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(54) Erasing typewriter with automatic selection of automatic or manual erase mode.

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Courier Press, Leamington Spa, England.

Description

Technical field

This invention relates to improvements to electronic typewriters to allow both automatic and manual erase functions with a minimum amount of keying.

Background of the invention

The automatic erase feature, disclosed in the document US—A—3,780,846, in which the typist need not key in an identification of the character to be erased, while considerably increasing keystroke efficiency, is, of course, only applicable where the line memory associated with the typewriter electronics includes identification of the character sought to be erased. In the event that the associated memory includes, at the print point at which the carriage is positioned, no erasable character, the typewriter leaves the erase mode and thus requires additional keystroking to effect the erasing action initially sought by depression of the erase key. In the event that the memory includes a code indicating a space function, the automatic erasing typewriter of the document US—A—3,780,846 will produce a backspace in response to the first erase depression and a second backspace to, in effect, search for an erasable character in the line memory, and when such character is found, it will be erased.

The document US—A—3,724,633 teaches a manual erasing technique which serves to improve the keystroking efficiency. This improvement required the operator to stroke a correction key with two effects; firstly, a backspace is performed to bring the print point and the type carrier into conjunctions with the character sought to be erased, and the typewriter is conditioned such that on the next keystroke, rather than using the normal print ribbon, a special erase ribbon is interposed between the type carrier and the paper sheet when the type carrier next strikes the paper. Accordingly, when the operator next strokes a key, identical to the erroneously stroked key, the impression of that key is lifted off, or erased, from the paper. The operator can then stroke the desired key to replace the erased character with the desired character.

In automatically erasing typewriters such as that disclosed in the document US—A—3,780,846, the typewriter is only capable of automatically erasing a character when a code representing the character is retained in a (line) memory. Once the carriage is indexed (or carriage return is effected), the line memory is cleared and thereafter the automatic erase feature cannot be employed. Some automatically erasing typewriters manufactured by IBM, however, are still capable of erasing a character even when the line memory does not contain a representation of the erroneously typed character, by simultaneously depressing the erase and "code" keys. This has the effect

of backspacing the print point and on the next key depression, if a character key, the erase media is used to erase the character from the page. However, the operator must decide to use the "code" key when the line memory is cleared in order to produce the desired result. This obviously places an added burden on the operator and will result in loss of keystroking efficiency if the operator's decision is incorrect.

Brief description of the present invention

The present invention seeks to improve operation of an automatically erasing typewriter in the event that the character sought to be erased is not contained in the line memory, and enables the automatically erasing typewriter to achieve the erasing function with a minimum amount of decision-making on the part of the operator. In accordance with the invention, the operator employs the same initial techniques regardless of whether or not the character sought to be erased is retained in the line memory. In particular, in accordance with the invention, the operator strokes the erase key which initiates the automatic erasing operation. In the event that the erroneously typed character is contained in the line memory, it is automatically erased as taught in the document US—A—3,780,846. In the event, however, that the erroneously type character is not found in the line memory, signals are generated to condition the typewriter for manual erasure in accordance with the techniques identified in the document US—A—3,724,633. Thus, after stroking the erase key, in the event that the erroneously typed character is not found in the line memory, the operator merely follows stroking the erase key by stroking the erroneously type character key. Operation of the erase key, in the event that the erroneously type character is not found in the line memory, conditions the typewriter for manual erasure in which the operator must select the erroneously typed character so as to induce the erasure thereof.

Employing the automatic selection of erasing mode of the present invention further improves the capabilities of the typewriter in other respects as well. In the automatically erasing typewriter disclosed in the document US—A—3,780,846, when the operator strokes the erase key, and the typewriter finds a space function in the line memory, a second backspace is initiated, in effect, "looking" for an erasable character. Thus, if the typist is attempting to erase the "space", the automatically erasing typewriter requires the typist to either erase the immediately preceding character and begin typing at that point, or employ the backspace key rather than the erase key. In accordance with the present invention, when an erase operation is initiated, if the typewriter finds a space function in the associated line memory location, the backspace is terminated and the machine is conditioned for manual erase.

Operating the space bar then deconditions the typewriter from the erase mode without causing an escapement to thereby enable the typist to continue typing to, in effect, "erase" the space by inserting a character therein.

Thus, the automatically erasing typewriter of the present invention is of the kind which can type a sequence of characters on a page in response to operator actuation of a sequence of keys on the keyboard and is of the kind which includes:

- . key actuated means for generating signals representing an actuated key,
- . memory means for storing an ordered sequence of signals representing a sequence of operator actuated keys,
- . print means including print and erase media for executing a print cycle to at times print a character if said print media is enabled, or to erase a character if said erase media is enabled,
- . print point position control means responsive to said key actuated means for displacing said print means and for accessing a selected location of said memory means corresponding to said print point, and
- . erase means operative in response to actuation of an erase key for initiating a sequence of operations including:

a) actuating said print point position control means to displace said print point toward a left margin,

b) accessing said memory means at a selected location corresponding to said print point for reading signals stored at said selected location,

c) actuating said print means and enabling said erase media to execute a print cycle to erase a character at said print point corresponding to signals read from said memory means.

According to the invention, the typewriter further includes:

- . means responsive to the absence of signals representing an erasable character at said selected location of said memory means, to inhibit said print cycle and to enable said erase media and said printing means to execute a print cycle on a following key actuation only if said following key actuation corresponds to actuation of a key representing an erasable character.

More particularly, in accordance with the present invention, when an erase key is stroked, a backspace is initiated which has the effect of displacing the print point one character space rearwardly. Moving the print point has two effects; firstly, the type carrier or print means is displaced corresponding to moving of the print point, and secondly, the line memory location addressed is also correspondingly displaced. In

the event that the line memory contains a character code, a print cycle is initiated with the erase media enabled and the automatic erase function is carried out. In the event, however, that the line memory does not contain a character code, the typewriter print cycle is inhibited and instead the typewriter is conditioned to manually erase, in which, on the next keystroke, comprising an erasable character, manual erase is effected by initiating a print cycle with the erase media enabled, inhibiting or preventing escapement of the print means and finally, deconditioning the typewriter from an erase mode. In the event that the operator strokes a key other than an erasable character, the typewriter either re-initiates the automatic erase sequence in the event that the subsequently stroked key is the erase key, or merely deconditions the typewriter from an erase mode if the subsequently stroked key is the space bar.

Brief description of the drawings

Figure 1 is a block diagram of a known electronically controlled typewriter which may implement the present invention.

Figure 2 is a partially broken-away view of the interrelation of the mechanical components of the typewriter of figure 1.

Figures 3 and 4 are logic flow diagrams illustrating the logic of the present invention; and

Figure 5 is a schematic of a discrete logic circuit implementing the present invention.

Detailed description of preferred embodiments

Referring to figures 1 and 2, there is illustrated a typewriter 10 of the type disclosed in GB-A-2 021 830 and GB-A-2 021 831 and which is controlled by electronics in that the keyboard signals generated are processed electronically and the electronic controls therein then issue electronic commands to the printer to effect the appropriate functions of the printer elements to cause printing, escaping, backspacing, tabulation, correction and other normal printer functions. When a key lever 12 on the keyboard 14 is depressed to effect the selection of a character for printing, the keyboard 14 causes associated switches to make in a predetermined pattern thereby transmitting signals from the keyboard 14 to the keyboard control 16. The keyboard control unit 16 captures the electronic inputs from bail codes B1 through B7 and generates an appropriate strobe or control signal which then causes the total data signals to be transmitted to the character and velocity decode logic 18. The character and velocity decode logic 18 then converts the signals from the keyboard control 16 into signals which represent the position on the type element of the character selected by the key lever depression. This is accomplished by converting the keyboard control 16 signal into signals to magnet drivers 20 which then effect the rotation (R1, R2, R3) and the tilt (T1, T2) of a

single type element 11, or other conventional selection technique, to position the desired type font at the print point and then the selection of other controls such as the velocity (V1, V2) with which that type font is propelled toward the printed page.

The keyboard control 16 signals are simultaneously read into the escapement and erase logic 22 which, then, through a conventional table look-up, determines the assigned escapement values for each of the characters which are represented by the output of the keyboard control 16. These escapement values or widths may be a standard width such as for example using a 1/60th of an inch (0.423 mm) per unit, 6 units for a 10 pitch escapement or 5 units for a 12 pitch escapement. Additionally, with the escapement of characters being defined as units of 1/60th of an inch (0.423 mm), it is possible to assign escapement values to characters proportional to their actual printing width, otherwise known as proportionally spaced characters. This thereby provides the capability of escaping the typewriter 10 responsive to the keyboard control signals and effecting proportionally spaced character printing.

