

- [54] **POWER-ASSISTED LINE INDICATOR FOR USE IN TYPING LINED COPY**
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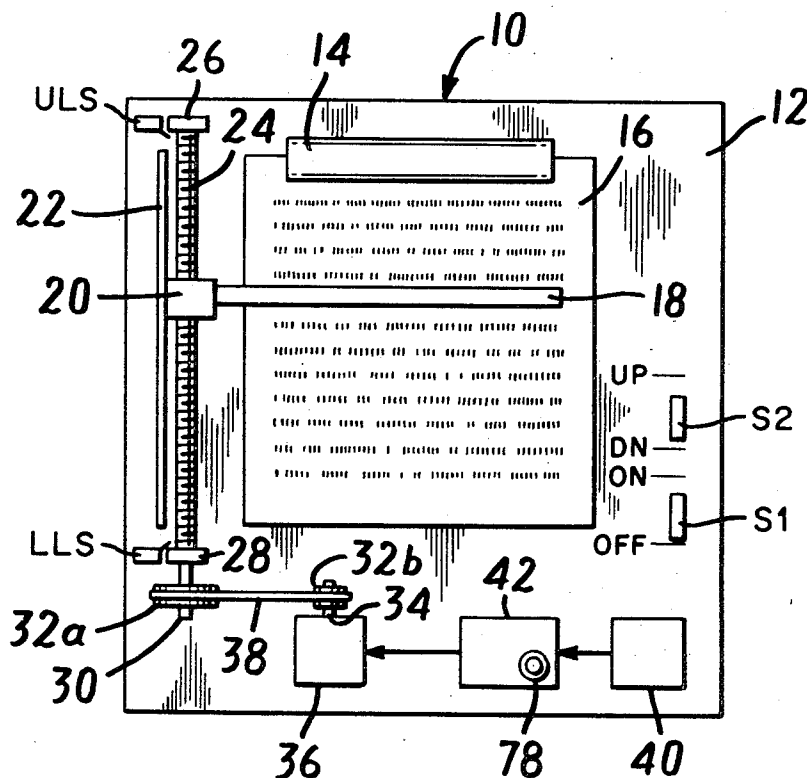
- [52] U.S. Cl. 197/181.2, 40/343, 318/460
[51] Int. Cl. B41j 11/44
[58] Field of Search 197/12, 17, 127, 197/180, 181.1, 181.2; 318/460; 40/341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357

