(No Model.)

4 Sheets—Sheet 1.

H. HUBBELL.

MACHINE FOR SLOTTING SCREWS.

No. 602,288. Patented Apr. 12, 1898.

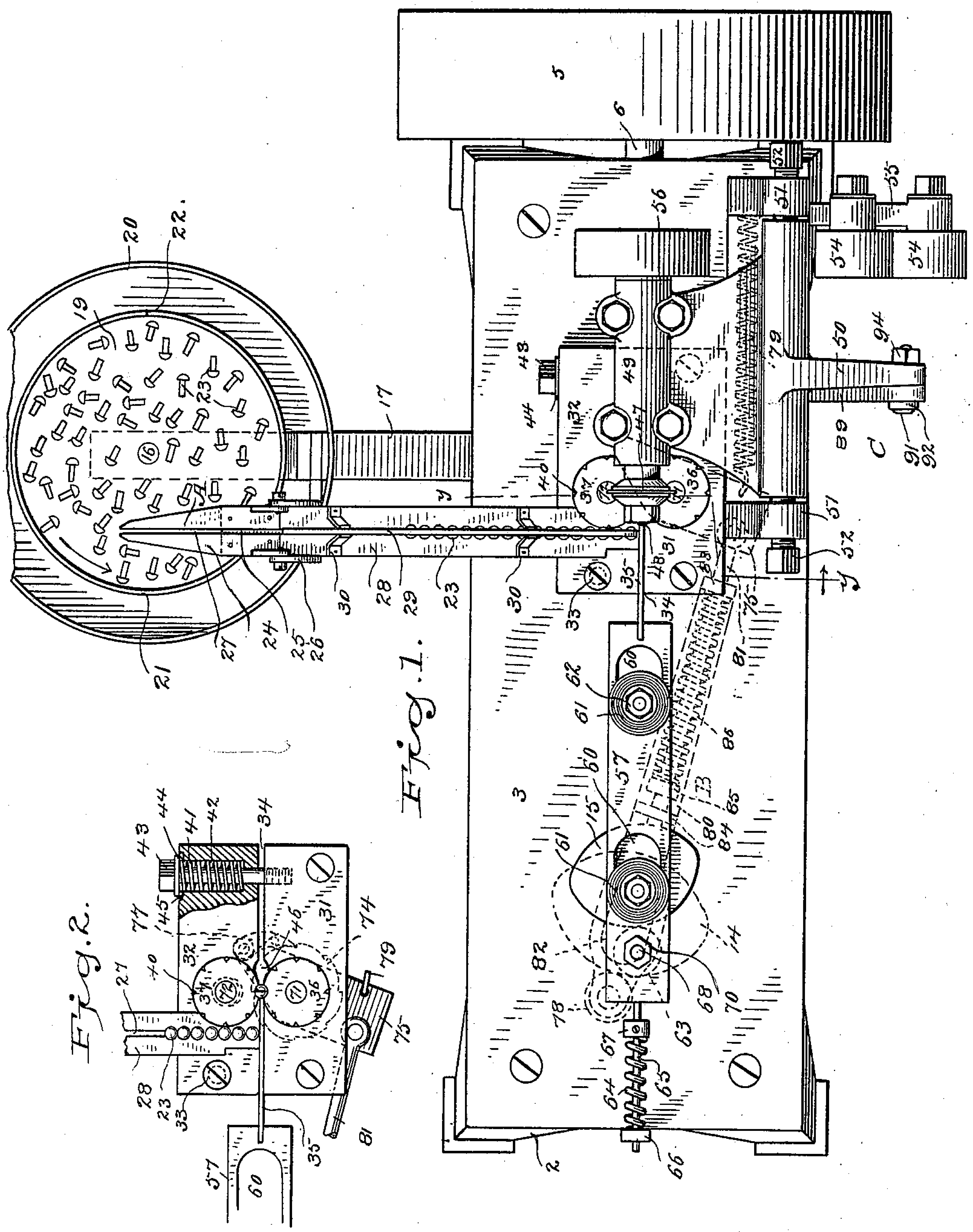

Fig. 1.

Fig. 2.

WITNESSES

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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H. HUBBELL.

