

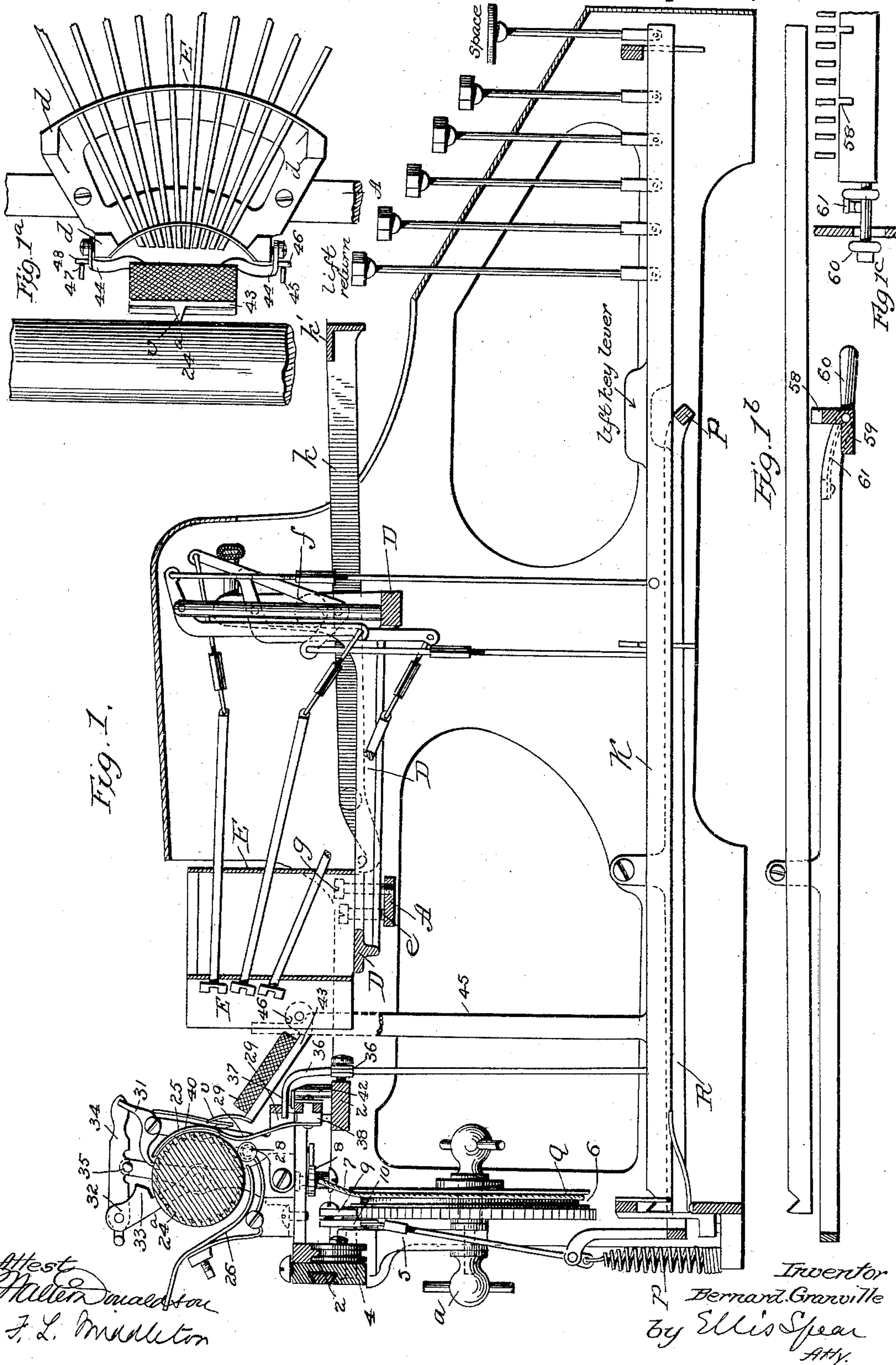
(No Model.)

3 Sheets—Sheet 1.

B. GRANVILLE.  
TYPE WRITING MACHINE.

No. 482,521.

Patented Sept. 13, 1892.



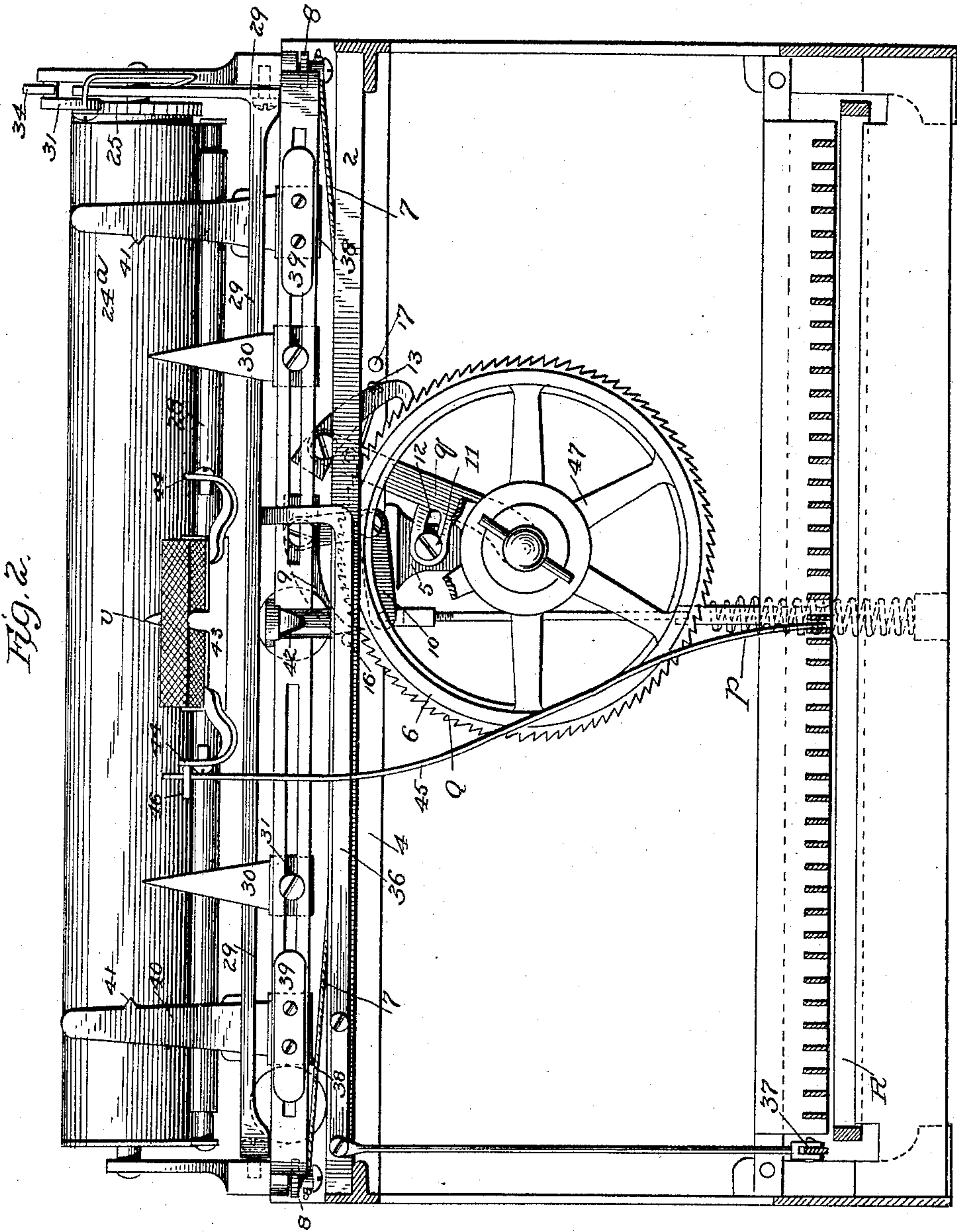
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Attest  
Halter Malden  
J. L. Middleton

Inventor  
Bernard Granville  
by Ellis Spear  
Atty.



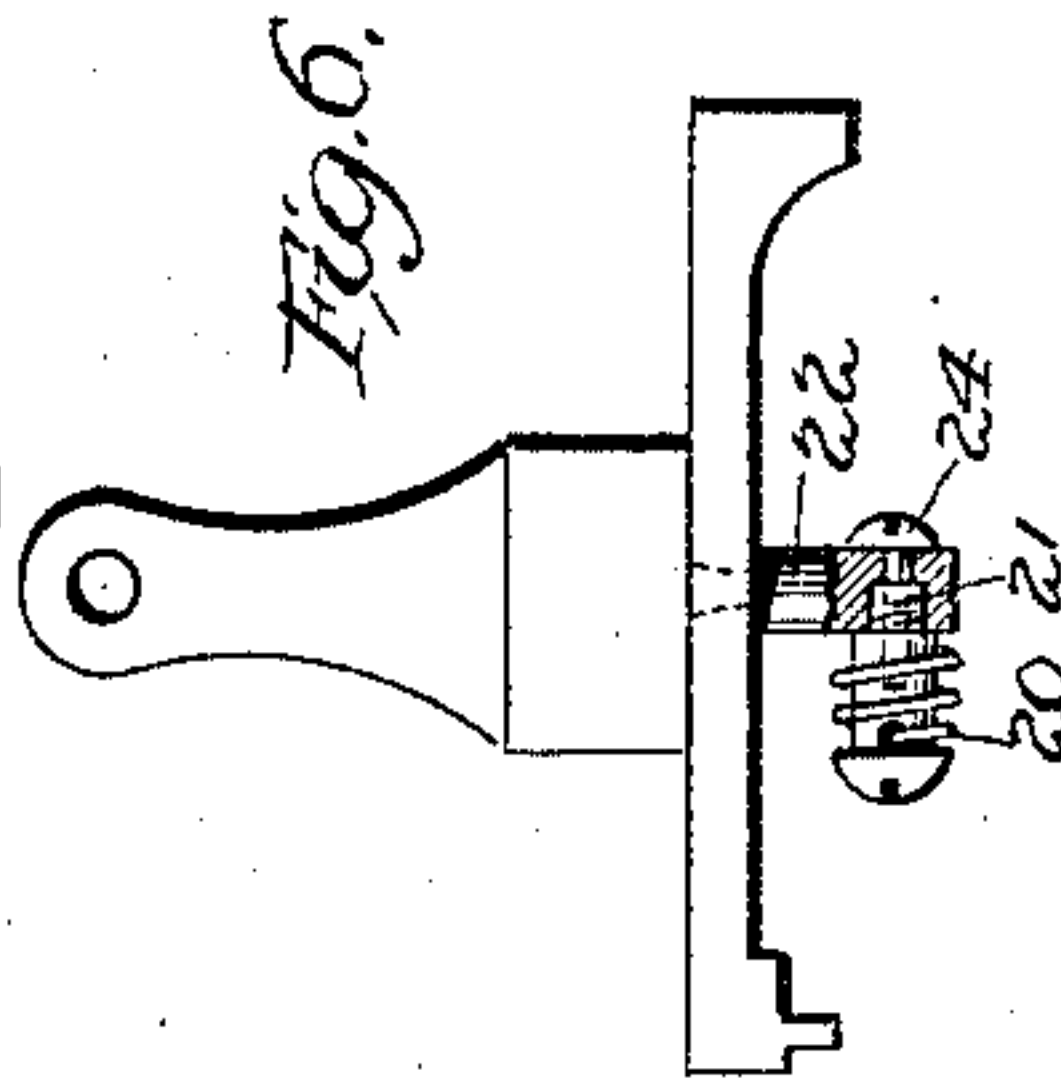
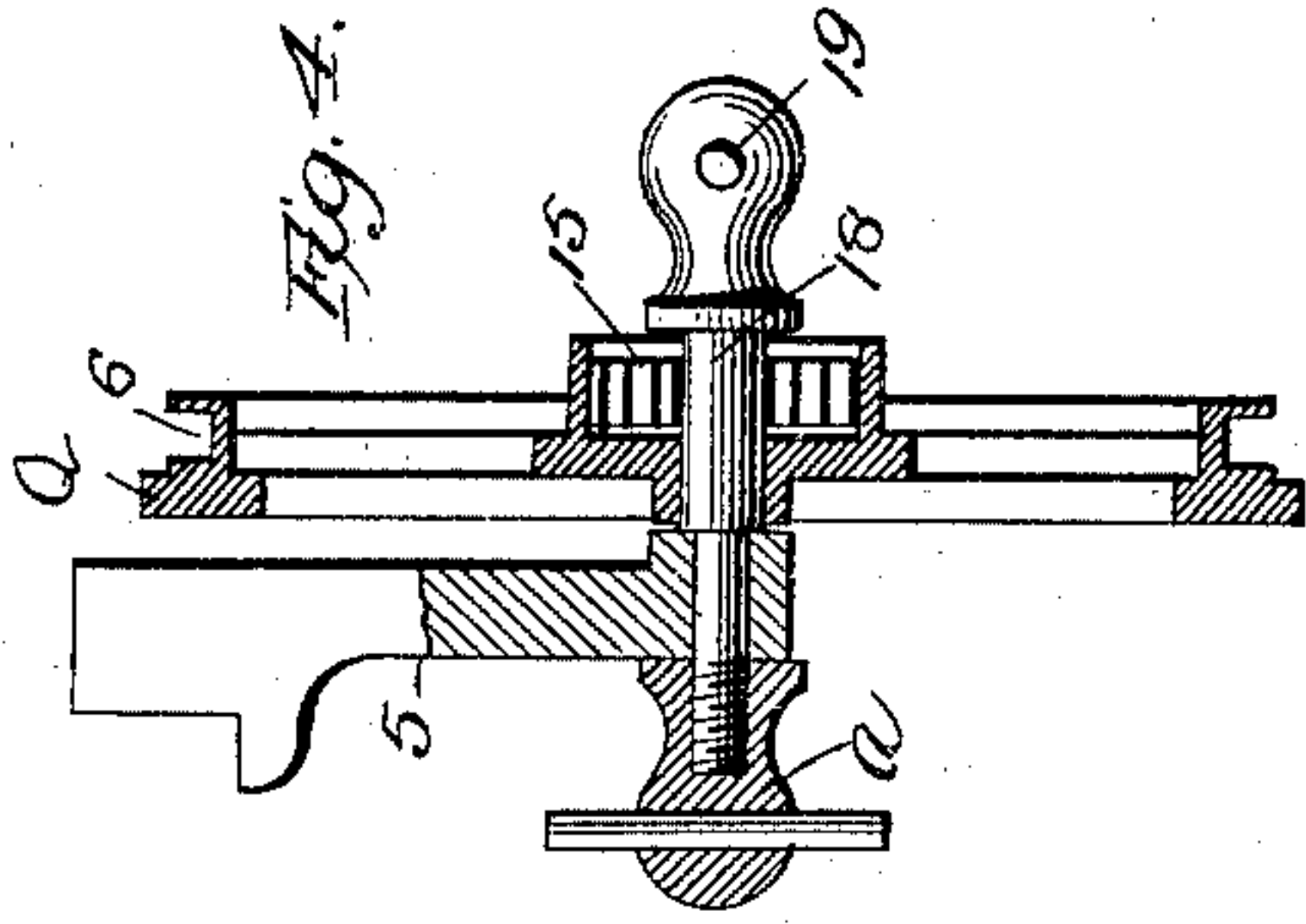
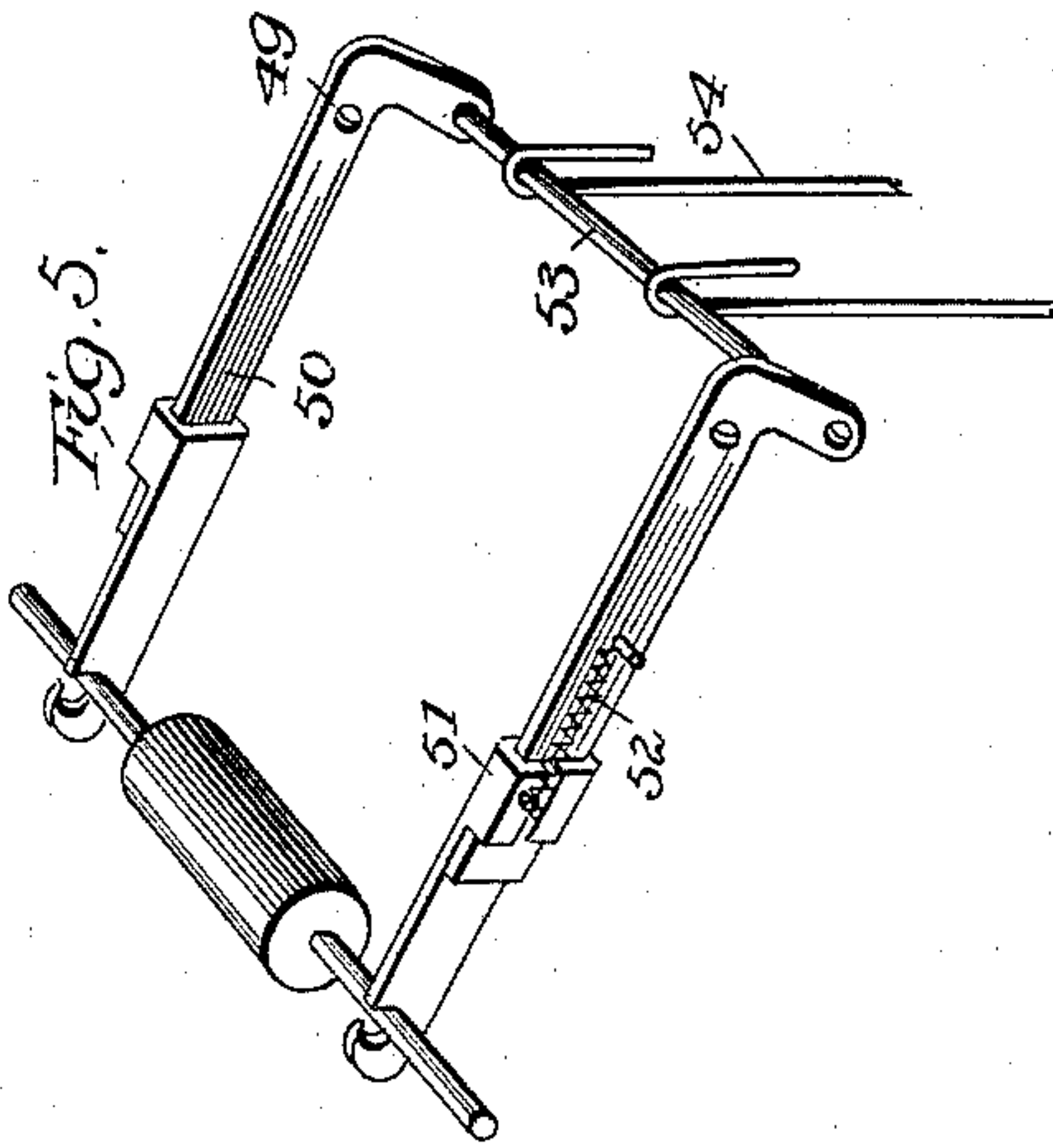
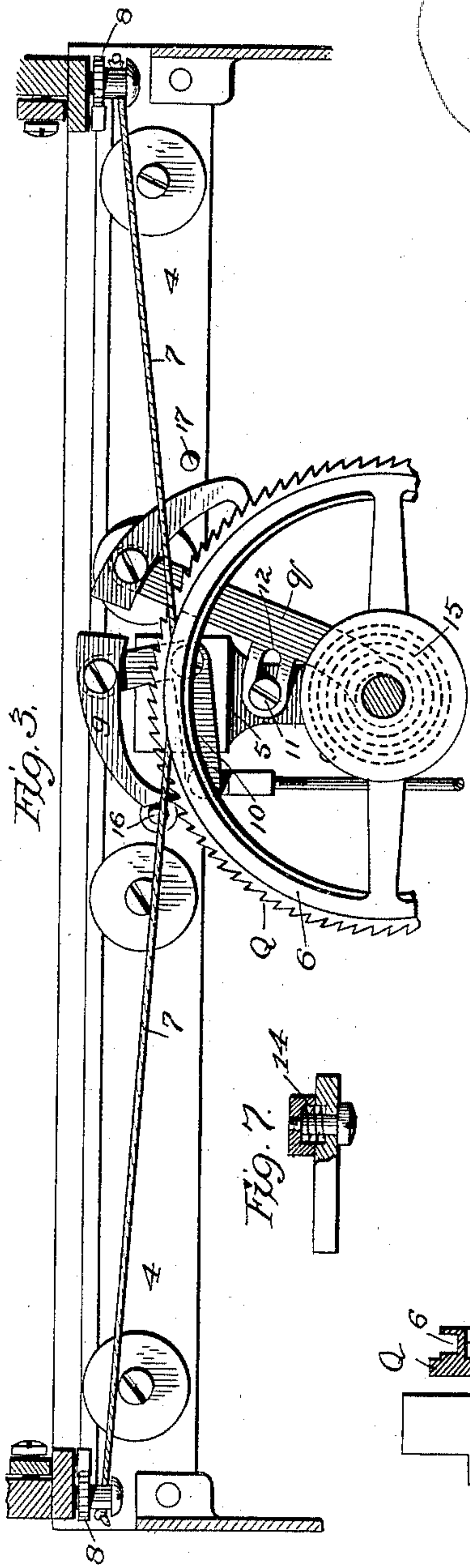
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B. GRANVILLE.  
TYPE WRITING MACHINE.

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# UNITED STATES PATENT OFFICE.

BERNARD GRANVILLE, OF DAYTON, OHIO.

## TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 482,521, dated September 13, 1892.

Application filed May 2, 1891. Serial No. 391,363. (No model.)

*To all whom it may concern:*

Be it known that I, BERNARD GRANVILLE, a citizen of the United States of America, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My invention includes a novel form of operating mechanism for the carriage, combined with means for controlling the movements of the carriage from the keyboard. It includes, also, inking mechanism in which the ordinary inking-ribbon is dispensed with and the type print directly upon the paper. It further includes variable-spacing mechanism to suit different widths of letters. The details of construction also form a part of my invention.

My said invention is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section through the machine, with parts in elevation. Fig. 1<sup>a</sup> is a detail view of the type-bars and the inking-pad. Figs. 1<sup>b</sup> and 1<sup>c</sup> are details of a preferred form of spacing-frame. Fig. 2 is a front view of the carriage and the escapement mechanism. Fig. 3 is a detail view of the escapement mechanism. Fig. 4 is a detail sectional view of the escapement-wheel and its pivot with the driving-spring. Fig. 5 is a modification of the inking mechanism, and Figs. 6 and 7 are views of details.

The general organization of the machine is the same as that shown in Letters Patent of the United States granted to me on the 1st day of May, 1889, No. 382,036. In machines of this class, in which the type are carried on the ends of converging bars, which reciprocate longitudinally to a common printing-point, it is necessary to support the bars in a movable frame in order to permit the use of upper and lower case type, and this feature is embodied in the present case, being similar to that shown and claimed in an application of even date herewith, Serial No. 391,846.

In the drawings accompanying this, A represents a lug, which is fixed to the frame of the machine on each side. On these lugs rests the frame which supports the plates in which the type-bars slide. This frame D, which carries the type-bars, is pivoted at *f* to the machine-frame about midway between the

upper and lower banks of type-bars. In this frame there are four posts *d*, Fig. 1<sup>a</sup>, on which are segmental plates E, and in these plates are the bearings of the type-bars. The plates are formed on concentric circles, and the bars are arranged in their bearings in the plate to converge to a common printing-point, which is the center of the circles.

Bearing on the lug A is an adjusting-screw *e* of the frame D, which limits the downward movement of the frame, and when the frame is down the upper range of type is in line with the printing-line of the cylinder which carries the paper. The upward movement of the frame D on its pivot *f* is limited by an adjusting-screw *g*, which passes loosely through a hole in the bottom of the frame D and is threaded into the lug A, and when the frame is up and bearing on the head of this screw the lower range of type is in line with the printing-line on the cylinder. The frame is held normally down by a spring or by its own gravity. The frame is tilted to its raised position by means of a lever *k*, which has a finger key or bar *k'*, suitably arranged on the keyboard. As the printing-point is at some distance to the rear of the pivotal point of the frame, only slight movement of the frame is necessary. The position of the pivot *f* is such that the movement of the type vertically is evenly distributed. It will be understood that in order to print the lower set of characters on the bars the key must be depressed before the time in which the key is struck for the particular character required.

The paper-carriage is mounted upon ways 2 3 and moves freely thereon without any rack-bars.

Midway upon the frame of the machine, upon a bracket 5, fixed to the back bar 4, is a wheel Q, which has ratchet-teeth on its periphery and a pulley-groove 6 by the side of the ratchet-teeth. The carriage is connected to this pulley-groove by a cord 7, attached at each end and stretched to a point of connection in the groove. The cord at one end may be taken up by means of a small pawl-and-ratchet connection 8, to which it is attached at one end of the carriage. A push-pawl 9 is mounted on a bell-crank lever 10, which is pivoted on the bracket which supports the wheel. The push-pawl is on the upper end



of the lever, and the lower end is connected with the frame R, which carries a cross-bar P under the keys, so that the frame is raised and the push-pawl is carried back one step on the depression of any one of the keys to advance a key-lever or by the depression of the space-key in the manner well known in type-writing machines. The advance of the push-pawl is caused by a spring *p*, which draws down the frame after each elevation thereof. The retaining-pawl is pivoted upon a segment *q*, which is pivoted upon the axis of the wheel, and is adjustable by means of a screw 11, working in a slot 12 on the segment. The holding-pawl is reversed and has a hooked end, and by means of the movable or adjustable segment the holding-pawl can be brought up snug to the tooth while the push-pawl is engaged. This gives accuracy of feeding and at the same time gives perfect adjustment, so that there is no lost motion. The pawls may be held down by springs 13, bearing directly upon them, or by small coiled springs 14 about their pivots, as shown in Fig. 7.

The frame which operates the pawl to push the wheel forward is operated by all the keys, excepting the "lift-key," which shifts the paper from line to line, the forward part of the frame lying under these levers. The movement permitted by all the keys, excepting the return-key, is just sufficient to move the push-pawl back far enough to cover a single tooth. The lever of the return-key, however, is formed underneath, so as to permit a farther downward movement and to push the forward part of the frame farther down and beyond the limit of the other keys. This carries the push-pawl a greater distance than it is carried by the other keys, so that its rear end comes in contact with the rear end of the holding-pawl, which stands in a reversed direction. The rear ends of the pawls are so constructed that the push-pawl strikes the holding-pawl below its pivoting-point, and this throws upward the end of the pawl out of engagement with the ratchet-wheel and frees the ratchet-wheel, so that the wheel and the carriage connected therewith are entirely loose from restraint. Within the hub of the wheel is a light coiled spring 15, one end of which is attached to the hub of the wheel and the other to the fixed pivot, so that as the wheel is turned by the push-pawl the spring is wound upon the pivot and put under increased tension as the carriage advances from right to left. When, therefore, the pawls are both withdrawn from engagement with the wheel in the manner heretofore described, the reaction of the spring 15 returns the carriage from left to right and puts it in position to begin another line. A stop 16 on the back bar limits the forward movement of the push-pawl and the rear of the holding-pawl limits its backward movement. Another pin 17, set in the back bar, projects over the holding-

pawl to prevent it from flying up too far in rapid working of the machine.

The parts being constructed and arranged as above described, the carriage is held under control of the key marked "Return," and by varied manipulation of this key the carriage may be moved forward step by step by a light touch or partial depression of the said key, the depression being just sufficient to move back the push-pawl over one tooth of the ratchet-wheel; but by holding down the return-key to the extreme limit of its movement, which carries back the push-pawl and releases at the same time the holding-pawl, the spring in the hub is permitted to move the carriage back again to its extreme right-hand limit. Further, by holding down the return-key very near its lower limit and until the rear of the push-pawl almost touches the rear end of the holding-pawl and while holding the key in this depressed position giving it a further quick push the holding-pawl may be released long enough to allow one tooth to escape, or more, if desired, according to the quickness of the push, and in this way the same mechanism which acts to push the carriage step by step from right to left may be used to permit a similar step-by-step movement from left to right, and thus by a single key the carriage is under complete control and the operator may move it or permit it to move a single step either way in order to bring any point on the carriage to the printing-point of the type, or he may allow the carriage to go back to begin a new line at one movement.

I have described the stud or pin on which the ratchet-pin is pivoted and to which the spring is connected only in general terms. For convenience of adjustment I have shown a particular construction of an adjustable pin for pivoting the wheel. The inner part (marked 18) is that to which the spring is attached and has a handle 19, by means of which it may be turned. It extends through to the rear of the bracket, on which it is supported, and on its inner end is provided with a threaded stem. The outer part is practically a nut *a*, which has a handle by which it may be turned. When the nut is loosened, the inner part may be turned to increase or decrease the tension of the spring, and when the tension of the spring is properly adjusted the nut may be turned up to hold it in place.

Instead of the stud having a ratchet and pawl for putting the proper tension on the cord I may use the device shown in Fig. 6. This consists of a stud 20, having a reduced shank 21, turning in the bearing 22, fixed to the end of the frame of the carriage. The stem is shorter than its bearing and is jammed by a nut 24 to hold the stud in any position. By loosening the screw the nut may be turned. The cord is attached to it, and when the stud is turned the cord is wound thereon and tightened. The cylinder 24<sup>a</sup> is mounted upon a



standard on the carriage and has a ratchet-wheel on the right-hand end, (marked 25.) A scroll or paper guide 26 extends outward to the rear, and at its front edge, under the carriage, there is a small roller 28, bearing against the larger roller. A rocking frame 29 is pivoted upon the carriage and extends horizontally on the front of it over the front bar of the carriage. It carries at the right-hand end a vertical arm, on the upper end of which is a spring-pawl 31, engaging with the ratchet-wheel on the roller. An arm 32, pivoted on the axis of the roller, carries a stop 33, against which the forward end of the pawl strikes. The arm has a latch 34, which has several notches by which it may be held upon a pin 35 in the upper end of the standard. When it is set in any one of these, the stop is held in front of the pawl and limits its movement. In this way the spacing is varied. The spacing-frame is operated by a lift-key, which connects with a lift-lever 36, that is arranged to be inactive in respect to the other frames, but lifts the space-frame through the key-lever 37, to which it is connected. The rear end of the lift-lever 36 projects under the spacing-frame 29, so that as the carriage moves the spacing-frame travels on the rear end of this lifting-lever. The front bar of the carriage-frame is slotted, and to it are attached sliding blocks 38, one at each end. They are held by screws, which pass through the slots from the front and with their heads bearing upon springs 39. Upon the blocks are spring-arms 40, which bear against the paper-roller and act as clamps to hold the paper. They are adjustable longitudinally, being held in any position by the springs, and may be set to hold an envelope or a postal-card. Small spurs 41 on the inner edges indicate the printing-line. There is a post 42 set centrally upon the track and in line with these blocks, so that as the carriage moves the post stops the blocks and prevents the type from striking upon the clamping-arms, as this would injure the type. The clamp-arms may be set near the margins of the paper to be printed upon, and the spurs are to conveniently indicate the line of printing and direct the operator in adjusting the paper. The printing is invariably on the line indicated by the spurs, whether the roller turns more or less. The post 42 also serves to confine and guide the paper-carriage. As the roller turns positively by the depression of the lift-key, it may be carefully manipulated by turning very slightly—as, for example, when it is required to make a double under-line. The inking mechanism consists of a movable pad or roller adapted to be brought up over the ends of the type-bars. The pad-frame 43 is provided with arms 44, pivoted to the outside of the rear post of the frame which supports the type-bars. The pad is centrally pivoted upon it, so as to have slight rocking movement to allow it to adjust itself to the end of the type-bars. The pad-frame drops back by gravity when not held under

stress against the type and has a pointer *v*, which indicates the printing-point on the roller. It is so held by means of an arm 45, fixed upon the space-lever and having its upper end bearing against a pin 46 on one of the arms which supports the pad. Whenever, therefore, the spacing-lever is depressed, its rear end is raised and the upper end of the arm is thrown back, and this brings the inking-pad up against the type. The pad is made thick enough to retain the ink a long time, and ordinarily it will give sufficient ink to the type if brought up against them at the end of every word. Another arm 47, Fig. 1<sup>a</sup>, may be used, connected with the "return-key" and bearing against a pin 48 at the other end of the frame, to operate the pad independently when the return-key is worked.

Instead of the pad I may use a roller, as shown in Fig. 5. This roller is supported upon a frame pivoted at 49. Its arms 50 are made extensible, being in two parts connected with clamps 51, the ends being drawn in by springs 52. The journals of the roller bear in notches in the ends of the arms. The journals are long enough to pass the posts. The rear end of the frame has a cross-bar 53, which is connected to the spacing-lever or the lift-lever, either or both, by means of a rod 54, which rod has a long hook on its upper end, which hooks over the bar 53, so that when one is drawn down the other will not be disengaged. When either of these keys is depressed, the inking-roller is moved up over the type and is drawn with sufficient pressure against them by the springs 52.

The general construction of this machine renders variable spacing practicable, and I accomplish this by a special construction of the cross-bar P of the frame which lies under the key-levers. This is shown in the general view of the machine at 56, and the special construction is shown in Figs. 1<sup>b</sup> and 1<sup>c</sup>. In this the bar is pivoted in side pieces. It is formed with two bearing-faces 58 59, a quarter-turn from each other, but of the same height, excepting as hereinafter specified. The face 58 is formed with notches. These notches are adapted to receive the key-lever, which is arranged over them. They are arranged under the levers of the narrow letters, such as "i," "l," &c. A ratchet-wheel is constructed with double the ordinary number of teeth. It will be apparent that when the notched bar is raised that part of it without notches will bear upon the key-levers above it and be moved by them as soon as it comes in contact with them; but the notched parts will be acted upon later, and consequently will not move the frame and the push-pawl so far as the unnotched parts would move them. Therefore, these notches being arranged in the proper relation to the narrow letters, the operation of the keys for those letters will give a varied space in proportion thereof. The pivot of this notched bar extends through the side of the machine and is provided with a lever 60,



by means of which it may be moved to throw either the notched part or the unnotched part into operation. A spring 61 bears on the pivot and holds the bar steadily in position.

5 I employ adjustable pointers 30, Fig. 2, held in the slotted carriage-frame by headed screw 31, and by these I can gage the printing at the bottom of the sheet to correspond with any desired point near the top of the sheet.

10 I claim as my invention—

1. The ratchet-wheel having a retracting-spring, the paper-carriage connected therewith, a frame arranged to be operated by the key-levers and connected with the push-pawl  
15 of the ratchet-wheel, a return-key arranged to act upon the frame, and a retaining-pawl, the parts being combined and arranged to operate substantially as described.

2. In combination, the ratchet-wheel connected to the paper-carriage, a push-pawl engaging said ratchet, a retaining-pawl, and lever mechanism connected to the push-pawl, said pawl being adapted to engage and operate the retaining-pawl when desired, substantially as described.

3. In combination, the ratchet-wheel connected to the paper-carriage, the frame arranged to be operated by the key-levers and connected to the push-pawl of the ratchet-wheel, a return-key arranged to operate upon the frame, and a retaining-pawl reversed to the push-pawl, the pawls having the construction and relative location as described, whereby the push-pawl, acted upon by the extreme  
35 movement of the return-key, raises the retaining-pawl, all substantially as described.

4. In combination with the ratchet-wheel connected to the paper-carriage and the push-pawl connected with the key-levers, the retaining-pawl mounted upon the segment pivoted upon the axis of the wheel and provided with means for adjustment, whereby the pawls may be set to bear snugly against the teeth, substantially as described.

45 5. In combination with the push-pawl mounted upon a bell-crank lever and connected to a frame, with key-levers adapted to operate the frame, the holding-pawl pivoted upon the segment mounted on the axis of the  
50 wheel, having a slot and set-screw for holding it adjustable, the said wheel being connected to the paper-carriage, substantially as described.

6. In combination with the ratchet-wheel  
55 connected to the paper-carriage and with pawls and mechanism for operating the push-pawl, the spring connecting the hub of the

wheel with the stud on which it turns and a nut on the threaded end of the stud, holding it adjustably to the bracket, substantially as  
60 described.

7. In combination with the push-pawl having a square end connected to a frame and letter-keys arranged to retract the pawl a certain distance, a retaining-pawl also having a  
65 square end set in line with the line of movement of the push-pawl and operated thereby, substantially as described.

8. In combination with the paper-carriage, a rocking frame 29, having a vertical arm at  
70 one end, carrying a pawl engaging with the ratchet-wheel on the roller, an arm 32, pivoted on the axis of the roller and carrying a stud, and the latch having notches adapted to engage with the pin, substantially as described.

9. In combination with the type-bars operating substantially in a horizontal plane, an inking-pad pivoted below the line of the type-bars and arranged to swing up into vertical  
80 position and means for operating the said pad extending to the keyboard, substantially as described.

10. In combination with the inking-pad on a pivoted frame, an arm on the spacing-lever  
85 bearing upon one end of the frame and an arm on the return-lever bearing against the other end of the frame, these arms being constructed and arranged to operate independently, substantially as described.

11. In combination, the key-levers, the spacing-frame beneath the same pivotally supported, and variable-spacing means consisting of the bar having a bearing-face provided with notches, said bar being pivoted to and  
95 carried by the pivoted space-frame, substantially as described.

12. In combination with the key-levers and mechanism connected therewith for moving the paper-carriage, a variable-spacing mechanism consisting of a bar on the connecting-frame beneath the key-levers and the mechanism for moving the paper-carriage, the said bar having two bearing-faces, one plain and the other provided with notches, and a lever  
105 for turning said bar, substantially as described.

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

BERNARD GRANVILLE.

Witnesses:

HENRY E. COOPER,  
F. L. MIDDLETON.