G. B. BAKER.

TYPE WRITER.

APPLICATION FILED OCT. 3, 1912.

1,078,081.

Patented Nov. 11, 1913.

3 SHEETS—SHEET 1.

Fig. 1.

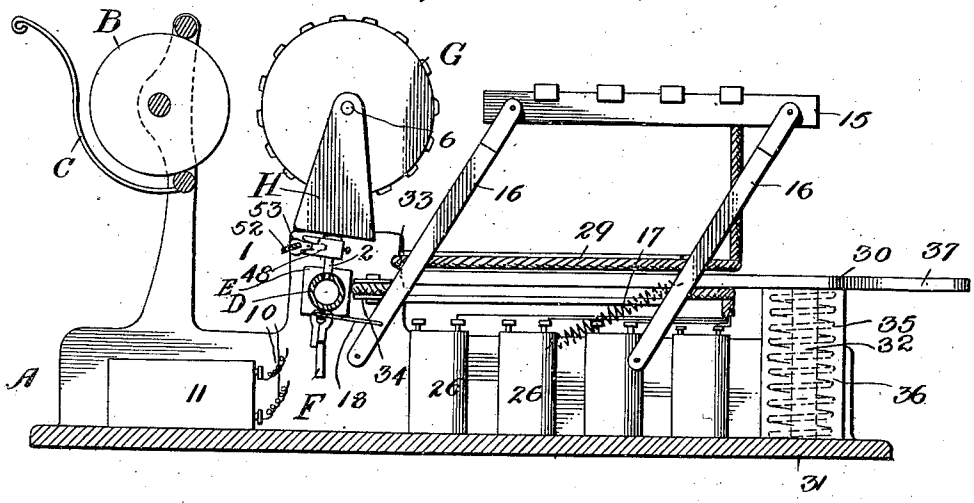
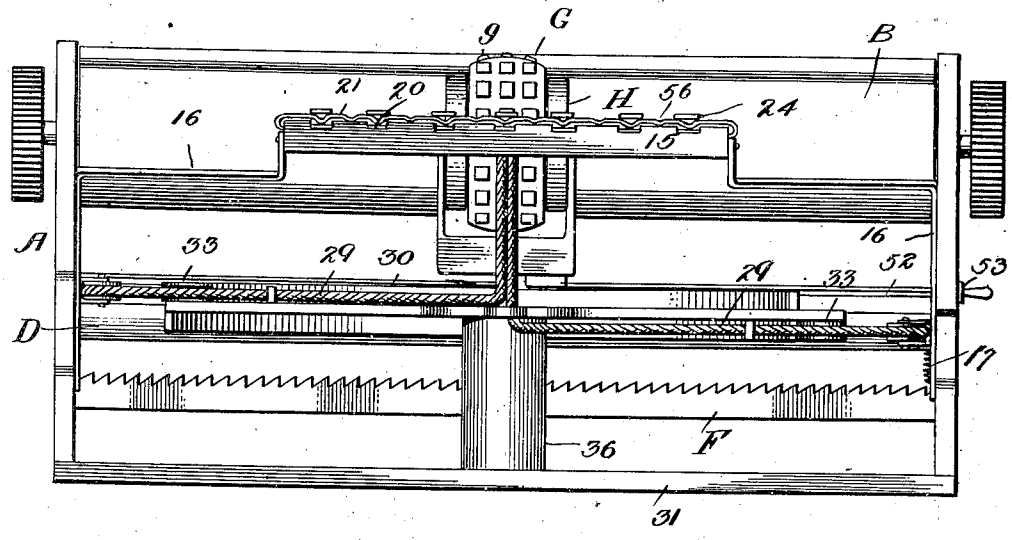