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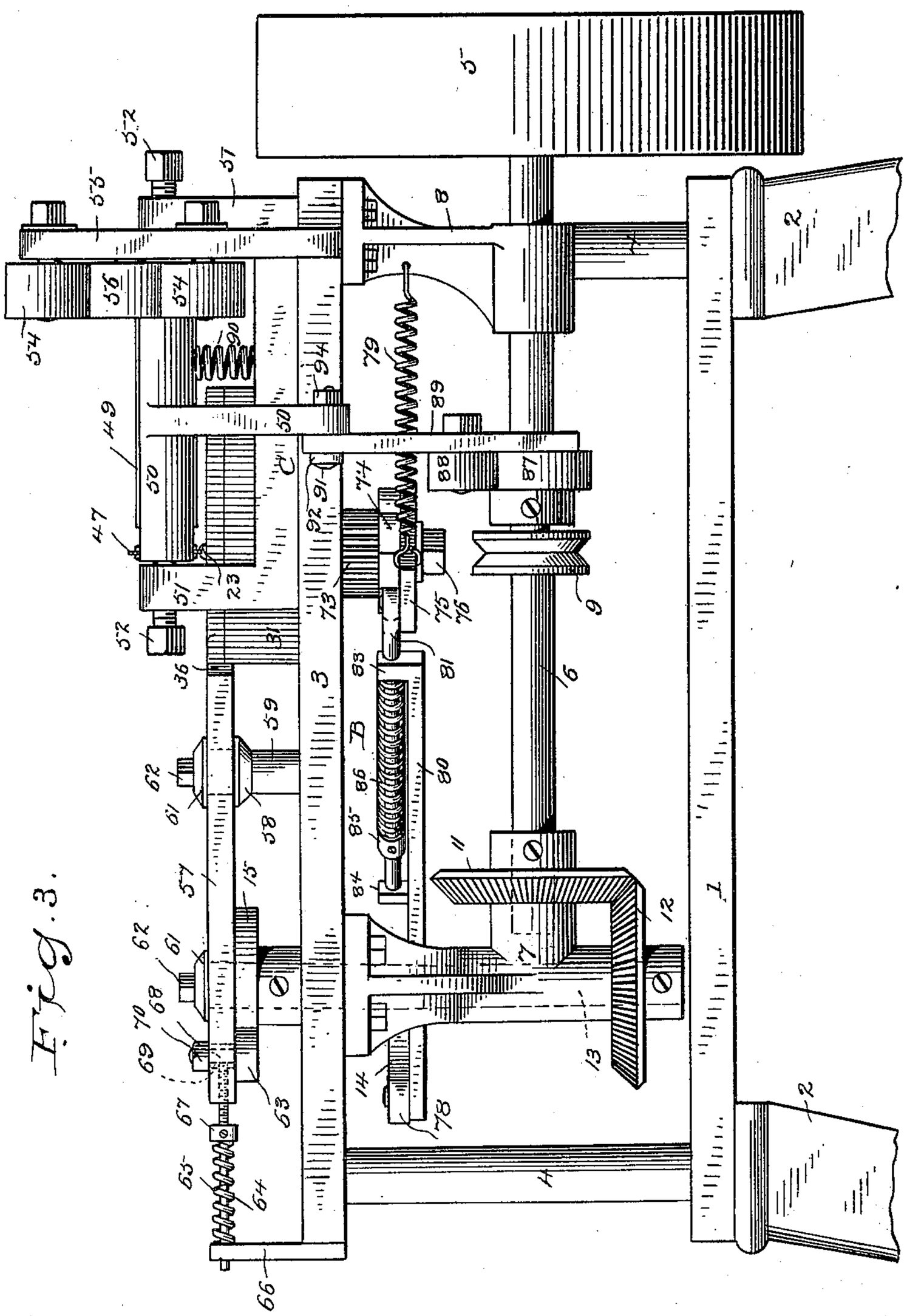
Fig. 3.



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H. HUBBELL.

MACHINE FOR SLOTTING SCREWS.

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Fig 4.

