

Aug. 8, 1967

J. E. HICKERSON

3,334,720

SELECTION MECHANISM IN WHICH ONE SELECTOR PLATE PROVIDES
SELECTION IN PLURAL DIRECTIONS

Filed Oct. 21, 1965

3 Sheets-Sheet 1

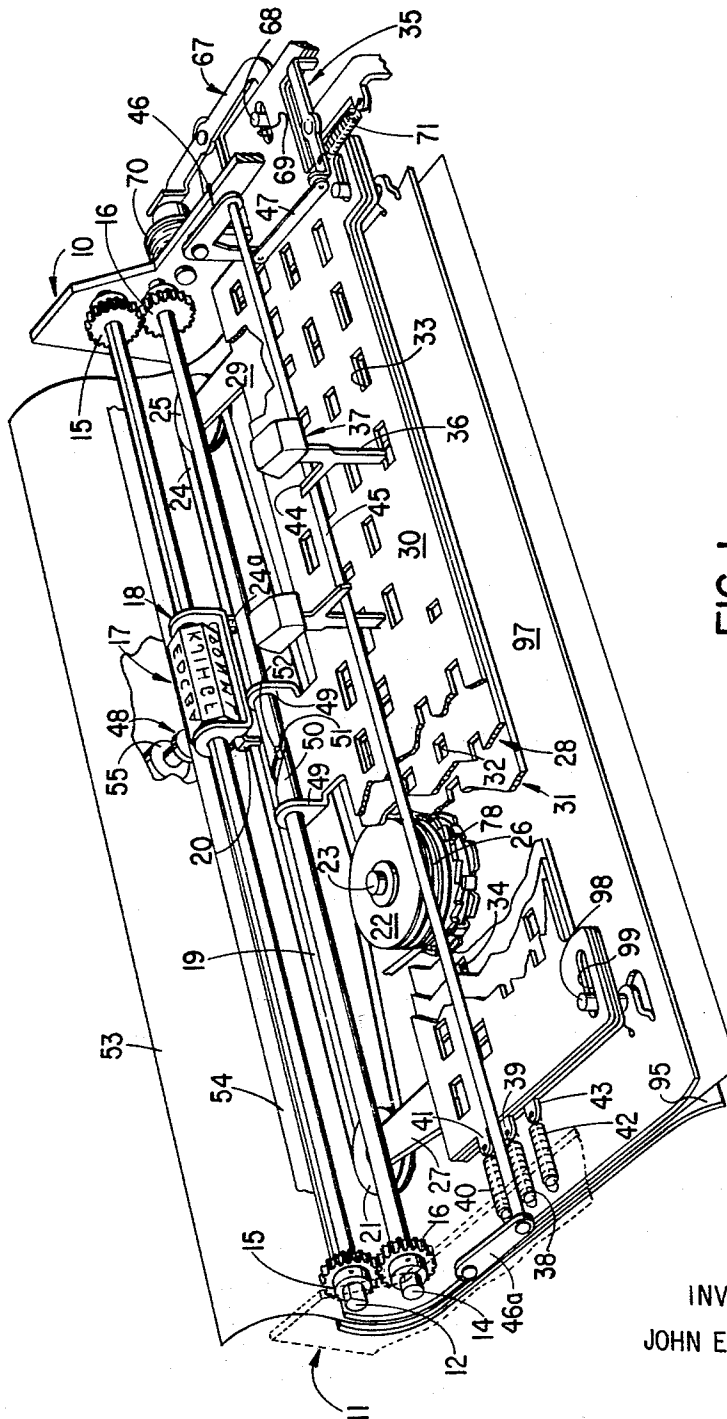


Fig. 1

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FIG. 3

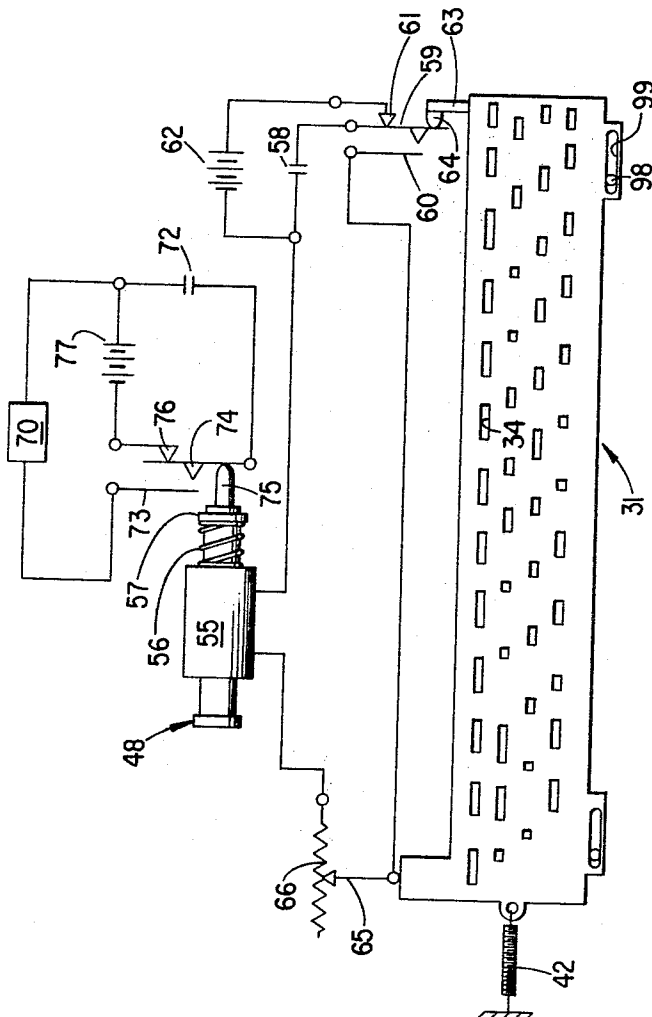
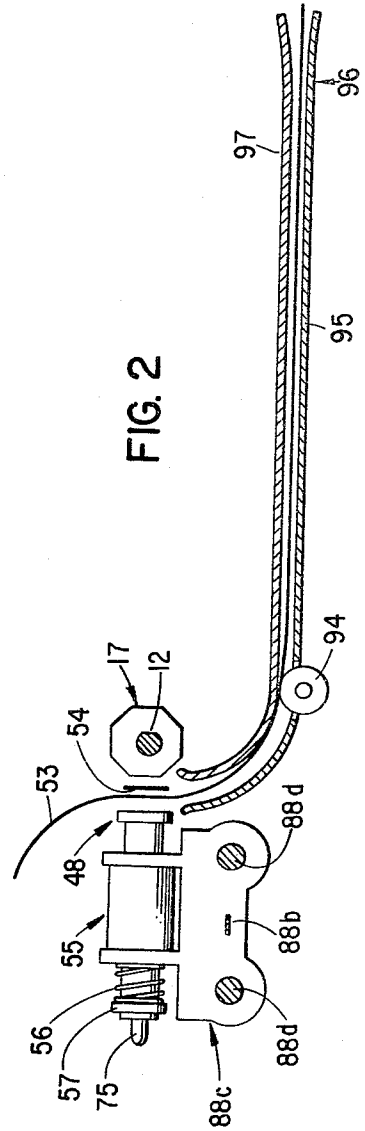


FIG. 2



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FIG. 4

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SELECTION MECHANISM IN WHICH ONE SELECTOR PLATE PROVIDES SELECTION IN PLURAL DIRECTIONS

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24 Claims. (Cl. 197—49)

This invention relates to a mechanism for positioning a type character at a reference position and, more particularly, to a printing mechanism having a simplified structure for selecting a type character to be printed.

