Dec. 24, 1957 Y. L. APPELBERG 2,817,428

ELECTRIC TYPEWRITING MACHINE

Filed Sept. 15, 1955 2 Sheets-Sheet 1

Fig. 1.

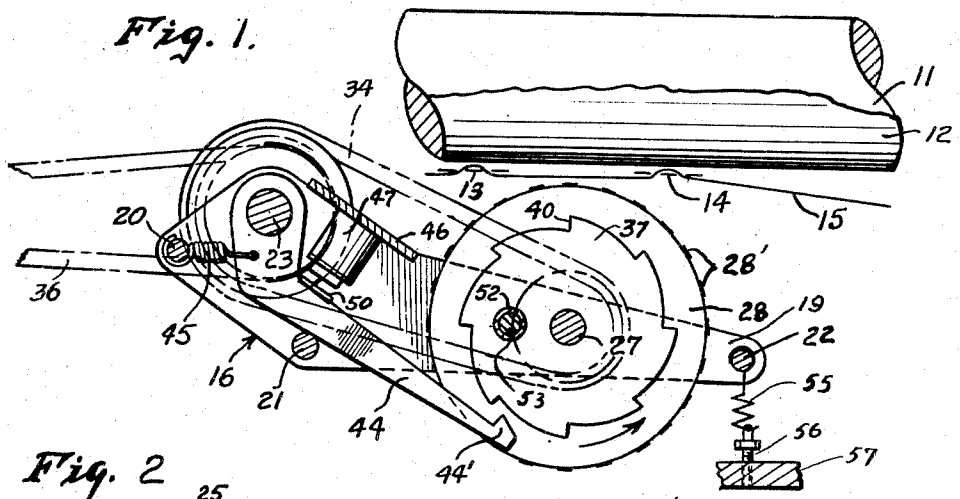


Fig. 2

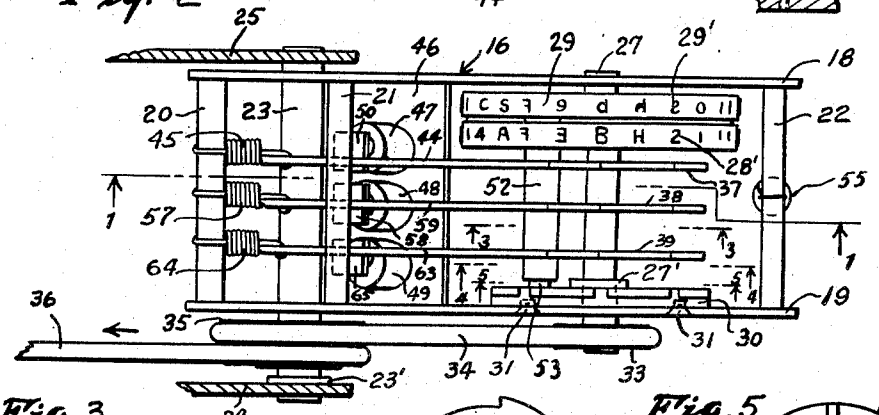


Fig. 3

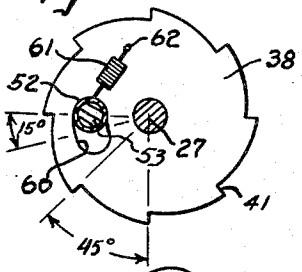


Fig. 4

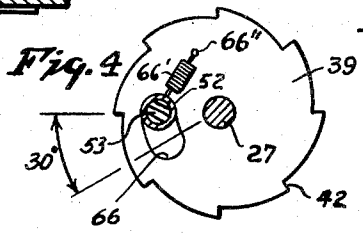


Fig. 5

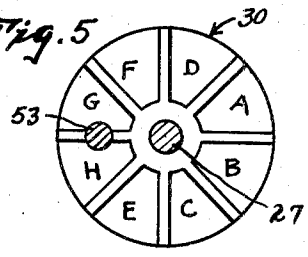
