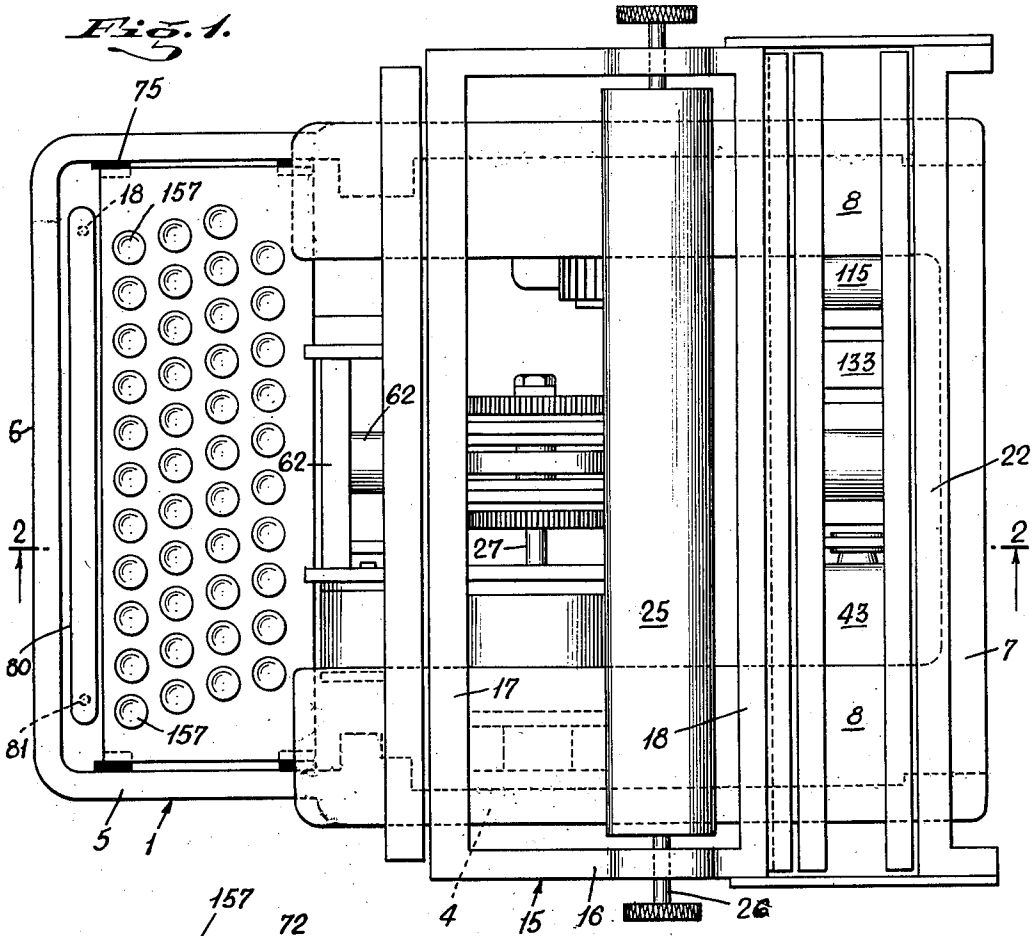
Oct. 14, 1952 L. R. PROUTY 2,613,796

CONTINUOUSLY ROTARY CHARACTER-WHEEL PRINTING MACHINE

Filed Sept. 15, 1947 4 Sheets-Sheet 1

Fig. 1.



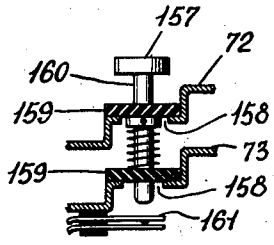


Fig. 7.

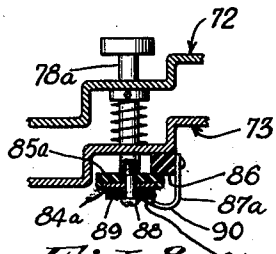


Fig. 8.

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CONTINUOUSLY ROTARY CHARACTER-WHEEL PRINTING MACHINE

Filed Sept. 15, 1947 4 Sheets-Sheet 2

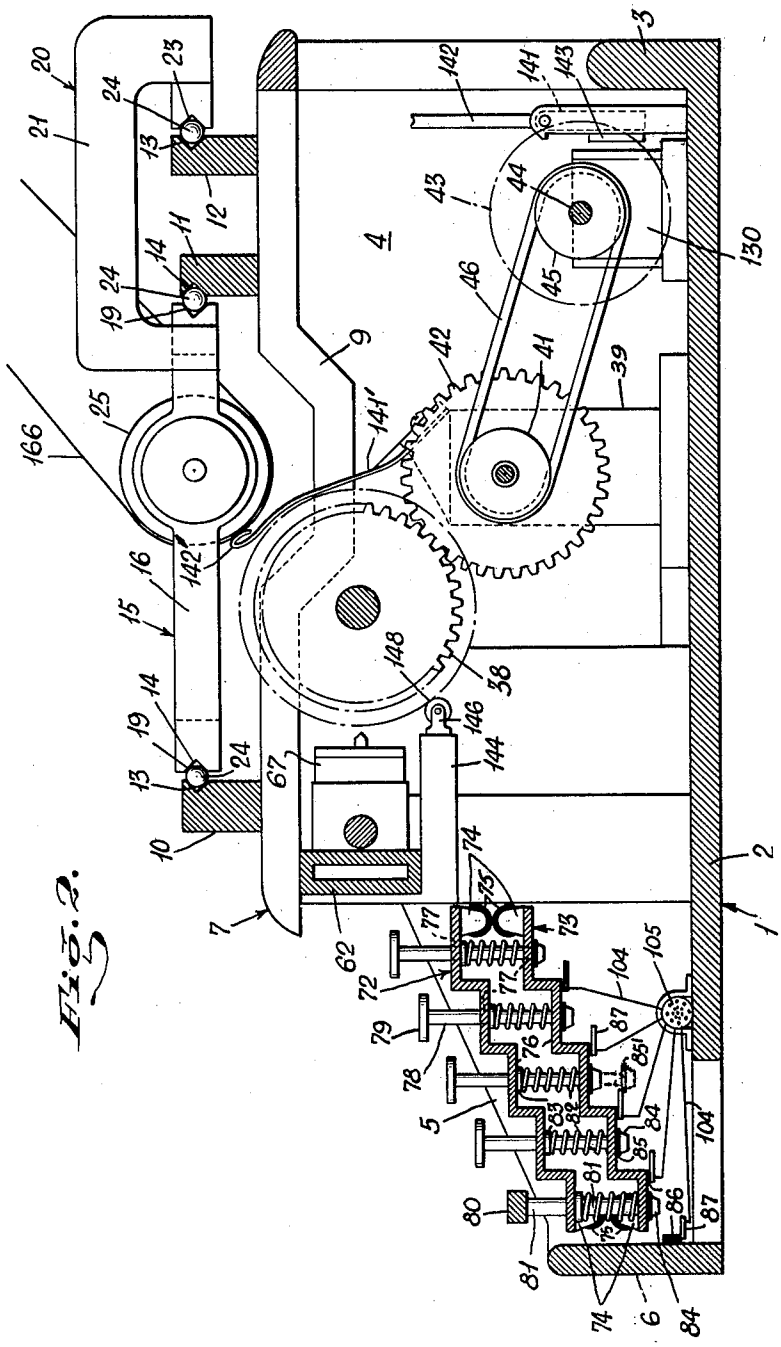


Fig. 2.

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CONTINUOUSLY ROTARY CHARACTER-WHEEL PRINTING MACHINE

Filed Sept. 15, 1947 4 Sheets-Sheet 3

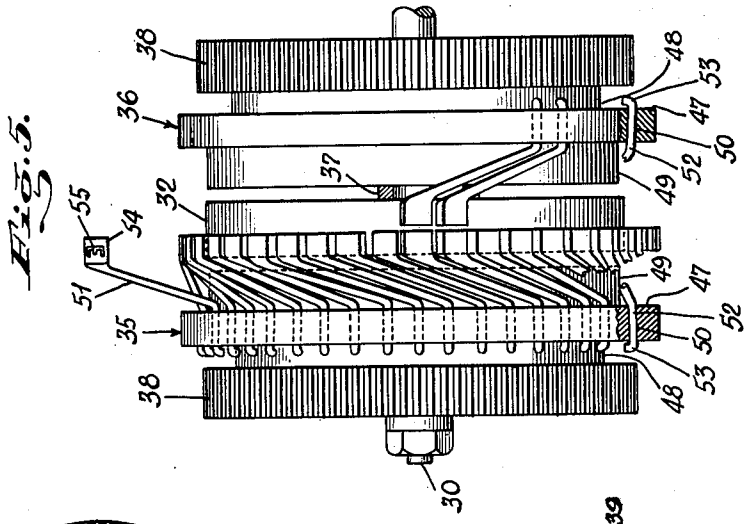


Fig. 5.