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

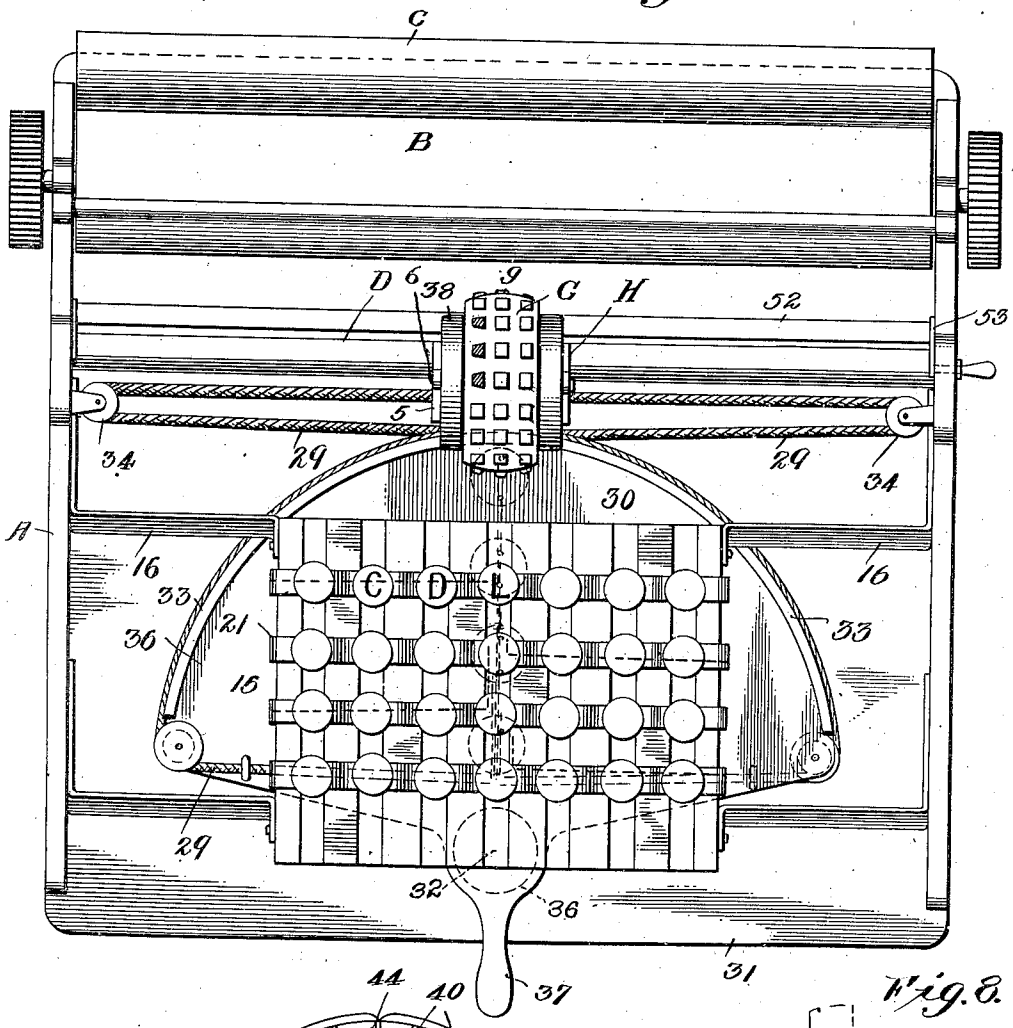


Fig. 4.

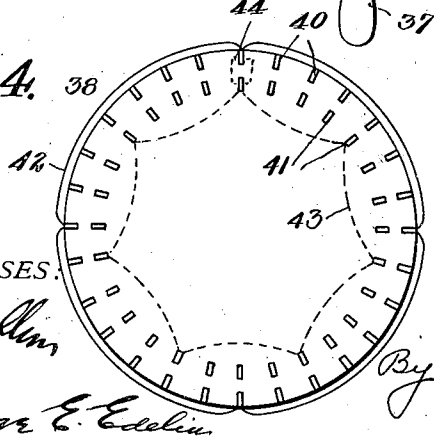
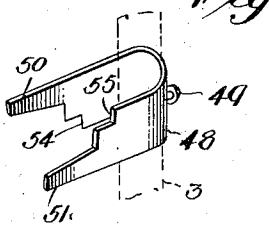


Fig. 8.



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3 SHEETS—SHEET 3.

Fig. 5.