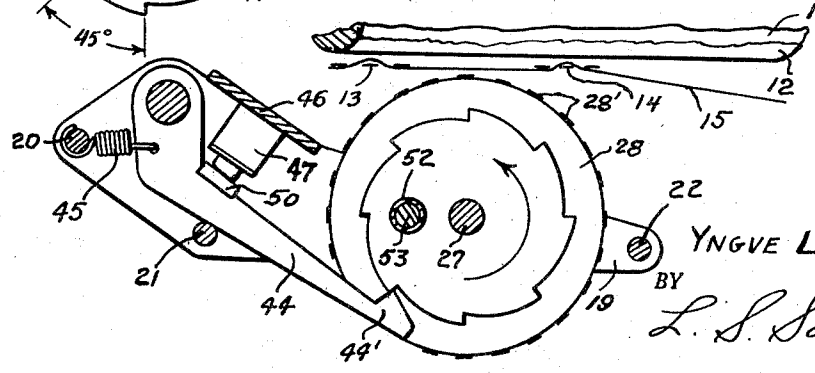


Fig. 6



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ELECTRIC TYPEWRITING MACHINE

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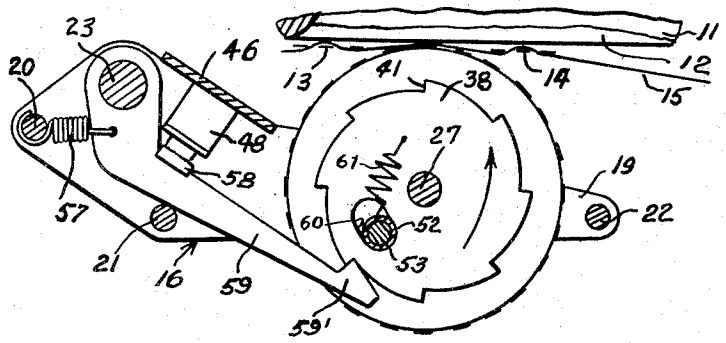


Fig. 7

Fig. 8

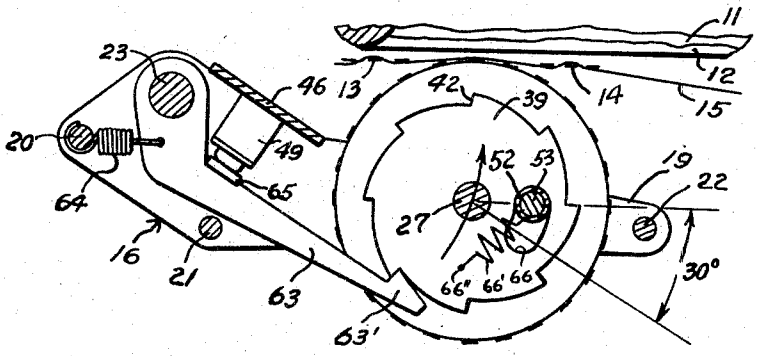
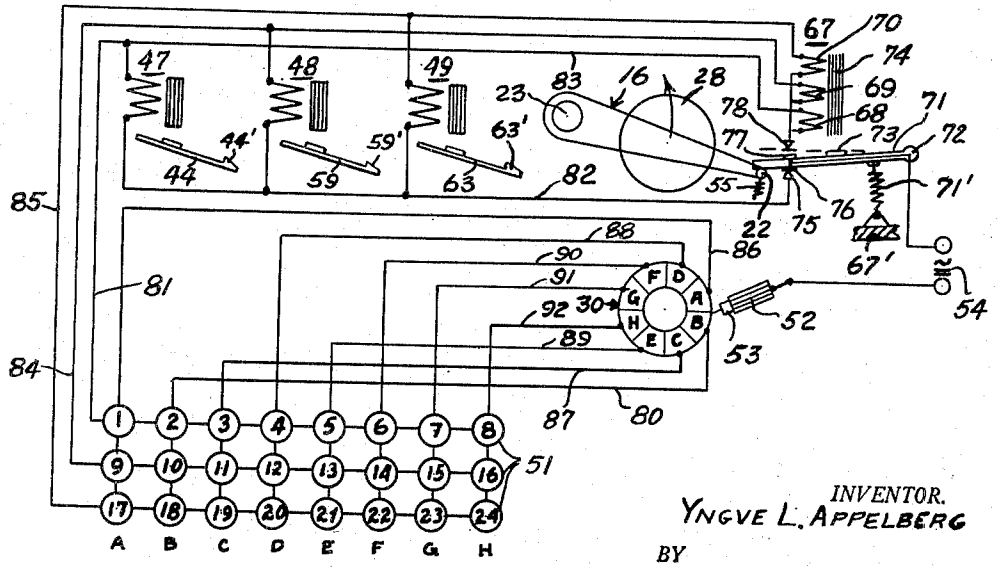