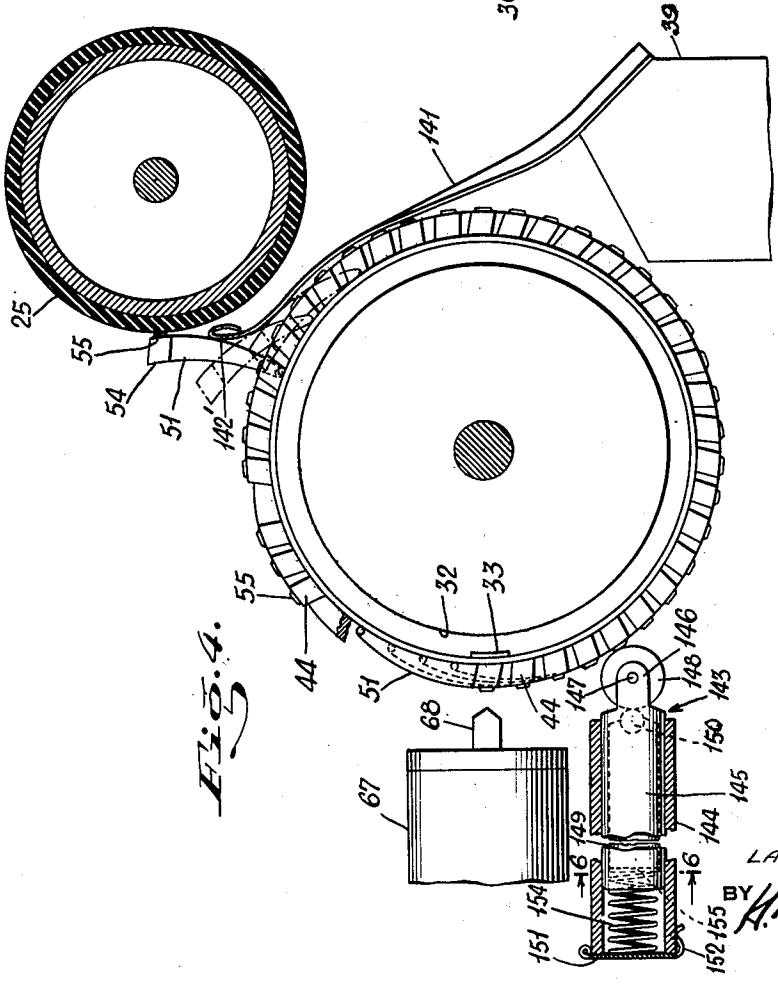


Fig. 4.

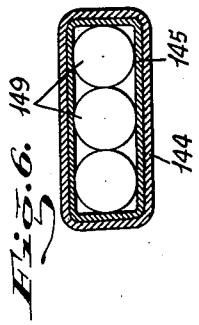


Fig. 6.

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CONTINUOUSLY ROTARY CHARACTER-WHEEL PRINTING MACHINE

Filed Sept. 15, 1947 4 Sheets-Sheet 4

Fig. 2.

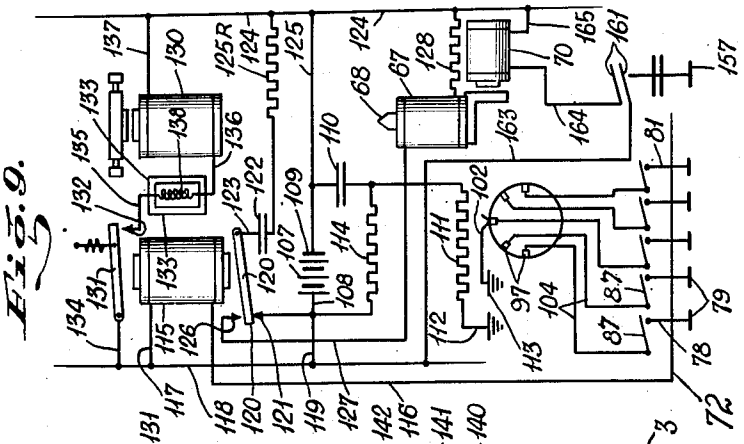
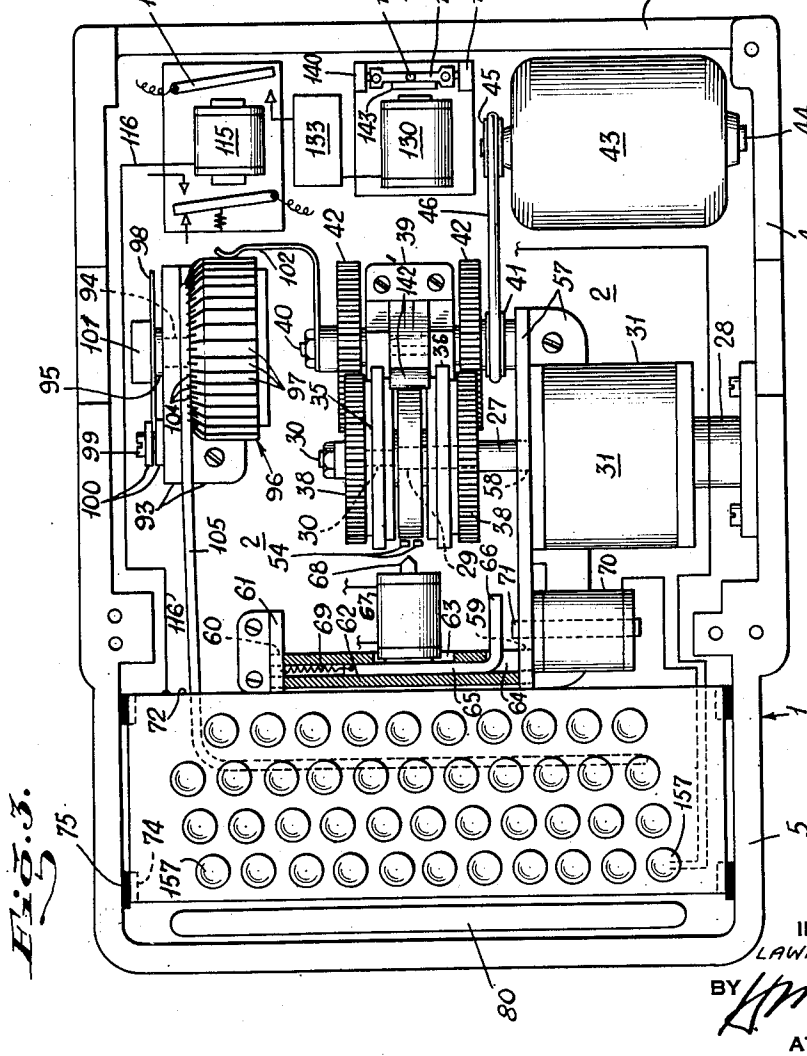


Fig. 3.



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Patented Oct. 14, 1952 2,613,796

UNITED STATES PATENT OFFICE

2,613,796

CONTINUOUSLY ROTARY CHARACTER-WHEEL PRINTING MACHINE

Lawrence R. Prouty, New York, N. Y.

Application September 15, 1947, Serial No. 774,101

52 Claims. (Cl. 197—12)

1

This invention relates to selecting means and typewriting machines similar to embodiments shown in my co-pending application Serial Number 774,102, filed September 15, 1947, and now abandoned, and more particularly to apparatus and devices for selecting type in the typewriting operation, though it is noted that in some of the claims the invention is not limited to selecting means.

One object of the invention is to provide an improved device and apparatus of this kind with which it is possible to select type or other objects with great rapidity.

Other objects are to provide a typewriting machine having great speed and power which is not liable to frequent breakage as in other known power typewriters.

Other objects of the invention are to provide an improved typewriting machine of the rotor-type wheel type to replace the clumsy bar and lever system of conventional typewriters, and to produce a completely electronic typewriter easily adaptable to mass production, and adaptable to very high speed without danger of the type piling up upon each other during operation.

Additional objects of the invention are to effect simplicity and efficiency in such typewriters and to provide an easily assembled and adjusted, compact, light weight, portable, extremely simple typewriter of this kind which is economical, durable, safe and very reliable in operation, and easy and economical to manufacture.

Still other objects of the invention will appear as the description proceeds; and while herein details of the invention are described in the specification and some of the claims, the invention as described in the broader claims is not limited to these and many and various changes may be made without departing from the scope of the invention as claimed in the broader claims.

The inventive features for the accomplishment of these and other objects are shown herein in connection with a rotor-type wheel typewriter which briefly stated includes a pair of constantly rotary upper and lower case type-carrying wheels disposed side-by-side, carrying type bars pivoted to the wheels and carrying the type blocks containing magnetic material, which when inactive are disposed rearwardly circumferentially of the wheels and there magnetically held by the magnetism of a stationary magnet having a cylindrical pole face disposed between said wheels. A releasing electromagnet disposable adjacent to the paths of the inactive blocks of either of said wheels and normally disposed adjacent to the path of the lower case blocks of one wheel is

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adapted when energized to draw a passing block from the influence of said pole face and allow centrifugal force to dispose the bar outwardly and substantially radially as the wheel rotates.

The blocks have printing type on the face which is forward when the bars are thus disposed outwardly; and a platen for the paper to be typed upon is disposed in the path of the type when thus disposed forwardly to receive the impact of the type. Keys corresponding to the respective type blocks cooperate with means controlled by the respective keys when depressed for energizing the releasing electromagnet as the block corresponding to the depressed key passes the releasing magnet thus to detach the selected type block and allow it to print. Shift key operated means are provided for at will moving the releasing magnet adjacent to the path of the blocks of the upper case wheel.

In the accompanying drawing showing, by way of example, one of many possible embodiments of the invention,

Fig. 1 is a plan showing the assembled typewriter;

Fig. 2 is a longitudinal vertical sectional view, partly in elevation, showing the assembled typewriter, the carriage being shown in elevation, the section being taken substantially on the line 2—2 of Fig. 1, looking in the direction of the arrows of said line;

Fig. 3 is a plan showing the typewriter with the carriage and its support removed;

Fig. 4 is a side elevation on a larger scale and partly in section, showing a type wheel, its type and associated parts;

Fig. 5 is a plan showing the type wheels, the type and associated gears;

Fig. 6 shows a section on the line 6—6 of Fig. 4;

Fig. 7 is a fragmental vertical sectional view, partly in elevation, showing the capital shift key;

Fig. 8 is a vertical sectional view showing a modified form of character key; and Fig. 9 is a wiring diagram.