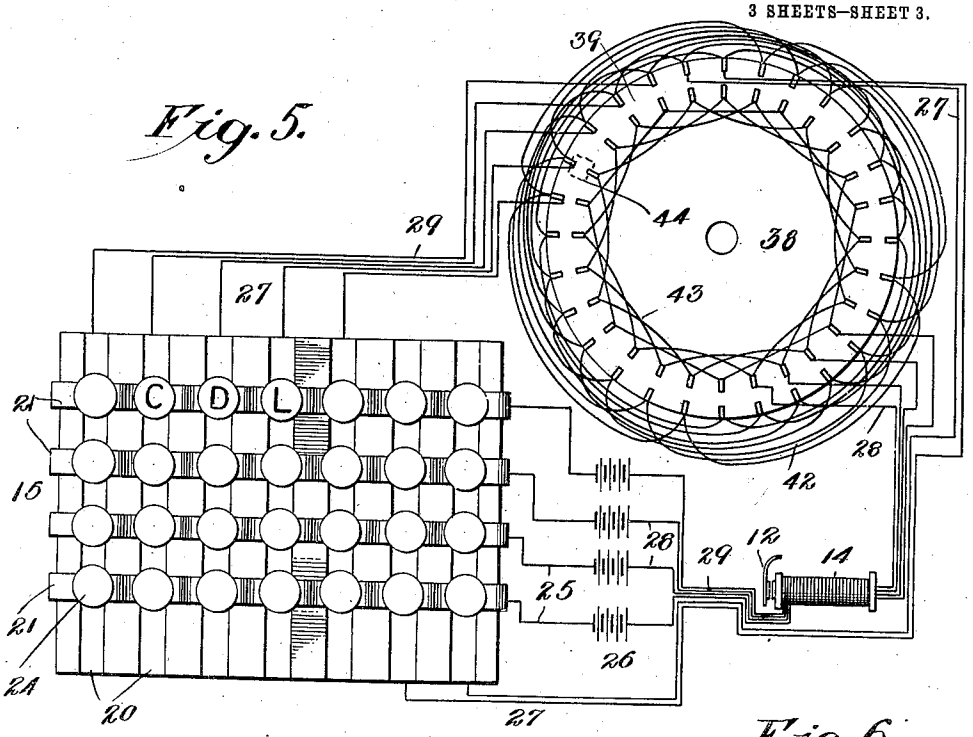


Fig. 6.

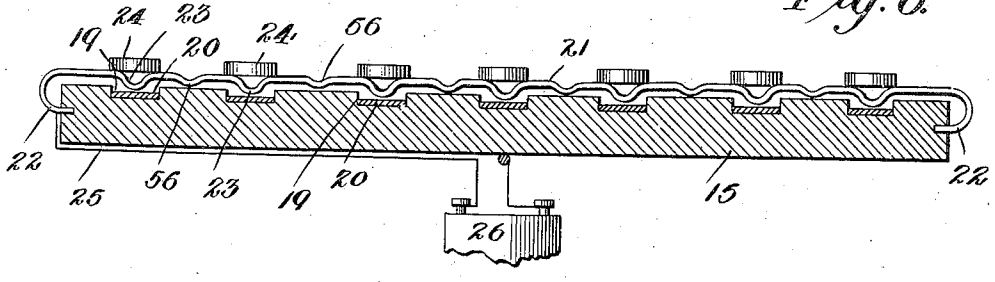
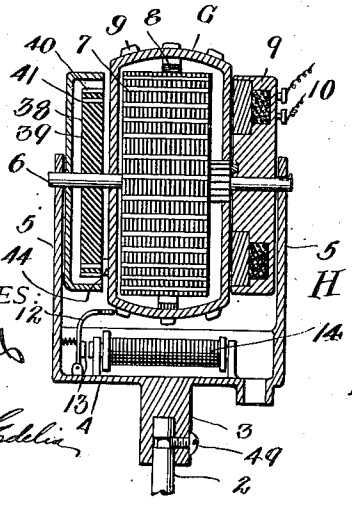


Fig. 7.



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TYPE-WRITER.

1,078,081. Specification of Letters Patent. Patented Nov. 11, 1913.

Application filed October 3, 1912. Serial No. 723,768.