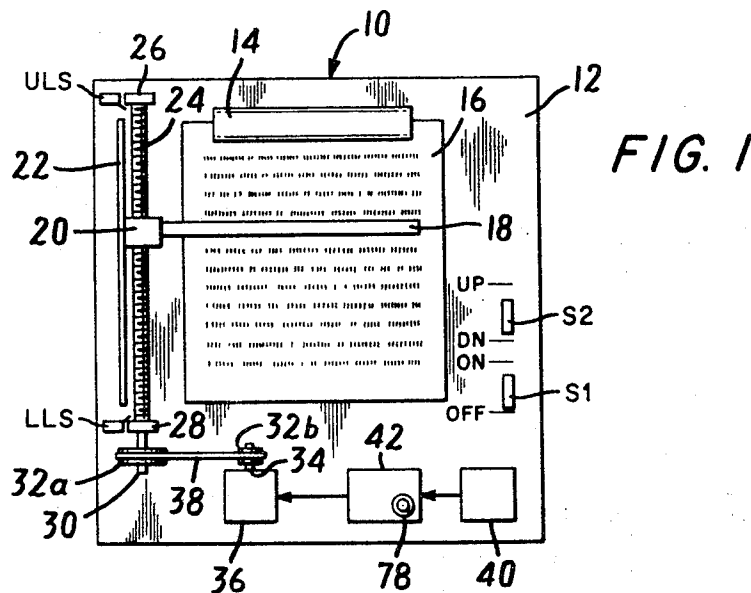
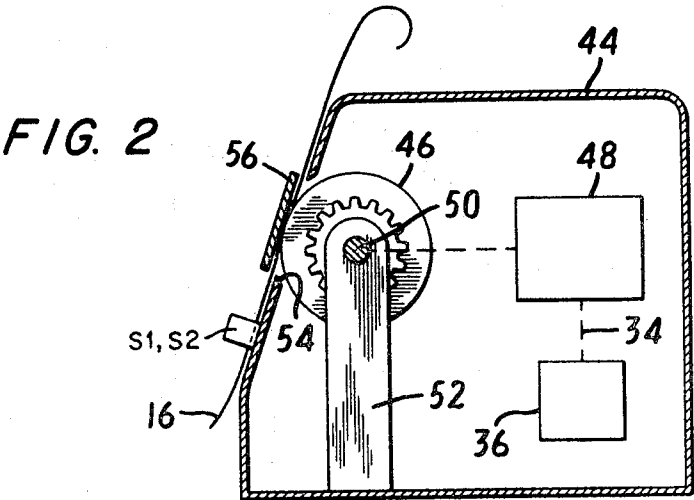
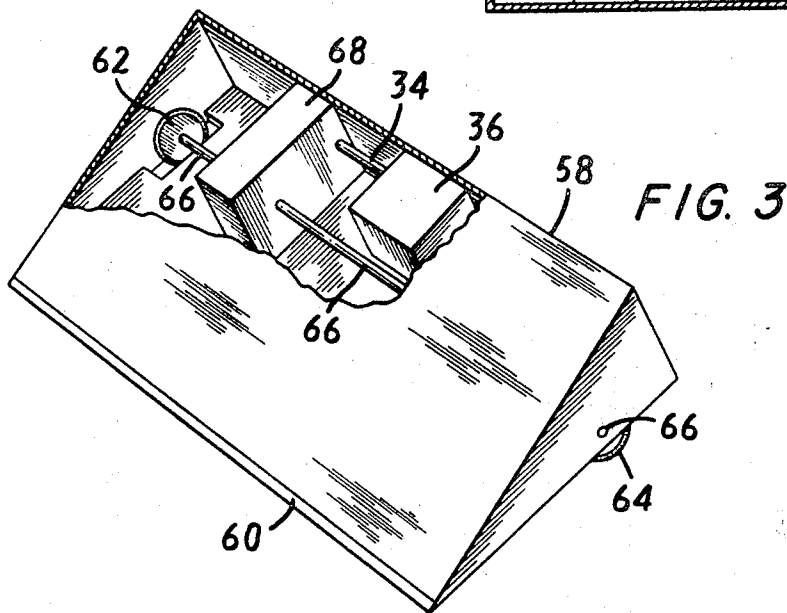
Primary Examiner—Ernest T. Wright, Jr.
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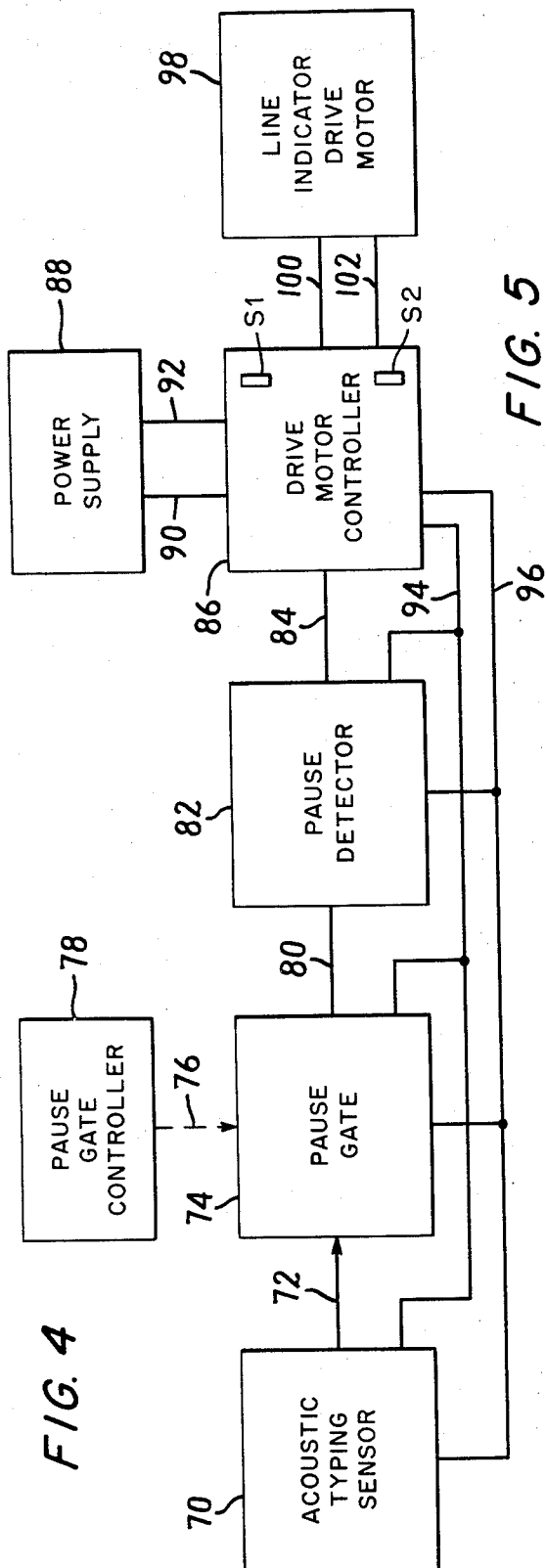
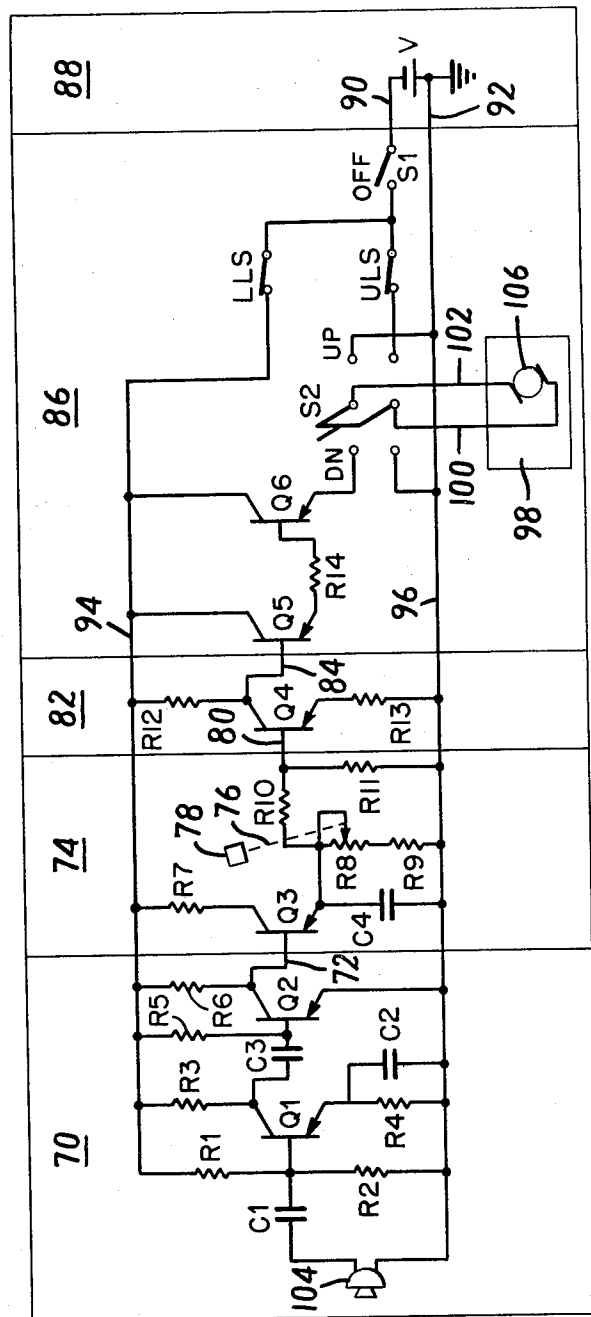
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[57] **ABSTRACT**
The drive motor of a power-assisted line indicator is energized and deenergized respectively in response to the occurrence of a preselected pause in typing activity and the subsequent renewal of typing activity.