This invention is an improvement of the invention disclosed in U.S. Patent No. 2,757,775 and issued to me on Aug. 7, 1956. My aforesaid patent discloses a mechanism for selecting a type character for positioning at a reference position. In my aforesaid patent, a plurality of permutation bars having cam surfaces are utilized in conjunction with a plurality of pulleys and tapes or wires. The present invention uses a simpler arrangement by utilizing one or more thin plates in cooperation with the character selection key of the keyboard. Thus, the present invention provides an even lower cost printing mechanism while retaining a printing mechanism capable of relatively high speed.

In one of the embodiments of the present invention, the selector or shuttle plate and the type characters are formed as an integral unit. This integral unit construction eliminates any need for pulleys and tapes or wires.

Since the printing or embossing areas of the type characters vary, the application of the same amount of force to each type character will cause the characters to be printed on the paper with a varying force depending on the area of the character being printed whereby a variable printing density results. That is, a small area character would strike the paper with greater force than a larger character. This is what causes periods and commas, for example, to sometimes cut through the paper and to have a heavier print.

The present invention satisfactorily overcomes this problem by utilizing a print hammer in which the printing force of the hammer varies in accordance with the area of the character being printed. The selector plate construction permits utilization of an arrangement wherein the printing force of the print hammer is varied in accordance with the area of the character being printed.

An object of this invention is to provide a low cost, high speed printing mechanism.

Another object of this invention is to provide a typewriter having the character selection mechanism and the type characters formed as an integral unit.

A further object of this invention is to provide a device for varying the striking force of the character against the paper in accordance with the area of the character being printed.

The foregoing and other objects, features, and advantages of the invention will be apparent from the following more particular description of preferred embodiments of the invention, as illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is a perspective view of a portion of a typewriter incorporating the selection mechanism of the present invention.

FIG. 2 is a sectional view, partly in elevation, of a portion of the structure of FIG. 1 and showing the relation of the hammer and the type head.

FIG. 3 is a diagrammatic view of a portion of the structure of FIG. 1 and showing a wiring arrangement

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for actuating the print hammer and the plate return mechanism.

FIG. 4 is a perspective view of a portion of the structure of FIG. 1 and showing the carriage return mechanism.

FIG. 5 is a perspective view of another embodiment of the present invention in which the selection mechanism and the type characters are formed as an integral unit.

Referring to the drawings and particularly FIG. 1, there is shown a portion of a typewriter including upstanding support walls 10 and 11. Parallel shafts 12 and 14 have their opposite ends journaled in the walls 10 and 11 for rotation with respect thereto. The shaft 12 has gears 15 adjacent its ends for meshing with gears 16, which are secured to the shaft 14 adjacent its ends.

A type head 17, which is in the shape of a prism, is mounted on the shaft 12 between the gears 15. The type head 17 has a plurality of type characters formed thereon in parallel rows and parallel columns. The shaft 12 is D-shaped to provide a flat surface so that the type head 17 may be rotated by the shaft 12 while still being capable of sliding therealong.

The type head 17 is moved along the shaft 12 by a bracket 18, which has a portion disposed on each side of the type head 17 and slidably movable along the shaft 12. The portions of the bracket 18, which are engaging the ends of the type head 17, are sufficiently large to pass over the shaft 12 so as to not be rotated thereby.

The bracket 18 has one end of a tape or wire 19 attached to a depending ear 20 on one end thereof. The tape 19 passes around a pulley 21 and is fixedly secured to a pulley 22, which is secured to a shaft 23 for rotation therewith.

A second tape or wire 24 has one end fixedly secured to a depending ear 24a on the other end of the bracket 18. The tape 24 passes around a pulley 25 and is secured to a second pulley 26, which is secured to the shaft 23 for rotation therewith and has the same diameter as the pulley 22.

It should be understood that the tape 19 may be wound around the pulley 22 a plurality of times and the tape 24 wound around the second pulley 26 a plurality of times. The exact amount of winding of each of the tapes 19 and 24 depends upon the amount of sliding movement required by the type head 17 and the diameter of the pulleys 22 and 26.

Thus, as long as the pulleys 21 and 25 are held stationary, rotation of the shaft 23 results in the type head 17 being advanced along the shaft 12 in a sliding direction by the tapes 19 and 24. The shaft 23 is rotated an equal increment after each printing of a type character on the type head 17.

The pulley 21 is mounted on an arm 27, which extends from one side of a selection or shuttle plate 28 and is integral therewith. The pulley 25, which has the same diameter as the pulley 21, is mounted on an arm 29. The arm 29, which is integral with the selector plate 28, extends from the same side of the selector plate 28 as the arm 27. The arms 27 and 29 are parallel to each other.

The selector plate 28 and a second selector or shuttle plate 30, which is disposed above the selector plate 28 and parallel thereto, have their sides riding in grooves in support portions (not shown) of the typewriter. A third selector plate 31, which is disposed beneath the selector plate 28 in a plane parallel to the plates 28 and 30, also rides in the same grooves. The plates 28, 30, and 31 are thin and formed of a suitable material such as stamped metal or molded plastic, for example.

The selector plate 28 has slots 32 formed therein in parallel rows. The selector plate 30 has slots 33 formed therein in parallel rows with each of the slots 33 aligned

with one of the slots 32 when the selector plates 28 and 30 are held in a home position. Likewise, the selector plate 31 has slots 34 in parallel rows formed therein with each of the slots 34 aligned with one of the slots 32 and one of the slots 33 when the selector plates 28, 30, and 31 are in the home position. All of the slots 32, 33, and 34 are arranged with their longitudinal axes extending parallel to the sides of the selector plates 28, 30, and 31.

The selector plates 28, 30, and 31 are retained in the home position by a pivotally mounted latch 35, which has one end bearing against projections or shoulders at one end of each of the selector plates 28, 30, and 31. When the selector plates 28, 30, and 31 are held in the home position by the latch 35, each of the three aligned slots 32, 33, and 34 in the three selector plates 28, 30, and 31, respectively, has a depending portion 36 of a character selection key 37 in alignment therewith.

The selector plate 28 is urged away from its home position by a spring 38, which has one end attached to an ear 39 on the end of the selector plate 28 that is remote from the latch 35. The other end of the spring 38 is attached to the wall 11 of the typewriter.

The selector plate 30 is urged away from its home position by a spring 40, which has one end attached to an ear 41 on the end of the selector plate 30 that is remote from the latch 35. The other end of the spring 40 is attached to the wall 11 of the typewriter.

A spring 42 urges the third selector plate 31 away from its home position. One end of the spring 42 is attached to an ear 43 on the end of the selector plate 31 remote from the latch 35, and the other end of the spring 42 is attached to the wall 11 of the typewriter.

When one of the selection keys 37 is actuated, its depending portion 36 enters the aligned slots 32, 33, and 34. At the same time, a finger 44, which extends substantially perpendicular to the depending portion 36, contacts a bail 45 to release the latch 35 whereby the springs 38, 40, and 42 urge the selector plates 28, 30, and 31, respectively, away from the home position. The movement of each of the selector plates 28, 30, and 31 depends upon the length of the slot in which the depending portion 36 of the selection key 37 is disposed.

One end of the bail 45 is attached to the end of one arm of a pivotally mounted bellcrank 46 and the other end of the bail 45 is connected to a pivotally mounted arm 46a. Thus, actuation of the character selection key 37 results in the bellcrank 46 pivoting clockwise (as viewed in FIG. 1) due to the finger 44 moving the bail 45 downwardly against the force of springs (not shown) urging the bellcrank 46 and the arm 46a to the position shown in FIG. 1.

The bellcrank 46 has its other arm connected by a link 47 to one end of the latch 35. Thus, clockwise movement of the bellcrank 46 causes clockwise (as viewed in FIG. 1) rotation of the latch 35 to allow the selector plates 28, 30, and 31 to be moved away from the home position by the springs 38, 40, and 42.