To all whom it may concern:

Be it known that I, GEORGE B. BAKER, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Type-Writers, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to typewriting machines of the key-wheel type and has for its object to simplify, reduce the cost of, and otherwise improve machines of this kind.

I have embodied my invention in a machine which is adapted to be operated, in the main, by electricity, and many of the improvements relate to specific devices and combinations of an electric typewriter.

Figure 1 is a view partly in side elevation and partly in section illustrating a typewriting machine embodying my improvements. Fig. 2 is a front view of the same. Fig. 3 is a top plan view. Fig. 4 is a face view, detached, of the stationary contacts forming the automatic switch. Fig. 5 is a diagrammatic view illustrating the electrical connections by which the selection of the desired character to be printed is secured. Fig. 6 is a cross sectional view taken through the key board. Fig. 7 is a vertical sectional view taken through the type-wheel and adjacent parts. Fig. 8 is a detail view in perspective illustrating the mechanism for effecting a turning of the type-wheel.

In the accompanying drawings, A represents the frame of the machine which may be of any usual or approved construction. In this are mounted the platen B and the paper supports and guides C, which also may be of any preferred construction.

D represents a shaft supported in the frame so as to be free to turn about its longitudinal axis. Upon it is mounted a slide or carriage E which is free to be moved thereon longitudinally and is preferably splined thereto so that it and the shaft turn together. An escapement mechanism of usual or preferred construction, and designated as a whole by the letter F, is employed to insure that the carriage shall have a step by step movement along the shaft or bar D. The carriage supports a frame H in which is mounted the type-wheel G. This latter is preferably a light hollow shell sufficiently strong and rigid for purposes for which it is used, and carries upon its periphery the types *g*, which are preferably arranged in three rows. It will of course be understood that this arrangement is not essential to the invention and may be modified to suit the number of characters with which it is desired to supply the machine.

The inking mechanism is not illustrated, since it forms no part of my invention, and this may be of any usual or approved kind.

According to my invention the type or key-wheel G is maintained in constant revolution when the machine is in use, except when one of the keys is pressed for the purpose of causing a character to be printed. The means for rotating the type-wheel may be of any suitable nature, mechanical, electric, or pneumatic, though I prefer to employ electric means, and have therefore illustrated a mechanism of this kind for the purpose stated.

2 indicates a stud or short shaft that projects outward from the slide or carriage E. Supported thereon is a frame H carrying the type-wheel. This frame preferably comprises a socket-piece or sleeve 3 that engages with the stud 2, a cross-piece 4, and side pieces 5, 5, united by the cross-piece. In these side pieces is mounted a shaft 6 upon which the type-wheel is mounted so as to be free to turn thereon. Upon this shaft is also mounted, preferably within the hollow type-wheel G, and so as to turn on the shaft and independently of the type-wheel G, a rotor 7 of a small electric motor. Between this rotor and the type-wheel there is a connection, preferably frictional in nature, such as the shoe 8, arranged to cause the type-wheel to be turned with the rotor, except when the former is forcibly arrested in its movements, when the rotor will continue its revolutions independently of the type-wheel. The stationary element 9 of the motor is supported in the frame H, by one of the side pieces 5, and current for running the motor is supplied through a conductor 10 leading from a battery 11 or other suitable source of electric power.

In order to arrest the type-wheel whenever it is desired to print a character I employ a detent 12, which is preferably in the form of a spring-actuated lever to which is secured a piece of iron 13 that serves as the armature of an electro-magnet 14 supported in the frame H. The free end

of this detent normally lies close to the path of movement of the types *g* located in one of the rows of the type-wheel and is adapted when the electro-magnet 14 is energized and its armature attracted to be moved between two of the types or printing projections *g* and thus arrest the movement of the type-wheel and insure that the latter shall be accurately stopped in printing position. The end of the detent is preferably beveled, and the opposite side faces of the types or projections with which it engages are also beveled or inclined, as indicated in Fig. 3, to insure accurate working cooperation of these parts.

The striking of the type against the paper to effect the printing of a character may be caused automatically by electrical means whenever a key is operated, or mechanically as illustrated in the drawings where I have shown a frame 15 constituting the key-board, supported by links 16 so as to be free to have a limited vertical movement. Springs 17 bear upon the links 16 to maintain the key-board in its elevated position. There is a connection 18 between one of the links 16 and the shaft D so arranged that whenever the key-board is depressed, rocking its supporting lever, the latter turns the shaft, and as the carriage 3 that supports the type-wheel is splined to such shaft the wheel is carried into engagement with the paper supported upon the platen, causing a character to be printed. While key-boards of many kinds might be employed with the other mechanisms constituting my invention, I prefer to use that which I have devised and will now describe, as it is simple in construction and permits the ready separation of parts for cleaning or substitution whenever this may become necessary.

In the face of the key-board 15 is formed a series of shallow parallel grooves 19 in the bottoms of which are secured conducting strips 20 formed preferably of thin brass or copper.

21, 21 indicate conductors arranged transversely across the key-board, at right angles to the conducting strips 20. These latter strips are elastic and normally are separated by short spaces from the strips 20 at the points where they cross them. The places of intersection between the conducting strips 20 and 21 constitute closing points for the normally open circuits employed to determine the position in which the type-wheel shall be arrested for the printing operation and the number of these points of intersection corresponds with the number of printing characters upon the type-wheel, there being 28 of these in the arrangement shown in the drawings, though a greater or less number may be used as desired. The conducting strips are preferably formed of thin elastic metal such as spring brass or copper, the ends of which are bent inward to engage with kerfs formed in the edges of the key-board 15, as represented at 22. The strip is stamped so as to form a series of bosses or projections 23 that lie partially in the grooves 19, and when the strip is depressed are adapted to make contact with the conducting strips 20. Covering each depression formed in swaging or bending the strip to form the projections 23 I prefer to place a finger piece 24 constituting the key, upon which may appear the letter or other character the printing of which this particular key controls. The elastic nature of the strip 21 permits it to be easily bent to make contact between the conductors 20 and 21 at the point below any key which may be pressed. In the arrangement shown the pressing of one key will cause contact to be made at one intersection only, but in order to insure against such movement of the elastic strip as will cause a plurality of contacts to be simultaneously made, I prefer to bend or indent the strip between the projections 23 to form stops 56 which may rest upon the surface of the key-board and serve to prevent contact except at the point directly below the key which may be touched. The strips 21 are easily separable from the board 15 by springing the bent ends 22 out of the grooves in which they rest, thus making it easy to replace a strip should one become broken or inoperative, and also permitting easy access to the contacts to remove any obstruction which might lodge there and tend to prevent good effective contact. Each of the strips 21 is connected, by a conductor 25, with a battery 26 which may be located in any suitable place, as below the key-board 15. The other wire or conductor leading from the battery is that designated 28. With each strip 20 there is connected a conductor or wire 27. The wires 27 and 28 are collected and formed into two cables 29, 29, which lead to an automatic switch 38 controlled by the movements of the type-wheel and supported by the frame H, where they are distributed.

By means of the arrangement herein shown I am enabled to successfully operate with a number of conducting wires between the key-board and the automatic switch considerably less in number than the number of characters which the machine is capable of printing, and which corresponds with the sum of the two sets of strips 20 and 21. I prefer to arrange the wires into two cables as stated and illustrated, because the smaller cables thus produced are more flexible than a larger one would be and I find I can utilize two cables to advantage in controlling the movements of the carriage as will be described.

30 designates a segment-shaped pivoted frame preferably arranged between the

board 15 and the baseboard 31. The conducting wires after being collected and formed into the cables 29 are secured to the frame 30 on either side of its fulcrum 32 and thence pass into grooves formed therefor in the flanged edge 33 of the frame, which edge is preferably shaped concentric to the fulcrum 32. The two cables cross one another at a point directly opposite the fulcrum, on the shortest line between it and the rod D, where they leave the flanged edge of the segmental frame and pass to pulleys 34 about which they turn, and thence pass to the carriage 3 with which they are connected, after which the wires constituting the cables are separated.