21 Claims, 5 Drawing Figures







POWER-ASSISTED LINE INDICATOR FOR USE IN TYPING LINED COPY

FIELD OF THE INVENTION

This invention pertains to power-assisted apparatus and systems for use in highlighting individual lines of lined copy material to be entered in a keyboard.

BACKGROUND OF THE INVENTION

Presently employed typing copyholders are generally of the all-mechanical type, wherein an actuating bar is depressed by the typist and initiates operation of mechanism for stepping the copyholder line indicator to the next line of copy to be highlighted.

Various efforts have been undertaken to introduce power assistance in such mechanical copyholders for typist convenience and fatigue reduction. In such efforts, electrical motors have been provided which respond to operation of a switch by the typist to perform the stepping function. Such switches may be actuated by typewriter-mounted keys or buttons as in Vincent U.S. Pat. No. 3,369,313 and Stevens patent No. 2,153,109, by a pedal associated with the copyholder as in Di Pasquale et al. U.S. Pat. No. 3,449,849 or by typewriter platen advance mechanism as in Sperling U.S. Pat. No. 1,919,399.

Such known power-assisted copyholders share a primary performance limitation in common with the completely mechanical copyholder based on their line-stepping operation. Thus, even where the copy comprises evenly spaced lines of matter, an initial typist adjustment as to step magnitude is necessary. Where the copy comprises lines of matter which are not evenly spaced, the typist is required to set the copyholder to one-line step magnitude and to actuate the copyholder switch respectively where she confronts multiple spacing between lines. Evident structural complexities attend those of the foregoing copyholders which seek to place their switch elements in position for actuation by mechanism of the typewriter. All of the foregoing copyholders are limited by their requirement for typist manipulative input thereto for line indicator stepping.

In a still further version of a power-assisted copyholder, shown in Johnson U.S. Pat. No. 2,530,702, a motor apparently advances copy whenever typing activity occurs which induces predetermined vibration of the typewriter platen as detected by an electromagnetic sensor having a vibratory element secured to the platen operating knob. This type of copyholder, as is the case for certain of the above-discussed copyholders, does not permit desired physical independence between the same and the typewriter. While it presents an apparent advantage over prior copyholders in not being limited to discrete line-stepping operation, i.e., the motor thereof advances copy continuously during typing activity, this type of copyholder apparently does not fulfill a commonly desired copyholder objective, namely, selective movement of the line indicator into temporarily fixed position for highlighting a line of copy. To the contrary, it appears that this type of copyholder maintains its line indicator in completely fixed position only when typing activity does not occur.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an improved power-assisted copyholder.

It is a further object of the invention to provide a power-assisted copyholder not requiring typist manipulative input thereto to initiate line indicator advance.

It is another object of the invention to provide a power-assisted copyholder not requiring typist manipulative input thereto for line spacing control.

It is a still further object of the invention to provide a power-assisted copyholder responsive to typing activity to discontinue movement of its line indicator, thereby adapting its operation to the performance demands of the typist.

In attaining these and other objects, the invention provides line indicator apparatus including drive means therefor and a system generating a control signal for selectively energizing the drive means. The system incorporates sensor means providing output signals indicative of typing activity and circuit means initiating generation of the control signal upon non-occurrence of the sensor means output signals for a preselected time period and discontinuing the generation of the control signal upon subsequent occurrence of sensor means output signals.

The foregoing and other objects and features of the invention will be evident from the following detailed description of preferred embodiments of the invention and from the drawing wherein like reference numerals identify like parts throughout.

BRIEF DESCRIPTION OF THE DRAWING

FIGS. 1 and 2 illustrate different embodiments of copyholder and line indicator apparatus in accordance with the invention.

FIG. 3 illustrates mobile copy line indicator apparatus in accordance with the invention.

FIG. 4 is a block diagram of the system of the invention.

FIG. 5 is a schematic diagram of a preferred circuit implementation of the system of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, copyholder 10 comprises apparatus for use in entering the content of lined copy in a keyboard and includes face plate member 12 supporting clip 14 for removably securing lined copy 16 in indicated position thereon. An indicator means comprising line indicator 18 is supported transversely of plate member 12 for downward (line highlighting) and upward (return) movement on traveling nut assembly 20. As shown schematically, assembly 20 is restrained against rotation by guide 22 and moves threadably along lead screw 24 upon rotation of the screw 24. Screw 24 is supported for rotation in bearings 26 and 28 and screw extension 30 is keyed to pulley 32a. Pulley 32b is keyed to shaft 34 of line indicator drive motor 36 and endless belt 38 engagingly encircles the pulleys 32a and 32b, thus imparting rotation to screw 24 when the motor 36 is energized. Elements 20-38 thus comprise a motive means for moving the indicator means. Switch S1 is placed in its ON position during use of copyholder 10. Switch S2 is placed in its DN position for line highlighting and in its UP position for line indicator return.