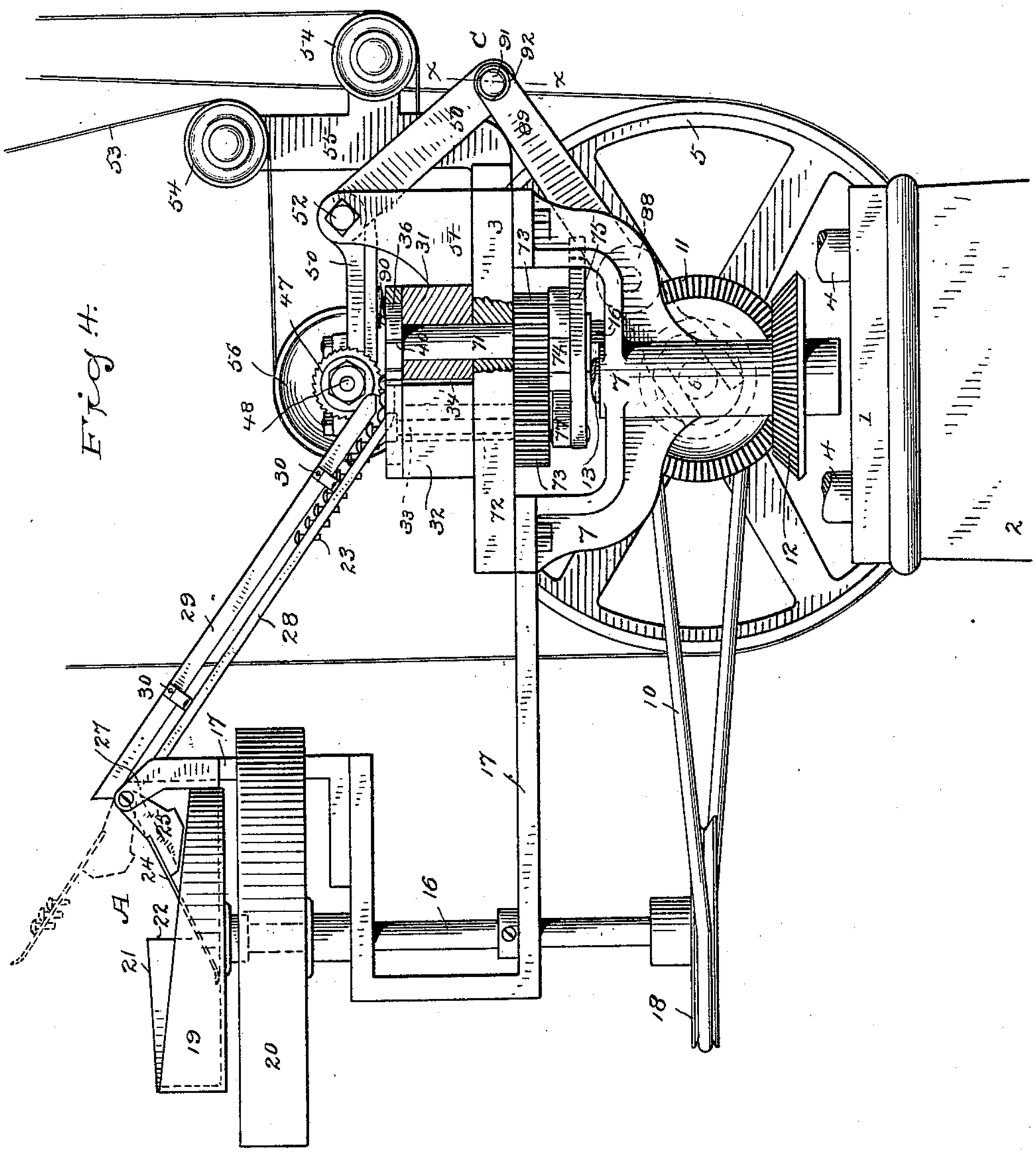

Fig. 5.

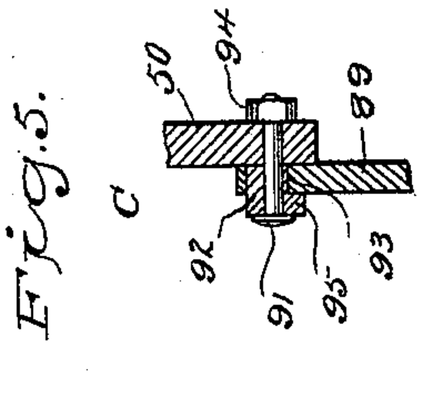

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Fig. 7.

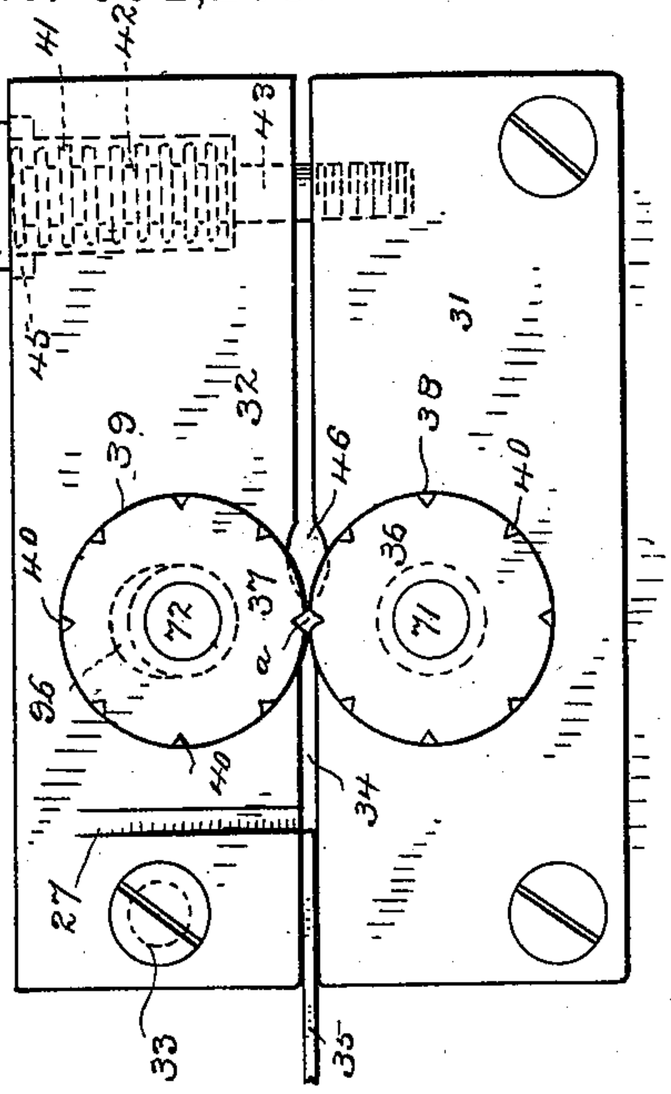


Fig. 8.