My improved rotor typewriter is shown mounted in a frame or base 1 resembling the conventional typewriter base and having a floor 2, a low rear wall 3 and high side walls 4, each side wall having a lower front extension 5 connected by a low front connecting wall 6. A U-shaped stationary top plate or table 7 is disposed above the floor to the rear of said extensions 5 and has side members 8 mounted on the side walls 4, each side member having a downwardly offset intermediate part 9. Transverse tracks 10, 11, 12 mounted on the front and back margins of the top plate 7 and just to the rear

of said off-set parts 9 (Fig. 2) have rearwardly and frontwardly opening grooves 13, 14.

A rectangular carriage frame 15 is disposed between the front and intermediate tracks 10, 11 and comprises end members 16 and front and rear members 17, 18, the latter being provided with grooves 19 opposed and adjacent to the grooves 13 and 14 of said tracks 10 and 11. A rear extension frame 20 at the rear of the carriage frame 15 comprises side members 21 secured to the carriage frame, and a cross member 22 provided with a groove 23 opposed and adjacent to the groove 13 of the rear tracks 12. Bearing balls 24 are disposed in all of the adjacent grooves, whereby the carriage frame is transversely slidable. A platen 25 disposed across the carriage frame has projecting knob-carrying shaft ends 26 rotatably mounted in said end members 16 of the carriage frame over said off-set parts 9.

The parts above described are somewhat diagrammatically shown, as it is understood that the important features of the invention as claimed are not limited to the particular carriage frame shown, and are not, as claimed in many of the claims, limited to a platen which moves longitudinally relative to the type wheel later to be described, rather than the reverse.

Within the main frame 1 there is provided a stationary main magnet shaft 27 of magnetically conductive material mounted fast on a bracket 28 and perpendicular to and adjacent to the adjacent side wall 4 and axially parallel to, frontwardly of and lower than the platen 25. Said shaft 27 has a short reduced portion 29 near its free end about over the middle of the floor and a longer further reduced portion 30 extending to the free end of the shaft. A large solenoid 31 is disposed on said shaft adjacent to the bracket; and a disk shaped magnet pole piece 32 (Fig. 5) is mounted fast on said short reduced portion 29 and has a cylindrical pole face coaxial with the shaft.

If desired, the pole face 32 may have a small inlay 33 (Fig. 4) of brass or other non-magnetic material, for slightly weakening the magnetic force at said inlay for a purpose to be explained.

The solenoid receives direct current through suitable connections (not shown) to magnetize the magnet shaft and pole piece. If desired the solenoid may be omitted, in which case the pole piece and/or the shaft would be permanently magnetized. The invention is not limited to the particular form of magnet.

Upper case or capital and lower case type-carrying wheels 35, 36 are rotatively mounted on the shaft 27 and said further reduced portion respectively on opposite sides of the magnet pole piece 32 and slightly spaced by washers 37 therefrom, the upper part of each type wheel being rotatable toward the platen. Gear wheels 38 are secured fast on the sides of said type wheels respectively. An intermediate bearing bracket 39 (Fig. 3) mounted on the floor in the plane of the pole piece has an elongated bearing opening axially parallel to the magnet shaft and disposed under the platen and lower than the magnet shaft which rotatably receives a countershaft 40 carrying a grooved pulley 41, and also carries pinions 42, the same diameter as, and meshing with said gears 38 respectively. A synchronous or other constant speed motor 43 mounted on the rear of said floor 2 has a shaft 44 having a grooved pulley 45 thereon axially parallel to the countershaft. A belt 46 is received on said pulleys 41, 45, whereby the motor may drive the countershaft 40, pinions 42, gears 38 and type wheels 35, 36, and cause said type wheels to rotate to move the upper part of the wheels 35, 36 toward the platen. The motor may have a speed to rotate the type wheels at about 1200 revolutions per minute.

Each type wheel is provided with an annular peripheral rib 47 having a cylindrical peripheral face, and deep rabbet grooves 48, 49 on opposite sides of the rib, the rib having therein a series of transverse apertures 50 (Fig. 5) almost parallel to the shaft and slightly inwardly inclined toward the magnet pole piece.

A series of type bars 51, which may be wholly or partly of magnetic or non-magnetic material, are, as will be explained, disposable substantially radial to the type wheel as shown at the upper part of Fig. 4, or may be disposed approximately circumferential to the type wheel in a direction rearward to its rotation and inclined toward the space around the periphery of the magnet pole piece 32. Each bar has a laterally turned pivot part 52 (Fig. 5) disposed in one of said apertures 50, the pivot part having an angular free end 53 to retain it in the aperture. The outer end of the bar has a type block 54 wholly or in part of magnetic material, adapted when inactive to be, by the magnetism of the pole piece 32, yieldably magnetically held, against the centrifugal force, adjacent to the respective right and left margins of the peripheral face of the magnet pole piece. The type bars are of a cross-section elongated in a direction transverse to the axis of the wheel, to stiffen the bar. The bar tapers toward its pivot part, and the intermediate part of the bar is slightly outwardly curved and rests on the type wheel, when in inward position, to hold the block 54 slightly spaced from the periphery of the stationary pole piece 32.

Each block, except as noted hereinafter, may have in relief on its outer face a printing letter or character 55, which when the type bar becomes substantially radial, faces forward and is adapted to strike the platen 25 as the type wheel rotates. The printing plane of each letter 55 is slightly curved and coaxial with the platen when in printing position to cause even printing throughout the letter. The type associated with the capital and lower case wheels 35, 36 respectively have upper and lower case letters and characters thereon. The very slight inclination of the angle of the axes of said pivot parts 52 (Fig. 5) and apertures 50 is such that upper case and lower case letters will strike in the same place on the platen, in the mid-plane of the magnet pole piece 32.

A bracket plate 57 (Fig. 3) mounted on the floor 2 and disposed parallel to the plane of the type wheels between the large solenoid 31 and the type wheels is provided with an opening 58 snugly receiving the magnet shaft, and is provided a distance frontward of the magnet shaft with a rectangular opening 59 alined with a similar opening 60 in a supplemental bracket 61 mounted on the floor near the opposite side wall. Said rectangular openings 59, 60 receive fast therein a horizontal guide tube 62 of vertically elongated rectangular cross-section disposed forward of the type wheels and provided with a cutaway portion 63 facing the pole piece and with a cutaway portion 64 adjacent to the plate bracket 57 facing the magnet shaft. A bar 65 slidable in said guide tube and guided thereby is provided with an angular end portion 66 of magnetic material ex-

tended toward the magnet shaft and forming an armature, the edge of said cutaway 64 adjacent to the bracket plate limiting outward movement of the armature 66.

A selecting and releasing electromagnet 67 (Fig. 3) mounted on said bar radial to the pole piece 32 has a pointed core 68 projected normally adjacent to the path of the inactive lower case type blocks 54, the magnetism of the releasing electro-magnet when instantaneously energized being strong enough to cooperate with the centrifugal force of the revolving type block to withdraw the type block from the influence of the main magnet pole piece 32 to allow the centrifugal force to dispose the type bar substantially radial to the main shaft, as in the upper part of Fig. 4 to allow the type to strike the platen. A tension spring 69 tensioned between the outer end part of the tube and said bar serves for normally yieldably holding the bar in normal position with the armature 66 against said edge of the cutaway 64. A shift solenoid 70 adapted to be energized as will be explained and secured fast on said bracket plate 57 on the side remote from the armature 66 has a core 71 projecting a short distance through the bracket plate adjacent to the armature and adapted when the solenoid is energized to draw the armature 66 against the influence of the spring 69 to move the selecting electromagnet 67 from the plane of the lower case letter blocks to the plane of the upper case letter blocks.

A pair of slightly spaced upwardly rearwardly stepped keyboard plates 72, 73 (Fig. 2) mounted one above the other and having end ears 74 secured between, and insulated by washers 75 from the front extension 5 of the side walls comprise steps 76, corresponding steps having vertically alined guide openings 77 receiving metal stems 78 of keys 79 respectively corresponding to the type 55 of either of the type wheels, said metal stems 78 being vertically slidable in said pairs of openings 77 and each having a button 79 secured on the top of the stem. A spacing bar 80 is mounted at the ends on similar stems 81 mounted in two of said alined openings. A spring 82 is compressed between a collar 83 fast on the upper part of each stem 78 or 81 and the lower plate 73 to urge the keys upwardly. Each metal stem has on its lower end a disk 84 having an insulating coating 85 on its upper face. Insulated blocks 86 are secured fast to the wall 6 or the lower face of the lower plate 73 adjacent to each stem; and a spring metal contact 87 mounted on each block and having its free end disposed below and under the adjacent turned end is instantaneously engageable by the disk 84 of the associated stem when the key is pressed downwardly, at ordinary speed, and is engageable by the insulating coating at the position 85' only as the key is being moved upwardly and restored by the spring 82.

Instead of the switches as in Fig. 2 I may omit the disk 84 and its coating, as will be explained hereinafter, or I may provide switches as in Fig. 8 in which the metal disk 84a coaxially held on the lower end of the stem 78a by means of a metal screw 88 contacting the disk carries an upper coating 85a of insulation on the upper and peripheral faces of the disk, and a lower insulating coating 89 on the lower face of the disk leaving only a narrow margin of the disk 84a exposed. The insulating block 86 mounted on the lower face of the plate 73 has mounted thereon a metal contact spring 87a having an intermediately downwardly curved portion 90 forming a lower

hook turned toward the disk and having its free end 91 engageably by said lower coating 89 as the key lowers to bend this free end 91 downwardly to place the hook under tension and cause the free end 91 to point inwardly downwardly and cam from the lower coating 89 and snap from the lower coating across the narrow margin of the disk 84a and upper coating 85a and make instantaneous contact with the disk 84a, and then assume its normal position. Release and rising of the key causes the upper coating 85a to cam past the yieldable hook 90 without contact with the metal to allow the hook again to assume normal position.