A sensor means, comprising typing sensor 40, e.g., a microphone responsive to acoustic signals generated in the course of typing activity, is supported by copyholder 10 as is circuit means comprising electronic sys-

tem 42 responsive to the sensor 40 for selectively energizing drive motor 36 in a manner discussed in detail hereinafter (FIG. 4).

In FIG. 2, an alternate copyholder structure is shown wherein casing 44 includes therewithin copy drive means including roller 46 driven through reduction gears 48 by the output shaft 34 of motor 36. Roller 46 is supported for rotation on shaft 50 in turn supported by opposed struts 52. Roller 46 extends through opening 54 forwardly of the casing face plate to the undersurface of line indicator 56, which is fixedly supported relative to the casing 44. Copy 16 positioned against the undersurface of indicator 56 is advanced by roller 46 when motor 36 is energized. An individual line of copy is highlighted by indicator 56 when roller 46 is stationary.

A still further embodiment of apparatus for copy line indication in accordance with the invention is illustrated in FIG. 3. Therein, mobile casing 58 includes a line indicating marginal portion 60 and wheels 62 and 64 supporting the casing for movement. Wheel shaft 66 is driven through reduction gears 68 by shaft 34 upon energization of motor 36. In the apparatus of FIGS. 2 and 3, motor 36 is also energized by the system of FIG. 4 contained in casings 44 and 58.

In FIG. 4, acoustic typing sensor 70 generates electrical output signals indicative of typing activity and the same are applied by line 72 to pause gate 74. Gate 74 is settable to a preselected measure of typist pause by input thereto on line 76 from pause gate controller 78. This controller 78 may comprise a simple control knob as in FIG. 1. The gate 74 is operative on each occurrence of such preselected pause in typing activity to change the signal applied by the gate 74 to line 80 and pause detector 82 is operatively responsive to such line 80 signal change to in turn change the signal it applies on line 84 to drive motor controller 86.

On placing S1 to its ON position, controller 86 derives operating power from power supply 88 which applies its terminal voltage difference to the controller 86 through lines 90 and 92. Sensor 70, gate 74 and detector 82 derive their operating power from the controller 86 over lines 94 and 96. Line indicator drive motor 98 is a d.c. motor and derives operating power from the controller 86 over lines 100 and 102 which may be selectively energized by the controller 86 to effectuate line indicator movement on the occurrence of the above-discussed signal change on line 84. Alternatively, these lines 100 and 102 may be energized by placing of S2, an operator controllable means in its UP position.

In operation of the system of FIG. 4, with S1 ON and S2 DN, controller 86 energizes line 94 and 96. Sensor 70 senses typing activity and generates electrical signals responsive to operation of typewriter keys. Pause gate controller 78, a further operator-controllable means, is set at will by the typist in a manner discussed more fully hereinafter. During normal typing activity involving pauses between successive key operations of durations less than the pause duration corresponding to the setting of pause gate controller 78, pause gate 74 applies a signal on line 80 which detector 82 recognizes as not being indicative of a pause to be detected. Conversely, where a pause occurs in typing activity of duration greater than the pause duration corresponding to the setting of controller 78, pause gate 74 changes the character of the line 80 signal and detector 82, cogni-

zant of such change, thereupon changes the character of the signal it applies to line 84 and thus informs controller 86 of the occurrence of such pause. Typically, the typist sets controller 78 such that each pause of duration, e.g., several seconds, initiates signal changing activity on line 80 and hence on line 84. On the occurrence of such pause, controller 86 energizes line indicator drive motor 98 to move the line indicator 18 continuously until expiration of the pause. Positive termination of the pause is brought on in accordance with the invention on the renewal of typing activity. Thus, when the typist strikes the key corresponding to the first letter of the line highlighted by the then moving line indicator 18, sensor 70 generates a signal indicative thereof and units 74 and 82 discontinue the signal change effected on lines 80 and 84 whereupon controller 86 discontinues energization of line indicator drive motor 98.

In effect, the generalized system generates a control signal for selectively energizing the line indicator drive motor 98, such control signal being initiated upon the non-occurrence of typing sensor output signals for a preselected time period and being positively discontinued on the subsequent occurrence, i.e., recurrence of typing sensor output signals.

