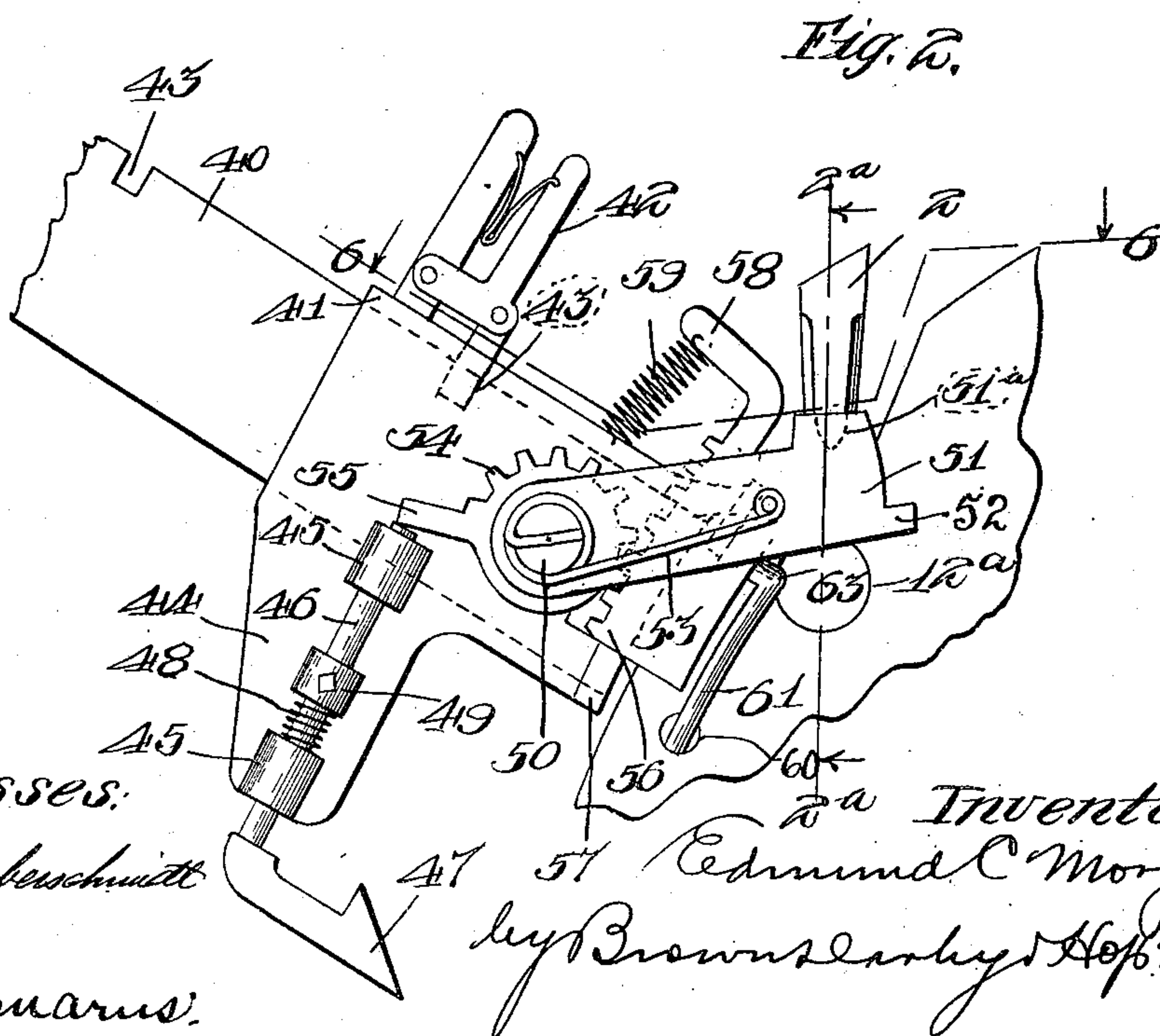
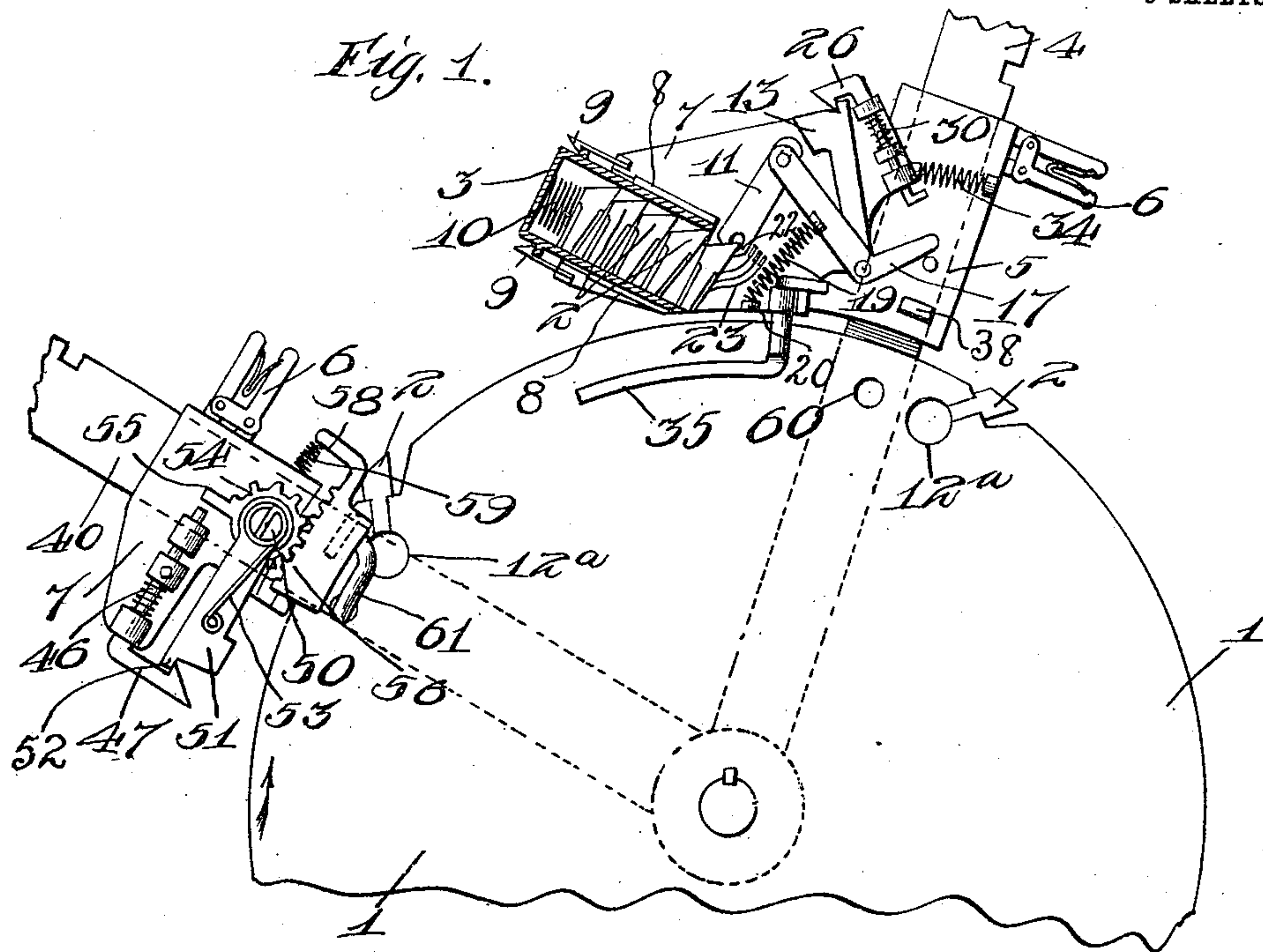


