Aug. 10, 1948. M. RUDERFER 2,446,851

ELECTRICALLY OPERATED TYPEWRITER WITH CONSTANTLY ROTATING TYPE WHEEL

Filed April 14, 1947 3 Sheets-Sheet 1

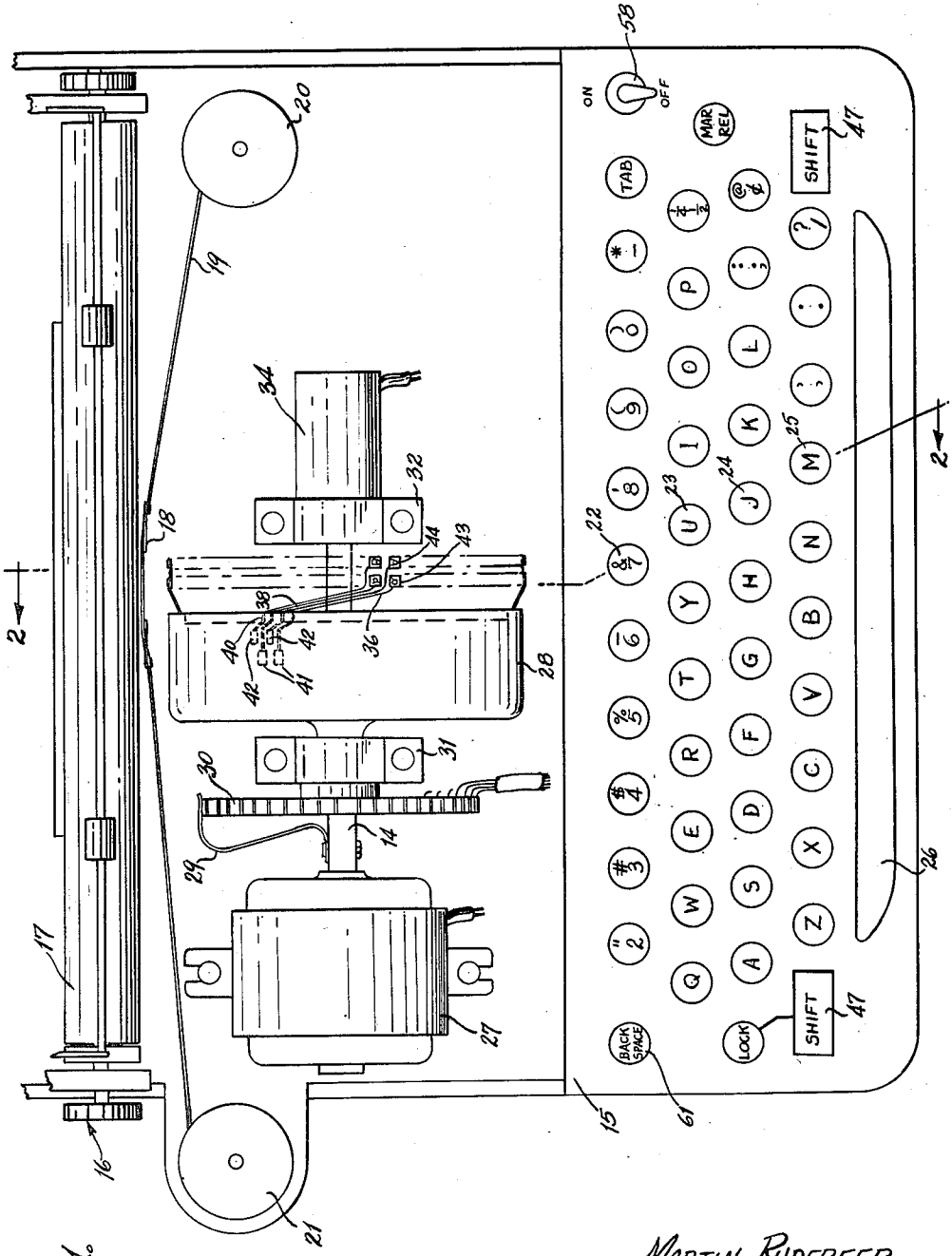


Fig. 1.