The lengths of the slots 32 in the selector plate 28 determine the particular vertical column of type characters on the type head 17 to be disposed at a reference position, which is defined by a print hammer 48. As viewed in FIG. 1, the vertical column at the left side of the type head 17 is disposed in the same vertical plane as the print hammer 48, and this is the home position of the type head 17. Thus, if the character, which is selected by actuation of the selection key 37, is in the left column on the type head 17, then the slot 32 in the plate 28 is of a length to prevent any movement of the selector plate 28 from the home position by the spring 38.

If the character to be selected by the selection key 37 is disposed in the right column of the type head 17, then the slot 32 has its greatest length to permit maximum movement of the selector plate 28 by the spring 38. When this maximum movement of the selector plate 28 occurs, the selector plate 28 moves the pulleys 21 and 25 therewith so as to cause movement of the type head 17 toward

the left side of the typewriter (as viewed in FIG. 1) to position the right column of the characters on the type head 17 opposite the print hammer 48 at the reference position. Since the pulleys 22 and 26 do not move at this time, sliding movement of the selector plate 28 results in the same amount of sliding movement of the type head 17 along the shaft 12.

The selector plate 30 has a pair of spaced, parallel up-standing ears 49 with a hollow cylindrical shaft 50 disposed therebetween and attached thereto. The hollow shaft 50 has a cam slot 51 formed therein and extending therethrough to receive a pin or stud 52 on the shaft 14. When the selector plate 30 is moved away from its home position by the spring 40, the sliding movement of the selector plate 30 is translated by the cam slot 51 and the pin 52 into rotary motion of the shaft 14. As a result, the gears 16 rotate the gears 15 whereby the shaft 12 is rotated. Accordingly, one of the horizontal rows of characters on the type head 17 is presented at the reference position for printing by the print hammer 48.

The amount of rotation of the shaft 12 is determined by the amount of movement of the selector plate 30 by the spring 40. If no rotary movement of the type head 17 is required because the character being selected is disposed in the horizontal row in the same horizontal plane as the horizontal plane of the print hammer 48 (i.e. the home position of the type head 17), then the slot 33 is of a length to prevent any movement of the selector plate 30 by the spring 40 when the latch 35 is released due to the character selection key 37 being actuated. The maximum amount of rotation of the type head 17 and maximum movement of the selector plate 30 occurs when the selected character is in the horizontal row requiring the greatest amount of rotation to be disposed in the same horizontal plane as the horizontal plane of the print hammer 48.

Thus, by appropriately designing the slots 32 in the selector plate 28 and the slots 33 in the selector plate 30, each type character on the type head 17 will be disposed at the reference position when its selection key 37 is actuated. When the character on the type head 17 is at the reference position, the hammer 48 moves a sheet 53 of paper and a ribbon 54 (see FIG. 2) into contact with the selected character on the type head 17 whereby the character is printed on the sheet 53 of paper.

As shown in FIG. 3, the hammer 48 forms a plunger of a solenoid 55. A spring 56 acts against a shoulder 57 on the rear of the hammer 48 to urge it away from engagement with the type head 17. When the solenoid 55 is energized, the force of the spring 56 is overcome and the print hammer 48 moves the sheet 53 of paper and the ribbon 54 into engagement with the selected character on the type head 17.

The solenoid 55 is energized whenever a condenser 58 discharges therethrough due to a resiliently biased leaf switch 59 engaging a contact 60. The leaf switch 59 is resiliently biased to engage a contact 61, which is connected to one side of a power source such as a battery 62. The other side of the battery 62 is connected to the condenser 58.

When the leaf switch 59 engages the contact 61 as shown in FIG. 3, the battery 62 charges the condenser 58. When the leaf switch 39 is moved away from engagement with the contact 61 into engagement with the contact 60, the solenoid 55 is energized to move the print hammer 48 to print the selected character.

An arm 63, which extends from the selector plate 31, has an insulated member 64 thereon for engaging the leaf switch 59 to move the leaf switch 59 into engagement with the contact 60. The arm 63 causes this movement whenever the latch 35 is moved from its locking position to allow the spring 42 to move the selector plate 31 away from its home position. The slots 34 of the selector plate 31 have sufficient length to insure that the insulated member 64 on the arm 63 engages the leaf

switch 59 to complete a circuit between the condenser 58 and the solenoid 55 through the switch 59 and the contact 60.

The contact 60 is connected to the solenoid 55 through a conducting pointer 65, which is mounted on the selector plate 31 but insulated therefrom, and a resistance element 66. As the pointer 65 moves to the left (as viewed in FIG. 3), a greater portion of the resistance element 66 is in the circuit of the condenser 58 and the solenoid 55. As a result, increasing the portion of the resistance element 66 in the circuit decreases the voltage to the solenoid 55. Thus, a decreasing voltage at the solenoid 55 results in a smaller force being applied to the print hammer 48.

Therefore, the lengths of the slots 34 in the selector plate 31 are designed so that maximum movement of the selector plate 31 by the spring 42 occurs for the type characters of smallest area such as a period, for example. Likewise, the minimum amount of movement of the selector plate 31 whereby a minimum portion of the resistance element 66 is disposed in the circuit of the condenser 58 and the solenoid 55 occurs for the slots 34 of smallest length. The slots 34 of smallest length are used when a character with a large area such as "W" is employed, for example. It should be understood that movement of the selector plate 31 occurs when any of the selection keys 37 is actuated.

After the print hammer 48 has been moved to print the selected character on the type head 17, the selector plates 28, 30, and 31 must be returned to the home position. The selector plates 28, 30, and 31 are returned to the home position by moving a pivoted arm 67, which has an upstanding stud 68 at one end thereof. The stud 68 extends through aligned slots 69 in the selector plates 28, 30, and 31.

The pivoted arm 67 is actuated by a magnet 70, which is connected to the end of the pivoted arm 67 remote from the stud 68. Thus, whenever the magnet 70 is energized, it causes counterclockwise (as viewed in FIG. 1) rotation of the pivoted arm 67 whereby the stud 68 engages the edges of the slots 69 to return the selector plates 28, 30, and 31 to the home position.

Actually, the pivoted arm 67 will move the selector plates 28, 30, and 31 slightly beyond the home position to permit the latch 35 to be moved by a spring 71 into engagement with the projections on the ends of the selector plates 28, 30, and 31. As soon as the magnet 70 ceases to be energized, the springs 38, 40 and 42 return the selector plates 28, 30, and 31 to the home position whereby the projections on the selector plates 28, 30, and 31 abut against the latch 35. Thus, it is not necessary to maintain the magnet 70 energized to hold or retain the selector plates 28, 30, and 31 in the home position.

As shown in FIG. 3, the magnet 70 is connected in a circuit with a condenser 72 when a contact 73 is engaged by a resiliently biased leaf switch 74. However, an insulated extension 75 on the print hammer 48 holds the leaf switch 74 out of engagement with the contact 73 and in engagement with a contact 76 when the solenoid 55 is not energized. When this occurs, a circuit is completed from a power source such as a battery 77 to charge the condenser 72.

When the print hammer 48 is moved to print a character due to the solenoid 55 being energized, the extension 75 moves with the hammer 48 whereby the leaf switch 74 ceases to engage the contact 76 and moves into engagement with the contact 73. Since the time for the magnet 70 to have its flux field build up to permit actuation is approximately four milliseconds while the print hammer 48 moves into its printing position in approximately one millisecond, the print hammer 48 will have printed the selected character before any movement of the selector plates 28, 30, and 31 to the home position occurs.

After the selected character has been printed, it is necessary to advance both the type head 17 and the print hammer 48 to permit printing of the next selected character.

Accordingly, a ratchet wheel 78 (see FIG. 4) is attached to the shaft 23. Any suitable type of mechanism may be employed for actuating the ratchet wheel 78 such as that disclosed in my aforesaid patent.