E. C. MORGAN.
 BIT CHANGING MEANS FOR ROTARY CUTTERS.
 APPLICATION FILED AUG. 5, 1905. RENEWED MAY 9, 1910.

975,563.

Patented Nov. 15, 1910.

3 SHEETS-SHEET 1.



Witnesses:

J. A. Schubert

W. Dornier

Inventor:

Edmund C. Morgan
 by Brown & Lehigh

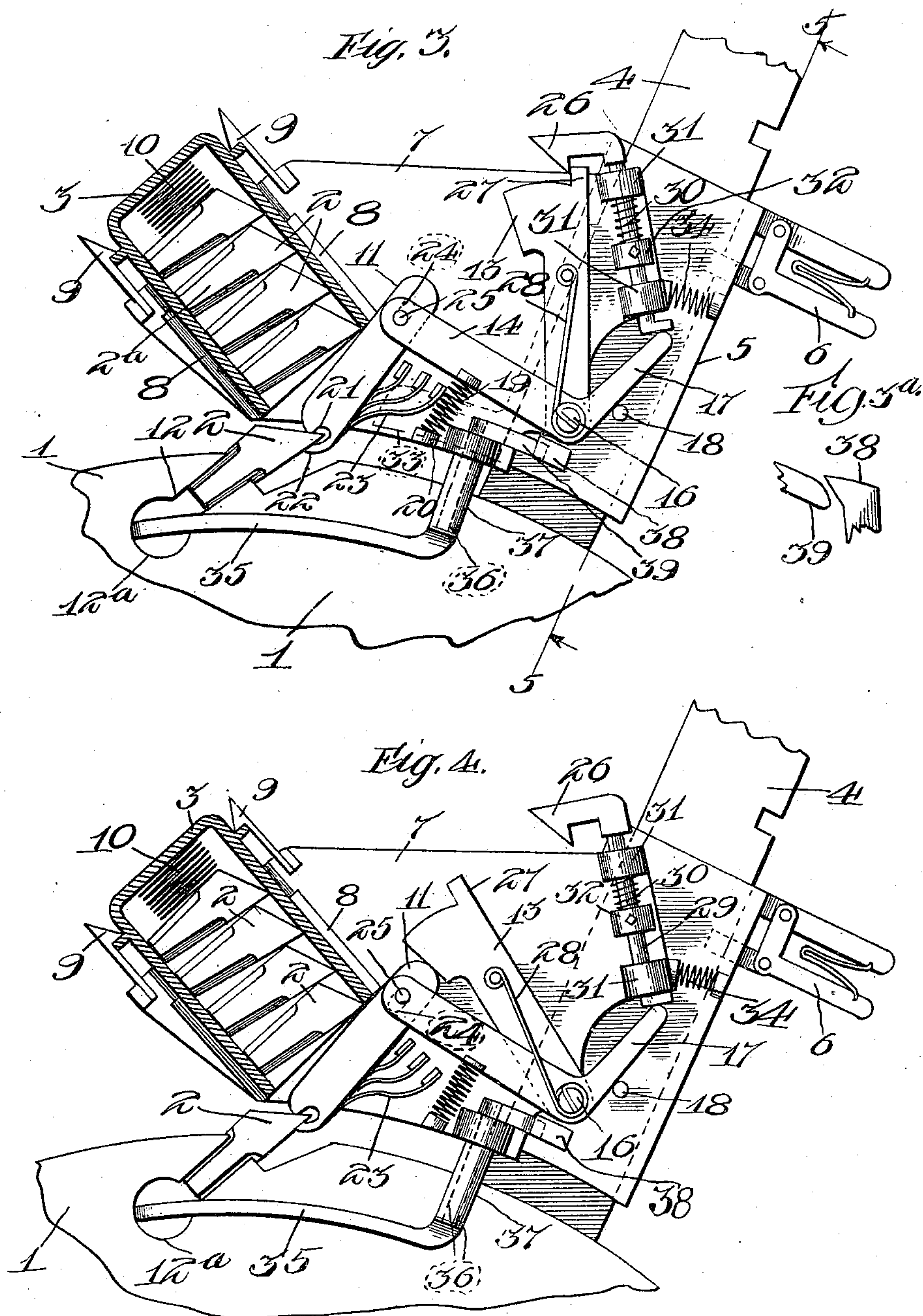
Attys

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3 SHEETS—SHEET 2.



Witnesses:
 G. A. Paulschmidt
 W. D. Marcus.

Inventor:
 Edmund C. Morgan
 by Brown & Darby & Co.
 Attys.

E. C. MORGAN.

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3 SHEETS—SHEET 3.

Fig. 5.

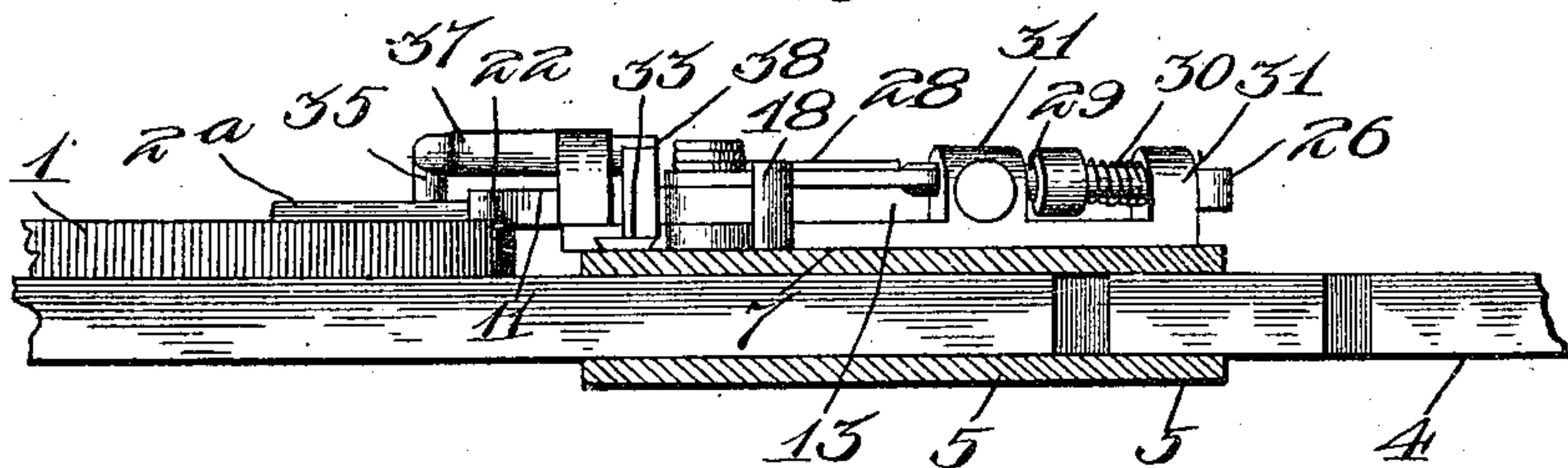


Fig. 6.