The position of the carrier 13 (see figure 2) or the print point defining means of the typewriter 10 is constantly stored in the escapement register 24 which is a portion of the escapement and erase logic 22, thereby providing a current location, measured from the leftmost point of travel of the print carrier 13, and this value is updated as the print carrier 13 translates left or right under the control of any of the keyboard signals. The escapement and erase logic 22 outputs the width of the characters which have been selected at the keyboard to the escapement counter 26. This is necessary to provide a control over the escapement functions of the printer. The escapement counter 26 then stores on a temporary basis the information necessary to control the translation of the print carrier 13 over a predetermined or preselected distance. The escapement counter 26 is controlled in its operation by the signals emanating from integrator 28 which has input signals representing the output of a pitch selection switch 15 and the photoemitter/sensor 17 associated with the lead screw 19 and the escapement signals wheel 21 which indicates which portion of a rotation the lead screw 19 has been rotated through. The pulses created by the photoemitter/sensor 17 and wheel 21 on the end of the rotatable lead screw 19 of the typewriter 10 effect decrementing of the escapement counter 26. As long as the escapement counter 26 contains a numerical value, the photoemitter/sensor 17 will then pulse the escapement counter 26, through the integrator 28, and cause the escapement counter 26 to provide an output signal to the appropriate magnet drivers 30 to cause movement of the print carriage 13.

The escapement or movement of the print carriage 13 is a result of signals emanating from the magnet drivers 30 which are provided their input from the escapement counter 26. The escapement signal, the direction signal, the drive signal and the erase signal all emanate from the magnet drivers which are controlled ultimately from the keyboard 14. The escapement magnet driver 30 causes the release of the lead screw 19 and thus allows its rotation together with the emitter wheel 21 which interacts with the photoemitter/sensor 17, thus creating the signals discussed above. The direction magnet driver 30 controls the engagement of the clutches 31 in the drive unit 33 to determine the forward or reverse direction of the carrier, by controlling the rotational direction of the lead screw 19. The drive magnet driver 30 provides the engagement or the coupling between the main drive motor 43 of the typewriter 10 and the lead screw 19, through the power transmission or drive unit 33.

The erase magnet driver 30 controls the elevation, from its withdrawn position of an erase media or tape (shown in figure 2 wound on a reel 23) so that any subsequent printing effected by the print element causes the impacting of the erase media against the page to effect erasure, if the character being impacted was the same character as was previously impacted onto the printing ribbon at that print point.

The printer control unit 32 contains the character velocity decode logic 18, the escapement and erase logic 22, the escapement register 24, the escapement counter 26 and the line memory 34. As signals are decoded by the character and velocity decode logic 18 for subsequent utilization by the magnet drivers 20 for selection, that same information is temporarily stored in a memory designated as the line memory 34. This memory or register 34 is capable of receiving and storing data in the sequence in which they have been received. The line memory 34 is capable of being read in reverse to determine characters which have been previously printed and machine functions which have occurred during that particular line of operation, such as the initiation of a tabulation or space command.

Functions of the typewriter 10 are controlled by the function portion 36 of the keyboard. The functions which may be included into such a typewriter 10 include tabulation, space, carrier return, shift, index and erase.

Of particular interest in this case is the erase function. As disclosed in the document US—A—3,780,846, typewriter 10 is capable of automatic erase. In an automatic erase operation, three functions are performed; in response to actuation of erase key 25, firstly, the line memory is interrogated for the present print point and determination is made as to whether or not an erasable character is found at

that location. Assuming an erasable character is found, the erase media is enabled (or lifted) so that when a print operation occurs, the type element will drive the erase media into the page rather than the print media. If the type carrier which drives the erase media to the paper matches the character which is to be erased, the previously typed character is deleted, either by lifting off the ink deposit in the first print operation or by covering the ink so that it is not visible. Thus, with the erase media lifted, the character read from the memory is employed to select a corresponding typeface and a print cycle operation is executed. As disclosed in the US—A—3,780,846, if memory is empty or if an erasable character is not found at the preceding location, the typewriter 10 merely performs a backspace and then begins the sequence again.

Frequently, the line memory will not contain an erasable character. This can occur if the operator, after typing a full or partial line, indexes the carriage. This has the effect of clearing the line memory, thus insuring that no erasable character will be found in subsequently interrogating the line memory. If the operator has indexed the carriage to register it with a preceding line, while the line memory will contain no erasable characters, the page will indeed contain erasable characters, and therefore, the operator may desire an erase operation to be performed.

A second instance when interrogation of the line memory will reveal no erasable character occurs if the line memory contains a space. If, for example, the operator has erroneously operated the space bar 27, and wished to "erase" the space, the line memory containing the space will not have erasable character. In the US—A—3,780,846, in response to an erase command, the typewriter, in effect, skips the space and erases the immediately preceding character which may not be the operation desired by the operator.

Of course, if the line memory does not contain a signal representing the character to be erased, an automatic erase operation is not possible. However, prior art typewriters are capable of what is termed a manual erase. In a manual erase, firstly, the print point is selected to correspond to the character to be erased (i.e., typically requiring a backspace function), the erase media is enabled such that on a following depression of a character key, the typeface will impact the erase media into the paper, and if the character which has been stroked corresponds to the character to be erased, it will be erased. Some typewriters, for example, are capable of the automatic erase function, and are also capable of implementing the manual erase operation. This is effected by engaging simultaneously the "code" key and the erase key which has the effect of "teaching" the typewriter to perform the manual erase function.

In accordance with the present invention, the

electronic control circuits of the typewriter contain logic to implement either the automatic erase or the manual erase, and the selection is made by the electronic controls based upon the status of the line memory. In effect, if an automatic erase operation at the effective print location is possible, it will be performed. On the other hand, if the line memory contains either a non-erasable character such as the space, or if the line memory is empty, the electronic controls will implement a manual erase. If the following keystroke is that of an erasable character, the manual erase operation will be performed. Otherwise, the electronic controls either reinitiate automatic erase, if the following keystroke is the erase key, or simply decondition from manual erase if the following keystroke is neither an erasable character nor the erase key.

For purposes of this application, an "automatic erase" is an erase function performed in response to selection of only the "erase" function without operator selection of the character to be erased. On the other hand, "manual erase" is an "erase" function in which the operator selects the character to be erased. Conditioning for a manual erase is an operation in which an erase latch is set so that, on a following print cycle, the erase media is lifted and interposed between the type element and paper. Correspondingly, deconditioning from manual erase corresponds to resetting the erase latch.

Upon the initiation of an erase command, the special function portion 36 of the keyboard 14, generates a signal which is passed through to the function decoder logic 38 and decoded. The output of the function decode logic 38 is gated into the escapement and erase logic 22 which, in turn, recognizes that the function is an erase operation. The escapement and erase logic 22 accesses the line memory 34 to determine the character which was previously printed in the next leftmost character position from that of the present print point. If the line memory 34 has signals stored in that position corresponding to an erasable character, the automatic erase function is performed. On the other hand, if the character position accessed does not contain an erasable character or if the line memory at that position is empty, the logic conditions the machine for manual erase and awaits the next keystroke operation. If the next keystroke operation is a second actuation of the erase key, then the machine is deconditioned from manual erase operation and again begins a sequence of operations in attempting to perform an automatic erase operation. In the event that the subsequently actuated key is not the erase key, but is an erasable character, then the manual erase operation is performed. The operator is allowed to decondition the machine from manual erase and return it to its normal operating state by operation of the space bar. If, on the other hand, another function key is

depressed, such as a tabulation function, index function, carriage return or shift, the function is performed, the machine is deconditioned from manual erase, and it returns to its normal operating state.

The block diagrammed control apparatus 32 of figure 1 is employed to implement the functions described above. The apparatus 32 interfaces with the print mechanism 13 and its drive through the magnet drives 20 and 30. While the action of the electronic controls 32 may, with state of the art techniques, be operated at very high rates, the printer operation, requiring, as it does, mechanical movements, is much more limited. Typical electronic typewriters on the market today have an operating cycle that has four distinct states. A first state is a rest or wait state. As a key is actuated and decoded, the typewriter shifts to a second state at which point the print cycle is initiated. Once the print cycle is begun, it must be completed in a fixed time frame since that time frame is fixed by the rotation of a shaft. Once the print cycle is concluded, the typewriter is in its third state. At this time, escapement may be performed. When escapement, or the time for escapement is concluded, the machine is in its fourth state. At this time, the various control signals which have controlled the print cycle and escapement are turned off and the machine returns to its original state. In response to various conditions the typewriter may skip various functions, for example, while the machine cycle always includes a time during which escapement is effected, in certain conditions no escapement actually occurs.