Fig. 9



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ELECTRIC TYPEWRITING MACHINE

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Application September 15, 1955, Serial No. 534,485
3 Claims. (Cl. 197—12)

This invention relates to electric typewriting machines of the rotating wheel type.

It is an object of the present invention to provide an electric typewriting machine of the rotating wheel type wherein multiple ratchet wheels on the driving shaft are used to position the rotating type wheel for striking action that may be angled with respect to one another at fifteen degrees apart, yet having their ratchet teeth or abutments spaced forty-five degrees about their periphery and utilizing a bracket support for the rotating and ratchet wheels adapted to be swung to the printing position upon the shaft being stopped by magnetically-operated pawls respectively associated with the respective ratchet wheels and the type wheel made to strike owing to its kinetic energy and against the action of a return spring until the pawl is released.

It is another object of the invention to provide in an electric typewriting machine of the rotating wheel type lock out relay means for releasing the magnet prior to the release of the finger from the key on the keyboard yet prohibiting further energization of the actuating magnet until the relay has been de-energized.

Other objects of the invention are to provide an electric typewriting machine of the rotating wheel type, having the above objects in mind, which is of simple construction, inexpensive to manufacture, of reduced weight, small in size, has a uniform striking force, avoids complicated electric circuits, adapted for high speed operation, compact, requires little mechanical effort, effective and efficient in use.

For other objects and for a better understanding of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawing, in which:

Figure 1 is a horizontal sectional view showing the type wheel unit positioned relative to the typewriter roller as viewed generally on line 1—1 of Fig. 2 and looking upon one of the multiple rotating ratchet wheels;

Fig. 2 is a front elevational view of the type and ratchet wheel assembly and of the driving pulley mechanism therefor;

Fig. 3 is a fragmentary sectional view looking upon a second ratchet wheel and as viewed on line 3—3 of Fig. 2;

Fig. 4 is a fragmentary sectional view looking upon a third ratchet wheel as viewed on line 4—4 of Fig. 2;

Fig. 5 is a vertical sectional view looking upon a commutator serving as a part of the mechanism and as viewed on line 5—5 of Fig. 2;

Fig. 6 is a sectional view of the rotating type wheel assembly similar to Fig. 1 but with the pawl engaging the ratchet wheel and the printing rotation stopped and about to be moved to a position to effect the printing action;

Fig. 7 is a sectional view similar to Fig. 3 but showing the frame of the assembly and with the ratchet wheel stopped and the rotating wheel effecting a printing action upon the paper;

Fig. 8 is a sectional view similar to Fig. 4 but showing the frame of the assembly and with the ratchet wheel

stopped and the rotating wheel effecting a printing action upon the paper; and

Fig. 9 is a wiring diagram of the entire typewriting machine.

Referring now to the figures, **11** represents a rubber roller on which a paper sheet **12** is disposed in the usual manner. Positioned in front of this roller on ribbon supports **13** and **14** in the usual manner is a travelling inked ribbon **15** operated in the usual manner by the typewriter mechanism, not shown. Positioned in front of the ribbon and this roller is the rotating type wheel assembly indicated generally at **16** and forming the gist of the present invention.