A commutator bracket 93 (Fig. 3) mounted on the floor 2 has a bearing opening 94 alined with the countershaft 40 and loosely receiving a commutator shaft 95 carrying fast thereon a commutator 96 adjacent to the end of the countershaft 40 and having segments 97 corresponding in order to the characters of said type blocks 54 and associated keys 79. A disk 98 is mounted fast on the inner end of the commutator shaft; and a clamping screw 99 adjustable in said bracket carries washers 100 under its head engaging opposite faces of the disk for holding the disk commutator in proper adjusted position, after adjustment by means of a knob 101 on the shaft 95. A brush arm or brush 102 fast and grounded on the countershaft 40 and thereby grounded on the frame of the typewriter successively engages successive segments 97; and conductors 104, gathered in a cable 105, connect the spring contacts 87 (Figs. 2 and 9) of the keys 79 or spacer bar 80 to the respective corresponding commutator segments 97 (Figs. 3 and 9). Said disk 95 and commutator 96 are relatively adjusted or positioned to cause the brush arm 102 to engage the commutator segment 97 corresponding to any associated key 79, the spacer bar 80 and associated type block 54 or spacer location of the type wheel, as will be explained, just as said block or spacer location comes opposite to said releasing magnet core 68 (Fig. 3).

A suitable source of current 107 (Fig. 9) has one ungrounded terminal 108 and one terminal 109 connected through a condenser 110 and a low resistance 111 to a ground 112 on the frame of the machine, thereby connected through a ground 113 on the frame to the brush arm. A high resistance 114 is connected between said ungrounded terminal and the condenser element, of said condenser 110, nearest the ground 112.

When no current passes the brush 102, the condenser 110 is charged, through the high resistance 114; and when a circuit is established through a closed key switch 78, 87, conductor 104, a commutator segment 97, the brush 102, ground 112 and resistance 111, the condenser 110 causes an instant discharge through a cut-out relay magnet 115 having its coil connected by conductors 116, 117, 118, and 119 between said stepped plate 72 and said ungrounded terminal 108 of the source 107, thereby to magnetize the magnet 115 and cause it to attract an electrically conductive armature 120 of magnetic material adjacent to the relay magnet and normally retracted therefrom. A back contact 121 engageable by said armature when retracted is electrically connected to said ungrounded terminal 108 of said source. A selective actuating condenser 122 is connected by conductors 123, 124, 125 and resistance 125R between the terminal 109 and said armature, whereby said condenser 122 normally is maintained charged. A front

relay contact 126 is connected through conductor 127, the coil of the selecting release magnet 67, resistance 128 and conductors 124, 125 to said terminal 109 and is engageable by the armature 120 when attracted by the relay magnet.

The condensers 110 and 122 are normally charged; and when any letter or character key is being pressed, the brush 102 will during that time engage the corresponding commutator segment 97, and said cut-out relay magnet 115 will be energized and said armature 120 attracted, whereupon said condenser 122 will discharge through the releasing magnet 67, and said releasing magnet will be magnetized at the instant that the corresponding type block 54 passes the core 68, thereby to withdraw such type block from the influence of the main magnet pole piece 32 to allow its type bar 51 (Fig. 4) to assume under centrifugal force an approximately radial position until the type strikes the platen 25 before another key depression takes place.

An escapement electromagnet 130 is horizontally mounted on said floor 2. A normally open relay spacer switch 131, 132 is closed by the relay magnet 115 when energized. This relay switch, the spacer escapement magnet 130 and a time delay element 133 are all connected in series between the terminals 108, 109 by means of conductors 119, 118, 134, 135, 136, 137, 124, 125; whereby the spacer solenoid 130 receives current each time the relay magnet is energized, whether a type block or spacer location is adjacent to the releasing magnet.

The time delay element may be a retarding coil 138 or a retarding relay or any desired delaying means to cause the escapement magnet 130 to become energized a predetermined time after the relay magnet becomes energized, to allow the type to print before the escapement magnet acts. A pair of posts 140 (Figs. 2 and 3) at opposite sides of the rear end of the core of the escapement magnet carry an upright escapement lever 141 intermediately pivoted between the upper ends of said posts and carrying an upright escapement actuating arm 142, said lever carrying at the lower end an armature 143 opposite the magnet core end. When the escapement magnet 130 is energized said arm is rocked and operates a conventional escapement mechanism (not shown) for stepping the carriage across the machine, and which is not a part of the present invention.

By this arrangement, the circuit of the spacer escapement magnet is separate from the relay magnet 115, or the circuit of the selector magnet 67, and any usual form of delaying element 133 in the spacer magnet circuit may delay the operation of the spacer magnet as much as desired, to give the type full time to print before the spacer lever is actuated.

The type lever 51 and block 54 corresponding to the spacing stems 81 of the spacing bar are omitted or preferably merely brazed or otherwise anchored or suitably secured fast in inactive position on the type wheel to prevent printing when only the spacing bar 80 is depressed, the secured-on bar and block serving to maintain the balance of the type wheel during rotation.

The bracket 39 (Figs. 2 and 4) mounted under the platen between the pinions 42 of the countershaft 40 carries a restoring means or cam such as a rubber coated spring cam plate 141' of sheet metal mounted on said bracket and disposed approximately on a line tangential to the lower front face of the platen 25 and the upper rear periphery of the type wheel ribs 50, and having its upper end part (Fig. 4) curved to act as a restorer cam 142' to be engaged by an active type bar 51 as the type thereof strikes the paper on the platen, and to cause the type block to draw back suddenly from the platen to prevent smearing. The moving bar and block cam on the face of the cam 142' and plate 141' and are moved by the cam plate into the influence of the main magnet pole piece 32 to be held thereby in normal position just out of contact with the pole piece.

Any suitable type inking means may be provided, the type inking means 143 (Fig. 4) here shown comprising an open ended fixed guide tube 144 secured to the lower face of the tube 62 (Fig. 2) parallel to the releasing magnet 67 and slidably receiving a tubular casing 145 extending to near the type wheel and having on its side walls a pair of ears 146 adjacent to the type wheels and carrying a pin 147 loose in the perforations of the ears on which pin rotates a soft rubber roller 148 engaging the inactive normal position type of both wheels to be rotated by the type. One or more reservoirs 149 of the ball-point pen type are disposed side-by-side longitudinally of said casing and radial to the roller and have their balls 150 engaging said roller, thereby to spread ink upon the rotating roller to be picked up by the type engaging the roller. A hinged closure 151 closing the rear end of the casing has a lower hook 152 yieldably engaged in an indentation in the casing to hold the lid closed. A spring 154 compressed between the lid and a plate 155 disposed against the inner ends of the reservoirs serves to hold the balls 150 against the roller and the roller against the type.

Fig. 7 shows the capital shift key 157 (Fig. 3). Lower corner portions of the stepped plates 72, 73 have large vertically alined openings 158 therein over which are secured insulating disks 159 covering said openings and provided with alined perforations receiving a shift key stem 160 slidable in said apertures and having its lower end engageable with the upper spring contact 161 of a pair of separately insulated superposed spring contacts 161 having free ends under the shift key stem 160. Conductors 119, 118, 163, 164, 165, 124, 125 connect the spring contacts in series with the shift solenoid 70 between the terminals 108, 109, whereby operation of a shift key energizes the shift magnet and shifts the selecting magnet 67 from adjacent to the lower case letter blocks 54 to adjacent to the capital letter blocks.

The operation of the typewriter will be understood from the foregoing, and now need be summarized only briefly as follows:

The paper 166 (Fig. 2) is inserted into the carriage and the platen rotated for line spacing in the ordinary way; and the carriage is spaced or moved to the right or left in the ordinary way and is shown only diagrammatically being no part of the present invention.

The main magnet solenoid 31 (Fig. 3) is energized; and the motor 43 is rotated to give the type wheels the desired constant speed, which may be 1200 revolutions a minute, more or less. The energization of the magnet is such that the type blocks 54 (Fig. 5) are held in inactive position near but not touching the magnet pole face 32, the intermediate part of the type bar 51 resting on the type wheel, while the type faces 55 point outwardly and are engaged and inked by the inking roller 148 as the type wheels rotate.

The selecting condenser 122 (Fig. 9) is charged through the back contact 121 and the conducting armature 120 from one terminal of the source

107 and through the resistor 125R from the other terminal of the source.

The condenser 110 remains normally charged, through the high resistance 114, and this potential is communicated through resistance 111, the grounds 112, 113 to the revolving brush arm 102.

When a key 79 is depressed, contact between the disk 84 and contact spring 87 is as long as a complete revolution of the brush 102; and when the brush reaches the segment 97 to which the engaged contact spring is connected, a path is established from the brush, through the commutator segment, spring contact 87, key stem 78, keyboard plate 72, conductor 116, coil of the cut-out relay magnet 115 and conductors 117, 118, 119 to terminal 108, thus through the relay magnet 115, causing the conducting armature 120 to engage the front contact 126, allowing the discharge of the selecting condenser 122 to find a path from one plate of the condenser through the conducting armature, the coil of the selecting magnet 67 and resistors 128, 125R to the other plate of the condenser 122, thus energizing the selecting magnet 67. As the selecting magnet is so placed that it is energized just as the type block 54 corresponding to the depressed key 79 and the associated segment 97 passes, such type block is attracted by the selecting magnet 67.

The strength of the selecting magnet is such that it combined with centrifugal force is sufficient to withdraw the type block from the influence of the main magnet pole face 32 allowing the centrifugal force to move the type bar substantially radially outwardly as the type moves with its face forward toward the platen.