The automatic erase function typically requires two iterations of the four machine states. When actuation of the erase key is decoded, the typewriter has moved from a rest state to a second state. A print cycle is begun but no print operation occurs (i.e., a no-print cycle). At the conclusion of the print cycle an erase latch has been set so that escapement is initiated and is accomplished as a backspace. At the conclusion of the escapement, the control signals are turned off and the machine is in a quasi-rest state, similar to a rest state except that the erase function is only partially complete, not only is an erase latch set but a second cycle latch is set indicating that line memory interrogation has resulted in detection of an erasable character. On a second interaction of the machine states (which follows immediately after the first because the second cycle latch is set) the print cycle is performed with the print element controlled by signals read from the line memory and thus erasure is effected. The escapement cycle is effectively skipped and, at the conclusion of the second iteration of the machine states, the automatic erase function is concluded. In accordance with the present invention, similar iterations of the same machine states are effected but the cycle in which type impact occurs is initiated only

after the operator has selected the character to be erased.

In more detail, the typewriter of the present invention initiates similar action in response to erase key depression as outlined immediately above. However, after the first print and escape cycles, while the erase latch is set, a manual rather than automatic erase latch is set indicating the failure to find an erasable character in the interrogated line memory location. With the manual and erase latches set, the machine returns to a wait state in which no further operation will be initiated until a further key depression is detected. When a further key depression is detected, the machine again goes through its various states corresponding to the first iteration of the machine states for automatic erase. On this second iteration, no printing or impacting occurs but instead, the printer is prepared for impacting in accordance with the operator's key selection and a second cycle latch is set (assuming an erasable character is selected). Escapement is also inhibited and as this cycle terminates, a final or third cycle is begun since the second cycle latch is set. On this final cycle, impacting and erasure occurs, escapement is again inhibited and all latches are reset. If the operator has not selected an erasable character, the second cycle latch is not set and thus, no impacting occurs on the final cycle; however, depending on the operator's selection, some or all of the latches may be reset as will be described.

A preferred embodiment employs random logic in the form of a programmed processor to implement the control 32, for example, a microprocessor, although it is within the scope of the invention to implement control 32 in the form of discrete logic or hard wired circuits. In an embodiment of the invention which has been constructed, the microprocessor used was an Intel 8048 (RTM). Clearly, other microprocessors could be utilized. Regardless of implementation however, the flow diagrams of figures 3 and 4 illustrate the signal and logic flow.

As shown in figure 3, control 32 in its normal state awaits a keyboard input. When a keyboard input is detected at function 50, the character and velocity decode logic 18 determines, at function 51, whether or not the input corresponds to a character. If it is a character, functions 53 and 54 are performed to store the character in a line memory 34, and execute a print cycle wherein the character is printed on the paper at the present print point. The print sequence 54 includes a function to space (or escape) the print carriage such that, at the conclusion of the normal print operation, the print point has moved to the next character location, ready for a following print sequence. This operation typically requires only a single iteration of the four machines states described above.

On the other hand, if the character and

velocity decode logic 18 determines that the keyboard input was not a character, then the function decode logic 38, at function 52 determines whether an erase function has been commanded. If it has not, the function decode logic 38 checks for the existence of other function commands, in portions of the logic which are not germane to the present invention and therefore are not described herein.

However, assuming that the function decode logic 38 recognizes an erase command, then an erase latch is set and the logic performed is illustrated in figure 4.

As shown in figure 4, the erase command is gated through the function decode logic 38 to the escapement and erase logic 22. A quantity is loaded into the escapement counter 26 which, as disclosed, for example, in the document FR—A—2,426,574, operates to backspace the print carrier. Since the escapement register 24 is used to access the line memory, once the backspace operation (function 62) is concluded, the escapement register 24 stores the location of the print point so it accesses the line memory at the "back-spaced" location. The escapement and erase logic interrogates the line memory 34 at function 63 to determine whether the location accessed is empty. If it is not empty, then the escapement and erase logic 22 determines at function 64 whether or not the signals stored in the line memory 34 correspond to an erasable character. If an erasable character is found, the second cycle latch 107 (see fig. 5) is set and the automatic erase function 65 is performed. Those functions are not disclosed in detail here since they are identified in document US—A—3,780,846. In brief compass, the erase media is enabled (lifted) by the magnetic drive 30, and a print command is issued corresponding to the character found in the line memory.

If, on the other hand, either at functions 63 or 64, the escapement and erase logic 22 determined that the memory location accessed was empty, or an erasable character was not found at the memory location, then the escapement and erase logic 22 conditions the typewriter 10 for a manual erase at function 66 (i.e., the manual latch 112 is set). This prepares the erase media for engagement on the conditions which are specified below. Once that operation has been performed, the escapement erase logic 22 awaits the next keystroke at function 67. The preceding functions from depression of the erase key up to function 66 correspond to a single iteration of the four machine states.

In the event that the next keystroke actuation is that of an erasable character, the keyboard control 16 sends the corresponding signals to the character and velocity decode logic 18. The same signals are received by the function decode logic 38 which determines that this keystroke actuation is not that of an erase key, i.e., function 68. Similarly, the function decode logic 38 determines that the next keystroke

actuation was not a space bar, i.e., function 70. However, the character and velocity decode logic 18 determines that the next keystroke actuation was indeed that of an erasable character which information is gated into the escapement erase logic 22. While the machine cycles through the second cycle in which both print and escape functions are skipped, the second cycle latch 112 is set. On the final cycle, the character and velocity decode logic 18 formulates a print command to the magnet drive 20 which has the effect of rotating and tilting the type ball, or other similar effects, depending upon the print apparatus employed in the typewriter. However, since the machine has previously been conditioned for manual erase (the manual and erase latches are set) at function 66, the magnet drive 30 now energizes the erase magnet to lift the erase media. Thus, at function 75, a manual erase operation is performed wherein the operator has selected the character, and the machine has lifted the erase media such that the type ball forces the erase media into the paper to effect the erasure. Following the print cycle (in which erasure is effected), the machine is deconditioned from the manual erase mode, that is, the latches are reset.

If, on the other hand, an erasable character was not the next character key stroked, but rather a function key was stroked, then the decode logic 38 determines at function 74 that a function has been selected. This selected function is executed through the escapement and erase logic 22 in combination with the other apparatus necessary to perform the selected function. At the same time, the machine is deconditioned from manual erase.

If, rather than stroking an erasable character or a function key, the operator has operated the space bar, then function decode logic 38 determines that the next actuated key was the space bar. This information is gated to the escapement and erase logic 22. The effect of this operation is to decondition the typewriter from manual erase (function 71) in that the previously prepared circuit for the erase magnet through the magnet drive 30 is eliminated.

Finally, if the operator has again actuated the erase key, as the next following key, then function decode logic 38 deconditions the machine from manual erase, at function 69, by interrupting the previously prepared circuit for the erase magnet through magnet drive 30 and the sequence shown in figure 4 is repeated again starting at the backspace function 62.

Figure 5 illustrates in detail the components of the erase and escape logic 22 required to implement one embodiment of the present invention. As shown in figure 5, the erase and escape logic 22 is provided with two sets of signals inputs, a first set from keyboard decoding logic 38 and 18 identifying the actuation of a key corresponding to a character, space, erase or other function; and a second set

of input signals from a decoding circuit arranged to decode the addressed content of the line memory 34 corresponding to the print point, the second set including signals identifying a character, function, space or empty state of the memory location.

As is indicated in figure 5, the two sets of signals are supplied, in selected combinations to AND gates 100—102. AND gate 100, subjected to an input identifying an erase key actuation and a corresponding character decode from the line memory, provides an output to set the second cycle latch 107. At an appropriate clock time, the set output of latch 107 is coupled through further AND gate 108. The output of AND gate 108 is provided to the printer to cause execution of an erase cycle. The printer erase cycle includes a print cycle in which the erase media is enabled and impacted by the print element into the paper, and a skipped escape cycle. The same output of gate 108 is provided to a delay circuit 109, the output of which is arranged to reset the second cycle latch 107.

This operation corresponds to execution of the automatic erase function. Namely, the AND gate 100 detects the depression of an erase key and the presence of a character in the relevant location in the line memory, and as mentioned above, the second cycle latch 107 is set so that at an appropriate time, the automatic erase function is executed.