However, the preferred arrangement for driving the ratchet wheel 78 is disclosed in FIG. 4. A pawl 79, which is pivotally mounted by a pin 80 on a pivotally mounted arm 81, cooperates with the teeth of the ratchet wheel 78 for holding and advancing the wheel 78.

A spring 82 continuously urges the pawl 79 into engagement with the ratchet wheel 78 to hold the wheel 78 in position against the force of a spring 83, which is constantly urging the ratchet wheel 78 counterclockwise (as viewed in FIG. 4). The spring 83 has one end attached to the shaft 23 and its other end secured to a drum 83a, which is attached to a fixed portion of the typewriter.

A solenoid 84 has its plunger 85 connected to the pivoted arm 81. When the solenoid 84 is energized, the arm 81 is pivoted whereby the pawl 79 causes clockwise (as viewed in FIG. 4) movement of the ratchet wheel 78 against the force of the spring 83. Since the ratchet wheel 78 is secured to the shaft 23, this also imparts the same amount of clockwise rotation to the pulleys 22 and 26, which are secured to the shaft 23. Accordingly, the type head 17 is moved along the drive shaft 12 through the tapes 19 and 24; by appropriately designing the teeth of the ratchet wheel, the type head 17 moves one character column.

As soon as the solenoid 84 is de-energized, a spring 86, which is attached to an end of the pivoted arm 81, returns the arm 81 to the position of FIG. 4. When this occurs, the pawl 79 rides counterclockwise with respect to the ratchet wheel 78 over the adjacent of the teeth of the ratchet wheel 78 to engage the adjacent tooth.

A second pivotally mounted pawl 87 engages the teeth of the ratchet wheel 78 to insure that the ratchet wheel 78 retains its advanced position when the pawl 79 rides over the adjacent tooth. A spring 88, which has one end fixed to an end of the pawl 86 and its other end attached to fixed structure of the typewriter, continuously urges the pawl 87 into engagement with the teeth of the ratchet wheel 78 to prevent counterclockwise (as viewed in FIG. 4) rotation thereof by the spring 83.

The solenoid 84 may be energized at the same time as the magnet 70 since it requires approximately four milliseconds for its energization. Since the same type of circuit of a battery and condenser could be employed with the solenoid 84 as used with the magnet 70, it will not be described in detail herein. However, it should be understood that the condenser for the solenoid 84 cannot discharge until after the print hammer 48 starts movement towards the type head 17 in the same manner as the condenser 72. Thus, this insures that the ratchet wheel 78 is not rotated clockwise (as viewed in FIG. 4) against the force of the spring 83 until the selected character has been printed.

However, the movement of the type head 17 along the shaft 12 by the ratchet wheel 78 may occur at the same time as the selector plates 28, 30, and 31 returning to the home position. This presents no problem since the tapes 19 and 24 are connected with the selector plate 28 by the pulleys 21 and 25. Accordingly, returning the type head 17 to its home position wherein the type head 17 has its left column disposed opposite the print hammer 48 and advancing the type head 17 one column to the right for printing the next selected character may occur simultaneously.

It should be understood that the hammer 48 is advanced the same distance to the right (as viewed in FIG. 1) as the type head 17 by the ratchet 78. Any suitable means may be employed for connecting the print hammer 48 to the ratchet wheel 78 for causing the same amount of sliding movement of the print hammer 48 as the type head 17 due to the ratchet wheel 78. One example of suitable structure for performing this movement of the print hammer 48 is disclosed in my aforesaid patent.

This structure would include a pulley 88a attached to the shaft 23 for rotation therewith and a tape 88b connected to the pulley 88a and a carrier 88c (see FIG. 2). The carrier 88c is slidably mounted on fixed support rods 88d, which are parallel to the shafts 12 and 14. The carrier 88c supports the print hammer 48 and the solenoid 55 for sliding movement therewith. The additional details of this structure for slidably moving the print hammer 48 by the ratchet wheel 78 will not be described herein.

When the end of a line of typing is reached, a carriage return button 89 is actuated. The button 89 has an arm 90 extending from one side thereof and disposed beneath ends of the pawls 79 and 87. The arm 90 has lugs 91 and 92 thereon for engaging against the ends of the pawls 79 and 87, respectively.

A spring 93 urges the arm 90 in a direction so that the lugs 91 and 92 do not pivot the pawls 79 and 87. However, when the carriage return button 89 is actuated against the force of the spring 93, the lugs 91 and 92 cause the pawls 79 and 87 to move out of engagement with the teeth of the ratchet wheel 78. As a result, the spring 83 drives the shaft 23 counterclockwise (as viewed in FIG. 4) whereby the type head 17 and the print hammer 48 are rapidly moved from the right side of the typewriter to the left side. A stop (not shown) limits the amount of rotation of the ratchet wheel 78 to insure that the type head 17 and the print hammer 48 stop at the desired position on the left side of the typewriter.

When the ratchet wheel 78 rotates counterclockwise (as viewed in FIG. 4), a feed roll 94 (see FIG. 2) causes advancement of the sheet 53 of paper in the well-known manner. Furthermore, the feed roll 94 may be actuated manually in the well-known manner when desired. The feed roll 94 extends through an opening in a guide member 95 of a guide chute 96. The feed roll 94 cooperates with a second guide member 97 of the guide member 95 to advance the sheet 53 of paper.

Considering the operation of the embodiment of FIGS. 1-4, the selector plates 28, 30, and 31 are retained in the home position by the latch 35. When one of the character selection keys 37 is depressed, the finger 44 of the selection key 37 engages the bail 45 to pivot the latch 35 whereby the latch 35 is moved to an inactive position to allow the springs 38, 40, and 42 to move the selector plates 28, 30, and 31, respectively, to the left (as viewed in FIG. 1).

At the same time that the bail 45 is contacted by the finger 44 due to actuation of the character selection key 37, the depending portion 36 enters the aligned slot 33 in the selector plate 30, the aligned slot 32 in the selector plate 28, and the aligned slot 34 in the selector plate 31. The amount of movement of each of the selector plates 28, 30, and 31 is regulated by the length of the slot therein in which the depending portion 36 of the selection key 37 is disposed.

The length of the slot 33 in the selector plate 30 determines the amount of rotation of the type head 17 by the shaft 12. Thus, the selector plate 30 determines the particular horizontal row of characters on the type head 17 to be disposed in the same horizontal plane as the print hammer 48 for printing thereby. As previously set forth, there is no movement of the selector plate 30 when the selected character is in the row disposed in the same horizontal plane as the print hammer 48.

The length of the slot 32 in the selector plate 28 determines the amount of sliding movement of the type head 17 along the shaft 12. As previously mentioned, there is no movement of the type head 17 along the shaft 12 or of the selector plate 28 when the selected character is in the left column while there is a maximum amount of sliding movement when the selected character is in the right column.

At the same time that the type head 17 is being positioned by the selector plates 28 and 30, the selector plate 31 is moving to the left (as viewed in FIG. 3). This results

in the condenser 58 discharging through the solenoid 55 due to the leaf switch 59 engaging the contact 60 whereby the print hammer 48 prints the selected character.

The amount of striking force of the print hammer 48 is dependent upon the position of the conducting pointer 65. This position of the conducting pointer 65 is determined by the length of the slot 34, which has the depending portion 36 of the character selection key 37 disposed therein. As previously mentioned, a lesser strike force is applied by the print hammer 48 when a character of relatively small area is being typed and a greater force is applied when a character of relatively large area is being typed.

When the print hammer 48 is moved toward the type head 17 by the solenoid 55, the insulated extension 75 on the print hammer 48 moves therewith. Accordingly, the magnet 70 is energized due to the leaf switch 74 engaging the contact 73. The solenoid 84 is energized in a like manner. Since the magnet 70 and the solenoid 84 have a minute build up required before energization as previously mentioned, this insures that neither the magnet 70 nor the solenoid 84 is energized until after the print hammer 48 is moved away from the type head 17 by the spring 56. This insures that there is no smudging or smearing of the character being printed.