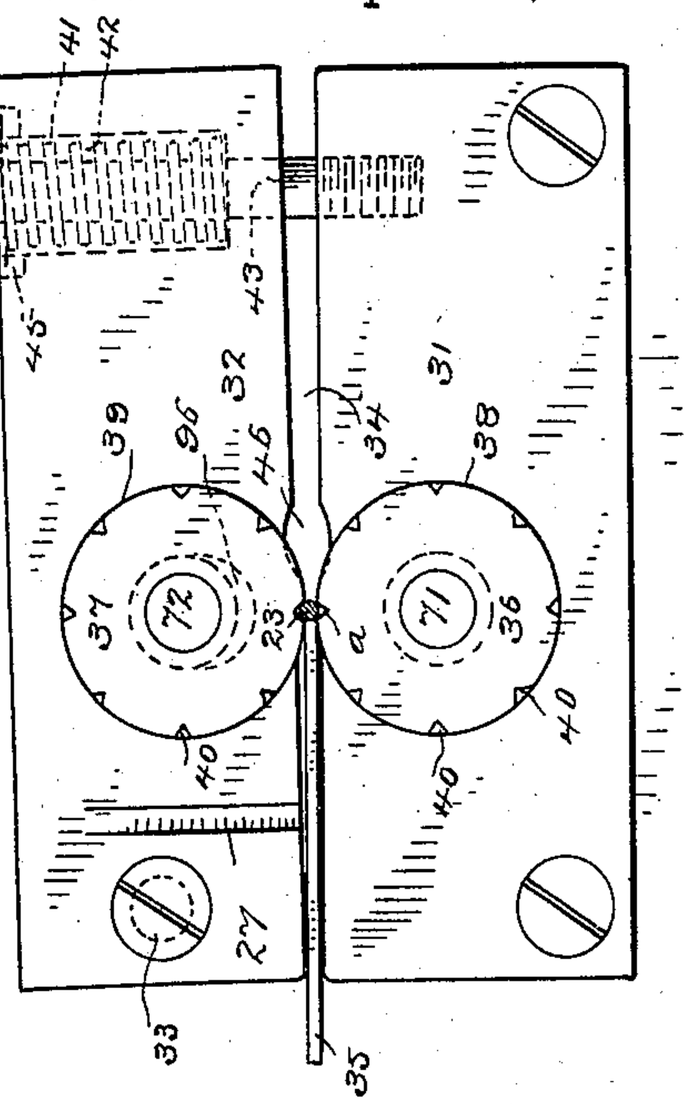
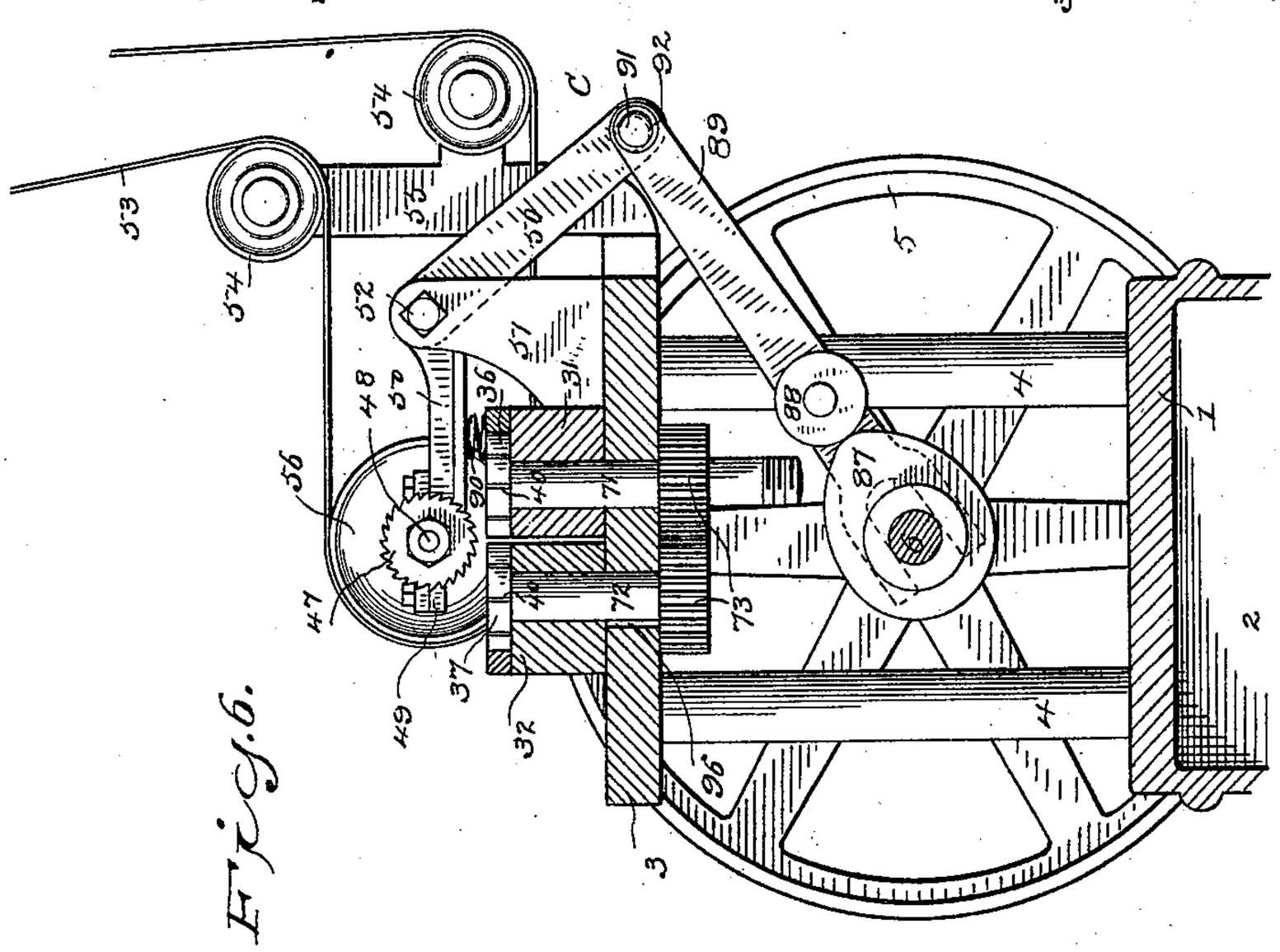


Fig. 6.



WITNESSES

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UNITED STATES PATENT OFFICE.

HARVEY HUBBELL, OF BRIDGEPORT, CONNECTICUT.

MACHINE FOR SLOTTING SCREWS.

SPECIFICATION forming part of Letters Patent No. 602,288, dated April 12, 1898.

Application filed July 17, 1897. Serial No. 644,935. (No model.)

To all whom it may concern:

Be it known that I, HARVEY HUBBELL, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Machines for Slotting Screws; 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.

My invention relates to screw-making machines, and has for its object to produce a durable, quick-acting, and thoroughly-practicable machine for slotting the heads of screws.

With this end in view I have devised the simple and novel machine which I will now describe, referring by numbers and letters to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view of the machine complete; Fig. 2, a plan view, partly in horizontal section, of a portion of the feeding mechanism detached; Fig. 3, a side elevation, a portion of the feeding mechanism being removed for the sake of clearness; Fig. 4, an end elevation, partly in vertical section, as seen from the left in Fig. 3, a portion of the feeding mechanism and other parts being removed for the sake of clearness; Fig. 5, a detail sectional view on the line $x\ x$ in Fig. 4; Fig. 6, a vertical section on the line $y\ y$ in Fig. 1; and Figs. 7 and 8 are detail views, on an enlarged scale, illustrating changed positions of the gripping-disks.

1 denotes the bed of the machine, 2 legs by which it is supported, and 3 a table supported above the bed by standards 4. Power is applied to drive the operative parts of the machine, with the exception of the saw, by means of a belt (not shown) passing over a belt-pulley 5 on a shaft 6, journaled in brackets 7 and 8, which are bolted to the table.

9 denotes a belt-pulley on shaft 6, and 10 a belt passing over this pulley, by which the blank-holder is rotated, as will be more fully explained.

11 denotes a bevel-gear on shaft 6, which meshes with a bevel-gear 12 on a vertical shaft 13, which is journaled in bracket 7.

14 denotes a cam on this shaft, from which the gripping-disks are actuated, and 15 another cam on the same shaft, by which the feed-slide is actuated, as will presently be fully explained.

Turning now to Fig. 4, in connection with which see Fig. 1, 16 denotes a shaft journaled in a bracket 17, which extends outward from the table. This shaft is provided with a belt-pulley 18 and receives motion from belt 10, which passes over the pulley.

19 denotes a blank-holder rigidly secured at the upper end of shaft 16, and 20 a cup below the blank-holder, which receives blanks that may drop from the slotted finger presently to be described. The outer wall of the blank-holder is circular, and two-thirds to three-fourths of the top of said wall consists of a spiral incline, (designated by 21,) said incline terminating in a shoulder 22. The headed blanks, which I have indicated by 23, are thrown loosely into the blank-holder and are picked up by a slotted finger A, which is pivoted to arms 26, extending from bracket 17. The form of slotted finger illustrated in the drawings comprises a slotted block 25, to which plates 24 are secured. These plates are separated from each other, leaving a slot 27 between them, said slot being continuous with the slot in the block.

28 denotes an inclined slotted way the upper end of which is secured to arms 26 in such a position that when the slotted finger is raised, as will presently be described, the slot in the way is continuous with the slot 27 in the finger, and is therefore likewise designated as 27. This slot is wide enough to receive the shanks of the blanks freely, but not the heads, so that the heads of the blanks will slide freely along the top of the finger and the way.

29 denotes a guard, which is shown as held in place over the portion of slot 27 in the inclined way by means of clips 30.

It will be understood from Figs. 1 and 4 that when the relatively low portion of incline 21 is under block 25 the ends of plates 24 will rest on the bottom of the blank-holder. During the last half of each rotation of the blank-holder, however, block 25 is riding up the incline, which movement continues until the finger reaches approximately the position indicated by dotted lines in Fig. 4, the free end of the finger being considerably higher than the pivoted end. As the slot in the finger is

continuous with the slot in the way, it is obvious that as soon as the free end of the finger has been lifted somewhat above a horizontal position the blanks which have been picked up by the finger with the heads above the slot will slide along out of the slot in the finger and into the slot in the way, as clearly indicated in the drawings. Blanks which have passed into the slot with the shanks up and the heads lying under the finger will of course drop out when the finger is raised. As soon as the block has reached the highest portion of incline 21 it will drop off at shoulder 22, so that the slotted finger will again drop down upon the bottom of the blank-holder or upon the blanks in the holder. The tendency when the machine is in use is for a number of blanks to be picked up and passed into the slot between the plates during each rotation of the blank-holder. In practice the blanks are fed by this device much faster than they can be slotted. As soon as the portion of slot 27 in the way is entirely filled the blanks picked up by the slotted finger will either slide out during the upward or downward movements of the finger and will drop back into the blank-holder or into the cup or a portion of them may remain in the finger until there is room for them to pass out from the finger and into the portion of the slot in the way. In practice there is no clogging whatever, and it is wholly immaterial whether all of the blanks raised by the finger pass into the way or not. I find that the finger always keeps the way filled and does not clog, which is all that is required.

31 denotes a block bolted upon the table, and 32 a block pivoted to the table, as at 33. Between these blocks is a recess 34, which receives the feed-slide 35, presently to be described. The lower end of inclined way 28 rests upon pivoted block 32, said block being provided with an inclined slot (also indicated by 27) which is a continuation of the slot in the way and receives the shanks of the blanks freely—that is to say, loosely enough so that slight oscillation of the block is permitted, as will be more fully explained, without the blanks coming in contact with the walls of the slot in the block. From this slot 27 the blanks pass into the recess 34 between the blocks and are pushed forward singly in said recess by the feed-slide. This feed-slide is the same height as the blocks, and the end of the feed-slide in its retracted position (see Fig. 7) forms, practically, a continuation of the wall of slot 27 which is farthest from the gripping-disks, so that in practice one blank at a time will pass from the slot into the recess directly before the feed-slide, the heads of the blanks lying upon the top of the way—that is, not passing through the slot—and the head of the foremost blank passing over the top of the feed-slide, so that when the feed-slide moves forward it will engage the blank under the head and carry it forward in recess 34. This construction avoids the possibility of more than one blank passing into the recess and also renders clogging of the blanks in either the slot or the recess practically impossible.

36 and 37 denote gripping-disks lying, respectively, in recesses 38 and 39 in blocks 31 and 32, the surface of the gripping-disks being flush with the surface of the blocks. As each blank is carried forward by the feed-slide in recess 34 it is received in a recess *a*, formed by corresponding notches 40 in the disks, (see Fig. 8,) and firmly gripped and held therein, the pivoted block moving slightly on its pivotal point against the power of a spring 41, which moves gripping-disk 37 outward slightly from gripping-disk 36 and permits the feed-slide to carry the blank forward until it is deposited in the recess *a*, formed by the corresponding notches 40. I have in the present instance shown the spring 41, which determines the actual pressure with which the blank is gripped, as a coil-spring lying in a transverse recess 42 in block 32, a bolt 43 passing through said recess and continuing loosely through the block and being threaded to engage block 31, by which the bolt is held rigidly. One end of the spring bears against the base of the recess and the other against a washer 44, lying under the head of the bolt, a recess 45 in the side of block 32 receiving the washer when the block is moved outward, as in Fig. 8. Just forward of the gripping-disks blocks 31 and 32 are cut away on their opposite faces to form a recess 46, through which the blanks drop after the slotting operation, as will be more fully explained.

The rotation of the gripping-disks is of course intermittent. When the parts are in the position shown in Figs. 2 and 8, the gripping-disks are stationary and hold the blank firmly while the slot in the head of the blank is cut by a saw 47, the feed-slide beginning at once to move backward toward the position indicated in Fig. 7. The saw is carried by a shaft 48, journaled in an elongated bearing 49, carried by a rocker-arm 50, which is pivoted between standards 51, extending upward from the table, the rocker-arm in the present instance being shown as pivoted between the points of bearing-screws 52. It is of course necessary that the saw should rotate at a high rate of speed. In the present instance I have shown shaft 48, which carries the saw, as driven by means of belt 53, extending from a counter-shaft (not shown) and passing partly about pulleys 54, journaled on a bracket 55, and over a belt-pulley 56 on shaft 48. The pulleys 54 are provided for belt 53 to pass over, so that rocker-arm 50, which carries the saw, may oscillate freely in the vertical plane in raising and lowering the saw without affecting the tension of the belt, and the elongated bearing for shaft 48 and the widely-separated bearing-points for rocker-arm 50 are provided in order to give steadiness to the saw.

I will now describe the mechanism for actuating the feed-slide and the gripping-

disks and for raising and lowering the saw. The feed-slide proper, which I have designated by 35, is carried by a plate 57, which rests upon cam 15 on vertical shaft 13 and upon a plate 58 on a stump 59, which extends upward from the table, plate 57 being provided with slots 60, through which the shaft and stump pass, and said plate being held in position to slide freely, but without lost motion, by plates 61, which rest upon plate 57 and are held in position at the upper ends of shaft 13 and the stump by bolts or screws 62. Upon the under side of plate 57 is a roller 63, which bears upon cam 15 on shaft 13, this cam, through its engagement with the roller, acting in connection with a spring 64 to produce the forward and backward movements of the feed-slide. This spring is shown as carried by a rod 65, which extends backward from plate 57 and passes through an arm 66, extending upward from the table. One end of the spring bears against this arm and the other against a collar 67, which is adjustably secured to the rod. The end of rod 65 is shown as tapped into plate 57, so as to serve as an adjustment for the bolt 68, which carries roller 63, this bolt passing through a slot 69 in plate 57 (see dotted lines, Fig. 3) and being held in position by a nut 70, which bears on the top of the plate. It will readily be understood that the action of spring 64 is to keep roller 63 constantly in engagement with cam 15.

Gripping-disks 36 and 37 are carried by shafts 71 and 72, journaled, respectively, in blocks 31 and 32. 73 denotes intermeshing pinions carried by these shafts under the table. It will be noticed in Fig. 6 that a slot 96 is provided in the table to permit the movement of shaft 72, which is necessitated by the oscillation of block 32. Below the pinion on shaft 71 (see Figs. 3 and 4) is a ratchet 74, which is fixed to the shaft, and below the ratchet is a lever 75, which is pivoted on said shaft and is held in position thereon by a nut 76. (See Fig. 3.) This lever is pivoted on shaft 71 at approximately its mid-length, one end of said lever carrying a pawl 77, which engages the ratchet. (See Fig. 2 in connection with Fig. 4.) To the other end of lever 75 is pivoted a yielding connecting-rod B. At the outer end of this connecting-rod is a roller 78, which bears upon cam 14 on shaft 13, a spring 79, one end of which is connected to lever 75 and the other to a fixed portion of the frame, in the present instance bracket 8, (see Fig. 3,) acting to retain the roller constantly in engagement with the cam. The construction of the yielding connecting-rod, which I have designated as a whole by B, will be clearly understood from Fig. 3 in connection with Fig. 1. This connecting-rod consists, primarily, of two members, which I have designated as 80 and 81. Member 80 carries roller 78 and is provided with a slot 82, through which shaft 13 passes freely. This member is also provided at its inner end with a stump 83, through which member 81 passes freely, and intermediate its ends with a stump 84, through which the outer end of member 81 passes freely. Member 81 carries an adjustable collar 85 and a spring 86, one end of which bears against the collar and the other against stump 83. This spring in practice is made amply strong not only to overcome the power of the spring 79, but also under ordinary circumstances to carry, through the engagement of the pawl with ratchet 74, shafts 71 and 72 and the gripping-disks; but should the blanks become clogged in the gripping-disks or should anything occur to interfere with the perfect working of this portion of the mechanism then spring 86 will yield and prevent damage to any portion of the machine.

The saw carried by rocker-arm 50 is raised and lowered by means of a cam 87 on shaft 6, which is engaged by a roller 88 on a connecting-rod 89, the upper end of which is pivoted to rocker-arm 50, as at C. The lower end of this rocker-arm is bifurcated to straddle the shaft. (See dotted lines, Fig. 6.) A spring 90, the respective ends of which bear upon rocker-arm 50 and the table, acts to hold the roller in engagement with the cam and to normally retain the end of the rocker-arm which carries shaft 48 and the saw at the raised position, and consequently to hold the saw out of operative position.

In order to provide a convenient means for regulating the operative position of the saw—that is to say, determining the depth of the cut in the head of a screw-blank, if required—I provide a special form of joint C. (See Fig. 5 in connection with Figs. 1 and 4.) The bolt or pin 91 of the joint is shown as passing directly through rocker-arm 50 and through an eccentric bushing 92, which lies in a circular recess 93 in connecting-rod 89 and is provided with a head 95, which may be grasped by a tool in changing the adjustment. The parts are locked in position after adjustment by tightening up nut 94 on the bolt. Suppose that at any time it is desired to change the adjustment of the saw. The operator loosens nut 94 and oscillates the eccentric bushing in either direction as may be required to slightly raise or lower the saw and then locks the parts in position by means of the nut.

The operation of the machine as a whole is briefly as follows: Screw-blanks are placed loosely in the blank-holder, from whence they are picked up by the slotted finger, and thence pass down the slotted way and one by one pass into recess 34 in front of the feed-slide, it being obvious from the shape of the blanks that they can only be picked up by the feed-slide with the heads above the slot, as if the blanks pass into the slot in the finger with the heads downward they will not be lifted by the finger when it is raised by the incline, as has been clearly described in connection with Fig. 4. When the feed-slide moves forward in recess 34, it passes under the head of each blank and pushes the blank along the

recess until it passes into recess *a*, formed by the notches in the gripping-disks, the disks being at this instant in rotation and acting to carry the blank forward until the head is in position to be acted upon by the saw. At this instant the rocker-arm which carries the saw is tilted and the saw is lowered into position to cut the required slot in the head of the blank. An instant later the rocker-arm resumes its normal position, the saw is lifted from its operative position, and another actuation is given to the gripping-disks, the effect of which is to release the blank which has been slotted and which drops down into a suitable receptacle (not shown in the drawings) and to place another blank in position for the head to be slotted by the saw, this operation being continuously repeated and the working of the entire machine being automatic. As already stated, the feeding mechanism supplies the blanks faster than they can be slotted, but in such a manner that there can be no clogging, as the surplus blanks—that is, blanks which cannot pass into the slotted way — drop back into the blank-holder or into a cup provided to catch them.

Having thus described my invention, I claim—

1. In a machine for slotting screw-blanks, the combination with feeding mechanism to deliver the blanks to the slotting instrumentalities, of gripping-disks rotating in a horizontal plane which receive the blanks from the said feeding mechanism between their peripheries, means for imparting an intermittent rotation to said gripping-disks, a slotting device carried by a rocker-arm, and mechanism by means of which said rocker-arm is tilted so as to bring the said slotting device into operative relation to the blank at the time when said blank is held stationary by the said gripping-disks.

2. In a machine for slotting screw-blanks, the combination with feeding mechanism to deliver the blanks to the slotting instrumentalities, of a pair of horizontally-gripping disks having notches formed in their edges for the reception of the bodies of the blanks as they come from the feeding mechanism, mechanism for imparting an intermittent rotation to said gripping-disks, a rotary slotting-saw, a rocker-arm by which said saw is carried, and means for tilting said arm and bringing the said saw into operative relation to the blank at the time when said blank is held stationary by said notched gripping-disks.

3. In a machine for slotting screw-blanks, the combination with feeding mechanism to deliver the blanks to the slotting instrumentalities, of a pair of intermittently-rotated notched gripping-disks which receive the blanks from the said feeding mechanism, one of said gripping-disks being movable bodily relative to the other, means to normally force said movable disk yieldingly against the other, so that the blanks are held with a spring-grip, and a slotting-saw in operative relation to said gripping-disks.

4. The combination with the gripping-disks, the saw, a rocker-arm by which the saw is carried and mechanism for tilting the rocker-arm, of an inclined slotted way, a rotating blank-holder having a spiral incline 21 and a pivoted slotted finger adapted to be raised by the incline so that blanks picked up by the finger will pass into the slotted way.

5. The combination with a rotating blank-holder having a spiral incline, of a pivoted slotted finger adapted to pick up blanks lying loosely in the holder and to be raised by the incline on the blank-holder.

6. The combination with a rotating blank-holder having a spiral incline terminating in a shoulder, of a pivoted slotted finger adapted to pick up blanks lying loosely in the holder and to be raised by the incline until the free end is higher than the pivoted end, the finger then passing off at the shoulder and the free end dropping down into the blank-holder.

7. The combination with a rotating blank-holder having a spiral incline, and an inclined slotted way, of a slotted finger adapted to pick up blanks lying loosely in the holder and pivoted at the upper end of the way, said finger being adapted to be raised by the incline until the free end thereof is higher than the pivoted end so that blanks picked up by the finger will pass into the slotted way.

8. The combination with the gripping-disks and fixed and pivoted blocks by which they are carried, of a rotating blank-holder having a spiral incline, an inclined slotted way and a pivoted slotted finger adapted to pick up blanks in the holder and to be raised by the incline so that blanks picked up by the finger will pass into the way and a feed-slide by which the blanks are moved forward singly into position to be gripped by the disks.

9. The combination with the gripping-disks and fixed and pivoted blocks by which they are carried, said blocks having a recess 34 between them, of a rotating blank-holder having a spiral incline, an inclined slotted way leading into said recess, a pivoted slotted finger adapted to travel up the incline by which blanks are picked up in the holder and passed to the slotted way and a feed-slide by which blanks in the recess are carried forward singly into position to be gripped by the disks.

10. In a machine of the character described the combination with intermittently-rotated gripping-disks, of fixed and pivoted blocks by which they are carried, said blocks having a recess between them adapted to receive the shanks but not the heads of the blanks, a spring to normally force said blocks and gripping-disks together, a way from which blanks pass to the recess with the heads upward, and a feed-slide reciprocating in said recess which moves the blanks forward singly into position to be gripped by the disks.

11. The combination with the gripping-

disks, shafts by which they are carried, fixed and pivoted blocks in which said shafts are journaled and intermeshing pinions on said shafts, of a ratchet fixed to one of said shafts below the pinion, a lever pivoted on said shaft below the ratchet and carrying a pawl engaging the ratchet and means for oscillating the lever substantially as described for the purpose set forth.

12. The combination with the gripping-disks, shafts therefor, fixed and pivoted blocks in which said shafts are journaled, and intermeshing pinions on said shafts, of a ratchet on one of said shafts, a lever pivoted on said shaft below the ratchet and carrying a pawl engaging the ratchet, cam 14, a connecting-rod carrying a roller engaging said cam and a spring 79 for retaining the roller in engagement with the cam.

13. The combination with the gripping-disks, shafts therefor, fixed and pivoted blocks in which said shafts are journaled and intermeshing pinions on said shafts, of a ratchet on one of said shafts, a lever pivoted on said shaft below the ratchet and carrying a pawl engaging the ratchet, a spring 79 acting to draw the lever in one direction, cam 14, and a connecting-rod comprising members 80 and 81 said member 80 carrying a roller engaging the cam, a stump 83 through which the member 81 passes and a stump 84 through which member 81 passes freely and said member 81 carrying a collar and a spring 86 which bears against the collar and the stump 83, said spring 86 being stronger than spring 79 but adapted to yield should clogging occur and thereby prevent damage to any portion of the machine.

14. The combination with the table, a block 31, bolted to the table and a block 32 pivoted to the table, said blocks having a recess 34 between them, of intermittent gripping-disks carried by said blocks and having corresponding notches to form recesses *a*, a bolt 43 passing loosely through block 32 and engaging block 31, a spring acting to hold the gripping-disks normally in contact, and a feed-slide by which the blanks are moved forward singly into one of the recesses *a*, the spring yielding to permit the blank to enter the recess, where it is retained until the next actuation of the disks.

15. The combination with the fixed block, pivoted block and intermittent gripping-disks carried by said blocks and having corresponding notches to form recesses *a*, of a spring acting to hold the disks normally in contact, said blocks having a recess 34 between them and being cut away in their opposite faces to form a recess 46, and a feed-slide by which each blank is moved forward into one of the recesses *a*, said blank being released and dropping through recess 46 at the next actuation of the disks.

16. In a machine for slotting screw-blanks, the combination with suitable feeding mechanism, of intermittently-rotated, spring-pressed gripping-disks which receive the blanks from the feeding mechanism, a slotting-saw, a rocker-arm in which said saw is mounted, and means to tilt said rocker-arm and force the said slotting-saw into operative relation to said blank at the moment the spring-pressed gripping-disks bring the blank to its stationary position.

17. In a machine for slotting screw-blanks, the combination with suitable feeding mechanism, of a pair of intermittently-rotated, spring-pressed gripping-disks having notches formed in their gripping-peripheries, which receive the blanks independently and hold them stationary during the slotting operation, a slotting-saw, a rocker-arm 50 in which said saw is mounted, a thrust-rod 89 connected with said rocker-arm 50, a roller 88 on said thrust-rod, a rotating cam 87 which bears against said roller and imparts movement to said thrust-rod and rocker-arm, and a spring 90 to hold the roller 88 in contact with said cam 87 and normally raise the rocker-arm 50 so as to keep the saw out of its cutting position.

18. The combination with the fixed block, pivoted block, intermittent gripping-disks carried by said blocks, and having corresponding notches to form recesses *a*, and a spring acting to hold said disks normally in contact, said blocks having a recess 34 between them and being cut away in their opposite faces to form a recess 46 and a feed-slide by which the blanks are moved forward singly and placed in engagement with one of the recesses *a*, a saw, a rocker-arm by which it is carried and mechanism for tilting the rocker-arm at the instant a blank is held by the disks whereby the head of the blank is slotted.

19. The combination with the feeding mechanism and the intermittent gripping-disks, of the saw, a rocker-arm by which the saw is carried, spring 90, cam 87, connecting-rod 89 carrying a roller engaging the cam and having a circular recess 93, an eccentric bushing in said recess and a bolt 91 passing through the rocker-arm and through the eccentric bushing whereby the movement of the rocker-arm may be adjusted to regulate the depth of the cut made by the saw.

In testimony whereof I affix my signature in presence of two witnesses.

HARVEY HUBBELL.

Witnesses:
A. M. WOOSTER,
S. V. HELEY.