In accordance with the present invention, however, AND gates 101 and 102 are provided, the first subjected to an input from the actuated erase key and a corresponding decode of an empty location in the line memory. AND gate 102 is also subjected to an input derived from the depression of an erase key, with the corresponding decode from the line memory corresponding to storage of a function command or space. The outputs of AND gates 101 and 102 are coupled to an OR gate 110. The output of either one of AND gates 101 or 102 indicates that an automatic erase function cannot be executed since an erasable character is not found at the corresponding print point in the line memory 34. The output of OR gate 110 is coupled to an AND gate 111, clocked at an appropriate time in the machine cycle to set a manual erase latch 112. As will be explained below, setting the manual erase latch 112 temporarily inhibits execution of a printer erase cycle. However, it should be recalled that, at the time the line memory 34 is interrogated, the print point has already been backspaced or escaped and therefore, the typewriter is in condition to execute a manual erase depending upon the next key actuation. Setting the manual erase latch 112 puts the machine in a quasi-wait state, similar to a normal wait state except for the set condition of the manual erase latch 112.

The set output of the manual erase latch 112 provides an input to AND gates 103—106. The

other input to AND gate 103 is provided from a character key actuation, and production of an output from AND gate 103 provides a setting input to the second cycle latch 107. Accordingly, when AND gate 103 produces an output, the printer will execute an erase cycle, causing an impact of the type element in the print cycle, but with the erase media lifted. As shown in figure 5, the output of the delay circuit 109 is also arranged to reset the manual erase latch 112 so that at the conclusion of the erase cycle both the second cycle latch 107 and the manual erase latch 112 are reset.

AND gate 104 has a second input provided from a decoded function key actuation, and the output of AND gate 104 is coupled to the printer to execute the selected function. The same output, coupled through a buffer 113, resets the manual erase latch 112.

The other input to AND gate 105 is provided by a decoded space bar actuation, and the output of the gate is provided to the printer which causes a no-print no-escape cycle, and the same output, coupled through buffer 114 is provided to reset the manual erase latch 112.

Finally, AND gate 106 has a second input provided by the decoded erase key actuation, and the output of AND gate 106 is provided to reset the manual erase latch 112.

A comparison of the logic of figure 5 with the flow chart of figure 4 will illustrate that the functions performed by this discrete logic circuit are substantially the same as that shown in figure 4.

The clock inputs to AND gate 108 and 111 can be replaced by other state-determining signals in the typewriter as will be apparent to those skilled in the art. The only requirements are that, for example, once the second cycle latch 107 is set, the other electronic components should be allowed to settle so that the signal provided to the printer for the erase cycle are not indeterminate.

The clocking function at AND gate 111 is provided to prevent a race condition at the manual erase latch 112. In the event that a reset signal is produced by depression of the erase key 25 when the manual erase latch 112 is set, the clocking function is arranged to insure that the resetting of the manual erase latch 112 occurs prior to the setting of the same latch so that when the erase key 25 is depressed, the manual erase latch 112 is maintained set in the event that the decoded contents of the line memory 34 correspond to either an empty location or a function command. Similar function is performed by the delay circuit 109, and those skilled in the art will appreciate that other apparatus or signals for delaying the resetting of second cycle latch 107 can be employed, for example, other machine-state determined signals.

As has been mentioned above, however, the preferred embodiment of the invention employs

a stored program processor, preferably a micro-processor.

Appendices A, B and C, illustrate the program instructions (or code) used in a preferred embodiment of the invention incorporating the logic previously described herein. Appendices A and B comprise the code itself, including a series of statements listed in the column entitled "Statement". The remaining portions of Appendices A and B, consisting of the column labelled "Source" and the material to the right of the column labelled "Statement" are explanatory material helpful in understanding functions performed by the program instructions. Appendix C identifies the meaning of several of the statements to enable the reader to more readily comprehend the subject matter of Appendices A and B. It should be apparent to those skilled in the art that Appendices A and B are but portions of the program instructions used to control a typewriter implemented in accordance with this invention, but capable of other functions not directly pertinent to the invention, and therefore, there are other collections of code referred to which are not directly pertinent to the instant invention.

In more detail, Appendix A is the collection of codes which is referred to when the typewriter recognizes that the erase key has been stroked. On the other hand, Appendix B is a portion of the code which is referred to when the typewriter recognizes a printable character has been stroked. These two code collections are inter-related. Note, for example, that the instruction located at L33 includes a jump to L11 which is found in Appendix B (in the column labelled "Source"). Likewise, the first instruction of Appendix B "JB4" is a conditional jump to L502, and L502 is found in Appendix A.

Briefly, when an erase key is stroked, the carry bit of the accumulator is set and the printer buffer pointer is decremented. This operation results in the printer buffer pointer pointing at the memory location corresponding to the key depressed prior to actuation of the erase key. After the ID word is examined, a conditional jump results in a jump if the ID word indicates that a printable character was not found. The jump is to location L500. The instruction L500 sets the manual erase flag. The following instruction at L503 turns on the bit which controls the backspace operation and then jumps to L17. L17 is also found in Appendix A, and one of the functions of this instruction is to set the keyboard buffer pointer to the printer buffer pointer. The next instruction, L30, sets bits for no escape and no print. Instruction L33 includes a jump to L11 which is found in Appendix B. This instruction is the output instruction which causes the various control bits to be effective and the printer is thereafter controlled. Accordingly, in the event that the typewriter was responding to depression of an erase key, and the buffer did

not include an erasable character, the cycle of the print shaft which is initiated which instruction L11, results in a no print, no escape, and the only significant event accomplished in this operation of code is setting of the manual erase flag.

In the event that a manual erase flag is set, and the operator strikes a printable character, the code at Appendix B is entered. The first instruction includes a jump to L502 if the manual erase flag is set (L502 is found in Appendix A). The first few statements at L502 insure that the shift magnet becomes set if the character case is different from the case which would otherwise be printed to insure that upon printing, the printed case agrees with the keyboard selected character case. The next instruction, L506, turns on the erase flag, and then the instruction string, starting at L17, is executed which terminates at L11 (Appendix B). The first pass through the code, entered when a printable character is stroked with the manual erase flag set, has the effect of turning on the erase flag, but in other respects, rotation of the print shaft which is initiated at L11 is again a no print, no escape cycle. The next cycle of the print shaft will be the cycle in which the print element is driven toward the paper for imprinting the character keyed by the operator. With the erase flag on, (at L506) the print element will be driven into the erase media to effect an erase operation.

From the foregoing, it should be apparent that the code shown in Appendices A and B is effective to set a manual erase flag if the erase key is actuated and the relevant buffer position does not contain a printable character. The code also illustrates that actuation of a printable character with the manual erase flag set will inhibit normal printing operation and instead result in an erase function.

Two examples will illustrate the operation. Assume that the following text is printed on a page:

ABC DEF GHIJKLMNOP

assume the next keystroke is an erase key. When the electronics recognize the erase stroke, i.e., function 52 (figure 3) a backspace cycle is executed (function 62) and then the line memory is interrogated (function 63, 64). If the memory does contain an erasable character, it is automatically erased (function 65). So long as the erase key remains depressed, or is continually depressed the characters up to the G are erased in this fashion.

After the erase of the G, the next depression of the erase key performs the same functions except that at function 64, the electronics recognize that an erasable character is not in the line memory. Accordingly, at function 66, the typewriter conditions itself for manual erase, and at function 67 awaits the next keystroke. If the next keystroke is an erase key, this is recog-

nized by the electronics, the previously effected conditioning for manual erase is deconditioned, and the logic returns to function 62 to initiate a further backspace. Since all other conditions are the same, the F is erased.

If we assume that having erased the N through the G the operator wishes to delete the space and continue typing adjacent the F, the operator depresses the erase key following the erase of the G. As mentioned above, the typewriter conditions itself for manual erase and awaits the next keystroke. If the next keystroke is operation of the space bar, the resulting function performed by the electronics to merely decondition the typewriter for manual erase and await the next keystroke. Since this deconditioning does not result in the escape function, the next keystroke is the text that the operator desired to place adjacent the F.

If we assume that the text shown above is typed, but that for some reason, the line memory does not contain signals representing these characters, for example, because the

operator has moved the platen following typing and has then relocated the platen to the text above, actuation of the erase key will result in a determination, at function 63, that the memory is empty. The machine then conditions itself for manual erase and awaits the next keystroke. If the next keystroke is an N, a print cycle is performed but with the machine conditioned for manual erase, the media employed is the erase media rather than the print media and therefore, the N is erased.

It should be apparent from the foregoing that the improved typewriter is capable of initiating either an automatic or manual erase, on actuation of the erase key. If line memory contains an erasable character at the immediately preceding print point, that character is automatically erased. If the immediately preceding print point contains signals which do not correspond to a printable character, then the typewriter is conditioned for manual erase. The manual erase is effected if the next following keystroke is that of a printable character.

Appendix A

Source	Statement		
Erase	Org		
	CPL C		Note-Carry was cleared in Start routine
			Set=1 to indicate erase
Backsp	Call	DECBPT	Decrement PBP
	Call	IDWRD	Get the ID Word
	CPL A		
	ANL A,	B00000111	Jump if not a printable character
	JNZ	L500	
	Call	Case	Set Fo to indicate keycode case
	Call	DKITST	Jump of a dead key
	JF1	L501	
	JNC	L504	Jump if backspace
	MOV R5,	B01000000	Turn on Lv Mag Bit (for a backspace)
L502	Call CPLA	Case	Case returns with bit 7 of "A" set to 1 if keycode case and ball case are not equal
	JB7	L506	Jump if keycode and ball case are equal
	Call	Shift	Compliment PUC flag, turn on R2 Magnet bit (for a shift)

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Appendix A (contd.)

Source	Statement		
L506	SEL RBO		
	MOV A, R3		Turn on erase flag
	ORL A, B00000010		(R3 bit 1)
	MOV R3, A		
	SEL RB1		
L17	Call	KPBP	Set KBP=PBP
	Call	CLRDKE	Clear 'Disable keyboard entries flag
L30	CLR F1		
	CPL F1		
	ORL P2, B11110000		Turn on bit for N.P. Magnet
L33	MOV An R5		
	JMP	L11	Turns on 'CC' and selection magnets and Turns on the cycle started flag
L501	JC	L502	Jump if erase
L507	Call	DECBPT	Decrement the PBP
	JMP	L17	
L500	JNC	L505	If erase set the ME flag
	MOV R6, B00000001		Jump if not space
	JNZ	L503	
L504	Call	DECBPT	Decrement the PBP
L503	MOV R5, B01000000		Turn on LV Mag bit (for a backspace)
	JMP	L17	
	END		

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Appendix B

Source	Statement		
PRNT	ORG		
	MOV A, R6 JB4	L502	Jump if the ME flag was set (Test MET Flag)
	Call	Case	'Case' returns with FO=1 for lower case OR FO=0 for upper case and bit 7 of 'A'
			Set to 1 if keycode case and ball case are not equal
	JB6	RKSFT2	Jump to RKSFT2 if the keycode case does not equal the ball case
	Call	DK1TST	Set F1=1 if Dead key
LVTST	MOV R1,	H17	(Keyminder byte for MV2 key)
	MOV A, @ R1 CPL A		Jump if MV2 keyminder bit is Clear (MV2 key depressed)
	JBO	LVEL	(Keyminder bit for MV2 key)
	MOV R1	H11	(Keyminder byte for MV1 key)
	MOV A R1 CPL A		Jump if MV1 keyminder bit is clear (MV1 key depressed)
	JBO	LVEL	(Keyminder bit for MV1 key)
	Call	MAGWRD	Get the magnet code word
	JFO	L11	Jump if lower case
	JBO	LVEL	Jump if LV2 bit is set
HVEL	Call	MAGWRD	Clear LV magnet bit in
	ANL A,	B10111111	Magnet code word
	JMP	L11	
LVEL	Call	MAGWRD	Set LV magnet bit in
	ORL A,	B01000000	Magnet code word

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Appendix B (contd.)

Source	Statement	
L11	ORL A, B00000001	Set the CC bit on
	OUTL BUS, A	Output to the selection magnets
	SEL RBO	
	MOV A, R2	Turn on the cycle started
	ORL A, B10000000	flag
	MOV R2, A	
	RETR	
	END	

Appendix C

ERASE	Entered on Decode of erase key actuation
PBP	Printer buffer pointer
IDWRD	a word in buffer or line memory identifying the type of entry, such as printable character, functions, space, etc.
CPL	Complement
C	Carry bit of accumulator
KBP	Keyboard buffer pointer
ANL	AND Latch
ORL	OR Latch
A	Accumulator
DECBPT	Collection of code to decrement PBP
CASE	Collection of code to compare keycode and ball case
SHIFT	Collection of code to control shift magnet control bit
N.P.	No print
ME	Manual erase flag
JCN	Jump if not carry
JMP	Jump
XRL	Exclusive OR latch
JNZ	Jump if not zero

Appendix C (contd.)

PRNT	Collection of code entered when a key corresponding to a printable character is struck
CC	bit, when set, turns on the cycle clutch to rotate the print shaft.

Claims

1. Erasing typewriter of the type including: key actuated means (14, 36, 18, 38) for generating signals representing an actuated key (12),

memory means (34) for storing an ordered sequence of signals representing a sequence of operator actuated keys,

print means (11, 13) including print and erase media for executing a print cycle to at times print a character at a print point if said print media is enabled, or to erase a character at a print point if said erase media is enabled,

print point position control means (22, 24, 26, 30) responsive to said key actuated means (14, 36, 18, 38) for displacing said print means (11, 13) and for accessing a selected location of said memory means (34) corresponding to said print point, and

erase means (36, 38, 22, 30) operative in response to actuation of an erase key (25) for initiating a sequence of operations including:

a) actuating said print point position control means (22, 24, 26, 30) to displace said print point one character space toward a left margin,

b) accessing said memory means (34) at a selected location corresponding to said displaced print point for reading signals stored at said selected location,

c) actuating said print means (11, 13) and enabling said erase media to execute a print cycle to erase a character at said print point corresponding to signals read from said memory means (34),

said erasing typewriter being characterized in that it further includes:

first means (101, 102, 110, 111, 112) responsive to the absence of signals representing an erasable character at said selected location of said memory means (34) to inhibit said print cycle and to enable said erase media and said printing means (11, 13) to execute a print cycle on a following key actuation only if said following key actuation corresponds to actuation of a key (12) representing an erasable character.

2. Erasing typewriter according to claim 1 characterized in that said first means (101, 102, 110, 111, 112) includes:

latch means (112) set to a distinctive condition only when said erase key (25) is actuated and said selected location of said memory means (34) does not contain an erasable character.

3. Erasing typewriter according to claim 2 characterized in that it includes input means

(101, 102) to set said latch (112) if said memory means (34) contains signals representing a typewritten function or is empty at said selected location.

4. Erasing typewriter according to claim 2 or 3 characterized in that it includes logic means (103, 107, 108, 109) distinctively operated in response to depression of a printable character key (12) when said latch means (112) is set to execute an erase function and to reset said latch means (112).

5. Erasing typewriter according to claim 2 or 3 characterized in that it includes logic means (104) distinctively operated if a typewriter function key is depressed when said latch means (112) is set to execute a corresponding function and to reset said latch means (112).

6. Erasing typewriter according to claim 2 or 3 characterized in that it includes:

logic means (105) distinctively operated if a typewriter space bar (27) is depressed when said latch means (112) is set to execute a no print, no escape cycle and to reset said latch means (112).

7. Erasing typewriter according to claim 2 or 3 characterized in that it includes:

logic means (100, 106) distinctively operated if the erase key (24) is depressed when said latch means (112) is set to initiate an automatic erase cycle and to reset said latch means (112).

Revendications

1. Machine à écrire avec système d'effacement comprenant:

des moyens actionnés par touches (14, 36, 18, 38) pour engendrer des signaux représentant une touche actionnée (12),

des moyens de mémoire (34) pour emmagasiner une séquence ordonnée de signaux représentant une séquence de touches actionnées par l'opérateur,

des moyens d'impression (11, 13) comprenant des supports d'impression et d'effacement pour exécuter un cycle d'impression afin d'imprimer un caractère à un point d'impression si ledit support d'impression est conditionné, ou d'effacer un caractère à un point d'impression si ledit support d'effacement est conditionné,

des moyens de contrôle de position de point d'impression (22, 24, 26, 30) sensibles auxdits moyens actionnés par touches (14, 36, 18, 38) pour déplacer lesdits moyens d'impression (11, 13) et pour avoir accès à une position sélectionnée.

tionnée desdits moyens de mémoire (34) correspondant audit point d'impression, et des moyens d'effacement (36, 38, 22, 30) opérationnels en réponse à l'actionnement d'une touche d'effacement (25) afin d'amorcer une séquence d'opérations comprenant:

a) actionnement desdits moyens de contrôle de position de point d'impression (22, 24, 26, 30) pour déplacer ledit point d'impression d'un espacement de caractère vers la marge gauche,

b) accès auxdits moyens de mémoire (34) à une position sélectionnée correspondant audit point d'impression déplacé pour lire des signaux emmagasinés à ladite position sélectionnée,

c) actionnement desdits moyens d'impression (11, 13) et conditionnement desdits supports d'effacement pour exécuter un cycle d'impression afin d'effacer un caractère audit point d'impression correspondant aux signaux lu dans lesdits moyens de mémoire (34),

ladite machine à écrire avec système d'effacement étant caractérisée en ce qu'elle comprend, en outre:

des premiers moyens (10, 102, 111, 112) sensibles à l'absence de signaux représentant un caractère effaçable à ladite position sélectionnée desdits moyens de mémoire (34) afin d'inhiber ledit cycle d'impression et de conditionner ledit support d'effacement et ledit moyen d'impression (11, 13) pour exécuter un cycle d'impression lors de l'actionnement de la touche suivante uniquement lorsque ledit actionnement de touche suivante correspond à l'actionnement d'une touche (12) représentant un caractère effaçable.

2. Machine à écrire avec système d'effacement selon la revendication 1, caractérisée en ce que lesdits premiers moyens (101, 102, 110, 111, 112) comprennent:

des bascules à verrouillage (112) instaurées à une condition distinctive uniquement lorsque ladite touche d'effacement (25) est actionnée et ladite position sélectionnée desdits moyens de mémoire (34) ne contient pas de caractère effaçable.

3. Machine à écrire avec système d'effacement selon la revendication 2, caractérisée en ce qu'elle comprend des moyens d'entrée (101, 102) pour instaurer ladite bascule à verrouillage (112) lorsque lesdits moyens de mémoire (34) contiennent des signaux représentant une fonction de machine à écrire ou lorsqu'ils sont vides à ladite position sélectionnée.

4. Machine à écrire avec système d'effacement selon la revendication 2 ou 3, caractérisée en ce qu'elle comprend des moyens logiques (103, 107, 108, 109) actionnés distinctement en réponse à l'enfoncement d'une touche de caractère imprimable (12) lorsque ladite bascule à verrouillage (112) est instaurée pour exécuter une fonction d'effacement, et pour restaurer ladite bascule à verrouillage (112).

5. Machine à écrire avec système d'effacement selon la revendication 2 ou 3, caracté-

térisée en ce qu'elle comprend des moyens logiques (104) actionnés distinctement lorsqu'il y a enfoncement d'une touche de fonction de machine à écrire alors que ladite bascule à verrouillage (112) est instaurée pour exécuter une fonction correspondante, et pour restaurer ladite bascule à verrouillage (112).

6. Machine à écrire avec système d'effacement selon la revendication 2 ou 3, caractérisée en ce qu'elle comprend:

des moyens logiques (105) actionnés distinctement lorsqu'une barre d'espacement de machine à écrire (27) est enfoncée alors que ladite bascule à verrouillage (112) est instaurée pour exécuter un cycle de non impression, non échappement, et pour restaurer ladite bascule à verrouillage (112).

7. Machine à écrire avec système d'effacement selon la revendication 2 ou 3, caractérisée en ce qu'elle comprend:

des moyens logiques (110, 106) actionnés distinctement lorsqu'il y a enfoncement de la touche d'effacement (24) alors que ladite bascule à verrouillage (112) est instaurée pour amorcer un cycle d'effacement automatique, et pour restaurer ladite bascule à verrouillage (112).

Patentansprüche

1. Schreibmaschine mit Zeichenlöschvorrichtung, vom Typ mit:

durch Tasten betätigten Mitteln (14, 36, 18, 38) zur Erzeugung von Signalen, die eine betätigte Taste darstellen (12),

Speichermitteln (34) zum Speichern einer geordneten Folge von Signalen, die eine Folge von betätigten Tasten darstellen,

Druckmitteln (11, 13) einschliesslich Druck- und Löschmedien für die Ausführung eines Druckzyklus zum Drucken eines Zeichens an einem Druckpunkt, wenn das besagte Druckmedium freigegeben wird, oder zum Löschen eines Zeichens an einem Druckpunkt, wenn das besagte Löschmedium freigegeben wird,

Mitteln für die Steuerung der Druckpunktposition (22, 24, 26, 30) die auf die besagten tastenbetätigten Mittel (14, 36, 18, 38) ansprechen und die besagten Druckmittel (11, 13) bewegen und Zugang zu einer ausgewählten Stelle der besagten Speichermittel (34) gestatten, die dem besagten Druckpunkt entsprechen, und

Löschmitteln (36, 38, 22, 30), die auf die Betätigung einer Lösch Taste (25) ansprechen, um eine zweite Folge von Vorgängen einzuleiten, die enthält:

a) die Betätigung der besagten Mittel für die Steuerung der Druckpunktposition (22, 24, 26, 30) für die Verstellung des besagten Druckpunkts um eine Zeichenposition zum linken Rand hin,

b) Zugang zu den besagten Speichermitteln (34) an einer ausgewählten Stelle, die dem

besagten verschobenen Druckpunkt entspricht, zum Lesen der an der besagten ausgewählten Stelle gespeicherten Signale,

c) Betätigung der besagten Druckmittel (11, 13) und Freigabe der besagten Löschmittel, um einen Druckzyklus auszuführen, in dem ein Zeichen am besagten Druckpunkt gelöscht wird, das den in den besagten Speichermitteln (34) gelesenen Signalen entspricht,

wobei die besagte Schreibmaschine mit Zeichenlöschvorrichtung dadurch gekennzeichnet ist, dass sie ferner enthält:

erste Mittel (101, 102, 110, 111, 112), die aus das Fehlen von Signalen ansprechen, welche ein löschbares Zeichen an der besagten ausgewählten Stelle der besagten Speichermittel (34) darstellen, um den besagten Druckzyklus zu sperren, und die besagten Löscho- und Druckmittel (11, 13) freigeben, auf nachfolgende Tastenbetätigung hin einen Druckzyklus auszuführen, nur wenn die nachfolgende Tastenbetätigung der Betätigung einer Taste (12) entspricht, die ein löschbares Zeichen darstellt.

2. Schreibmaschine mit Zeichenlöschvorrichtung gemäss Anspruch 1, dadurch gekennzeichnet, dass die besagten ersten Mittel (101, 102, 110, 111, 112) enthalten:

Sperrvorrichtung (112), die nur dann in den Sperrzustand versetzt wird, wenn die besagte Löschtaste (25) betätigt wird und die besagte Stelle der besagten Speichermittel (34) kein löschbares Zeichen enthält.

3. Schreibmaschine mit Zeichenlöschvorrichtung gemäss Anspruch 2, dadurch gekennzeichnet, dass sie Eingabemittel (101, 102) enthält, um die besagte Sperrvorrichtung (112) einzusetzen, wenn die besagten Speichermittel (34) Signale enthalten, die eine Schreibfunk-

tion darstellen oder an der besagten ausgewählten Stelle leer sind.

4. Schreibmaschine mit Zeichenlöschvorrichtung gemäss Anspruch 2 oder 3, dadurch gekennzeichnet, dass sie logische Mittel (103, 107, 108, 109) enthält, die in Antwort auf die Betätigung einer druckbaren Zeichentaste (12) nur wirksam werden, wenn die besagte Sperrvorrichtung (112) eingesetzt ist, um eine Löschfunktion auszuführen, und die besagte Sperrvorrichtung (112) wieder einzusetzen.

5. Schreibmaschine mit Zeichenlöschvorrichtung gemäss Anspruch 2 oder 3, dadurch gekennzeichnet, dass sie logische Mittel (104) enthält, die nur wirksam werden, wenn eine Schreibmaschinenfunktionstaste betätigt wird, während die besagte Sperrvorrichtung (112) eingesetzt ist, um eine entsprechende Funktion auszuführen und die besagte Sperrvorrichtung (112) wieder einzusetzen.

6. Schreibmaschine mit Zeichenlöschvorrichtung gemäss Anspruch 2 oder 3, dadurch gekennzeichnet, dass sie enthält:

logische Mittel (105), die nur wirksam werden, wenn die Leerzeichenstange der Schreibmaschine (27) betätigt wird, während die besagte Sperrvorrichtung (112) eingesetzt ist, um einen Zyklus ohne Druck und ohne Umschaltung auszuführen, und die besagte Sperrvorrichtung (112) wieder einzusetzen.

7. Schreibmaschine mit Zeichenlöschvorrichtung gemäss Anspruch 2 oder 3, dadurch gekennzeichnet, dass sie enthält:

logische Mittel (100, 106), die nur wirksam werden, wenn die Löschtaste (24) gedrückt wird, während die besagte Sperrvorrichtung (112) eingesetzt ist, um einen automatischen Löschozyklus einzuleiten und die besagte Sperrvorrichtung (112) wieder einzusetzen.

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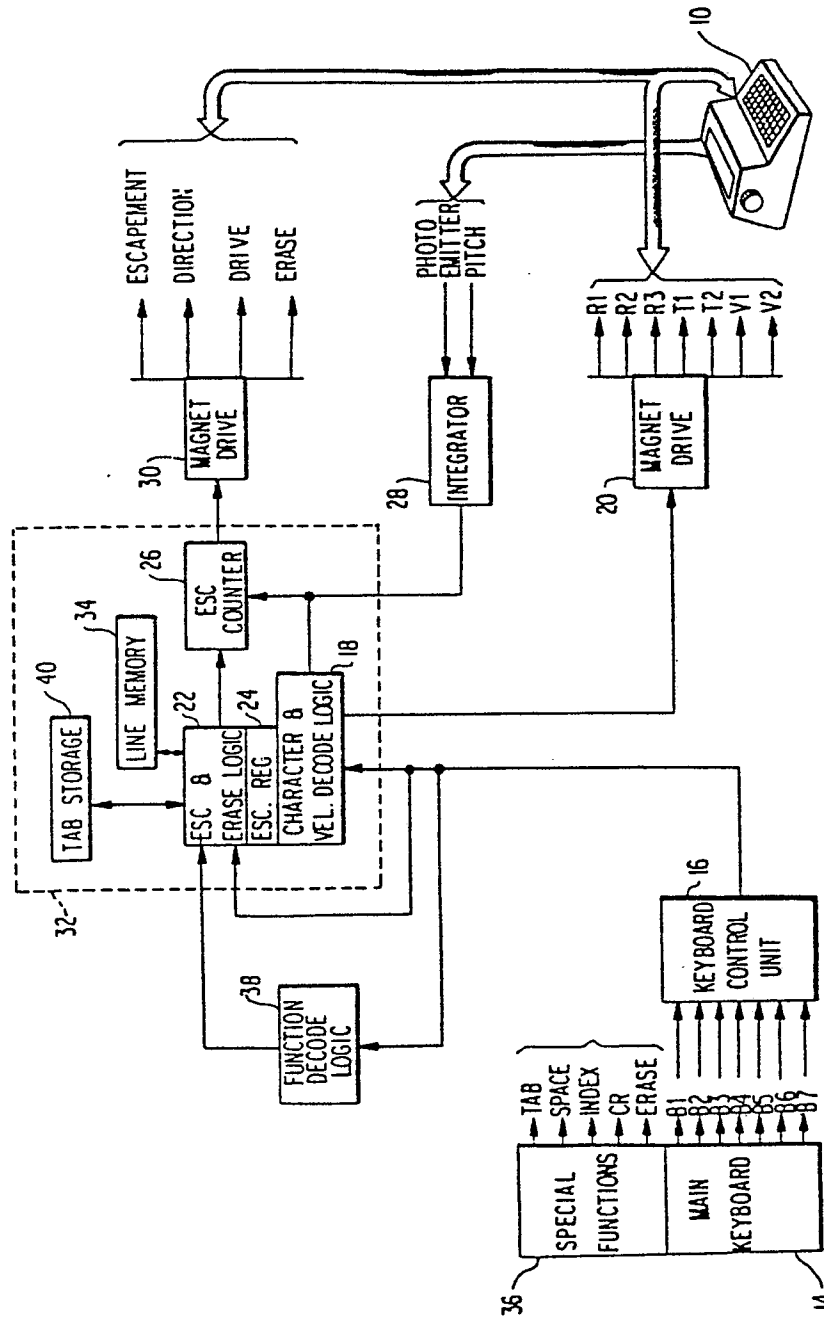


FIG. 1

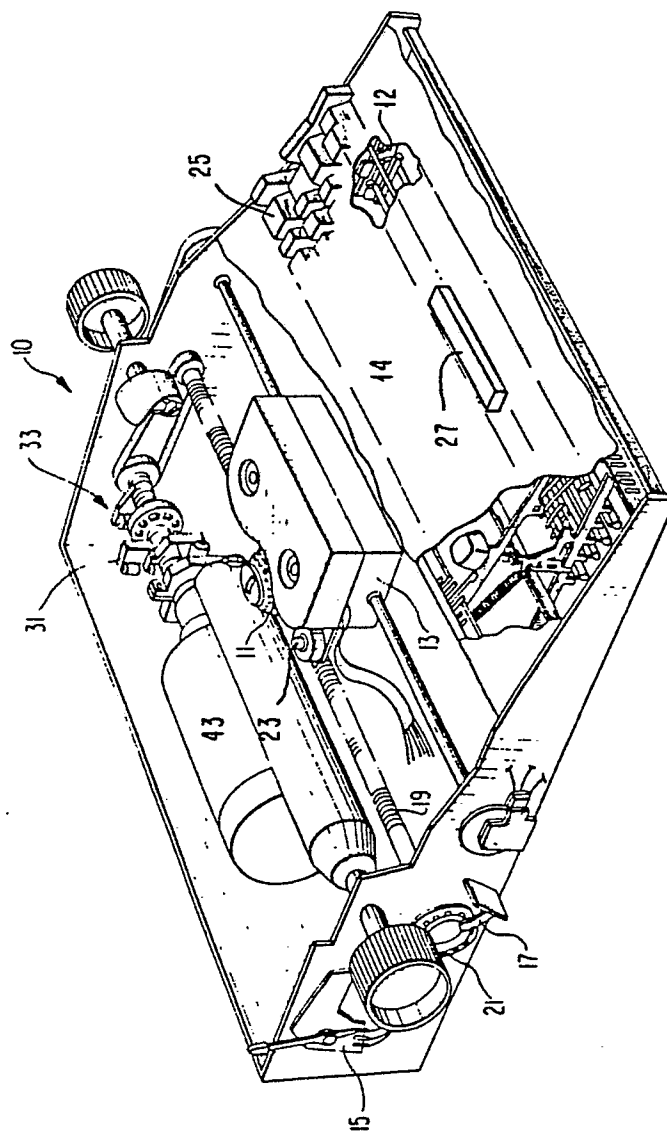


FIG. 2

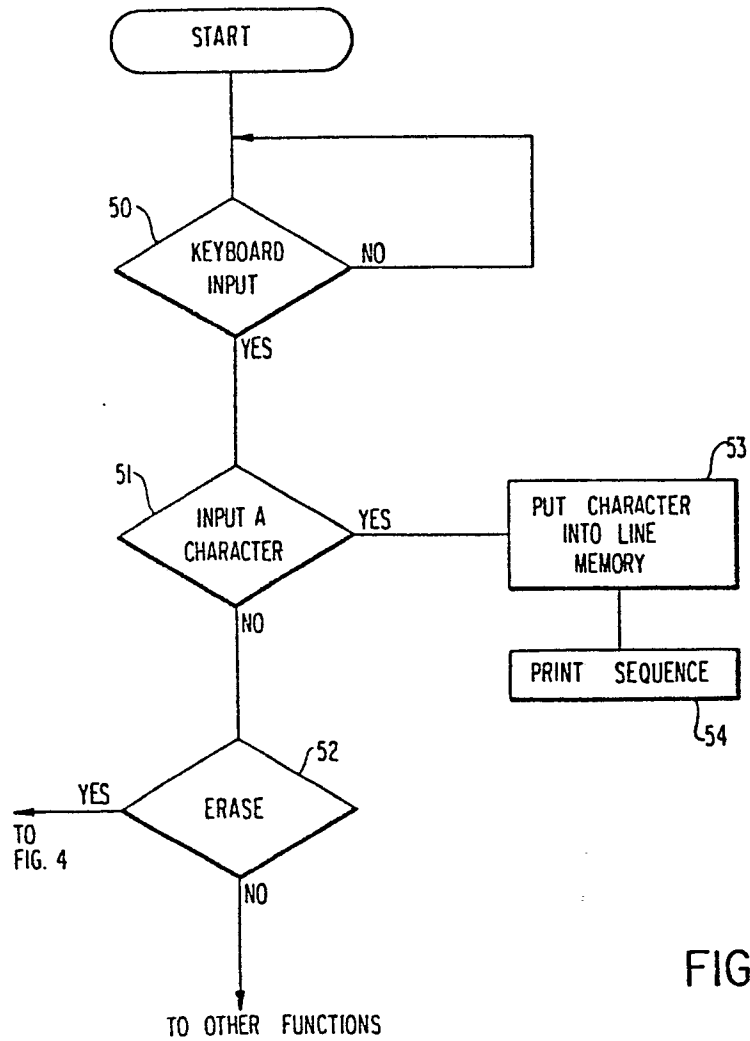
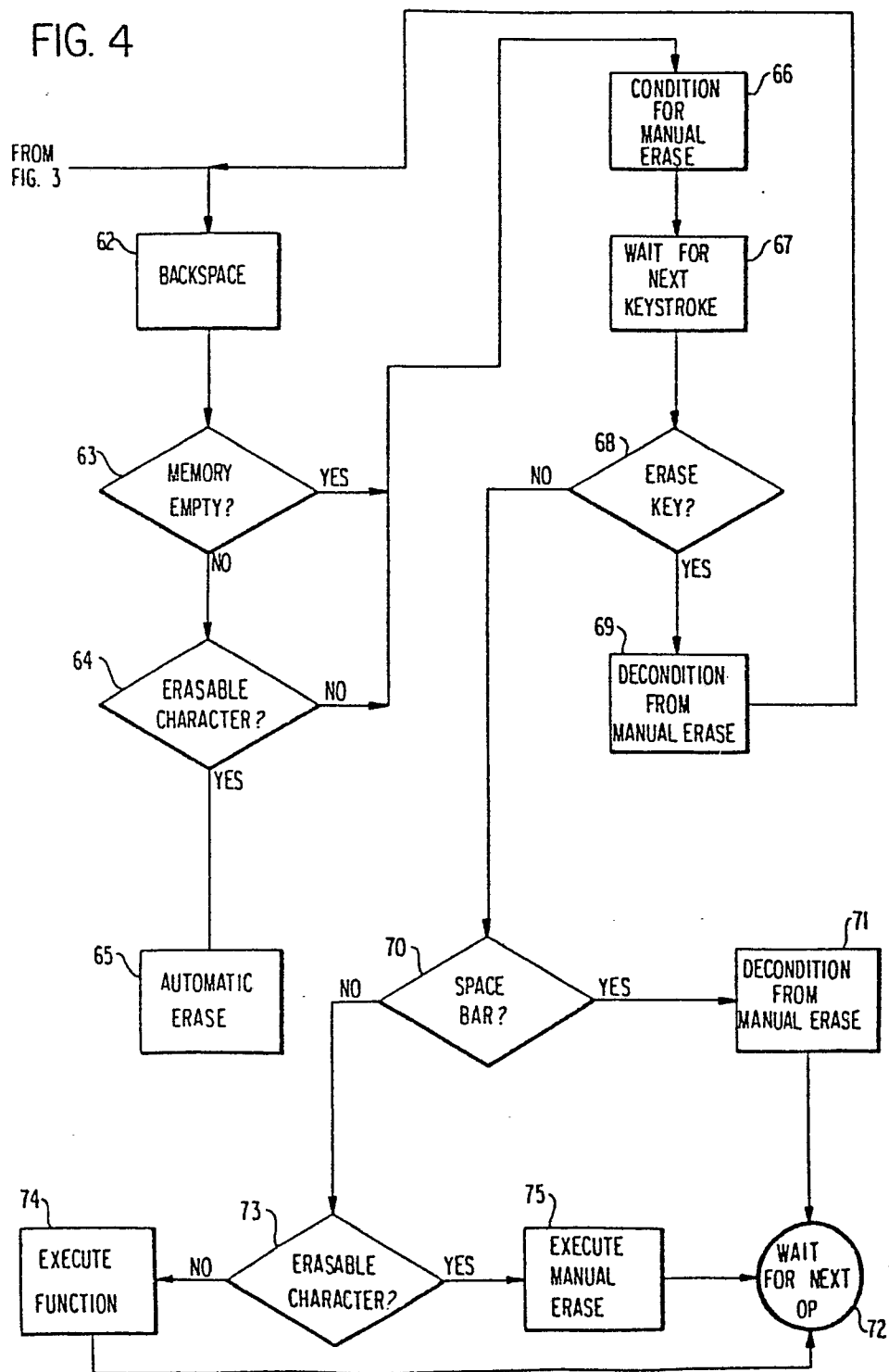


FIG. 3

FIG. 4



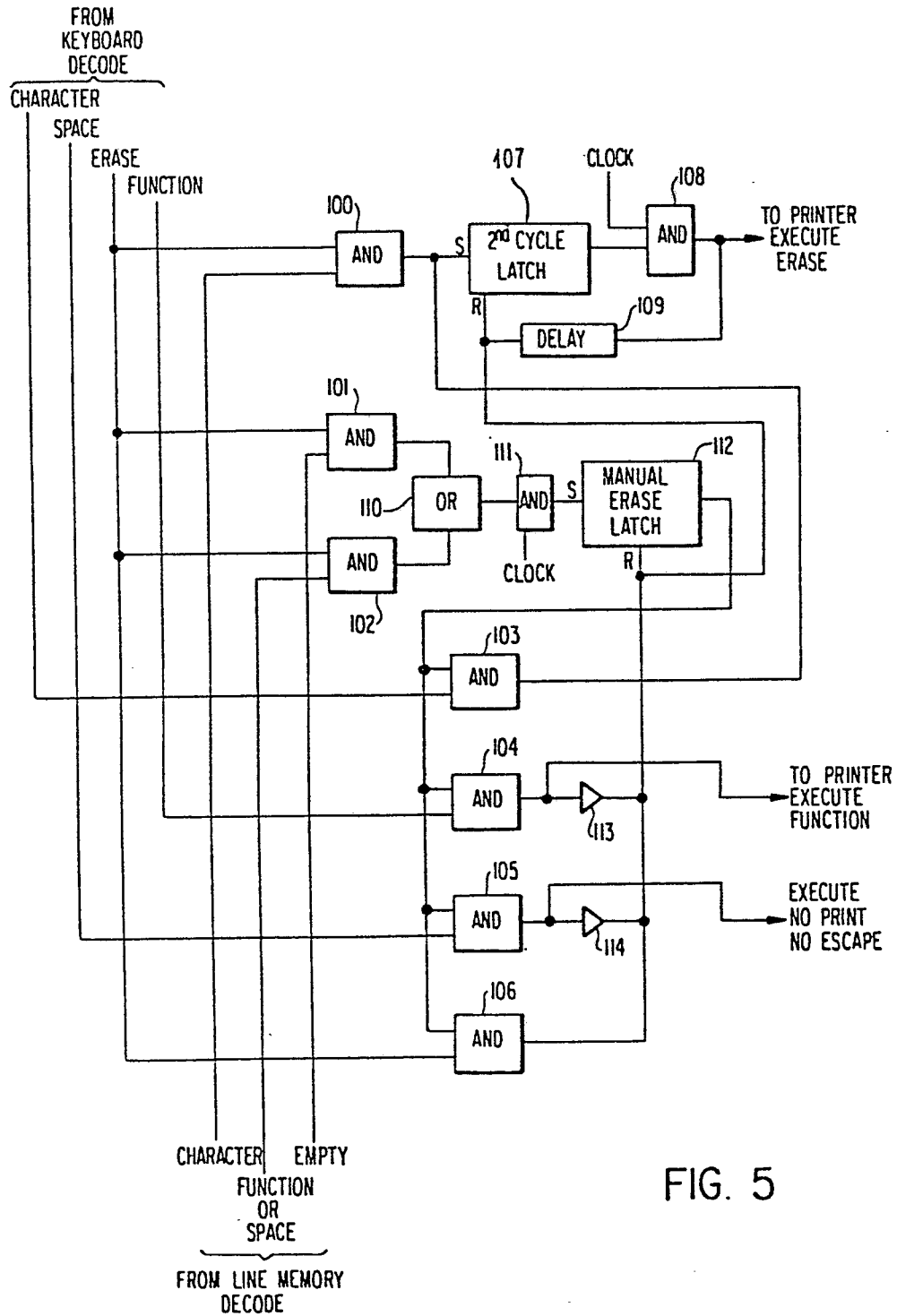


FIG. 5