June 23, 1959 W. L. PETERSON 2,891,649

MANUAL AND/OR ELECTRIC TYPEWRITERS

Filed May 13, 1957 2 Sheets-Sheet 1

FIG. 1

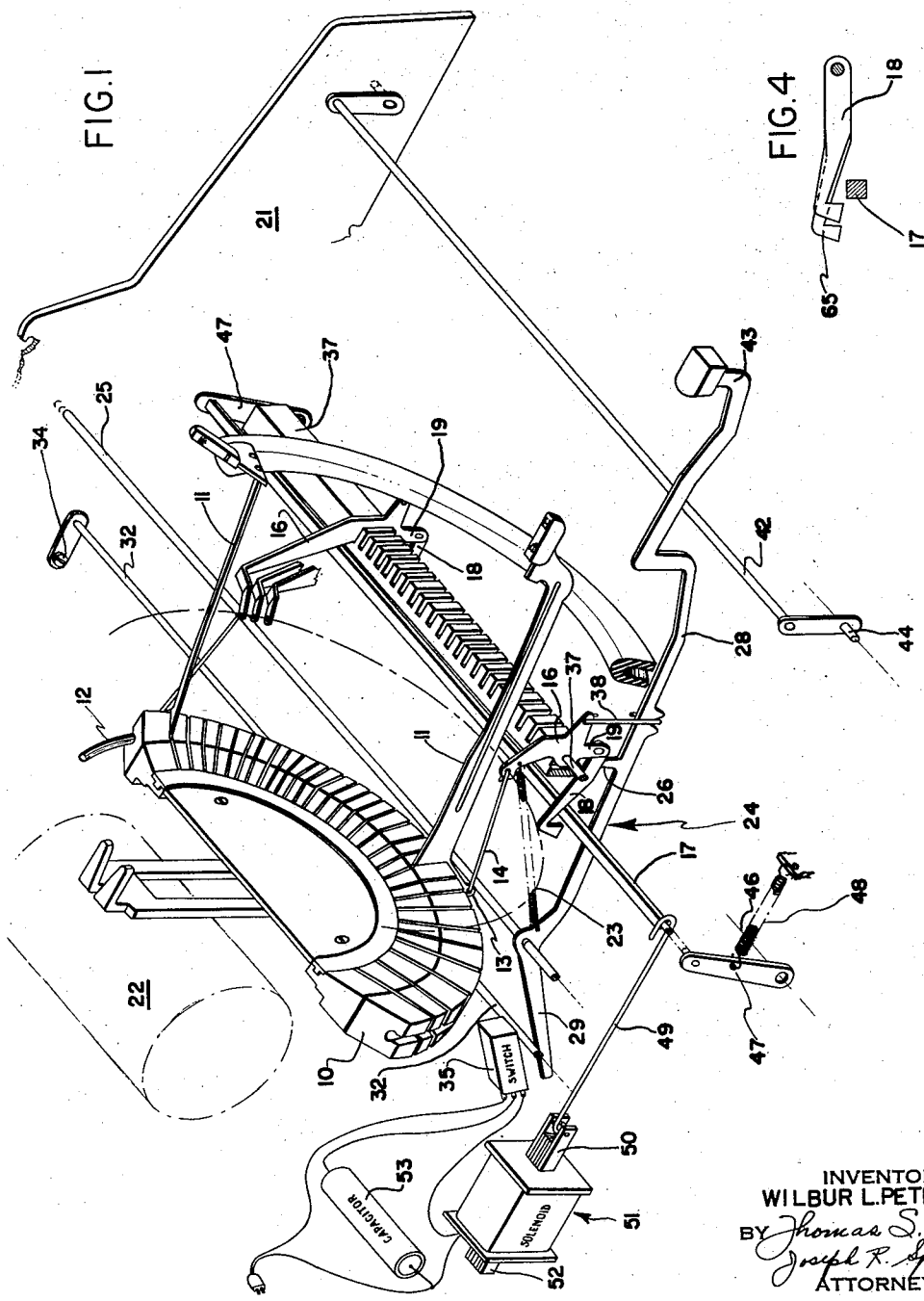


FIG. 4

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MANUAL AND/OR ELECTRIC TYPEWRITERS