A coiled spring 35 inclosed in a box 36 and arranged about the fulcrum of the segmental frame unites the latter with the base board or some other suitable part of the frame of the machine and serves as the motor spring for moving the carriage. The cables 29 when arranged as described constitute power-transmitting connections between the segmental frame 30 and the carriage 3. The frame 30 is provided with a handle 37 by which it may be shifted in order to move the carriage to any desired position with reference to the platen so as to permit corrections to be easily made. It will be understood that the machine may be provided with any suitable form of mechanism for disengaging the carriage from the escapement rack, but as this constitutes no part of the invention it is not illustrated in the drawings.

The automatic switch is supported by the frame H preferably along side of and close to the type-wheel G. It consists of two sets of contacts arranged in pairs and corresponding in number with the characters upon the type-wheel. The contacts of each set are preferably arranged in concentric circles and those in the outer circle are designated 40 and those in the inner circle 41. They are supported in an insulating block or piece 39 and are connected with the wires 27 and 28 in the manner to be described. A brush 44 carried by the type-wheel sweeps over the face of the switch as the type-wheel revolves and successively makes engagement with the pairs of contacts 40, 41, and thus successively bridges or closes the breaks in the circuits at these points. It has been stated that the number of wires leading from the key-board to the automatic switch is less than the number of key contacts and characters upon the type-wheel and therefore less than the number of pairs of contacts which are successively engaged by the brush 44 of the automatic switch. In order to utilize all of the contacts I unite the contacts of each set into groups, the number of groups of one set being equal to the number of strips 20, while the number of groups of the other set of contacts corresponds with the number of strips 21. This arrangement is illustrated in Fig. 5 where it is represented that the contacts 40 of the outer set or circle are united by conductors 42, there being as many groups of these contacts as there are strips 20, and the uniting conductors 42 of each group being connected to one of the wires 27. Likewise the contacts 41 of the inner series are united into groups by conductors 43 to which are respectively connected the wires 28. Each of these wires 28 in its course is coiled about the core of the electro-magnet 14, as represented in Fig. 5.

While any one of many well known forms of mechanism for shifting the type-wheel to bring the printing characters of one or another of the rows into operating position may be employed, I prefer that shown in the drawings which I will now describe.

48 represents a clip secured to the socket piece 3 of the frame in which the type-wheel is mounted. This may be secured in place by the screw 49 that unites the said frame to the post or stud 2 projecting from the carriage and permits the frame to turn about the said stud without moving lengthwise of the latter. The clip is provided with a pair of arms 50, 51, extending inwardly, that is, in a direction toward the paper platen.

52 designates a bar or plate extending across the machine and so disposed that when the type-wheel is in position to cause the characters of the central row to print, the arms 50, 51 of the clip extend on either side of, one above and one below, the said bar or plate as the frame carrying the type-wheel is rocked toward the platen to cause a printing character to strike against the paper. The adjacent edges of the arms 50, 51, which engage with the cross-bar 52, are beveled or inclined, as represented in the drawings, so that as the type-wheel frame comes into printing position the bar is in engagement with both the arms at their bases, thus firmly locking the wheel against rotary movements and insuring a clean and clearly cut impression upon the paper.

53 designates a shift device for the cross-bar 52, it being arranged to give to the bar three positions, one above and another below the middle position which has just been referred to. When the shift device raises the cross-bar the arm 50 of the clip engages with the cross-bar as the type-wheel frame is moved to cause a printing impression upon the paper, with the result that the frame H and the type-wheel which it carries are turned about the stud or post 2 so as to bring the row of printing characters adjacent to one edge of the wheel into printing position. The type-wheel and its supporting frame are positively arrested and

held in this position by the engagement of the cross-bar with the arm 50 and also with a shoulder or stop 54 formed in the clip. When the shift device moves the cross-bar to its lowermost position and the type-wheel carriage is moved toward the platen, the arm 51 comes into engagement with the cross-bar, rocking the type-wheel and its supporting frame in the opposite direction from that just described and bringing the other row of characters into printing position, where they are held by engagement of the arm 51 and the stop or shoulder 55 with the cross-bar 52.

The operation of the machine may now be set forth.