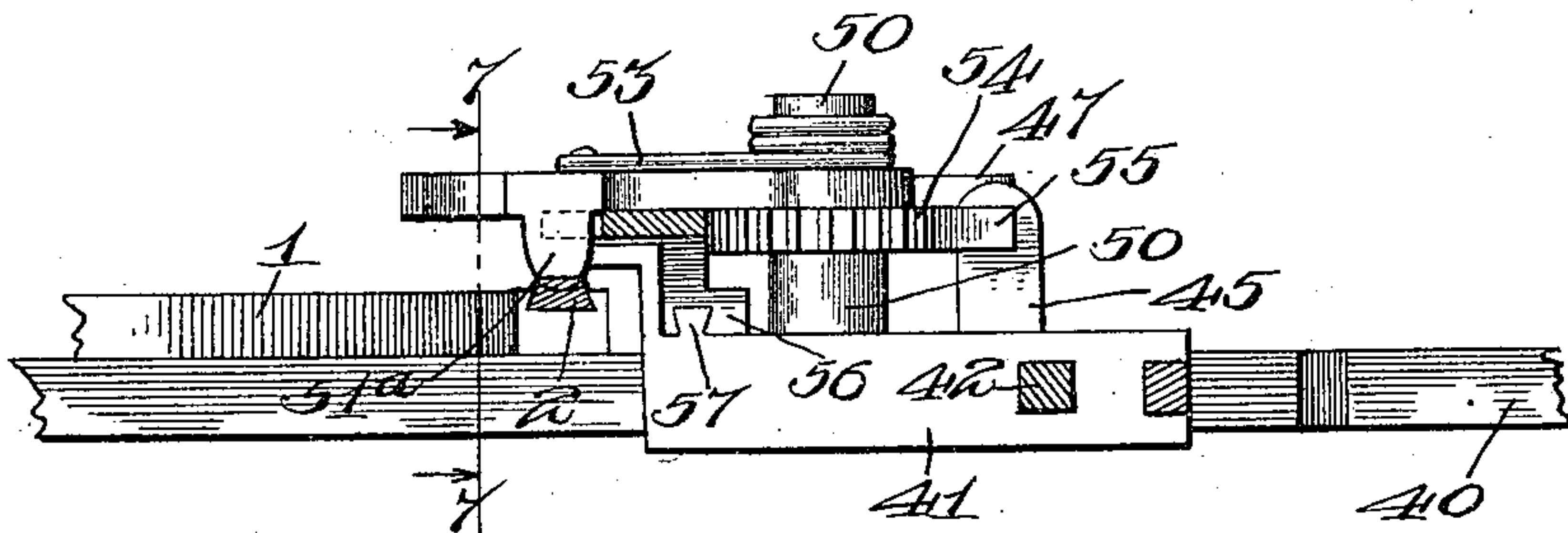


Fig. 7.

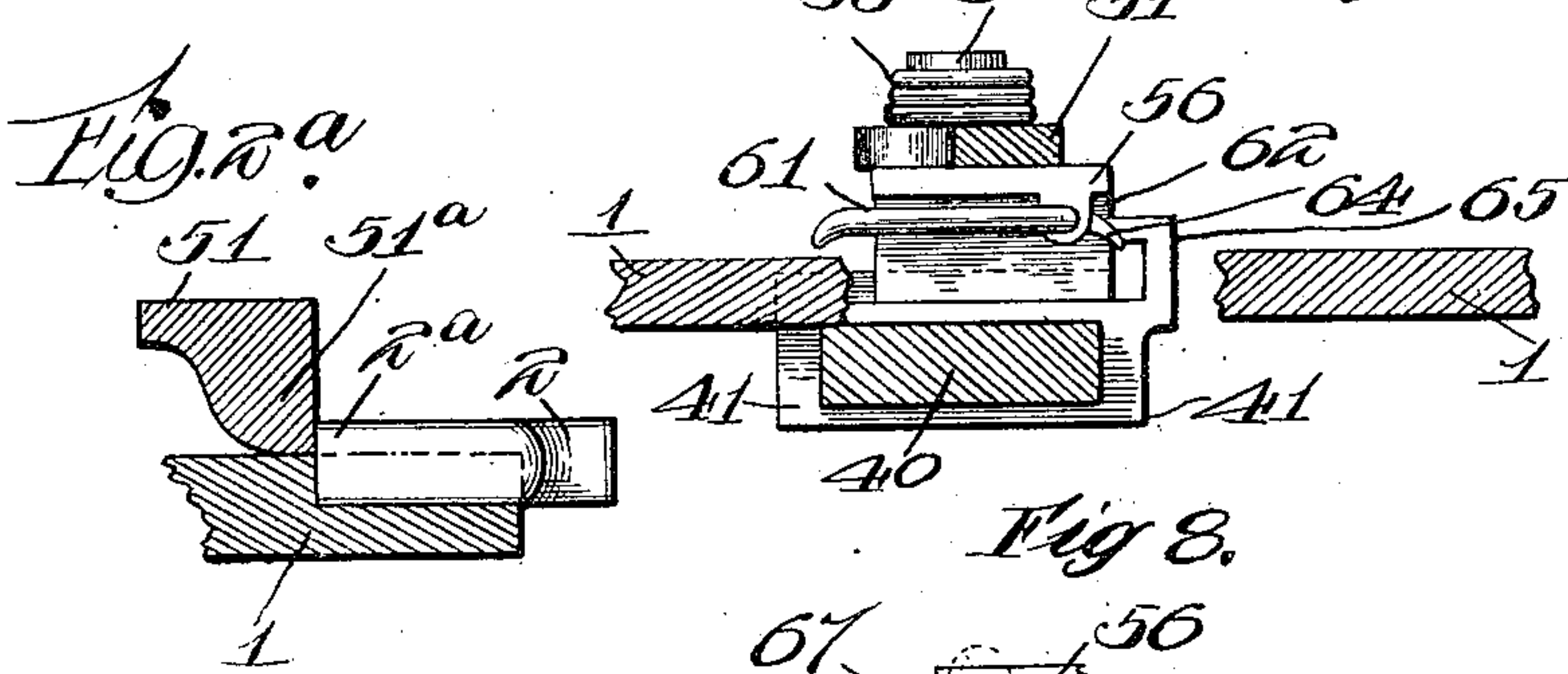
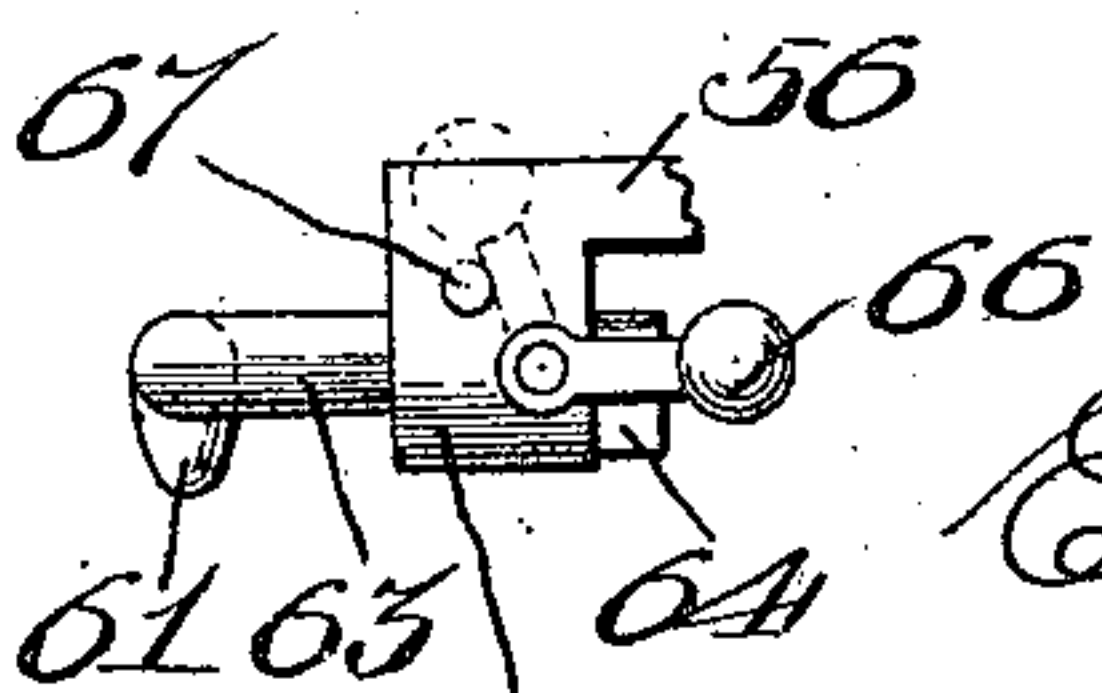