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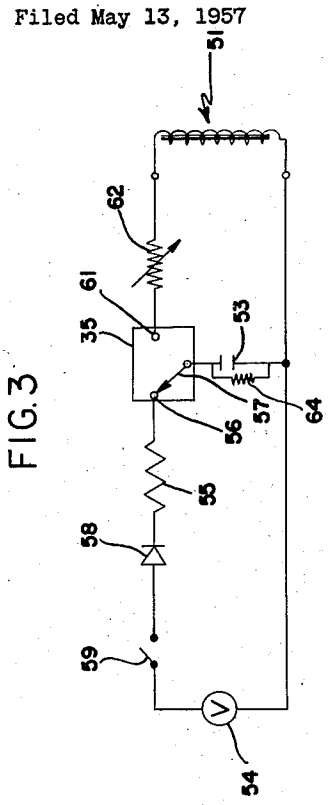


FIG. 3

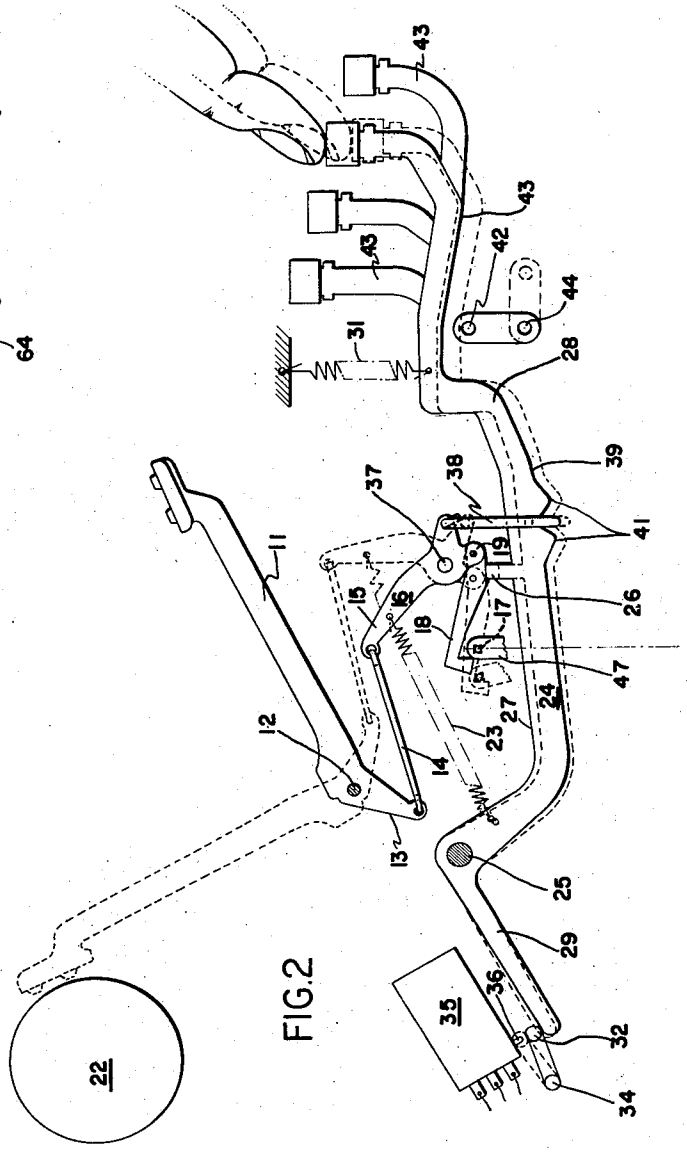


FIG. 2

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MANUAL AND/OR ELECTRIC TYPEWRITERS

Wilbur L. Peterson, Newington, Conn., assignor to Royal McBee Corporation, Port Chester, N.Y., a corporation of New York

Application May 13, 1957, Serial No. 658,602

15 Claims. (Cl. 197—14)

This invention relates to powering mechanisms for typewriting machines; more particularly to a normally quiescent power mechanism having a reciprocating motion for individually actuating selected type bar mechanisms; and specifically to a power mechanism having a member common to all of the type bar mechanisms which is reciprocally actuated through discharge of a single capacitor through a single solenoid.