If desired, in order to facilitate the withdrawal of the type block from the influence of the pole face 32 at the right time I may weaken the magnetic attraction at the pole face by the inlay 33, while maintaining the magnetic attraction strong at all other points of said pole face.

The type block 54 and type bar 51 may be designed to strike the paper on the platen and the restorer cam 142 substantially at the same time or to cause the bar to strike the cam somewhat in advance. In either case the type hits the platen instantly and is instantly retracted from the paper without any smear. After striking, the type and type bar are retracted by the cam 142' to the influence of the main magnet pole piece 32, after which the typewriter is ready for a repetition of the above action of the same or another type.

In the above described operation, as the engagement of the key switch contacts 84, 87, the discharge of the condensers 110 and 122, and the energization of the relay magnet 115 and the selector magnet 67 are substantially instantaneous, the conducting armature 120 is immediately restored to normal position against the back contact 121, and the selector condenser is immediately recharged for another selecting operation.

During the above selecting and printing operation, the relay magnet operates to close the normally open relay switch 131, 132, thus closing a circuit from terminal 108 through conductors 119, 117, 134, 135, 136, 137, 124, 125, switch 131, 132, time delay element 133 and the coil of the spacer magnet 130, thus operating the escapement lever 141, 142 to effect spacing from letter to letter by operation of conventional escapement means (not shown) which forms no part of the present invention. The time delay element may be any conventional delaying means, such as a conventionally indicated current delaying inductance coil 138, or any suitable form of time delaying relay or similar device, to insure that the energization of the escapement magnet shall be delayed enough to allow the printing to take place before the escapement lever operates to effect spacing, thus to avoid any smearing by the type.

The operation of spacing between words effected by the spacing bar is the same as the spacing operation between letters, except that the anchored type and type bars 54, 51 do not move from the inactive location and therefore do not print, but leave an unprinted blank space on the paper, while the spacer escapement lever operates.

The spacer bar 80 (Figs. 1 and 2) has a stem 81, a disk 84 and spring contact 87 at each end, both of these spring contacts being connected by conductors 104 to the single commutator segment corresponding to the anchored type block on the type wheel. Therefore, if the middle or either or both ends of the spacer bar should be pressed upon, one or both of the spring contacts 87 will be engaged and a circuit will be established through the commutator segment corresponding to the anchored type block at the instant the anchored block passes the selector magnet. Hence the relay magnet and selector magnet will be energized but the selector magnet cannot release the anchored type block. However, the energized relay magnet will close the normally open relay spacer switch 131, 132 (Fig. 9) and energize the spacer escapement magnet 130 without effecting printing.

When it is desired to print a capital letter, the shift key 157 (Figs. 1, 7 and 9) is depressed to close the switch 157, and energize the magnet 70 to shift the releasing selector magnet 67 from the lower case type series to the upper case series. Depressing the shift key closes upon each other the insulated spring contacts 161, and a circuit is completed from the terminal 108 through the conductors 119, 118, 163, 164, 165, 124, 125 to terminal 109, thus energizing the shift magnet 70 and attracting the armature 66 to the end of the slot 64. The shift key may be held down manually or by any suitable means until the desired upper case character or characters have been printed, after which the shift key is raised.

If desired I may omit the condenser 110, and the resistance 114, and make the relay magnet 115 a slow release magnet timed to hold the armature longer than one revolution of the brush arm 102. In this case a simple switch may be used instead of the instantaneous switch 84, 87 or 84a, 87a and the insulation coated disk 84 may be omitted, allowing the metal stem to directly engage the contact spring directly. With this arrangement the key switch may be held closed through several revolutions of the brush, since the relay switch will not release during the intervals between commutator contacts, and the selecting condenser 122 will discharge only once and will not recharge so long as the relay magnet 115 holds the armature 120 away from the contact 121 connected to the terminal 108.

If the actuating condenser 110 and the resistance 114 are used it is also possible to omit the insulation coated disk of the key switches. The high resistance 114 is sufficiently low to allow the actuating condenser to recharge between the fastest strokes on the keys; but when contact is made through the closed key switch 84, 87 and engaged commutator segment 97, the discharge of the condenser 110 is instantaneous, and the resistance 114 is sufficiently high to prevent re-

charge of the condenser between successive contacts of a commutator segment 97, if a circuit through the key switch, without the insulated coated disk, is maintained by holding the key down. Thus when a key 79 is held down, the condenser 110 will not recharge fast enough to accumulate a charge large enough to cause actuation of the relay magnet 115 a second time.

I claim as my invention:

1. In combination, a rotary wheel, type bars having their inner ends pivoted to the wheel and normally disposed in an inner position rearward of the pivot, and movable outwardly substantially radial to the wheel, and having end type faced forward when the bars are thus disposed radially; means for holding the type in inactive position near the periphery of the wheel and selectively releasing them; a platen adapted to be struck by the type when disposed radially to the wheel to effect printing; and cam means engageable with the type bars for restoring the type to inactive position after striking.

2. In combination, a frame having side walls and a floor; a platen on the side walls; a bracket on the floor; a stationary main magnet shaft of magnetically conductive material mounted on said bracket fast and perpendicular to and adjacent to one of the side walls and parallel to, frontwardly of and lower than the platen; said shaft having a short reduced portion near its free end about over the middle of the floor and a longer further reduced portion extending to the free end of the shaft; a large solenoid on said shaft adjacent to the bracket; a disk shaped magnet pole piece mounted fast on said short reduced portion and having a cylindrical pole face coaxial with the shaft; upper case and lower case type carrying wheels rotatively mounted on the shaft and said further reduced portion respectively on opposite sides of the magnet pole piece and slightly spaced therefrom, the upper part of each wheel being rotatable toward the platen; type movably carried by the wheels and movable outwardly by centrifugal force beyond the wheels and faced forward when thus disposed outwardly and magnetically held adjacent to said pole face; and means for selectively releasing any type of either wheel from said face; said platen being adapted to be struck by the type when thus disposed.

3. In combination, a pair of rotary type wheels disposed side-by-side; a magnet having a cylindrical pole face between the peripheries of the wheels; each type wheel having an annular peripheral rib having a cylindrical peripheral face and deep rabbet grooves on opposite sides of the rib, the rib having therein a series of transverse apertures almost parallel to the shaft and slightly inwardly inclined toward the magnet pole face; and a series of type bars disposable substantially radial to the type wheel or approximately circumferential thereto in a direction rearward to its position and inclined toward the periphery of the magnet pole face and each having a laterally turned pivot part disposed in one of said apertures, the pivot part having an angular free end to retain it in the aperture; the outer end of the bar having a type block containing magnetic material adapted when inactive to be, by the magnetism of the pole piece, yieldably magnetically held against the centrifugal force adjacent to the respective margins of the peripheral face of the magnet; means for selectively releasing any block of either wheel from said face; type carried by the bars and movable outwardly by centrifugal force and faced forwardly when thus disposed outwardly; and a platen adapted to be struck by the type when thus disposed, the inclination of the angle of the axes of said pivot parts and apertures being such that upper case and lower case letters will strike in the same place on the platen in the mid-plane of the magnet pole face.

4. In combination, a rotary type wheel having a peripheral rib having transverse apertures; bars pivoted in said apertures and movably carried by the wheel and disposable rearwardly and movable outwardly by centrifugal force beyond the wheel, and each carrying a type faced forward when thus disposed outwardly; a platen adapted to be struck by the type when thus disposed; and a magnet having a circumferential pole face adjacent to the periphery of the wheel and adapted to magnetically hold the blocks adjacent to said face; the type bars being of a cross-section elongated in a direction transverse to the axis of the wheel to stiffen them, and tapering toward the pivot part, the intermediate part of the bar being slightly outwardly curved and resting on the type wheel to hold the block slightly spaced from the periphery of the pole face.

5. In combination, a pair of adjacent series of circumferentially disposed type; a rotary means carrying said type; said type containing magnetic material and being movably carried by said means in an inner position and movably urged outwardly to be disposed in an outer position; holding means for holding the type in inner position against the outward urge; a support adapted to be struck by the type when disposed outwardly; a magnetic device shiftable to a point adjacent to either series for removing the type from the holding influence of the holding means; and means for energizing said device when a desired type is adjacent thereto.

6. In combination, a pair of traveling members disposed side-by-side each carrying characteristic character determining parts successively to predetermined adjacent points; a support carrying a surface to receive the characters determined by said parts; and a cooperating device movably mounted to be associated with said parts of either member at said points and adapted to cooperate with the part at one of said points to apply to said surface the character determined by the part associated with said point at the time.

7. In combination, a pair of rotary type carrying wheels disposed side-by-side; type bars pivoted to the wheels and carrying type blocks and when inactive being disposed rearwardly circumferentially of the wheels; a stationary magnet having a cylindrical pole face between said wheels and magnetically holding the type blocks in inactive position; a releasing electromagnet adjacent to the path of the inactive blocks of one wheel and adapted when energized to draw a passing block from said face and allow centrifugal force to dispose the bar outwardly as the wheel rotates; the blocks having printing type on the face which is forward when thus disposed outwardly; a platen disposed in the path of the type when thus disposed forwardly; keys corresponding to the respective type blocks; means controlled by the respective keys when depressed for energizing the release magnet as the block corresponding to the depressed key passes; and means for at will moving the releasing magnet adjacent to the path of the blocks of the other wheel.

8. In combination, coaxial rotary wheels disposed side-by-side and each having a peripheral rib having apertures inclining toward the other wheel; type bars having laterally turned inner ends pivoted in said apertures, the bars being normally disposed in an inner position adjacent to the periphery of the wheel and movable outwardly substantially radial to the wheel, and having end type faced forward when the bars are thus disposed radially; means for holding the type in inactive position near the periphery of the wheel and selectively releasing them; and a platen adapted to be struck by the type in a common plane midway between the wheels when disposed substantially radially to the wheel.