The operator first closes the circuit 10, including the battery 11 and the motor that operates the type-wheel, thus setting the latter into rotation. The next operation is to close one of the circuits of the selecting switch, that is, the key-board switch, by pressing upon a key 24. As soon as the type-wheel is set to rotating the brush 44 makes successive engagement with the pairs of contacts in the automatic switch, and as soon as it comes into contact with that pair which is a part of the circuit selected and closed at the key-board, the circuit peculiar to the key which is pressed and to the corresponding printing character upon the type-wheel is completed. The closing of this circuit instantly energizes the electro-magnet since part of the circuit is one of the coils 45 of such magnet, whereupon the armature 13 is attracted and the detent drawn into operative engagement with the type wheel which is thereby arrested. The parts are so timed in their operations that the arresting of the type wheel takes place at the same instant that the character corresponding with the key that was pressed is in printing position. It now remains only to force this character against the paper supported on the platen and this is effected, in a machine like that shown, by depressing the key-board and, through the connections which have been described between it and the type-wheel, forcing the latter against the paper. It will be understood that the pressure required to move the strip 21 to bring it into contact with strip 20 below it is much less than that required to depress the key-board, from which it follows that the contact at the selecting switch is closed an instant before the type-wheel is moved to engage the paper.

What I claim is:—

1. In a typewriting machine, the combination of a type-wheel carrying printing characters, a shaft supporting the said wheel and upon which the wheel is freely rotatable, means for rotating the wheel upon its shaft, and selecting mechanism for arresting the type-wheel independently of the operation of the means for rotating the type-wheel, with the desired character in printing position.

2. In a typewriting machine, the combination of a type-wheel carrying printing characters, a support upon which the said wheel is freely rotatable, means for turning the type-wheel comprising a rotor supported adjacent to the type-wheel and freely rotatable independently thereof, and selecting mechanism for arresting the type-wheel with the desired character in printing position without stopping the rotor.

3. In a typewriting machine, the combination of a type-wheel carrying printing characters, a support upon which the said wheel is freely rotatable, means for driving the type-wheel comprising a rotor supported upon the same shaft as the type-wheel and free to rotate independently thereof, connections between the rotor and type-wheel by which the latter is driven when free to turn but permitting the type-wheel to be arrested without stopping the rotor, and selecting mechanism for arresting the key-wheel with the desired character in printing position.

4. In a typewriting machine, the combination of a type-wheel carrying printing characters, comprising a hollow shell, a support upon which the type-wheel is supported so as to be free to rotate, means arranged within the said type-wheel for rotating it, and selecting mechanism for arresting the type-wheel without arresting the means which rotate it, with the desired character in printing position.

5. In a typewriting machine, the combination of a hollow type-wheel provided with printing characters and freely rotatable upon its support, a driving motor for the type-wheel arranged within the latter and freely rotatable independently thereof, and selecting mechanism for arresting the type-wheel independently of the operation of its motor, with the desired character in printing position.

6. In a typewriting machine, the combination of a type-wheel freely rotatable upon its support, an electric motor for turning the type-wheel, having a rotor that is arranged to be coupled directly with the type-wheel and is also free to turn independently thereof when the wheel is stopped, and selecting mechanism for arresting the type-wheel with the desired character in printing position.

7. In a typewriting machine, the combination of a type-wheel carrying printing characters, a shaft on which the wheel is supported and about which it freely turns, an electric motor mounted on the same shaft as the type-wheel and having a rotor freely turning on the shaft independently of the type-wheel, a driving connection between

the said rotor and type-wheel arranged to permit the type-wheel to be stopped without arresting the rotor, and selecting mechanism for arresting the type-wheel with the desired character in printing position.

8. In a typewriting machine, the combination of a hollow type-wheel carrying printing characters, a shaft on which the wheel is freely rotatable, an electric motor for driving the type-wheel and having a rotor arranged within the type-wheel and free to turn independently thereof, a driving connection between the rotor and the type-wheel arranged to permit the latter to be arrested in its rotation without arresting the rotor, and selecting mechanism for stopping the type-wheel with the desired character in printing position.

9. In a typewriting machine, the combination of a type-wheel carrying printing characters, means for rotating the type-wheel, selecting mechanism for arresting the type-wheel with the desired character in printing position, and means controlled by the rotation of the type-wheel for setting into operation the said selecting mechanism, after it has been set to cause printing of the desired character.

10. In a typewriting machine, the combination of a type-wheel carrying printing characters, means for rotating the type-wheel, selecting mechanism for arresting the type-wheel with the desired character in printing position, including an electro-magnet, and a switch controlled by the rotation of the type-wheel for closing the circuit of the said electro-magnet.

11. In a typewriting machine, the combination of a type-wheel carrying printing characters, means for rotating the type-wheel, and electrically-operated means for arresting the type-wheel with the desired character in printing position, comprising an electro-magnet that operates to arrest the rotation of the type-wheel, a series of current-carrying circuits corresponding with the printing characters on the type-wheel, a selecting mechanism for closing the desired circuit through the coils of the electro-magnet, and an automatic switch for closing the selected circuit, operated by the rotation of the type-wheel.

12. In a typewriting machine, the combination of a type-wheel carrying printing characters, means for rotating the type-wheel, a key-board containing electric contacts corresponding with the printing characters on the type-wheel, electric circuits including the said key-board contacts and sources of current supply, means controlled by the passage of current over any selected circuit for causing the arrest of the type-wheel, and an automatic switch controlled by the rotation of the type-wheel and arranged to close the selected circuit to cause the operation of the said arresting means and the stopping of the type-wheel with the desired character in printing position.

13. In an electric typewriter, the combination with a paper platen, of a carriage movable longitudinally relatively thereto, printing mechanism carried by the said carriage, electrically-operated means for causing the selection and operation of the printing devices, a keyboard constituting a selecting switch for determining the character to be printed, conducting wires extending from the key-board to the carriage, the said wires being gathered into two cables, a segmental pivoted frame in the periphery of which the cables are supported, and means for guiding the said cables to cause them to approach the carriage from opposite directions, whereby as the carriage is moved the segmental frame is turned about its pivot, and vice versa.

14. In an electric typewriter, the combination with a paper platen, of a carriage movable longitudinally relatively thereto, printing mechanism carried by the said carriage, electrically-operated means for causing the selection and operation of the printing devices, a key-board constituting a selecting switch for determining the character to be printed, conducting wires extending from the key-board to the carriage, the said wires being gathered into two cables, a segmental pivoted frame in the periphery of which the cables are supported, means for guiding the said cables to cause them to approach the carriage from opposite directions, whereby as the carriage is moved the segmental frame is turned about its pivot, and vice versa, and a spring for moving the carriage in one direction connected with the said segmental frame.

15. In a typewriter, the combination of a paper platen, a carriage movable longitudinally relatively thereto, printing mechanism carried by the said carriage, means for causing the operation of the printing devices, a segmental pivoted frame, a pair of cords attached to the said frame respectively on the opposite sides of its pivot and extending thence to grooves in the periphery of the frame in which the cords lie, means for guiding the cords after leaving the segmental frame in opposite directions to cause them to approach the carriage to which they are connected, from opposite directions, and a spring for moving the carriage in one direction connected with the said segmental frame.

16. In a typewriter, the combination with a paper platen, of a type-wheel carrying printing characters arranged in a plurality of rows, a frame in which the type-wheel is mounted movable longitudinally relative to the platen and also free to oscillate to bring one or the other row of characters into

printing position, means for rocking the type-wheel and its supporting frame toward and from the platen, and means for causing the oscillation of the type-wheel to bring the desired row of characters into printing position, comprising a cross-bar substantially parallel with the platen, means for shifting the said cross-bar, and a pair of arms carried by the type-wheel frame, the arms being so disposed that they lie upon opposite sides of the cross-bar when adjusted to its middle position, thus holding the type-wheel frame in position to print from the characters in one row, and when the bar is adjusted to one extreme position one of the arms engages the bar and causes the type-wheel frame to be rocked in one direction, bringing another row of characters into printing position, and when adjusted to the other extreme position the other arm engages the bar and rocks the frame, bringing a third row of characters into printing position.

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

GEORGE B. BAKER.

Witnesses:
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GEORGE E. EDELIN.