Powered typewriting machines currently in use employ constantly rotating motor driven rolls in combination with cams or pawls adapted to engage the powered roll upon actuation of associated key levers, thereby to convert the rotary motion of the roll into reciprocal cam or pawl motion for transfer to type bar levers through sub-levers. In all such powered typewriters, the cam or pawl carrier mechanisms, whereby the pawl or cam is moved into and out of engagement with the powered roll, are very elaborate, difficult and expensive to manufacture and difficult to service. These carrier mechanisms are necessarily complicated in order to prevent, among other things, repetitive typing in the event the keys are held depressed. In addition, further complicated mechanisms in combination with the carrier mechanisms are necessary to compensate for the different surface areas of different character type bars, since, if the impact delivered to a period type-bar was the same as that delivered to an M type bar for example, the period type bar would cut through the paper or the printed M would be too light.

This invention provides a simple and reliable power mechanism which enables the inherent disadvantages of the mechanism necessary to typewriting machines employing powered rolls to be overcome. Briefly, the invention utilizes a static power source for imparting motion to a normally quiescent reciprocally movable bar which is adapted to impart momentum to key selected pawls in the type bar mechanism. The power source comprises a capacitor, a key lever actuated switch, a solenoid and an armature. Depression of a key selects an associated pawl by allowing it to drop into the path of said reciprocally movable bar which is common to all of the type bar mechanisms. Depression of the key also sequentially connects the capacitor in circuit with the solenoid whereby the capacitor, normally connected across a power source, discharges through the solenoid. The energized solenoid attracts the armature which is connected to the reciprocally movable bar. The movement of the bar in turn imparts motion to the pawl selected by the key lever.

Uniform impression by different character key bars is accomplished by varying the duration of engagement of the pawls with the movable bars through the simple expedient of providing longer or shorter pawls corresponding to smaller or larger faced type bars. Collecttive control of impression is accomplished by a rheostat in the discharge path of the capacitor.

As will be apparent infra, the construction embodied in the invention eliminates the constantly rotating powered rolls and the complex cam or pawl carrier mechanisms necessary thereto; eliminates additional mechanisms necessary to provide uniform type impressions; and eliminates the necessity for key bar locks.

The construction illustrated in the drawings is particularly suited for incorporation into a portable typewriter for powering its type bars, and as will hereinafter be more fully described, incorporates a key action which permits manual operation in the event electric power is not available thereby providing a true electric portable typewriter.

An object of the invention therefor is to provide a simplified low cost electrically powered typewriting machine.

Another object of the invention is to provide a portable typewriter wherein the type bars may be electrically or manually powered.

Another object of the invention is the provision of a normally quiescent power source adapted to actuate the type bars in a typewriting machine.

Another object of the invention is the provision of an electrically powered normally quiescent reciprocally movable member common to all of the type bar mechanisms in a typewriting machine for powering said type bar mechanisms.

A further object of the invention is the provision of an electric power source for powering the type bar mechanisms in a typewriting machine and for collectively controlling the momentum of said type bar mechanisms.

A still further object of the invention is the provision of a key actuated electro-mechanical powering mechanism for powering the type bars in a typewriting machine.

Still another object of the invention is to provide a powered typewriting machine operable on alternating or direct current and wherein the current drain is negligible during idle time.

Still another object of the invention is the provision of a typewriting machine having a key actuated type bar powering mechanism which obviates the need for latch out mechanism to prevent repeat bar strokes while the keys remain depressed.