9. In combination, a platen; a magnet having a narrow cylindrical pole face; upper and lower case type carrying wheels rotatively mounted coaxial with, and at opposite sides of, the pole face, the upper part of each wheel being rotatable toward the platen; each type wheel having a peripheral rib having therein apertures almost parallel to the shaft and slightly inwardly inclined toward the magnet pole; type bars disposable substantially radial to the type wheel or approximately circumferential thereto in a direction rearward to its rotation and each having a lateral pivot part in one of said apertures; the outer end of each bar carrying a type block of a magnetic material adapted to be magnetically held adjacent to the face of the pole piece; the intermediate part of each bar resting on the type wheel; each block having on its forward outer face a printing character adapted to strike the platen when the bar is radial to the wheel; the angle of said pivot parts being such that upper case and lower case letter blocks will strike the platen in the mid-plane of the magnet pole; and means for selectively releasing the blocks from the influence of the magnet.

10. In combination, a rotary member; type containing magnetic material movably carried by the member in an inner position and movably urged outwardly to be disposed in an outer position; holding means for yieldably holding the type in inner position against the outward urge; a support adapted to be struck by the type when thus disposed; a releasing electromagnet adjacent to the path of the type in inner position; and means for energizing the electromagnet when the desired type is adjacent to the electromagnet for selectively removing the type from the influence of the holding means.

11. In combination, a pair of traveling members disposed side-by-side each carrying characteristic character determining parts successively past predetermined adjacent points; a support carrying a surface to receive the characters determined by said parts; and a cooperating device movably mounted to be at will associated with said parts of either member at said points and adapted to be energized by an electric current passing therethrough to cooperate with the part at the point at the time of energization to apply to said surface the character is determined by the part associated with said point at the time.

12. In combination, a rotary member; type blocks containing magnetic material movably carried by the member and movable outwardly by centrifugal force beyond the member and faced forward when thus disposed outwardly; a magnet having a circumferential pole face for magnetically holding the type blocks in inactive position near the member; a selecting and releasing electromagnet having a pointed core projected normally adjacent to the path of the inactive type-blocks, the magnetism of the electromagnet when instantaneously energized being strong enough to cooperate with the centrifugal force of a revolving type block to withdraw the type block from the influence of the said pole piece to allow the centrifugal force to dispose the type block substantially radially outward from said member; a platen adapted to be struck by the type block when thus disposed; and means for energizing the releasing electromagnet when the desired type block is adjacent thereto.

13. In combination, a rotary member; type containing magnetic material movably carried by the member in an inner position and movably urged outwardly to be disposed in an outer position; a magnet having a circumferential pole face adjacent to the type in the inner position for holding the type in inner position against the outward urge; a support adapted to be struck by the type when thus disposed; an electromagnet adjacent to the path of the inner position type for selectively removing the type from the influence of the magnetic means; and a gap in said pole face having non-magnetic material therein adjacent to the electromagnet.

14. In combination, a pair of traveling members disposed side-by-side each carrying characteristic character determining parts successively past predetermined adjacent points; a support carrying a surface to receive the characters determined by said parts; a cooperating device movably mounted to be associated with said parts of either member at said points and adapted to be energized by an electric current passing therethrough to cooperate with the part at the point at the time of energization to apply to said surface the character determined by the part associated with said point at the time; and means for moving said device into association with either of said members.

15. In combination, a magnet shaft; a pair of constantly rotary type-carrying wheel disposed side-by-side on the shaft; a magnet having a narrow cylindrical pole face between and adjacent to the peripheries of the wheels; type blocks of magnetic material carried by the wheels and yieldably magnetically held in inactive position adjacent to margins of the pole face and when withdrawn from said pole face being disposable outwardly to active position; a horizontal guide tube of vertically elongated rectangular cross-section disposed forward of the wheels and provided with a large cutaway portion facing the pole piece and a small cutaway portion facing the magnet shaft; a bracket and a bracket plate adjacent the small cutaway portion provided with alined openings receiving said tube; a bar slidable in said guide tube and guided thereby and provided with an angular end portion of magnetic material extended toward the magnet shaft and forming an armature, the edge of said cutaway portion adjacent to the bracket plate limiting outward movement of the armature; a releasing electromagnet radial and adjacent to the path of the inactive blocks of one of said margins and mounted on the bar in the large cutaway portion; means to energize the electromagnet when a selected block is adjacent thereto for drawing the block from said periphery; means urging the bar away from said bracket plate to retract said armature; a solenoid for attracting the armature toward the bracket plate; and means for at will energizing the solenoid.

16. In combination, a frame having a floor; a

platen mounted across the frame; a pair of adjacent coaxial, constantly rotary type-carrying wheels axially parallel to the platen; type blocks of magnetic material carried by the wheel and yieldably held in inactive position adjacent to the wheel and when drawn from said periphery being disposable outwardly to active position and adapted to strike the platen; a releasing electromagnet adjacent to the path of the inactive blocks of one wheel; means to energize the electromagnet when a selected block is adjacent thereto; a bracket plate mounted on the floor parallel to the plane of the type wheels on one side of the wheels and provided at a distance frontward of the axis of the wheels with a rectangular opening; a bracket mounted on the opposite margin of the floor and provided with a rectangular opening axially alined with the opening of the bracket plate; a tube fitted in said openings and having rear cutouts in one of which the releasing magnet is mounted; a bar in the tube supporting the electromagnet and having an angular armature in the other cutout; a tension spring tensioned between the outer end of the tube and said bar for holding the bar in a position with the armature against an edge of the cutout; a solenoid on said plate on the side remote from the armature and having a core projecting through the plate adjacent to the armature and adapted when energized to draw the armature to move the releasing electromagnet adjacent to the blocks of the other wheel; and means for energizing the solenoid.

17. In combination, a pair of constantly rotary type-carrying wheels disposed side-by-side; type blocks of magnetic material carried by each wheel and yieldably held in inactive position adjacent to the wheel and when withdrawn from said periphery being disposable outwardly to active position; a releasing electromagnet adjacent to the path of the inactive blocks of one wheel; a guided bar supporting the electromagnet and carrying a transverse armature and movable to move the electromagnet to be adjacent to the path of the blocks of the other wheel; a stationary shift solenoid for attracting said armature; means to energize the electromagnet when a selected block is adjacent thereto; spaced superposed keyboard plates; corner portions of said plates having large vertically alined openings therein; insulating disks covering and secured over said large openings and provided with alined apertures; a shift key having a stem slidable in said apertures and having a lower end; a pair of separately insulated superposed spring contacts having free ends under the shift key stem; and conductors connecting the spring contacts in series with the solenoid.

18. In combination, a frame; a constantly rotary type-carrying wheel therein; type blocks containing magnetic material carried by the wheel and yieldably held in inactive position adjacent to the wheel and when withdrawn from said periphery being disposable outwardly to active position; a releasing electromagnet adjacent to the path of the inactive blocks; a pair of slightly spaced upwardly rearwardly stepped keyboard plates mounted in the frame and comprising steps, corresponding steps having vertically alined guide openings; keys having stems vertically slidable in said alined openings and a button secured on the top of each stem; a spacing bar mounted at each end on similar stems mounted in two of said alined openings; a collar fast on the upper part of each stem between the plates; a spring compressed between the collar and the lower plate to urge the keys upwardly; switches corresponding to the type blocks respectively and operable by said stems and means controlled by the respective switches to energize the electromagnet when the corresponding block is adjacent thereto for drawing the block from said periphery.

19. In combination, a rotary member; type containing magnetic material movably carried by the member in an inner position and movably urged outwardly to be disposed in an outer position; holding means for holding the type in inner position against the outward urge; a support adapted to be struck by the type when thus disposed; a releasing magnet adapted when instantly energized to remove the type from the influence of the holding means; an insulated metal keyboard plate; metal keys corresponding to the type and movable on the plate; insulated contacts engageable by the keys; and means connected in electric circuit between said plate and contacts and set in operation by pressing the respective keys, to instantly energize the releasing magnet when the corresponding type is adjacent to the releasing magnet.

20. In combination, a plurality of characteristic character determining parts movable to operative position; a cooperating device adapted to receive an instantaneous electric current thereby to be actuated to cooperate with said parts to move a desired determining part to operative position; a plurality of switches corresponding to said parts and adapted to make instantaneous contacts and means cooperating with said switches for causing said instantaneous current and cooperating with an actuated switch for actuating said device; each switch comprising an insulated metal plate having an opening; a yieldably raised key having a metal stem slidable in said opening and having a lateral projection having insulation on one of its faces; and an insulated metal contact spring having its free end engageable by said projection as the stem moves.

21. In combination, a plurality of characteristic character determining parts movable to operative position; a cooperating device adapted to receive an instantaneous electric current thereby to be actuated to cooperate with said parts to move a desired part to operative position; a plurality of switches corresponding to said parts and adapted to make instantaneous contacts and means cooperating with said switches for causing said instantaneous current and cooperating with an actuated switch for actuating said device; each switch comprising an insulated metal plate having an opening; a key having a metal stem slidable in said opening and having a lateral projection having insulation on its upper and lower faces; and an insulated metal contact spring having its free end engageable by said projection.

