present screws in proper position to be acted upon by the slotting-saw, said driving connections comprising a rotating driver, and a spring lock or latch, said parts being arranged so that the rotating driver will first release the spring-latch, and then engage with and actuate the driving gear or pinion of the rotary head or turret, substantially as described.

5. In a machine for slotting screws, the combination of a rotary hopper or receptacle, a pivoted selecting mechanism for delivering screws from the hopper or receptacle to an inclined guideway, an escapement comprising a transversely-movable slide having escapement-sections or offset blades, a lever connected to operate said slide, a horizontally-movable cam-actuated slide having a spring-pressed loose connection with a plunger or pusher, and having a cam-slot for operating the escapement-lever, a rotary head or tur-

ret having a plurality of recesses to which screws are transferred from the guideway, a locking mechanism for holding the rotary head in different relative positions, means for  
5 operating said rotary head, comprising a pinion, and a rotary driver, said parts being arranged so that the rotating arm will first release the locking device and then actuate the pinion, a cam-actuated clamp for securing  
10 successive screws in rigid position, and a cam-

actuated vertically-movable carriage having a rotary saw or cutter for slotting the screws, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing  
25 witnesses.

WILLIAM H. GATES.

Witnesses:

PHILIP W. SOUTHGATE,  
LOUIS W. SOUTHGATE.