Still another object of the invention is the provision of a typewriting machine having a key actuated type bar powering mechanism which obviates the need for key lever locks.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the figures thereof and wherein:

Fig. 1 is a skeletonized perspective view of the novel powering mechanism disposed with respect to a central and side type bar mechanism operatively mounted on a typewriter frame; only those parts of the machine necessary to understand the invention being shown;

Fig. 2 is a schematic vertical sectional view of a typewriting machine showing a single type bar mechanism in operative combination with an electro-mechanical power source in accordance with the invention;

Fig. 3 is a schematic view of the electrical circuitry employed in the invention; and

Fig. 4 is a view of impellable members in accordance with the invention.

Referring now to the drawings, which have been simplified to illustrate only those portions of a typewriter as is necessary to a complete understanding of the invention, and wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in Figs. 1 and 2, which illustrate a specific embodiment, a slotted type bar segment 10 adapted to support identical type bars 11 in an arcuate array. The type bars 11 are pivoted in the segment slots on an arcuate pivot wire 12 whereby the type bars will swing through printing strokes of like amplitude and arc. The type bars

(only a center and side one of which are shown in Fig. 1) each have identical short operating lower arms 13 pivotally connected to the rearwardly disposed end of identical wire links 14. The forwardly disposed ends of each of the links are pivotally connected to the upper arms 15 of sub-levers or bell cranks 16. Individual type bar mechsub-levers 16 are selectively connectable, as will hereinanisms comprising the type bars 11, the links 14 and the after be more fully described, to a reciprocally movable bar 17 through hooked pawls 18 pivotally connected to the lower arms 19 of the sub-levers 16. The bar extends horizontally across the typewriter frame 21 beneath the hooked pawls 18 and is adapted to drive the type bar mechanisms through their respective pawls 18 part way towards the platen roll 22 after which they complete their printing strokes by acquired momentum against the restraining force of return springs 23, and are thereafter returned to rest position by said return springs. The return springs 23 are connected, as shown, to the upper arms 15 of the sub-levers 16 and to the forward extending arms of associated key levers 24.

A plurality of key levers 24, fulcrumed on a common straight bar 25 which extends horizontally across the typewriter frame, are adapted, through abutments 26 integrally formed on the upper edges 27 of their forwardly extending arms 28, to trip the pawls 18 of associated type bar mechanisms into the path of motion of the reciprocally movable bar 17, and subsequently, through movement of their rearwardly extending arms 29 as will hereinafter be described, to actuate the bar 17.

The key levers 24 are normally biased in a rest position by return or normalizing springs 31 (Fig. 2) that are suitably secured to an anchor either fixed or movable, mounted on the typewriter frame 21 as is understood in the art to vary key tension. The rearwardly extending arms 29 of the key levers are all positioned adjacent a conventional horizontally disposed ribbon vibrator actuating bar 32 which is rotatably linked to a pivot 34 (Fig. 2) mounted on the typewriter frame 21. A suitable double throw single pole switch 35, such as a micro-switch, is mounted adjacent one end of the bar 32 and in the path of motion thereof. Motion of the bar 32 by the rearwardly extending arms 29 of the key levers 24 pushes a spring biased plunger 36 (Fig. 2) on the micro-switch whereby switching occurs.

As most clearly seen in Fig. 1 the bell crank or sub-levers 16 are mounted for rotation on a straight sub-lever bracket fulcrum 37 which is mounted on the typewriter frame 21 in a conventional manner. As seen in Fig. 1 the upper arms 15 of the bell crank levers 16 are graded progressively upward in length outwardly from the centrally disposed bell crank and have their upper portions bent laterally inward such that the pivoted connections to the wire links 14 are in an arcuate path parallel to the arcuate type bar segment whereby the link and bell crank connections and the link and type bar connections are in common planes.

In order that the type bars may be manually powered in the event electric power is not available the lower arms 19 of the bell cranks are pivotally connected to wire links 38 which depend downwardly and about the lower edge 39 of the key levers. The links 38 are held in position and spaced a predetermined distance from the lower edge 39 of the key levers by spaced abutments 41 on the lower edge of the key levers.

In accordance with the invention, the depth of the stroke of the key levers 24 is controlled by means of a single two position downstop bar 42 horizontally disposed below and adjacent the finger key ends of the key levers and pivoted about frame mounted rod 44. To provide for uniform depression of the key levers the first, second, third and fourth banks of key levers have progressively longer vertical key tab sections 43 whereby the stopping edge portions of all of the key levers are equidistant from the downstop 42.