22. In combination, a plurality of characteristic character determining parts movable to operative position; a cooperating device adapted to receive an instantaneous electric current thereby to be actuated to cooperate with said parts to selectively move a desired part to operative position; a plurality of switches corresponding to said parts and adapted to make instantaneous contacts; and means cooperating with said switches for causing said instantaneous current; each switch comprising an insulated metal plate having an opening; a yieldably raised

metal stem slidable in said opening and having a metal disk on its lower end; an upper insulating coating on the upper and peripheral faces of the disk; a lower insulating coating on the lower face of the disk leaving only a narrow margin exposed; an insulating block mounted on the lower face of the plate; and a metal contact spring mounted on the block and having a downturned portion having a lower hook turned toward the disk and having its free end engageable by said lower coating to tension bend the hook and cause the free end to snap across said narrow margin and upper coating and make instantaneous contact with the disk; release of the key causing the upper coating to cam past the hook without contact with the disk.

23. In combination, means comprising a movable part and a cooperating device adapted to receive electric impulses at different positions of the movable part to perform selected operations depending upon said positions; upper and lower insulated keyboard plates having vertically alined guide openings; yieldably raised keys corresponding to said operations and having metal stems slidable in said openings and each having a laterally disposed lower end projection having an insulating coating on its upper face; an insulated block on the lower face of the lower plate adjacent to each stem; a spring metal contact mounted on each insulating block and having its free end disposed under the projection and engageable by the projection when the key is pressed and engageable by the coating only as the key is restored; and means connected in circuit between said plate and the respective contacts for supplying said impulses to said device at a time to cause the operation corresponding to the depressed key.

24. In combination, a type-carrying wheel constantly rotary at a high speed; type blocks of magnetic material carried by the wheel and yieldably held in inactive position adjacent to the wheel and when drawn outwardly from said periphery being disposable outwardly to active position; a releasing electromagnet adjacent to the path of the inactive blocks; spaced superposed insulated metal keyboard plates having alined openings; metal character keys corresponding to the type blocks and having stems movable in the perforations of the plates; each metal stem having a lower end disk; an insulating coating on the upper face of the disk an insulated block secured fast to the lower face of the lower plate adjacent to each stem; a spring metal contact mounted on each insulated block and having its free end spaced under the adjacent disk and engageable for a period longer than the rotation of the type wheel, by the disk when the key is pressed downwardly at ordinary speed and engageable by the coating only, as the key is restored; a non-rotary commutator having segments electrically connected to respective corresponding spring contacts; a brush arm revolvable in step with the wheel and engageable with the segments; a relay magnet having its coil connected in circuit between said keyboard and brush; and means operated by the relay magnet to energize the releasing magnet.

25. In combination, a traveling member carrying characteristic character determining parts; a support carrying a surface to receive the characters determined by said parts; a cooperating device adjacent to which said parts successively pass and adapted to be actuated to cooperate with the part adjacent thereto to apply to said surface the corresponding character; key switches corresponding to the determining parts respectively; a non-rotary commutator having segments electrically connected to one element of respective corresponding key switches; a conducting member connected to the other element of the switches; a source of current; a brush arm revolvable in step with the traveling member and electrically connected to one source terminal and successively engageable with the commutator segments; a relay magnet having one end of its coil connected to said conducting member and the other to the other terminal; and means operated by the relay magnet for actuating said device.

26. In combination, a frame; a constantly rotary type-carrying wheel therein; type blocks containing magnetic material carried by the wheel and yieldably held in inactive position adjacent to the wheel and when withdrawn from said periphery being disposable outwardly to active position; a releasing electro-magnet adjacent to the path of the inactive blocks; key switches corresponding to the type blocks respectively; a countershaft geared to the type wheel to rotate at the same speed; a commutator bracket mounted in the frame and having a bearing opening alined with the countershaft; a commutator shaft loose in said opening; a commutator fast on the commutator shaft adjacent to the end of the countershaft and having segments corresponding in order to the characters of said type blocks and associated key switches; an adjusting disk fast on the inner end of the commutator shaft; a clamping screw adjustable in said bracket, and carrying washers under its head engaging opposite faces of the disk for adjustably holding the disk fast; the commutator segments being electrically connected to one member of respective corresponding key switches; a brush arm on the countershaft successively engageable with the commutator segments; a relay magnet having its coil connected in circuit between the other members of the key switches and the brush arm; and means operated by the relay magnet when energized to instantaneously energize the releasing electro-magnet.

27. In combination, a pair of rotary type-carrying wheels disposed side-by-side; type bars pivoted to the wheels and carrying type blocks containing magnetic material, the bars when in inactive position being disposed rearwardly circumferentially of the wheels; a stationary magnet having a peripheral pole face between said wheels and magnetically holding the type blocks in inactive position; a releasing electromagnet adjacent to the path of the inactive blocks of one wheel and adapted when energized to draw a passing block from said face and allow centrifugal force to dispose the bar outwardly; the block having printing type; a platen disposed in the path of the type when disposed outwardly; means for energizing the release magnet and causing it to selectively withdraw type from either wheel; gears secured fast to the outer faces of the wheels; a countershaft carrying fast thereon pinions engaged with said gears, and means for driving the countershaft.

28. In combination, a pair of coaxial rotary type-carrying wheels disposed side-by-side; type bars movably carried by each wheel and carrying type blocks containing magnetic material disposable outwardly by centrifugal force beyond the periphery of the wheel as the wheel rotates; a stationary magnet having a narrow cylindri-

cal pole face between the peripheries of said wheels for magnetically holding the type blocks in inactive position near the periphery of the wheels; means for selectively releasing the type blocks; the blocks having printing type on the face which is forward when thus disposed outwardly; a platen parallel to the axis of rotation of the wheels; gears secured to the outer side face of the wheels; an intermediate stationary bearing bracket mounted in the plane of the pole piece having a bearing opening axially parallel to said axis under the platen; a countershaft mounted in said bearing opening and carrying also pinions, the same diameter as, and meshing with said gears respectively; and means to rotate the countershaft having a speed to rotate the type wheels at about 1200 revolutions per minute.

29. In combination, a traveling member carrying characteristic character determining parts successively past a predetermined point; a support carrying a surface to receive the characters determined by said parts; a cooperating device associated with said parts at said point and adapted to be energized by an electric current passing therethrough to cooperate with the part at the point at the time of energization to apply to said surface the character determined by the part associated with said point at the time; an insulated common conducting member; switches corresponding to the characters and having one switch element connected to said conducting member; a non-rotary commutator having segments corresponding to said characters electrically connected to the other element of respective corresponding key switches; a brush arm traveling in step with the character carrying member and engageable with the commutator segments; a relay magnet having its coil connected in circuit between said conducting member and brush; and means operated by the relay magnet when energized to energize the cooperating device.

30. In combination, a traveling member carrying characteristic character determining parts successively past a predetermined point; a support carrying a surface to receive the characters determined by said parts; a cooperating device associated with said parts at said point and adapted to be energized by an electric current passing therethrough to cooperate with the part at the point at the time of energization to apply to said surface the character determined by the part associated with said point at the time; a condenser; means to charge the condenser; and means to discharge the condenser through said device at a predetermined time.

31. In combination, a traveling member carrying characteristic character determining parts successively past a predetermined point; a support carrying a surface to receive the characters determined by said parts; a cooperating device associated with said parts at said point and adapted to be instantly energized by an electric current passing therethrough to cooperate with the part at the point at the time of energization to apply to said surface the character determined by the part associated with said point at the time; a condenser adapted to be instantly discharged through the cooperating device; an insulated common conducting member; switches corresponding to the characters and having one switch element connected to said conducting member; a non-rotary commutator having segments corresponding to said characters electrically connected to the other element of respective corresponding key switches; a brush arm traveling in step with the character carrying member and engageable with the commutator segments; a relay magnet having its coil connected in circuit between said conducting member and brush; means to charge the condenser; and means operated by the relay magnet when energized to discharge the condenser through the cooperating device.

32. In combination, a rotary type-carrying wheel; type blocks containing magnetic material carried by the wheel and yieldably held in inactive position adjacent to the wheel and when released being disposable outwardly to active position; a releasing electromagnet adjacent to the path of the inactive blocks; key switches corresponding to the type blocks respectively; a non-rotary commutator having segments connected to one element of respective corresponding key switches; a conducting member connected to the other switch elements; a source of current; a brush arm revolvable in step with the type carrying wheel and connected to one source terminal and engageable with the segments; a relay comprising a relay magnet having one end of its coil connected to said conducting member and the other to the other source terminal, a normally retracted conducting armature adjacent to the relay magnet, a back contact electrically connected to said other terminal, and a front contact connected through the releasing magnet coil to said arm; and a condenser connected between said first named terminal and said armature; whereby said condenser will be normally charged and when any key switch is closed and said brush arm at the same time engages the corresponding commutator segment, said relay magnet will be energized, said armature retracted, said condenser discharged through the release magnet, and said release magnet energized at the instant that the corresponding type block passes thereby to withdraw the type block from the wheel to allow the type block to move outwardly to active position.

33. In combination, a constantly rotary type-carrying wheel; type blocks containing magnetic material carried by the wheel and yieldably held in inactive position adjacent to the wheel and when withdrawn from said periphery being disposable outwardly to active position; a releasing electromagnet adjacent to the path of the inactive blocks; a metallic keyboard; key switches on the keyboard corresponding to the type blocks respectively and each having one switch member connected to the keyboard; a non-rotary commutator having segments electrically connected to the other member of respective corresponding key switches; a current source; a brush arm revolvable in step with the type-carrying wheel and successively engageable with the commutator segments and electrically connected to one terminal of the source; a relay magnet having its coil connected in circuit between the keyboard and the other terminal of said source; a conducting armature adjacent to the relay magnet and normally retracted therefrom; a back contact engageable by said armature when retracted and connected to said other terminal; a condenser having one plate connected to said first named terminal and the other to said armature; and a front relay contact connected through the coil of the release magnet to said first named terminal, and engageable by the armature when retracted by the relay magnet.

34. In combination, a constantly rotary type-

carrying wheel; movable type blocks containing magnetic material movably carried by the wheel in a series of peripheral inactive locations adjacent to the periphery of the wheel, and when withdrawn from said periphery being disposable outwardly to active position; a releasing electromagnet adjacent to the path of the inactive location blocks; a source of current; a relay comprising a relay magnet, a normally retracted conducting armature, a back contact electrically connected to one terminal of the source, and a front contact connected through the releasing magnet coil to the other terminal of said source; a condenser connected between said conducting armature and said other terminal; and means for selectively energizing the relay magnet when the desired type block is adjacent to the releasing electromagnet.

35. In combination, a constantly rotary type-carrying wheel; type blocks containing magnetic material carried by the wheel and yieldably held in inactive position adjacent to the wheel and when withdrawn from said periphery being disposable outwardly to active position; a releasing electromagnet adjacent to the path of the inactive blocks; key switches corresponding to the type blocks respectively; a non-rotary commutator having segments electrically connected to one member of respective corresponding key switches; a brush revolvable in step with the type-carrying wheel and successively engageable with the commutator segments; a source of current; a relay magnet having its coil connected in circuit between the other members of the key switches and one terminal of said source; means operated by the relay magnet for energizing the releasing electro-magnet; a resistance and a condenser connected in series between the brush and said other terminal of the source, the resistance being nearer the brush; and a high resistance connected between said first named terminal and the condenser element nearest the brush.

36. In combination, a constantly rotary type-carrying wheel; a spacer block and type blocks containing magnetic material carried by the wheel, the spacer block being positively held in inactive position adjacent to the wheel, the type blocks being yieldably held in inactive position and when drawn from said periphery being disposable outwardly to active position; a platen adapted to be struck by the active position type for printing; a releasing electro-magnet adjacent to the path of the inactive blocks for releasing the type to active position for printing; a spacer bar and keys corresponding to the spacer blocks and type blocks respectively; a horizontally disposed escapement electro-magnet; a relay magnet; means operated by the respective keys to energize the relay magnet when the corresponding block is adjacent to the releasing electromagnet; means operated by the relay magnet when energized for energizing the releasing electromagnet and the escapement magnet; a support for the escapement electro-magnet; a pair of posts on said support at opposite sides of the rear end of the core of the escapement magnet; and an upright lever intermediately pivoted between the upper ends of said posts and carrying an upright escapement actuating arm and carrying at the lower end an armature opposite the magnet core end; the block corresponding to the spacer bar being suitably secured fast in inactive position on the type wheel to prevent printing when only the spacing bar is depressed,

the spacer block serving to maintain the balance of the type wheel.

37. In combination, a constantly rotary type-carrying wheel; type blocks containing magnetic material carried by the wheel and yieldably held in inactive position adjacent to the wheel and when withdrawn from said periphery being disposable outwardly to active position; a releasing electro-magnet adjacent to the path of the inactive blocks; key switches corresponding to the type blocks respectively; a non-rotary commutator having segments electrically connected to one element of respective corresponding key switches; a conducting member connected to the other element of the switches; a source of current; a brush arm revolvable in step with the type carrying wheel and electrically connected to one source terminal and successively engageable with the commutator segments; a resistor; a relay comprising a relay magnet having one end of its coil connected to said conducting member and the other to the other source terminal, a normally retracted conducting armature adjacent to the relay magnet, a back contact electrically connected to the first named terminal, and a front contact connected through the releasing magnet coil to said first named terminal; a condenser connected between said first named terminal and said armature; an escapement magnet; and means operated by the relay magnet for energizing the escapement magnet.

38. In combination, a constantly rotary type-carrying wheel; movable type blocks of magnetic material movably carried by the wheel in a series of peripheral inactive locations adjacent to the periphery of the wheel, and when withdrawn from said periphery being disposable outwardly to active position, one inactive location in the series being a spacer location and free of any movable type block; a releasing electromagnet adjacent to the path of the inactive location blocks; a source of current; a relay magnet; means operated by the relay magnet for energizing the releasing electromagnet; means for selectively energizing the relay magnet when the desired location is adjacent to the releasing electromagnet; and a spacer escapement solenoid, a normally open relay switch closed by said relay magnet when energized and a time delay element all connected in series between the source terminals whereby the spacer solenoid receives delayed current each time the relay magnet is energized, whether a type block or spacer location is adjacent to the releasing electromagnet.

39. In combination, a rotary member; type elements movably carried by the member in an inner position and movable outwardly to be disposed in an outer active position; a support adapted to be struck by the type elements when thus disposed; and a cam engageable by the type elements after striking to restore them to said inner position.

40. In combination, a rotary type-carrying wheel; type bars movably carried by the wheel and carrying type blocks of magnetic material and disposable substantially radially outwardly by centrifugal force beyond the periphery of the wheel as the wheel rotates; a magnet having a circumferential pole face adjacent to the periphery of the wheel for holding the type bars in inactive position near the periphery of the wheel; means for selectively releasing the type blocks; the blocks having printing type on the face which is forward when thus disposed outwardly; a platen parallel to the axis of rotation of the wheel and adapted to be struck by the type when the

bar is disposed substantially radially; a bracket mounted under the platen in the plane of movement of the striking type; and a rubber coated spring cam plate of sheet metal mounted on said bracket and disposed approximately tangential to the lower front face of the platen and the upper rear periphery of the type wheel, and having its upper margin rearwardly curved to act as a restorer cam to be engaged by an active type bar as the type thereof strikes the paper on the platen, and to cause the type block to draw back suddenly, the bar and block camming on the face of the spring cam plate and being moved by the cam plate into the field of the magnet pole face to be held adjacent thereto.

41. In combination, a rotary type-carrying wheel; type bars movably carried by the wheel and carrying type blocks of magnetic material and disposable outwardly by centrifugal force beyond the periphery of the wheel; a magnet having a pole face adjacent to said periphery for holding the type blocks in inactive position near the periphery of the wheel with the type printing faces disposed outwardly; means for selectively releasing the type blocks; the blocks having the printing faces forward when thus disposed outwardly; a platen adapted to be struck by the forwardly faced type; a stationary tubular casing having on the ends of its side walls perforated ears adjacent to the type wheels; a pin loose in the perforations of the ears; a soft rubber roller rotary on the pin and engaging the outwardly disposed faces; one or more reservoirs of the ball-point pen type disposable side-by-side longitudinally in said casing and radial to the roller and having their balls engaging said roller, thereby to spread ink upon the rotating roller to be picked up by the type engaging the roller; a lid closing the rear end of the casing; a plate against the inner ends of the reservoirs; and a spring compressed between the plate and lid to hold the balls against the roller.

42. In a typewriter, a continuously rotating rotor; a plurality of levers, each pivotally mounted on said rotor; a character element and an 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 while the rotor rotates that the character element carried thereon is brought to printing position; 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 character element is thereby caused to move 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.

43. In a typewriter, a continuously rotating rotor; a plurality of levers, each movably mounted on said rotor; a type element and an armature fast on each lever; all of said armatures normally lying in an annular lane and each lever being so positioned when moved from rest position on the rotor, that the type element carried thereon is brought to printing position; and a single electro-magnet near the lane for selectively exerting a force on one of said armatures.

44. In a typewriter, a continuously rotating rotor; a plurality of levers, each pivotally mounted on said rotor; a type element and an 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 as the rotor rotates, that the type element carried thereon is brought to a predetermined printing position; and a single stationary electro-magnet having the axis thereof substantially in the plane of the lane for selectively attracting one of said armatures.

45. In a typewriter, a rotor; a plurality of levers, each pivotally mounted on said rotor; a type element and an armature carried on each lever; said armatures normally lying in annular lanes, each lane being in a plane perpendicular to the axis of rotation of the rotor and each lever being so positioned when swung about its axis during rotation of the rotor, that the type element carried thereon is brought to printing position; means for producing an electro-magnetic field adapted when actuated to direct its force in one of the lanes of the armatures; and means for shifting said field from one lane to another.

46. In combination, a rotor; type members mounted on the rotor and adapted to move outwardly from the periphery thereof and each provided with a character element and a movable armature; and a non-rotary electro-magnet near the path of the armatures of the members.

47. In combination, a rotor wheel; type members mounted on the wheel and adapted to move outwardly from the periphery of the wheel to printing position, and a single magnet for holding the members in a normally retracted position near the periphery of the wheel.

48. In combination a rotor wheel, type levers pivoted on the wheel, each provided with a character element and armature both fast on the same arm of each lever, and adapted to swing to printing and retracted positions, in retracted position the armatures lying in a common path during rotation of the wheel; and electro-magnetic means near said path.

49. In a typewriter, a rotary printing member having movably mounted thereon type pieces each having an armature; a stationary commutator having segments equal in number to said pieces; a brush arm in step with the member and adapted to sweep said segments; electro-magnetic means near the path of the armatures of the pieces; and a plurality of key circuits each comprising one of said segments for selectively energizing said electro-magnetic means when the printing member is in predetermined positions of rotation.

50. A typewriter comprising a rotary printing wheel; type members movably mounted on the wheel each having a character end portion adapted to move outwardly to printing position and provided with an armature; inner and outer magnetic means adapted to act on said armatures; and means for selectively making the effect of the outer magnetic means on particular armatures dominant over the effect of the inner magnetic means.

51. In a typewriter, a rotary printing wheel; type levers pivoted on the wheel and having armatures constrained to move in a plane perpendicular to the axis of rotation of the wheel; and an electro-magnetic means near the armatures and comprising a substantially stationary solenoid whose axis is in said plane.

52. In a typewriter, a rotary printing wheel; type blocks movably mounted on the wheel for movement to outward and retracted position and containing magnetic material; and electro-mag-

netic means near the path taken by the blocks in retracted position as the wheel rotates, for exerting a magnetic force on the blocks.

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