Fig. 8.



Witnesses:

G. W. Paulschmitt

W. D. Dumas,

Inventor:
Edmund C. Morgan

by Brown & Sharpe, Boston

Atty

UNITED STATES PATENT OFFICE.

EDMUND C. MORGAN, OF CHICAGO, ILLINOIS.

BIT-CHANGING MEANS FOR ROTARY CUTTERS.

975,563.

Specification of Letters Patent. Patented Nov. 15, 1910.

Application filed August 5, 1905, Serial No. 272,901. Renewed May 9, 1910. Serial No. 560,314.

To all whom it may concern:

Be it known that I, EDMUND C. MORGAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Bit-Changing Means for Rotary Cutters, of which the following is a specification.

This invention relates to means for changing the bits in rotary cutting machines, such as mining machines, wood-working machinery, metal-working tools, etc., and it has for its primary object to provide an improved and efficient means whereby a supply of sharpened bits may be maintained on hand and automatically inserted into the rotary cutting head or other stock which holds the bits, without necessarily stopping the operation of the machine, the old or worn bits being automatically extracted in advance of the introduction of the new or sharp bits.

With these ends in view, the invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which said object, and certain other objects hereinafter appearing, are attained, all as fully described with reference to the accompanying drawings, and more particularly pointed out in the claims.

In the said drawings, Figure 1 is a plan view, partly in horizontal section, of a portion of a rotary bit stock or cutter-head, equipped with this invention whereby the old bits are extracted and the new ones inserted as before described. Fig. 2 is an enlarged detail plan view of the extracting mechanism in action. Fig. 2^a is a detail section on the line 2^a, 2^a, Fig. 2. Fig. 3 is an enlarged detail plan view, with the magazine in horizontal section, showing the mechanism in the act of inserting a new bit prior to the operation of the hammer which drives the bit home. Fig. 3^a is a detail view of the tripping means for resetting the mechanism. Fig. 4 is a similar view showing the hammer in operation. Fig. 5 is an edge or side elevation partly in section, on the line 5, 5, Fig. 3. Fig. 6 is an edge elevation of the mechanism shown in Fig. 2, partly in section on the line 6, 6, Fig. 2. Fig. 7 is a detail vertical section on the line 7, 7, Fig. 6. And Fig. 8 is a modification hereinafter described.

1 represents a rotary cutter-head, stock, or other rotating member for holding the bits

2, some of which are shown in place in the cutter-head or stock, while others are illustrated ready for application in a suitable magazine 3. The means for driving or rotating the stock 1, and the particular uses to which the stock is put when in operation are entirely immaterial so far as the principle and scope of this invention are concerned. Suffice it to say, that as the stock or cutter-head rotates, the projecting edges or points of the cutters 2 perform their allotted cutting function in the material or substance with which they come in contact.

Secured on any suitable support (here illustrated as an arm 4, radiating, if desired, from the center of the cutter-head 1, and supported at its inner end in any suitable way) is a slide 5, which (as better shown in Fig. 5) embraces the arm 4, and is provided with a latch dog 6, whereby it may be adjusted to different positions with respect to the length of the arm 4. On this slide 5 is carried a plate 7 having suitable guide-ways 8 between which the magazine 3 is inserted, the magazine being held in place by one or more catches 9, permitting of its withdrawal when it is desired to replenish it with the bits 2, which are inserted therein from the lower open end, the upper end being preferably closed, and provided with a compression spring 10, serving to press the entire supply of bits downwardly against the side of the plunger 11, which holds them in place in the magazine as long as the plunger is across the mouth thereof in either of the positions shown in Figs. 3 and 4.

The periphery of the cutter-head or stock 1 is provided with a suitable number of sockets 12 for the reception of the shanks of the bits, and the shanks of the bits are preferably tapering in form, as shown at 2^a, (see Fig. 3) so that they will be wedged tightly in the sockets and forced downwardly by the bit-inserting mechanism comprising, as one of its elements, the plunger 11, and as another of its elements, the hammer 13, which will be presently described. The plunger 11 has pivotal connection with one arm 14 of a bell-crank-lever which is pivoted at 16 to the plate 7, and has its other arm 17 arranged to engage an abutment 18 secured rigidly to the slide 5. The plunger 11 is held normally withdrawn, in the position shown in Fig. 1, by any suitable means, such as a spring 19, bearing between the inner edge of the arm 14 and a boss 20 formed on the inner edge of

plate 7, and the free or forward end of the plunger 11 is formed with a socket or seat 21 for receiving the point of the bit 2, one side of this seat being in the form of an extended lip 22, which engages the side of the bit for preventing the spring 10 from pushing the bit beyond the seat 21, and for holding the bit in line with the socket 12 while the plunger 11 is introducing it. The form of the seat 21, and lip 22, however, will of course depend upon the form of the point of the bit, the form described and shown being the best adapted for holding the form of point on the bit illustrated in connection with this invention. When the plunger 11 withdraws to permit a bit to be forced out into place at the end of the plunger, the shank of the bit is held in line with the socket 12 by a series of springs 23, which serve to engage it at different points throughout its length and hold it in place against the end of the magazine while it slides into the socket 12, and which also serve to hold the free end of the plunger 11 against the end of the magazine after the bit passes beyond them.

When the bit has been fairly introduced by the plunger 11, as shown in Fig. 4, the final seating of the bit in its socket is effected by the hammer 13 striking the outer end of the plunger, which has an ordinary pin and slot connection 25, 24 with the arm 14. This inward or ramming motion of the plunger is effected by a bodily movement of the bell-crank 14, 17, connected with the plate 7, causing the arm 17 of the bell-crank to engage the abutment 18, forcing the arm 17 outwardly and the arm 14 inwardly, and at the same time, or at or about the completion of the inward stroke of the plunger 11, effecting the release of a catch 26, which engages a projection 27, or other suitable means for holding the hammer 13 in its retracted position.

The hammer is actuated to drive the bit by a spring 28, shown as coiled on the pivot 16 and having one end secured to the hammer 13, which is also pivoted on the pivot 16, and the catch 26 is released by the arm 17 engaging the inner end of a sliding rod 29, to the outer end of which the catch 26 is secured. On the rod 29 is a spring 30, which bears between one of the guides 31 of the rod 29 and a collar 32 secured on the rod. In order that the plate 7 may have this bodily movement toward the abutment 18 for accomplishing these operations, the slide 5 is formed with a dove-tail 33 projecting laterally therefrom but in a direction concentric with the rotary stock or cutter-head 1, and the plate 7 is mounted on such dove-tail, as shown in Fig. 5, and adapted to slide lengthwise thereof in a direction concentric with the periphery of the cutter-head. The plate 7 is pushed normally away from the abutment 18 by any suitable means,

such as a spring 34, and it is moved toward said abutment by the cutter-head itself acting through the medium of a projecting arm 35, which is secured to a rocker shaft 36 in elongated bearing 37 on the plate 7, and which arm 35 projects downwardly toward the face of the cutter-head or stock 1, and at the proper time engages in the circular portion 12^a of the bit socket, which is usually formed, in devices of this kind, at the inner end of the socket, or any other suitable abutment may be provided on the stock 1 for the engagement of this arm 35. Whatever the abutment may be, it is seen that when it engages with the arm 35 the whole plate 7, together with its associated mechanism or parts carried thereon, will be shifted in a direction concentric with the line of rotation of the cutter-head or stock, and as it does so, the bit, which extends normally at the end of the plunger 11, as shown in Fig. 1, will be forced away from the magazine and into the bit socket 12 by the time the arm 17 fully engages the abutment 18 and said socket arrives at a registering position with the end of the magazine, as shown in Fig. 3. Further movement of the plate in the described direction effects the release of the hammer 13, as before mentioned, driving the bit home, and the instant this occurs the arm 35 is released from the socket or abutment 12^a by another abutment 38 mounted on the slide 5 in position to engage a trip 39 secured to the outer end of the rocker-shaft 36 in such a manner as to tip the arm 35 upwardly out of the socket 12 after the plate 7 has moved sufficiently to set the described mechanism into operation as explained the spring 19 being of sufficient strength to overcome the tension of the spring 28, which will cause the plunger 11 to move the hammer into a position that the projection 27 will be engaged by the catch 26. The arm 35 being thrown up out of the way, the rotary stock or cutter-head continues its rotation, while the spring 34 causes the plate 7 to slide back to its former position on the dove-tail guide or way 33, where it remains until another cavity 12^a reaches the end of the arm 35, which drops into place therein, and repeats the operation before described.

When the bits 2 have been worn beyond usefulness they may be automatically removed by the ejecting mechanism which will now be described, or, if desired, this ejecting mechanism may act to remove the bits at each revolution of the stock or cutter-head 1, the sockets from which the bits are removed being instantly replenished by sharp bits from the magazine 3 as soon as the sockets arrive at the introducing position shown in Fig. 3. This ejecting mechanism is mounted on another arm like the arm 4, the same being shown at 40, and if desired,

radiating from the center of the stock 1 like the arm 4, and supported in any suitable way; if desired, being rigid with the arm 4.