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Fig. 2.

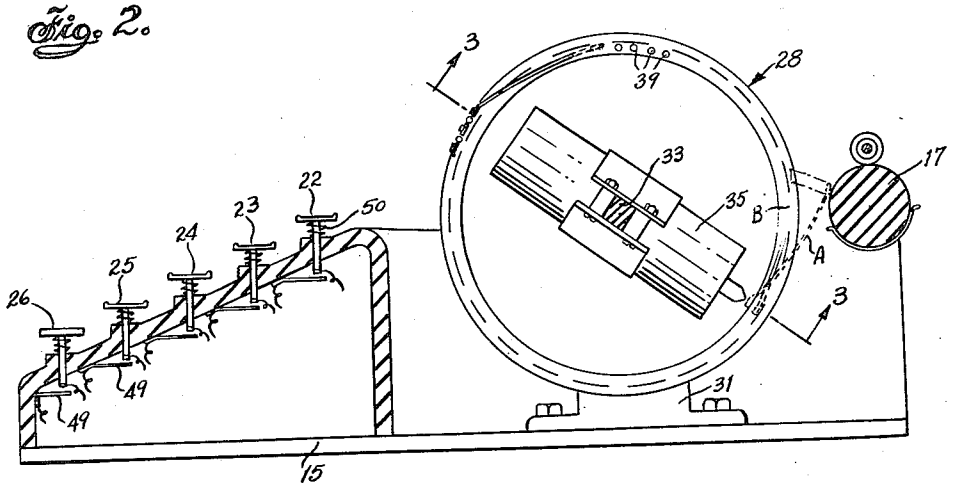
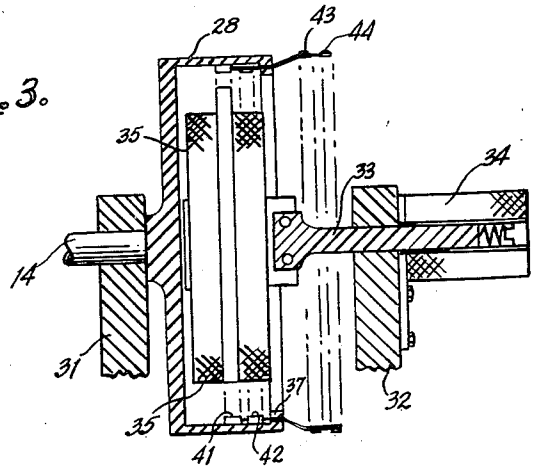


Fig. 3.



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Filed April 14, 1947 3 Sheets-Sheet 3

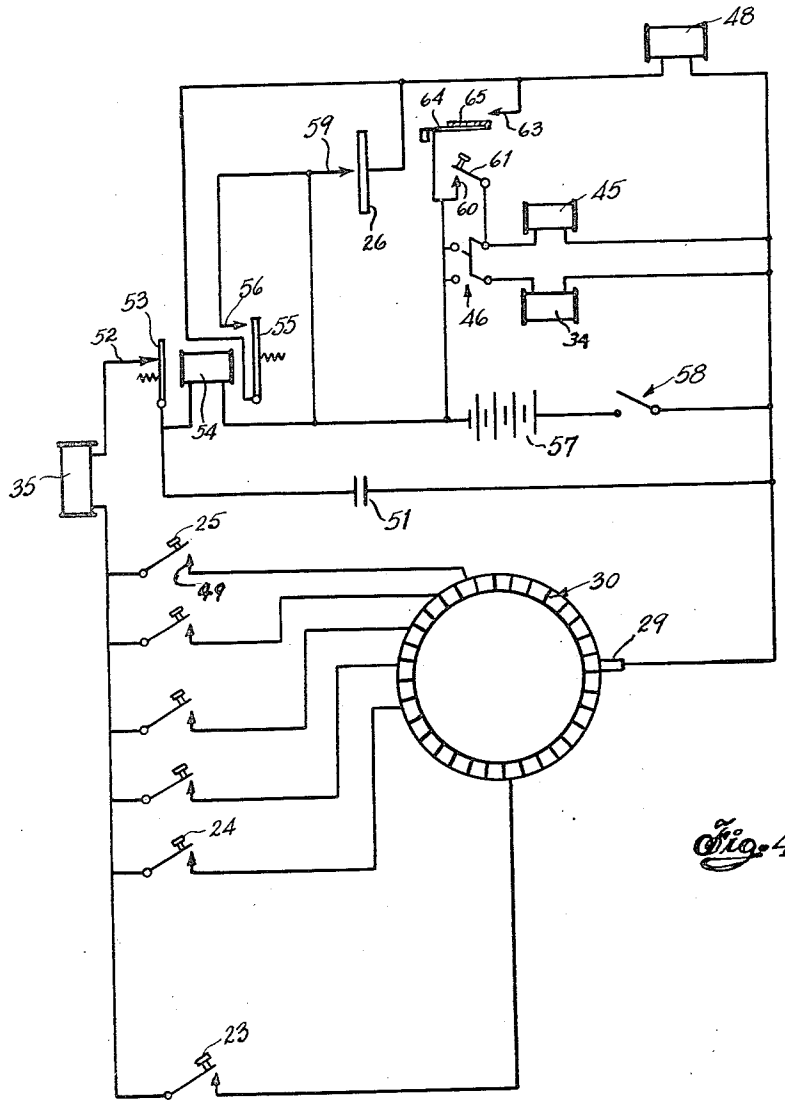


Fig. 4.

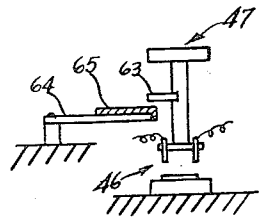


Fig. 5.

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UNITED STATES PATENT OFFICE

2,446,851

ELECTRICALLY OPERATED TYPEWRITER WITH CONSTANTLY ROTATING TYPE WHEEL

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Application April 14, 1947, Serial No. 741,298

11 Claims. (Cl. 197—12)

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The present invention relates to typewriters having a rotatable drum which carries movable type elements, and includes an electrical system for operation, whose switchboard is the keyboard.

An object of this invention is to provide a typewriter of the class mentioned, of novel, improved and simplified construction, whose type elements are actuated in a novel manner, electrically controlled and electro-magnetically accomplished, thus eliminating the necessity for many mechanical mechanisms included in previously known typewriting machines of the character mentioned, as type shifting hammers or triggers, levers and linkages.

Another object hereof is to provide a novel and improved electrically operated typewriting machine, whose type carrying drum is constantly rotating while the machine is in use, and wherein independently movable type elements are operable to make proper impression of their character or symbol, without stopping or slowing down the drum, thus affording a fast typing speed.

A further object of this invention is to provide an electrically operated typewriter of the character set forth, of novel and improved construction, having considerably less parts than heretofore necessary and which operates in a manner which avoids some of the noise experienced heretofore in typewriting machines generally.

Another object hereof is to provide a novel and improved typewriter of the class described, affording a plurality of shifts if desired, so that the number of symbols, characters and styles of type, can be more than heretofore possible, and which will permit typewriting, for instance, in more than one language, or the inclusion of systems of characters used in technical nomenclatures; such shifts being accomplished electrically by very simple means. In addition, the design may be such that a particular set of characters can be made removable and another set, such as of another language or special nomenclature, be mounted in its place by a simple operation, to be controlled by the same keyboard in each instance.

A further object of the present invention is to provide a typewriting machine of the kind mentioned, of novel and improved construction, which is simple in structure, easy to use, light in weight, occupying considerably less space than standard mechanical typewriting machines, reasonably cheap to manufacture and efficient in carrying out the purposes for which it is designed.

Other objects and advantages will become apparent as this disclosure proceeds.

In the accompanying drawings forming part of this specification, similar characters of reference indicate corresponding parts in all the views.

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Fig. 1 is a diagrammatic top view of a typewriting machine embodying the teachings of this invention.

Fig. 2 is a section taken at line 2—2 in Fig. 1 with some incidental parts left out for clarity.

Fig. 3 is a longitudinal section through the type-operating electro-magnet coil and the type drum in which said coil is positioned.

Fig. 4 is a wiring diagram of an electrical system that may be employed in this machine.

Fig. 5 is a diagrammatic view showing a construction for one of the special keys included in this embodiment.

In the drawings, in the embodiment illustrated, on a frame 15, is a usual typewriter carriage 16, movably mounted for side-to-side movement on the frame, said carriage including a platen 17, which is rotatable about its longitudinal axis, a line parallel to carriage movement. Forward of the platen 17, is a guide 18, for an inked ribbon 19, drawn off from a spool 20 and wound up on a second spool 21. Of course, any other suitable paper shifting and inking means may be employed. The type-selector keys are in number and arrangement as the keyboard of a standard typewriter, some of which keys are indicated by the numerals 22, 23, 24 and 25 respectively, while the forwardly positioned spacer bar 26 occupies its usual place in relation to said plurality of keys.

The frame has mounted thereon an electric motor 27, at the end of whose horizontally positioned shaft 14 is a drum indicated generally by the numeral 28. Said shaft also carries thereon a commutator brush 29, which contacts a stationary commutator 30, fixed to a bracket 31, extending from the main frame 15; said bracket also serving to support the motor shaft. Another bracket 32, extending from the frame, horizontally slidingly supports the armature 33 of a solenoid 34 mounted on said bracket 32. Said armature 33, carries an electro-magnet 35, positioned within the cylindrical space determined by the plurality of type-carrying elements or levers 36 and 38, carried on the drum 28.

The drum 28 is open at one end, at which it has an inward flange 37, provided with a plurality of holes 39 arranged in one or more circles through its faces. Each of the type-carrying elements 36 and 38, is swingably mounted on the drum and may be formed of a short stiff wire having its intermediate portion 40 positioned as a rotatable shaft through one of the holes 39 respectively in flange 37. The end portion of each said wire

piece, positioned within the drum 28, is bent in clockwise direction and carries at its free end an armature of soft iron or equivalent to be acted on by electro-magnet 35. These respective armatures indicated by the numeral 41, which are the termini respectively of the elements 36, determine one annular lane and the respective armatures indicated by the numeral 42, which are the termini respectively of the elements 38, determine another annular lane, next to and in tandem with the aforesaid lane. The portion of each of the elements 36 and 38 positioned exteriorly of the drum 28, is bent in counter-clockwise direction and each carries at its free end a type element. The respective type elements indicated by the numeral 43, determine an annular lane, and the respective type elements indicated by the numeral 44 determine another annular lane right next to and in tandem with the aforesaid type formed lane. The distance between centers of both lanes of type elements 43 and 44, is made equal to the distance between letters to be typed on the machine. All of the type-carrying elements 36 and 38 are so formed and nested that each is free for independent movement, so that when the electro-magnet 35 is actuated to attract a particular armature of the series 41 or 42, the latter's associated type element will strike the ribbon 19 at "writing" position against the paper on the platen 17. The series of type elements 43 may constitute the small letters of an alphabet, and the series of type elements 44 may constitute the capital letters of any style of type or language and may include other characters, insignia or symbols.

It may here be noted that normally, the electromagnet 35 is positioned to attract an armature in the lane of series 41, and that upon actuation of solenoid 34, its associated armature 33 will be shifted so that said electromagnet lies in position to attract an armature in the lane of series 42. The writing position against the paper on platen 17, being different for the respective series of type elements, if there be more than one series, the platen must be "back-spaced" at the striking of any key, prior to the operation of any of the type-elements of series 44. It is therefore so arranged that upon every actuation of the solenoid 34, the electro-magnet 45 which operates the back-spacing means, shall simultaneously be actuated. Switching means 46, to accomplish such, is therefore closed upon pressing the key 47, marked "Shift."

It will be readily understood by those versed in the art that this invention may be embodied in a structure employing shifting of the carriage as in ordinary typewriters, in which instance each of the type-carrying elements would need to carry both a small and a capital letter, thus eliminating "back spacing" at the "writing" of each capital, and all type elements would be in a single lane, as well as that all armatures associated with said elements would lie in a single lane. When more than one lane of type elements is used as in the embodiment described and illustrated herein, the diameter of the drum 28 is quite small, and in practice may be less than three inches, making for a compact structure. The two lane arrangement set forth, also permits that the characters in one lane shall be of one language, while that of the other shall be of another language, for example. Although not shown, bracket 32 may be shiftable to permit mounting of other drums carrying type elements of any desired character or style.

Means for movement of carriage 16, to accomplish spacing between letters and for back-spacing, as known in the art, include each a bar or lever to be pulled for their operation. I have therefore provided the electro-magnets 48 and 45 to provide the actuating force for such respective purposes, and have not shown the mechanical means for such carriage movements, for they are well known.

The keys of the keyboard are arranged as normally "open" switches. When pressed down against a compression spring 50, the switch they constitute with their associated fixed contact point, indicated in one instance by the numeral 49, is "closed." Reference is now made to the wiring diagram of the electrical system employed for operation, shown in Fig. 4.

The keys, among which are 23, 24 and 25, are marked with a designation of the characters they control. Each such key has its associated fixed contact point 49. There are as many commutator segments in the commutator 30, as there are type-carrying elements determining one lane of type, and as many keys. All of the keys which are to control type characters, are electrically connected to one terminal of the type-operating electro-magnet coil 35. The fixed contact points 49, associated with said keys to form switches therewith respectively, are electrically connected, one to each of the segments of the commutator 30. The brush 29 is electrically connected to one terminal of an electrical condenser 51. A normally closed switch is interposed in the electrical connection of the second terminal of said condenser 51 and the second terminal of the type-operating electro-magnetic coil 35, said last mentioned switch comprising the fixed contact point 52 and the armature 53, which is part of a relay whose coil is designated by the numeral 54. Said relay also includes a second armature 55 electrically insulated from armature 53, and a fixed contact point 56, which is normally out of contact with said second armature. Upon actuation of relay coil 54, both armatures move, 53 breaking contact with 52, and 55 making contact with 56.

It is to be noted that at any position of drum 28, brush 29 contacts such segment of commutator 30, that the character marked on the key associated with said segment, is the same character as that of the type element which would be shifted to "printing" position against the ribbon 19, if electro-magnet 35 were then and there actuated.

Consider condenser 51 to be in charged condition, and motor 27 in operation, then when a particular key as say 25, is pressed down to touch its fixed contact point 49, said condenser will discharge to actuate the type-operating electro-magnet coil 35, when brush 29 comes into contact with the segment of commutator 30 related to the said pressed key, and the chosen character will be "printed" onto the paper on platen 17, due to movement of the proper type-carrying element. Spring means not shown, is included with each type-carrying element 36 and 38, to automatically return same from "printing" position A against platen 17, to rest position B on drum 28.

Before explaining more of the condenser operation, we now note the remainder of the circuit shown in Fig. 4. A source of direct current 57 controlled by a switch 58, serves to supply the electrical energy for operation of the solenoid 34, the electro-magnet 45 for operating the back spacer means, and the electro-magnet for operating the back spacer means, and the electro-

magnet 48 for operating the means to effect spacing between letters. One terminal of switch 58 is electrically connected to the current source 57, while its other terminal is electrically connected to the brush 29, and to one terminal of each of the electro-magnet coils 34, 45 and 48. The other terminal of the current source is electrically connected to one terminal of the relay coil 54, to the fixed contact point 56 of said relay, also to the fixed contact point 59 of the spacing bar switch, the fixed contact point 60 associated with the back spacer key 61, and the two fixed contact points of the switch designated generally by the numeral 46, the moveable part of which switch is the "Shift" key 62. Said switch 46 is of the double pole, single throw, spring return type.

The other terminal of coil 45, is electrically connected to the back space key 61 and to one pole of switch 46. The other terminal of coil 34 is electrically connected to the second pole of switch 46. The spacer bar key 26, is also electrically connected to armature 55 of the relay, while the other terminal of the relay coil 54, is electrically connected to relay armature 53. The inductance of coil 54 of the relay, is of such extent, that no appreciable current flow through the said coil during the time condenser 51 discharges through coil 35.

The motor 27 is in circuit with an independent energy source, which may be controlled by switch 58; such motor circuit not being shown. It is intended, that to commence operation of the machine, the closing of switch 58 will cause motor 27 to run, and bring the electrical system of Fig. 4 into operative condition. As heretofore mentioned, during operation of the machine, said motor runs continuously. Hence drum 28 and brush 29, are continuously revolving.

The capacitance of condenser 51 is chosen to be such that it discharges through the operating coil 35 almost completely in the interval the brush 29 contacts the commutator segment connected to the actuated key, or, in the interval the type element moves from its rest position to "writing" position, whichever interval is smaller. Thus, by the time the actuated type element strikes the platen 17, there is negligible current flowing in coil 35 and therefore no appreciable attractive force between the shifted armature and operating coil 35 exists. The moved type-carrying element then immediately rebounds from the platen 17, leaving a clear impression, though the drum 28 is continuously rotating. The type element is returned to its normal rest position by means of a restoring spring, not shown.

In operation, switch 58 is closed. All keys associated with the commutator 30, being in raised rest position, the condenser 51 will become charged by the battery 57. Upon pressing down a particular key, say, the key 25, for contact with its associated contact point 49, brush 29 in its travel will come in contact with the commutator segment related to said key, and as soon as the brush does so, which will be within one revolution thereof, coil 35 will become actuated because the condenser 51 will discharge a current therethrough, and the character or symbol on the type carrying element swung by such action of coil 35, will become impressed on the paper carried on platen 17.

As soon as the brush has passed the commutator segment which is connected to the actuated key, condenser 51 will begin to charge up again from the battery through relay coil 54. This current is designed to actuate the relay coil 54,

moving its armatures 53 and 55, whereby contact is unmade at 52, and made at 56. When armature 55 contacts with 56, the circuit of coil 48 is closed, causing a forward shift of the carriage 16, a single space to next "writing" position. Armature 53 being out of contact with 52, it is evident that no operation of type-operating coil 35 can occur during operation of coil 48.

As condenser 51 becomes fully charged, current flow decreases through relay coil 54, whereupon the spring loaded armatures 53 and 55 will return to initial position as shown in Fig. 1. The machine is now in condition for operation of any of the keys controlling the "writing."

It is to be noted that whenever spacer bar 26 is pressed down to contact 59, coil 48 is actuated. Whenever the back spacer key 61 is pressed down to contact 60, the coil 45 is actuated. Also, whenever the shift key 47 is pressed down, meaning switch means 46 becomes closed, the coil 34 is actuated to move the operating coil 35 from the lane of armatures 41 to the lane of armatures 42. Upon opening of the switch means 46, the spring loaded armature 33 of the solenoid will automatically return to initial position, where coil 35 is again in position to act upon armatures in the lane 41. It is also necessary to operate the coil 48 upon the upward movement of the shift key 47, to advance the paper to next printing position for the next character to be printed. Hence, referring to Fig. 5, said key carries contact point 63 for contact with spring strap 64 only during upward movement of said key. Insulation piece 65 carried atop spring 64, prevents contact of said metal strap and point 63, upon downward movement of the key 47 when switch 46 is to be closed. Referring now to the Fig. 4, it will be seen that the switch composed of members 63 and 64 controls the circuit of coil 48.

The motor 27, for proper operation, should be run at least at such a speed that the drum 28 shall complete one revolution in the time one key is pressed down.

This invention is capable of numerous forms and various applications without departing from the essential features herein disclosed. It is therefore intended and desired that the embodiment shown herein be deemed illustrative and not restrictive and that the patent shall cover all patentable disclosure herein set forth; reference being had to the following claims rather than to the specific description and structure herein, to indicate the scope of this invention.

I claim:

1. In a typewriting machine of the character described, the combination of a continuously rotating rotor, a plurality of levers, each pivotally mounted on said rotor, a separate type element and a separate armature carried on each lever; all of said armatures normally lying in an annular lane and each lever being so positioned when swung about its axis from rest position on the rotor, that the type element carried thereon is brought to printing position, spring means to restore the moved lever to normal rest position on the rotor, an electro-magnet means, adapted when actuated to direct its force in the lane of the armatures, attracting one of said armatures whose associated type element is thereby swung to printing position, a plurality of key circuits and an electrical selecting means to bring the particular key circuit which is brought to condition to operate, into energizing relation with the electro-magnet means.

2. A typewriting machine as defined in claim

1, wherein each of the levers is pivotally mounted intermediate its ends on the rotor, and carries its type element and armature at its ends respectively.

3. A typewriting machine as defined in claim 1, wherein all the axes of rotation of the levers are parallel to the axis of rotation of the rotor.

4. A typewriting machine as defined in claim 1, wherein the key circuits include an electrical condenser adapted to energize the electro-magnet means when the particular key circuit to operate, is brought into operative relation with the electro-magnet means by the electrical selecting means.

5. A typewriting machine as defined in claim 1, wherein the rotor is a drum and wherein the armatures and the electro-magnet means are housed in said drum.

6. A typewriting machine as defined in claim 1, wherein any armature moved by the electro-magnet means, always remains spaced from same to avoid the noise of contact.

7. In a typewriting machine of the character described, the combination of, a platen, a continuously rotating rotor, a first and second plurality of levers; each lever being pivotally mounted on the rotor, a separate type element and a separate armature carried on each lever; all of the armatures on the first plurality of levers normally lying in an annular lane and each lever of said first pluraltiy being so positioned when swung about its axis from rest position on the rotor, that the type element carried thereon is brought to printing position; all of the armatures of the second plurality of levers normally lying in another annular lane and each lever of said second plurality being so positioned when swung about its axis from rest position on the rotor that the type element carried thereon is brought to a single position adjacent said printing position, spring means to restore any moved lever to normal rest position on the rotor, an electro-magnet means, adapted when actuated to direct its force in the lane of the armatures carried by the first plurality of levers normally, thereby moving one of said armatures associated with the first plurality of levers so that its type element is swung to printing position; said electro-magnet means and rotor being relatively movable to such a position that when the said electro-magnet means is energized it shall direct its force in the lane of armatures carried by the second plurality of levers, thereby moving one of the armatures associated with the second plurality of levers so that its type element is swung to the position adjacent the printing position of the type carried by the first plurality of levers, means to shift the relative position of the electro-magnet means and rotor so that said electro-magnet means is in either of said lanes, a plurality of key circuits, an electrical selecting means to bring the particular key circuit which is brought to condition to operate, into energizing relation with the electro-magnet means, means to operate the shifting means whenever the key circuit to be actuated is for movement of any of the levers of the second plurality of levers and means to shift the relative position of platen and rotor upon operation of said shifting means whereby the position adjacent printing position is moved to said printing position.

8. In a typewriting machine of the character described, the combination of, a platen, a continuously rotating rotor, a first and second plurality of levers; each lever being pivotally mounted on the rotor, a separate type element and a separate armature carried on each lever; all of the armatures on the first plurality of levers normally lying in an annular lane and each lever of said first plurality being so positioned when swung about its axis from rest position on the rotor, that the type element carried thereon is brought to printing position; all of the armatures on the second plurality of levers normally lying in another annular lane and each lever of said second plurality being so positioned when swung about its axis from rest position on the rotor that the type element carried thereon is brought to a single position adjacent said printing position, spring means to restore any moved lever to normal rest position on the rotor, an electro-magnet means, adapted when actuated to direct its force in the lane of the armatures carried by the first plurality of levers normally, thereby moving one of the said armatures associated with the first plurality of levers so that its type element is swung to printing position; said electro-magnet means being movable to such a position that when energized it shall direct its force in the lane of armatures carried by the second plurality of levers, thereby moving one of the armatures associated with the second plurality of levers so that its type element is swung to the position adjacent the printing position of the type carried by the first plurality of levers, means to shift the electro-magnet means from one to the other of said lanes, a plurality of key circuits, an electrical selecting means to bring the particular key circuit which is brought to condition to operate, into energizing relation with the electro-magnet means, means to operate the shifting means whenever the key circuit to be actuated is for the movement of any of the levers of the second plurality of levers and means to shift the relative position of platen and rotor upon operation of said shifting means whereby the position adjacent printing position is moved to said printing position.

9. In a typewriting machine of the character described, the combination of a platen, a continuously rotating rotor, more than one series of levers; each lever being pivotally mounted on the rotor, a separate type element and a separate armature carried on each lever; all of the armatures on each pluraltiy of levers normally lying in an annular lane, respectively, and each lever of a particular series of levers being so positioned when swung about its axis from rest position on the rotor, that the type element carried thereon is brought to printing position; all of the armatures of the other series of levers respectively being so positioned when swung from rest position on the rotor that the respective type elements carried thereon are brought respectively to a different position adjacent said printing position; all of the type elements of any one series of levers coming to an identical position when moved, spring means to restore any moved lever to normal rest position on the rotor, an electro-magnet means, adapted when actuated to direct its force in the lane of the armatures of but one series of levers normally, thereby moving one of said armatures so that its associated type element is swung to its position aforesaid; said electro-magnet means and rotor being relatively movable to such a position that when the said electro-magnet means is energized it shall direct its force in the lane of armatures of one of the series of levers which is predeter-

mined, means to shift the relative position of the electro-magnet means and rotor so that the electro-magnet means is in one of said lanes as is predetermined, a plurality of key circuits, an electrical selecting means to bring the particular key circuit which is brought to condition to operate, into energizing relation with the electro-magnet means, means to operate the shifting means and means to shift the relative position of platen and rotor upon operation of said shifting means whereby the particular adjacent position determined by the shifting means, is moved to said printing position.

10. A typewriting machine as defined in claim 7, wherein the means to shift the relative position of rotor and electro-magnet means, includes a solenoid and a circuit therefor adapted for actuation whenever the key circuit to be brought to actuated condition, is for operation of any of the levers of the second plurality.

11. A typewriting machine as defined in claim

8, wherein the means to shift the electro-magnet means, includes a solenoid and a circuit therefor adapted for actuation whenever the key circuit to be brought to actuated condition, is for operation of any of the levers of the second plurality.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,093,544	Bryce et al.	Sept. 21, 1937

FOREIGN PATENTS

Number	Country	Date
4,359	Great Britain	1910
343,934	Germany	1921