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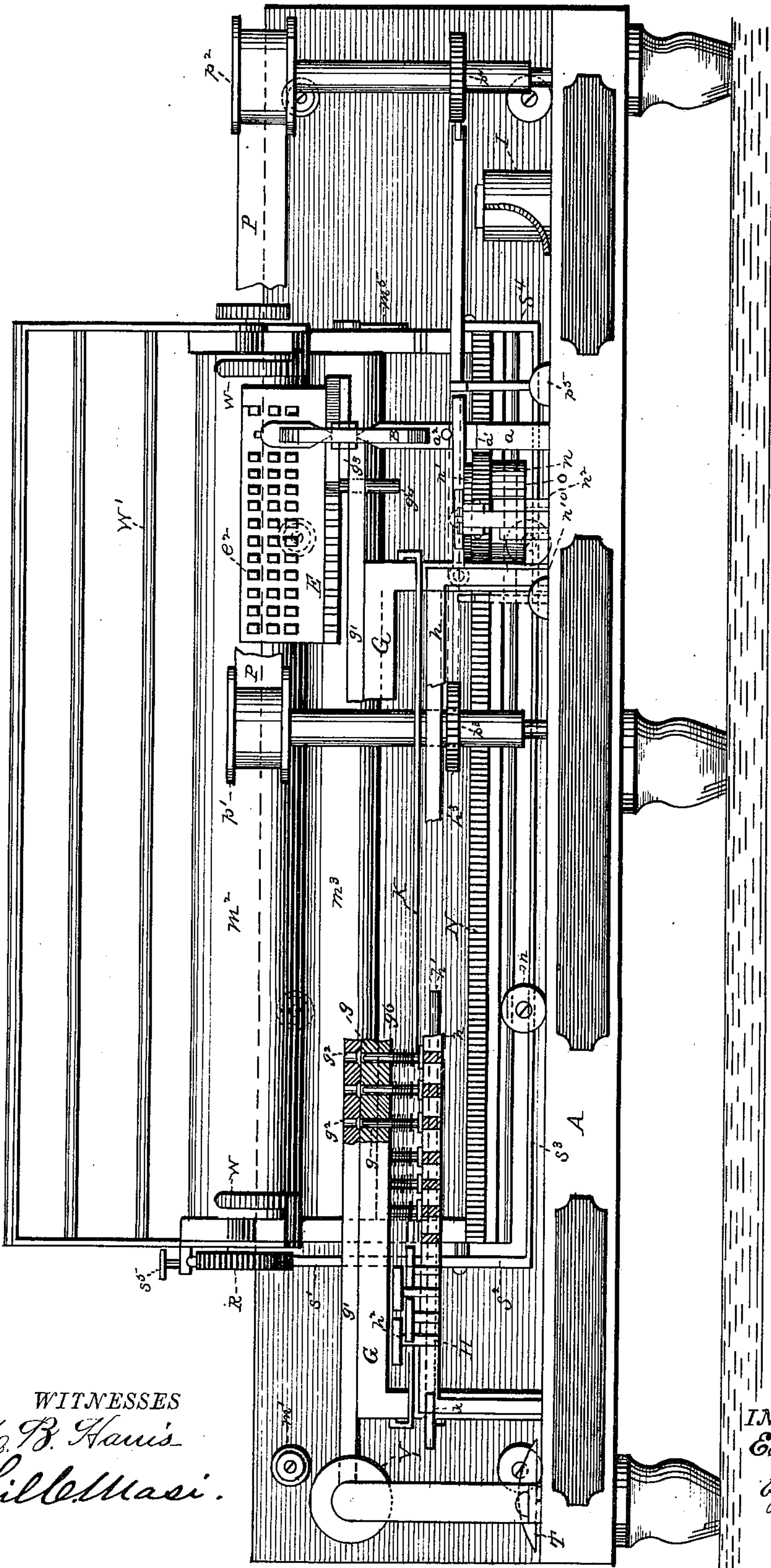
8 Sheets—Sheet 1.

E. J. SILKMAN.
TYPE WRITING MACHINE.

No. 436,319.

Patented Sept. 9, 1890.

Fig. 1.



WITNESSES
W. B. Harris
Phil. Masi.

INVENTOR
Edward J. Silkman.
by E. W. Auderson
Attorney

(No Model.)

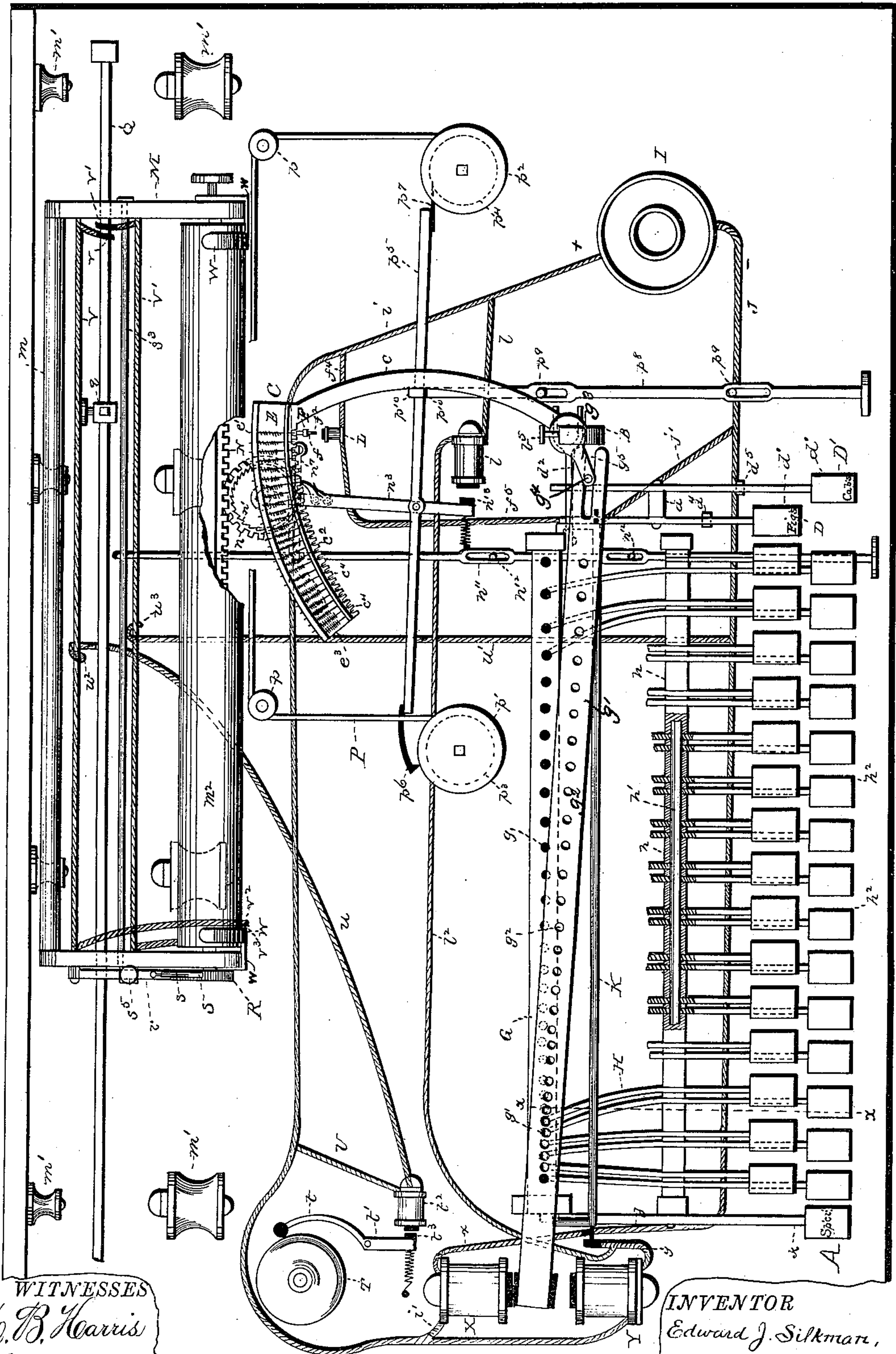
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E. J. SILKMAN.
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Fig. 2.



WITNESSES
W. B. Harris
Philip Masi.

INVENTOR
Edward J. Silkman,
by E. W. Audinson,
Attorney

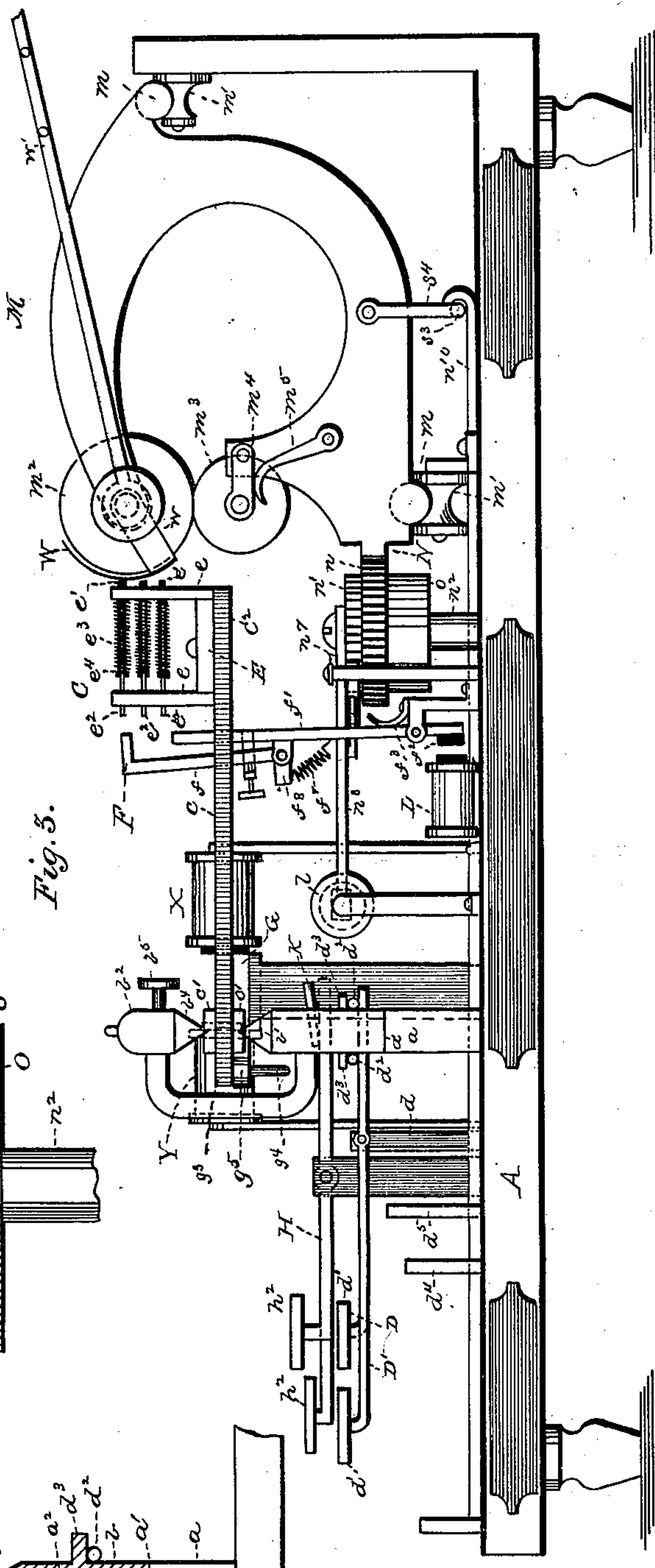
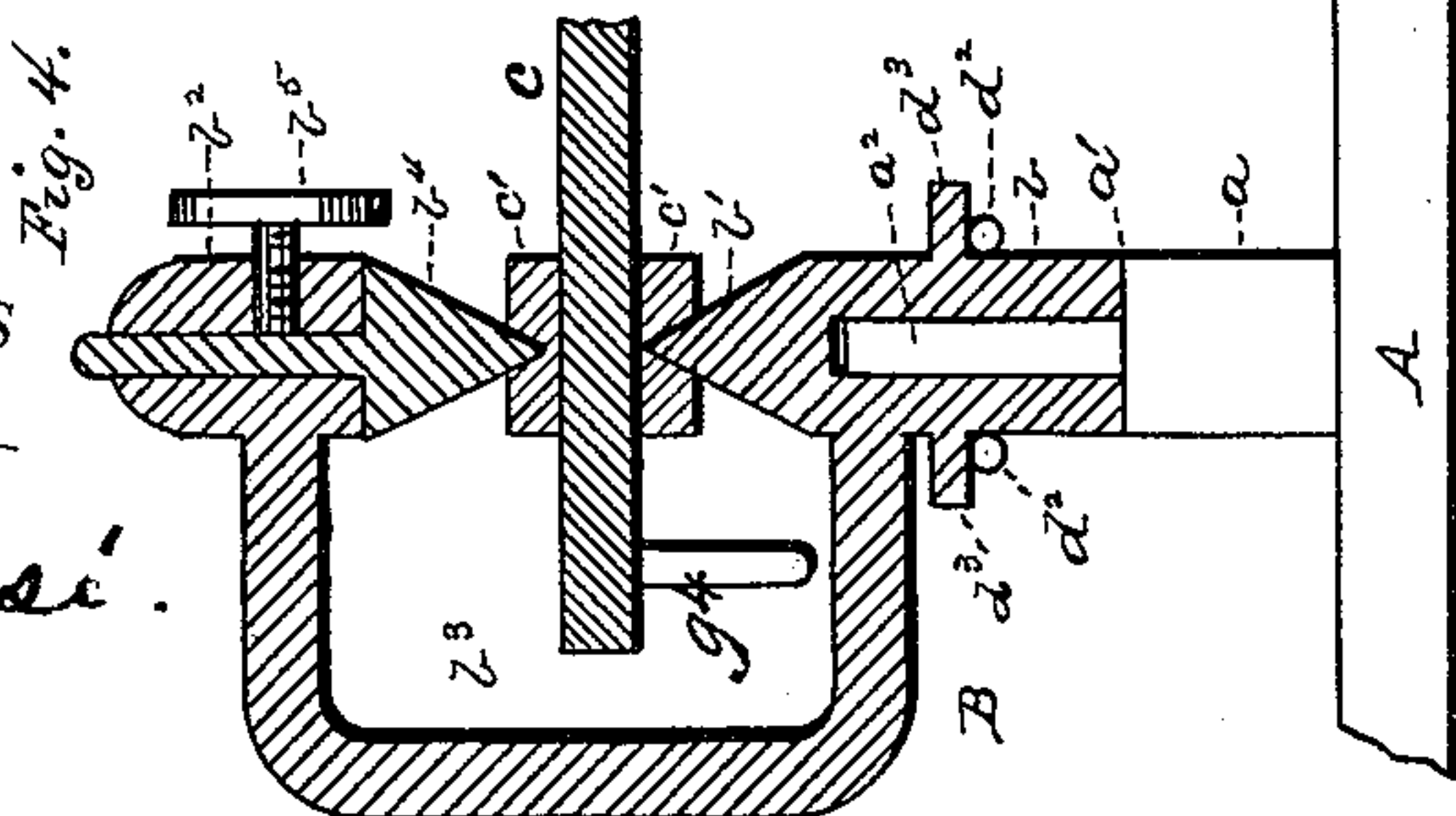
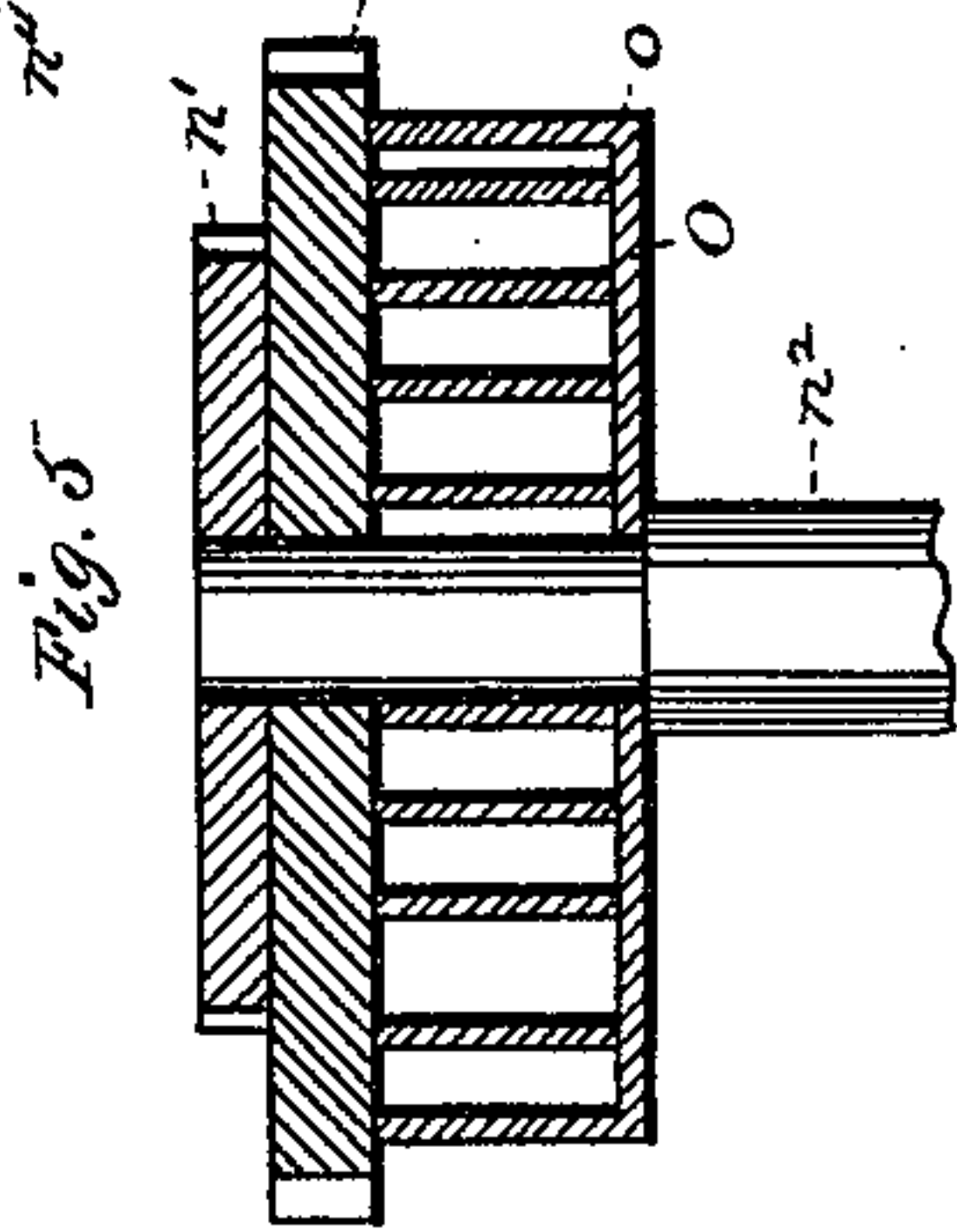
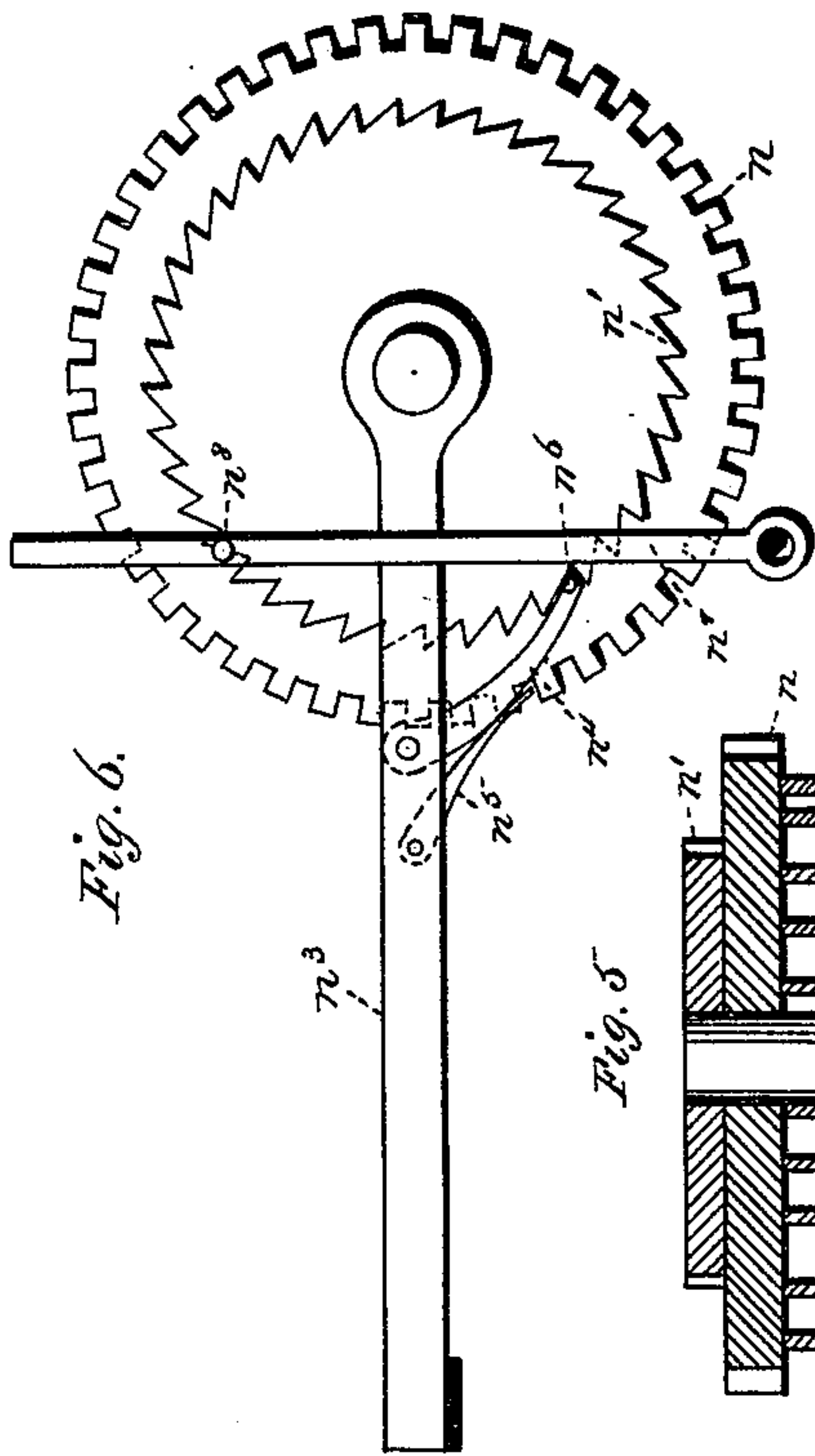
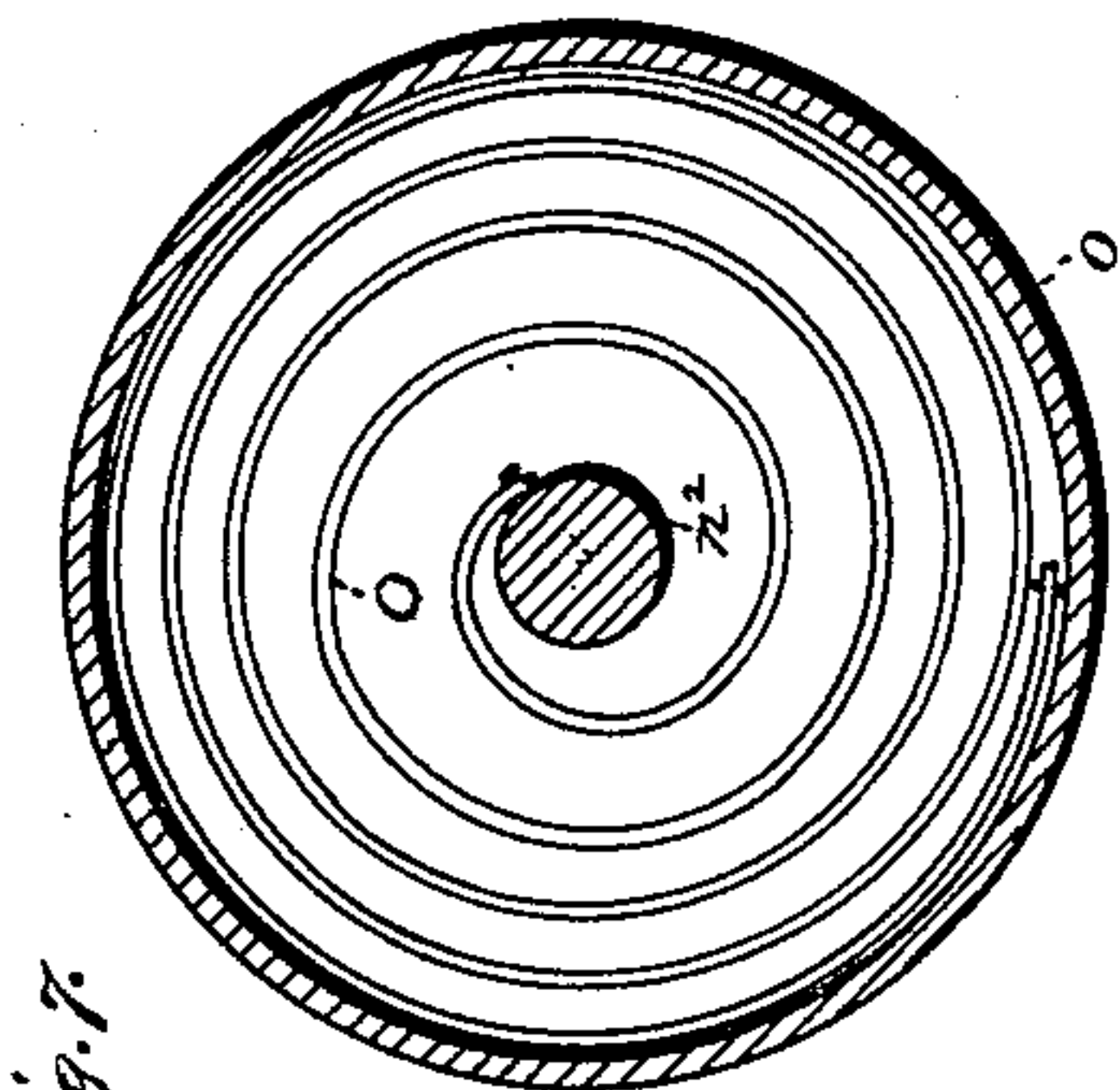
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E. J. SILKMAN.
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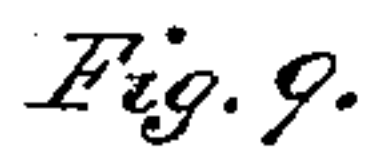


WITNESSES
Mc. B. Harris
Phile. Massi.

INVENTOR
Edward J. Silkman,
by E. W. Anderson.
Attorney

8. Sheets—Sheet 4.

Patented Sept. 9, 1890.



INVENTOR
Edward J. Silberman,
by E. W. Anderson,
Attorney

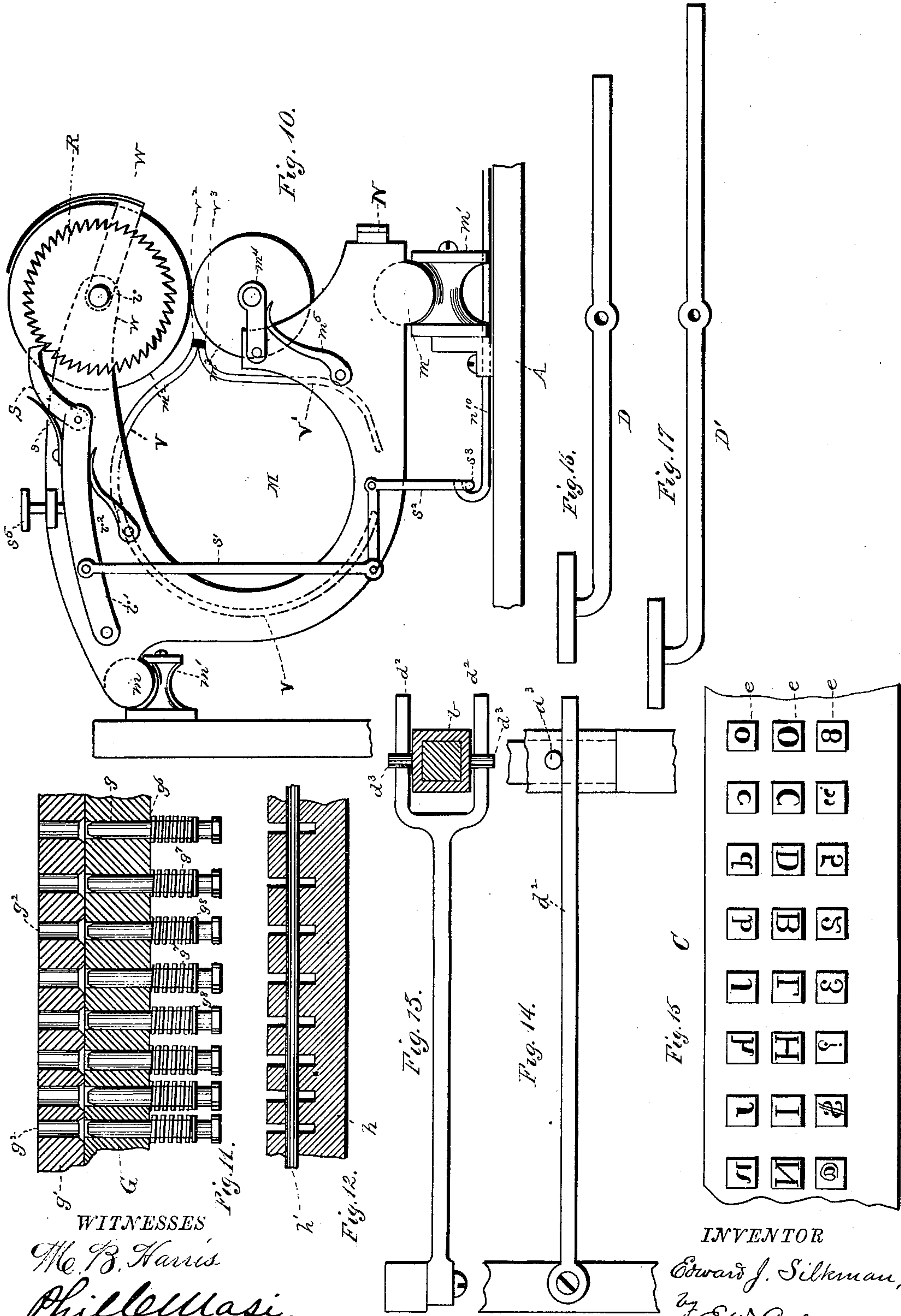
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E. J. SILKMAN.
TYPE WRITING MACHINE.

No. 436,319.

Patented Sept. 9, 1890.



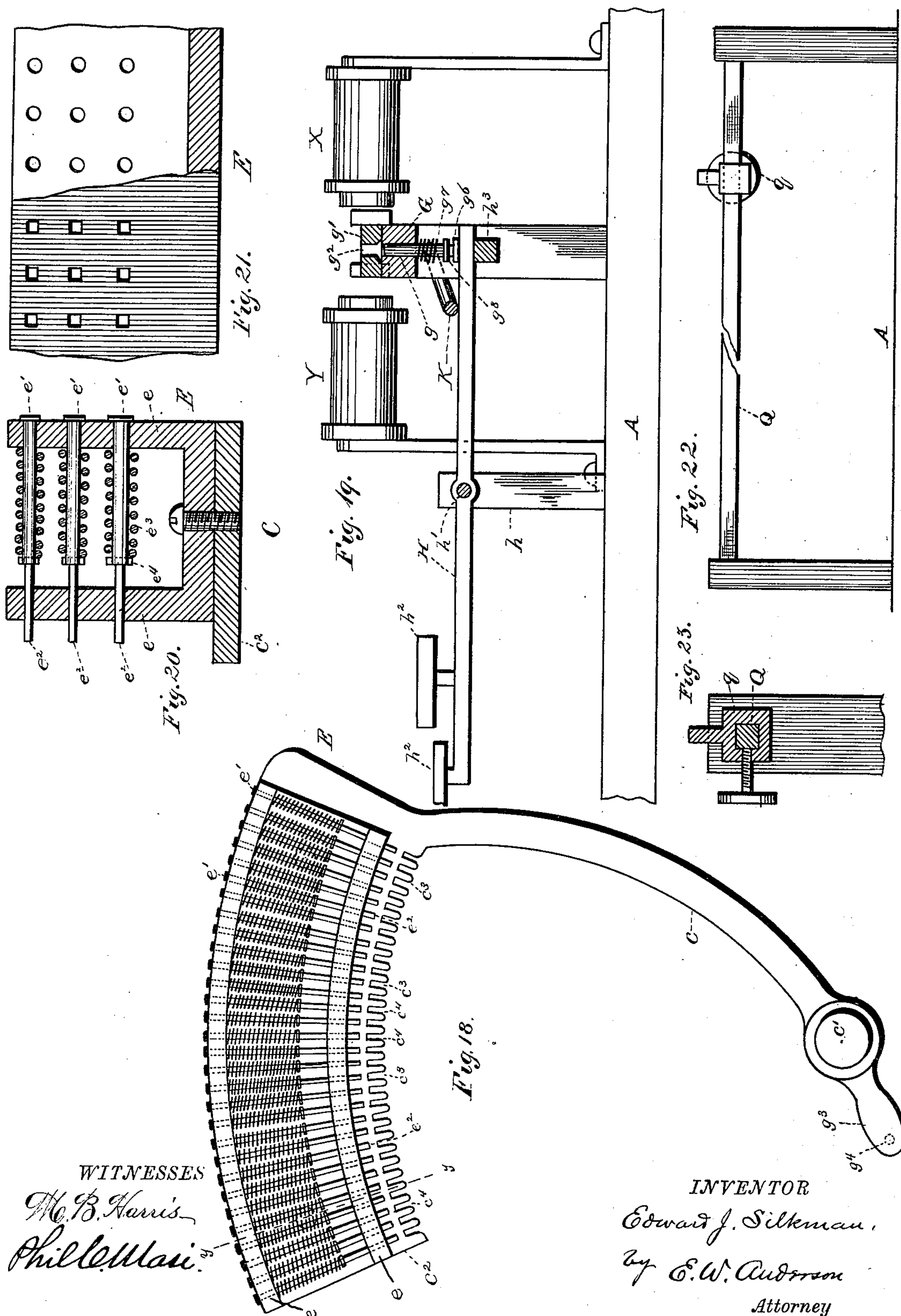
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E. J. SILKMAN.
TYPE WRITING MACHINE.

No. 436,319.

Patented Sept. 9, 1890.



WITNESSES
M. B. Harris
Phil C. Mason

INVENTOR
Edward J. Silkman.
by E. W. Anderson
Attorney

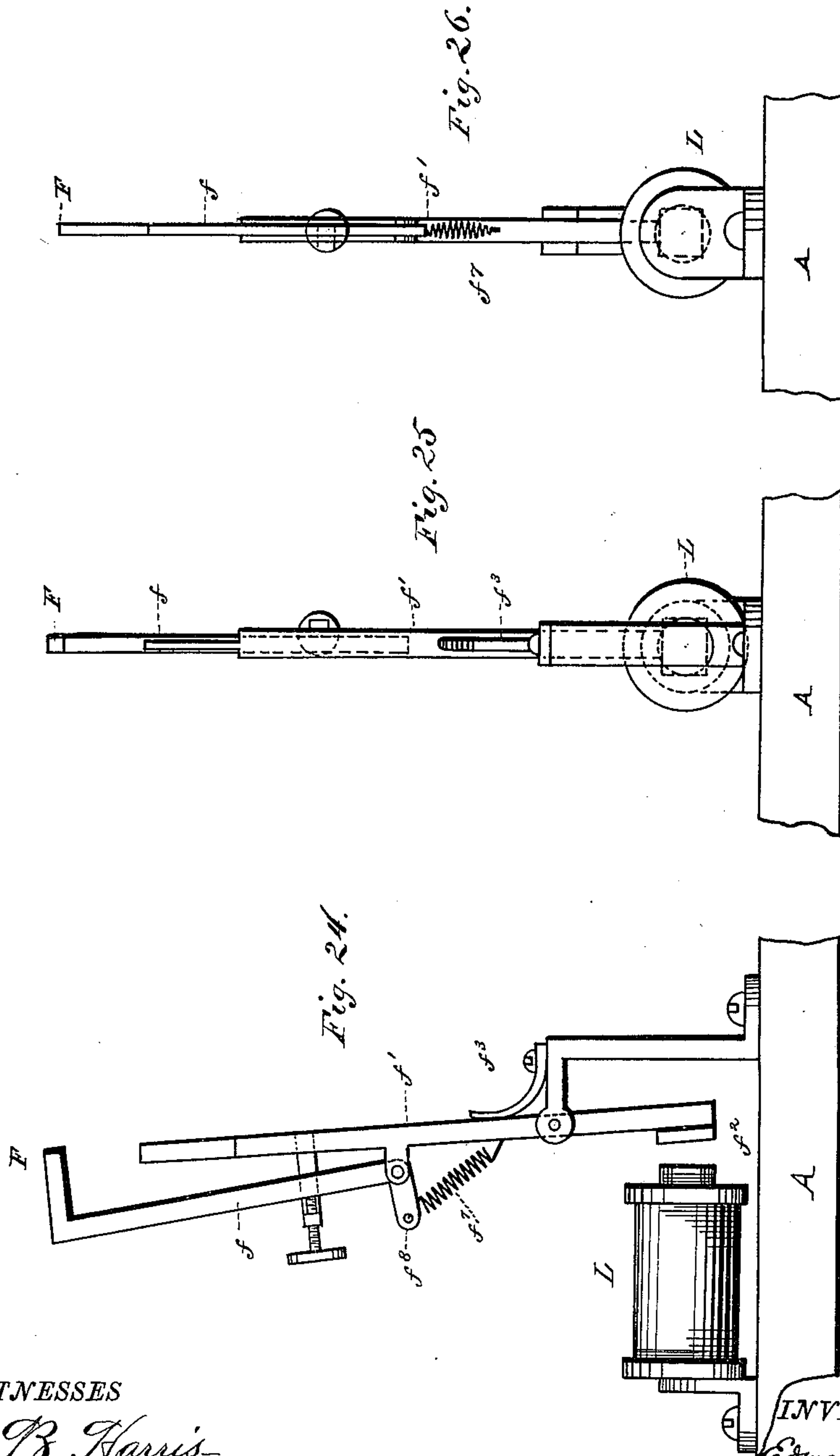
(No Model.)

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E. J. SILKMAN.
TYPE WRITING MACHINE.

No. 436,319.

Patented Sept. 9, 1890.



WITNESSES

Mc. B. Harris
Phillips

INVENTOR

Edward J. Silkman,
by E. W. Anderson
Attorney

(No Model.)

8 Sheets—Sheet 8.

E. J. SILKMAN.
TYPE WRITING MACHINE.

No. 436,319.

Patented Sept. 9, 1890.

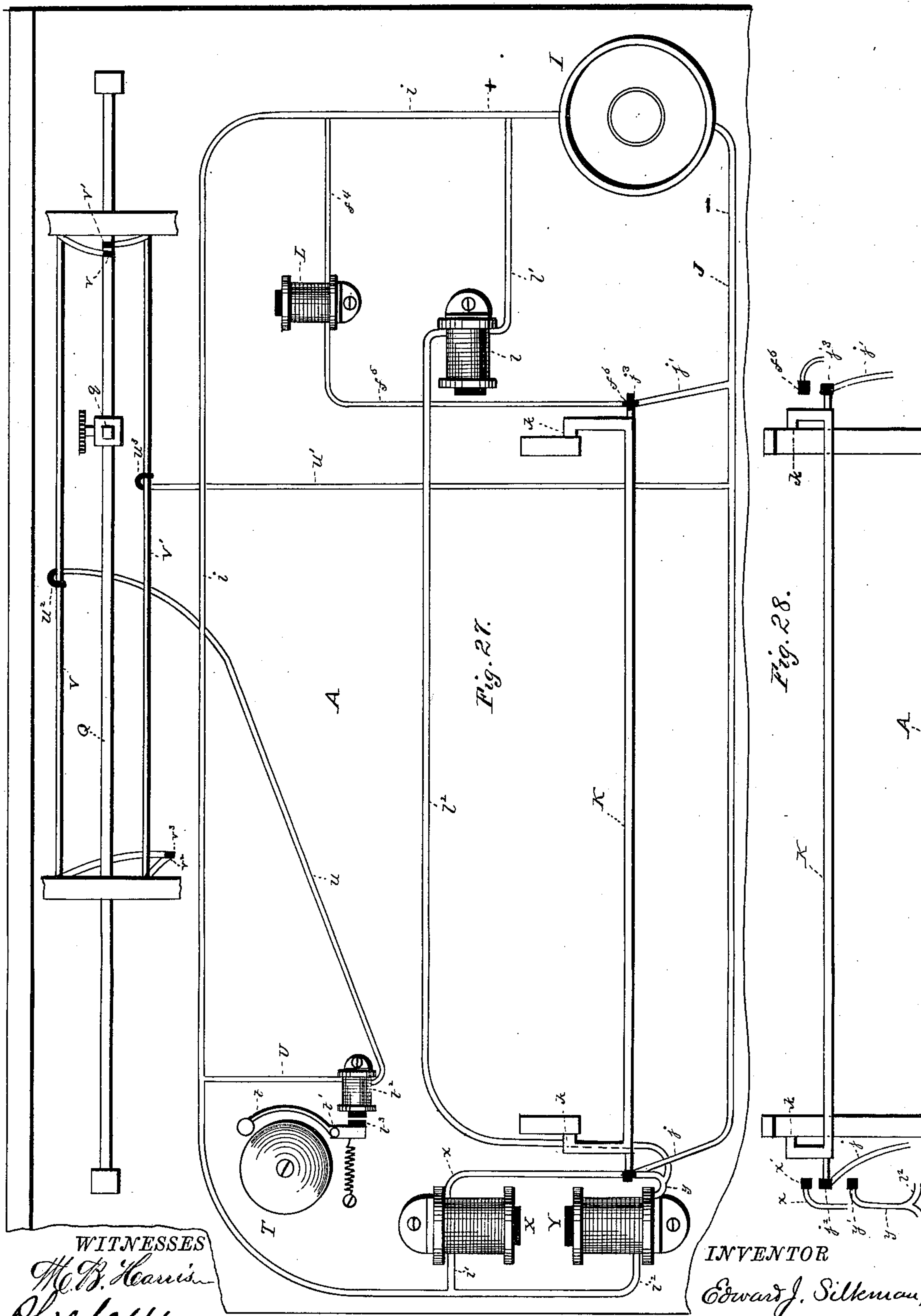


Fig. 27.

Fig. 28.

WITNESSES
H. B. Harris
Phil. Massi

INVENTOR
Edward J. Silkman
by *E. W. Audron*
Attorney

UNITED STATES PATENT OFFICE.

EDWARD J. SILKMAN, OF BALTIMORE, MARYLAND, ASSIGNOR OF TWO-THIRDS TO GEORGE D. PENNIMAN AND THOMAS K. WORTHINGTON, BOTH OF SAME PLACE.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 436,319, dated September 9, 1890.

Application filed August 25, 1887. Serial No. 247,858. (No model.)

To all whom it may concern:

Be it known that I, EDWARD J. SILKMAN, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Type-Writing Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 is a front elevation of my improved electrical type-writing machine. Fig. 2 is a plan view of my improved type-writing machine. Fig. 3 is an end view of same. Fig. 4 is a vertical transverse section of bracket B and cone-points b' b^4 . Fig. 5 is a vertical section of barrel o , spring O , wheel n , and ratchet n' . Fig. 6 is a top or plan view of wheel n , ratchet n' , and levers n^3 and n^7 . Fig. 7 is a horizontal section of barrel o and spring O . Fig. 8 is a front elevation of ribbon movement. Fig. 9 is a plan view of same. Fig. 10 is an end view of carriage M. Fig. 11 is a vertical longitudinal section of a part of bars G g' . Fig. 12 is a vertical longitudinal section of a section of the bar h . Fig. 13 is a broken detail top view of bar d^2 . Fig. 14 is a front view of same. Fig. 15 is a broken face view of type-carrier. Fig. 16 is a detail side elevation of lever and key-plate D. Fig. 17 is a detail side elevation of lever and key-plate D'. Fig. 18 is a detail top view of type-carrier. Fig. 19 is a section on line $x x$, Fig. 2. Fig. 20 is a vertical section on line $y y$, Fig. 18. Fig. 21 is a detail view of type-carrier. Fig. 22 is a front view of bar Q, showing the tappet q . Fig. 23 is a transverse section of same. Fig. 24 is a side elevation of hammer. Fig. 25 is a back view of same. Fig. 26 is a front view of same. Fig. 27 is a plan view of battery and wires. Fig. 28 is a front elevation of bar K, showing contact-points.

This invention relates to type-writing machines, the main object being to actuate the machine by electricity when the key-board is operated in the usual manner, so that by

means of one battery, one main circuit, and several branch circuits the type-frame will be vibrated, the hammer will strike the stem of the proper type-plate, and the carriage will be moved a suitable distance laterally.

Referring to the accompanying drawings by letter, A designates the base-plate of the machine, having the post a rising from it at a suitable point. The said post is provided with the circumferential shoulder a' , above which rises the stem a^2 .

B is a bearing-bracket, having the sleeve b fitting on the stem a^2 down to the shoulder a' , which stem is angular in cross section. The sleeve b at the top is provided with the cone-point b' . The upper sleeve b^2 of the bearing-bracket is aligned with the sleeve b and is connected therewith by the arm b^3 .

b^4 is a detachable and adjustable cone-point having a stem that passes through an axial opening in the sleeve b^2 . By means of this stem and the set-screw b^5 the point b^4 is adjusted in relation to the lower point b' for the purpose of taking up wear.

C is the type-carrier frame or type-frame, consisting of the curved arm c , provided near one end with the opposite bosses c' , which have bearings for the cone-points b' b^4 and the arc plate c^2 concentric with the bearings of the cone-points. The inner edge of the arc plate c^2 is provided with the series of equidistant notches c^3 , the openings of which are rounded or beveled on each side, as at c^4 , for a purpose hereinafter explained.

D D' are key-levers pivoted upon opposite sides of a post d rising from the base-plate A and respectively provided with the face-plates d' d'' . The inner arms of the said levers bear against the lower edge of a lifting-bar d^2 , which has one end pivoted on a standard rising from the base-plate and the other end bifurcated. The arms of the bifurcation rest under the pins d^3 , which stand out oppositely from the lower sleeve b of the bearing-bracket B.

The key-levers D D' have respectively under their outer arms the stop-blocks d^4 d^5 , which limit the upward motion of their inner arms, the lever D moving the bifurcated end

of the bar d^2 twice as high as the key-lever D' moves the same. This is for the purpose of moving the type-case and the type-plates, hereinafter described, into such position that their different rows of type will face the center of the roller.

The key-plate of the lever D' is marked "caps," and that of the lever D "signs" or "numbers."

E is the type-case, consisting of a base-plate secured to the arc plate of the type-frame and the inner and outer vertical edge plates or flanges e concentric with the cone-points or journals. The outer flange is flush with the outer edge of the arc plate c^2 , but the inner flange is sufficiently removed from the inner edge of the same to leave the notches c^3 entirely uncovered.

$e' e'$ are the rows of type-plates resting normally against the outer surface of the outer flange e , the members of the rows being each provided with a central stem e^2 , which stems pass through registering or corresponding openings in the plates e , the stems being radial to the arcs on which the plates are made. The corresponding members of the rows are above each other and vertically and centrally above the corresponding notches c^3 .

F is the hammer, hereinafter described, situated centrally in a plane at right angles to the roller and passing vertically through the bearings of the type-frame, so that when the hammer strikes the inwardly-projecting end of the type-stem e^2 the type-plate will be driven squarely against the paper on said roller.

Each type-plate has on its surface opposite the type-frame a character, the one on the upper plate being a small letter, that on the central plate in the row being the capital letter corresponding to said small letter, and the character on the corresponding plate in the lowest row a sign or number. Thus there are formed by the type-plates three rows of characters, small letters, capitals, and signs or figures in the order stated. The type-stem of each plate is surrounded between the plates e by a coiled spring e^3 , which bears against a collar e^4 and returns the type-plates inward after it has been driven outward by the hammer. The type-stem on the side of the collar e^4 toward the inner end e^2 thereof is reduced in size and squared, passing through a squared opening in the adjacent plate e for the purpose of preventing said stem from rotating in its bearings and misplacing the letter.

G is a horizontal bar supported upon end standards rising from the base-plate and provided with a series of vertical openings g , and g' is a metal lever-bar resting upon the bar G and provided with vertical openings g^2 , registering at certain times with the openings g .

g^3 is an arm standing out from the curved arm c of the type-frame and provided with a depending pin g^4 , that enters a longitudinal

notch or slot g^5 in the adjacent end of the lever-bar g' . The opposite end of the lever-bar is situated between the facing-poles of the electro-magnets, hereinafter described, and is alternately attracted by each, for a purpose hereinafter explained.

$g^6 g^6$ are pins provided with heads on their lower ends that rest normally in the openings g and are thrust downward by the coiled springs g^7 , that surround them between the lower surface of the bar G and the collars g^8 . The upper ends of the pins are beveled or rounded and the lower ends of the openings g^2 are correspondingly countersunk, so that the pins will readily enter said openings. The heads on the lower ends of the pins rest upon the ends of the inner arms of the key-levers H , which are pivoted in notches in the longitudinal bar h , a rod h' passing through the bar and through suitable openings in the key-levers, which are provided on the ends of their outer arms with the key-plates h^2 and rest when in normal position upon a stop-bar h^3 , that extends between the end supports of the bar G and prevents the inner arms of the levers from descending below a horizontal position, so that the pins g^6 are held with their ends in the openings g , but not in the openings g^2 .

The faces of the key-plates h^2 are marked each with the letter and the sign or number corresponding with those on the registering type-plate in the three rows, so that when any key is depressed and the pin g^6 corresponding thereto is driven up into the proper opening g^2 in the lever-bar g' the said lever-bar will by the attraction of the magnet X turn the type-frame into such position that the stem of one of the corresponding type-plates will be in front of the hammer and ready to be struck thereby, so as to make its impress upon the paper in front of the roller. The openings in the lever-bar are so related to the type-plates and the pins g^6 that when any key is depressed and the circuit established by means hereinafter described one of the corresponding type-plates will have its stem moved in front of the hammer ready to be struck thereby.

The magnets X and Y are aligned with their facing-poles on each side of the outer end of the lever-bar, and have their helices in the following circuits.

I is the battery, having the positive wire i , which runs outward and branches, one branch i' connecting with the helix of the magnet X and the other branch i^2 connecting with the helix of the magnet Y . The negative wire J from the battery has a branch j , which runs to one end of a bar K , resting upon the key-levers and pivoted at the ends of its arms k upon the supports of the perforated bar G , the said end being adjacent to the magnets X and Y . A second branch j' runs to the other end of said bar K . $j^2 j^3$ are contact-points standing from the ends of said bar and in electric connection, respectively, with the

wires j and j' . When any key is pressed down, the corresponding pin g^6 is pushed up into the opening g^2 above the opening g , in which the said pin rests, so that the lever-bar can turn on the pin as a fulcrum. The openings g in the bar G and the corresponding openings g^2 in the lever-bar gradually decrease their distance apart toward the magnets in the proper ratio to cause the throw of the type-frame when any key is touched to bring the proper type-plate in front of the hammer, the fulcrum-point changing when different keys are operated. When the nearest pin to the magnet is pressed up by its key and is the fulcrum on which the lever-bar turns, the leg of said bar toward the magnets is much shorter than the leg outward from the same, and consequently the type-frame will be thrown to its farthest position inward and the type-plate nearest the arm of the frame will be brought in front of the hammer. When the pin nearest the type-frame is pressed up by the corresponding key, the outer arm of the lever-bar is much shorter than the inner arm of the same, and consequently the type-frame is moved the least distance and the type-plate farthest from the arm of the frame is brought under the hammer. The intermediate openings in the lever-bar and bar G are spaced in such manner that the type-frame will be moved by operating the keys multiples of the distance between any adjacent type-plates, which are arranged at equal distances apart.

L is the magnet for the hammer F , the rod f of which is pivoted on a projection f' , pivoted on a bracket rising from the base-plate of the machine. On the lower end of said bar f' is an armature f^2 for the magnet L .

f^3 is a spring secured to the bracket and forces the bar f' outward from the stems of the type-plates against the action of the magnet L .

f^7 is a coiled spring, which connects the arm f^8 of the hammer-rod f with the bar f' .

f^4 is a wire connecting the helix of the magnet L with the positive wire of the main circuit, and f^5 is a wire running from the hammer-magnet and having a contact-point f^6 on its end, which point stands above the contact-point j^3 .

The magnet Y connects by a wire y with a contact-point y' below the contact-point j^2 , and the magnet X connects by a wire x with a contact-point x' , which stands above the contact-point j^2 , but nearer thereto than the contact-point f^6 is to the contact-point j^3 , so that when the key is touched and the bar K raised the point j^2 , which is between the points x' and y' , will close the main circuit before the secondary circuit through the points j^3 and f^6 and the hammer-magnet is closed.

By this means the type-frame is thrown into position before the magnet L by attracting the armature f^2 causes the hammer to strike the stem of the type-plate in front of it. When the key is released, the bar K falls

back therewith, the circuits between the points j^3 and f^6 and between the points x' and j^2 are broken, and the circuit between the points j^2 and y' is established, so that the magnet Y is rendered active and the lever bar drawn to the magnet, moving the type-frame into its normal position.

k is a key-lever pivoted upon the bar h on the rod h' and resting on the bar h^3 similarly to the key-levers H . The said key-lever does not extend under a pin, but under the bar K only, which it raises when the key-plate is pressed down. By pressing the key-lever k down sufficiently to raise the bar K slightly the circuits through the magnets Y and l are broken, but the circuits through x and the hammer-magnet are not established. Then when the key is released no letter is printed; but when the bar K falls and establishes the circuit through the magnets Y and l the carriage will be moved a space. The circuits are broken only to let the bar n^3 spring back and the pawl n^4 engage another tooth. Then when the bar K falls and the circuit is established through the magnets Y and l the magnet l attracts the armature n^{13} and moves the carriage. This is done to secure a blank space between the words. The hammer is not thrown directly by the magnet L , but the motion of the bar f' , caused by the magnet, gives the hammer sufficient momentum to overcome the tension of the spring f^7 , so that the hammer is thrown over against the type-plate stem, and after striking it immediately rebounds and allows the type to retract from the roller, the spring f^7 drawing the hammer outward. The bar f' strikes in the notches c^3 , and should the type-frame not be in the exact proper position on account of a worn pin or from other cause the said bar by striking on one or the other of the beveled edges of the corresponding notches will force the type-plate into a perfectly-true position for the type when struck by the hammer to print in the proper place.

l is the magnet that moves the carriage by means of mechanism hereinafter described. This magnet connects with the positive wire i by a wire l' and with the contact-point y' by a wire l^2 , so that when the circuit through the magnet Y is established a secondary circuit is also established through the magnet l and the carriage moved a proper distance.

M is the carriage, provided with the longitudinal rods m m , that slide laterally on the sets of rollers m' m' , provided with shafts having bearings in brackets secured to the main frame.

m^2 is the main roller, and m^3 is the lower opposing roller that coacts with the main roller to carry the paper. The said rollers are journaled in the arms of the frame M , the lower roller m^3 having its bearings journaled in the outer ends of short bars m^4 , the inner ends of which are pivoted upon the outer surfaces of the arms or ends of the carriage. m^5 are springs secured to said arms and

bearing against the bars m^4 to force the roller n^3 upward against the main roller.

N is a longitudinal rack secured to the lower part of the carriage and meshing with the gear-wheel n , which has secured upon its upper side the ratchet-wheel n' , the gear-wheel and ratchet-wheel both rotating upon a vertical shaft n^2 rising from the base-plate.

N^3 is a lever with one end pivoted upon the shaft n^2 above the ratchet-wheel and having pivoted upon it the pawl n^4 , which engages the ratchet-wheel and is forced into engagement therewith by the spring n^5 , secured upon the lever. The pawl n^4 has a pin n^6 standing upward from a point near its end, which pin rests against the spring-bar n^7 , that has a depending pin n^8 engaging the teeth of the ratchet-wheel. The outer end of the spring-bar n^7 enters between the up- standing arms n^9 of a bar n^{10} , that is provided with longitudinal slots n^{11} , into which the guide-pins n^{12} enter, so that when the bar n^{10} is pulled outward the spring-bar n^7 pulls the pawl out of engagement by means of the pin n^6 , and also moves its own pin n^8 out of engagement with said wheel. The pin n^8 on the spring-bar keeps the ratchet-wheel and gear-wheel n from rotating when the pawl n^4 is drawn over the ratchet-wheel and held thereto by the spring n^5 . When the circuit is established through the magnet Y and also through the magnet l by the means described, the latter magnet attracts the armature n^{13} on the outer or vibrating end of the lever n^3 , and by means of the pawl n^4 , the gear-wheel and rack N, moves the carriage a proper distance laterally.

O is a coiled spring in a barrel o , which turns upon the shaft n^2 and is secured to and below the gear-wheel n . The said spring has one end attached to the barrel within the same and the other end attached to the shaft n^2 , so that as the carriage is moved over to the left by the pawl n^4 the spring is wound up. When the carriage has reached its proper distance to the left, the operator, by pulling the bar n^{10} outward, releases the pins n^6 and n^8 from engagement with the ratchet-wheel, as described, and the spring O returns the carriage to the right.

P is a ribbon running in front of the main roller over the rollers p , and p' and p^2 are the spools upon which the ribbon is wound, the ribbon passing from the spool p' to the spool p^2 over the rollers, or the reverse.

p^3 and p^4 are ratchet-wheels secured, respectively, to the shafts of the spools p' and p^2 , and having their teeth face in the same direction. The said shafts turn on standards which rise from the base-plate and enter the bores of the shafts, and have their upper ends squared, so that the spools which have squared openings can be slipped on and off and will turn with their respective shafts.

p^5 is a bar pivoted at its central point on the lever n^3 and having on its opposite ends

the pawls p^6 p^7 , respectively, so that as the lever n^3 swings to the magnet l when the bar p^5 is in the position shown in the drawings the ratchet-wheel p^4 is shoved by the straight pawl p^7 and the ribbon given a part of a turn on the spool p^2 and off the spool p' , as the ratchet-wheel p^3 is not engaged by the pawl p^6 . This action takes place when the circuit through the magnets Y and l is closed, so that when a key-lever falls back after operating the corresponding type-plate the ribbon is moved a space for the next actuated type-plate to strike a fresh place thereon.

p^8 is a slotted bar moving on the guide-pins p^9 p^9 and provided with the arms p^{10} p^{10} , between which rests the arm of the bar p^5 nearest the spool p^2 . When the slotted bar is pushed inward, the bar p^5 is moved on its pivotal point in such manner that the pawl p^7 is disengaged from the ratchet-wheel p^4 and the pawl p^6 is engaged on the ratchet-wheel p^3 . The ribbon is then wound in the opposite direction, or on the spool p' , the pawl p^6 , which is curved, pulling the ratchet-wheel toward the magnet l as the latter attracts the armature.

Q is a bar extending longitudinally under the carriage and supported at the ends by standards. The bar Q is angular in cross-section and has upon it the tappet q , the sleeve of which slips on the bar and is adjustable thereon by a set-screw, as shown.

R is a ratchet-wheel secured on the left journal of the shaft r of the main roller.

r' is a lever pivoted at one end to the carriage and at the other end carrying the pivoted pawl S. The lever r' is pressed upward by the spring r^2 , secured to the carriage, and the pawl S, which engages the ratchet-wheel R, is pressed into engagement therewith by the spring s , which is secured upon the lever r' .

s' is a link-rod connecting the lever r' at a suitable point with the horizontal arm of a crank-lever s^2 , which is pivoted at its angle to the carriage and has its vertical depending arm connected to one end of a bar s^3 , the opposite end of which is similarly connected to a link s^4 , which has its upper end pivoted to the opposite end of the carriage at a point corresponding to the pivotal point of the crank-lever. The said link equals in length the depending arm of said crank-lever. The bar s^3 rests within a hook on the rearwardly-extended end of the slotted sliding bar n^{10} .

When the end of any line is nearly reached, the same is indicated by the following means: A bell T is secured to any proper point of the main frame, having a hammer t . The rod or handle t' of the bell is pivoted upon a proper support on the base-plate, as shown. t^2 is an electro-magnet, with one pole opposite the armature t^3 on the arm of the hammer-rod, so that when the magnet attracts the armature the bell will ring. The magnet t^2 connects with the positive wire i of the main circuit, by a wire U and has a wire u running

from it and rising within the carriage-frame at a proper point. u' is a wire running from the negative wire J of the main circuit to a point transversely opposite the wire u . The wires u and u' , respectively, end in contact-hooks u^2 and u^3 , which engage over the parallel wires V V', running between the ends of the carriage. The said wires rise within the carriage-frame at such a point that neither end of said frame can strike them while moving to and fro. The wires V V', at the right end of the carriage are provided with the free spring ends or contact-points $v v'$, one of which is inward from the other and which spring apart to prevent contact. When said electric points reach the tappet q as the carriage moves to the left, the tappet forces them together, closing the circuit through the magnet t and ringing the bell. Immediately thereafter the operator pulls out the bar n^{10} , releasing the carriage, as described, which is then carried to the right end of the machine by the spring O. The pulling out of the bar n^{10} also swings outward the bar s^3 , and by means of the angle-lever s^2 and link s' draws down the lever r' , causing the pawl S to rotate the main roller and move the paper the proper space for a new line.

s^5 is a set-screw engaging a tapped opening in a lug on the carriage. By means of this set-screw the lever r' can be depressed and the space consequently made narrower. At the left end of the carriage the wires V V' are provided with the elastic contact-points $v^2 v^3$, which lie between the two rollers, so that the paper passes between them and separates said points. When the paper is removed, the points spring together, closing the circuit and ringing the bell. The circuit through the magnet t^2 can thus be closed either through the points $v v'$ or through the points $v^2 v^3$, as the hooks $u^2 u^3$ keep up constant contact with the wires V V' as the carriage slides along.

W W are springs secured to the arms $w w$, that are attached to the ends of the carriage-frame. The said springs are curved to conform to the circumference of the main roller and hold the opposite edges of the paper on the roller. The paper passes from rearward under the main roller and under said springs and is by them directed forward and upward to receive the impress of the type-plates. Then it is directed backward over the top of the main roller and falls on the frame w' , which inclines upward and rearward from the carriage. When one of the pins g^6 has been driven up into the corresponding opening g^2 by the key-lever below it, it acts as a pivot for the lever-bar to return to its normal position. The contact-points $x' y'$ are so situated that when the perforated lever-bar is in its normal position and the keys down the point y' and the point j^2 are in contact and the circuit is established through the magnets Y and L. When the key falls back, contact is made between the points j^2 and y' before the

pin is out of the corresponding opening g , so that the lever-bar can turn thereon into its normal position, and when said contact is made the carriage is advanced in the manner and by the means described.

Having described my invention, I claim—

1. The combination of an electric battery having connection with oppositely-disposed electro-magnets, a type-carriage, a lever-bar having connection with the type-carriage, a circuit-closer, and independent pivots separately thrown into action at will between said lever-bar and keys, substantially as and for the purpose set forth.

2. The combination of an electric battery having connection with oppositely-disposed electro-magnets, a type-carriage, a lever-bar having connection with said carriage, keys, a circuit-closer, independent pivots separately thrown into action at will between said lever-bar and keys, the hammer, and its magnet, said circuit-closer having the contact-point upon one end nearer to the contact-point of the main circuit-wire than the contact-point upon its opposite end is to the contact-point of the secondary circuit-wire, substantially as specified.

3. In a type-writer, the combination of the fixed perforated bar, the lever-bar provided with perforations registering with those of the fixed bar, the pivoted keys, and the pins resting on the inner arms of the keys, with the two magnets having their poles aligned on each side of the outer end of the perforated lever-bar, the frame K, the battery, circuits, and contact-points, whereby the current is alternately deflected through the magnets when operating a key, first throwing the type-frame in front of the printing-roller and then returning it to its normal position, substantially as specified.

4. The combination of the perforated lever-bar, the pivoted keys, the pins moved by said keys, the oppositely-disposed electro-magnets, the battery, the circuit-wires, and the bar lying upon the inner arms of the keys and having the contact-point upon its one end in nearer proximity to the contact-point of a main circuit-wire than the contact-point at its opposite end is to the contact-point of a secondary circuit-wire, substantially as and for the purpose set forth.

5. In a type-writer, the combination, with the battery, magnets, circuits, and contact-points, substantially as described, of the pivoted key-levers, the spring-controlled pins, the stationary perforated bar, the lever-bar provided with perforations corresponding with those of the stationary bar and having a slot in its inner end, the frame K, the journaled type-frame provided with a depending arm that enters said slot, the type-carrier secured to said frame and provided with the inner and outer plates concentric with the journals of the lever-frame, and the type-plates having letters, signs, and figures simi-

lar to those of the corresponding keys, substantially as specified.

6. The combination of the vibratory type-carriage, the electric battery, the oppositely-disposed electro-magnets, the circuit-wires, the contact-points, the perforated lever-bar, the pins actuated by the keys, the circuit maker and breaker or commutator, the contact-points of said commutator or circuit maker and breaker, the contact-point upon one end of said commutator being nearer to the contact-point of the main circuit-wire than the contact-point upon the opposite end of said commutator is to the contact-point of the secondary circuit-wire, and the hammer and its circuit-wires, substantially as set forth.

7. The combination of the battery, electro-magnets, circuit-wires, contact-points, the pivoted key-levers, the spring-controlled pins, the stationary perforated bar, the perforated lever-bar having an end slot, the bar or frame resting upon the key-levers, the journaled type-carriage provided with a pendent arm entering the end slot of the lever-bar, the type-plates having letters, signs, and figures corresponding to those of the keys, the hammer, the hammer-magnet, and the secondary circuit for actuating the hammer, substantially as and for the purpose specified.

8. In a type-writer, the combination of the vibratory type-frame, the stationary perforated bar, the lever-bar having perforations that register with those of said bar, the spring-controlled pins, the pivoted key-levers to raise said pins, the magnets aligned on opposite sides of the outer end of the lever-bar, the main circuit, the bar lying on the key-levers with its arms pivoted on the supports of the stationary perforated bar, the contact-points attached to one end of said pivoted bar, and the contact-points on the ends of the wires from the magnets, respectively, above and below the contact-point on the pivoted bar, the contact-point at the end of one upper wire being nearer to the contact-point at one end of the pivoted bar than the contact-point at the end of the other upper wire is to the contact-point at that end of the pivoted bar, substantially as specified.

9. The combination of the vibratory type-frame, the bank of pivoted key-levers, the pins, and the lever-bar slotted at one end to receive the depending pin from the type-frame and provided with perforations registering with the pivotal pins and adapted to receive the same when driven up by the corresponding keys; substantially as specified.

10. In a type-writer, the combination, with the perforated lever-bar, the pivoted key-levers, the spring-controlled pins, the type-frame actuated by the movement of the lever-bar, the type-carrier attached thereto, and the main-current battery and magnets vibrating said lever-bar and frame when the keys are operated, of the carrier-frame, the

rack secured to the same, the gear-wheel and attached ratchet-wheel, the lever pivoted on the shaft of said gear-wheel, the spring-pawl pivoted to said lever and engaging the ratchet-wheel, the magnet actuating said lever, and the secondary or shunt circuit, of which the helix of said magnet forms a part and which connects with the negative and positive wires of the main circuit and is provided with contact-points that connect only when the perforated lever-bar is in its normal position, substantially as specified.

11. The combination, with the vibratory lever-bar, the type-frame actuated by said bar, the battery, magnets, and main circuit, of the hammer, the hammer-magnet actuating the same, and the secondary or shunt circuit, of which the hammer-magnet forms a part and which has contact-points that connect immediately after the main circuit is closed through the helix of the magnet and throws the type-frame forward, substantially as specified.

12. An electro type-writing machine, substantially as described, consisting of a bank of keys, a battery, a main circuit having electro-magnets, a perforated lever-bar vibrated by said magnets when the keys are operated, spring-controlled pins resting upon the keys and within apertures in a stationary bar, a commutator actuated by the said key-levers, a vibratory type-frame moved by the lever-bar, a carriage having a rotary main roller, mechanism for actuating the main roller-carrying carriage, the type-plates provided with stems, a type-carrier secured to the type-frame and provided with bearings for the said stems, a hammer situated in position to strike the stems of said key-plates when brought opposite to it, and a shunt or secondary circuit in connection with the main circuit and having within it a magnet that operates the hammer when the type-frame has rotated to position and is at rest, substantially as specified.

13. In an electro type-writing machine, the combination, with the battery and main circuit, of the carriage, the wires running longitudinally along the carriage and having separated points at one end, the shunt-wires from the main circuit forming loops over said carriage-wires and having the helix of the bell-magnet in the circuit, and the tappet-block adjustably attached to a rod on the main frame, whereby said points are closed when the carriage reaches a proper point near the end of its travel and by closing the circuit rings the bell, substantially as specified.

14. The combination, with the main circuit and the vibratory type-frame actuated by said circuit and the battery, of the hammer, the shunt or secondary circuit embracing the coil of the hammer-magnet, and the contact-points, whereby said shunt or secondary circuit through the key-levers having pivotal connection with a lever-bar, one end of which is connected to the type-frame and the other

end is disposed intermediately of opposite electro-magnets, will be rendered active immediately after the type-frame has been thrown by the magnets of the main circuit into proper position and come to rest, substantially as specified.

15. The combination, with the main circuit and the vibratory type-frame actuated by said circuit, of the carriage provided with the main roller, the mechanism whereby the carriage is moved longitudinally, the electro-magnet actuating said mechanism, the shunt or secondary circuit embracing the helix of said magnet and actuating the said magnet when the type-frame is thrown into its normal position by the main circuit, and means, substantially as described, by which the battery and circuit actuate the type-frame, substantially as specified.

16. The combination, with the perforated lever-bar, the type-frame actuated by the vibrations thereof, the pivoted key-levers, the pivotal pins thrown upward into position by the depression of the outer arms of the key-levers, the battery, the main circuit, the two magnets having their cores aligned on opposite sides of the outer end of the perforated lever-bar, and the commutator mechanism actuated by the keys and provided with contact-points, whereby the current is alternately deflected through the two magnets of the main circuit as the keys are operated, of the hammer, the hammer-magnet, the shunt or secondary circuit embracing the coil of the hammer-magnet and rendered active immediately before the lever-bar is returned to its normal position, the carriage and the carriage-moving mechanism, substantially as described, the secondary or shunt circuit embracing the helix of the carriage-moving magnet, and the contact-points whereby the carriage is operated as the type-frame is brought to its normal position, substantially as specified.

17. The combination of the carriage, the rack carried thereby, the gear wheel or pinion meshing with said rack, the ratchet-wheel secured to and moving with the gear-wheel, the lever having one end pivoted to the shaft of the gear-wheel and the other end opposite the pole of an electro-magnet, the spring-pressed pawl engaging the ratchet-wheel, the pivoted spring-bar having a pin engaging the teeth of said ratchet-wheel and resting upon a pin projection from said pawl, and a slotted bar having arms between which is received said spring-bar at its free end and receiving guide-pins in its slot, substantially as and for the purpose specified.

18. The combination of the carriage, the rack carried thereby, the gear wheel or pinion meshing with said rack, the ratchet-wheel secured to and moving with the gear-wheel, the lever having one end pivoted to the shaft of the gear-wheel and the other end opposite the pole of an electro-magnet, the spring-pressed

pawl engaging the ratchet-wheel, the pivoted spring-bar having a pin engaging the teeth of said ratchet-wheel and resting upon a pin projection from said pawl, a slotted bar having arms between which is received the outer free end of said spring-bar, the electro-magnet, and the coiled spring arranged within a barrel secured to said gear-wheel, one end of said coiled spring being connected to the barrel and the other end connected to the gear-wheel shaft, substantially as and for the purpose set forth.

19. The combination of the carriage-frame carrying a rack, the gear-wheel meshing therewith and having an inclosed spring, one end connected to the wheel-shaft and its other end to the inclosure, a ratchet-wheel, a lever pivoted upon the shaft of the gear-wheel and carrying a spring-pressed pawl engaging with said ratchet-wheel and having a pin, a pivoted bar resting against the pin of the pawl and having itself a pin engaging with said ratchet-wheel, and the slide-bar having arms between which is received the outer free end of said pivoted bar, by means of which said pivoted bar and the pawl are simultaneously disengaged from the ratchet-wheel and the carriage returned to the right, substantially as specified.

20. The combination of the battery, the main circuit, the carriage, the wires running longitudinally along the carriage and forming contact-points at one end between the rollers, and the shunt-wires reaching from the main circuit and looped over said carriage-wires and having the helix of the bell-magnet in the circuit, which contact-points are kept separated by the paper and upon the removal of which paper said contact-points spring together, closing the circuit and ringing the bell, substantially as described.

21. In a type-writer, the combination of the rack on the carriage-frame, the gear-wheel meshing therewith, the ratchet-wheel on the gear-wheel, the pawl engaging the ratchet-wheel and having an outstanding pin, the pivoted bar having a depending pin engaging the ratchet-wheel and itself engaged by the pin on the pawl, the slide-bar engaging the pivoted bar of the longitudinal bar swung to the carriage and engaging the hooked end of said sliding bar, the angle-lever connected to one end of the swinging bar, the link connected to the horizontal arm of the angle-lever, the pivoted lever connected to the upper end of the link and pressed upward by a spring, the pawl pivoted to the end of said pivoted lever and pressed downward by a spring, and the ratchet-wheel on the end of the printing-roller shaft engaged by said pawl, substantially as specified.

22. In an electric type-writer, the combination of the hammer, the hammer-magnet, and the secondary circuit for actuating the hammer, the hammer having its principal member or lever hung upon a bracket with its

armatured end opposite said magnet and normally held by a spring away from the magnet, the other member of said hammer having a rearwardly-projecting arm at its lower end connected by a spring to the principal member, normally holding it away from the principal member as also away from the type-frame, substantially as shown and described.

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

EDWARD J. SILKMAN.

Witnesses:

PHILIP C. MASI,
THEO. MUNGEN.