In the particularized system embodiment of FIG. 5, sensor 70 includes a microphone 104 having an acoustic frequency sensitivity range inclusive of and preferably limited to the frequencies of acoustic signals which occur on the operation of keys of a typewriter keyboard. Electrical signals generated by the microphone 104 are amplified and filtered in the stage incorporating transistor Q1. The reference designations "Q", "C" and "R" are employed respectively for identification of transistors, capacitors and resistors in accordance with custom in the electronics industry. These amplified signals are further amplified, rectified and clipped in the stage incorporating Q2. The collector of Q2 is coupled over line 72 to the base of Q3. The emitter of Q3 is connected to capacitor C4, the level of charge of which is indicative of typing activity.

By way of explanation of the charging of C4, let it be assumed that the system is in its quiescent mode, i.e., that an individual line of copy material highlighted by the line indicator 18 is being typed. The succession of substantially sinusoidal signals generated by microphone 104 and applied through C1 to the base of Q1 are amplified and inverted in Q1 and applied to Q2. Q2, biased to saturation in the absence of signal input thereto, is rendered less conductive upon positive excursions of the collector of Q1, i.e., upon negative excursions of the signals generated by microphone 104. When Q2 is rendered less conductive, the collector thereof goes toward -V potential and conduction in Q3 increases substantially, thereby charging C4. On negative excursions of the collector of Q1, the collector of Q2 recedes from -V potential rendering the base of Q3 more positive than the emitter of Q3, thus back-biasing Q3. In effect, Q3 selectively applies direct current to C4.

Variable resistor R8 and fixed resistor R9 are series-connected in parallel circuit with C4 and provide, with R10, R11 and Q4, a variably settable discharge circuit for the capacitor C4. The time constant of this discharge circuit may be adjusted by manipulation of pause gate controller 78, the same providing a mechanical input by link 76 to the wiper of R8. During the system quiescent mode under discussion, no effective dis-

charge of C4 occurs, the time spacing between typist operation of keys and hence the charging of C4 taking place at a rate substantially faster than the rate of discharge determined by such time constant. Accordingly, C4 readily charges toward $-V$ potential, thereby maintaining the base of Q4 at a substantially negative potential and rendering Q4 highly conductive. The collector of Q4 applies a somewhat negative potential to the base of Q5 over line 84 and the dual emitter follower comprised of Q5 and Q6 is in nominal conduction or is non-conductive. With switch S2 in its left hand closed position, armature 106 of drive motor 98 is connected in the emitter circuit of Q6 and nominal current, substantially less than that required for motor energization, i.e., motor rotor movement, may flow through the armature 106.

Upon the completion of the typing of the highlighted line, no acoustical signals emanate from the keyboard and microphone 104 discontinues its signal generation. The system shifts to its dynamic mode, wherein Q2 is in a state of continuous saturation and the base-emitter junction of Q3 is continuously back-biased. As C4 commences its discharge, the potential at the base of Q4 thereby gradually changes toward ground potential. During the course of such discharge of C4, the base-emitter junction of Q4 approaches ground potential, conduction in Q4 decreases and the collector of Q4, line 84 and the base of Q5 go toward $-V$ potential. At this time Q5 and Q6 are rendered highly conductive, Q6 thereby energizing drive motor 98.

As will be evident, the time interval between the cessation of microphone 104 output signals and the changes of potential of lines 80 and 84, which cause motor energization, may be adjusted by changing the resistance R8. As will also be evident, the current supplied to armature 106 of motor 98 increases gradually to maximum level to provide for variable speed line indicator movement. Thus, as will be generally desirable, the line indicator 18 is moved slowly upon initial energization of motor 98 and then at higher speed.

Following such energization of drive motor 98, the line indicator 18 will highlight the next successive line of copy. At the instant such line is fully highlighted, the typist will naturally commence typing thereof and microphone 104 again generate a succession of sinusoidal signals, the first of which occurs upon the typing of the initial letter in such sentence. The system will thereupon revert to its quiescent mode. By the circuit arrangement of FIG. 5 and particularly with the circuit element values selected in accordanc with Table I below, such initial key operation is alone effective to discontinue the energization of drive motor 98, thereby discontinuing movement of the line indicator 18 such that the line indicator 18 is retained in exact registration with the line being highlighted. To this extent, the FIG. 5 circuit reverts to the above-discussed instance whereby Q3 is rendered selectively conductive to charge C4 to a level sufficient to increase Q4 current and hence to decrease the current in Q5 and Q6 to a level below that required for motor energization.

As indicated above, the system of FIG. 5 makes the transition from its quiescent operation mode to its dynamic operating mode only upon the occurrence of a preselected pause in typing activity. Where pauses occur during typing activity which are of lesser duration than such preselected pause set into pause gate 74, e.g., momentary typist hesitation during the course of

typing a given highlighted line, the attendant discharge of C4 is not of magnitude sufficient to effect the state of conduction of Q4-Q6 to provide current to armature 106 of magnitude sufficient to energize the drive motor 98. In the event that typing activity is interrupted intentionally in the course of the typing of a highlighted line, e.g., by reason of the need to attend to a telephone call or the like, the typist need only place switch S1 in its OFF position to discontinue operation of the system. Upon renewing typing activity, the typist preferably completes the typing of the then highlighted line prior to placing switch S1 in its ON position.

At the conclusion of the typing of the given sheet of copy, the line indicator 18 may be readily moved by the drive motor to its uppermost position by placing switch S2 in its UP position, thereupon connecting armature 106 directly to power supply 88 such that reverse rotation of motor 98 occurs. The line indicator 18 is thereby advanced upwardly in FIG. 1 until upper limit switch ULS is tripped. This switch ULS and lower limit switch LLS are effective on tripping thereof, to interrupt connection of supply 88 to motor 98 (FIG. 5).

By virtue of its inclusion of typing sensor 40 in its apparatus and system, the invention eliminates need for typist manipulative input for each line advance operation. By virtue of the constitution of its system for drive motor control, the invention eliminates the need for typist input for line spacing control. Thus, the line indicator 18 is controlled by the system of the invention, without stepping mechanism, to advance to the next copy line to be highlighted irrespective of the relative spacing thereof from the previously highlighted line and is retained in such position on renewal of typing activity. Such arrangement is of evident advantage where variably spaced lined copy is typed. In addition, the invention avoids the need for interconnection, mechanical or electrical, between the apparatus thereof and the keyboard machine with which the apparatus is used.

TABLE I

R1	68 K	C1	0.01 μ
R2	22 K	C2	1 μ
R3	4.7 K	C3	0.1 μ
R4	2.2 K	C4	50 μ
R5	100 K		
R6	2.7 K	Q1-Q5	2N414
R7	100	Q6	2N1539
R8	50 K		
R9	4.7 K	V	6 volts
R10	10 K		
R11	10 K		
R12	10 K		
R13	470		
R14	47		

Various modifications of the disclosed invention will be evident to those skilled in the art. Thus, the circuitry of FIG. 5, while illustrated as embodying analog operation, may readily include circuitry embodying digital operation. Also, additional circuit elements may be introduced to provide for speed control of drive motor 98. Typing sensor 40 may be comprised of a sensor having other than acoustic sensitivity and the system of the invention may readily provide for line indication by apparatus of type other than that illustrated in FIGS. 1-3. The particularly disclosed embodiments of the apparatus and system of the invention are thus intended in an illustrative and not in a limiting sense. The true spirit and scope of the invention is defined in the following claims.

What is claimed is:

1. Apparatus for use in entering the content of lined copy in a keyboard comprising:
 - a. a plate member for supporting said lined copy;
 - b. indicator means supported for movement relative to said plate member for indicating lines of said copy individually;
 - c. motive means for moving said indicator means in a first direction during occurrence of a control signal;
 - d. sensor means for generating an output signal indicative of said entering of the copy content in said keyboard; and
 - e. circuit means responsive to said sensor means for initiating generation of said control signal upon non-occurrence of said sensor means output signal for a preselected time period and for discontinuing generation of said control signal upon subsequent occurrence of said sensor means output signal.
2. The apparatus claimed in claim 1 wherein said circuit means includes first operator-controlled means for controlling the extent of said preselected time period.
3. The apparatus claimed in claim 2 including second operator-controlled means for generating a further control signal, said motive means moving said indicator means in a direction opposite said first direction during generation of said further control signal.
4. The apparatus claimed in claim 1 wherein said motive means comprises an electric motor energized by said control signal, said apparatus supporting a lead screw for rotation by said motor, said lead screw supporting a nut assembly for travel thereon, said nut assembly supporting said indicator means.
5. The apparatus claimed in claim 1 wherein said sensor means comprises an acoustic sensor contained in said apparatus.
6. In combination, in apparatus for use in entering the content of lined copy in a keyboard:
 - a. indicator means supported for movement relative to said copy for indicating lines of said copy individually;
 - b. motive means for moving said indicator means;
 - c. a voltage source;
 - d. sensor means for generating an output signal indicative of the entering of the copy content in said keyboard; and
 - e. circuit means responsive to said sensor means for connecting said voltage source and said motive means for energizing of said motive means during each time interval between non-occurrence of said sensor means output signal for a preselected time period and recurrence of said sensor means output signal.
7. The invention claimed in claim 6 wherein said circuit means includes operator-controlled means for controlling the extent of said preselected time period.
8. The invention claimed in claim 6 wherein said sensor means comprises an acoustic sensor.
9. In combination, in apparatus for use in entering the content of lined copy in a keyboard:
 - a. indicator means supported for movement relative to said copy for indicating lines of said copy individually;
 - b. motive means for moving said indicator means during occurrence of a control signal;
 - c. sensor means for generating an output signal indicative of the entering of the copy content in said keyboard; and

- d. circuit means responsive to said sensor means for initiating generation of said control signal upon non-occurrence of said sensor means output signal for a preselected time period and for discontinuing generation of said control signal upon subsequent occurrence of said sensor means output signal.
10. The invention claimed in claim 9 wherein said circuit means includes operator-controlled means for controlling the extent of said preselected time period.
11. The invention claimed in claim 9 wherein said sensor means comprises an acoustic sensor.
12. Apparatus for highlighting individual lines of a lined copy sheet having content to be entered in a keyboard, comprising:
 - a. a mobile casing having a line indicating marginal portion;
 - b. drive means supporting said casing for movement on the surface of said sheet;
 - c. sensor means for generating an output signal indicative of said entering of the copy content in said keyboard; and
 - d. means responsive to said sensor means for energizing said drive means upon non-occurrence of said sensor means output signal for a preselected time period.
13. Apparatus for use in entering the content of lined copy in a keyboard comprising:
 - a. a mobile casing having a line indicating marginal portion;
 - b. motive means for moving said casing in a first direction relative to said copy during occurrence of a control signal;
 - c. sensor means for generating an output signal indicative of said entering of the copy content in said keyboard; and
 - d. circuit means responsive to said sensor means for initiating generation of said control signal upon non-occurrence of said sensor means output signal for a preselected time period and for discontinuing generation of said control signal upon subsequent occurrence of said sensor means output signal.
14. The apparatus claimed in claim 13 wherein said circuit means includes first operator-controlled means for controlling the extent of said preselected time period.
15. The apparatus claimed in claim 14 including second operator-controlled means for generating a further control signal, said motive means moving said casing in a direction opposite said first direction during generation of said further control signal.
16. Apparatus for use in entering the content of lined copy in a keyboard comprising:
 - a. a line indicator fixedly supported in said apparatus for indicating lines of said copy individually;
 - b. copy drive means for advancing said copy in a first direction relative to said line indicator during occurrence of a control signal;
 - c. sensor means for generating an output signal indicative of said entering of the copy content in said keyboard; and
 - d. circuit means responsive to said sensor means for initiating generation of said control signal upon non-occurrence of said sensor means output signal for a preselected time period and for discontinuing generation of said control signal upon subsequent occurrence of said sensor means output signal.

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17. The apparatus claimed in claim 16 wherein said circuit means includes first operator-controlled means for controlling the extent of said preselected time period.

18. The apparatus claimed in claim 17 including second operator-controlled means for generating a further control signal, said copy drive means advancing said copy in a direction opposite said first direction during generation of said further control signal.

19. In combination, in apparatus for use in entering the content of lined copy in a keyboard:

- a. indicator means supported for movement relative to said copy for indicating lines of said copy individually;
- b. motive means for moving said indicator means

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during occurrence of a control signal;

c. sensor means for generating an output signal indicative of the entering of the copy content in said keyboard; and

d. circuit means responsive to said sensor means for initiating generation of said control signal upon non-occurrence of said sensor means output signal for a preselected time period.

20. The invention claimed in claim 19 wherein said circuit means includes operator-controlled means for controlling the extent of said preselected time period.

21. The invention claimed in claim 19 wherein said sensor means comprises an acoustic sensor.

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