When the magnet 70 is energized, the stud 68 on the pivoted arm 67 returns the selector plates 28, 30, and 31 slightly past the home position against the force of the springs 38, 40, and 42, respectively. This allows the spring 71 to return the latch 35 to its locking position wherein it holds the selector plates 28, 30, and 31 in the home position.

At the same time, energization of the solenoid 84 results in both the type head 17 and the print hammer 48 being advanced one character to the right. Thus, another character may be rapidly selected by a character selection key 37 for printing by the print hammer 48.

When the type head 17 has been moved along the shaft 12 to its furthestmost position on the right side, the carriage return button 89 is actuated. This moves the pawls 79 and 87 out of engagement with the teeth of the ratchet wheel 78 whereby the spring 83 rotates the ratchet wheel counterclockwise (as viewed in FIG. 4) until a stop (not shown) is engaged. The stop is engaged when the type head 17 and the print hammer 48 have returned to the desired position on the left side of the typewriter.

While the selector plates 28 and 30 have been shown as movable in the same direction by the springs 38 and 40, it should be understood that the selector plate 30 could be moved substantially perpendicular to the direction of the movement of the selector plate 28. In such a configuration, the shaft 14, the gears 16, the ears 49, the hollow shaft 50, the cam slot 51, and the pin 52 would be eliminated. In place of this structure, a rack could extend from the side of the selector plate adjacent each end thereof for meshing with the gears 15.

It should be understood that the third plate 31 could be eliminated if desired. It would then be necessary to actuate the solenoid 55 by having suitable means move the leaf switch 59 into engagement with the contact 60 and away from the contact 61. This could be accomplished by movement of the selection key 37 actuating a second bail.

While the urging means for each of the selector plates 28, 30, and 31 has been shown as a spring, other suitable means could be employed. For example, a sprocket, which would be driven by suitable means, might have its teeth cooperating with openings in the selector plate for urging the selector plate away from the home position.

It is necessary that the selector plates 28, 30, and 31 move in the desired direction when urged by the springs 38, 40, and 42. In order to insure this movement, guide pins 98, which extend upwardly from the guide member 97, are disposed in aligned slots 99 in each of the selector

plates 28, 30, and 31. The axis of each of the slots 99 insures the desired direction of the selector plates 28, 30, and 31 as they are moved by the springs 38, 40, and 42, respectively.

Referring to FIG. 5, there is shown a modification of the present invention wherein a single selector or shuttle plate 110 is employed instead of the two selector plates 28 and 30. Furthermore, the selector plate 110 has a plurality of parallel fingers 111 extending therefrom with each of the fingers 111 having a plurality of type characters thereon in a column. The type characters on each of the fingers 111 are arranged in parallel rows so that the characters are disposed in parallel rows and parallel columns. It should be understood that the selector plate 110 is slidably mounted within grooves or guides in fixed portions (not shown) of the typewriter.

The selector plate 110 has a plurality of slots 112 formed therein with each of the slots 112 being aligned with the depending portion 36 on one of the character selection keys 37 in the same manner as the slots 32 and 33 of the selector plates 28 and 30, respectively. The slots 112 are designed to permit movement of the selector plate in two different directions so as to position any row of characters and any column of characters at a reference position, which is defined by the print hammer 48. It should be understood that the hammer 48 is fixed against sliding movement in the embodiment of FIG. 5.

The selector plate 110 is urged to the left to present any of the columns of characters at the reference position by suitable urging means. The urging means preferably includes a plate 114, which is disposed above a fixed support plate 115 of the typewriter in sliding relation thereto. The plate 114 has a pair of diagonal grooves or slots 116 formed therein and extending therethrough to receive studs or pins 117 on the support plate 115.

A spring 118 has one end fixed to an end of the plate 114 and its other end attached to the support plate 115. The spring 118 causes the plate 114 to be moved with respect to the support plate 115.

The plate 114 extends beneath the selector plate 110. The plate 114 has a pair of studs or pins 119 extending through slots 120 in the selector plate 110. The slots 120 are disposed substantially parallel to the ends of the selector plate 110.

Thus, as the spring 118 causes the plate 114 to move to the left and forwardly with respect to the support plate 115, this motion is translated through the studs 119 and the slots 120 to cause movement only to the left of the selector plate 110. This results in moving the columns of characters on the fingers 111 with respect to the reference position, which is defined by the print hammer 48.

The plate 110 is urged forwardly to present any of the rows of characters at the reference position by suitable urging means. The urging means preferably includes a plate 121, which is disposed above the support plate 115 in sliding relation thereto. The plate 121 has a pair of diagonal grooves or slots 123 formed therein and extending therethrough to receive upstanding studs or pins 124 on the support plate 115.

A spring 125 has one end fixed to an end of the plate 121 and its other end attached to the support plate 115. The spring 125 urges the plate 121 to move forward and to the left with respect to the support plate 115.

The plate 121 extends beneath the selector plate 110. The plate 121 has a pair of upstanding studs or pins 126 extending through slots 127 in the selector plate 110. The slots 127 are disposed parallel to the sides of the selector plate 110 and substantially perpendicular to the slots 120.

Thus, as the spring 125 causes the plate 121 to move forwardly and to the left with respect to the support plate 115, this motion is translated through the studs 126 and the slots 127 to cause movement in only a forward direction of the selector plate 110. This results in moving

the rows of characters on the fingers 111 with respect to the reference position, which is defined by the print hammer 48.

The amount of movement of the selector plate 110 by each of the plates 114 and 121 depends upon the shape of the slot 112. That is, the slot 112 may be designed to permit movement by only the plate 114 or the plate 121 or by both of the plates 114 and 121. Furthermore, the selector plate 110 may be moved further by one of the plates 114 and 121 than the other.

Since the selector plate 110 is in its home position when the left column of characters is positioned in the same plane as the print hammer 48 and the outermost or top row of characters is disposed in the same plane as the print hammer 48, the movement of the selector plate 110 depends upon the character selected for printing at the reference position. That is, if a character is in the left column, then the slot 112 is designed to permit movement only of the selector plate 110 by the plate 121. The amount of movement of the selector plate 110 by the plate 121 will depend upon the horizontal row in which the character is disposed.

Thus, if the character should be in the outermost or top row and the left column, the slot 112 would not permit any movement of the selector plate 110. However, if the character is in the left column and in the innermost or lower row, then the slot 112 permits the maximum amount of movement of the selector plate 110 by the plate 121 but permits no movement of the selector plate 110 by the plate 114.

If the selected character is in the outermost or top row but in the right column, then the slot 112 is designed to permit maximum movement of the selector plate 110 by the plate 114 and no movement of the selector plate 110 by the plate 121. If the selected character is in the innermost or lower row and the right column, then the slot 112 is designed to permit maximum movement of the selector plate 110 to the left by the plate 114 and maximum forward movement of the selector plate 110 by the plate 121.

Accordingly, the amount of movement of the selector plate 110 is determined by the character being selected. Movement of the selector plate 110 is stopped when the depending portion 36 of the actuated selection key 37 engages an edge of the slot 112 in the same manner as described with respect to the embodiment of FIGS. 1-4.

The selector plate 110 is held or retained in the home position by an upstanding lug 128 on an arm 129, which is pivotally mounted on the support plate 115. A spring 130 urges the arm 129 counterclockwise whereby the lug 128 is moved away from holding the selector plate 110 in the home position.

A latch 131, which is pivotally mounted on the support plate 115, retains the pivoted arm 129 in the hold or locking position wherein the lug 128 holds or maintains the selector plate 110 in the home position. A spring 132 urges the latch 131 against a stop 133, which is attached to the support plate 115, so that the latch 131 maintains the lug 128 against the selector plate 110 to retain the selector plate 110 in the home position.

The latch 131 is connected to the link 47. Thus, when the bail 45 is moved downwardly by the finger 44 of the actuated selection key 37, the latch 131 is moved out of the position in which it holds the pivoted arm 129. This results in the spring 130 urging the arm 129 counterclockwise to move the upstanding lug 128 away from holding the selector plate 110 in the home position.

As soon as the upstanding lug 128 moves away from the selector plate 110, the plates 114 and 121 move the selector plate 110 to position the selected type character at the reference position. The length of the slot 112 and its direction determine the amount of movement of the selector plate 110 by each of the plates 114 and 121. When the depending portion 36 of the selection key 37 engages the edge of the slot 112, further movement of the selector plate 110 is prevented.

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While the selector plate 31 has not been shown in FIG. 5 for clarity purposes, it should be understood that it would be employed, if desired, with the selector plate 110. Of course, the selector plate 31 would be movable only in the single direction in the same manner as described with respect to the embodiment of FIGS. 1-4.

Thus, the print hammer 48 is actuated to print the selected character on a sheet 134 of paper in the same manner as described with respect to the embodiment of FIGS. 1-4. A ribbon 134a is disposed between the sheet 134 of paper and the type character. Furthermore, a platen 134b is disposed beneath the print hammer 48 to provide support when the print hammer moves the selected character into engagement with the sheet 134 of paper.

The sheet 134 of paper extends around a plurality of rollers (one shown at 135). Suitable feed means (not shown) move the sheet 134 of paper after each actuation of the print hammer 48 since the hammer is stationary. Feeding of the sheet 134 of paper is preferably accomplished by energizing a solenoid to actuate the feed means, which would include a ratchet wheel and pawl combination, in the same manner as the solenoid 84 of FIGS. 1-4 is energized. That is, the solenoid would be energized by a condenser after the print hammer 48 has printed.

The magnet 70 of the embodiment of FIGS. 1-4 is employed with the embodiment of FIG. 5. However, the magnet 70, which is secured to the support plate 115, is connected to an arm 136 having an upstanding lug 137 at its end remote from the magnet 70.

When the magnet 70 is energized as previously described with respect to the embodiment of FIGS. 1-4, the arm 136 is moved toward the magnet 70. This results in the lug 137 pivoting the arm 129 clockwise against the force of the spring 130 whereby the lug 128 returns the selector plate 110 to its home position.

As the arm 129 pivots clockwise, the spring 132 moves the latch 131 against the stop 133. As a result, the latch 131 is positioned to retain the pivoted arm 129 in a position wherein the selector plate 110 is held in the home position. Accordingly, it is only necessary to maintain the magnet 70 energized long enough to permit the latch 131 to move into position to hold the arm 129.

Of course, the finger 44 of the actuated selection key 37 is no longer holding the bail 45. Thus, the spring 132 is able to move the latch 131 as soon as the arm 129 is pivoted against the force of the spring 130 by the actuation of the magnet 70.

Considering the operation of the embodiment of FIG. 5, the actuation of one of the character selection keys 37 results in the latch 131 being released by movement of the bail 45. This allows the spring 130 to pivot the arm 129 counterclockwise whereby the lug 128 moves away from engagement with the selector plate 110.

When this occurs, the plates 114 and 121 move the selector plate 110. The length and direction of the slot 112 determines the amount of movement of the selector plate 110 by each of the plates 114 and 121.

If the selected character is in the left column, which is the home position, the slot 112 will not permit any movement of the selector plate 110 by the plate 114. Thus, the slot 112 would be designed to not have any length greater than the depending portion 36 of the selected key 37.

The width of the slot 112 would depend upon the row in which the selected character is disposed. Thus, if the selected character is in the innermost or lower row, then the width of the slot 112 would be a maximum to permit maximum movement of the selector plate 110 in a forward direction by the plate 121. Of course, if the selected character is in the outermost or top row, which is the home position, then the width of the slot 112 would be the same as the depending portion 36 of the selection

key 37 to prevent any movement of the selector plate 110 by the plate 121.

If the selected character is in one of the columns other than the left column and in one of the rows other than the outermost or top row, then the slot 112 is formed on a diagonal. This allows both of the plates 114 and 121 to move the selector plate 110. The amount of movement by each of the plates 114 and 121 depends upon the row and the column in which the selected character is disposed.

Movement of the selector plate 110 is stopped when the depending portion 36 of the selection key 37 engages an edge of the slot 112. When this happens, the selected character is disposed at the reference position, which is defined by the print hammer 48.

Because of the simultaneous movement of the selector plate 31 in the manner described with respect to FIGS. 1-4, the print hammer 48 is energized when the selected character is disposed at the reference position. Furthermore, the force of the print hammer 48 is varied in accordance with the character being printed.

If desired, the selector plate 31 and the cooperating structure may be omitted. In such an arrangement, a second bail would be actuated when the selection key 37 is depressed to cause energization of the solenoid 55 whereby the print hammer 48 would be actuated.

In the same manner as described with respect to FIGS. 1-4, the magnet 70 is energized after actuation of the print hammer 48. This results in the lug 137 on the arm 136 pivoting the arm 129 clockwise whereby the lug 128 returns the selector plate 110 and the plates 114 and 121 to the home position.

As the arm 129 is pivoted clockwise, the latch 131 moves into locking position to retain the selector plate 110 in the home position by holding the arm 129 in a position wherein the lug 128 bears against the selector plate 110. As previously mentioned, it is not necessary for the magnet 70 to remain energized; thus, the lug 137 returns to a position away from engagement with the pivoted arm 129 as soon as the magnet 70 is de-energized.

When the magnet 70 is energized, a solenoid (not shown) also is energized to cause the sheet 134 of paper to be advanced one column of characters. Thus, another character may be readily printed as soon as one of the selection keys 37 is actuated.

While the embodiment of FIG. 5 has shown the fingers 111 on the single selector plate 110, a plurality of plates could be employed with each having a plurality of fingers thereon with only one character on each finger. In this arrangement, all of the plates would move in only one direction. Furthermore, no character would be disposed beneath the print hammer 48 in the home position of the selector plates. Thus, movement of the selector plate having the selected character would always be required and all of the other selector plates would be prevented from moving.

While the invention has shown slots in one or more selector plates cooperating with the character selection key to position the selector plates, the position of the selector plates could be determined from a remote input device having the selection keys thereon. In this arrangement, the actuation of a character selection key would result in the input device providing a coded signal to position bars for cooperation with the selector plates to regulate the movement of each of the selector plates by the urging means.

Likewise, the selector plates could position a character at a remote terminal or output device. In this configuration, a suitable read-out device would be attached to each selector plate for supplying a coded signal to the terminal device for positioning the selected character at the reference position at the terminal device.

An advantage of this invention is that the interim linkage and connectors between the selection keys and the type characters are eliminated to produce a simple selec-

tion mechanism. Another advantage of this invention is that even printing is produced.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by others skilled in the art that the foregoing and other changes in form and details may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. A mechanism for positioning a selected type character from a plurality of type characters at a reference position, said mechanism comprising:
 - a single selector member;
 - said selector member being movable in a plurality of none-parallel coordinate directions and providing character selection in a plurality of non-parallel coordinate directions;
 - and selection means for positioning said selector member to effect positioning of one of said type characters at the reference position.
2. A mechanism for positioning a type character at a reference position, said mechanism comprising:
 - a single selector plate;
 - a plurality of type characters arranged for positioning at the reference position in response to the position of said selector plate;
 - said selector plate being movable in a plurality of non-parallel coordinate directions and providing character selection in a plurality of non-parallel coordinate directions;
 - a separate selection member related to each of said type characters;
 - and means responsive to movement of said selection member for positioning said selector plate to dispose the related type character at the reference position.
3. A mechanism for positioning a type character at a reference position, said mechanism comprising:
 - a single selector plate;
 - a plurality of type characters arranged for positioning at the reference position in response to the position of said selector plate;
 - said selector plate being movable in a plurality of non-parallel coordinate directions and providing character selection in a plurality of non-parallel coordinate directions;
 - a separate selection member related to each of said type characters;
 - and means to regulate movement of said selector plate to and from a home position, said regulating means being responsive to movement of any of said selection members to position said selector plate to cause the related type character to be disposed at the reference position.
4. A mechanism for positioning a type character at a reference position, said mechanism comprising:
 - at least one selector plate disposed in a single plane for movement only in said plane to a plurality of different positions away from a home position;
 - a plurality of type characters positioned in accordance with the position of said selector plate within said plane;
 - a separate selection member for each of said type characters;
 - said selection member being capable of providing movements of said plurality of type characters in plural non-parallel coordinate directions to position a selected type character at the reference position;
 - means to hold said selector plate in the home position;
 - means continuously urging said selector plate away from the home position;
 - means to inactivate said hold means when one of said selection members is actuated whereby said selector plate is movable by said urging means;
 - said selection member and said selector plate having cooperating means to regulate movement of said se-

lector plate within said plane by said urging means to position one of said type characters at the reference position;

and means to return said selector plate to the home position after said type character is disposed at the reference position.

5. A mechanism for positioning a type character at a reference position, said mechanism comprising:

a single selector plate having a plurality of type characters attached thereto for movement therewith;

a selection member for each of said type characters;

means to hold said selector plate in a home position;

means urging said selector plate away from the home position;

means to inactivate said hold means when one of said selection members is actuated whereby said selector plate is movable by said urging means;

said selection member and said selector plate having cooperating means to regulate movement of said selector plate by said urging means to position one of said type characters at the reference position;

and means to return said selector plate to the home position after said type character is disposed at the reference position.

6. A mechanism for positioning a type character at a reference position, said mechanism comprising:

at least one selector plate disposed in a single plane for movement only in said plane;

a plurality of type characters positioned in accordance with the position of said selector plate within said plane;

a selection member for each of said type characters;

said selector plate having a plurality of slots therein with each of said slots in alignment with one of said selection members said slots being arranged in a plurality of substantially parallel rows;

means to hold said selector plate in a home position;

means urging said selector plate away from the home position;

means to inactivate said hold means when one of said selection members is actuated to move said selection member into said aligned slot in said selector plate to permit movement of said selector plate within said plane by said urging means until said selection member engages an edge of said slot to position a type character at the reference position;

and means to return said selector plate to the home position after the type character is disposed at the reference position.

7. A mechanism for positioning a type character at a reference position, said mechanism comprising:

a pair of selector plates disposed adjacent each other, each of said plates being disposed in a single plane for movement only in said plane with said planes being substantially parallel to each other;

a plurality of type characters positioned in accordance with the positions of said selector plates;

a separate selection member for each of said type characters;

each of said selector plates having a plurality of rows of slots therein with each of said selector plates having one of said slots in alignment with each of said selection members, said rows of said slots being substantially parallel to each other;

means to hold said selector plates in a home position;

means urging each of said selector plates away from the home position;

means to inactivate said hold means when one of said selection members is actuated to move said selection member into said aligned slots in said selector plates to permit movement of said selector plates by said urging means until said selection member engages an edge of each of said aligned slots to position a type character at the reference position;

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and means to return said selector plates to the home position after the type character is disposed at the reference position.

8. The mechanism according to claim 7 in which said selector plates are moved in the same direction by said urging means.

9. The mechanism according to claim 8 in which said urging means is resilient biasing means.

10. A mechanism for positioning a type character at a reference position, said mechanism comprising:

a single selector plate having a plurality of type characters attached thereto for movement therewith;

a selection member for each of said type characters;

said selector plate having a plurality of slots therein with each of said slots in alignment with one of said selection members;

means to hold said selector plate in a home position;

means urging said selector plate away from the home position;

means to inactivate said hold means when one of said selection members is actuated to move said selection member into said aligned slot in said selector plate to permit movement of said selector plate by said urging means until said selection member engages an edge of said slot to position one of said type characters at the reference position;

and means to return said selector plate to the home position after said type character is disposed at the reference position.

11. A mechanism comprising:

means supporting a plurality of type characters;

means to select one of said type characters for positioning at a reference position;

said selecting means comprising:

a separate selection member for each of said type characters;

at least one selector plate having slots therein with each of said slots aligned with one of said selection members for cooperation therewith;

said selector plate being disposed in a single plane for movement only in said plane;

said slots being formed in said selector plates in a plurality of substantially parallel rows;

means to hold said selector plate in a home position;

means urging said selector plate away from the home position;

said type characters being positioned in accordance with the position of said selector plate;

means to inactivate said hold means when one of said selection members is actuated to move said selection member into said aligned slot in said selector plate to permit movement of said selector plate within said plane by said urging means until said selection member engages an edge of said aligned slot whereby one of said type characters is disposed at the reference position;

and means to return said selector plate to the home position after said type character is disposed at the reference position.

12. A mechanism comprising:

means supporting a plurality of type characters;

means to select one of said type characters for positioning at a reference position;

said selecting means comprising:

a selection member for each of said type characters;

a plurality of selector plates disposed adjacent each other, each of said selector plates being disposed in a single plane for movement only in said plane with said planes being substantially parallel to each other;

each of said selector plates having a plurality of slots therein with each of said selector plates having a slot aligned with each of said selection members, said slots being disposed in a plurality

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of substantially parallel rows in each of said selector plates;

said type characters being positioned in accordance with the positions of said selector plates to dispose one of said type characters at the reference position;

means to hold said selector plates in a home position;

means urging said selector plates away from the home position;

means to inactivate said hold means when one of said selection members is actuated to move said selection member into said aligned slots to permit movement of said selector plates by said urging means until said selection member engages an edge of each of said aligned slots whereby one of said type characters is positioned at the reference position;

and means to turn said selector plates to the home position after said type character is disposed at the reference position.

13. The mechanism according to claim 12 in which said selector plates are moved in the same direction by said urging means.

14. The mechanism according to claim 13 in which said urging means is resilient biasing means.

15. A mechanism comprising:

a type head having a plurality of type characters arranged thereon in parallel rows and parallel columns;

means to select one of said type characters on said type head for positioning at a reference position;

said selecting means including:

a separate selection member for each of said type characters;

a pair of selector plates disposed adjacent each other in parallel planes;

each of said selector plates having a plurality of rows of slots therein with each of said selector plates having a slot aligned with each of said selection members, said rows of said slots being substantially parallel to each other;

means connecting one of said selector plates to said type head to position one of said rows of said characters at the reference position;

means connecting the other of said selector plates to said type head to position one of said columns of said characters at the reference position;

means to hold said selector plates in a home position;

means urging said selector plates away from the home position;

means to inactivate said hold means when one of said selection members is actuated to move said selection member into said aligned slots to permit movement of said selector plates by said urging means until said selection member engages an edge of each of said aligned slots whereby one of said type characters is positioned at the reference position;

and means to return said selector plates to the home position after said type character is disposed at the reference position.

16. The mechanism according to claim 15 in which said selector plates are moved in the same direction away from the home position.

