

W. P. QUENTELL & F. JUDGE.  
 CALCULATING MACHINE.  
 APPLICATION FILED MAY 13, 1909.

945,601.

Patented Jan. 4, 1910.

3 SHEETS—SHEET 1.

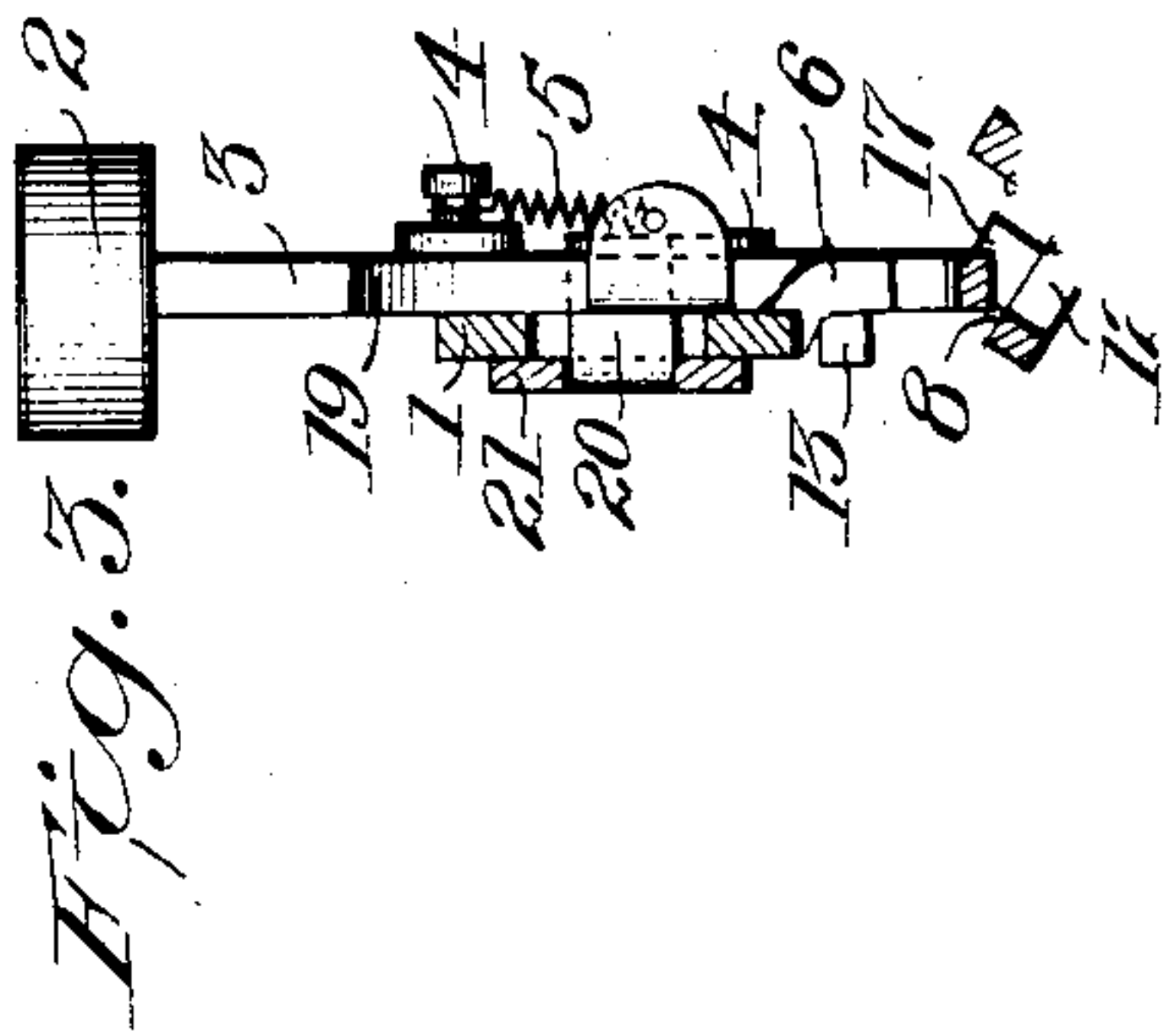


Fig. 3.

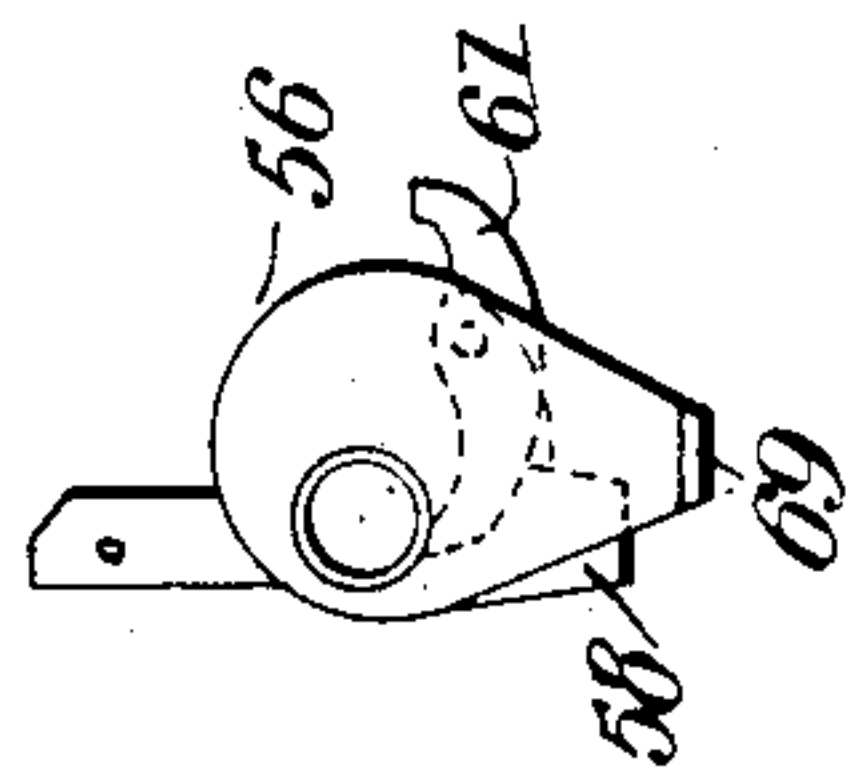


Fig. 8.

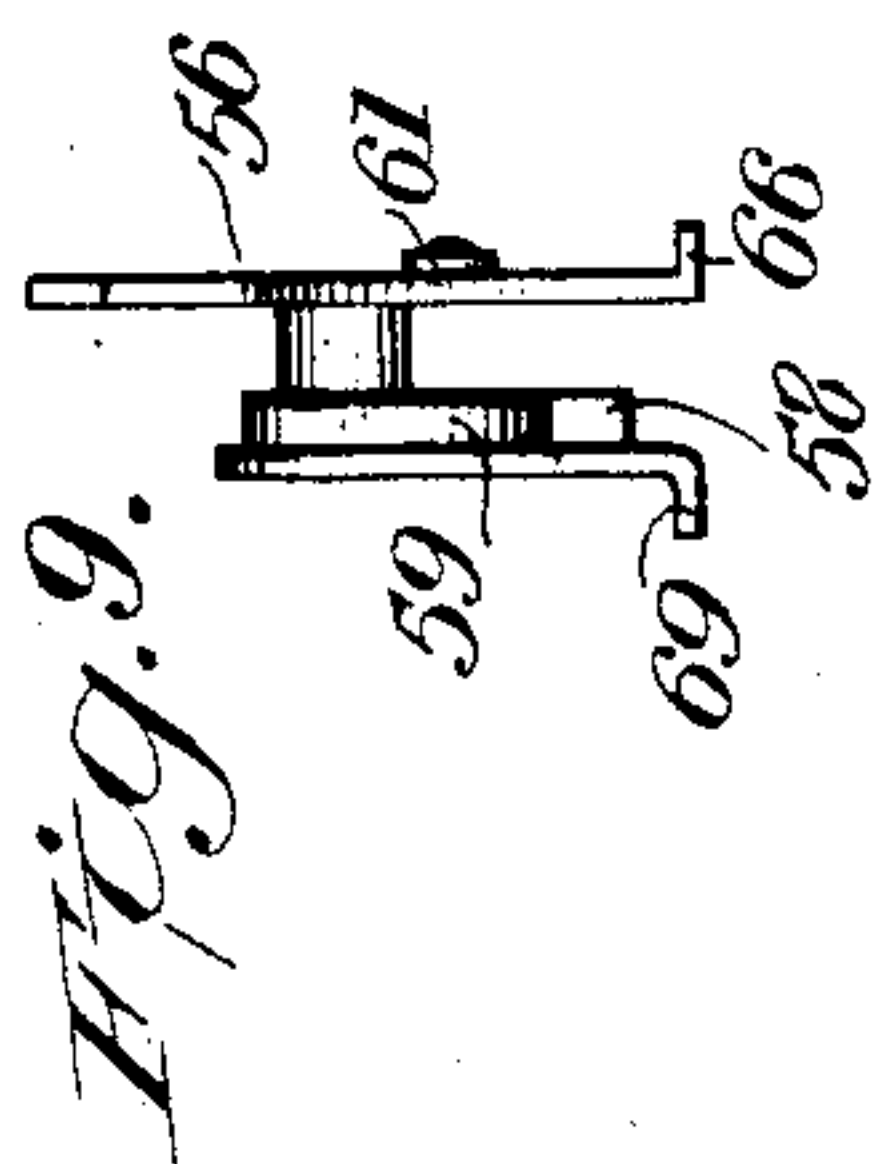
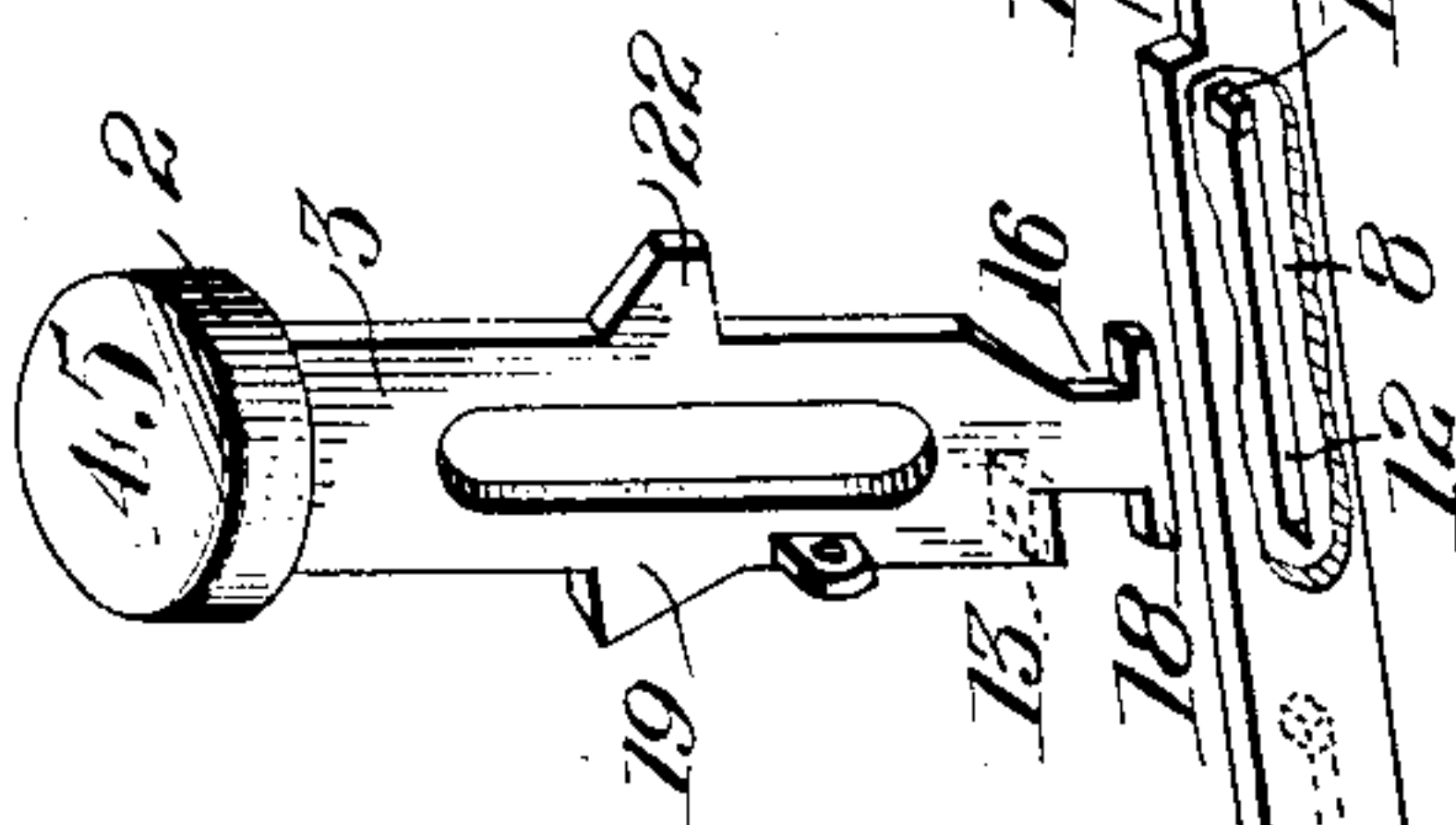


Fig. 2.

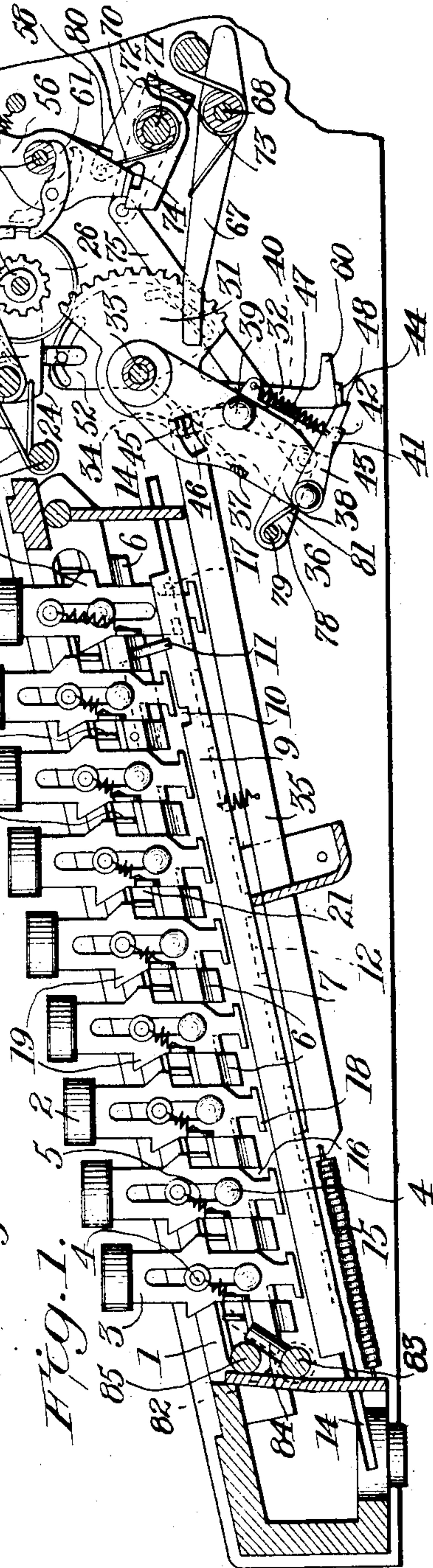


Fig. 1.

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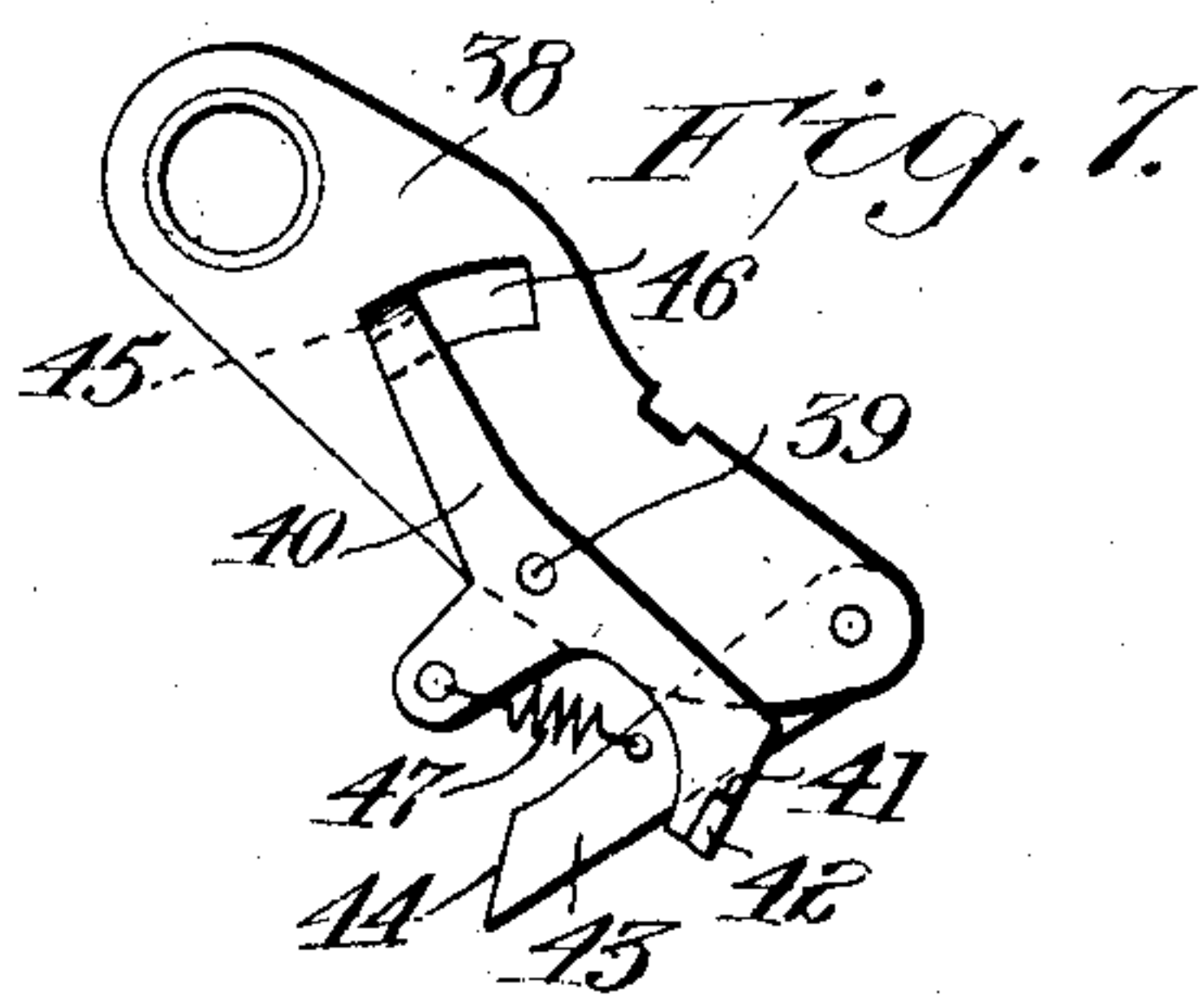
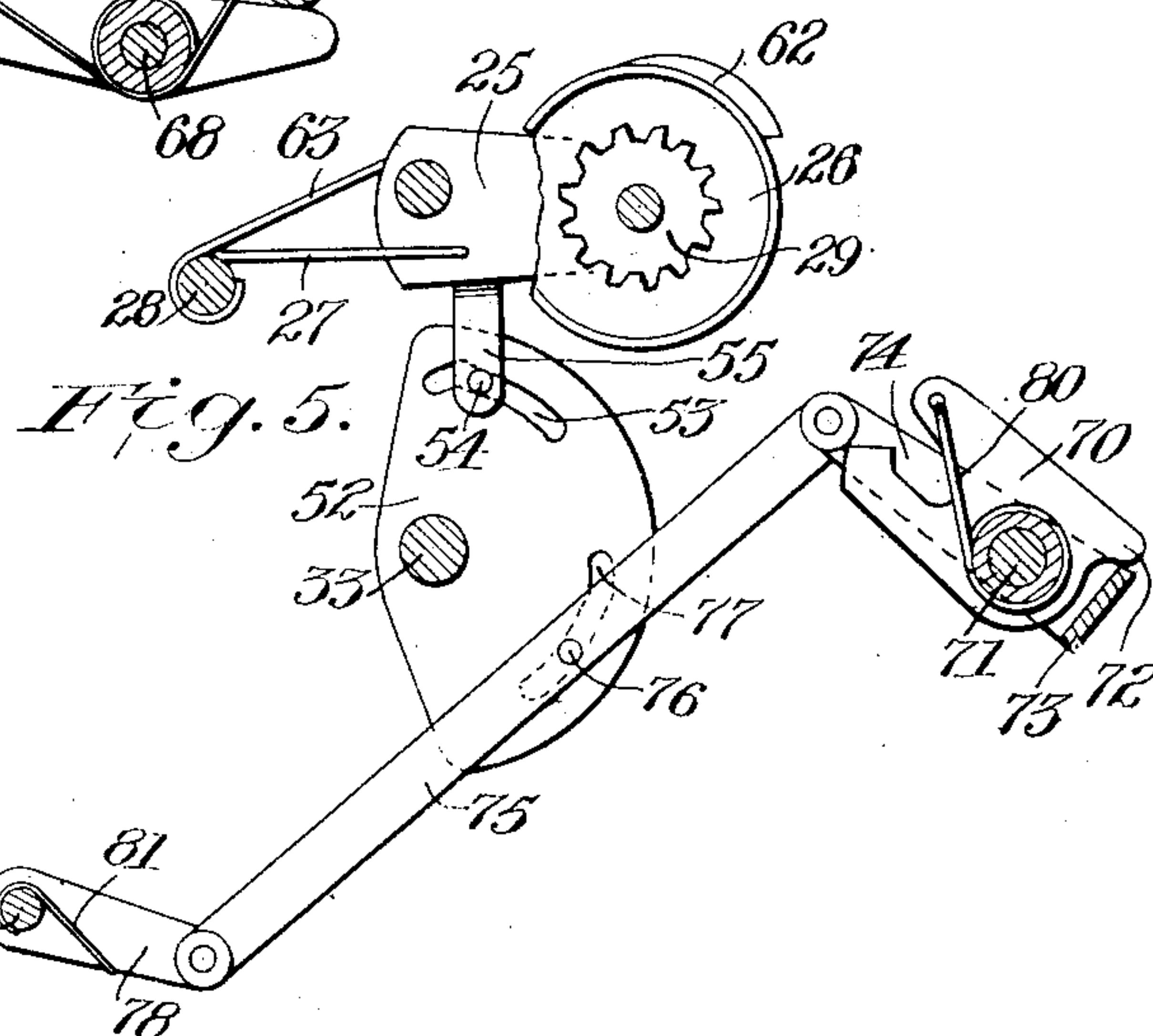
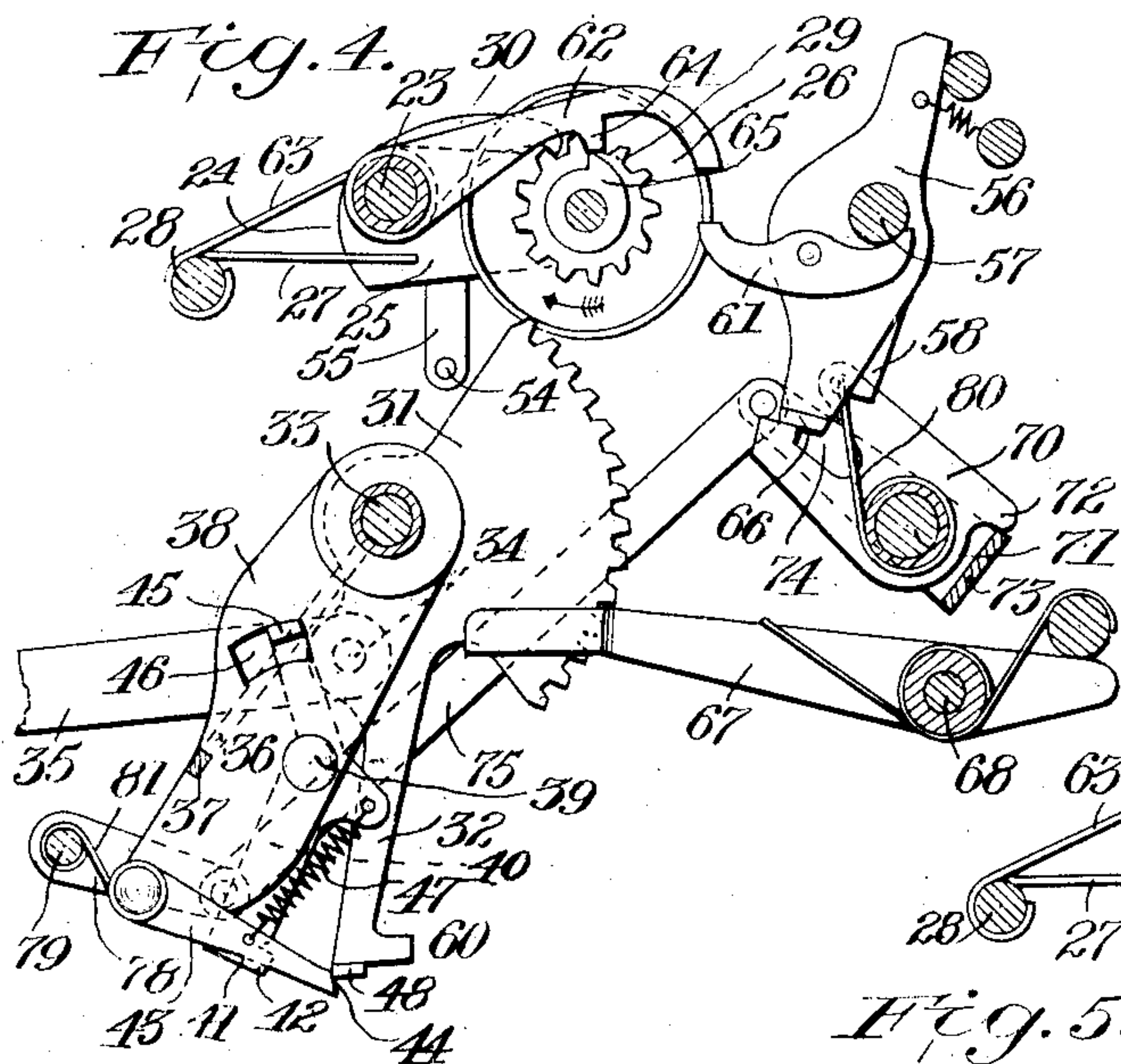
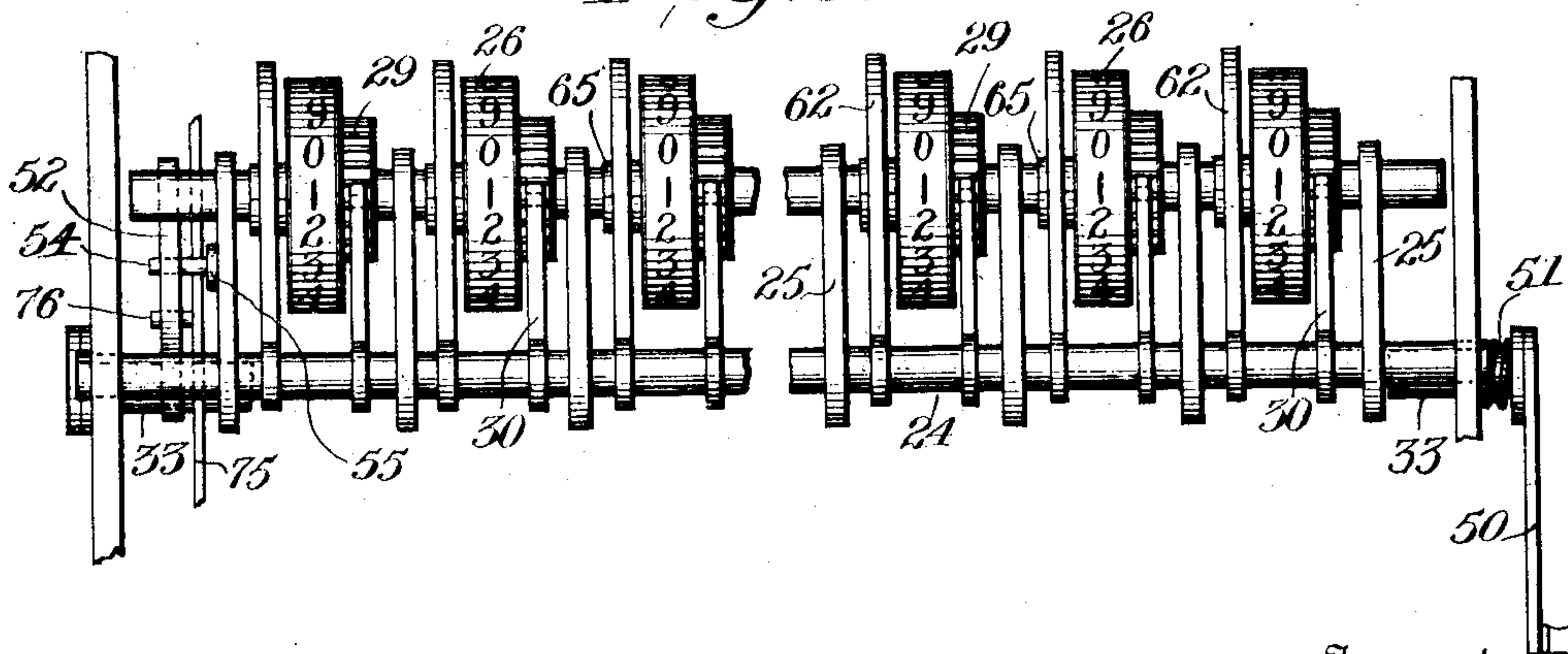


Fig. 6.



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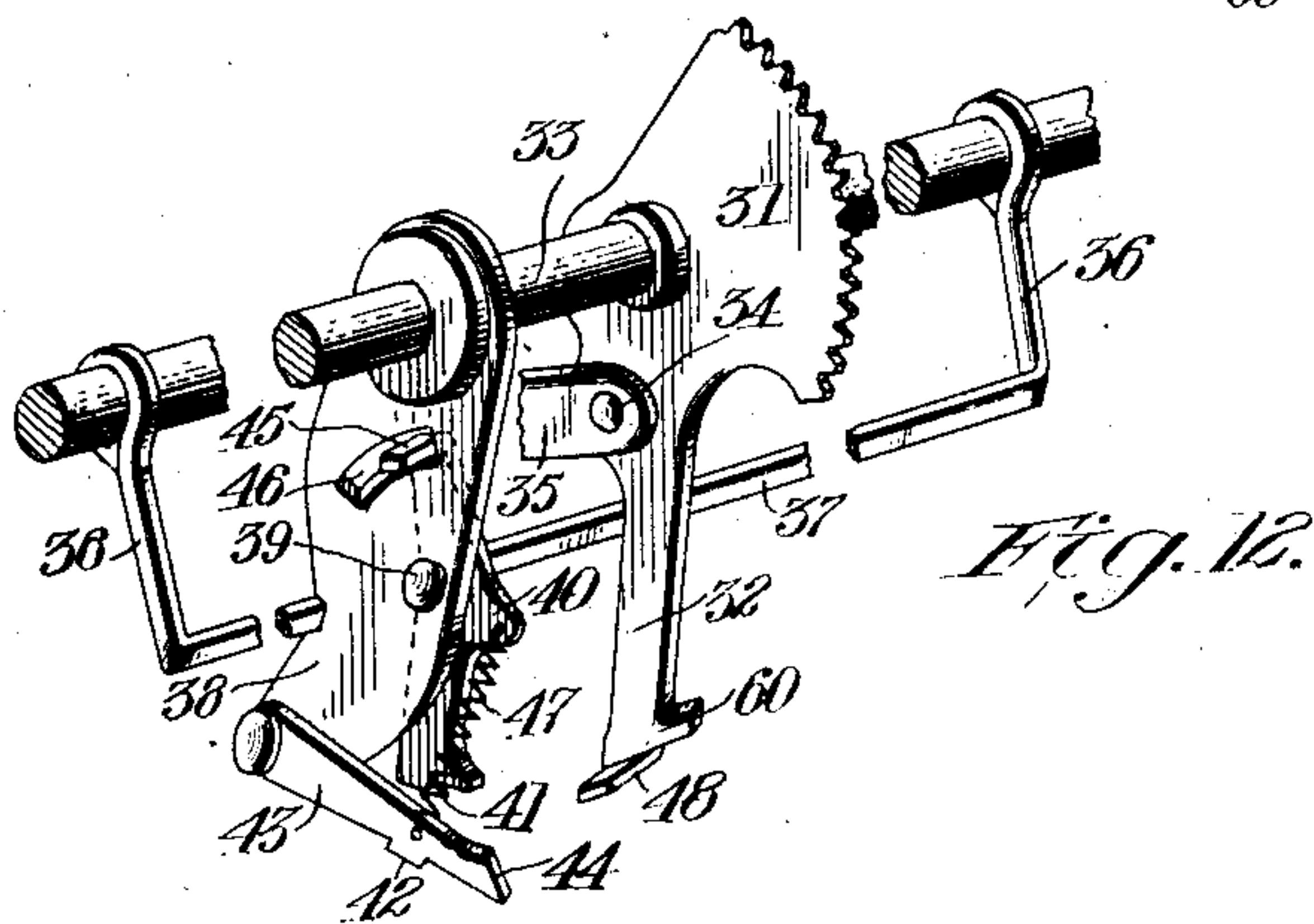
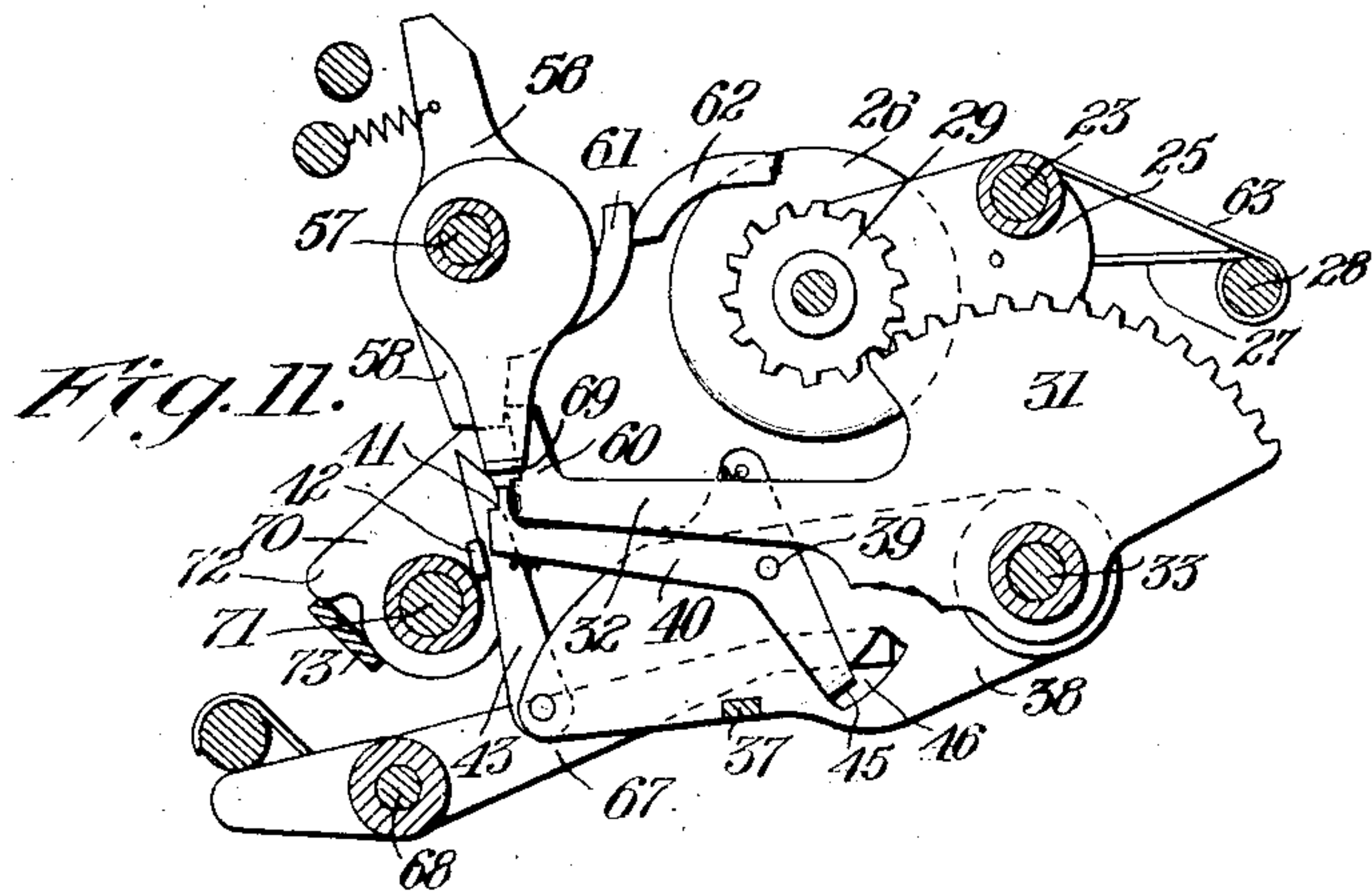
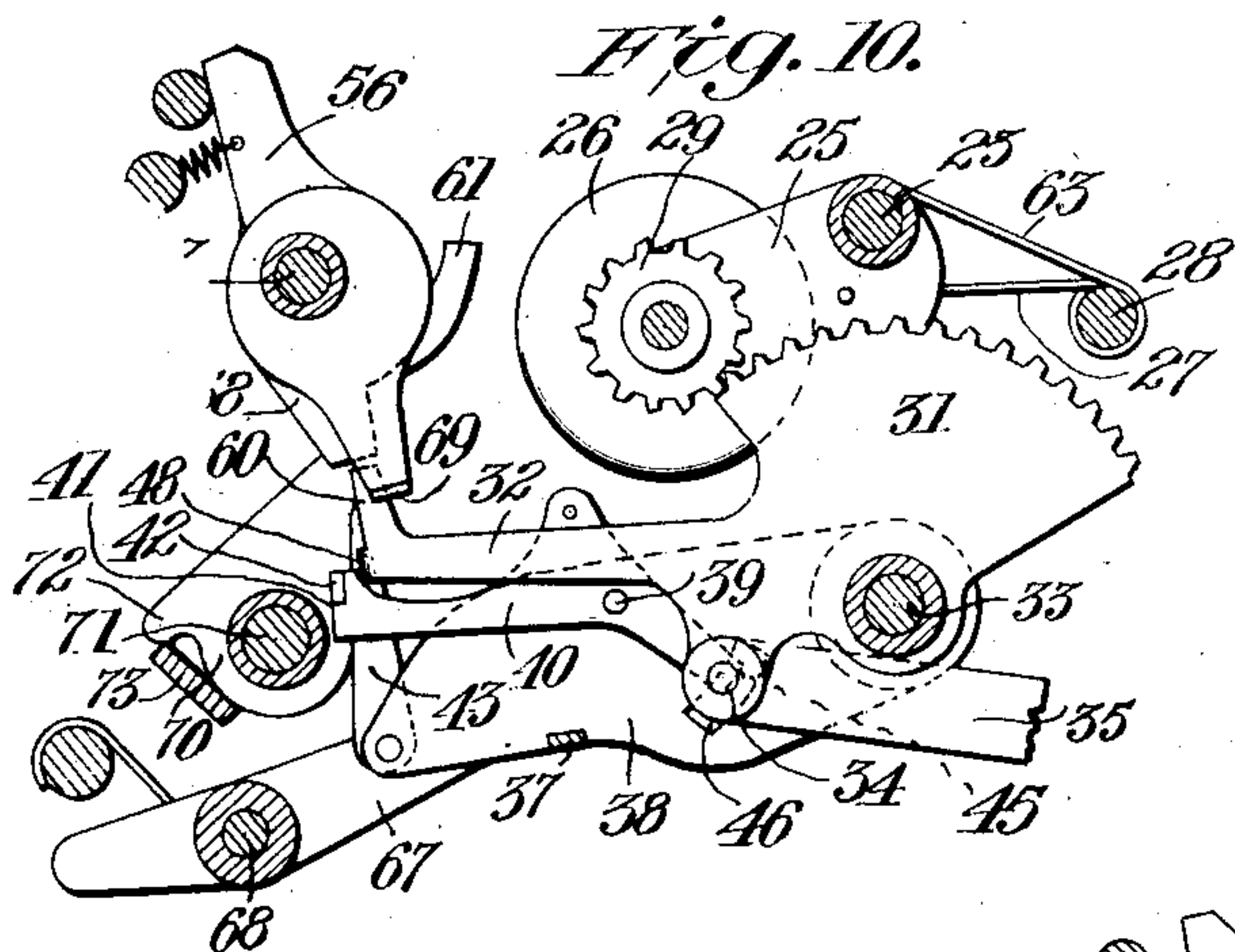
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 3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

WILLIAM P. QUENTELL, OF STAMFORD, AND FRANKLIN JUDGE, OF NORWALK,  
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## CALCULATING-MACHINE.

945,601.

Specification of Letters Patent.

Patented Jan. 4, 1910.

Application filed May 13, 1909. Serial No. 495,809.

*To all whom it may concern:*

Be it known that we, WILLIAM P. QUENTELL and FRANKLIN JUDGE, both citizens of the United States, residing at Stamford and Norwalk, respectively, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Calculating-Machines, of which the following is a specification.

Our invention relates to calculating machines and its object is to generally improve the construction of a machine of this class.

Our invention is illustrated in the accompanying drawings in which;

Figure 1 is a longitudinal sectional view showing a part of our improvement; Fig. 2, a detail perspective of key and setting mechanism slide bar; Fig. 3 is a cross-section through slide bar and key supporting bar; Fig. 4, a detail side view, partly in section, showing the number wheel actuating means and carrying mechanism; Fig. 5, a detail side view showing the movable frame for carrying the number wheels and means for actuating said frame; Fig. 6, a detail plan view of the number wheels and their movable frame; and Fig. 7, a detail elevation of driving arm, from opposite side to that shown in Figs. 1 and 4; and Figs. 8 and 9, detail views of the bell crank for the carrying mechanism. Fig. 10, a side view looking in the opposite direction from Fig. 4 and showing the parts in actuated registering position; Fig. 11, a view similar to Fig. 10 showing the parts in carrying position, and Fig. 12, a perspective view showing the main shaft and bail member for the driving arms broken and a driving arm and gear segment member spaced apart on the shaft.

Referring to the drawings, 1 is a supporting bar on which the keys 2, provided with stems 3, are mounted so as to move vertically, said stems being supported and guided by studs 4 and the key being held normally in uppermost position by a spring 5. Each key has its lower portion extended between two offset portions 6 formed in and extending from the bar 1, so that said offset portions extend into line with and serve as guides for the key stems.

The key is adapted, when actuated, to contact with an angled slide bar 7 extending longitudinally of the machine and connected

with a number wheel setting mechanism; a slide bar is provided for each longitudinal column of keys and each number wheel. This slide bar is provided with two faces 8 and 9 at an angle to one another, the face 8 being held tilted upward slightly from a horizontal plane and the bar held in position toward the back of the machine by the engagement of a slot 10 in said slide bar, with a detent 11 projecting from the key supporting bar 1. When a key is depressed its lower portion will be projected through a longitudinal slot 12 formed in the face 8 of the slide bar and a projection 13 extending horizontally from the key stem will strike the edge of the bar, causing the face 8 to be depressed so as to thereby turn the slide bar on its pivot extension 14 at each end of said bar, releasing the slide bar from the detent 11 and permitting a spring 15, connected to the front end of the slide bar, to retract the slide bar and thus set the number wheel setting mechanism so as to turn the number wheel to the proper number indicated by the depressed key. As the slide bar is retracted, the end of the slot 12 will strike against the stop portion formed by the recess 16 of the key stem, a projecting lip 17 at the edge of the slot, providing an abutment that prevents the sharp contact between the edge of the slide bar and the thin metal of the key which would otherwise be produced. A slot 12 is provided for each key, these slots being of such length and so positioned relatively to the keys that the depression of the respective keys in the same longitudinal column will cause the slide bar to be retracted different distances for the purpose of enabling the setting mechanism to be retracted the proper setting distances corresponding to said keys.

Each key is provided with a heel 18 for the purpose of preventing more than one key being depressed and kept in depressed position in the same column at the same time, which is effected by the contact of the heel against the slide bar at the end of the slot 12, if another key has been previously depressed and the slide bar retracted. In addition to the stop means provided by the heel 18 we provide additional locking means for the undepressed keys comprising a small cam 19 projecting from the side of each key and adapted to contact with a projection 20



carried by a longitudinally shiftable bar 21 mounted on the key supporting bar 1. The bar 21, when moved toward the front of the machine, by the depression of a key through the contact of the key cam and the projection 20, carries the projections 20, corresponding to the undepressed keys, under the lugs 22 projecting from the sides of the keys, thus positively locking all the remaining keys against depression.

Pivotaly mounted at 23 in the frame of the machine, is the tilting frame 24 provided with forwardly projecting wheel carrying and spacing plates 25, which plates are adapted to receive the shaft or shafts on which the number wheels 26 are rotatably mounted. Springs 27 connected to shaft 23 and bearing against a fixed shaft 28 are adapted to hold the swinging or tilting frame normally in raised position. Each number wheel is provided with a pinion 29, which pinions are normally held from movement by pawls 30 mounted on the shaft 23. Adapted to respectively engage each of the pinions of the number wheels is a gear segment 31 carried by an oscillatory arm 32 mounted on the main operating shaft 33. This gear segment and its arm constitute the setting mechanism for the number wheel. Each arm 32 is pivotaly connected at 34 to a link 35 which is pivoted at its front end to the key operated slide bar 7, whereby the gear segment is positioned by the movement of the key in order to turn the number wheel to the numeral corresponding to the depressed key.

Fixed on the main shaft 33 are depending arms 36 carrying at their ends a universal bail 37 extending across the machine and adapted to engage a series of driving arms 38. One driving arm is provided for each gear segment arm. Each driving arm is provided at 39 with a rocker 40 pivoted thereon and held in engagement with a pivoted trigger 43. The rocker member 40 has a shoulder 41 against which bears a lug 42 of the trigger 43. The trigger is pivoted on the driving arm and has a pointed or beveled end 44. On the rocker 40 is a tooth 45 extending through an elongated arc-shaped slot 46 in the driving arm, whereby the rocker is permitted a limited range of movement with respect to the driving arm. The coil spring 47 joins the trigger and an arm of the rocker and normally holds these parts in engagement keeping the trigger down against the shoulder 41 of the rocker and the shoulder behind the lug of the trigger. The rocker is adapted to contact with a lug 48 projecting from the gear arm 32, so as to carry the latter arm forward when the driving arm is oscillated by the movement of the main shaft.

On one end of the main shaft outside of the frame, is an operating lever 50 provided

with a handle and pressed against by a return spring 51 which serves to return the lever to its normal upright position after it has been operated by hand. By pressing the lever downward, the driving arms, gear segments and number wheels are actuated to register by these number wheels, the numbers on the keys previously depressed.

When the machine is at normal position with the operating lever in raised position, the frame 24 is in raised position so as to hold the pinions 29 out of engagement with the gear segments 31. When the operating lever is depressed to effect the registering movement after the setting of the gear segment by the keys, the frame is depressed so as to carry the pinions into engagement with the gear segments. This action is effected by a cam slot plate 52 carried by the main shaft 33 at one end thereof, and provided with a cam slot 53 with which is adapted to engage a pin 54 on a lug 55 projecting from one of the plates 25 of the frame 24, whereby as the operating lever starts downward, rotating the shaft 33 in a working direction, the said slot will draw the frame 24 downward and move the pinions into engagement with the gear segments 31. In the continued rotation of the main shaft the driving arms 38 will pick up and carry forward any of the gear segment arms that have been positioned by the depression of their respective keys. The gear segments will thereupon rotate the pinions so as to turn the number wheels to indicate the proper registration.

To prevent the momentum imparted to the gear segment carrying arm by the driving arm from carrying the former too far and thus turning an extra tooth and to also provide means for controlling the carrying of the numerals to be added from one decimal place to the next higher decimal place, a controlling member 56, consisting preferably of a bell crank member, is provided, which member is mounted so as to oscillate on a fixed shaft 57, one of such members being provided for each gear segment. This member has a stop arm 58 projecting from an inner circular member 59 carried by the hub of the bell crank member. The arm 58 is adapted to normally extend into the path of the projecting end 60 of the gear segment arm 32. The end of the gear arm is adapted to be stopped by the stop arm but does not abut positively against the same, being separated therefrom by a slight space when the arm is in the thrown position, so as to avoid friction when the gear arm is thrown a tooth farther in the operation of carrying from 9 to 10 from the wheel of the next lower column, as will be described.

To provide means for tilting the bell crank member so as to carry the stop arm thereof out of the path of the gear segment arm and permit the gear to be moved an-



other tooth to effect the carrying operation from the next lower column, a yielding tripping mechanism is provided between the bell crank member and its corresponding number wheel. In the preferred embodiment of this construction, a spring pressed arm or lever 61 is pivotally mounted on the bell crank member with its end projecting into the path of the downwardly projecting end of a lever 62, which is pressed in a downward direction by coil spring 63. The lever 62 has a projection 64 adapted to ride on a cam 65 carried by the number wheel. When the wheel moves from 9 to 0 the spring 63 will throw the lever 62 down as the cam 65 slips past the projection 64. The end of the lever 62 strikes the yielding lever 61 of the bell crank and moves said bell crank so as to carry its stop arm out of the path of the gear segment arm. The end of the lever 62 goes down far enough as it moves the bell crank to the 10 position, to slip off the point of the lever 61. In order to permit the lever 62 to be raised up again as the number wheel, with its cam, moves from the 0 to the higher figures the lever 61 yields as shown in the dotted lines, and when the wheel is at about 7 or 8 the lever 61 slips past the point of the lever 62 to its normal position. The object of this construction is to permit accurate setting of the carrying device and to permit such device to be set to operate very late so as to avoid lost motion.

The bell crank having been set to permit the stop arm 58 to be moved out of the path of the projecting end 60 of the gear arm 32, the carrying movement is then effected by the point of the trigger 43 striking against the edge of a trip arm 66 on the bell crank member, which arm 66 has been moved by the oscillation of the bell crank by the wheel of the next lower column into the path of the trigger. As the point of the trigger strikes the trip arm the rocker 40, on the driving arm, will be released from engagement with the trigger. A spring pressed rocking lever 67 mounted on a shaft 68, projects into the path of the tooth 45 of the rocker and is pressed by said tooth at each movement of the driving arm and upon the release of the rocker from the trigger this lever 67 throws the rocker against the gear carrying arm 32 and the gear thus impelled turns the pinion a tooth and the number wheel to the next higher number. As the bell crank is shifted to its carrying position a hook 69 thereon engages and is held by a spring pressed latch 70 mounted freely on a shaft 71 and having a tail piece 72. This latch serves to hold the bell crank in proper position during the carrying operation. A bail 73 extends across and under all the tail pieces and is pivoted on the shaft 71 and is provided with an arm

74 pivotally joined to a link 75. The link 75 has a pin 76 which engages a cam slot 77 in the plate 52 carried by the main shaft and rocked thereby, by which connection the bail is adapted to release the latch from the bell crank hook. A guide link 78 is pivoted to the end of the link 75 and is pivotally mounted on a shaft 79. Springs 80 serve to normally press the latches toward the hooks of the bell crank members and to counterbalance the action of the springs so that less force will be exerted against the actuating movement of the operating lever a balance spring 81 is mounted on the shaft 79 and adapted to bear against the guide link 78, so that the force of one set of springs will be exerted against the force of the other.

When it is desired to repeat the numbers indicated by the depressed keys in different columns as, for instance, in multiplication, the shiftable longitudinal bar 21 is adapted to be held retracted toward the front of the machine by means of a small hand lever 82 secured at the end of a rocking shaft 83 which is pivoted in the frame and carries arms 84 adapted to be projected against a rod 85 attached to the bars 21, whereby as the hand lever is pulled back the bars 21 will be held retracted with the projections 20, corresponding to the depressed keys, above the lugs 22 thus holding such keys down while the operating shaft is operated any desired number of times in order to repeat the amounts registered.

The general operation of the device is as follows:—When a key is depressed the lower end thereof passes through its corresponding stop 12 in the angled slide bar 7, the heel of the key striking against the tilted face of the slide bar and causing the bar to swivel at its ends, whereupon the bar will be released from its detent and carried toward the front of the machine by its actuating spring. The end of the slot in the slide bar strikes against the key and thus stops the slide bar at a point that determines the movement of the setting mechanism according to the number of the key depressed. As the slide bar is drawn toward the front of the machine it will carry back with it the link 35 which will thereby oscillate the gear carrying arm 32, thus positioning the gear segment at the proper point to turn the number wheel pinion the proper number of teeth. The operating handle is then depressed, which will turn the main shaft, and by means of the cam slot plate 52 move down the frame 24 so as to carry the pinions of the number wheels into mesh with the gear segments. The further movement of the main shaft oscillates the driving arms 38 which are carried forward into contact with the gear carrying arm, the rockers of said driving arms contacting with the lugs of



the gear arms and thus turning the gears, pinions and number wheels until the operating lever reaches a stop at the end of its working stroke, and the forward ends of the gear arms being limited against undue momentum movement by the respective stop arms of the bell crank members. When the carrying operation is to be effected from one column to the next higher column, the wheel operated lever corresponding to the number wheel of the lower column will by means of the yielding tripping mechanism, trip its corresponding bell crank so as to carry the stop arm on said bell crank, which projects into line with the gear carrying arm, out of line with the said arm of the next higher column and so as to carry the trip arm on the bell crank into line with the trigger of the arm of said next higher column, thus releasing the rocker on the driving arm and permitting said rocker to throw the gear arm and its gear, forward one tooth so as to carry the addition from the lower column to the next higher column. Upon the return movement of the operating lever, the latches which have engaged the bell crank will be released by the movement of their actuating bail through the cam slot plate, permitting the bell cranks to return to normal position, through the action of the springs.

It is obvious that in regard to the yielding connection or contact between the bell crank and the carrying lever operated by the number wheel, the number wheel lever may itself be provided with a yielding tripping part instead of the bell crank member and also that other changes in the construction of the parts of the device may be made without departing from the principle of our invention.

Having thus described our invention, what we claim is:—

1. In a calculating machine, in combination with a key, a swiveling slide-bar actuated by the key, a number wheel, a swinging frame carrying said number wheel, wheel rotating means, said bar connected to said wheel rotating means and adapted to set the same, an operating lever, means to hold the frame and wheel in normally inoperative position, and means actuated by the operating lever at the beginning of its working stroke to throw the frame and wheel into operative position.

2. In a calculating machine, in combination with a key and a number wheel, a swinging frame on which the wheel is mounted, a pinion carried by the wheel, a gear segment, a swiveling slide-bar connected to said gear segment and actuated by said key, means to hold the frame in one position to keep the pinion and gear inoperative during the setting movement of the gear, and an operating lever adapted to move the frame and carry the pinion and

gear into engagement at the beginning of the working stroke of the lever.

3. In a calculating machine, in combination with a series of number wheels, driving means for said wheels, movable stop members for determining the extent of movement of the wheel driving means, means for moving the stop members to permit the wheel driving means to make an extra movement to carry the decimal from the lower to the higher wheel, means carried by the number wheel for actuating said stop member moving means and yielding contact means between the stop members and the stop member moving means.

4. In a calculating machine, in combination with a series of number wheels, driving means for said wheels, stop members for controlling the carrying operation from one column to the higher column, a lever, a cam intermediate the wheel and lever for controlling the movement of the lever by the rotation of the wheel, and a member intermediate the stop member and the lever and adapted to establish operative connection between the lever and stop member whereby the latter is moved to permit the carrying operation to be effected, said member being yieldable in one direction whereby the lever and stop member are free to pass one another upon their return to normal position.

5. In a calculating machine, in combination with a series of keys, a series of number wheels, driving means for said wheels, movable stop members for said driving means, cams carried by said wheels, spring pressed levers controlled by said cams, spring pressed levers with which the first levers are adapted to contact, said second levers mounted on the stop members and held fixed against movement in one direction and yieldingly in the other direction.

6. In a calculating machine, in combination with a series of number wheels, driving means for said number wheels, movable bell crank stop members having a stop to limit the movement of the driving means of the wheel of one column and having a trip to cause the driving means of the wheel of the next higher column to make an extra movement to effect the carrying operation, a spring pressed lever carried by said bell crank member and fixed against movement thereon in one direction, and a spring pressed lever adapted to contact with the bell crank lever and controlled by the number wheel.

In testimony whereof we affix our signatures, in presence of two witnesses.

WILLIAM P. QUENTELL.  
FRANKLIN JUDGE.

Witnesses:

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