Mounted upon the arm 40 is a slide 41, not essentially different from the slide 5, provided with a latch-dog 42 adapted to lock the slide 41 at any desired position on the arm 40 through the aid of notches 43. Slide 41 is formed with an extension 44 having guides 45 in which slides a rod 46 carrying a latch 47, the rod 46 being braced in one direction by a spring 48 sleeved thereon and bearing between a collar 49 and one of the sockets 45. Pivoted on the upper face of the slide 41 by means of pivot 50, or other suitable device, is a hammer 51 having a projection 52 adapted to engage with the latch 47, whereby the hammer is held in its retracted position against the tension of a spring 53 coiled on the pivot 50 and acting against the hammer to throw it into the position shown in Fig. 2.

Mounted upon the pivot 50, under the hammer, is a toothed segment 54, which is provided with a finger 55 adapted, when the segment is turned in one direction, to engage the end of rod 46 and release the hammer from the latch 47, thereby permitting the hammer to make a quick rotary movement upon the pivot 50 and strike the butt end of the bit directly in line with its socket 12 and thereby knock the bit out of place, in the manner shown in Fig. 2, the inner or active end of the hammer being provided with a depending boss, which is shown in dotted lines at 51^a, whereby the hammer may pass over other mechanism and at the same time be close to the base of the stock 1 so as to engage the end of the bit which projects into a plane above the plane of the stock 1, more clearly shown in Fig. 2^a. This rotary movement of the segment 54 for releasing the hammer is produced by a rack-bar 56, sliding on a dove-tail 57, or other suitable guide, on the upper face of slide 41, and having an arm 58 connected to the slide 41 by a spring 59, which serves to return the rack-bar 57 to its normal position, or toward the left as viewed in Fig. 2, when not otherwise held. The segment 54 is secured to the pivot 50 rigidly, while the hammer 51 is loose thereon, but one end of the spring 53 is secured to the hammer, and the other end, as shown in Fig. 2, is secured to the pivot 50, which rotates with the segment 54. As a consequence, assuming the hammer to be locked by the latch 47, increased tension is put upon the spring 53 by the movement of the rack-bar 56 toward the right, causing the segment 54 to rotate toward the left until it releases the latch 47, thereby allowing this increased tension of the spring 53 to operate the hammer 51 as described; and when the moving power of the rack-bar 56 is withdrawn therefrom, the spring 59 returns the

rack-bar to its former position, and consequently also returns the hammer 51 into the possession of the latch 47. This movement of the rack-bar 56 toward the right is produced, like the movement of the plate 7, by the rotary stock or cutter-head 1 itself, when one of a series of sockets 60 comes into engagement with the end of an arm 61 projecting downwardly into the path thereof, and being mounted upon the rack-bar 56 in any suitable way. As shown in Fig. 7, this arm 61 is pivotally mounted in a boss or hanger 62 on the lower side of the rack-bar 56, it being provided with a cross-bend 63 constituting a rocker-shaft for its support in the hanger 62, and the inner end of this rocker-shaft is provided with a finger 64 adapted to engage under a cam-like projection 65 mounted on the slide 41 when the sliding rack-bar 56 arrives at a certain position, thereby throwing the arm 61 up out of engagement with the socket 60 and permitting the spring 59 to return the rack-bar 56 to its former position.

In the modification shown in Fig. 8 the rock shaft 63 is provided with a projecting portion 64 similar to the projecting portion 64 shown in Fig. 7. An arm provided with a weight 66 at one end thereof is pivoted by its other extremity to a suitable support. The projection 64 extends into the path of the downward movement of the arm of the weight so that when the weight and the arm are in the position shown in full lines in Fig. 8 the arm will engage and rest upon the projection 64 to hold the extremity 61 in an inoperative position. When it is desired to permit the extremity 61 of the rock shaft 63 to move into an operative position, the weight 68 is elevated to the position shown in dotted lines in Fig. 8. When the arm will engage and rest against the stop 67 to hold the weight in an elevated position, one projection 64 is relieved of the weight, the extremity 61 being heavier than the other extremity, the rock shaft will turn under the influence of this weighted extremity and will move into an operative position. When the weight is in the position shown in full lines in Fig. 8, that is, resting upon the projection 64, it overcomes the weight of the extremity 61 of the shaft 63 and holds the said extremity in an inoperative position.

What I claim as my invention, and desire to secure by Letters Patent, is:

1. In a machine for the purpose described, the combination of a movable bit stock having a bit socket, means for holding one or more bits contiguous to the line of movement of said socket in readiness to be inserted therein, and means for inserting a bit into said socket.

2. In a machine for the purpose described, the combination of a movable bit stock having a bit socket, means for holding one or

more bits contiguous to the line of movement of said socket in readiness to be inserted therein, means for forcing the bits into said socket, and means for causing the bit-inserting means to move in unison with the stock a limited distance while inserting the bit.

3. In a machine for the purpose described, the combination of a movable bit stock having a bit socket, means for holding one or more bits contiguous to the line of movement of said socket in readiness to be inserted therein, means for forcing a bit into said socket, means for causing the bit-inserting means to move in unison with the bit stock a limited distance in one direction, and means for returning said bit-inserting means in the opposite direction to its starting position.

4. In a machine for the purpose described, the combination of a movable bit stock having a bit socket, means for holding one or more bits contiguous to the line of movement of said socket in readiness to be inserted therein, means for forcing a bit into said socket, and means operatively related to said stock for actuating the last said means.

5. In a machine for the purpose described, the combination of a rotary bit stock having one or more bit sockets, means for holding a supply of bits in line with said sockets, a plunger for inserting the bits into said sockets, and means operatively related to said stock for actuating said plunger.

6. In a machine for the purpose described, the combination of a movable bit stock having one or more bit sockets, means for holding a supply of bits contiguous to the line of movement of said sockets, a plunger for forcing the bits into said sockets, said supply-holding means and plunger being movable with said stock, and means comprising an abutment, stationary with relation to said plunger, for actuating the plunger as it moves with the supply-holding means.

7. In a machine for the purpose described, the combination of a movable bit stock having one or more bit sockets, means for holding a supply of bits contiguous to the line of movement of said sockets, a plunger for forcing the bits into said sockets, said supply-holding means and plunger being movable with said stock, a lever connected to the plunger and movable therewith, and an abutment for said lever, stationary with relation thereto, whereby the lever is oscillated when striking the abutment.

8. In a machine for the purpose described, the combination of a rotary bit stock having one or more bit sockets, means for holding a supply of bits contiguous to the line of movement of said sockets, a plunger for forcing the bits into said sockets, said supply-holding means and plunger being mov-

able concentrically with said stock, and means for actuating said plunger as it moves with the stock.

9. In a machine for the purpose described, the combination of a movable bit stock having one or more bit sockets, means for holding a supply of bits contiguous to the line of movement of said sockets, means for inserting the bits into said sockets, and means co-operatively related to said inserting means for delivering a blow to the bit after it is inserted.

10. In a machine for the purpose described, the combination of a movable bit stock having bit sockets, means for inserting the bits into said sockets, and a hammer for delivering a blow to the bit after it is inserted, operatively related to the first said means.

11. In a machine for the purpose described, the combination of a movable bit stock having bit sockets, means for inserting bits into said sockets, a hammer for delivering a blow to the bit after it is inserted, a latch for holding the hammer inactive, and means actuated by the first said means for releasing said latch.

12. In a machine for the purpose described, the combination of a movable bit stock having bit sockets, means for holding a supply of bits contiguous to the line of movement of said sockets, movable therewith, a catch connected to and moving with the first said means and adapted to engage with and to be moved by said stock, a trip stationary with relation to said catch and adapted to trip the same out of engagement with the stock, means for returning the trip and the supply-holding means when thus tripped, and means actuatable by the movement of the stock for inserting bits into said sockets.

13. In a machine for the purpose described, the combination of a movable bit stock having bit sockets, means for inserting bits into said sockets, and means co-operatively related to the bit-inserting means for extracting the bits from the sockets.

14. In a machine for the purpose described, the combination of a movable bit stock having bit sockets, means for inserting bits into said sockets, a hammer for dislodging the bits from said sockets, a latch for holding the hammer inactive, means for placing the hammer under tension while thus held, by the motion of the stock, and means actuatable by the stock for releasing said latch.

15. In a machine for the purpose described, the combination of a movable bit stock having bit sockets, a pivoted hammer for knocking the bits from said sockets, a spring having one end connected with the hammer, a toothed segment connected to the other end of the spring, a rack-bar engaging

said segment, means for moving said rack-bar, means for moving the rack-bar with the bit stock, a latch for holding the hammer against movement with the segment, and
 5 means coöperatively related to the segment for releasing the latch after the stock moves a certain distance.

16. In a machine for the purpose described, the combination of a movable bit
 10 stock having bit sockets, a movable hammer for knocking the bits from said sockets, a spring having one end acting upon said hammer, a toothed segment connected to the other end of said spring, a rack-bar engaging
 15 said segment and movable a limited distance with the stock, a disengageable means connected to the rack-bar and arranged to engage with the stock, whereby the rack-bar is moved a limited distance with the stock, a
 20 trip for disengaging the last said means when the rack-bar moves a certain distance, means for holding the hammer inactive against the tension of the spring, and means for releasing said holding means, coöper-
 25 atively related to the rack-bar.

17. In a machine for the purpose described, the combination of a movable bit
 stock having bit sockets, a pivoted hammer for knocking the bits from the sockets, a
 30 spring having one end acting upon said hammer, a toothed segment connected to the other end of the spring, a rack-bar engaging said segment and movable with the stock, disengageable means for moving said rack-
 35 bar a limited distance with the stock, a latch

for holding the hammer inactive against the tension of the spring, means operatively related to the rack-bar for releasing said latch, and a spring for returning the hammer into the possession of the latch. 40

18. In a machine for the purpose described, the combination of a movable bit stock having a bit socket, means for holding one or more bits contiguous to the line of movement of said socket in readiness to be
 45 inserted therein, and means operatively related to said stock for inserting a bit into the socket.

19. In a machine for the purpose described, the combination of a rotary bit
 50 stock having one or more bit sockets, means for holding a supply of bits in line with said sockets, means for inserting the bits into said sockets, and means for actuating the last said means. 55

20. In a machine for the purpose described, the combination of a rotary bit stock having one or more bit sockets, means for holding a supply of bits in line with said sockets, means for inserting the bits into
 60 said sockets, and means for delivering a blow to the bit after it is inserted.

In witness whereof, I have hereunto set my hand this 3d day of August 1905, in the presence of the subscribing witnesses.

EDMUND C. MORGAN.

Witnesses:

E. C. SEMPLE,
 C. H. SEEM.