17. The mechanism according to claim 16 in which said urging means is resilient biasing means.

18. A mechanism comprising:

means supporting a plurality of type characters;

means to select one of said type characters for positioning at a reference position;

said selecting means comprising:

a separate selection member for each of said type characters;

a plurality of selector plates disposed adjacent each other, each of said selector plates being disposed in a single plane for movement only in said plane with said planes being substantially parallel to each other;

each of said selector plates having a plurality of slots therein with each of said selector plates having a slot aligned with each of said selection members, said slots being disposed in a plurality

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- at least one selector plate disposed in a single plane for movement only in said plane to a plurality of different positions away from a home position;
- said selection member being capable of providing 5
movements of said plurality of type characters in plural non-parallel coordinate directions to position a selected type character at the reference position;
- means to hold said selector plate in the home position; 10
- means continuously urging said selector plate away from the home position;
- means directly connecting said type character support means to said selector plate whereby said 15
type character support means is positioned in accordance with the position of said selector plate;
- means to inactivate said hold means when one of 20
said selection members is actuated whereby said selector plate is movable only within said plane by said urging means;
- said selection member and said selector plate having cooperating means to regulate movement of 25
said selector plate within said plane whereby one of said type characters is disposed at the reference position;
- and means to return said selector plate to the home position after said type character is positioned at the reference position. 30
19. A mechanism for positioning a type character at a reference position, said mechanism comprising:
- a at least one selector plate;
- a plurality of type characters positioned in accordance 35
with the position of said selector plate;
- a selection member for each of said type characters;
- means to hold said selector plate in a home position;
- means urging said selector plate away from the home position;
- means to inactivate said hold means when one of said 40
selection members is actuated whereby said selector plate is movable by said urging means;
- said selection member and said selector plate having cooperating means to regulate movement of said selector plate by said urging means to position one of 45
said type characters at the reference position;
- means to return said selector plate to the home position after said type character is disposed at the reference position;
- a hammer disposed at the reference position; 50
- means to move said hammer to cause printing of said type character at the reference position, said hammer moving means including a solenoid to move said hammer;
- a circuit connected to said solenoid for applying a voltage 55
to said solenoid to move said hammer;
- said circuit including a variable resistance;
- and means controlled by said actuated selection member to vary the value of said resistance over a range 60
of values between a minimum and a maximum and including values between said minimum and said maximum in accordance with the area of said type character at the reference position whereby the voltage applied to said solenoid is varied so that the force applied to said hammer is varied. 65
20. A mechanism comprising:
- means supporting a plurality of type characters;
- means to select one of said type characters for positioning at a reference position;
- said selecting means comprising: 70
- a selection member for each of said type characters;
- at least one selector plate;
- means to hold said selector plate in a home position; 75

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- means urging said selector plate away from the home position;
- means connecting said type character support means to said selector plate whereby said type character support means is positioned in accordance with the position of said selector plate;
- means to inactivate said hold means when one of said selection members is actuated whereby said selector plate is movable by said urging means;
- said selection member and said selector plate having cooperating means to regulate movement of said selector plate whereby one of said type characters is disposed at the reference position;
- and means to return said selector plate to the home position after said type character is positioned at the reference position;
- a hammer disposed at the reference position;
- means to move said hammer to cause printing of said type character at the reference position, said hammer moving means including a solenoid to move said hammer;
- and means to vary the force of said hammer moving means in accordance with the area of said type character at the reference position, said force varying means including:
- an additional selector plate movable in a plane parallel to said selector plate;
- said hold means retaining said additional selector plate in the home position until one of said selection members is actuated;
- means urging said additional selector plate away from the home position;
- said additional selector plate and said selection member having cooperating means to stop movement of said additional selector plate;
- and means responsive to the position of said additional selector plate to vary the voltage applied to said solenoid in accordance with the area of said type character at the reference position.
21. A mechanism for positioning a type character at a reference position, said mechanism comprising:
- a at least one selector plate;
- a plurality of type characters positioned in accordance with the position of said selector plate;
- a selection member for each of said type characters;
- means to hold said selector plate in a home position;
- means urging said selector plate away from the home position;
- means to inactivate said hold means when one of said selection members is actuated whereby said selector plate is movable by said urging means;
- said selection member and said selector plate having cooperating means to regulate movement of said selector plate by said urging means to position one of 55
said type characters at the reference position;
- means to return said selector plate to the home position after said type character is disposed at the reference position;
- a hammer disposed at the reference position;
- means to move said hammer to cause printing of said type character at the reference position, said hammer moving means including a solenoid to move said hammer;
- and means to vary the force of said hammer moving means in accordance with the area of said type character at the reference position, said force varying means including:
- an additional selector plate movable in a plane parallel to said selector plate;
- said hold means retaining said additional selector plate in the home position until one of said selection members is actuated;
- means urging said additional selector plate away from the home position;

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said additional selector plate and said selection member having cooperating means to stop movement of said additional selector plate;
and means responsive to the position of said additional selector plate to vary the voltage applied to said solenoid in accordance with the area of said type character at the reference position.

22. A mechanism for positioning a type character at a reference position, said mechanism comprising:

a single selector plate;
a plurality of type characters positioned in accordance with the position of said selector plate;
said selector plate being movable in a plurality of non-parallel coordinate directions and providing character selection in a plurality of non-parallel coordinate directions;

character selection means;

means to hold said selector plate in a home position;
means urging said selector plate away from the home position;

means to inactivate said hold means when said character selection means is actuated whereby said selector plate is movable by said urging means;

said character selection means and said selector plate having cooperating means to regulate movement of said selector plate by said urging means to position one of said type characters at the reference position;
and means to return said selector plate to the home position after said type character is disposed at the reference position.

23. A mechanism for positioning a type character at a reference position, said mechanism comprising:

a plurality of selector plates disposed adjacent each other, each of said selector plates being disposed in a single plane for movement only in said plane to a plurality of different positions away from a home position with said planes being substantially parallel to each other;

a plurality of type characters positioned in accordance with the positions of said selector plates within said planes;

a single individual and separate selection member for each of said type characters;

means to hold said selector plates in the home position;
means continuously urging each of said selector plates away from the home position;

means to inactivate said hold means when one of said selection members is actuated whereby said selector plates are movable by said urging means;

said selection member and each of said selector plates having cooperating means to regulate movement of each of said selector plates within said plane by said

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urging means to position one of said type characters at the reference position;

and means to return said selector plates to the home position after said type character is disposed at the reference position.

24. A mechanism for positioning a type character at a reference position, said mechanism comprising:

a plurality of selector plates disposed adjacent each other, each of said selector plates being disposed in a single plane for movement only in said plane to a plurality of different positions away from a home position with said planes being substantially parallel to each other;

a plurality of type characters positioned in accordance with the positions of said selector plates within said planes;

a single individual and separate selection member for each of said type characters;

means to hold said selector plate in the home position;
means continuously urging each of said selector plates away from the home position;

means to inactivate said hold means when one of said selection members is actuated whereby said selector plates are movable by said urging means;

each of said selector plates having a plurality of slots therein with each of said selector plates having a slot aligned with each of said selection members;

said actuated selection member being disposed within the aligned slots in said selector plates to regulate movement of said selector plates within said planes by said urging means to position one of said type characters at the reference position;

and means to return said selector plates to the home position after said type character is disposed at the reference position.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,334,720

August 8, 1967

John E. Hickerson

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

Column 4, line 63, for "39" read -- 59 --; column 5, line 1, for "complete" read -- complete --; line 47, for "40" read -- 40, --; column 6, line 58, after "31" insert -- are --; column 9, line 19, for "on" read -- of --; column 13, line 15, for "none" read -- non --; line 29, for "parellel" read -- parallel --; column 14, line 35, for "members" read -- members --; column 15, lines 35 to 59, each of the paragraphs should be a sub-paragraph; line 42, for "plates" read -- plate --; column 16, line 6, "position" should be indented; line 10, "home" should be indented; lines 19 to 21, the paragraph should be a sub-paragraph; line 19, for "turn" read -- return --; lines 61 to 63, the paragraph should be a sub-paragraph; column 17, line 25, for "plrte" read -- plate --.

Signed and sealed this 9th day of July 1968.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents