

G. C. CLARK.
ELECTRIC TYPEWRITER.
APPLICATION FILED APR. 26, 1916.

1,355,089.

Patented Oct. 5, 1920.
8 SHEETS—SHEET 1.

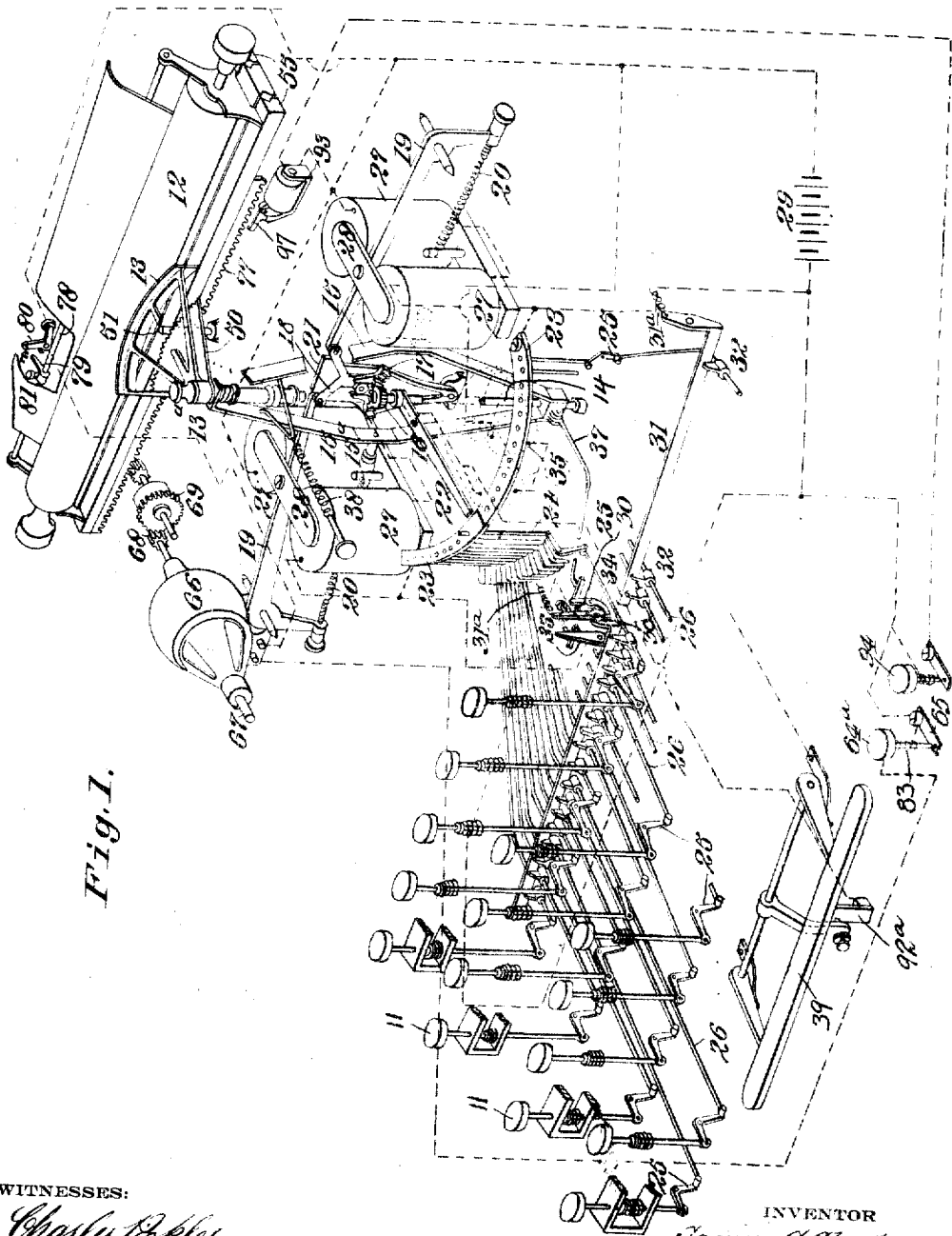


Fig. 1.

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ATTORNEYS

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8 SHEETS—SHEET 2.

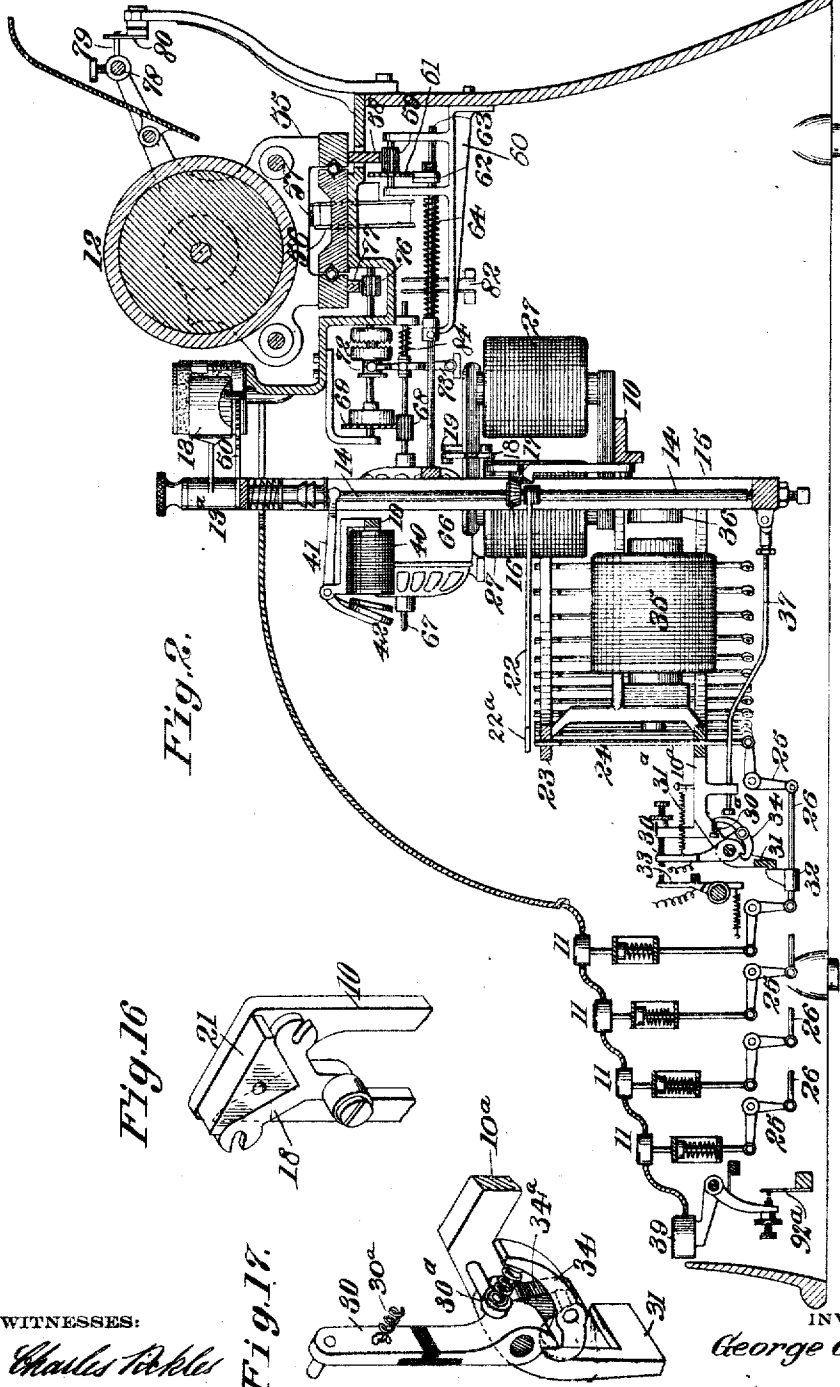


Fig. 2.

Fig. 16

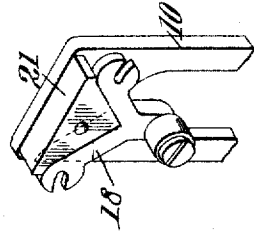
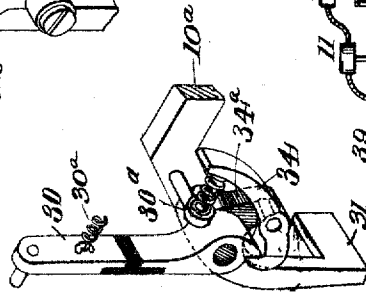


Fig. 17.



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8 SHEETS—SHEET 3

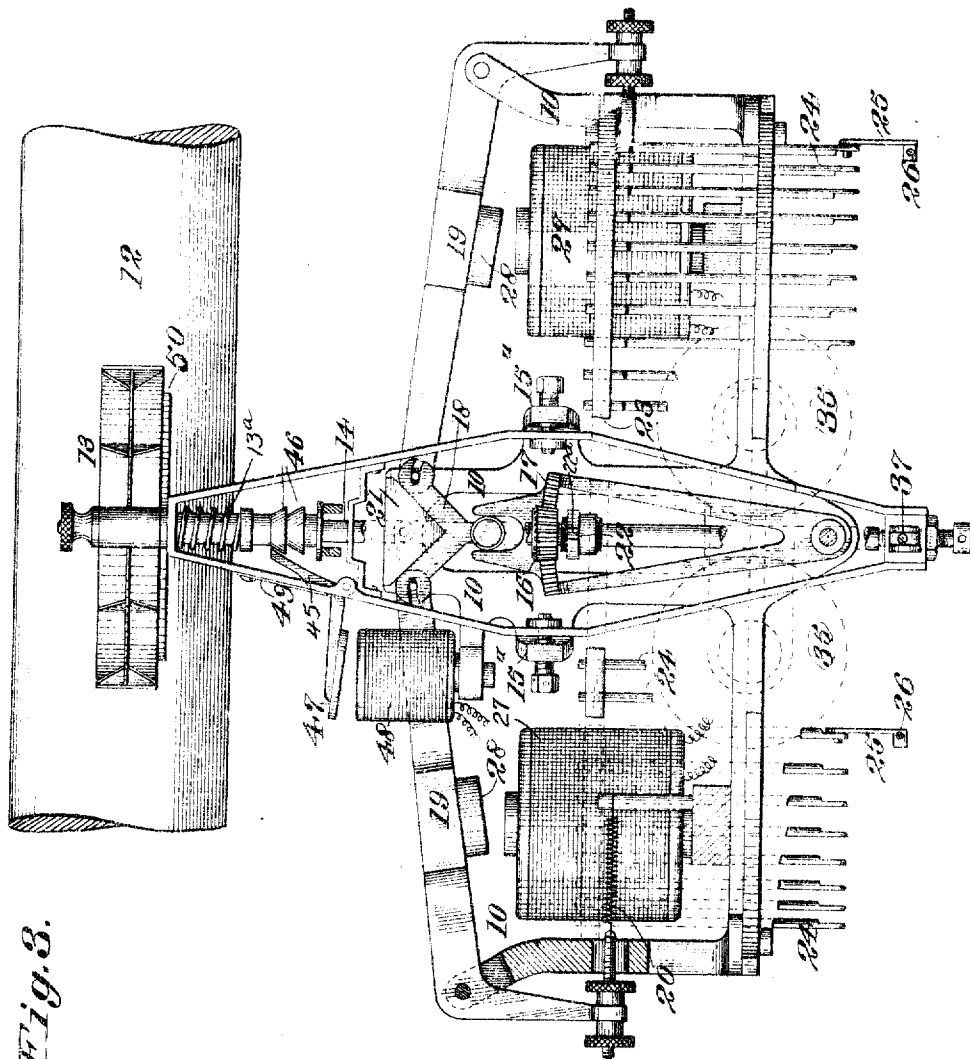


Fig. 3.

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8 SHEETS—SHEET 4.

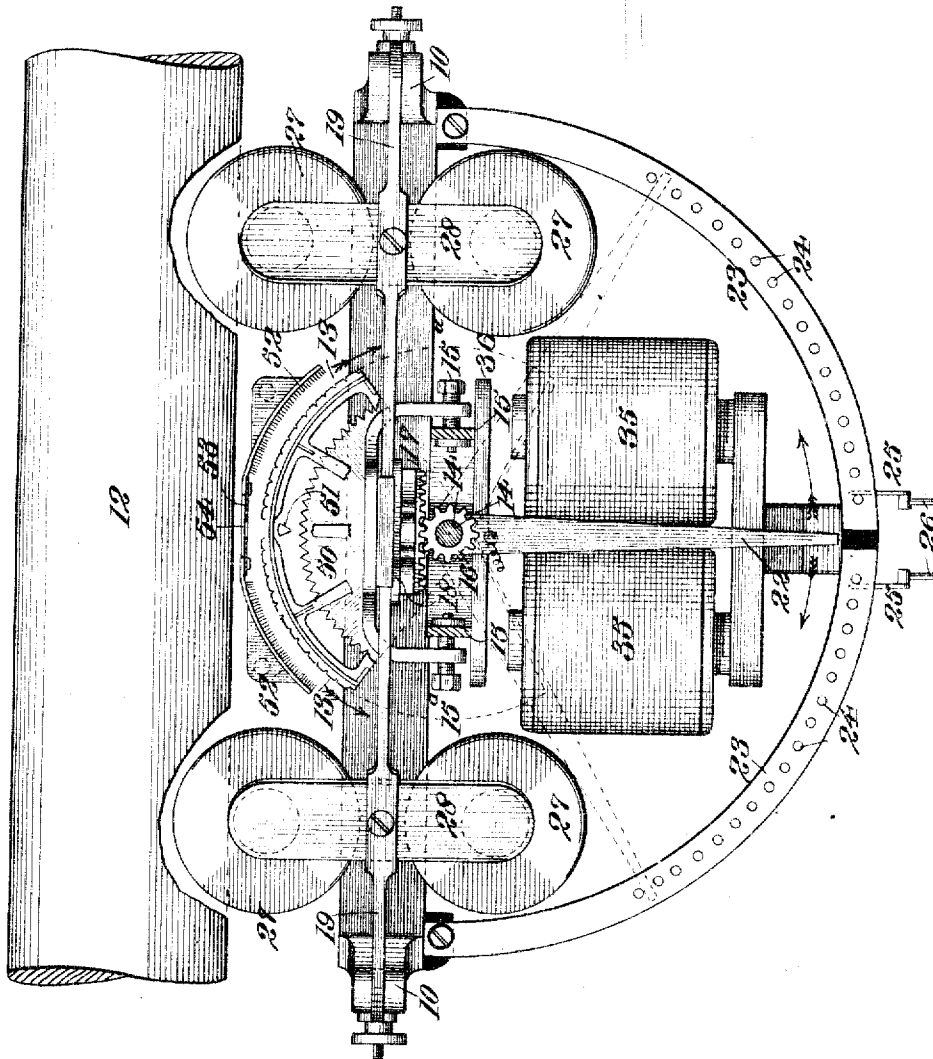


Fig. 4.

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8 SHEETS- SHEET 5.

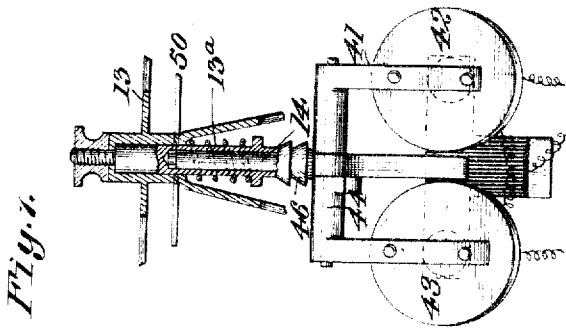


Fig. 1.

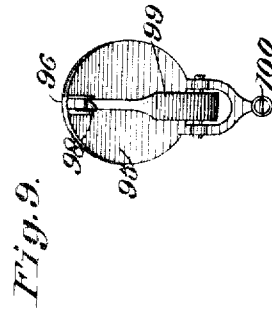


Fig. 9.

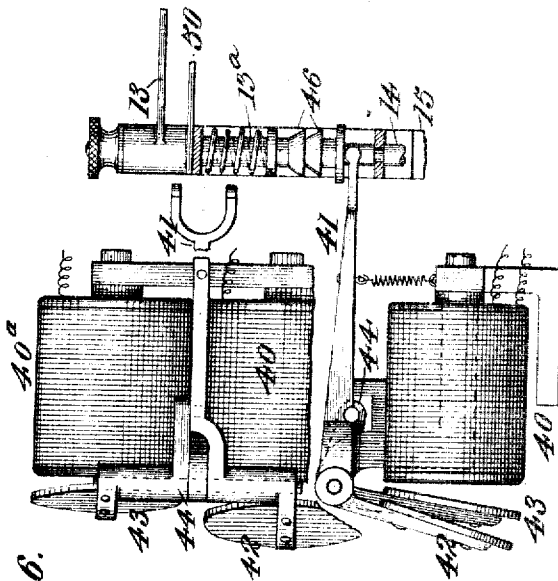


Fig. 6.

Fig. 8.

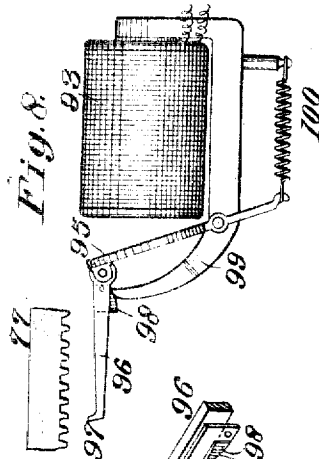


Fig. 8.

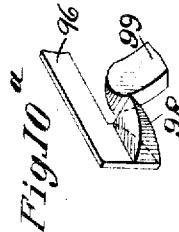


Fig. 10a.



Fig. 10.

WITNESSES:

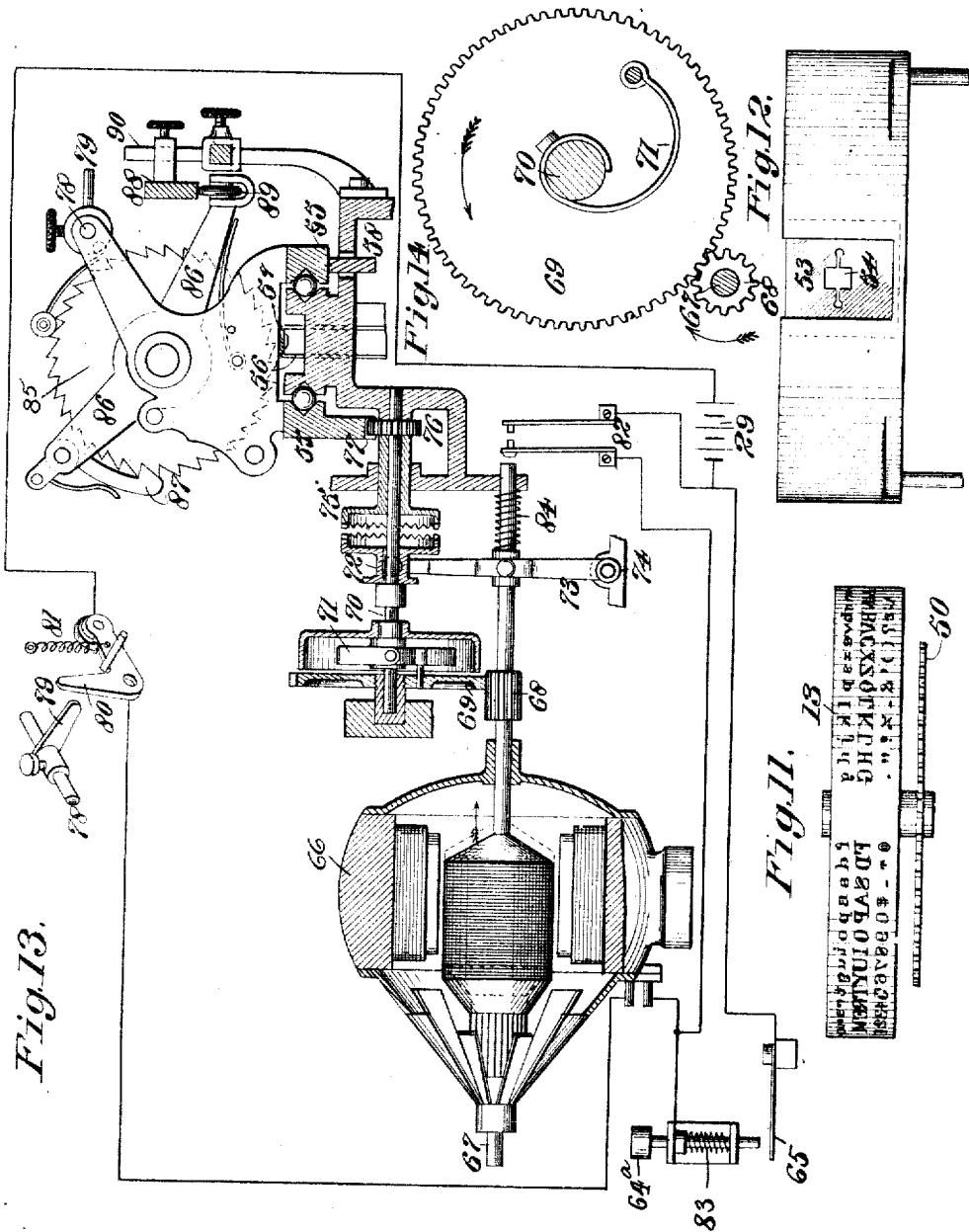
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8 SHEETS, SHEET 6.



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ELECTRIC TYPEWRITER.
APPLICATION FILED APR. 26, 1916.

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Patented Oct. 5, 1920.
8 SHEETS—SHEET 7.

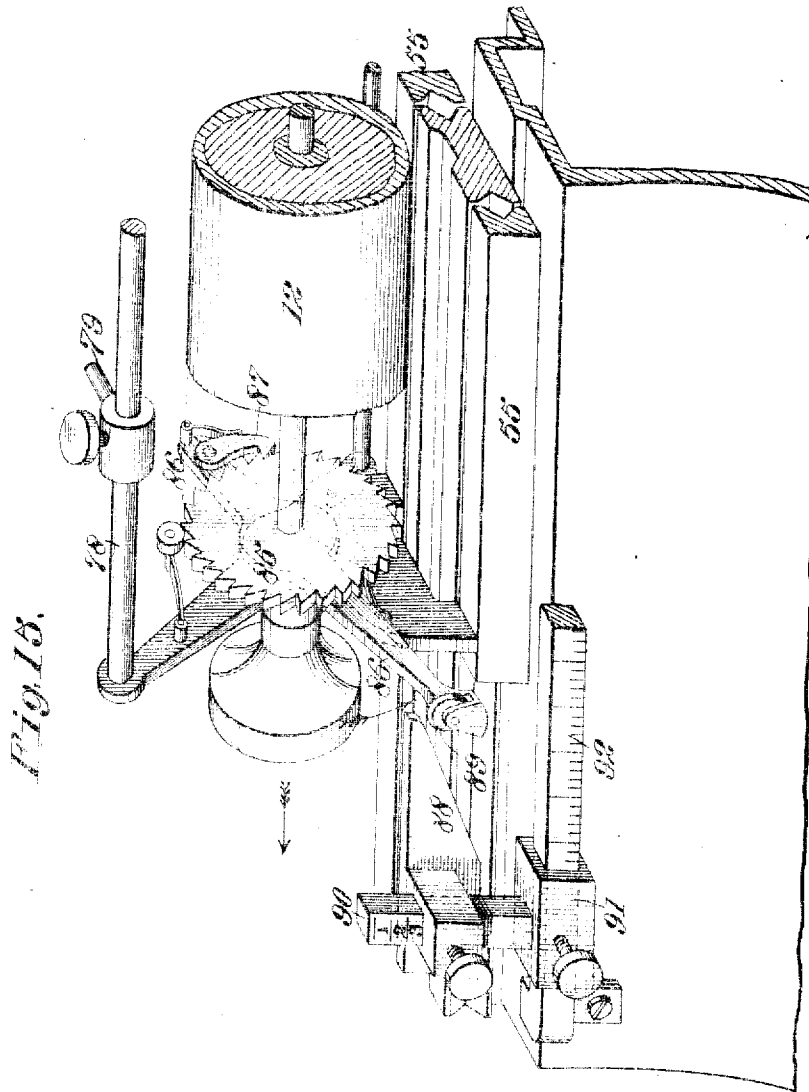


Fig. 18.

WITNESSES:

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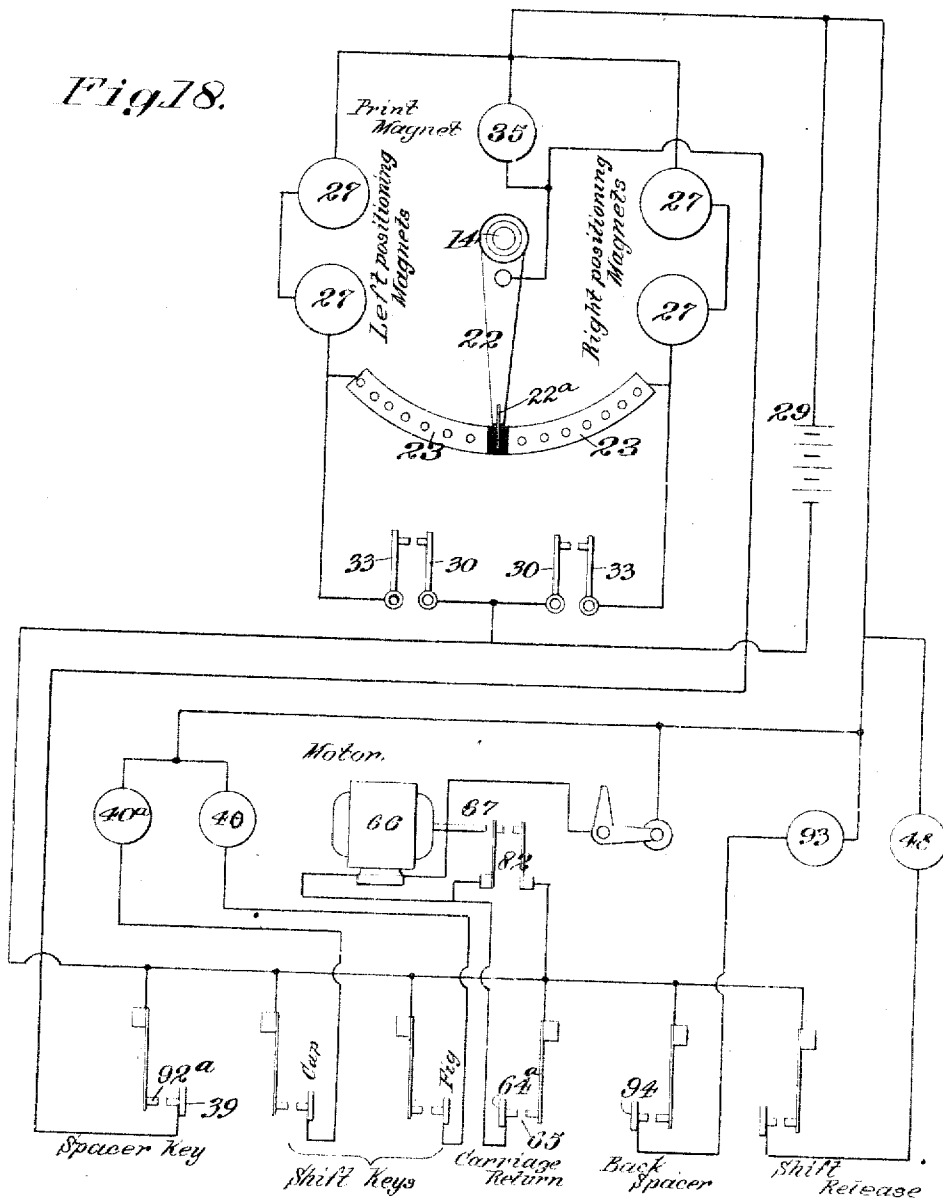
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1,355,089.

Patented Oct. 5, 1920
8 SHEETS SHEET 8

Fig. 18.



WITNESSES:

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UNITED STATES PATENT OFFICE.

GEORGE C. CLARK, OF OAKLAND, CALIFORNIA, ASSIGNOR OF THREE-FOURTHS TO
CHARLES F. GROSS, OF OAKLAND, CALIFORNIA.

ELECTRIC TYPEWRITER.

1,355,089.

Specification of Letters Patent.

Patented Oct. 5, 1920.

Application filed April 26, 1916. Serial No. 93,739.

To all whom it may concern:

Be it known that I, GEORGE C. CLARK, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Electric Typewriters, of which the following is a specification.

This invention relates to electric typewriters; and has for its object to simplify and improve the construction and operation of such devices.

In carrying out this object, I employ a typewriter having the usual standard keyboard in which the keys control electrical circuits for operating the machine. The principal structural features of the machine reside in a universal, oscillating, rocking type bar which carries the segmental printing plate and a traveling contact arm, the latter operative over a segment provided with a series of movable stop contact pins, said pins corresponding in number and position to the printing keys on the keyboard and operated thereby, oppositely placed electromagnets for oscillating the type bar having their armatures connected through levers and bevel gear mechanism to said type bar, the circuits of said magnets being controlled by the printing keys, whereby to position the type segment in such a manner as to expose the desired character thereon in printing position with the platen; electromagnets for rocking forward the type bar to cause the exposed character on the type face to print, said printing magnet having its circuit closed through the contact arm and stop pins before mentioned; means for shifting the type bar vertically to enable different cases on the type segment to be printed; electrically operated return mechanism for the platen carriage; an automatically operated line spacer; automatic inking means for the type face; and electrically controlled forward and backward spacing means for the platen carriage.

One form which my invention may assume is exemplified in the following description and illustrated in the accompanying drawings, in which—

Figure 1 shows a perspective view, partially in diagram, of a machine embodying my invention.

Fig. 2 shows a vertical cross section of the same.

Fig. 3 shows a front elevation, partly in section, of the type bar, oscillating mechanism and the stop contact pins and segment.

Fig. 4 shows a plan view of the device shown in Fig. 3, with certain parts broken away for the sake of clearness.

Fig. 5 shows a side elevation of the type-shifting mechanism.

Fig. 6 shows a plan view of the same.

Fig. 7 shows a front elevation of the same, with certain parts broken away.

Fig. 8 shows a side elevation of the back-spacer mechanism.

Fig. 9 shows a front elevation of the back-spacer mechanism.

Fig. 10 shows a detail perspective view of the back spacer mechanism.

Fig. 10^a is a fragmentary view in perspective illustrating a part of the back spacer mechanism.

Fig. 11 shows a front view of the type segment or printing plate, illustrating the alinement plate.

Fig. 12 shows a rear view of the inking pad.

Fig. 13 shows a view, partially in diagram, of the carriage return and line-spacing mechanism.

Fig. 14 shows a detail of the loose spring gear employed in the carriage return mechanism.

Fig. 15 shows a perspective view of the line-spacing mechanism, with certain parts broken away.

Fig. 16 shows a detail view of the upper end of the stationary frame.

Fig. 17 shows a detail view of the magnet energizing mechanism.

Fig. 18 shows a diagrammatic view of the electric wire connections.

The machine may be of any suitable form, embodying a frame 10, printing keys 11 and a platen roller 12. The type face 13 is in the form of a segment and is fixed upon a sleeve 13^a splined to the upper end of a vertical shaft 14 journaled in a movable frame 15; the latter pivotally mounted upon the typewriter frame at 15^a to swing back and forth toward the platen. The type shaft 14 carries a pinion 16 in engagement with a toothed segment 17, the latter pivoted to the frame 10 to oscillate sidewise therein.

A Y-shaped link 18 connects, slidably, at its stem with the segment 17, and at its arms to the inner ends of bell-crank levers

19, pivoted to the stationary frame at opposite sides thereof and held by retractile springs 20 in position with their inner ends raised. A triangular block 21 is seated between the arms of the link 18 to retain the same in a position where the toothed segment will be centered upon the pinion, in which position the segmental type plate will have its central portion disposed toward the platen. Fig. 3 shows an enlarged detail of this arrangement.

A contact arm 22 is fixed to the shaft 14 and insulated therefrom and swings horizontally over a divided sector 23, the latter secured to the stationary frame of the typewriter and also insulated therefrom. Movable up and down, through openings in the sector 23, is a series of contact pins 24, corresponding in number and arrangement to the printing keys of the typewriter and operated therefrom by means of bell-crank levers 25 and transmission links 26. Depression of a printing key raises the corresponding pin 24, whereby to block the movement of the contact arm 22 and establish an electrical connection. This mechanism is best shown in Figs. 1 and 4.

For rotating the type shaft I employ a set of electromagnets 27 for each of the bell-crank levers 19 also carried upon the stationary frame 10; the armature 28 of each set being secured to the lever. For controlling the energization of the magnets 27, I provide electrical connections for each, with a suitable source of current, indicated at 29; the latter being in connection with contact arms 30 actuated by swinging bails 31 carried on supports 10^a, one at either side of the machine for each set of magnets. These bails are normally held forward, by means of springs 31^a, against lugs 32 on the transmission links 26. In front of each arm 30 and normally separated therefrom is a contact member 33 connected electrically to the adjacent magnet. Thus, when a printing key is depressed, the bail on the corresponding side is moved to swing its arm 30 into contact with the terminal 33 to close the circuit through the adjacent magnet, whereby to draw the bell-crank lever downward at its inner end and, through the toothed segment, turn the type shaft a distance until the contact arm 22 strikes the projecting pin 24, whereupon the character of the type segment directed toward the platen will correspond to the character on the key depressed. The connection between each bail and its contact arm contemplates the use of a spring pressed locking pawl 34 pivoted on a rearward and downward extension 34^a of the bail and engaging a tooth on said arm, as shown in Fig. 17, whereby the arm is moved to contacting position jointly with the bail, and is releasable independently thereof when the pawl is tripped, in a man-

ner to be hereinafter described, to return under the action of its spring 30^a.

The type characters as shown in Fig. 11, are mounted upon the type-face plate 13 in three horizontal rows, the top row forming the "lower case" of characters which are normally presented in printing position in front of the platen 12. The capital letters form the central or second row, and the figures, punctuation marks, etc., form the third or lower row; the characters being equidistant apart corresponding with the stop pins 24. The characters in the three rows are arranged also in vertical series. The type-face is left blank at the center or normal position of the type segment to allow for spacing by means of the spacing key 39, because it will be seen hereinafter that whenever the spacing key is struck, the type frame will rock forward on its pivots and release the platen carriage for a one space movement. The arrangement of characters to the right and left of normal line position on the type-face, is such that the most frequently used characters have the shortest distance to travel, while other characters, like "q," "x," "z," most infrequently used, are mounted toward the outer ends of the type-face plate. Starting with the normal central position of the type segment, the characters on the right-hand side of the center are selected by the keys on the same side of the keyboard and those characters on the left-hand side are selected by the keys on the keyboard at the corresponding side.

With the segmental type plate properly positioned, the frame carrying the same is rocked forwardly to make the impression and this is accomplished by means of a stationarily mounted electromagnet 35, the armature 36 of which is secured to the lower end of the frame 15. The magnet 35 has included in its circuit the contact arm 22 and sector 23 so that when the arm strikes a projecting pin a circuit is closed through the magnet to draw the armature thereof in a direction to swing the frame 15 toward the platen and imprint the exposed type character. Simultaneously with the rocking movement of the frame the circuit, through the positioning and printing magnets, is broken by means of a rod 37 secured to the lower end of the frame 15 and movable against the pawls 34 to release the contacting arm 30.

A light pressure of any key, either on the right or left half of the keyboard, moves the contact arm of the switch for that side of the machine on which the key is depressed into the closed position so that current flows to and energizes either the right or left positioning magnet, as the case may be, oscillating the type shaft and swinging the traveling contact arm 22 carried thereon either to the right or left; and,

simultaneously, the key depresses mechanically pushes up its corresponding stop contact pin 24 in the pin segment directly into the path of the traveling contact arm so that the latter is arrested in its further movement in that direction. All the stop contact pins mounted in the segment 23 being connected to one of the current-carrying wires of the printing circuit and insulated from the rest of the machine and the other current-carrying wire of said circuit being connected to the printing magnet, which is in turn connected to the traveling arm 22, an electric circuit is established through the printing magnet when the traveling arm comes in contact with and is arrested by the pushed up stop contact pin. Thus the printing magnet is energized and the type face is tilted against the platen to print the letter selected.

At the proper moment during the forward movement of the type face to the platen the electric circuits are automatically broken by the backward movement of the rod 37. This breaking of the circuit is so timed that only about half of the forward movement of the printing plate is done under the attraction of the printing magnet, the last half of the movement being by inertia of the moving parts, thus giving the best results in the printing. Upon striking the platen the frame is instantly restored through the medium of a retractile spring 38, and the traveling contact arm and type segment are returned to central position under the action of the retractile springs 20.

To adapt the device to a standard keyboard machine provision for shifting the type plate must be made. This also is accomplished electrically and it is best illustrated in Figs. 3, 5, 6 and 7. Normally the type segment 13 stands with its top row opposed to the platen, so that whenever a character key 11 is struck a type in this row will be imprinted on the paper carried by the platen. To obtain a character in the central or lower row it is necessary to raise the type segment either one or two steps upward. The type segment is carried upon a sleeve 13^a splined to the shaft 14 and a pair of electromagnets 40 and 40^a are mounted on the frame 10, with their armatures connected to a bell-lever 41 engaging with the lower end of said sleeve. The armature 42, on the magnet 40, is rigid with the bell-lever 41 while the armature 43 of the magnet 40^a has a separately pivoted bell-lever extension 44 lying beneath the rearward extension of the bell-lever 41. The armature 42 is normally spaced a greater distance from its magnet than the armature 43, and the magnet 40 has its circuit controlled by a key marked "Fig.", while the magnet 40^a has its circuit controlled by a key marked "cap". Thereby

the type segment is raised the proper distance to present the desired row of characters.

In this connection a latch device is desirable to maintain the type segment 13 in raised position, and this comprises a latching dog 45 cooperating with spaced projections 46 on the sleeve and fitted with a bell-crank extension which carries the armature 47 of an electromagnet 48, as best shown in Fig. 3. The dog is pressed to latching position by a spring 49 so that the sleeve is automatically locked in shifted position. The circuit through the electromagnet 48 is closed by a key marked "release" and thereby the magnet is energized to release the dog.

In order to lock the type plate, when printing, and insure proper alinement of the type, I employ a segmental locking plate 50 as shown in Fig. 4 which is fixed to the sleeve 13^a, and turns with the type segment 13, and is of about one-half inch shorter radius than the type segment. The peripheral edge of this locking plate 50 is serrated or suitably formed with V-shaped notches, which latter conform in their position to the vertical rows of type on the type segment. Directly and centrally in front of this plate, at a point approximately coinciding with the normal position of the type segment, is a stationary vertical pin 51, also V-shaped in cross section, corresponding with the V-shaped notches in the locking plate 50. This pin is placed about one-sixteenth of an inch from the peripheral edge of the notched plate when the type bar stands vertical and in non-printing position, so that when the plate is oscillated horizontally the pin offers no obstruction to this free lateral movement. However, the moment that the printing circuit, before described, has closed, through the arm 22, pins 24 and segment 23, so as to oscillate the frame 15 to print, the notched plate 50 is also tilted forward and the notch in the peripheral edge of the plate corresponding to the character on the key depressed on the keyboard is brought into engagement with the stop pin 51, thus arresting and locking the universal type bar and preventing further lateral motion of the type segment 13. The inclined surfaces of said notches and pin operate to insure perfect alinement of the characters when printing.

Between the convexed surface of the type plate 13 and the platen roll is removably fixed a concaved velvet inkpad 52, Figs. 4 and 12, normally separated from the type-face. The center of the ink-pad corresponding to the central or normal position of the type segment is fitted with a resilient shield 53 of metal, or other suitable springy material, in the center of which is a square hole 54 just large enough to allow the free pas-

sage of a type, so that the type protruding therethrough will strike the paper on the platen and print whenever the type segment is rocked forward. This shield protects the paper on the platen from being soiled by the pressure of the adjacent letters. The forward motion of the type segment also accomplishes the inking of the types by bringing the convexed type-face into contact with the concaved inking-pad.

A carriage 55 receives the platen roll, and this carriage is suitably mounted for reciprocation so as to cause the platen roll to traverse the type-face, and its movement in one direction is accomplished by any suitable means well-known in the art and hereinafter explained.

As here shown, the carriage is operated in one direction by means of a spring drum 56, (Fig. 2), to the exterior of which is connected one end of a tape 57; the opposite end being attached to the carriage. Secured to the carriage is a toothed rack 58, into which meshes a pinion 59 journaled upon a support 60, and having connected to it an escapement wheel 61 providing for step by step movement. The controlling means for the escapement wheel consists of a duplex dog 62, one member of which is rigidly mounted on an endwise movable shaft 63; the other member being located at the side of the fixed member and having a limited pivotal movement on the shaft 63, said shaft being held by means of a spring 64 in position where the pivoted member is engaged with the escapement wheel. The endwise moving shaft 63 is held against rotation in its bearings and terminates adjacent to the upper end of the rocking frame 15. Thus each time the type bar and its frame rock forward to printing or spacing position, the shaft 63 is shifted to disengage the pivoted dog member and engage the rigid member with the escapement wheel and allow the pivoted member under spring pressure to be retracted. Then when the frame returns and the pivoted dog is reengaged it will yield to permit the carriage to progress one step to the left under the action of the spring drum 56.

The carriage return movement is accomplished by the depressing of a special carriage return key 64^a, at the left-hand side of the keyboard. Depressing key 64^a closes a switch 65 in the circuit of a motor 66. The armature of the motor is mounted on a shaft 67, which shaft and armature have a limited lengthwise movement within the field of the motor. The armature is so positioned with respect to the field that when the field is energized it will so react on the armature that the later is drawn into central position in the field, causing the armature to shift from the full line, or normal inert position, Fig. 13, to the dotted line, or active position of

the rotating parts. This will cause a corresponding lengthwise shifting of the motor shaft 67. Shaft 67 carries a wide spur gear 68 meshing with a gear 69, the latter mounted loose on a countershaft 70, being yieldingly held thereto by means of a spring 71 which has one end secured to the said gear, and the other end fixed to the shaft, Fig. 14. Thus it is seen that motion is transmitted from gear 69 to shaft 70 through the medium of the spring 71. Splined on to the shaft 70 is a clutch collar 72 which turns with the shaft and slides lengthwise on it and is operated by a lever 73 fulcrumed at 74 and loosely connected with the armature shaft 67, so that the lever 73 is moved back and forth correspondingly with the lengthwise movement of the shaft 67, to carry the clutch member 72 into and out of engagement with a corresponding clutch member 75, which is loose on shaft 70, and carries a pinion 76 meshing with a rack 77 on the platen carriage 55. The carriage has a rod 78 on which an adjustable trip or cam 79 is adapted to contact with the bell-crank switch member 80 and interrupt the motor circuit, so as to cut out the motor and stop the further return movement of the carriage.

When the carriage 55 is moved to the left, so that the cam or trip 79 is out of engagement with the switch member 80, this switch member is held in closed position by reason of the action of a spring 81, and thereby the motor circuit is closed at this point. The key-actuated switch 65 closes the motor circuit across the forward section and the moment the field of the motor is energized the armature is pulled to the right into central position with respect to the field, shifting the shaft 67 to the right, rocking lever 73, and throwing in the clutch 72-75. This endwise movement of the shaft 67 has the further function of closing a shunt circuit through switch members 82. This shunt circuit is for the purpose of keeping the motor circuit closed after the pressure is released on the carriage return key 64, because the moment the key is released, a spring 83 returns it to raised position, thereby opening the switch 65. Setting the motor in motion causes the shaft 67 to revolve, and the gear 76 acts on the rack 77 to move the carriage back to the right, or until the cam or trip 79 on the carriage comes into engagement with the switch lever 80 mounted on the frame independent of the trip and carriage. As soon as the cam 79 hits the switch lever 80 the motor circuit is interrupted at this point, thereby shutting off the motor, whereupon a spring 84 acts on lever 73 to throw out the clutch 72 and return the armature to initial full line position, shown in Fig. 13. The cam or trip 79 is adjustably mounted on the rod 78 so that it can be slid along the same

and clamped wherever desired to break the circuit and stop the carriage return at variable points. The moment the clutch 72 is thrown out, the shunt circuit through switch 82 is interrupted, and the motor is not operable until the key 64 is again depressed.

Provision is made for the automatic feeding or turning of the platen roller coincident with the return of the carriage mechanism, as shown in Fig. 15. This embodies a ratchet wheel 85 on the roller operated by means of a rocker-arm 86, carrying a pawl 87 to engage with the teeth on said ratchet wheel. A plate 88, having an inclined face to cooperate with a roller 89 on the arm 86, is adjustably mounted upon a vertical stem 90 of a holder 91; the latter being adjustably slidable upon a horizontal bar 92 fixed to the frame of the machine. The holder can thus be moved to position where the inclined face of the plate 88 will be engaged by the roller 89 as the carriage mechanism nears its return position, and thereby the platen will be turned. Adjustment of the plate on the vertical stem will determine the extent of turning of the platen as, for instance, one, two or three lines.

The spacing is controlled from the key 39 in a similar manner to the regular keys on the keyboard, the switch 92^a which it controls being connected in the circuit of the printing magnets 35, so that there is no oscillating movement of the contact arm 22, but there is a forward and back rocking movement of the universal type shaft 17 and its frame 15. No printing takes place, however, when the bar 39 is depressed, for the reason that the center of the type segment 13 is blank, as previously described.

An electrically controlled back-spacer mechanism is provided, as shown in Figs. 8, 9 and 10 and 10^a. Electromagnet 93, located adjacent to the toothed rack 77, has its circuit controlled by a back-spacer key 94. The armature 95 of said magnet is pivoted to the frame at its lower end and has its upper end pivoted to an arm 96 lying beneath the rack 77 and having a hook 97 to cooperate with the teeth thereof. The arm 96 has an inclined lug 98 lying adjacent to the end of a rigid support 99, and a spring 100 normally retains the armature in position where the lug is held away from the end of said support so that the arm 96 will be lowered to clear the rack. When, however, the key 94 is depressed to energize the magnet and actuate the armature thereof, forward movement of the armature will cause the lug to ride up on the support 99 and raise the arm 96 to engaging position with the rack, whereupon further movement of the armature will draw the carriage backward one step. By repeating this operation the back-spacing may be increased to any distance desired.

The adjacent faces of the lug 98 and sup-

port 99 are beveled at their rear ends to cause them to pass side by side in returning, so that the pawl will clear the rack.

The stop pins 24 are set to effect a contact with the arm 22 slightly in advance of the positioning of the corresponding type characters. The type segment will thus move forward when incompletely positioned, but the centering lug 51 will bring it to proper position before impact is made with the platen. Thus the interval between depression of the key and rocking of the type frame is somewhat shortened and the speed of operation of the machine consequently increased. This arm 22 may be of spring material and by advancing the position of the stop pins, the spring arm will come into contact with the stop pin before the intended type character has aligned itself with the platen. Immediately the type-carrying frame will begin to rock during the time that it remains in contact with the stop pin, the turning magnets will continue to turn it slightly, the arm 22 bending to permit this.

The function of the pawl 34 is to lock the bail 31 and contact arm 30 together so that they all move together when a key is depressed. Then when the pawl is released by the rod 37 the contact arm is retracted by its spring thus breaking the circuit, notwithstanding that the key may still be depressed. The two parts cannot thereafter be locked together until the key is released and the bail allowed to return.

The positioning and printing magnets, together with their armatures and levers, segmental toothed rack and Y-shaped links, are mounted upon the stationary frame, the teeth of the segmental rack and pinion being slightly beveled to allow relative movement. A minimum of weight is thus carried upon the rocking frame, and hence the latter may be constructed of light material such as aluminum, thereby further increasing the speed and responsiveness of the machine. The block 21 is preferably made of rubber to eliminate noise.

Among the advantages of this machine are the extreme ease and rapidity with which it may be operated, (a minimum physical exertion being required to depress the keys), practically noiseless action, and economy and simplicity of construction; the number of parts employed herein being vastly smaller than those of the standard machines now in use. The operating cost of the machine is decidedly low as the current consumption of the magnets and motor is small and the various electrical devices employed are designed to operate from the ordinary light or power service. The impact of the type segment upon the platen being independent of the touch makes the force of the impression uniform, resulting in a neater appearance of the typewritten matter. Other

features of advantage embodied herein are the standard keyboard, the electrically operated carriage return, the automatic line-spacer, improved system of inking giving a clean-cut impression, and electrical back-spacer all embodied in a single machine of compact form and light weight which is readily and easily transportable.

While I have shown and described herein in but one form of machine, it will be understood, nevertheless, that the same is susceptible of modification, and therefore, many changes in the construction and arrangement of the several parts may be employed without departing from the spirit of my invention as disclosed in the appended claims.

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

1. In a typewriter, the combination of a sidewise oscillating and fore and aft rocking type-carrying member, a keyboard, a contact segment carrying a plurality of separate stops, each stop being operably connected with a key on the keyboard, a contact arm on the type-carrying member, co-operating with said stops and swinging over the segment, electromagnets for oscillating said type-carrying member in accordance with the key depressed, whereby to position the type, and electromagnets energized by contact of said arm with a stop to rock said type-carrying member, whereby to print the exposed type.

2. In a typewriter, the combination with a platen and a key-board of a vertically disposed type-carrying member mounted for oscillation about its longitudinal axis and having a rocking motion toward and from the platen, electro-magnets for oscillating the said member to position the type characters thereon in printing relation with the platen and a separate set of electro-magnets to rock said member to print the positioned character, and means operative by the oscillating movement of said type-carrying member to control the energization of the second set of magnets.

3. In a typewriter, the combination with a platen and a keyboard, of a type-carrying member mounted for oscillation about its longitudinal axis and having a rocking movement toward and from the platen, electromagnets alternately controlled by the keys to turn said type-carrying member about its vertical axis in opposite directions, whereby to position one of the type characters thereon in printing relation with the platen, a stop arm swinging in unison with said type carrying member, a second set of electromagnets to rock said type-carrying member whereby to print the positioned character thereon, and means actuated by the keys to form a mechanical stop for the

stop arm of the type-carrying member in its oscillating movement and also an electrical contact for energizing the last named electromagnets.

4. In a typewriter, the combination with a platen and a key-board of a vertically disposed type-carrying member mounted for oscillation about its longitudinal axis and having a rocking movement toward and from the platen, electro-magnets controlled by the keys to turn said type-carrying member about its vertical axis whereby to position one of the type characters thereon in printing relation with the platen, a second set of electro-magnets to rock said type-carrying member whereby to print the positioned character thereon, means actuated by the keys to form a mechanical stop for the type-carrying member in its oscillating movement and also an electrical contact for energizing the last-named electro-magnets, the rocking of the type-carrying member to printing position serving to break the electrical and mechanical connection with said key-actuated means simultaneously.

5. In a typewriter, the combination with a platen and a keyboard, of a type-carrying member mounted for oscillation about its longitudinal axis and having a rocking movement toward and from the platen, electromagnets controlled by the keys for turning said type-carrying member about its longitudinal axis whereby to position a type character in printing relation with the platen, a stop pin connected with and movable by each of said keys, an arm on the type-carrying member coöperating with said stop pins whereby to limit the turning movement of the type-carrying member, and a second set of electromagnets having their circuits closed by the contacting of said arm with one of the stop pins to rock said type-carrying member whereby to print the positioned character thereon.

6. In a typewriter, the combination with a platen and a keyboard, of a type-carrying member mounted to oscillate about its longitudinal axis and having a rocking motion toward and from the platen, an electromagnet at each side of the typewriter and operatively connected to the type-carrying member for turning the latter in one direction about its longitudinal axis whereby to position one of the type characters in printing relation with the platen, a switch for controlling each of the electromagnets, and a swinging bail at each side of the typewriter acted upon by one half of the keys of the keyboard to close the switch of the adjacent electromagnet.

7. In a typewriter, the combination with a platen and a keyboard, of a type-carrying member mounted to oscillate about its longitudinal axis and having a rocking motion toward and from the platen, an electromag-

net at each side of the typewriter and operatively connected to the type-carrying member for turning the latter in one direction about its longitudinal axis, whereby to position one of the type characters in printing relation with the platen, a switch for controlling each of said electromagnets, the keys on one side of the keyboard when depressed acting to close the switch of one of said electromagnets and the keys on the other side of the keyboard acting when depressed to close the switch of the opposite electromagnet, electromagnetic means to rock the type-carrying member, whereby to print the positioned character thereon, and means actuated directly by the rocking of said member to open the closed switch of the positioning magnets.

8. In a typewriter, the combination with a platen and a keyboard, of a type-carrying member mounted to oscillate about its longitudinal axis and having a rocking movement toward and from the platen, electromagnets for turning said type-carrying member about its longitudinal axis, whereby to position one of the characters thereon in printing relation with the platen, operating switches for said electromagnets closed by the depression of one of the keys of the keyboard, means to rock said type-carrying member, whereby to print the positioned character thereon, and means actuated directly by the rocking of said type-carrying member to open the closed switch of the positioning magnets.

9. In a typewriter, the combination with a platen and a key-board of a type-carrying member mounted for oscillation about its longitudinal axis and having a rocking motion toward and from the platen, electromagnets for oscillating said type-carrying member whereby to position a type character in printing relation with the platen, a second set of magnets to rock said member whereby to print the positioned character, actuating connections between the positioning magnets and the type-carrying member separately supported from the positioning magnets so as to remain stationary while said member rocks, and means on said member to engage with the actuating connections.

10. In a typewriter, the combination with a platen and a keyboard, of a type-carrying member mounted for oscillation about its longitudinal axis and having a rocking motion toward and from the platen, electromagnets for oscillating said type-carrying member, whereby to position a type character in printing relation with the platen, a second set of magnets to rock said member whereby to print the positioned character, and a segmental gear operatively connected with said positioning magnets for turning said type-carrying member about its vertical axis, said gear being separately supported

from the type-carrying member and remaining stationary while the latter rocks.

11. In a typewriter, the combination with a platen and a keyboard, of a type-carrying member mounted for oscillation about its longitudinal axis and having a rocking motion toward and from the platen, electromagnets for oscillating said type-carrying member, whereby to position a type character in printing relation with the platen, a second set of magnets to rock said member whereby to print the positioned character, actuating mechanism between the positioning magnets and the type-carrying member, including a segmental gear, a lever at each side of the typewriter movable by the positioning electromagnets, and a swinging link slidably and pivotally connected to said levers and to the gear such that the three points of connection form a triangle, said link swinging about its pivot point of connection with one of the levers when moved by the other.

12. In a typewriter, the combination with a platen and a keyboard, of a type-carrying member mounted for oscillation about its longitudinal axis and having a rocking motion toward and from the platen, electromagnets for oscillating said type-carrying member, whereby to position a type character in printing relation with the platen, a second set of magnets to rock said member whereby to print the positioned character, actuating mechanism between the positioning magnets and the type-carrying member, including a segmental gear, a lever at each side of the typewriter movable by the positioning electromagnets, a swinging link slidably and pivotally connected to said levers and to the gear such that the three points of connection form a triangle, said link swinging about its pivot point of connection with one of the levers when moved by the other, and a triangular block for centering said link.

13. In a typewriter, the combination with a platen and a key-board of a type-carrying member mounted for oscillation about its longitudinal axis and having a rocking movement toward and from the platen, an electro-magnet at each side of the typewriter controlled by the keys for turning said type-carrying member about its vertical axis whereby to position one of the characters thereon in printing relation with the platen, a toothed gear for turning said type-carrying member, actuating means between said gear and the armature of each magnet and connections included in said actuating means operative to permit the actuating means at one side to remain stationary when the other is moved.

14. In an electric typewriter, the combination with a platen and a keyboard, of a shaft mounted to oscillate about its longitudinal axis, a type-carrying member mounted to oscillate about its longitudinal axis, and a keyboard, of a type-carrying member mounted to oscillate about its longitudinal axis and having a rocking motion toward and from the platen, electromagnets for oscillating said type-carrying member, whereby to position a type character in printing relation with the platen, a second set of magnets to rock said member whereby to print the positioned character, and a segmental gear operatively connected with said positioning magnets for turning said type-carrying member about its vertical axis, said gear being separately supported from the type-carrying member and remaining stationary while the latter rocks.

tudinal axis through an arc of less than 180° and having also a rocking movement toward and from the platen, a segmental type plate carried upon said shaft and movable therewith, electromagnets for turning said shaft, whereby to position a type character on the plate in printing relation with the platen, said electromagnets being energized by the depression of a key on the keyboard, a series of stop pins each connected with a key and arranged in an arc and projectable upon the depression of a key, and a single arm fixed upon said shaft and normally disposed in the center of said arcuately arranged stop pins for contact with the projected one, whereby to control the extent of turning movement of said shaft.

15. In an electric typewriter, the combination with a platen and a keyboard, of a type-carrying member mounted to oscillate about its longitudinal axis and having a rocking motion toward and from the platen, electrical means controlled by the keys for oscillating the type-carrying member to effect a positioning of the type characters thereon, and electrical means controlled directly by the position of the type-carrying member for rocking the latter, whereby to print the positioned character.

16. In an electric typewriter, the combination with a platen and a keyboard, of a type-carrying member mounted to oscillate about its longitudinal axis and having a rocking motion toward and from the platen, electrical means controlled by the keys for oscillating the type-carrying member to effect a positioning of the type characters thereon, and electrical means controlled directly by the position of the type-carrying member for rocking the latter, whereby to print the positioned character, said last-named means being effective slightly in advance of the completion of the turning movement of the type-carrying member.

17. In an electric typewriter, the combination with a platen and a keyboard, of a type-carrying member mounted to oscillate about its longitudinal axis and having a rocking motion toward and from the platen, electrical means controlled by the keys for oscillating the type-carrying member to effect a position of the type characters thereon, electrical means controlled directly by the position of the type-carrying member for rocking the latter, whereby to print the positioned character, said last-named means being effective slightly in advance of the completion of the turning movement of the type-carrying member, and a pin engageable with the type-carrying member as it moves into contact with the platen to control said member and insure the alignment of the positioned type character with relation to the platen.

18. In a typewriter, the combination of a platen and key board of a side-wise oscillating and fore and aft rocking type-shaft; a segmental type-plate carried thereby, electrical means controlled by the keys for oscillating the type-shaft to effect a positioning of the type characters on the plate and electrical means controlled by the positioning of the type-plate for rocking the type-shaft to print the positioned character, said last means being effective slightly in advance of the complete positioning of the type-characters.

19. In a typewriter, the combination of a platen and key board of a side-wise oscillating and fore and aft rocking type-shaft; a segmental type-plate carried thereby, electrical means controlled by the keys for oscillating the type-shaft to effect a positioning of the type characters on the plate and electrical means controlled by the positioning of the type-plate for rocking the type-shaft to print the positioned character, said last means being effective slightly in advance of the complete positioning of the type-characters, and a centering device adjacent the type segment to complete the positioning of the type characters.

20. In a typewriter, the combination of a platen and keyboard of a side-wise oscillating and fore and aft rocking type-shaft, a segmental type plate on said shaft to contact with the platen, electro-magnets at either side of the type-shaft for oscillating the same, whereby to position the characters on the segmental plate with relation to the platen, said magnets being controlled by the keys on the keyboard; a contact arm carried by the type-shaft, arcuately spaced stop pins over which the contact arm travels, each of said pins being operable by a key to move into contacting position with the arm, and electro-magnets having their circuits closed by said arm and pins to rock said shaft and print the positioned type-character.

21. In a typewriter, the combination of a platen and keyboard of a side-wise oscillating and fore and after rocking type-shaft, a segmental type plate on said shaft to contact with the platen, electro-magnets at either side of the type shaft for oscillating the same, whereby to position the characters on the segmental plate with relation to the platen, said magnets being controlled by the keys on the keyboard; a contact arm carried by the type-shaft, arcuately spaced stop pins over which the contact arm travels, each of said pins being operable by a key to move into contacting position with the arm, and electro-magnets having their circuits closed by said arm and pins to rock said bar and print the positioned type-character, said pins being positioned with respect to the characters on the segmental

plate to effect a premature contact with the arm.

22. In a typewriter, the combination with a frame having a platen and a keyboard, of a fore and aft rocking frame pivoted on the stationary frame; an oscillating shaft journaled vertically in said rocking frame, a type segment on said shaft to coact with the platen, electromagnets on the stationary board controlled by the keys in said keyboard to oscillate said shaft in either direction, mechanical means controlled by said keys to limit the extent of oscillating movement of the shaft, whereby to position the characters on the type segment in printing relation with the platen and an electromagnet on the stationary frame, having its circuit closed by said mechanical limiting means, whereby to rock said frame and print the positioned type character.

23. In a typewriter, the combination with a frame having a platen and a keyboard, of a fore and aft rocking frame pivoted on the stationary frame; an oscillating shaft journaled vertically in said rocking frame, a type segment on said shaft to coact with the platen, electromagnets on the stationary frame at either side of the shaft controlled by the keys in said keyboard, operating means between each of said magnets and the shaft, comprising a lever connected to the armature; a toothed segment carried on the stationary frame; a pinion on the shaft meshing with said segment and a rocking connection between each lever and the segment, whereby to oscillate the shaft in either direction depending upon the electro-magnet operated, and means actuated by said keys to limit the rocking movement of the shaft.

24. In a typewriter, the combination with a stationary frame having a platen and a keyboard, of a fore and aft rocking, side-wise oscillating type shaft, a type segment on the shaft to coact with the platen, and means for oscillating the shaft comprising an electro-magnet at either side of the type shaft, a lever on the armature of each magnet, a toothed segment carried on the stationary frame, a pinion on the shaft to mesh with said segment, a Y-shaped link pivoted to each of said levers and having a sliding connection with the toothed segment, and means operated by the keys for closing the circuit through said magnets and limiting the oscillating movement of the shaft.

25. In a typewriter, the combination with a stationary frame having a platen and a

keyboard, of a fore and aft rocking, side-wise oscillating type shaft, a type segment on the shaft to coact with the platen, and means for oscillating the shaft comprising an electro-magnet at either side of the type shaft, a lever on the armature of each magnet, a toothed segment carried on the stationary frame, a pinion on the shaft to mesh with said segment, a Y-shaped link pivoted to each of said levers and having a sliding connection with the toothed segment, means operated by the keys for closing the circuit through said magnets and limiting the oscillating movement of the shaft and a resilient noiseless centering block for said Y-shaped link.

26. In a typewriter, the combination with a platen and a keyboard, of a fore and aft rocking, side-wise oscillating type shaft, a type segment thereon to coact with the platen, electro-magnets at either side for oscillating said type-shaft and means operated by the keys on the keyboard to close the circuit through said magnets, said means comprising a swinging bail at either side of the center of the keyboard, movable by the adjacent keys, and a pair of contact members for each set of magnets adjacent each of the bails, one of said contact members being movable by the bail to close the circuit.

27. In a typewriter, the combination with a platen and a keyboard, of a fore and aft rocking, side-wise oscillating type shaft, a type segment thereon to coact with the platen, electro-magnets at either side for oscillating said type-shaft and means operated by the keys on the keyboard to close the circuit through said magnets, said means comprising a swinging bail at either side of the center of the keyboard, movable by the adjacent keys, and a pair of contact members for each set of magnets adjacent each of the bails, one of said contact members being movable by the bail to close the circuit, a pawl and ratchet connection between the bail and movable contact member, and means operated by the fore and aft rocking movement of the type shaft to release said pawl and allow the movable contact member to return independently.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

GEORGE C. CLARK.

Witnesses:

C. W. WIEGEL;
F. M. MAUX.