

(No Model.)

8 Sheets—Sheet 1.

E. L. CRAIGMILES.  
STENOGRAPHIC TYPE WRITING MACHINE.

No. 496,297.

Patented Apr. 25, 1893.

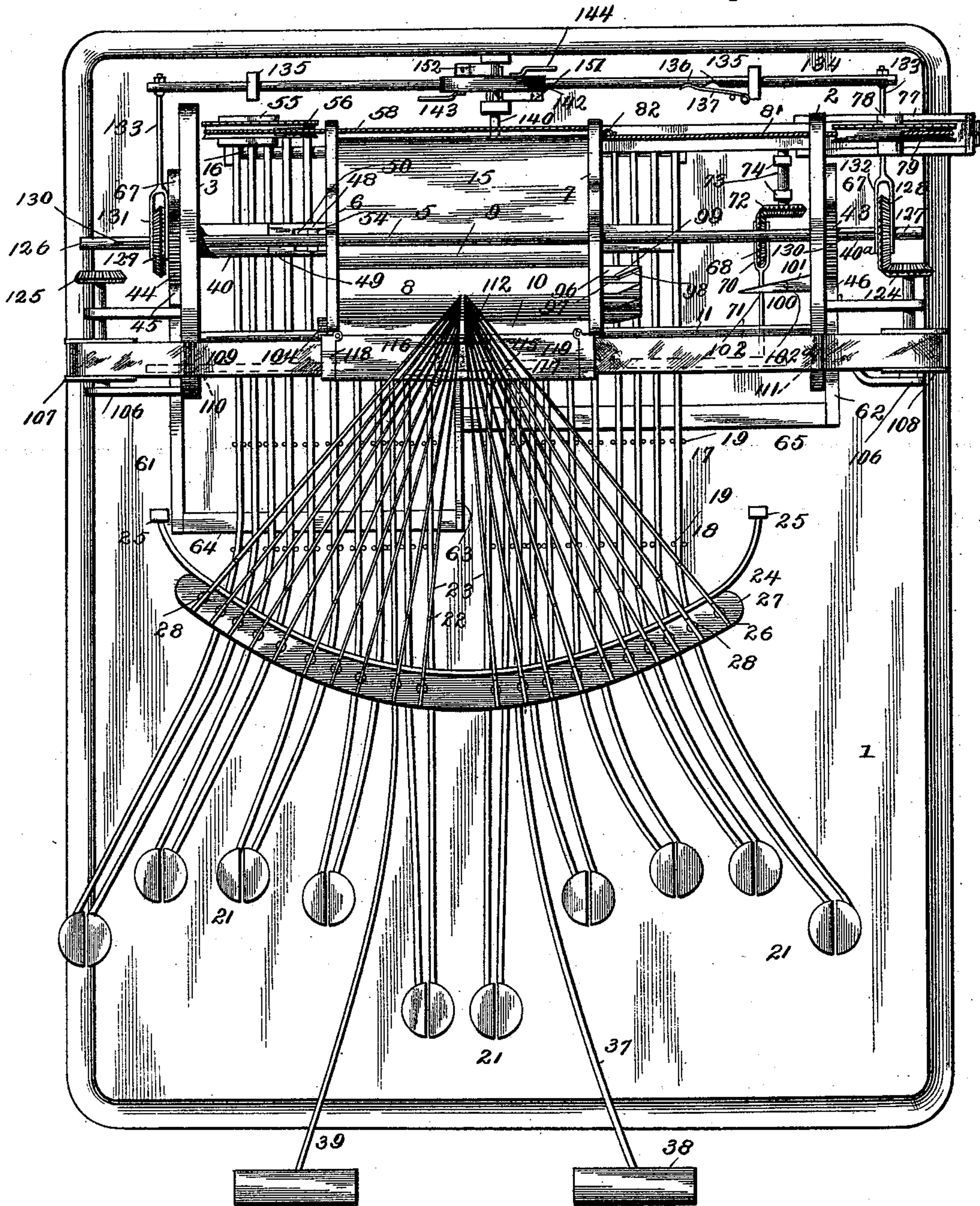


Fig. 1.

Witnesses

John Dinnie

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By his Attorney

James D. Morris

(No Model.)

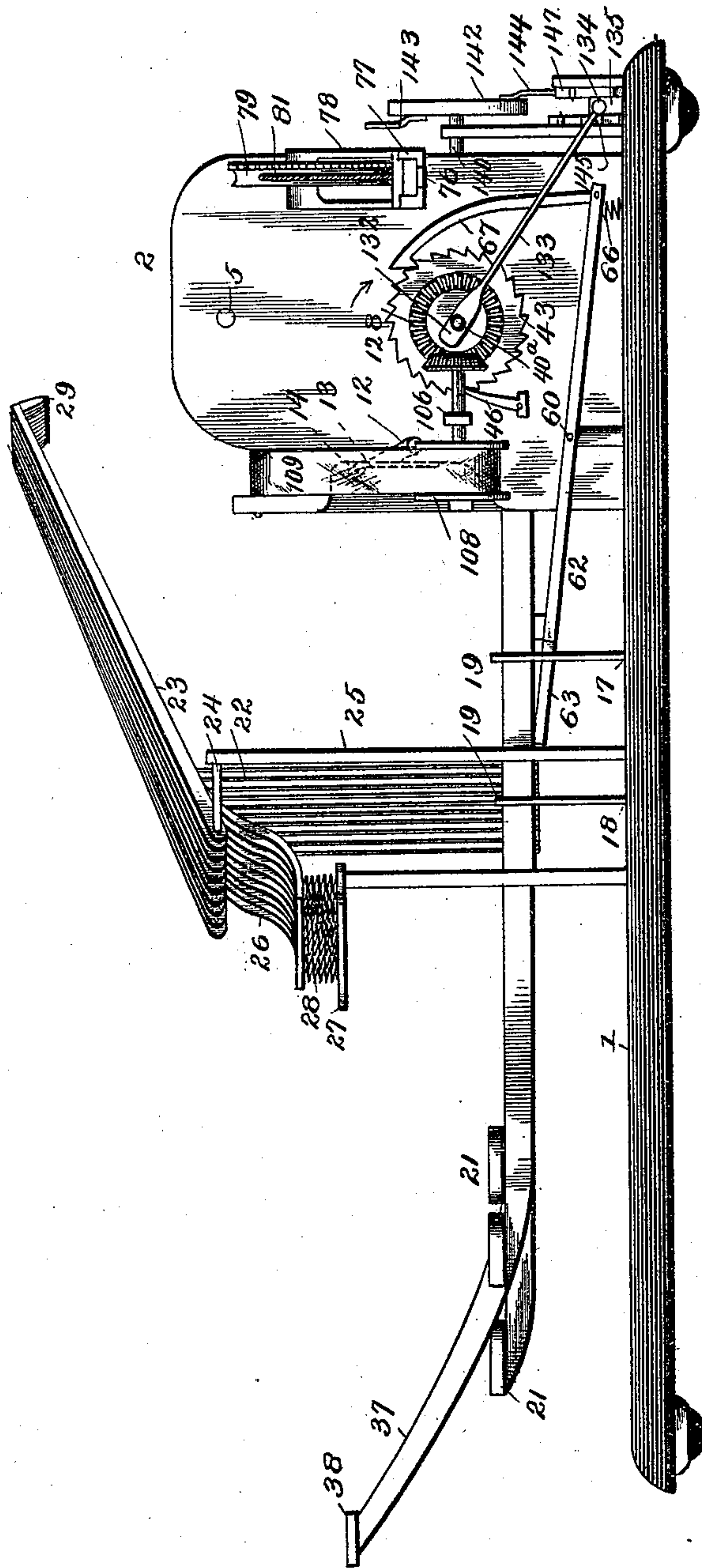
8 Sheets—Sheet 2.

E. L. CRAIGMILES.  
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Fig. 2.



Witnesses

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(No Model.)

8 Sheets—Sheet 3.

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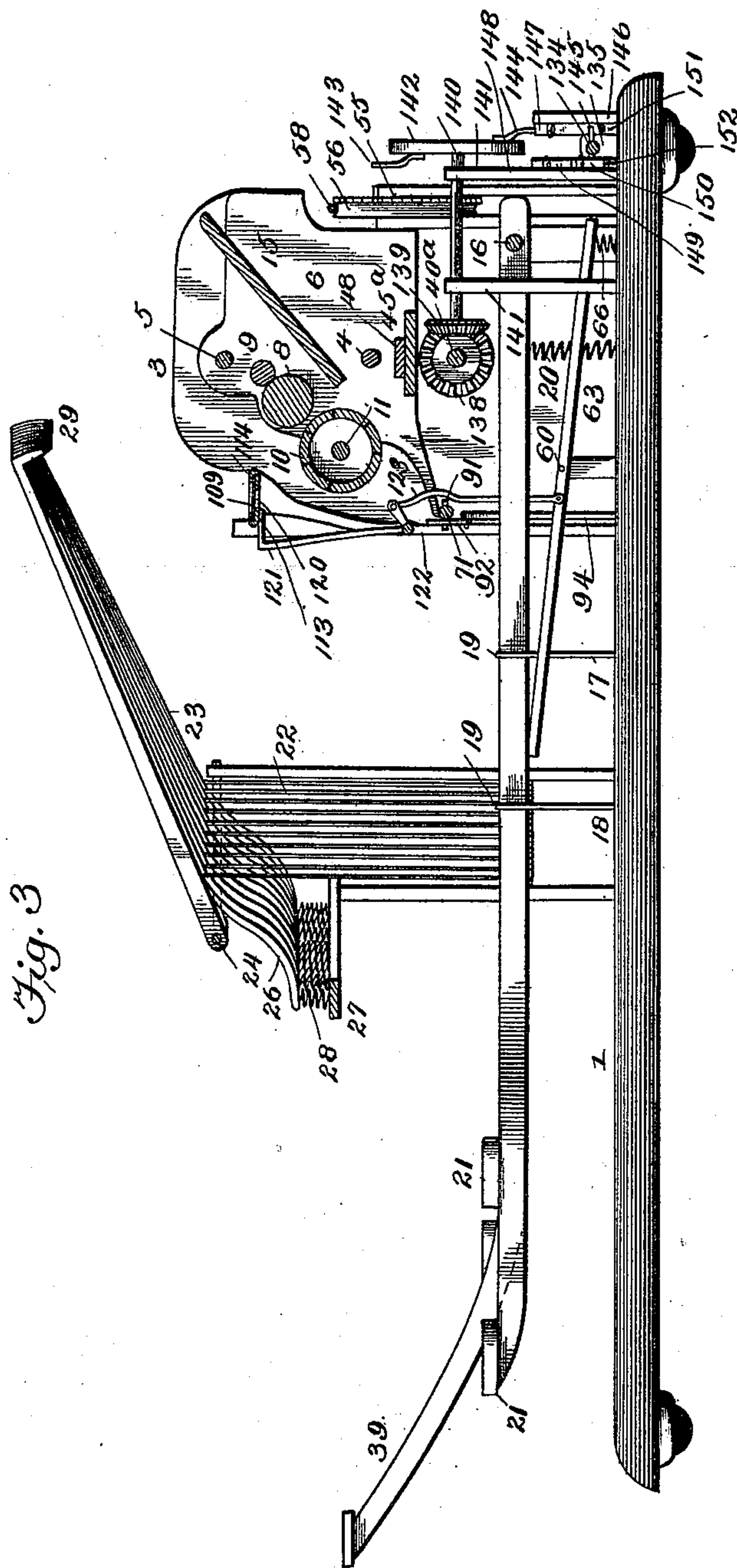


Fig. 3

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(No Model.)

8 Sheets—Sheet 4.

E. L. CRAIGMILES.  
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Fig. 4.

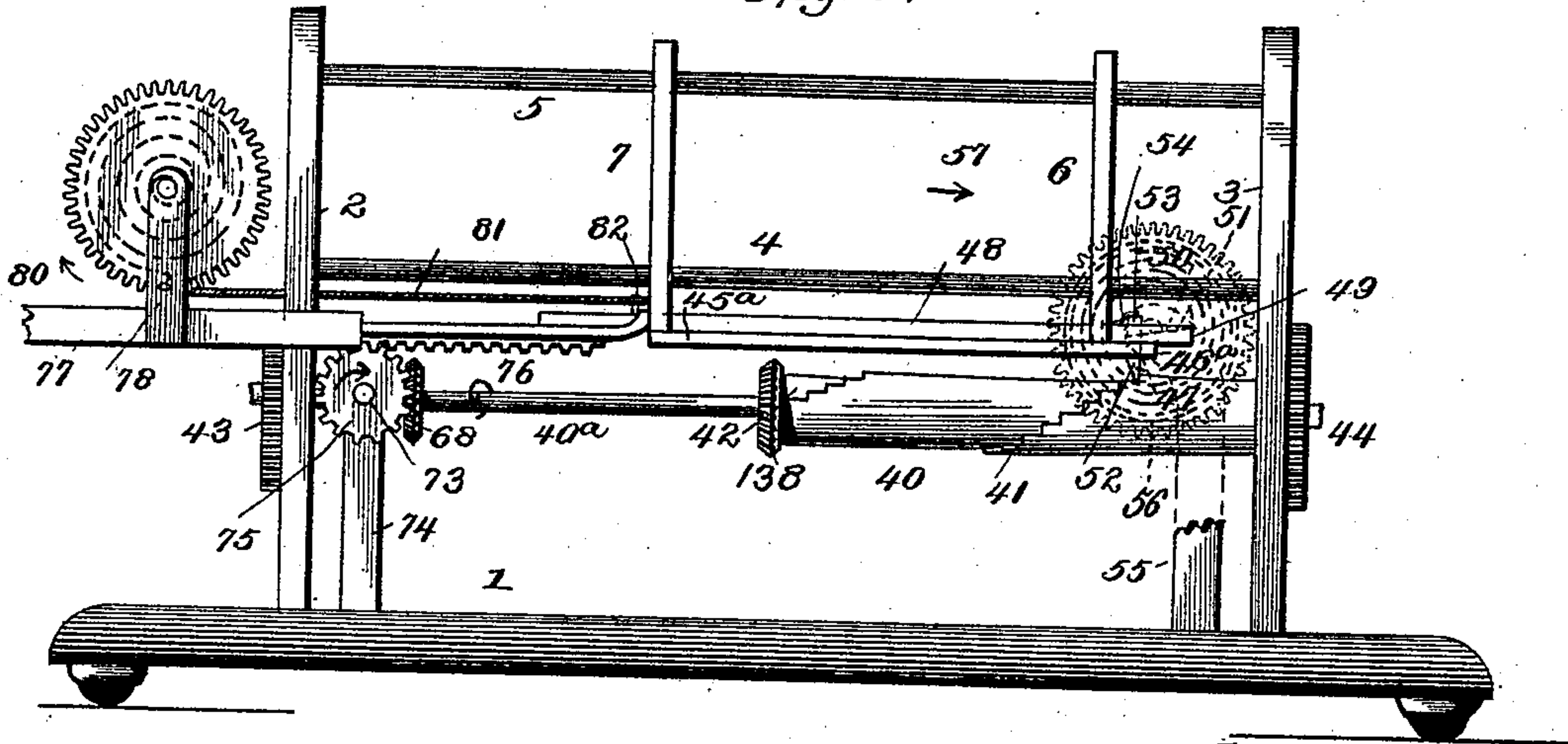


Fig. 5

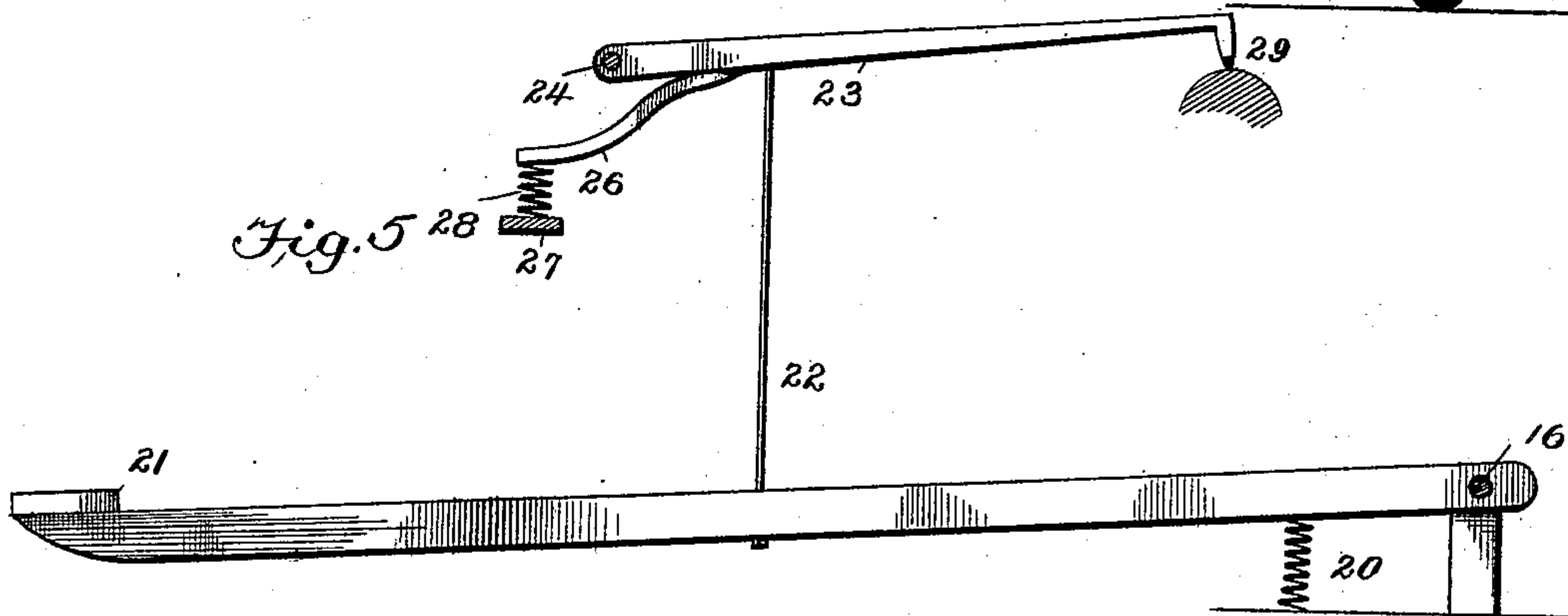
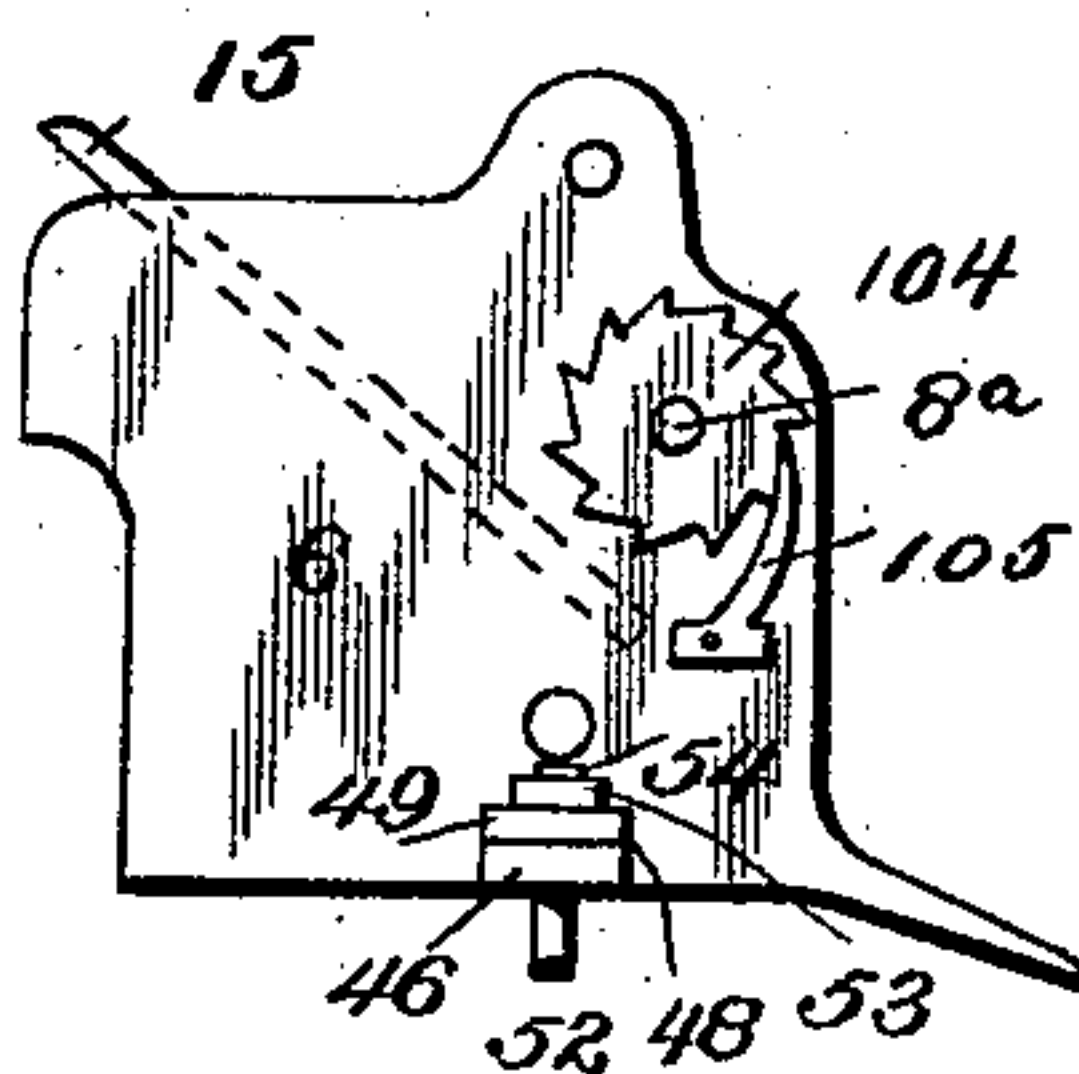


Fig. 6



Witnesses

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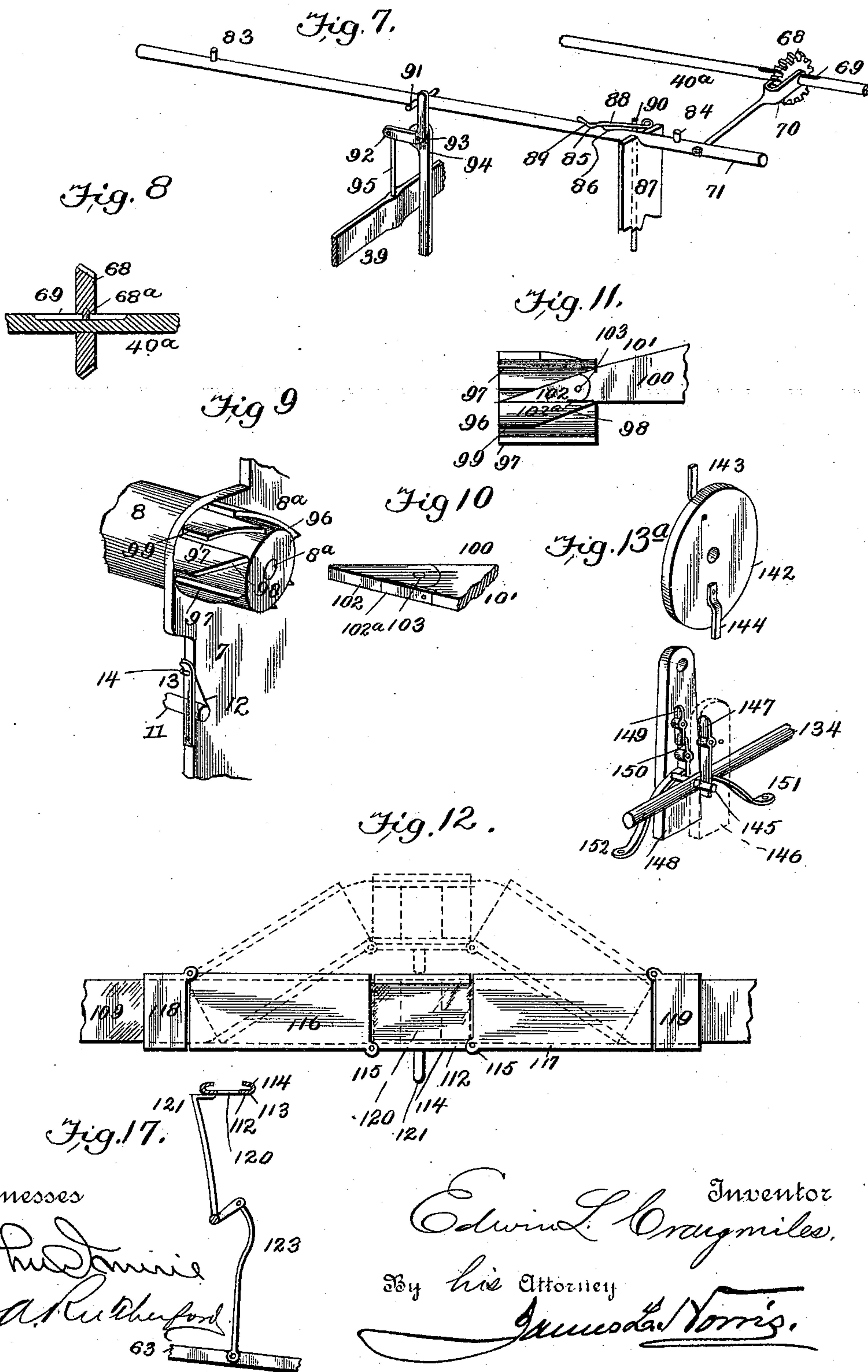
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8 Sheets—Sheet 5.

E. L. CRAIGMILES.  
STENOGRAPHIC TYPE WRITING MACHINE.

No. 496,297.

Patented Apr. 25, 1893.



Witnesses

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(No Model.)

8 Sheets—Sheet 6.

E. L. CRAIGMILES.  
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Fig. 13.

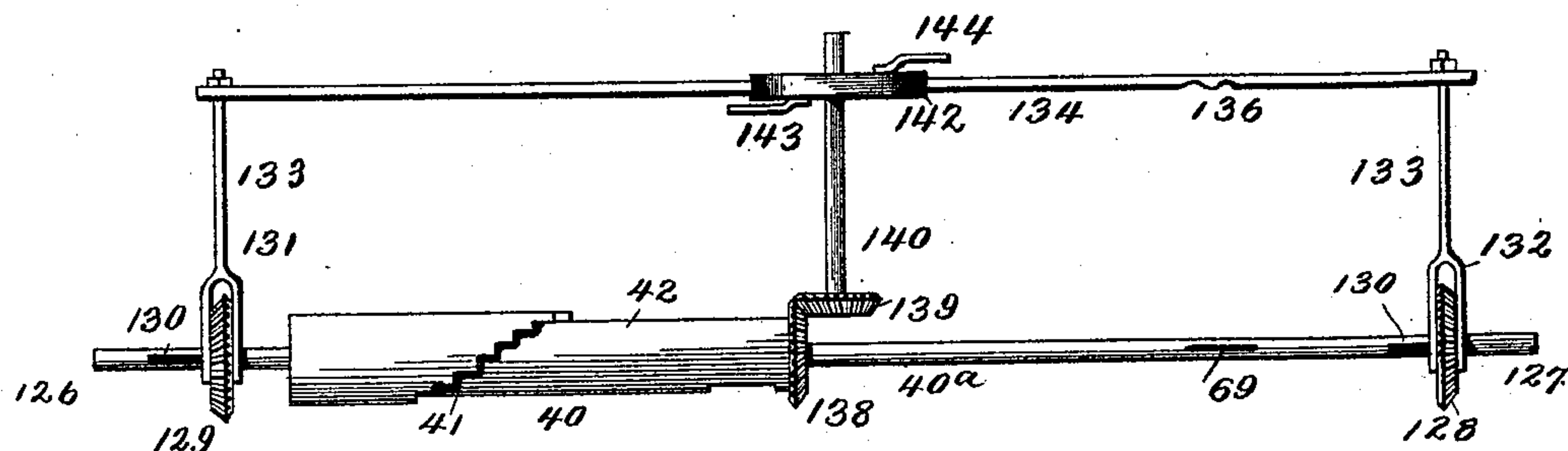


Fig. 15

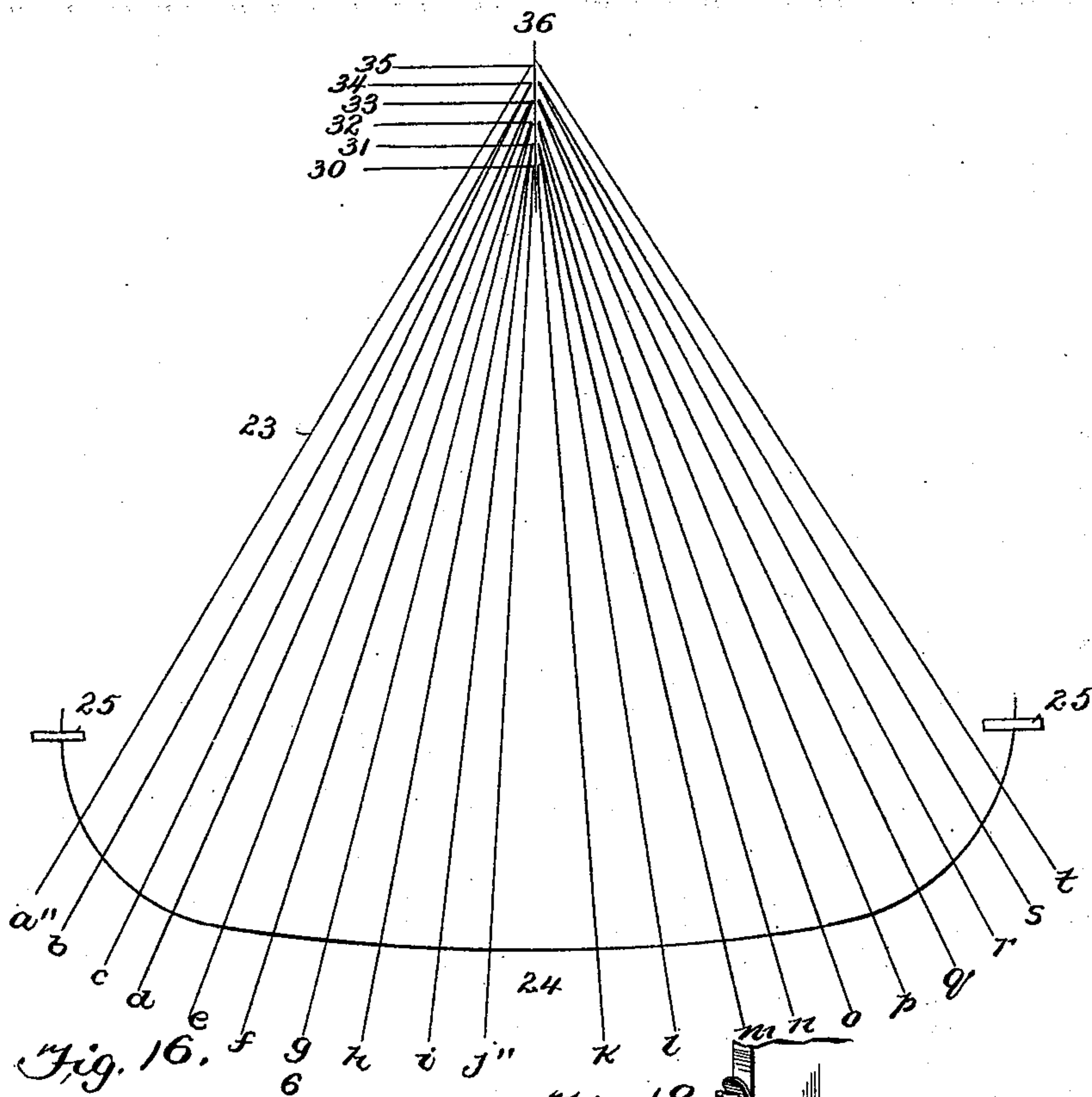


Fig. 16.

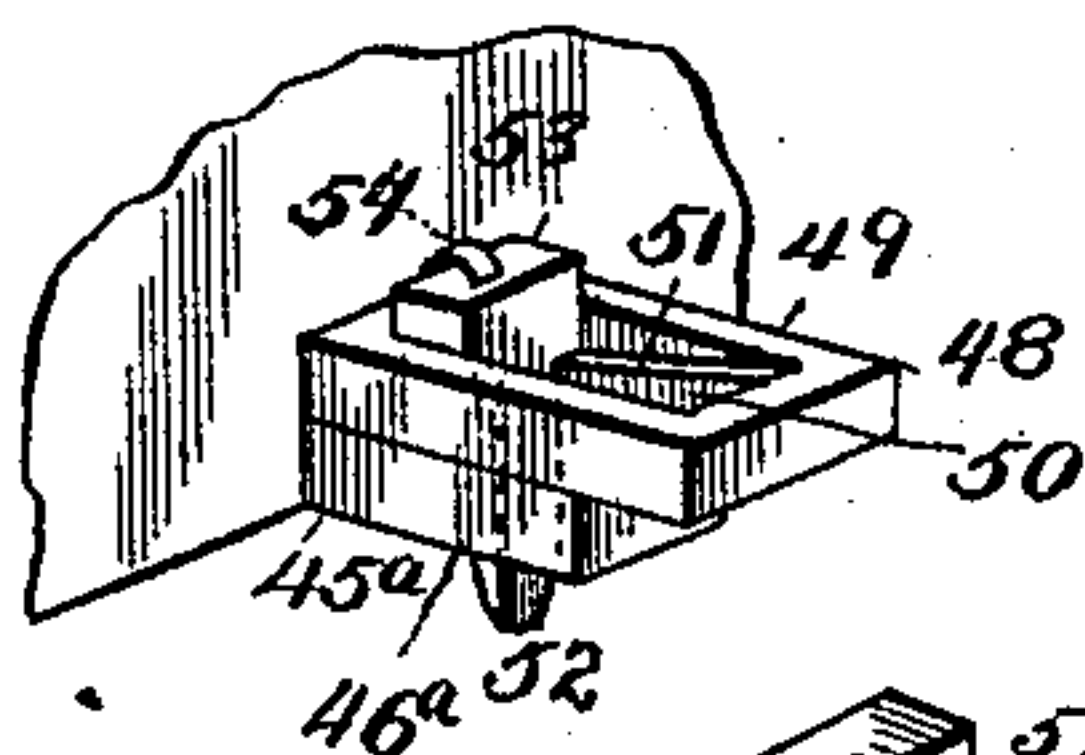
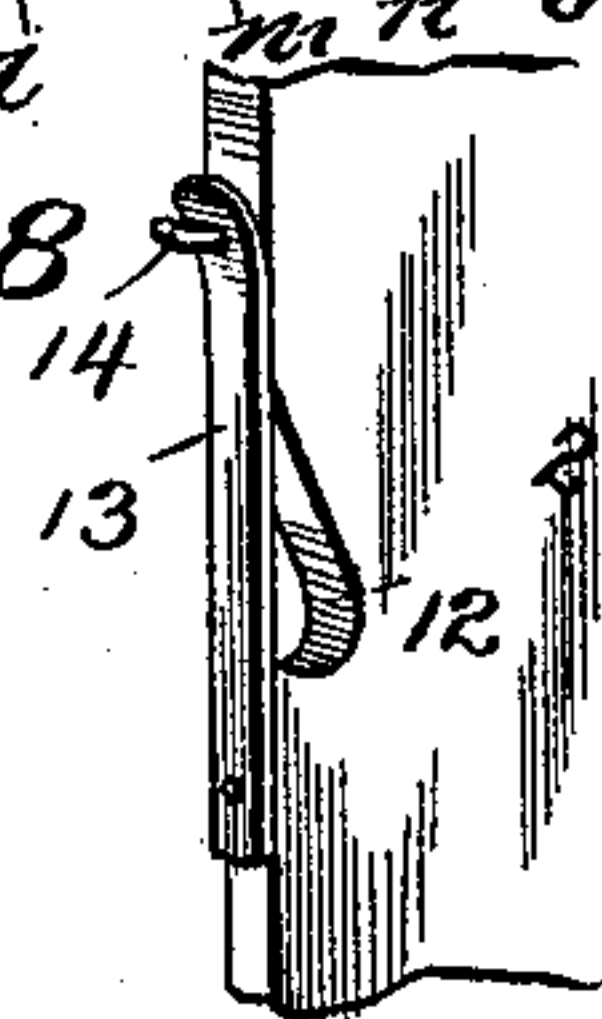
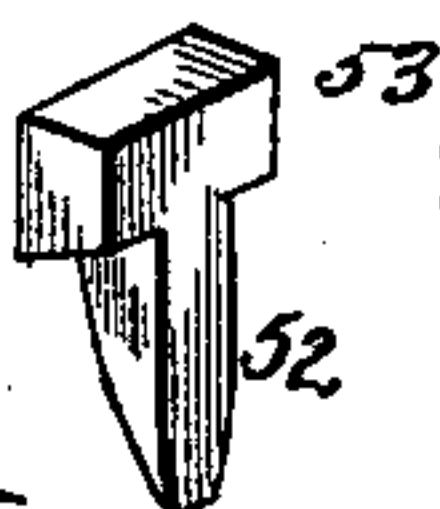


Fig. 18



Witnesses

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(No Model.)

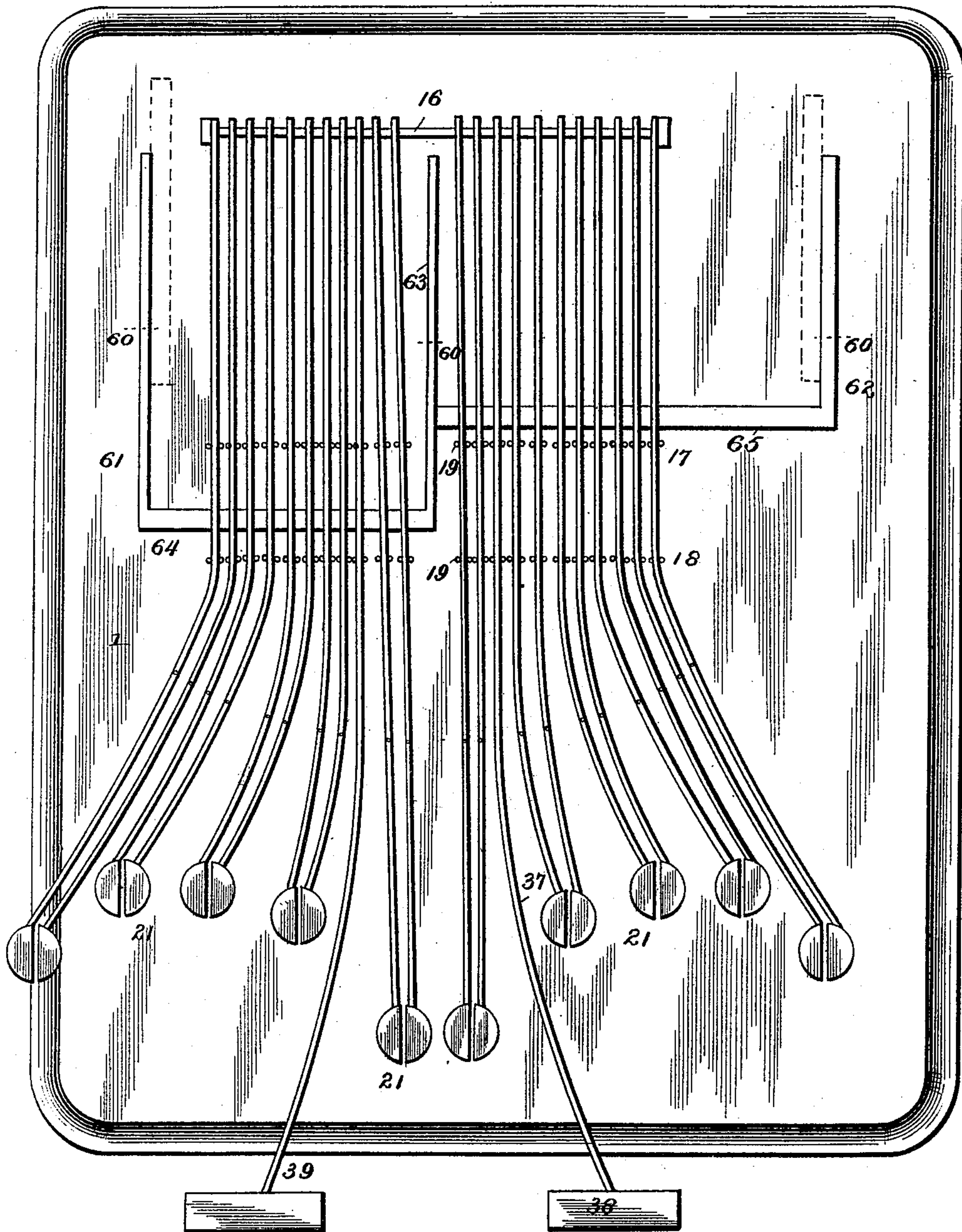
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Fig. 14.



Witnesses

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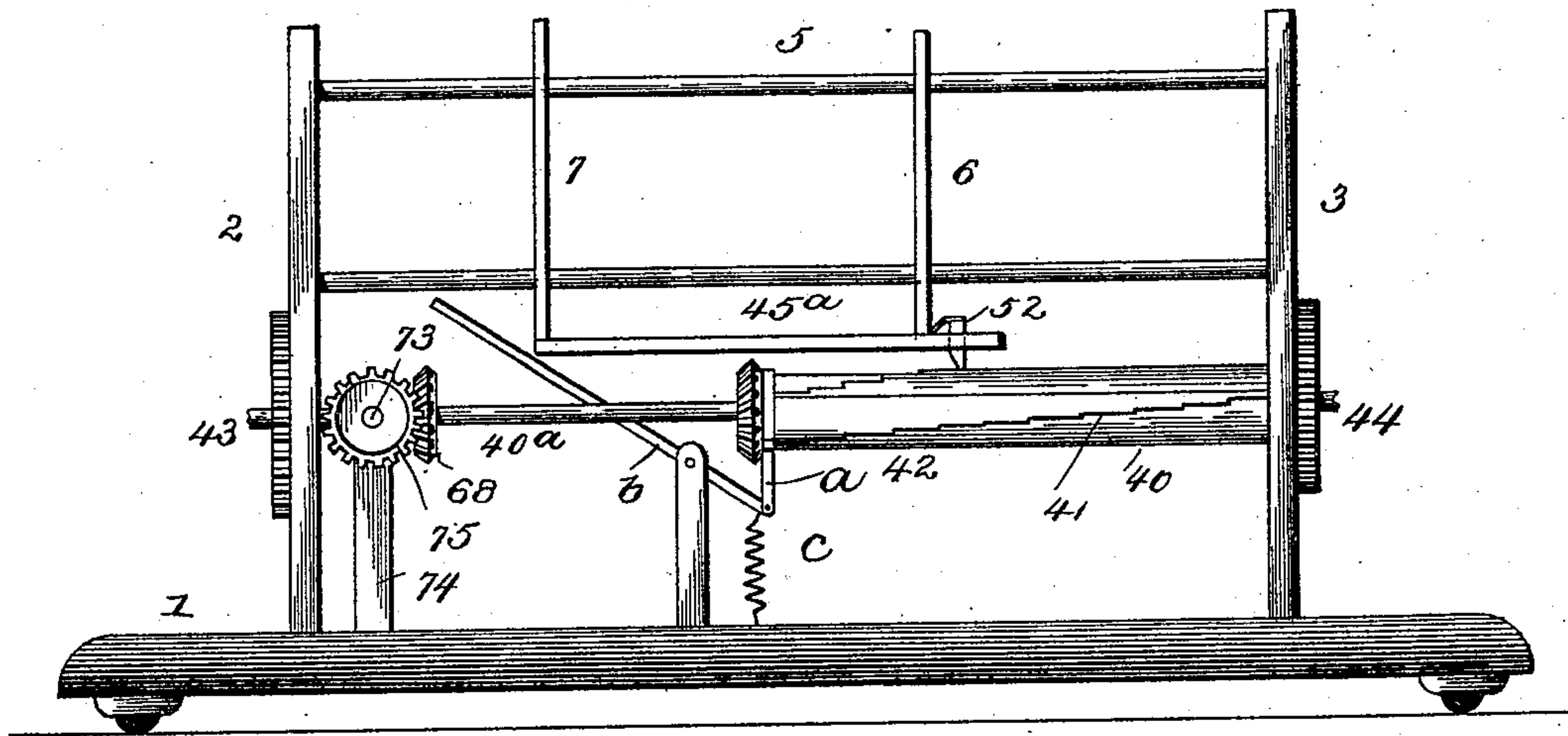
James H. Morris.

E. L. CRAIGMILES.  
STENOGRAPHIC TYPE WRITING MACHINE.

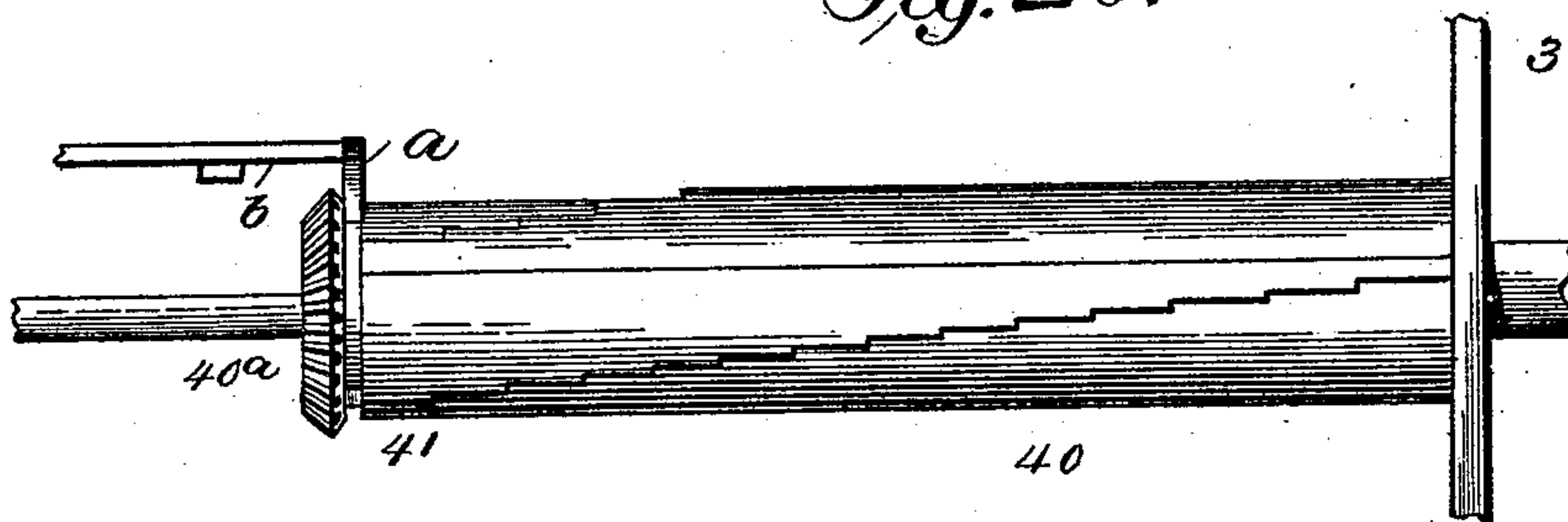
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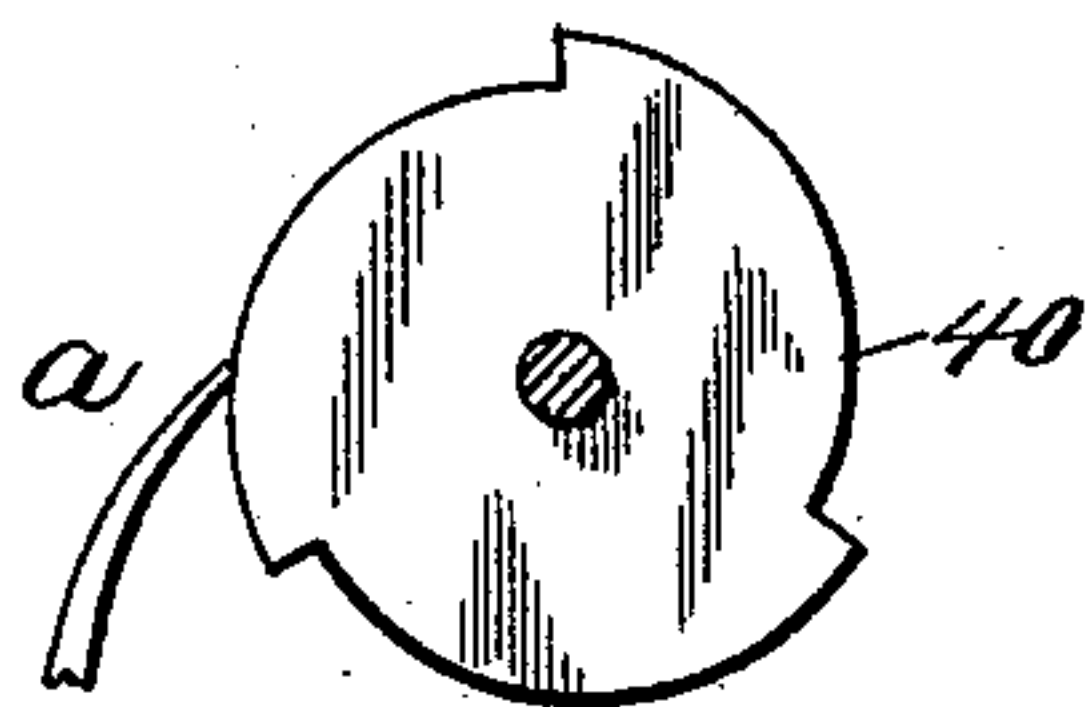
*Fig. 19.*



*Fig. 20.*



*Fig. 21.*



Witnesses

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# UNITED STATES PATENT OFFICE.

EDWIN LEE CRAIGMILES, OF CHATTANOOGA, TENNESSEE.

## STENOGRAPHIC TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 496,297, dated April 25, 1893.

Application filed May 14, 1892. Serial No. 433,019. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN LEE CRAIGMILES, a citizen of the United States, residing at Chattanooga, in the county of Hamilton and State of Tennessee, have invented new and useful Improvements in Stenographic Type-Writing Machines, of which the following is a specification.

My invention relates to certain new and useful improvements in type-writing machines, and more particularly to that class denominated "stenographic machines," wherein the type-characters are adapted to imprint stenographic signs or symbols that indicate syllables or phonetic sounds or word symbols such as are usually employed in the art of stenography for rapidly recording speech or language; and the invention has for its object to produce a machine of the kind referred to wherein the operation of recording such speech or language may be greatly facilitated so as to record the maximum number of words or signs in the least space of time and with a comparatively small exertion to the operator.

With such ends in view my invention consists in the peculiar arrangement of the key levers in each of two separate and distinct sets or banks as hereinafter described whereby two keys in each set or bank may be respectively operated by a single finger to simultaneously imprint double characters, or be separately and independently operated to produce single characters.

The invention further consists in improved mechanism for feeding a strip of paper from a continuous detachable roll; and in the automatic mechanism for feeding the paper upward at the end of each completed printed line. Further, in automatic mechanism for imparting a successive, intermittent, or step by step movement to the paper carriage for producing letter spaces; and in improved mechanism for producing word spaces.

The invention further, consists in means for automatically returning the paper-carriage to its initial point at the completion of each printed line; and in providing means for returning the carriage to its initial position to commence a new line at any time before the completion of any particular line of print.

The invention further consists in means or

mechanism for actuating and shifting the inking ribbon; and in the construction, arrangement, and combinations of parts more fully hereinafter described and claimed, due reference being had to the accompanying drawings, wherein—

Figure 1 represents a top plan view of my improved machine; and Fig. 2 an end view thereof. Fig. 3 is a vertical transverse central section of the same, and Fig. 4 is a detail view indicating the carriage feed. Fig. 5 is a detail view illustrating the action of one of the type-bars; and Fig. 6 is an end view of the paper carriage. Fig. 7 is a detail view illustrating the means for throwing the carriage actuating mechanism out of gear by hand. Fig. 8 is a detail view of the movable gear shown in Fig. 7. Fig. 9 is a perspective view of one end of the platen shaft. Fig. 10 is a detail perspective view of the pawl or dog for actuating the platen-shaft. Fig. 11 is a detail view showing the parts illustrated by Figs. 9 and 10 in engagement. Fig. 12 is a plan view of the ribbon advancing mechanism. Fig. 13 is a plan view of the mechanism for automatically effecting the reversal of the ribbon. Fig. 13<sup>a</sup> is a detail perspective view showing the means for operating the mechanism above mentioned. Fig. 14 is a top plan view of the keys. Fig. 15 is a diagrammatic view showing the relative striking position of the type bars. Fig. 16 is an end view of the carriage, illustrating the mechanism for actuating the carriage escapement shaft. Fig. 17 is a detail view in side elevation of the mechanism for shifting the ribbon; and Fig. 18 is a detail view of the latch for removably securing in place the shaft carrying the paper roll. Figs. 19, 20 and 21 are views of a modification of the feed for imparting a step by step motion to the paper carriage.

In order that my invention may be more readily understood I will describe the construction and operation of its different component parts separately, and, in proper sequence, will describe the coaction of such parts.

Reference being had to the drawings by the numerals and letters marked thereon 1 indicates the base of the frame of my improved machine from the rear end of which and near each side thereof project two vertical standards 2, 3,



as shown in Fig. 4 of the drawings. Secured to said standards are two guide bars 4, 5, lying in the same vertical plane but arranged one above the other, and upon which the paper-carriage travels. Said carriage is provided at each end with vertical plates 6, 7, which are suitably perforated to pass over the guide bars 4, 5, and between said plates is journaled the platen cylinder 8, and a guide roller 9, the roller lying in frictional contact with the platen 8.

The numeral 10 indicates the paper carrying roll upon which the paper is wound, and said roll is freely mounted upon a shaft 11, which at one end is journaled in a bearing in the standard 3, and at the other end is journaled in an open socket 12, formed in the standard 1, and is retained therein by means of a spring-latch 13, (see Fig. 18,) which at its lower end is rigidly secured to said standard 1 and at its upper end is perforated and engages a pin 14 slightly projecting upward so as to retain said latch in its closed position. The end of the shaft is removed from the socket 12, and the paper roll slipped thereon until it lies between the end plates 6 and 7 of the paper carriage; the shaft is then slipped back into its socket 12 and the spring latch snapped over the pin 14 securely holding the shaft in position. While the paper carrying roll is free to revolve upon the shaft 11 it is compelled to travel with the carriage owing to its being confined between the plates 6 and 7. As the platen 8 is revolved to produce line spaces, as will more fully hereinafter appear, the paper is unwound from the roll 10 and passes over said platen and between the same and the guide roll 9, and thence onto the rearwardly inclined table 15, by which it is conducted to the rear of the machine out of the way of the operating mechanism.

Before describing the feed mechanism for actuating the carriage to produce letter and word spaces, and the mechanism for rotating the platen and for producing line spaces, I will proceed to describe the key levers in order that the coaction of these parts may be more readily understood. Said key levers are arranged in two sets or series comprising a right and left hand set, and consisting of twenty levers, ten being in each set, as shown in Fig. 14. Said levers at their rear ends are pivoted to a bar 16 mounted in suitable supports at the rear of the base of the machine, and extend forward in a horizontal position to the front of the machine. At suitable points, as 17 and 18, said levers are embraced upon each side by vertically arranged pins 19 which serve to prevent any side movement of the levers while allowing them to have a free vertical movement. Between each key lever and the base 1, of the machine, is arranged a coiled spring 20 which throws said lever back into its horizontal position after it has been depressed. The said key levers are provided at their free ends with semi-

circular keys 21, each pair of adjacent keys lying in close juxtaposition and forming a circle, whereby the keys forming any one of the pairs may be struck together to simultaneously print two characters or may be independently struck to form single characters, as hereinafter fully described. To each of the key levers in Fig. 14 is secured a wire 22, the other end of which is secured to a type-bar 23, pivoted above it, the number of type-bars being equal to the number of key levers. The type-bars 23 are pivoted at their forward ends to a bar 24, preferably curved upon substantially the arc of a circle, and secured to suitable supports 25 rising from the base 1, and near their pivoted rear ends are provided with downwardly curved arms 26. Between the free ends of each of the arms 26 and a bar 27 secured to the supports 25, is disposed a spiral spring 28, one end of which is secured to said bar 27, and the other end to the free end of the arm 26, said springs serving to keep the type bars 23 in an elevated position. To the underside of the free ends of the type-bars 23 are secured the types 29, and it will be readily understood that when any one of the key-levers is depressed its corresponding type-bar, through the medium of the wire 22, will also be depressed, causing its type to strike the platen and leave its impression upon the paper stretched over the same, an ink ribbon being interposed between the platen and types, as will hereinafter more fully appear.

The types lettered from "a" to "j" imprint ten different characters, and these characters are printed in six different points 30, 31, 32, 33, 34 and 35, the types striking at different points on the convexity of the platen, as shown in Fig. 15. To accomplish this, eight of the types have four common striking points, that is to say, four of the types must strike at the same points where four other of the types composing the set will strike, while the two remaining keys of the set will each have its separate and distinct striking point. Thus, the type-bar *a* strikes in the plane 35, and no other type bar can strike in the same plane, while the type-bars *b*, and *c* both strike at the same point in the plane 34 but imprint different characters. It will be manifest, therefore, that the keys actuating the key levers *b* and *c* cannot be struck at the same time, but the keys actuating the key-levers *a* and *b*, since the corresponding types print in different planes, can be simultaneously struck and the two characters thus printed at the same time and by one operation. The keys which actuate the levers *a* and *b* are therefore arranged in close juxtaposition to form the first pair in the left hand set. A similar arrangement prevails throughout the whole series; thus the keys on the key-levers *c* and *d*, *e* and *f*, *g* and *h*, and *i* and *j* are arranged in pairs and the keys forming each pair can be simultaneously struck to produce two characters, but the keys on the key-bars *b* and *c*, *d* and *e*, *f* and



5 *g* and *h* and *i* cannot be struck together because the types actuated by each pair of keys as thus enumerated strike at the same point. The type on the bar *j* like the type  
 10 on the bar *a* has its own distinct point of striking, and hence the key which actuates it like that of *a* can be struck in conjunction with any other key of the series. The adjacent keys forming each pair in the series can  
 15 be simultaneously depressed thus enabling the operator by the use of a single finger to make a combination character consisting of two different marks, or two fingers can be used to simultaneously strike four keys in  
 20 the series. It will be readily seen that almost any four characters in the stenographic system written by this machine can be printed at once and from different combinations of these ten characters is formed the alphabet.  
 25 Instead of making the keys semi-circular they may be made of any desired shape, it always being preferable that they be of such shape that the adjoining edges of each pair shall lie in close juxtaposition. The keys,  
 30 key-levers, types and type-bars forming the set upon the right side of the machine are duplicates of those just described, each set being capable of printing the alphabet alone. The two sets, however, print in different vertical  
 35 planes, the left hand set printing on the left of a median line 36, while the right hand set prints on the right thereof, and thus it is possible to depress any type or combination of types in the left hand set and at the same  
 40 time depress any desired type or combination of types in the right hand set, and by this means simultaneously print two characters comprising a word. For example the proper key to print the letter "i" may be selected from the left hand set and the proper key  
 45 for printing the letter "n" may be selected from the right hand set, and both keys struck simultaneously to print the word "in." By reference to Fig. 1 of the drawings it will be  
 50 observed that the key levers and keys are arranged in such manner that when the fingers of the two hands are spread in a natural position they will fall directly over the keys in convenient position for their manipulation, making it unnecessary for the operator to change the position of his hands.

In addition to the key levers the machine is provided with a spacing lever and a lever for returning the carriage to its original position to start a new line, as shown in Figs. 1, 2 and 3. Referring to Fig. 1, the numeral 37 indicates the spacing lever which like the key-levers is pivoted to the bar 16, and guided between vertical pins 19, a coiled spring 20 being disposed beneath said lever to raise it to a horizontal position after it has been depressed. The free end of the lever 37 extends beyond the ends of the key levers and is elevated above the plane of said levers and provided with a broad key 38, in order that it may be depressed by the wrist and thus avoid the necessity of the operator changing

the position of his hand over the other keys of the right hand set to make a word space. The spacing lever 37 is arranged in the right hand set of key-levers, as shown. Arranged in the left hand set of key-levers is a carriage return lever actuated by the key 39 similar in all respects to the spacing lever 37, but designed to effect the return of the paper carriage to start a new line.

Before describing the operation of said levers it will be necessary to describe the means for feeding the carriage forward and the mechanism for returning the same to its starting point, which I will now proceed to do. Journaled in the standards 2 and 3 is a cylinder 40 provided upon its periphery for one-half its length with a series of step-like teeth or notches 41 which are disposed spirally around the cylinder, as shown in Fig. 4. That portion 42 of the cylinder which has a smooth periphery is of less diameter than the toothed portion, and will be hereinafter explained. Each end of the cylinder has rigidly secured thereto a ratchet wheel, respectively marked 43 and 44, and to the standards 2 and 3 are respectively secured pawls 45 and 46 which engage the said ratchet wheels and permit of the rotation of the cylinder 40 in but one direction.

Referring to Fig. 4 which is a rear elevation of the paper carriage, the driving mechanism, and main frame, 45<sup>a</sup> indicates a flat bar which is rigidly secured to the bottom and rear of the end frames 6 and 7 of the paper carriage, one end 46<sup>a</sup> thereof projecting slightly beyond the end frame 6 and provided with an aperture 47 for the purpose to be presently described. Resting upon said bar 45<sup>a</sup> is a sliding bar 48 which passes through suitable perforations in the end frames 6 and 7 of the paper carriage and projects beyond the same. The end 49 of the bar 48 is provided with an elongated slot 50 which is adapted to register with the aperture 47 in the bar 45<sup>a</sup> and the top of the bar 48 upon both sides of said slot is cut to form an inclined notch 51. Through the slot 50 and aperture 47 passes a dog 52 provided with a head 53 inclined in its bottom to correspond to the inclined notch 51, and the side of said dog 52 next the paper carriage is inclined, while the opposite side is vertical in order to afford a pointed end to engage the teeth 41 on the cylinder 40, as will hereinafter appear. Upon the top of the dog 52 rests one end of a spring 54 which constantly exerts its force to press said dog downward into the notches formed by the teeth 41. When, however, the bar 48 is moved in the proper direction to cause the inclined notch 51 to bear against the lower inclined side of the head 53 of the dog 52, said dog is raised to clear the notches formed by the teeth 41. To one side and to the rear of the main frame 1 are secured suitable supports 55, within which is journaled a grooved pulley 56 within which is arranged a coiled spring which in unwinding tends to constantly



draw the carriage in direction of the arrow 57, (Fig. 4), a strap or cord 58 being wound about said pulley and secured at its other end to the paper carriage. The spring herein 5 mentioned is precisely similar to the springs used for a like purpose in most type-writing machines now in common use and needs no further description.

I will now proceed to describe the mechanism by means of which the step by step movement of the carriage is produced to form the letter and word spaces. From the description heretofore set forth relating to the action of the key-levers forming the right and left hand series of keys, it will be evident that if two 15 keys are struck simultaneously to produce two characters side by side, the paper carriage will have to move the width of two types as the types return from contact with the paper; 20 but if only a single key or combination of keys be struck by the right hand set of keys the paper carriage would only be required to move the width of one type. It will be evident then that the depression of any key in 25 the right hand set must move the carriage the width of one type and the depression of any key in the left hand set must move the carriage the width of two types. This is accomplished in the manner and by the means now 30 to be described. On either side of the machine and outside of the standards 2 and 3 are respectively pivoted at the points 60 the levers 61 and 62, the lever 61 being about twice the length of lever 62, and pivoted at about 35 its center, while the lever 62 is pivoted near its end. Midway between the right and left hand sets of key-levers is a lever 63 similar in all respects to the lever 61 and pivoted at a point in line with the pivoted points 60 to the 40 base 1 of the machine. The levers 61 and 63 at their outer ends are united by a cross-bar 64 which rests under the left-hand series of key-levers while the short lever 62 is united to the lever 63, near the center of the latter 45 by a cross-bar 65 which rests under the key levers in the right hand series. The three levers 61, 62 and 63 are connected at their inner ends to the base 1 of the machine by spiral springs 66 which constantly exert their 50 force to keep said ends depressed. To the ends of the levers 61 and 62 are pivoted pawls 67 the upper ends of which engage the ratchet wheels 43 and 44 secured upon the ends of the cylinder 40 as heretofore described, and 55 upon the depression of said levers rotate the ratchet wheels, and of course the cylinder, in the direction of the arrow, Fig. 2. As the cross bars 64 and 65 rest under the key-levers, as described, it will be evident that depressing 60 any one of the key levers in either set will also depress the outer ends of the levers 61 and 62 and of course elevate their inner ends. But inasmuch as the bar 64 strikes the key-levers of the left hand set at a point further from 65 their fulcrum than does the bar 65 from the fulcrums of the key-levers of the right hand set the bar 64 will be depressed a greater distance

than the bar 65 upon an equal depression of the key-levers of the two sets and therefore the inner ends of the levers 61 and 62 will 70 likewise be elevated an unequal distance, causing the pawls 67 to engage an unequal number of teeth on the ratchet wheels 43 and 44. The levers 61 and 62 will, in practice, be 75 so proportioned and their fulcrums 60 so placed that the inner end of the lever 61 will be raised twice the distance of the inner end of the lever 62 and the relative arrangement of the ratchet wheels 43 and 44 and the pawls 80 67 will be such that the pawl will engage two teeth on the ratchet wheel 44 and but one tooth on the ratchet wheel 43 upon movement of the levers. As the inner ends of either of the levers 61 or 62 are raised by the depression of one of the key-levers the pawls 85 67 step over the teeth on the ratchet wheels 43 and 44, the pawl engaging the ratchet wheel 44 slipping over two teeth while that engaging the ratchet wheel 43 slipping over but one, as before described, and upon the release of the key-lever the spring 66 immediately draws down the inner end of one of said 90 levers and with it one of the pawls 67 which turns the cylinder the distance to produce a space equal to one or two types according to 95 which set the key-bar which has been struck belongs to. If the cylinder 40 be turned a sufficient distance to produce two type spaces two of the teeth 41 will be rotated out of the path of the dog 52, and the spring-pulley 56 100 will immediately draw the paper carriage forward the required distance until the said dog strikes the next tooth in the spiral series 41 by which further movement of the carriage is prevented until another key is depressed. 105 On the other hand if the cylinder 40 has been rotated through the medium of the lever 62 but one of the teeth 41 will have been removed from the path of the dog 52, and consequently the paper carriage will have advanced but the width of one type. At the 110 time the key-lever was depressed that operated as above described to rotate the cylinder 40, and before the cylinder was so operated, said key lever, by means of the wire 115 22, had drawn down its corresponding type bar 23 to cause the type carried at the end thereof to strike the paper on the paper platen and imprint its character, and it is only after such character has been imprinted and the 120 key lever is being returned to its original position by its spring that either of the levers 61 or 62 can operate to rotate the cylinder to permit the carriage to move forward.

As above described there is only one series 125 of spiral notches on the cylinder 40 which extend around said cylinder once, the cylinder making a complete revolution while the carriage is moving the space of one line. I may however make the cylinder 40 in two, three 130 or more sections, as shown in Figs. 19, 20 and 21 and provide each section with a row of spiral notches 41, which only extend around one-half, one-third, or one-fourth of the cir-



cumference of the cylinder according to the number of sections. Therefore, while the carriage is traveling the length of one line the cylinder revolves one-half, one-third, or one fourth of a revolution according to the number of sections with which it is provided. By this construction it is not necessary to raise the dog 52 from engagement with the notches, for it will be seen that when the dog has reached the last notch of one of the series of notches, or is at any point of its journey, it will have an unobstructed passage back to the starting point. For this reason, it is preferred that the dog 52 may be fixed. In operation, it will be evident that the first notch of a section shall exactly register with the dog 52 at the commencement of each line.

Referring to Figs. 19, 20 and 21, *a* indicates a pawl the free end of which is adapted to engage the free end of the cylinder 40 and at its other end is secured to an arm *b* which rests beneath and is adapted to be engaged by the carriage. A spring *c* is secured to said arm *b* and exerts its force to constantly draw the pawl to its lowermost position. As the carriage is returned to the starting point it bears against and forces down the free end of the arm *b*, thus raising the pawl *a*, and the end of said pawl coming in contact with one of the notches on the end of the cylinder 40 shown in Fig. 21, each one of which registers exactly with the first notch of one of the sections on the cylinder 40, forces it upward and thus rotates the cylinder 40 the distance required to commence a new line. As the end of the arm *b* is released by the carriage, the spring *c* operates to draw down the pawl *a* ready to again perform its work when the carriage is again returned. This result will follow every time the carriage is returned to the starting point, whether the carriage is returned by hand or returned automatically after completing a full printed line. I desire, however, to say in this respect that I am not bound to proportion the parts so the pawl on the lever 62 will move the cylinder 40 the width of one type and the pawl on the lever 61 will move it the width of two types. The arrangement may be reversed, so as to cause, for instance the long arm of the universal bar, 64, to be under the right-hand set of keys, and its short arm, 65, under the left hand set, so that the depression of any key in the right hand set will cause the carriage to move the width of three types, and the depression of any key in the left hand set will cause it to move the width of two types; or it may be changed in this respect in any preferred manner so that through a universal bar having two arms of unequal length the depression of any key in one set of key levers will cause the paper carriage to be moved a certain distance and an equal depression of any key in the other set will move the paper carriage another and a different distance.

The mechanism for returning the carriage to its starting point is as follows: As before

described only one-half of the cylinder 40 is provided with the spirally arranged teeth, the other half 40<sup>a</sup> being of considerable less diameter and having a smooth periphery. Arranged upon the cylinder 40<sup>a</sup> near its outer end is a beveled gear wheel 68. Said gear wheel 68 is not rigidly attached to the cylinder (see Fig. 8) but is provided with a feather 68<sup>a</sup> which engages a groove 69 in the cylinder, thus permitting a longitudinal movement of the gear wheel upon the cylinder but compelling it to revolve therewith. Loosely embracing both sides of the gear wheel 68 is a clutch 70 carried at one end of a shifting bar 71 mounted in suitable bearings and projecting through the standard 2. Meshing with the gear wheel 68 is a similar gear wheel 72 the two being arranged at right angles to each other. The gear wheel 72 is rigidly mounted on a shaft 73 rotating in bearings 74, and upon the opposite end of said shaft is rigidly secured a gear-wheel 75. The gear wheel 75 meshes with the under side of a rack-bar 76 which travels in guide ways 77 secured to the standard 2, the inner end of said rack-bar being secured to the end frame 7 of the paper carriage. Journaled in suitable supports 78 secured to the guideway 77 is a grooved pulley 79 provided with a coiled spring 77<sup>a</sup> which exerts its force to rotate the pulley in the direction of the arrow 80. This pulley is similar in construction to the pulley 56 before described, but the force of its spring exceeds that of the spring actuating the pulley 56 which draws the paper carriage forward. Secured by one end to the periphery of the grooved pulley 79 is a strap or cord 81, the other end of which is attached to a pin 82 fastened near the inner end of the rack-bar. The shifting bar 71, before named, is provided near each end with upwardly projecting pins 83 and 84 which are adapted to be engaged by the paper carriage for the purpose presently to be described, and at any suitable point is provided upon its side with two notches 85 and 86. To a support 87 which serves as rest for the end of the shifting-bar 71 is secured one end of a spring 88, the other end of the spring being bent to form a projection 89 which engages the notches 85 and 86 and serves to hold the shifting bar 71 against accidental displacement. A pin 90 projects upwardly from the base 1 of the machine and bears against the spring 88, thus keeping the free end of said spring constantly in contact with the shifting bar 71. The operation of this portion of the machine is as follows: As before described, when a key is depressed it revolves the cylinder 40 and the spring-pulley 56 draws forward the paper carriage one or two notches, according to which set the key belongs. As the cylinder 40 revolves it rotates the gear-wheel 68 in the direction of the arrow, which causes the gear-wheel 72 to rotate in the direction of its arrow. As the gear wheel 72 is revolved it rotates the gear wheel 75 in the same direction,



and the latter meshing with the rack-bar 76 moves it forward with the carriage. As the rack-bar 76 is moved forward it carries with it the strap or cord 81 which is secured to the periphery of the spring pulley 79, thus unwinding the spring of said pulley. As before described the force of said spring exceeds the force of the spring in pulley 56 and tends to draw the carriage in a direction opposite to the pull of the pulley 56, but by means of the gearing between the cylinder 40 and rack bar 76 the stronger spring of the pulley 79 is unwound and its force prevented from acting on the paper carriage until it reaches the end of a line, when it is automatically permitted to exert its greater force and, overcoming the weaker spring of the pulley 56 returns the carriage to its starting point, as will be now described. As the paper carriage nears the end of a line it comes in contact with the pin 83 on the end of the shifting bar 71, and as the carriage continues to move forward it carries with it the said shifting bar 71. As the shifting bar is moved forward by the carriage it shifts the clutch 70 which moves the beveled gear-wheel 68 longitudinally in the groove 69 in the cylinder 40<sup>a</sup> and throws it out of gear with the beveled gear wheel 72, releasing the latter from all restraint. The spring pulley 79 then acts to exert its superior strength and, rotating in the direction of the arrow winds up the strap or cord 81 which is attached to the rack bar 76 and draws back said bar and with it the carriage. However, before the carriage can return to commence a new line the dog 52 resting in the notches formed by the teeth 41 on the cylinder 40 must be raised to clear said notches, which is effected automatically as follows: As before described, and as shown in Fig. 4, the end of the sliding bar 48 projects beyond the standard 6. At the same moment that the end of the paper carriage strikes the pin 83 on the shifting bar 71 to throw out of gear the beveled gear wheels 68 and 72, the end of the sliding bar 48 strikes the standard 3 and as the carriage continues to move forward the sliding bar 48 is forced backward, pressing the inclined notch 51 under the head of the dog 52 and raising said dog out of the notches on the cylinder. The dog 52 is raised clear of the notches at the same instant that the two beveled gear wheels 68 and 72 are disconnected or ungear, and the spring pulley 79 is then permitted by the ungearing of said wheels to exert its force and the carriage starts to return to commence a new line. As the carriage nears the completion of its return journey its advancing end strikes against the pin 84 on the end of the shifting bar 71 and as the carriage continues its movement toward the starting point the shifting bar 71 is carried with it, throwing into gear the beveled gears 68 and 72. By the time the gear-wheels have been completely geared together the carriage has reached the end of the return journey. At the same mo-

ment the carriage strikes against the pin 84, as above described, the projecting end of the sliding bar 48 comes into contact with the standard 2, and as the carriage continues on its return journey the sliding bar 48 is forced inward to the former position, allowing the dog 52 to drop into the notches on the cylinder 40, the spring 54 serving to force the dog down. The sliding bar 134 is provided with a spring locking device 137 similar in all respects to the spring locking device 88 on the shifting bar 71, and it will therefore need no further description. As above described the carriage is automatically returned to the starting point when the end of a line is reached, but it often happens that the carriage must be returned before the completion of a line, and this is accomplished by depressing the lever 39 by the left wrist of the operator. Projecting horizontally from near the center of the shifting bar 71, as shown in Fig. 7, is a pin 91. Against this pin bears the upper end of a bell-crank lever 92, pivoted at 93 to an upright support 94 secured to the base of the machine. To the other end of the bell crank key 92 is attached a wire 95 secured at its other end to the inner end of the lever actuated by the key 39. When the key 39 is depressed by the left wrist its lever draws downward the wire 95 which causes the bell crank lever to oscillate forward on its pivot 93 and pushing against the pin 91, shifts the shifting bar 71 so as to ungear the beveled gear wheels 68 and 72. The sliding bar 48 is shifted by hand to raise the dog 52 out of engagement with the notches on the cylinder 40, when the carriage is returned by the spring pulley 79 to the starting point as already described. After the paper carriage has been returned to its starting point it is necessary that the paper be shifted upward over the platen cylinder 8 before commencing to print a new line, and this is accomplished as follows: Referring to Figs. 9, 8<sup>a</sup> indicates the right hand end of the platen cylinder shaft which projects through the end frame 7 of the paper carriage. The outer end of said shaft is provided upon its periphery with a series of teeth 96, each of which is straight upon one side, as at 97, and inclined upon the other side for a portion of its length, as at 98, and straight for the remainder of its length, as at 99. To the standard 2, at a point opposite the said teeth is secured a projecting finger 100 adapted to engage said teeth to rotate the platen cylinder. Said finger is composed of two parts 101 and 102, the part 101 being fixed and the part 102 being hinged thereto as at 103. The lower sides of the members 101 and 102 are straight and their upper sides are inclined, the end of 102 terminating in a point. Between the abutting edges of the members 101 and 102 is interposed a spring 102<sup>a</sup>, which normally maintains said members in the position shown in Fig. 10 in such manner that the upper sides of the two members form a continuous inclined plane and their lower



sides form a slight angle. As the carriage returns to its starting point, as before described, the inclined portion 98 of one of the teeth 96 comes in contact with the pointed end of the finger 100, and as the carriage continues its movement the inclined upper side of the said finger forces the tooth 96 upward, thus partially rotating the platen cylinder and feeding the paper upward from the roll to receive a new line of imprints. When the pointed end of the finger comes into contact with the straight side 97 of the next adjacent tooth 96, the member 102 of the finger is pushed upward against the action of the spring so that when the end of the shaft 8<sup>a</sup> comes in contact with the standard 2 and the return of the carriage to its starting point is completed the relative position of the two members 101 and 102 will be as shown in Fig. 11, their lower edges forming a continuous straight line which abuts against the straight side of one of the teeth 96 and their upper inclined edges showing a slight angle, and the members 101 and 102 will remain in this position until the paper carriage has moved forward far enough in printing a new line to release the pointed end of the finger 100 from contact with the teeth 96, when the spring restores the two members to the position shown in Fig. 10, ready to engage the teeth 96 when the paper carriage is again returned. To the opposite end of the platen-cylinder shaft 8<sup>a</sup> outside of the standard 6 is rigidly secured a ratchet wheel 104, and secured to said standard is a pawl 105 which engages said ratchet wheel and prevents any backward movement of said cylinder.

It now remains to describe the mechanism for shifting the ink-ribbon back and forth from over the platen cylinder and for feeding it from side to side, and for reversing the direction of the feed. Mounted in suitable bearings 106 secured to each side of the base of the machine are rolls 107 and 108, about which the ends of the ink ribbon 109 are wound. The ribbon 109 passes up over a roller 110 mounted in bearings upon the top of the standard 3 and from thence passes in front of the platen cylinder 8 to the other side of the machine over a roller 111, similar to the roller 110 and thence to the ribbon roll 108. When the machine is at rest the ribbon 109 as above described passes immediately in front of the cylinder 8 over which the paper passes and which receives the impact of the type in printing, as shown in Fig. 12. At the point where the ribbon passes in front of the cylinder it passes through a ribbon-guide constructed as follows: 112 indicates a shallow box-like casing consisting of a bottom 113 having its opposite edges 114 turned up and over toward each other to embrace the ribbon 109. To the front outer corners of said casing 112 are hinged at 115 similar casings 116 and 117 of greater length than the casing 112, which in turn are hinged at their rear inner corners to similar short casings 118 and 119,

the latter sliding on suitable supports. The central guide casing 112 is provided at its bottom with a square aperture 120 of a sufficient size to permit of the passage of the type, but preventing any other portion of the ribbon coming in contact with and soiling the paper. To the front end of the central guide-casing 112 is secured one end of a bell-crank lever 121 pivoted to a fixed support 122 secured to the base of the machine, the other end of said lever having attached thereto a wire-rod 123, the other end of said rod being attached to the lever 63 of the spacing device before described. The lever 63 is moved an equal distance upon the depression of any one of the twenty key-levers, and as one of said key-levers is depressed it presses down the free end of the lever 63 and draws down the rod 123 which turns the bell-crank lever 121 upon its pivot or axis and throws the central guide-casing 112 over the platen-cylinder in the position shown in dotted lines Figs. 12 and 17. When the key-lever was depressed it caused the type carried by the type-bar to descend, as before described, striking the ribbon which passes over the central guide casing 112 the instant that the latter has completed its forward movement. The type presses the ribbon through the aperture 120 in the central guide-casing 112 down into the paper on the cylinder 8, thus imprinting its character thereon. When the key-lever is released it is returned to its original position by the action of its spring 20, thus releasing the lever 63 of any downward pressure, which is returned to its normal position by its spring 66, and in its return it raises the rod 123 which turns the bell-crank lever upon its pivot and draws the guide-casing 112 back from over the cylinder, thus exposing to view the matter printed. Thus, every time a key-lever is depressed the ribbon advances to a position over the cylinder and when the key-lever is released it recedes to expose the character last printed. By inclosing it in the hinged guide-casings as described, sharp turns in the ribbon are avoided. If the guide casings 116 and 117 were omitted the central guide 112 would carry the ribbon forward at sharp angles, but by providing said guide-casings the ribbon is deflected gradually. As before described the ends of the ribbon are wound about the spools 107 and 108. To the rear ends of the shafts of the ribbon spools 107 and 108 are respectively secured beveled gear wheels 124 and 125 which revolve with said shafts. The cylinder 40 is extended at each end beyond the standards 2 and 3, as at 126 and 127, upon which are mounted beveled gear wheels 128 and 129. Said gear-wheels are each provided with feathers which engage longitudinal grooves 130 which permit said wheels to be moved longitudinally upon the shafts 126 and 127 but cause the wheels to revolve with the shafts. Embracing the gear wheels 128 and 129 on both sides are clutches 131 and 132 which are carried by rods 133



the ends of which are attached to a shifting bar 134. When one of the gear wheels, as 128, is in gear with one of the gear wheels as 124, on the ends of the spool shafts (as in Fig. 1) the cylinder shaft 127 will, through the said gears, rotate the ribbon spool 108 and wind the ribbon on said spool 108, the gear wheels 125 and 129 not being in mesh, thus allowing the ribbon to unwind from the spool 107. By moving the shifting bar 134 in the proper direction the clutch 132 throws the gear wheel 128 out of gear with the gear wheel 124, and at the same time the clutch 131 throws the gear wheel 129 into gear with the gear wheel 125, thus causing the ribbon to be reversed and wound on the spool 107 and off of 108. The shifting bar 134 rests upon suitable supports 135 secured to the base of the machine, and at a suitable point is notched, as at 136, said notches being engaged by the free end of a spring 137 in the manner and for the purpose heretofore described.

In order to reverse the ribbon automatically the following described mechanism is resorted to: On the cylinder 40, at the end of its toothed half is rigidly secured a beveled gear-wheel 138 which meshes with a similar beveled gear-wheel 139 rigidly secured to one end of a shaft 140 mounted in suitable bearings 141 secured to the base of the machine. Rigidly secured to the other end of the shaft 140 is a large wheel 142 which is supported immediately above the shifting bar 134. Projecting from the periphery of the wheel 142, and opposite each other, are two pins or tappets 143 and 144, as clearly shown in Figs. 3 and 13. Through the shifting bar 134 and at a point immediately beneath the center of the wheel 142 passes a pin 145 which projects upon both sides of said shifting bar. To a suitable support 146 is pivoted near its upper end a lever 147 the lower end of which is adapted to engage one end of the pin 145 and its other end adapted to be engaged by the pin 144 on the wheel 142. Opposite the support 146 is arranged a similar support 148, the two being a sufficient distance apart to permit the passage of the pin 145 between them. To said support is pivoted near its upper end a lever 149 while below the same is pivoted a similar lever 150. The adjacent ends of the levers 149 and 150 bear one against the other while the upper end of the lever 149 is adapted to be engaged by the pin 143 on the wheel 142 and the lower end of the lever 150 is adapted to engage the pin 145 on the shifting bar. Upon the opposite lower sides of the levers 147 and 150 bear the free ends of the springs 151 and 152 the opposite ends of which are secured to the base 1 of the machine. As the wheel 142 revolves in the direction of the arrow the pin 144 comes into contact with the upper end of the lever 147 which is thereby pushed forward. This forces the lower end of said lever against the spring 151. When the wheel 142 has revolved sufficiently to cause the pin 144 to escape over

the top of the lever 147 said lever is immediately released and the spring 151 exerts its power to force the lower end of the lever with violence against the pin 145 knocking the pin, and hence the shifting bar 134, forward and thus throwing the gear wheel 128 into gear with the gear wheel 124 which causes the ribbon to be wound on the ribbon spool 108 as before described. As the wheel 142 continues to revolve it brings the pin 143 into engagement with the upper end of the lever 149, pushing the upper end of said lever forward. The lower end of the lever 149 engages the upper end of the lever 150 and causes the lower end of the latter lever to press back the spring 152 until the wheel in its continued revolution disengages the upper end of the lever 149 upon which the spring causes the lower end of the lever 150 to also strike violently against the pin 145, driving the shifting bar 134 in a direction opposite to that before described, and causing the ribbon to be wound upon the ribbon-spool 107.

The levers 147, 149 and 150 are employed for the purpose of converting the very slow motion of the wheel pins 143 and 144 into a quick motion of the shifting bar through the medium of the springs 151 and 152, as the reversal of the ribbon spools must be effected rapidly, and for the same reason the levers are pivoted near their upper ends so that a small movement of the shorter arms of the levers will produce a much greater movement of the longer arms thereof.

It will be manifest that my improved machine is not exclusively adapted for use as a stenographic machine, for by changing the type and key-board it could be equally as well employed as a type-writer. I also wish to state that I am not confined to the exact and minor details of construction shown and described, as they in most every instance could be very readily changed and altered without departing from the scope intended.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a typewriting machine, the combination of the paper carriage, the platen cylinder, two groups of keys, key-levers and type-bars, the said keys in each group being arranged in pairs in the manner described and the said type bars of the two groups being adapted and arranged to simultaneously print their characters in different vertical planes—while the types in each group are adapted to print their characters at different points on the convexity of the platen, and a variable feed mechanism, arranged and operated in the manner described, whereby the paper carriage is fed forward a different distance by depression of the keys in the two groups, substantially as specified.

2. In a typewriting machine, the combination with the standards 2, 3, the guide bars 4, 5, connecting the same, the paper carriage traveling on said bars and provided with a



platen cylinder, guide roll and table, of the shaft 11, stepped at one end in a bearing in the standard 3, and at the other end journaled in an open-socket 12, and retained therein by a spring latch 13, and a paper roll 10, loosely mounted on said shaft and confined between the end frames of the paper carriage, substantially as described.

3. In a typewriting machine, the combination with the standards 2, 3, and the paper carriage traveling between the same, of the cylinder 40, journaled in said standards and provided with a series of spirally arranged notches, said cylinder being intermittently rotated by the key levers, a spring actuated dog carried by the carriage and engaging said notches, means for disengaging said dog from the notches, and a spring actuated pulley for advancing the carriage, substantially as described and for the purpose specified.

4. In a typewriting machine, the combination with the standards 2, 3, and the paper carriage traveling between the same, of the cylinder 40, journaled in said standards and provided with a series of spirally arranged notches said cylinder being intermittently rotated by the key levers, a spring actuated dog carried by the carriage and engaging said notches, means for automatically disengaging said dog from the notches upon the completion of a printed line, and a spring actuated pulley for advancing the carriage substantially as described and for the purpose specified.

5. In a typewriting machine, the combination with the paper carriage, of the cylinder 40 made in sections each of which is provided with a series of spirally arranged notches a dog carried by the carriage and engaging said notches, means for intermittently rotating said cylinder from the key levers, and mechanism for advancing the carriage, substantially as described.

6. In a typewriting machine, the combination with the standards 2, 3, and the paper carriage traveling between the same, of the cylinder 40 journaled in said standards and provided with a series of spirally arranged notches, a dog carried by the carriage and adapted to engage said notches, the key levers, a universal bar arranged under the key levers, a pawl and ratchet mechanism connected with said cylinder and universal bar, and a spring actuated pulley for advancing the carriage, substantially as described and for the purpose specified.

7. In a typewriting machine, the combination with the standards 2, 3, and the paper carriage traveling between the same, of the cylinder 40, journaled in said standards and provided with a series of spirally arranged notches, ratchet wheels secured to the opposite ends of said cylinder, the pivoted universal bar resting under the key-levers and carrying pawls engaging the said ratchet wheels, springs for depressing the rear ends of said universal bar, a dog carried by the

carriage and engaging the notches on the cylinder, and a spring actuated pulley for advancing the carriage, substantially as described and for the purpose specified.

8. In a typewriting machine, the combination with the standards 2, 3, and the paper carriage traveling between the same, of the cylinder 40, journaled in said standards and provided with a series of spirally arranged notches, ratchet wheels secured to the opposite ends of said cylinder, the pivoted universal bar resting under the key levers and carrying pawls engaging the said ratchet wheels, springs for depressing the rear ends of said universal bar, a dog carried by the carriage and engaging the notches on the cylinder, a spring actuated pulley for advancing the carriage and a spring actuated pulley for returning the same, substantially as described and for the purpose specified.

9. In a typewriting machine, provided with two groups of keys, the combination with the standards 2, 3, and the paper carriage traveling between the same, of the cylinder 40, journaled in said standards and provided with a series of spirally arranged notches, ratchet wheels secured to the opposite ends of said cylinder, the pivoted levers 61, 62, and 63, the levers 61, and 62, being of unequal length, the cross-bars 64, 65, uniting the free ends of said levers and resting respectively under the two groups of key levers, the pawls 67, carried by the rear ends of said levers and engaging the said ratchet wheels, the springs 66, for depressing said levers, a dog carried by the carriage and engaging the notches on the cylinder, and a spring actuated pulley for advancing the carriage, substantially as described and for the purpose specified.

10. In a typewriting machine, the combination with the main frame and traveling paper carriage of a spring actuated pulley 56, connected by a cord or strap to the carriage and operating to advance the same, a spring actuated pulley 79, of greater power than the pulley 56, and also connected to the carriage by a cord or strap and operating to return the carriage, the cylinder 40, journaled in the main frame and intermittently rotated by the key levers and provided with mechanism to permit the pulley 56, to advance the carriage step by step as said cylinder is rotated, a rack bar secured to the carriage, gearing driven by the cylinder and meshing with said rack bar to release the carriage as the cylinder is rotated, and a clutch for throwing said gearing out of mesh to permit the pulley 79, to return the carriage upon its release from the cylinder, substantially as described.

11. In a typewriting machine, the combination with the main frame and traveling paper carriage, of a spring actuated pulley 56, connected by a cord or strap to the carriage and operating to advance the same, a spring actuated pulley 79, of greater power than the pulley 56, and also connected to the carriage by a cord or strap and operating to return the



carriage, the shaft 40, journaled in the main frame and intermittently rotated by the key levers and provided with mechanism to permit the pulley 56 to advance the carriage step by step as said cylinder is rotated, the rack bar 76, secured to the carriage, a shifting beveled gear wheel 68, mounted on said cylinder a beveled gear wheel 72, meshing with said gear wheel, a driving gear wheel 75 meshing with the rack bar, and a clutch for throwing the wheels 68, and 72, in and out of gear, substantially as described and for the purpose specified.

12. In a typewriting machine, the combination with the main frame and traveling paper carriage, of the spring actuated pulleys 56, and 79, of unequal power and operating to move the carriage in opposite directions, the cylinder 40, journaled in the main frame and intermittently rotated by the key levers and provided with mechanism to permit the pulley 56, to advance the carriage step by step as said cylinder is rotated, the rack bar 76, secured to the carriage, a shifting gear wheel 68, mounted on the cylinder, gearing interposed between said gear wheel and rack bar to move the latter, a clutch 70, adapted to throw the gear wheel 68 out of mesh with said gearing, and a shifting bar 71, connected with said clutch and provided near its opposite ends with projecting pins 83 and 84, adapted to be engaged by the carriage as it approaches either end of its journey and thus automatically operate the clutch to throw the wheel 68, in and out of gear, substantially as described and for the purpose specified.

13. In a typewriting machine, the combination with the main frame and traveling paper carriage, of spring actuated pulleys 56, and 79, of unequal power and operating to move the carriage in opposite directions, the cylinder 40, journaled in the main frame and intermittently rotated by the key levers and provided with mechanism to permit the pulley 56, to advance the carriage step by step as said cylinder is rotated, the rack bar 76, secured to the carriage, a shifting gear wheel 68, mounted on the cylinder, gearing interposed between said gear wheel and rack bar to move the latter, a clutch 70, adapted to throw the gear wheel 68 out of mesh with said gearing, and a shifting bar 71, connected with said clutch and provided near its opposite ends with projecting pins 83 and 84, adapted to be engaged by the carriage as it approaches either end of its journey and thus automatically operate the clutch to throw the wheel 68, in and out of gear, and a spring 88, provided at its free end with a projection 89, adapted to engage notches 85, and 86, in the shifting bar and hold the same against accidental movement, substantially as described and for the purpose specified.

14. In a typewriting machine, the combination with the main frame and traveling paper carriage, of the spring actuated pulleys 56, and 79, of unequal power and operating

to move the carriage in opposite directions, the cylinder 40, journaled in the main frame and intermittently rotated by the key levers and provided with mechanism to permit the pulley 56, to advance the carriage step by step as said cylinder is rotated, the rack bar 76, secured to the carriage, a shifting gear wheel 68, mounted on the cylinder, gearing interposed between said gear wheel and rack bar to move the latter, a clutch 70, adapted to throw the gear wheel 68 out of mesh with said gearing, and a shifting bar 71, connected with said clutch and provided near its opposite ends with projecting pins 83 and 84, adapted to be engaged by the carriage as it approaches either end of its journey and thus automatically operate the clutch to throw the wheel 68, out of gear, a pin 91 secured to and projecting from the shifting bar 71, near its center, a pivoted bell crank lever 92, one end of which engages said pin, and a wire 95, attached at one end to the lower arm of said bell crank and at the other end to the lever actuated by the key 39 by means of which the wheel 68, is thrown out of gear by hand, substantially as described and for the purpose specified.

15. In a typewriting machine, the combination with the standards 2, 3, the paper carriage and feed mechanism, of the platen cylinder 8, journaled in the carriage and provided with a projecting shaft 8<sup>a</sup>, beveled teeth 96, arranged upon the periphery of said shaft, and an oppositely beveled finger 100 secured to the standard 2 and adapted to engage said beveled teeth as the carriage approaches said standard and automatically impart a partial rotation to the platen cylinder, substantially as described and for the purpose specified.

16. In a typewriting machine, the combination with the standards 2, 3, the paper carriage and feed mechanism, of the platen cylinder 8, journaled in said carriage and provided with a projecting shaft 8<sup>a</sup>, beveled teeth 96, arranged upon the periphery of said shaft, an oppositely beveled finger 100, secured to the standard 2 and adapted to engage said beveled teeth as the carriage approaches said standard and automatically impart a partial rotation to the platen cylinder, a ratchet wheel 104, secured to the opposite end of said shaft 8<sup>a</sup>, and a pawl 105 engaging said ratchet wheel and preventing backward movement thereof, substantially as described.

17. In a type writing machine, the combination with the standards, 2, 3, the paper carriage and feed mechanism, of the platen cylinder 8, journaled in said carriage and provided with a projecting shaft 8<sup>a</sup>, teeth 96 arranged upon the periphery of said shaft, said teeth having one straight side, the other side being beveled for a portion of its length and straight for the remainder, a finger 100 adapted to engage said teeth and consisting of a fixed member 101, and a pointed member 102, hinged thereto, a spring interposed between said members, the upper sides of said finger,



when in their normal position, forming a continuous inclined straight line, and their lower sides forming an obtuse angle, a ratchet wheel secured to the opposite end of the shaft and  
5 a pawl engaging the same, substantially as shown and described.

18. In a typewriting machine, the combination with the main frame and the platen cylinder, of a ribbon guide composed of sections  
10 alternately hinged together upon opposite sides, and means for projecting the central hinged section over the platen cylinder as a key lever is depressed and retracting the  
15 same upon the release of said key lever to expose the printed character, substantially as described.

19. In a typewriting machine, the combination with the main frame and the platen cylinder, of a ribbon guide composed of sections  
20 alternately hinged together upon opposite sides, the central section thereof being provided with an aperture through which the type imprint their characters, and means substantially as described, for projecting the central  
25 hinged section over the platen cylinder as a key lever is depressed, and retracting the same upon the release of said key lever to expose the printed character, substantially as described.

30 20. In a typewriting machine, a ribbon guide consisting of rectangular strips having overturned edges adapted to embrace the edges of the ribbon, said sections being alternately hinged together upon opposite sides, substantially as described.

21. In a typewriting machine, a ribbon guide consisting of the guide casings 112, 116, 117, 118 and 119, the two latter sliding in suitable  
40 bearings and the guides 116 and 117 hinged thereto at their rear inner corners and hinged at their forward outer corners to the central guide 112, and means for automatically projecting the central guide over the platen cylinder when a key lever is depressed and retracting the same when said lever is released,  
45 substantially as described.

22. In a ribbon guide for typewriters, the combination with the ribbon guide composed of sections alternately hinged together upon  
50 opposite sides, of the pivoted bell crank lever 121, one end of which is attached to the central section of said guide, and a rod 123 attached to the other end of said bell-crank lever, said rod being attached to the lever 63  
55 whereby upon depression of one of the key levers said guide is projected over the platen cylinder, and upon the release of said key lever is retracted to expose the printed character, substantially as described.

60 23. In a typewriter machine, the combination with the main frame, the cylinder 40, the ribbon spools 107 and 108 respectively provided with beveled gear wheels 124 and 125,

and the beveled gear wheels 128 and 129 mounted upon the ends of said cylinder and  
65 adapted to slide longitudinally thereon, of the clutches 131 and 132 engaging said beveled gear wheels 128 and 129, a shifting bar 134 common to both clutches, and a spring-bearing in contact with said shifting bar to  
70 prevent accidental movement thereof, substantially as shown and described.

24. In a typewriting machine, the combination with the main frame and the cylinder 40, of the ribbon spools driven by shifting gears  
75 mounted on said cylinder, clutches engaging said gears, a shifting bar 134 common to both clutches, and mechanism driven by said cylinder and actuating said shifting bar to periodically shift said gears and throw one ribbon  
80 spool into operation and the other spool out of operation, substantially as described.

25. In a typewriting machine, the combination with the main frame and cylinder 40, of the ribbon spools driven by gears mounted on  
85 said cylinder, clutches engaging said gears, a shifting bar 134 common to both clutches, a pin 145 projecting upon both sides of said shifting bar, a wheel 142 receiving motion from the cylinder 40 and provided at opposite  
90 ends of its periphery with pins 143 and 144, and spring actuated levers adapted to be actuated by the pins 143 and 144 to strike the pins 145 upon opposite sides to move the shifting bar 134 in opposite directions, substantially as described.

26. In a typewriting machine, the combination of the cylinder 40 and ribbon spools, gearing driven by said cylinder and actuating said  
100 spools, clutches for alternately throwing said gearing in and out of connection with the spools, a shifting bar 134 common to both clutches, a pin 145 projecting from opposite sides of said shifting bar, a wheel 142 receiving motion from said cylinder and provided  
105 at opposite sides of its periphery with pins 143 and 144, a pivoted lever 147 adapted to be engaged at its upper end by the pin 144 and its lower end adapted to engage one side of the pin 145, a spring bearing against the  
110 lower end of said lever, the levers 149 and 150 engaging each other at their adjacent ends, the pin 143 adapted to engage the upper end of the lever 149 and the lower end of the lever 150 engaging the pin 145, and a spring  
115 bearing against the lower end of said lever, all substantially as shown and for the purpose described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of  
120 two subscribing witnesses.

EDWIN LEE CRAIGMILES. [L. s.]

Witnesses:

CHAS. H. BAKER,  
W. A. MAHAFFEY.