This assembly **16** is generally comprised of a frame having vertically-spaced plate arms **18** and **19** held in vertically spaced relationship by vertically-extending spaced bars **20, 21** and **22**. This assembly **16** is fixed to a vertically-extending pivot shaft **23** by which the assembly **16** is mounted upon and between vertically spaced lower and upper vertically adjustable supporting members **24** and **25** on the machine frame and against vertical displacement relative thereto by means of a vertical thrust collar **23'** bearing against the upper face of the frame member **24**, Fig. 2. The assembly can accordingly pivot horizontally about a vertical axis toward and away from the sheet **12** and roller **17**.

Journalled in the frame and extending vertically is a rotating shaft **27** that carries upper and lower case rotating type wheels **28** and **29**. A commutator **30** is fixed to the lower plate arm **19** by fastening screws **31** and is concentric with the shaft that has a thrust collar **27'** bearing thereupon. Below the plate arm **19** and fixed to the lower end of the shaft **27** is a pulley **33** that is connected by a pulley belt **34** to a double pulley **35** that rotates freely upon pivot mounting shaft **23** and in turn is connected to a driving pulley belt **36** serving to supply the rotating power to the mechanism. The pulley belt **36** may be driven by any separate electric motor or by the main motor for the electric typewriter that drives the ink ribbon **15** and the roller carriage in a well known manner.

On the rotating shaft **27** are vertically spaced ratchet wheels **37, 38** and **39** and these ratchet wheels each have eight abutments or teeth angularly spaced forty-five degrees apart as respectively indicated at **40, 41**, and **42** for the respective wheels **37, 38** and **39**. The abutments or teeth **40** of the ratchet wheel **37** are adapted to be engaged by an engaging end **44'** of a pawl arm **44** pivoted upon shaft **23** and normally held against vertical spacing bar **21** by a tension spring **45** anchored to the vertically-extending spacing bar **20**, Figs. 1 and 6.

Extending between the frame members **18** and **19** is a magnet supporting plate **46** that supports three electromagnets **47, 48** and **49** and also serves as a vertical spacing bar. The magnet **48**, when energized, will magnetize a plate **50** secured to the arm **44** so as to draw the arm **44** against the action of tension spring **45** so that its end **44'** will engage any one of the abutments or teeth **40**, depending upon the key which is depressed in the upper row of a keyboard assembly generally indicated at **51**, Fig. 9.

Extending through the ratchet wheels **37, 38** and **39** parallel to and radially-spaced from the drive shaft **27** and extending from the type wheels **28** and **29** is a brush retaining sleeve **52** that contains a brush **53** which rides over embedded segments A, B, C, D, E, F, G, H, in the commutator **30** that is fixed to the plate arm **19**.

While the key in the upper row of the keyboard **51** is still depressed, the brush **53** and printing wheels will continue to rotate until a circuit is closed, whereupon magnet **48** will be energized, the arm **44** will be drawn toward the ratchet wheel and against the teeth corresponding to the key and the commutator segment that is in-

cluded in the circuit with the magnet 47 and an electric source 54. The pawl arm 44 thus stops the rotation of the ratchet wheel 37, the shaft 27 and the printing wheels 28 and 29 so that a letter or numeral thereon impresses the ribbon 15 and the paper sheet 12 upon the roller 11. The letters or numerals are indicated by raised projections 28' and 29' on the respective wheels 28 and 29. These projections conforming to letter or numeral configurations are spaced on each of the rotating type wheels fifteen degrees apart. If it is desired to use the wheel 29 to type with its projections, the assembly 16 is elevated by its vertically adjustable supporting members 24, 25 in a manner, not shown.

Upon the arm 44 being engaged with the ratchet wheel 37, the kinetic energy derived from the rotation of the printing and ratchet wheels will cause the frame 16 with the printing wheel to be turned to a position to effect the printing operation and against the action of an adjustable tension spring 55 anchored to an adjusting nut on a portion 56 of the machine frame. This spring is connected to the vertical spacing bar 22 on the outer end of the assembly 16. When the magnet 47 is de-energized, the arm 44 is released from the ratchet wheel 37 and the assembly 16 is returned to its retracted position by the tension spring 55.

The intermediate ratchet wheel 38 will have its abutments or teeth 41 engaged by end 59' of pawl arm when a key in the middle row of the keyboard 51 is depressed to energize the magnet 48 to act upon an iron plate 58 fixed to the arm 59. The pawl arm 59 will be pivoted upon the mounting shaft 23 and against the action of a tension spring 57 connected to the arm 59 and anchored to vertical bar 20.

In order that the ratchet wheel 38 can drive beyond the ratchet wheel 37 and to provide for a positioning of the letter upon the rotating type wheel fifteen degrees beyond a letter for a corresponding abutment on the ratchet wheel 37, a short arcuate slot 60 is provided in the ratchet wheel 38 so that the brush sleeve 52 can ride through fifteen degrees in the ratchet wheel 38 against a tension spring 61 anchored at 62 on the face of the wheel 38, Figs. 3 and 7. When this lost motion is taken up, the ratchet wheel 38 will be locked through the brush sleeve 59 with the shaft 27 and the rotating type wheels so that due to the kinetic energy of rotation thereof upon the magnet 48 remaining energized, the assembly 16 will be brought into engagement with the ribbon 15 to effect the printing operation upon the paper sheet on the typewriter roller 11. This movement will be resisted by the same tension spring 55 and the assembly is returned to its retracted position as the magnet 48 is de-energized and the pawl arm 59 disengaged from the ratchet wheel 38. The ratchet wheel 38 will be returned to its original position by the spring 61 and the brush sleeve 52 will engage again the beginning end of the slot 60, as shown in Fig. 3.

When a key in the lower row of the keyboard 51 is depressed, the ratchet wheel 39 will be engaged by end 63' of pawl arm 63, also pivoted upon vertical bar 23 and normally held in its retracted position against bar 21 under the action of tension spring 64 anchored to the vertical bar 20. This pawl arm 63 carries an iron plate 65 adapted to be magnetized and drawn toward the electromagnet 49 so that the end 63' of the arm 63 will engage with an abutment or tooth 42 on the ratchet plate 39 as the brush 53 engages with the commutator segment corresponding to the key that was depressed. The brush sleeve 52 extends through an arcuate slot 66 so that angular movement of the brush sleeve 52 can move through an arc of thirty degrees before the rotating wheel is arrested and the assembly 16 caused to be pivoted to effect a printing action of the assembly upon the paper 12 on the roller 11. This slot 66 will allow the ratchet wheel 39 to overrun the ratchet wheel 38 by fifteen degrees and the ratchet wheel 37 by thirty degrees. The ratchet wheel 39 is normally urged toward the brush sleeve 52 by tension spring 66' anchored at 66'' to the wheel 39 and connected to the sleeve 52. This makes for an arrangement wherein a large number of letters or numbers are provided on the rotating type wheel at a spacing of fifteen degrees apart and while allowing for an angular movement of forty-five degrees of the ratchet wheels relative to the engaging pawl arms. The speed of rotation of the rotating type wheels can be high and any difference in time and travel of the wheels before actuation of the assembly to effect a printing operation is instantaneous and of no consequence. If the ratchet wheels tend to overrun the drive mechanism, a slippage of the pulley belt 34 will be effected to prevent breakage.

In order to prevent further printing action before release of one of the keys, a multiple lock out relay 67, Fig. 9, having three coils 68, 69 and 70 and a switch arm 71 pivoted at 72 are part of the machine frame and has an iron plate 73 adapted to be drawn toward a magnet core 74 when the relay 67 is energized. This relay arm 71 is adapted to be engaged by the vertical spacing bar 20 on the end of the frame 17 so as to be moved from a fixed relay contact 75 as the assembly is moved into the printing operation so that a circuit leading through said contact 75 by way of a contact plate 76 on the relay arm 71 is interrupted and a circuit made by a contact 77 on the relay arm 71 with a fixed relay contact 78 that will energize any one of the coils 68, 69 and 70 of the relay 67, so as to energize the relay and cause the relay arm 71 to remain so that circuit is closed through contacts 77 and 78. Upon release of any key on the keyboard 51, the relay 67 will be de-energized and the contact arm 71 returned to its original position with its contact 76 against fixed contact 75 so as to condition the circuit in order that any one of the magnets 47, 48 and 49 may be energized to effect another printing operation. The arm 71 is normally urged toward fixed contact 75 by tension 71' anchored to a fragment 67' of a relay housing.

In operation, assuming a key switch marked by numeral "2" in the upper row of the keyboard 51 is depressed, current will flow from electric source 54 through brush 53 to segment B on the commutator 30, wire 80, key switch "2," wire 81, electric magnet 47, wire 82, relay contacts 75 and 76, relay arm 71 and back to electric source 54. On the magnet 47 being energized, the arm 44 will be drawn toward the ratchet wheel 38 so that its end 44' will engage the abutment 41 on the ratchet wheel 38 and the rotation of the ratchet wheel 38 will be arrested and one of the printing wheels brought to bear upon the typewriter roller to effect the printing operation. As the assembly 16 moves toward the roller 11, the vertical bar 22 engages the arm 71 so as to move the arm and its contact 76 away from the fixed contact 75 to break the circut and permit the de-energization of the magnet 47 and the release of pawl arm 44 from the ratchet wheel 38. As this is done, a circuit is established through wire 83, relay coil 68, relay contact 78, relay arm contact 77, relay arm 71 and back to the source 54. This circuit prevents further energization of any of the electromagnets 47, 48, 49 until the originally depressed key has returned to its normal position.

If a key switch marked "10" in the middle row of the keyboard 51 is depressed, a similar circuit will be established including the electric source 54, brush 53, segment B of the commutator 30, wire 80, key switch "10," wire 84, magnet 48, wire 82, contacts 75, 76 and arm 71 and back to electric source 54. The pawl arm 59 associated with the magnet 48 will have its end 59' engage with an abutment 42 on ratchet wheel 39 so as to arrest its rotation and cause the printing wheel to be engaged with the ribbon 15 to effect the printing operation. As the assembly 16 is turned to effect the printing operation, the contact 76 of the arm 71 will separate from the contact 75 and contact 77 of the arm 71 will engage with contact 78 and coil 69 of the realy 67 will be energized so that the circuit will flow through coil 69, contact 78,

contact 77 of relay arm 71, back to source 54. This circuit will remain closed until key "10" is released. As the key "10" is released, the arm 71 will have been released by the relay 67 and returned to a position where its contact 76 will again engage contact 75.

If key switch marked "18" in the lower row of the keyboard 51 is depressed, the current will pass from electric source 54, brush 53, segment B, wire 80, key switch "18," wire 85, magnet 49, wire 82, contacts 75 and 76, arm 71 back to the electric source 54. The arm 63 will be brought so that its end 63' engages with abutment 42 on ratchet wheel 39 so as to cause the ratchet wheel to be arrested and to effect the printing operation upon the paper sheet 12 on roller 11. The assembly 16 will accordingly be pivoted and the arm 71 will be moved out so that its contact 76 will be disengaged from contact 75 and its contact 78 of the relay 67 so that coil 70 of the relay is energized. The electric circuit will then pass through relay coil 70, contact 78, contact 77, arm 71, back to electric source 54.

The commutator has other wires leading therefrom to other keys on the keyboard 51. These wires are indicated at 86, 87, 88, 89, 90, 91 and 92. The key switches on any of the given rows of the keyboard are connected together. The several wires leading from the commutator respectively lead into vertical rows of key switches and identified by letters lying below the keyboard and corresponding to the letters on the segments of the commutator. The keys on the keyboard correspond to the letter and number projection on the printing wheels 28 and 29.

It should now be apparent that there has been provided an electric typewriting machine of the rotary printing wheel type wherein multiple ratchet wheels are utilized, wherein the letter and number on the printing wheels can be positioned fifteen degrees apart while the corresponding abutments or teeth on the ratchet wheels can be forty-five degrees apart.

It will be seen that this is effected through the provision of arcuate slots lying in the ratchet wheels and the commutator brush sleeve extending through the arcuate slots in two of the ratchet wheels so as to allow the overrunning of the ratchet wheel to allow each of the multiple ratchet wheels to position the printing wheels fifteen degrees apart.

It should be further apparent that by means of the lock out relay, only one key can be effective at a time and as long as that key on the keyboard is retained, further operation of the typewriter cannot be effected.

While various changes may be made in the detail construction, it shall be understood that such changes shall be within the spirit and scope of the present invention as defined by the appended claims.

What is claimed is:

1. In an electric typewriting machine, a rotating type wheel assembly having a frame having horizontally-extending plates and vertically-extending spacing bars therefor, a mounting shaft for securing the frame upon the machine frame for angular movement about a vertical axis, a rotating shaft journalled in said frame adjacent the outer end thereof, drive means for rotating said shaft, a rotating type wheel secured to said shaft, a commutator secured to one of said horizontal plates and having a plurality of commutator segments, a ratchet wheel secured to said shaft, a brush sleeve extending parallel to said shaft through said type and ratchet wheels, a brush projecting from said brush sleeve and adapted to engage with the commutator segments, a pawl arm pivoted on said assembly, a magnet mounted on said assembly, said arm having a magnetizable plate adjacent said magnet to be attracted thereby, spring means normally urging said pawl away from said ratchet wheel, said magnet serving when energized to pull the pawl against the action of said spring to engage said ratchet wheel to stop the rotation of said shaft and type wheel and cause the pivotal movement of said assembly about its pivot connection with the machine frame and to effect the printing operation upon a paper sheet retained by a typewriter roller.

2. An electric typewriting machine as defined in claim 1, and other ratchet wheels journalled on said shaft in vertical spaced relationship with respect to the one ratchet wheel and to each other, said other ratchet wheels respectively having arcuate slots therein, said brush sleeve extending through said arcuate slots, pawl arms similarly pivoted upon said frame and tension springs normally urging said pawl arms to a retracted position, magnetizable members carried by said pawl arms and electromagnets aligned with the respective magnetizable members and the pawl arms to effect the actuation of the pawl arms and the engagement of the ends thereof with the respective ratchet wheels, the type on said type wheel being spaced fifteen degrees apart, the ratchet teeth on the ratchet wheels being spaced forty-five degrees apart, the arcuate slot in the ratchet wheel adjacent the first mentioned ratchet wheel being of sufficient length to permit the turning of the ratchet wheel with respect to the brush sleeve through fifteen degrees, the arcuate slot in the third ratchet wheel extending throughout thirty degrees, whereby the ratchet teeth on the respective ratchet wheels may be adjusted to positions fifteen degrees apart from the ratchet teeth of the other ratchet wheels.

3. In an electric typewriter system, a keyboard having horizontally extending rows of keys, a rotating type printing wheel, a brush associated with said rotating printing wheel, a commutator over which said brush may traverse, an electric source, a frame adapted for pivotal movement and supporting said rotating printing wheel, a ratchet wheel connected to said printing wheel to be rotated therewith, a pawl arm adapted to engage the ratchet wheel, magnet means adapted to be energized upon depressing a key to actuate said pawl arm to engage the ratchet wheel and stop the rotation of the printing wheel and a lock out relay having an arm engageable by the printing wheel frame and normally adapted to establish an electric circuit through said magnet, said relay having a coil and a contact engageable by said arm to establish a circuit through said depressed key to engage said relay and to prevent further actuation of said magnet until said depressed key has been released.

References Cited in the file of this patent

UNITED STATES PATENTS

1,520,089	Scherbius	Dec. 23, 1924
2,675,108	Ruderfer	Apr. 13, 1954