Referring to Fig. 2 the solid lines show the key lever in a position of rest and the downstop 42 in position for electrically powered operation. The dotted lines show the key levers depressed through a stroke in electrically powered operation. As is apparent from Fig. 2 the distance the key levers 24 move during an electrically powered stroke is equivalent to the spacing of the lower end of links 38 from the lower edge 39 of the key levers so that during electric operation the links 38 are inoperative. Where power is not available the downstop is moved to the dotted line position shown in Fig. 2 thereby enabling the key levers to be depressed through a stroke which will move the links downwardly to rotate the sub-levers 16 and type bars 11 in the conventional manner.

Referring again to Fig. 1, the reciprocally movable bar 17 is supported for movement about a stationary horizontally extending bar 46 by supports 47 journalled on said stationary bar and is held in rest position by at least one return spring 48. The reciprocally movable bar is suitably coupled as by a link 49 to the armature or plunger 50 of a suitable solenoid 51 efficaciously mounted on the typewriter frame, whereby upon energization of the solenoid, the armature will be rapidly drawn toward the solenoid pole piece 52 carrying with it reciprocally movable bar 17.

The electrical circuit whereby the solenoid is enabled to move the movable bar 32 at a controlled rate, selectively and repeatedly in a reciprocal fashion is shown in Fig. 3 and comprises the micro-switch 35, the solenoid 51 and a capacitor 53. A power source 54, either alternating or direct current, is adapted to be normally connected across the capacitor through a resistor 55, one stationary contact 56 of the micro-switch and through the movable contact arm 57 of the micro-switch. Where alternating current is employed a rectifier 58, either half wave or full wave, is connected in the charge path of the capacitor. Hence upon closing line switch 59 the capacitor will charge almost instantaneously; the RC time constant of the charging circuit being very small. The solenoid 51 is adapted to be connected across the capacitor through the movable contact arm 57, the other stationary contact 61 of the micro-switch, and through a rheostat 62. As is apparent from Fig. 3, when a typist is through typing and the line switch 59 is opened, the capacitor 53 will remain charged. As understood in the art, a high resistance 64 may be employed in parallel with the capacitor so that its acquired charge may leak off.

Referring to Fig. 2 operation is as follows:

Upon throwing the line switch 59 the capacitor charges. Thereafter depression of a key lever 24 allows its associated pawl 18 to drop into the path of motion of the reciprocally movable bar. Further depression of the key lever to the downstop 42 causes the rearwardly extending arm 29 of the key lever to move the vibrator bar 32 which in turn moves the plunger 36 connected to the movable contact arm 57 of the micro-switch, thereby connecting the capacitor across the solenoid coil. Discharge is rapid and the magnetic flux set up around the coil and through its pole piece, due to the discharge current, instantaneously pulls the armature 50 toward the pole piece which in turn rapidly moves the reciprocally movable bar 17 through its stroke. The movement of the bar 17 carries with it the pawl 18 interposed in its path which pulls the bell crank 16 clockwise about its fulcrum 37 thereby accelerating the type bar 11 toward the platen roll. When the pawl is released by the kicker bar at the end of its stroke, the type bar completes its printing stroke by acquired momentum as is understood in the art.

Both the type bar and armature are returned to normal position by return springs 23 and 48 respectively. As is apparent, however, the key levers are returned to normal by their return springs 31 only when the key levers are released. Hence even though the pawl 18 drops back into the path of the bail after a type bar has been ac-

tuated, there can be no repeat since the key lever must be raised to allow the capacitor to recharge. Upon releasing the key lever the abutment **26** thereon pushes the pawl out of the path of the striker bar **17** and enables the spring biased plunger **36** to assume its normal position thereby disconnecting the solenoid from across the capacitor, the latter being reconnected to the power source.

To regulate the arc over which a type bar is powered and hence its rate of acceleration, the duration of engagement of the hooked pawls **18** with the kicker bail is varied by making selected ones **65** of the pawls longer as seen in Fig. 4. By pre-forming these lengths, the sub-levers **16** connected thereto will be driven through angles of throw which decrease or increase in proportion to the varying lengths of the pawls whereby as is understood in the art, the time interval over which the restraining force of the return springs **23** may act to reduce type bar acceleration increases or decreases respectively.

Collective and simultaneous control of the type impact may be accomplished by varying the time constant of the discharge path of the capacitor through the rheostat **62** in the discharge path which will control the rate of change of current through, and the attractive force of, the solenoid pole piece on the armature. The rheostat also serves to balance out differences in line voltage utilized to charge the capacitor.

While the powered mechanism has been described as a type bar actuator, it is to be understood that it may be employed to actuate other parts of the machine which perform the functions of back spacing, carriage return etc. It should be understood, therefor, that the foregoing disclosure relates to only a preferred embodiment of the invention and that it is intended to cover all changes and modifications of the example of the invention herein chosen for the purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

The invention claimed is:

1. In a typewriter having a plurality of key levers, a pawl, a bell crank lever and a type bar associated with each of said key levers, movable means, means on each of said key levers adapted to place said pawls in the path of said movable means upon depression of an associated key lever, a two position switch, a capacitor, and a solenoid, circuit means connecting said capacitor across a power source when said switch is in one position and across said solenoid when in the other of its two positions, means responsive to depression of any one of said key levers for switching said switch from said one position to the other of said positions, and means operatively connecting said solenoid to said movable means, said last named means being actuated upon energization of said solenoid upon depression of any one of said key levers thereby to cause said movable means to deliver an impact to a pawl in its path and thereby accelerate an associated type bar.

2. In a typewriter as recited in claim 1 wherein said power source comprises an alternating current power source and a rectifier.

3. In a typewriter as recited in claim 1 wherein said power source is a direct current power source.

4. In a typewriter having a plurality of character key levers, a bell crank lever and a type bar associated with each of said key levers, a pawl operatively connected to each of said bell cranks, each of said pawls being movable to a selected position upon depression of an associated key lever, means comprising reciprocally movable means adapted to deliver an impact to pawls associated with depressed key levers, said means comprising a solenoid and armature, means responsive to depression of any key lever, a capacitor, a switch normally connecting said capacitor across a power source and for connecting said capacitor across said solenoid upon actuation of said switch by said last named means, whereby said capacitor discharges through said solenoid each time a key lever is depressed and charges from said power source upon release of said key lever, and means connecting said armature to said reciprocally movable means.

5. An electric typewriter having a plurality of key levers and a bar movable upon actuation of any selected key lever, pawls associated with said key levers, means integral with each key lever adapted to place an associated pawl in a type bar actuating position and to maintain said pawl out of said type bar actuating position upon depression and release of said key lever respectively, circuit means including a capacitor and a solenoid, means responsive to the discharge current of said capacitor through said solenoid for delivering an impact to pawls in type bar actuating positions, and means responsive to depression of any key lever for providing a discharge path for said capacitor.

6. A typewriter having electrically powered type bars, bell cranks associated with said type bars, linkages connecting said associated type bars and bell cranks, said type bars adapted to be accelerated through associated linkages and bell crank levers, pawls rotatably mounted on said bell crank levers adapted to transfer motion to said bell crank levers whereby said type bars are accelerated toward a platen roll, a solenoid, a pawl actuator bar connected for reciprocal movement with the armature of said solenoid, key levers, said pawls being interposed in the path of said actuator bar upon depression of selected key levers through a predetermined distance, a capacitor normally connected across a power source, and means responsive to further depression of said key levers adapted to connect said capacitor across said solenoid to thereby discharge said capacitor through said solenoid, whereby said armature and actuator bar deliver an impact to a pawl in the path of said actuator bar.

7. In a typewriting machine having a plurality of type bar mechanisms adapted to be manually or electrically powered, each of said type bar mechanisms having a type bar, a link, and a bell crank connected through said link to said type bar, key levers, second links adapted to couple said bell cranks to said key levers, stop means for limiting the stroke of said key levers, said stop means being movable to a first position when electric power is available and to a second position when electric power is not available, a normally quiescent reciprocally powered bar, an impellable member connected to each of said bell cranks, and normally biased out of the path of motion of said bar by said key levers, a normally charged capacitor and electromechanical means adapted upon discharge of said capacitor therethrough to actuate said reciprocally movable bar, said impellable member being interposed in the path of motion of said bar and said capacitor being discharged through said electromechanical means upon depression of a key lever to said first stop position when electric power is available, thereby to electrically power said type bar mechanisms, and said second links being adapted to transmit an impulse to said type bar mechanism when electric power is not available upon depression of said key levers to said second stop position.

8. A power mechanism for a typewriting machine having a plurality of type bar mechanisms, each of said type bar mechanisms comprising a bell crank, a link and a type bar, a plurality of key levers, an impellable member connected to each of said type bar mechanisms, said power mechanism comprising a normally quiescent power driven bar common to all of the type bar mechanisms in said machine, means on each of said key levers for normally biasing said impellable member out of the path of movement of said bar, said impellable member being placed in the path of said bar upon depression of said key lever, and electromechanical means responsive to depression of said key levers for reciprocally actuating said bar,

whereby said type bars are accelerated toward a platen roll through said impellable member said electromechanical means comprising a two position switch, a capacitor normally charged from a power source through said switch, a solenoid, and an armature, said armature being connected to said bar, and means responsive to depression of a key for throwing said switch to its other position thereby connecting said capacitor across said solenoid.

9. A power mechanism as recited in claim 8 wherein said impellable members are hooked pawls.

10. A power mechanism as recited in claim 9, wherein said pawls are of different predetermined lengths whereby the time of engagement of predetermined ones of said pawls with said bar is controlled.

11. In a typewriting machine having a plurality of type bar mechanisms adapted to be manually or electrically powered toward a platen roll, each of said type bar mechanisms having a type bar, a link and a bell crank connected through said link to said type bar, a key lever associated with each of said type bar mechanisms normalizing springs connecting said key levers and bell cranks, key lever stop means adjustable to one or another of two positions, an impellable member rotatably mounted on each of said bell cranks, means common to all said type bar mechanisms adapted to move over a predetermined path from a rest position, means on said key levers for normally biasing said impelling members out of the path of motion of said last named means, electromechanical means responsive to key lever depression to said first stop position for moving said last named means through its path of motion thereby to deliver an impulse to an associated type bar mechanism through its associated impellable member, and mechanical means responsive to key lever depression to said second stop position for delivering an impulse to said type bar mechanisms directly.

12. A typewriting machine as recited in claim 11 wherein said electromechanical means comprises circuit means including a power source, a capacitor normally connected across said source, a solenoid having an armature connected to said means movable over a predetermined path, and means responsive to key lever depression for connecting said solenoid in the discharge path of said condenser.

13. A typewriting machine as recited in claim 12 wherein said discharge path includes a rheostat for controlling the discharge current whereby the rate of movement of said armature is controlled.

14. A typewriting machine as recited in claim 11 wherein said mechanical means comprises links coupling associated bell cranks and key levers.

15. In a typewriter having a plurality of key levers, a bell crank lever and a type bar associated with each of said key levers, a pawl operatively connected to each of said bell cranks, said pawls being movable to a selected position upon depression of an associated key lever, means comprising reciprocally movable means adapted to deliver an impact to pawls associated with depressed key levers, means for storing electrical elergy, means responsive to depression of any key lever for releasing said stored electrical energy, and means responsive to said released electrical energy for actuating said reciprocally movable means.

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CERTIFICATE OF CORRECTION

Patent No. 2,891,649 June 23, 1959

Wilbur L. Peterson

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 8, strike out "anisms comprising the type bars 11, the links 14 and the" and insert the same before "sub-levers 16" in line 7, same column 3; column 8, line 23, for "elergy" read -- energy --.

Signed and sealed this 10th day of November 1959.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents