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Taggart

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[54] **PRINTER VARIABLE FORM LENGTH CONTROLLER**

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[52] **U.S. Cl.** ..... **197/133 R,** 101/93 C, 226/32, 235/92 PE

[51] **Int. Cl.** **B41j 15/04**

[58] **Field of Search** ..... 197/127, 128, 130, 133; 101/93 C; 226/29, 32; 235/92 CA, 92 CT, 92 MP, 92 PE, 151.22

[56] **References Cited**

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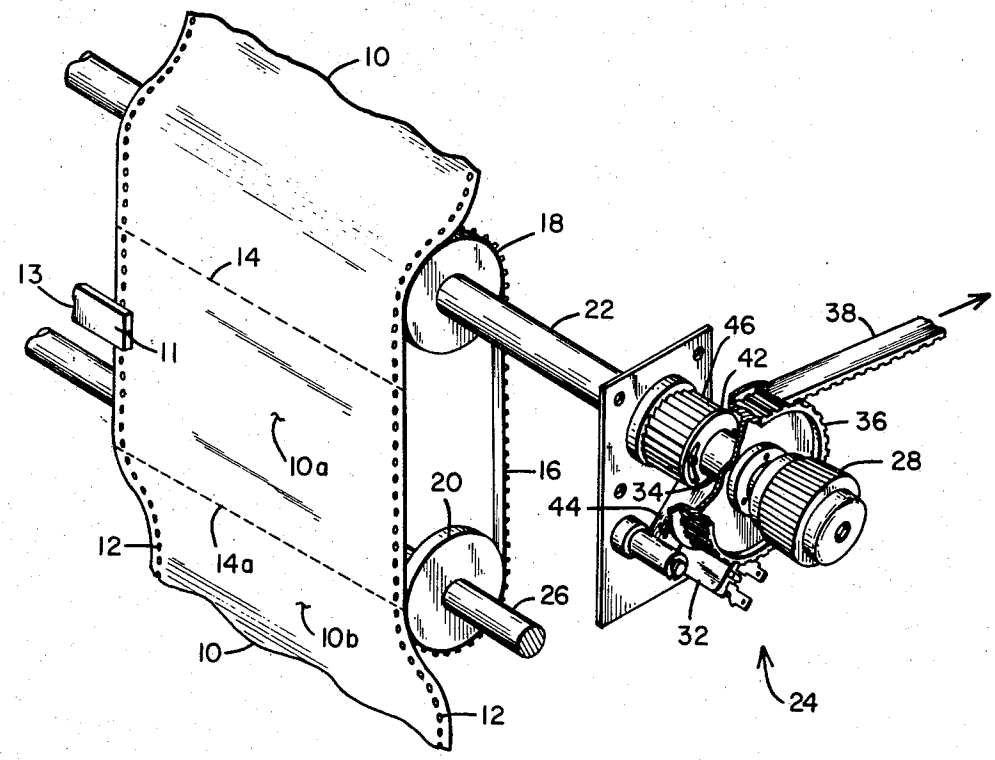
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Primary Examiner—Robert E. Bagwill
Assistant Examiner—Paul T. Sewell
Attorney, Agent, or Firm—Kenneth T. Grace; Thomas J. Nikolai; John P. Dority

[57] **ABSTRACT**

An apparatus for and a method of electrically controlling the movement of the paper web in a printer is disclosed. Prior to initiating the form setting operation of the variable form length controller of the present invention, a first row of perforations on the paper web is manually aligned to the O line count position of the first form that is to be printed. Next, the operator initiates the form setting operation by setting the paper or form length in which the paper web is prepared, i.e., the total number of printable lines between successive rows of perforations, into a thumbwheel switch assembly. Circuitry is next enabled for selectively moving the paper web in preparation for the first line to be printed on line 1 or 4. Successive line feed signals from the printer controller are counted, compared to the form length set into the thumbwheel switch assembly and when the line count equals the form length an end-of-form signal is generated for selectively moving the paper web in preparation for the first line to be printed on line 1 or 4 of the next form to be printed. Provision is made for a single form feed signal from the printer controller to move the paper web in preparation for the first line to be printed on line 1 or 4 of the next form to be printed.

6 Claims, 6 Drawing Figures



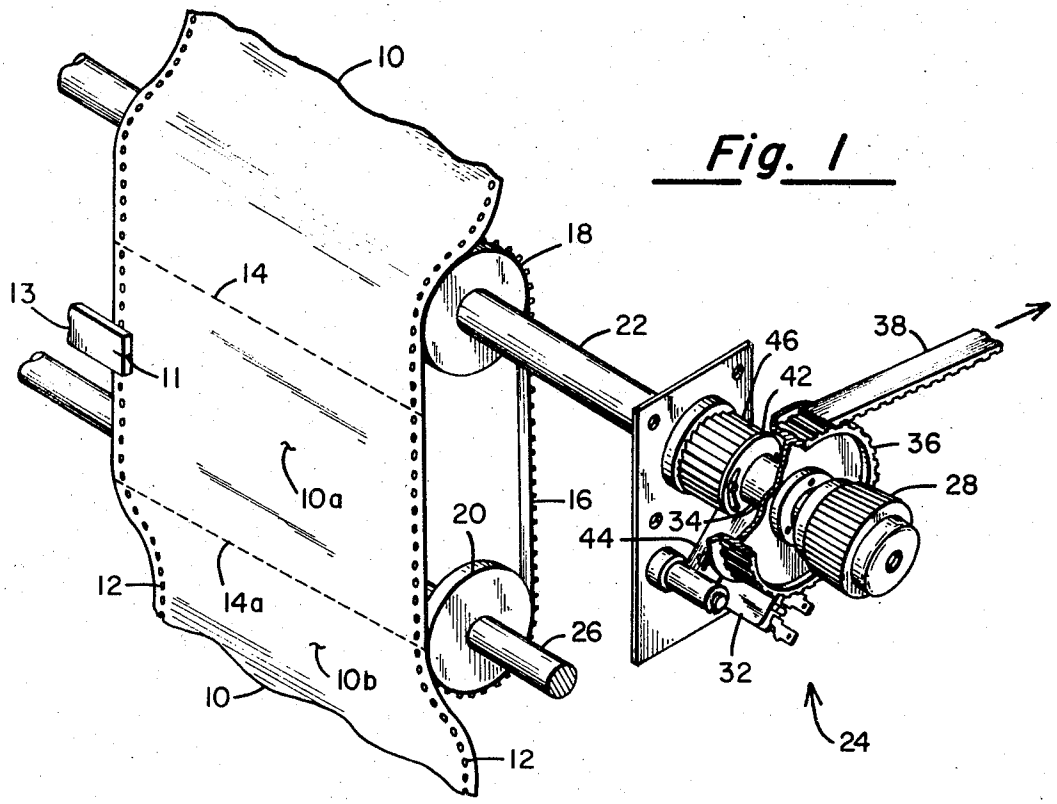


Fig. 1

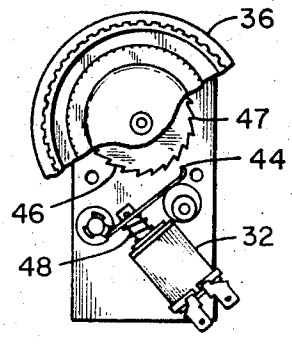


Fig. 2

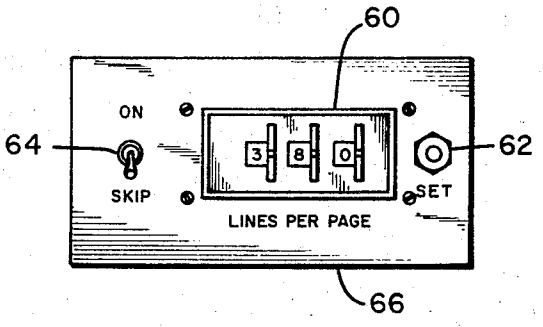
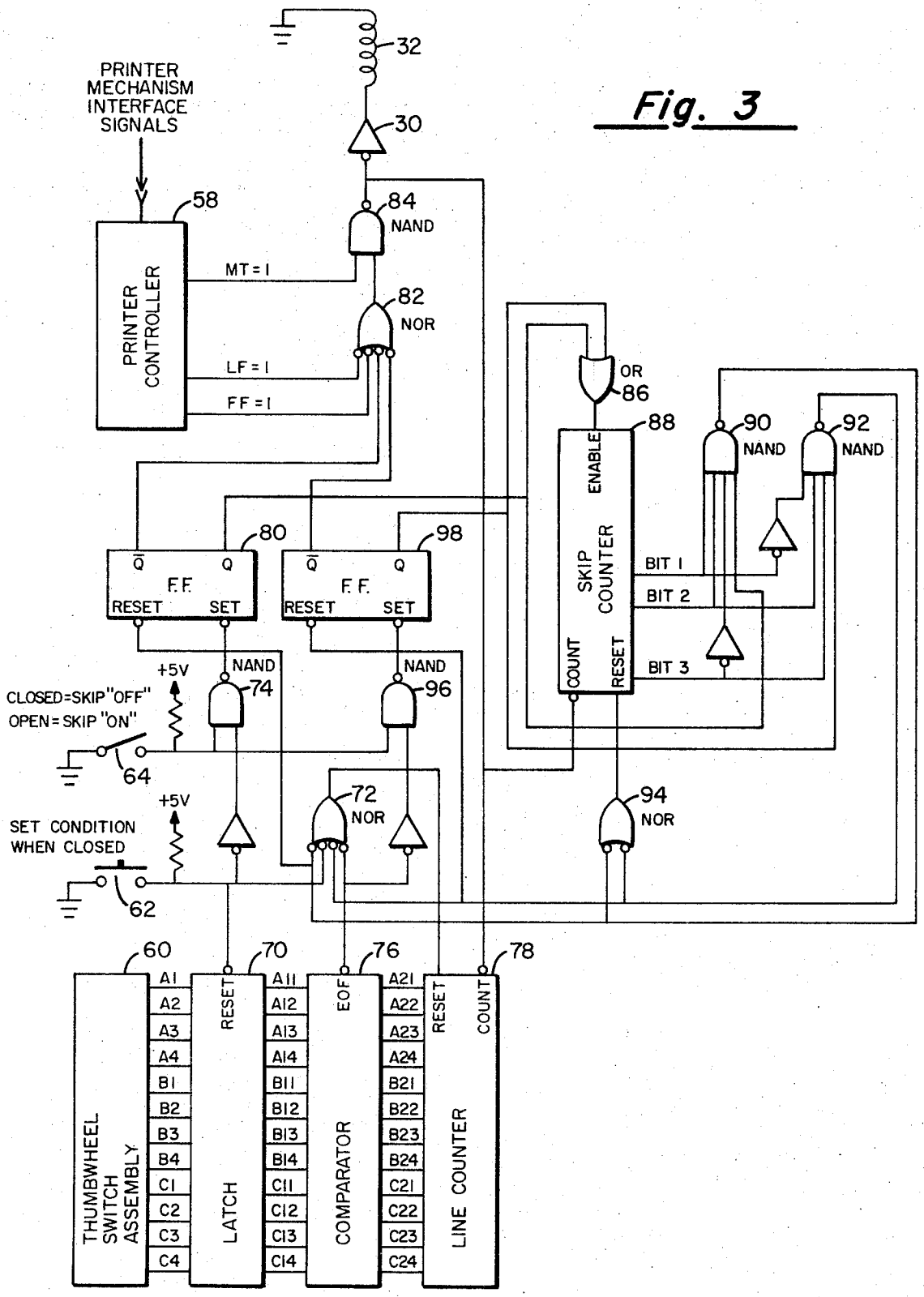


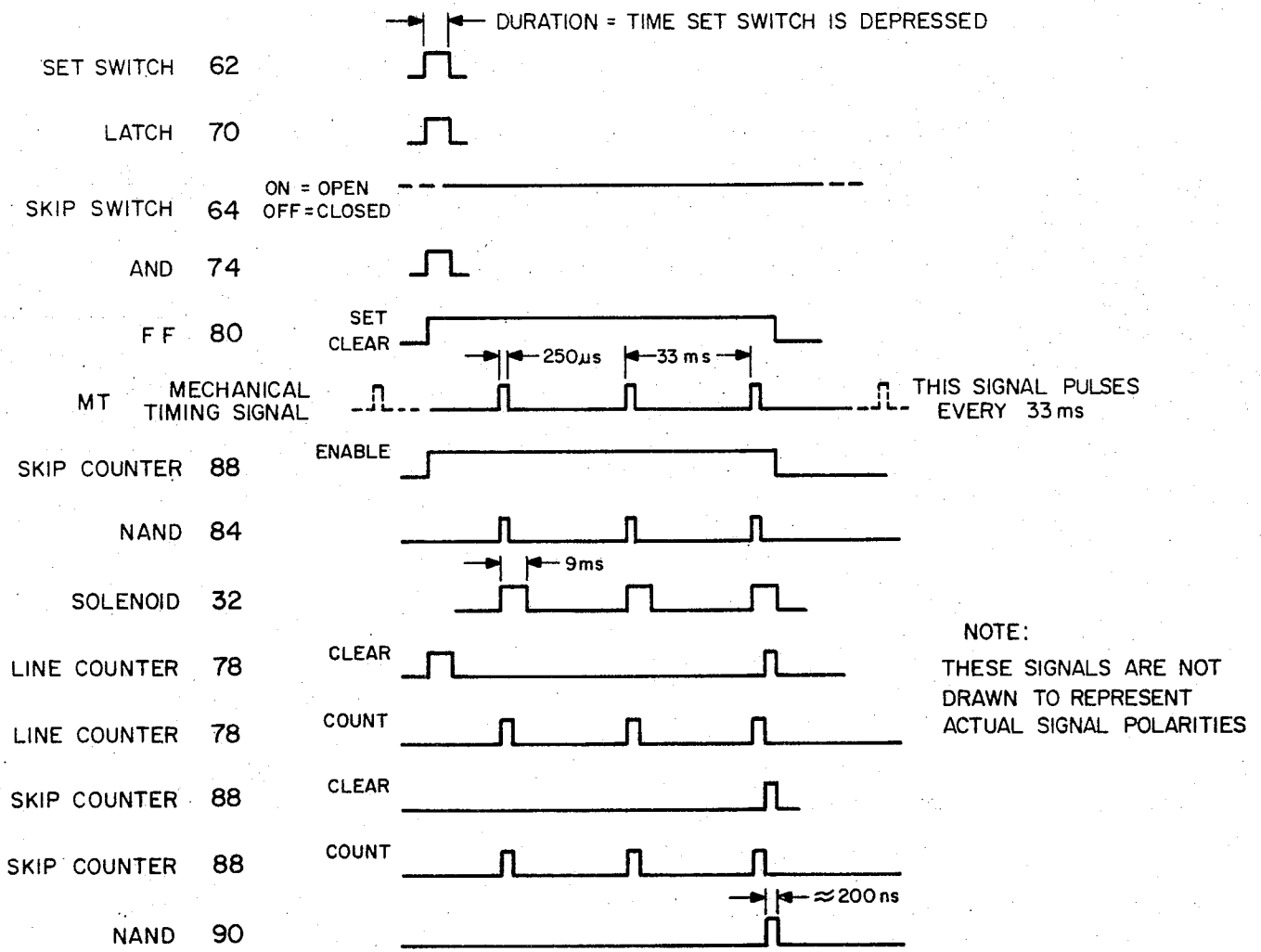
Fig. 4

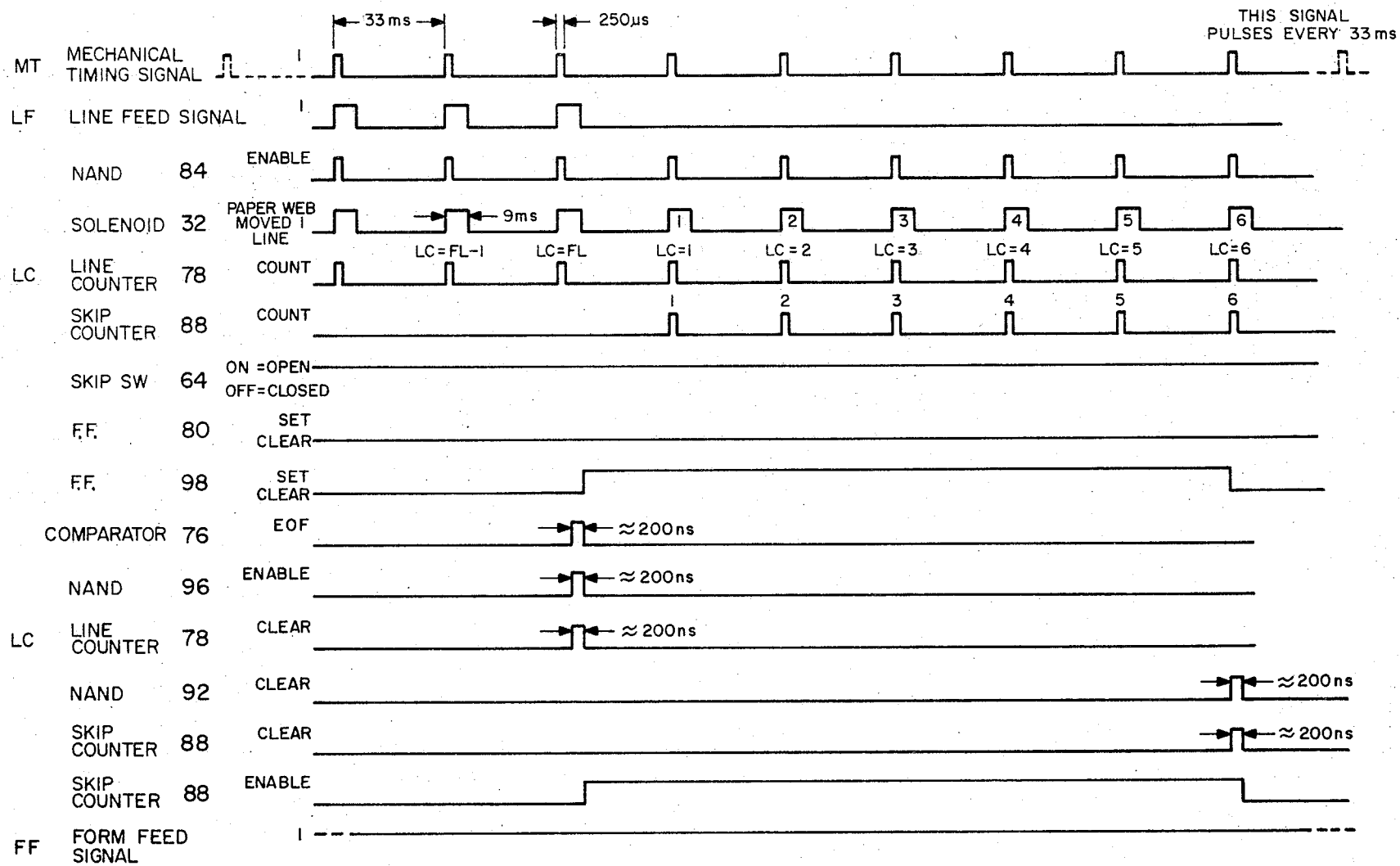
Fig. 3


PRINTER MECHANISM INTERFACE SIGNALS
58
PRINTER CONTROLLER
MT = 1
LF = 1
FF = 1
32
30
84
NAND
82
NOR
OR
86
88
ENABLE
SKIP COUNTER
COUNT
RESET
BIT 1
BIT 2
BIT 3
90
NAND
92
NAND
80
98
F.F.
RESET
SET
NAND
74
NAND
96
+5V
CLOSED=SKIP "OFF"
OPEN=SKIP "ON"
64
+5V
SET CONDITION WHEN CLOSED
62
72
NOR
94
NOR
60
70
76
78
THUMBWHEEL SWITCH ASSEMBLY
A1
A2
A3
A4
B1
B2
B3
B4
C1
C2
C3
C4
LATCH
RESET
A11
A12
A13
A14
B11
B12
B13
B14
C11
C12
C13
C14
COMPARATOR
EOF
A21
A22
A23
A24
B21
B22
B23
B24
C21
C22
C23
C24
LINE COUNTER
RESET
COUNT

FORM SETTING OPERATION

Fig. 5





PRINTER OPERATION

Fig. 6

NOTE: THESE SIGNALS ARE NOT DRAWN TO REPRESENT ACTUAL SIGNAL POLARITIES

PRINTER VARIABLE FORM LENGTH CONTROLLER

BACKGROUND OF THE INVENTION

In the prior art it is known that printers are often required to print upon paper webs of varying sizes or form lengths. Accordingly, many arrangements have been devised to permit the adjustment of form length to accommodate form length variation. In a typical arrangement, such as in the C. Barbagallo, et al., U.S. Pat. No. 3,174,610, a common drive shaft may drive both the paper web and an endless paper tape the latter containing punched holes indicative of the lines at which the movement of the paper web is to be arrested for printing. Such arrangement utilizes cumbersome mechanical drives for the endless paper tape and means to detect the significance of the holes punched therein such as for detecting head-of-form and end-of-form indications. With the advent of prepackaged and inexpensive electronics it is desirable that such prior art mechanical form control be replaced by an electrical form control.

SUMMARY OF THE INVENTION

In the present invention the paper web is driven by a well-known arrangement of a continuously operating electrical motor, belt drive coupled through a mechanical clutch. The clutch is released, i.e., is engaged, to permit the belt drive to move the paper web in one line increments by an escapement mechanism controlled by a solenoid that is, in turn, driven by the novel variable form length controller of the present invention. Prior to operation of the printer, the paper web is manually aligned along a first row of perforations that define the **0** line count position of the first form or page, i.e., defined as that portion of the paper web between successive rows of perforations. Then the total number of printable lines of the form, i.e., the form length FL, is loaded into a three wheel thumbwheel switch assembly.

A momentarily closed set switch loads the form length that was set into the thumbwheel switch assembly into a latch circuit or holding register while a line counter is cleared to **0**: a comparator compares the contents of the line counter and the latch circuit generating an end-of-form or match signal when the contents of the line counter and the latch circuit are equal. Each successive line feed signal from the printer controller moves the paper web one line and increments the line count LC held in the line counter by **1**. When the line count equals the form length, $LC = FL$, the comparator and the end-of-form signal clears the line counter to **0**. Provisions are made for permitting the end-of-form signal to cause the paper web drive to selectively skip three lines whereby the first line to be printed would be the fourth line below the row of perforations instead of the normal first line below the row of perforations.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a well-known paper advance mechanism incorporated in a printer utilizing the present invention.

FIG. **2** is an end view of the escapement mechanism, line feed clutch assembly incorporated in FIG. **1**.

FIG. **3** is a block diagram of the variable form length controller of the present invention.

FIG. **4** is a front view of the variable form length control panel of the present invention.

FIG. **5** is an illustration of a typical timing diagram of the variable form length controller of the present invention illustrating the operating relationship of the respectively associated circuitry of FIG. **3** during a form setting operation.

FIG. **6** is an illustration of a typical timing diagram of the variable form length controller of the present invention illustrating the operating relationship of the respectively associated circuitry of FIG. **3** during printer operation by the printer controller.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With particular reference to FIG. **1** there is presented a perspective view of a well-known paper advance mechanism incorporated in a printer utilizing the present invention. Paper web **10** is divided into successive forms of pages **10***a*, **10***b* by transverse rows of perforations **14**, **14***a* which permit paper web **10** to be folded in a zig-zag fashion prior to and subsequent to the printing of characters thereon. In addition, paper web **10** has lines of perforations **12** along the edges thereof which perforations **12** are spaced apart and adapted to be engaged by the sprockets of a pair of sprocket belts **16**, only one of which is visible in the drawing, supported by corresponding pairs of sprocket wheels **18**, **20**. Sprocket wheels **18** are driving pulleys fixed to driving shaft **22**. Line feed clutch assembly **24** includes the mechanism whereby driving shaft **22** and sprocket wheels **18** are driven by a continuously operating electrical motor, belt drive coupling through a mechanical clutch. Sprocket wheels **20** are idling or driven pulleys rotatably mounted on drive shaft **26**, being driven by the sprocket belts **16**.

Prior to operation of the printer, and, correspondingly, the variable form length controller of the present invention, the paper web **10** is manually aligned along a first row of perforations **14** that define the **0** line count position of the first row of page **10***a*; a form or page being defined as that portion of the paper web **10** between successive rows of perforations **14**, **14***a*. The manual alignment of paper web **10** at the **0** line count position is accomplished by using the paper position adjustment knob **28**. Knob **28** is rotated until the row of perforations **14** is aligned with the alignment mark **11** in nonmovable alignment bracket **13** located near the surface of paper web **10** on the lefthand side of the form **10***a* in a clearly visible location and as near as possible to the surface of paper web **10** to minimize parallax. After the alignment of paper web **10** to the **0** line count position of the first form **10***a* along row of perforations **14**, knob **28** is manually released and is not used thereafter to advance paper web **10**. All further paper web **10** advancement is then under control of the variable form length controller of the present invention.

Advancement of paper web **10** is accomplished via the output signal from line feed amplifier **30** (see FIG. **3**) at solenoid **32**. To better understand the following discussion of the line feed clutch assembly **24** of FIG. **1** reference should be had to FIG. **2** in which there is presented an end view of the escapement mechanism of the line feed clutch assembly **24**. Input shaft **34** of clutch assembly **24** has rotational torque applied thereto by means of the input pulley **36**, belt **38** and the printer motor (not illustrated). The rotation of the driv-

ing or output shaft **22** is controlled by separating the input shaft **34** and the output shaft **22** by the use of a clutch collar **42.** When solenoid **32** is activated, pawl **44** is retracted from stop collar **46** allowing stop collar **46** to rotate and coupling between input shaft **34** and output shaft **22** is accomplished. When solenoid **32** is de-energized, pawl **44** is forced against stop collar **46** by return spring **48.** When a stop collar tooth **47** is forced against the shoulder of pawl **44** by the rotation of stop collar **46,** stop collar **46** is restrained from further rotation. The output shaft **22** is rotated an amount equal to the angle between adjacent teeth **47** on stop collar **46.** When this angle of rotation is applied to sprocket wheel **18,** the paper web **10** will be advanced an amount determined by the diameter of sprocket wheel **18.** In this particular case, the paper web advancement is 1/6 inch. When solenoid **32** is energized, it is done so for only sufficient time to allow clutch collar **42** to rotate so that the tooth **47** on stop collar **46** clears the tip of pawl **44** and then solenoid **32** is de-energized allowing pawl **44** to fall against stop collar **46** so that its rotation is restricted to the spacing between adjacent teeth **47.** This results in a vertical advancement of paper web **10** one line of, e.g., 1/6 inch.

With particular reference to FIG. **3** there is presented a block diagram of the variable form length controller of the present invention. As stated above, prior to operation of the printer under control of printer controller **58,** and/or the variable form length controller of the present invention, paper web **10** is manually aligned along the first row of perforations **14** that define the **0** line count position of the first form **10***a*. Next, the form setting operation is initiated by setting the total number of printable lines of the form, i.e., the form length FL, into a three-wheel thumbwheel switch assembly **60,** the individual thumbwheel switches being adjusted such that they represent the number of printable lines per form. Printable lines are defined as those lines on a form upon which the printer is allowed to print. The total number of lines per form and the printable lines per form are not necessarily the same unless skip switch **64** is in the closed position. Skip switch **64,** when in the open position, provides for a **3** line margin on each side of a row of perforations **14, 14***a*. Thus, when skip switch **64** is in the open position the number of printable lines per form **10***a*, **10***b* is **6** less than the number of lines per form 10*a*, **10***b*. Table A illustrates examples of thumbwheel switch assembly **60** settings for various form lengths assuming (vertical) line spacing to be 1/6 inch.

With particular reference to FIG. **4** there is presented a front view of the variable form length control panel of the present invention as mounted upon the printer in which the subject invention is incorporated. Control panel **66** is illustrated as having the thumbwheel switch assembly **60** adjusted to, e.g., a total of 380 printable lines per form. Additionally mounted on control panel **66** are a momentarily closed set switch **62** and a two-position ON-OFF skip switch **64** the function of such switches to be discussed hereinbelow.

TABLE A

FORM LENGTH (VERTICAL INCHES)	TOTAL LINES PER FORM	SKIP SWITCH POSITION	CORRESPONDING THUMBWHEEL SWITCH ASSEMBLY SETTING IN PRINTABLE LINES
1/6 (MIN.)	1	OFF	001
4	24	ON	018
5	30	OFF	030
5½	33	ON	027
5½	33	OFF	033
7	42	ON	036
9	54	OFF	054
11	66	ON	060
13	78	OFF	078
15	90	ON	084
18	108	OFF	108
22	132	ON	126
50	300	OFF	300
100	600	ON	594
125	750	OFF	750
166½ (MAX.)	999	OFF	999

The individual thumbwheel switches of thumbwheel switch assembly **60** produce an electrical output in a binary coded decimal (BCD), each individual thumbwheel switch having one input terminal and four output terminals. The input terminal is utilized to supply the voltage for sensing and the output terminals contain the electrical signals in a binary code that represents the unique code corresponding to that thumbwheel switch position. There are **10** positions on each thumbwheel switch and each position is numbered consecutively starting with **0** and ending with **9.** Thus, there are a total of **12** output signals (**A1, A2, A3, A4, B1, B2, B3, B4, C1, C2, C3, C4**) from the thumbwheel switch assembly **60** that electrically represent the settings of the three individual thumbwheel switches.

With particular reference to FIG. **5** there is presented an illustration of a typical timing diagram of the variable form length controller of the present invention illustrating the operating relationship of the respectively associated circuitry of FIG. **4** during a form setting operation. After the thumbwheel switch assembly **60** is set to represent the desired form length of forms **10***a*, **10***b*, the operator depresses set switch **62.** Set switch **62** generates a pulse that is coupled to latch **70,** NOR gate **72** and NAND gate **74.** The pulse from set switch **62** gates the signals A1 – C4 from thumbwheel switch assembly **60** into latch **70.** The signals in latch **70** are subsequently compared by comparator **76** to the corresponding binary coded decimal signals in line counter **78.** An equality comparison of the signals in latch **70** and line counter **78,** $LC = FL$, causes comparator **76** to couple a match or end-of-form (EOF) signal to NOR gate **72** which, inter alia, clears line counter **78** to a count of **0** in preparation for the line count sequence. With skip switch **64** in its open condition, the set switch

62 pulse enables NAND gate 74 which, in turn, toggles Flip-Flop (FF) 80 to its set condition—FF 80 is only used during the form setting operation when skip switch 64 is set in the open position for causing a three line advance of paper web 10 so that the first characters printed on form 10*a* will appear four lines below the row of perforations 14 rather than the normal one line below the row of perforations 14. The mechanical timing signal MT from printer controller 58 and the set output from FF 80 through NOR gate 82 enable NAND gate 84 causing line feed amplifier 30 to pulse solenoid 32 advancing paper web 10 one line. The output from NAND gate 84 also increments line counter 78 and skip counter 88 one line count. Each time the mechanical timing signal MT enables NAND gate 84, line feed amplifier 30 pulses solenoid 32 advancing paper web 10 one line and increments line counter 78 and skip counter 88 one line count. When skip counter 88 reaches a skip line count of 3, NAND gate 90, along with the output from FF 80, is enabled causing NOR gate 94 to clear skip counter 88 to a count of 0, clears FF 80 and through NOR gate 72 clears line counter 78 to a count of 0.

In contrast to the above described form setting operation, if skip switch 64 had been in the closed condition when set switch 62 was depressed, NAND gate 74 would not have been enabled, and, accordingly, the three line advance caused by the setting of FF 80 would not have occurred. In this event, paper web 10 would be positioned whereby the first line below the row of perforations 14. This above described operation illustrated by the timing diagram of FIG. 5 completes the form setting operation whereby the variable form line controller is ready for printer operation under control of printer controller 58.

With particular reference to FIG. 6 there is presented an illustration of a typical timing diagram of the variable form length controller of the present invention illustrating the operating relationship of the respectively associated circuitry of FIG. 4 during a printer operation under control of printer controller 58. Each time printer controller 58 concurrently couples a mechanical timing signal MT to NAND gate 84 and a line feed signal LF to NOR gate 82, NAND gate 84 is enabled causing line feed amplifier 30 to pulse solenoid 32 causing paper web 10 to advance one line. The enabling of NAND gate 84 also increments line counter 78 one line count. When the contents of latch 70 and line counter 78 are equal, $LC = LF$, comparator 76 couples an end-of-form signal EOF to NOR gate 72 and NAND gate 96. NOR gate 72 clears line counter 78 to a count of 0 while NAND gate 96, with skip switch 64 in its open position, is enabled toggling FF 98 to its set condition. The set output of FF 98 through NOR gate 82 enables, at NAND gate 84, each mechanical timing signal MT to pulse line feed amplifier 30 causing solenoid 32 to advance paper web 10 one line count. Concurrently, the enabling of NAND gate 84 at each mechanical timing signal MT increments line counter 78 and skip counter 88 one line count. Skip counter 88 is enabled via OR gate 86 while OR gate 86 is enabled when either FF 80 or FF 98 is in the set condition. With FF 80 in the cleared condition and FF 98 in the set condition, successive mechanical timing signals MT increment skip counter 88 to a line count of 6, which, along with the output from FF 98, enables NAND gate 92 coupling its output to NOR gates 94 and 72. NOR gate 94 clears skip counter 88 to a line count of 0 terminating the output of NAND gate 92 while NOR gate 72 clears line counter 78 to a count of 0 in preparation for the start of printing on the new form 10*b*. At this time paper web 10 is positioned such that the first line of characters to be printed upon form 10*b* will be printed upon the fourth line below row of perforations 14*a*.

If in the above described operation skip switch 64 had been in its closed position rather than its open position, NAND gate 96 would not have been enabled by its end-of-form signal EOF from comparator 76 such that FF 98 would not have been set and, accordingly, skip counter 88 would not have caused paper web 10 to skip the three printable lines at the end of form 10*a* and the first three printable lines at the beginning of form 10*b*, above and below, respectively, row of perforations 14*a*. Further, if instead of coupling the line feed signal LF to NOR gate 82 printer controller 58 had coupled a form feed signal to NOR gate 82, the form feed signal, which is a continuous enabling signal, and each mechanical timing signal MT would have enabled NAND gate 84 to pulse line feed amplifier 30 causing solenoid 32 to advance paper web 10 one line count until comparator 76 would have generated its end-of-form signal EOF such that printer operation would be similar to that as described above.

Thus, the variable form length controller of the present invention permits the rapid adjustment of printer operation to any form length through a thumbwheel switch assembly and control of the first row of characters to be printed on the first or fourth line of the form. Accordingly, it is apparent that applicant has provided herein a novel means of electrically varying the operation of a printer to correspond to the particular form length of the paper web utilized.

What is claimed is:

1. A printer variable form length controller providing line advance signals for advancing a paper web upon which characters are to be printed, comprising:
- line advance gating means for providing a line advance signal output when enabled;
- means for coupling timing signals as the first input to said line advance gating means;
- a skip counter;
- means for coupling the line advance signal output from said line advance gating means to said skip counter for counting said line advance signals;
- a skip flip-flop;
- means for coupling the output of said skip counter as a first input to said skip flip-flop;
- means for coupling a first output of said skip flip-flop as the second input to said line advance gating means;
- set switch means coupled to the second input of said skip flip-flop for enabling said line advance gating means to couple said line advance signals to said skip counter to toggle said skip counter to a predetermined skip count and then to toggle said skip flip-flop and to disable said line advance gating means.

2. A printer variable form length controller providing line advance signals for advancing a paper web upon which characters are to be printed, comprising:
- line advance gating means for providing a line advance signal output when enabled;
- means for coupling timing signals as the first input to said line advance gating means;

a skip counter;
means for coupling the line advance signal output from said line advance gating means to said skip counter for counting said line advance signals;
a skip flip-flop
means for coupling the output of said skip counter as a first input to said skip flip-flop;
means for coupling a first output of said skip flip-flop as the second input to said line advance gating means;
set switch means;
skip switch means;
form setting gating means;
means for coupling said set switch means as a first input to said form setting gating means;
means for coupling the output of said form setting gating means as a second input to said skip flip-flop;
means coupling said skip switch means as an enabling second input to said form setting gating means for enabling said set switch means to toggle said skip flip-flop whereby said skip flip-flop enables said line advance gating means to couple said line advance signals to said skip counter to toggle said skip counter to a predetermined skip count and then to toggle said skip flip-flop and to disable said line advance gating means.

3. A printer variable form length controller providing line advance signals for advancing a paper web upon which characters are to be printed, comprising:
line advance gating means for providing a line advance signal output when enabled;
means for coupling timing signals as the first input to said line advance gating means;
a skip counter;
means for coupling the line advance signal output from said line advance gating means to said skip counter for counting said line advance signals;
a skip flip-flop;
means for coupling the output of said skip counter as a first input to said skip flip-flop;
means for coupling a first output of said skip flip-flop as the second input to said line advance gating means;
a thumbwheel switch assembly capable of assuming positions indicative of the form length of the forms into which said paper web is prepared for generating corresponding form length signals;
a latch circuit for accepting and storing said form length signals;
a line counter for counting said line advance signals;
means for coupling said form length signals from said thumbwheel switch assembly to said latch circuit;
means for coupling the line advance signal output from said line advance gating means to said line counter for counting said line advance signal;
a comparator coupled to said latch circuit and said line counter for comparing the form length stored in said latch circuit to the line count stored in said line counter and generating an end-of-form signal when said comparison is equal;
an end-of-form gating means;
means for coupling said end-of-form signal as a first input to said end-of-form gating means;
means for coupling said end-of-form signal to said line counter for resetting said line count to zero;
means for coupling the output of said end-of-form gating means to the second input of said skip flip-flop;
skip switch means coupled to the second input of said end-of-form gating means enabling said end-of-form signal at said end-of-form gating means to toggle said skip flip-flop for enabling said line advance gating means to couple said line advance signals to said skip counter to toggle said skip counter to a predetermined skip count and then to toggle said skip flip-flop and to disable said line advance gating means.

4. In a printer having a printer controller providing timing signals, a variable form length controller, comprising:
advancing means for advancing a paper web, upon which characters are to be printed, one line upon receipt of a line advance signal;
a line advance gating means for providing a line advance signal output when enabled;
a skip flip-flop;
means for coupling said timing signal as the first input to said line advance gating means;
means for coupling the line advance signal output from said line advance gating means to said advancing means;
means for coupling the first output of said skip flip-flop as the enabling second input to said line advance gating means;
a skip counter;
means for coupling the line advance signal output from said line advance gating means to said skip counter for incrementing said skip counter one line skip count;
a skip gating means;
means for coupling the output of said skip counter as the first input to said skip gating means;
means for coupling the second output of said skip flip-flop as the second input to said skip gating means;
means for coupling the output of said skip gating means to the first input of said skip flip-flop;
set switch means coupled to the second input of said skip flip-flop and through said line advance gating means enabling said timing signal to couple said line advance signal to said advancing means and said skip counter for incrementing said skip counter and enabling said skip gating means to toggle said skip flip-flop and to disable said line advance gating means.

5. In a printer having a printer controller providing timing signals, a variable form length controller, comprising:
advancing means for advancing a paper web, upon which characters are to be printed, one line upon receipt of a line advance signal;
line advance gating means for providing a line advance signal output when enabled;
a skip flip-flop;
means for coupling said timing signal as the first input to said line advance gating means;
means for coupling the line advance signal output from said line advance gating means to said advancing means;

means for coupling the first output of said skip flip-flop as the enabling second input to said line advance gating means;
a skip counter;
means for coupling the line advance signal output from said line advance gating means to said skip counter for incrementing said skip counter one line skip count;
a skip gating means;
means for coupling the output of said skip counter as an input to said skip gating means;
means for coupling the second output of said skip flip-flop as an input to said skip gating means;
means for coupling the output of said skip gating means to the first input of said skip flip-flop;
a thumbwheel switch assembly capable of assuming positions indicative of the form length of the forms into which said paper web is prepared for generating corresponding form length signals;
a latch circuit for accepting and storing said form length signals;
a line counter for counting said line advance signals;

means for coupling said form length from said thumbwheel switch assembly to said latch circuit;

means for coupling the line advance signal output from said line advance gating means to said line counter for incrementing said line counter one line count;
a comparator coupled to said latch circuit and to said line counter for comparing the form length stored in said latch circuit to the line count stored in said line counter and generating an end-of-form signal when said comparison is equal;
an end-of-form gating means;
means for coupling said end-of-form signal as an input to said end-of-form gating means;
means for coupling said end-of-form signal to said line counter for resetting said line count to zero;
means for coupling the output of said end-of-form gating means to the second input of said skip flip-flop;
skip switch means for enabling said end-of-form signal at said end-of-form gating means to toggle said skip flip-flop and through said line advance gating means to enable said timing signal to couple said line advance signal to said advancing means whereby said skip counter is incremented to enable said skip gating means to toggle said skip flip-flop and to disable said line advance gating means.

6. In a printer having a printer controller providing timing signals, line feed signals and form feed signals, a variable form length controller, comprising:
electromechanical means for advancing a paper web, upon which characters are to be printed, one line upon receipt of a line advance signal;
a line advance NOR gate;
a line advance NAND gate for providing a line advance signal output when enabled;
a three line skip flip-flop;
a six line skip flip-flop;
means for coupling said timing signal as a first input to said line advance NAND gate;
means for coupling the output of said line advance NOR gate as the second input to said line advance NAND gate;
means for coupling the line advance signal output from said line advance NAND gate to said electromechanical means;
means for coupling said line feed signal as a first input to said line advance NOR gate;
means for coupling said form feed signal as the second input to said line advance NOR gate;
means for coupling the first output of said three line skip flip-flop as a third input to said line advance NOR gate;
means for coupling the first output of said six line skip flip-flop as a fourth input to said line advance NOR gate;
a skip counter;
means for coupling the line advance signal output from said line advance NAND gate to said skip counter for counting said line advance signals;
a skip counter enable OR gate;
a three line skip NAND gate;
a six line skip NAND gate;
means for coupling the output of said skip counter as an input to said three line skip NAND gate and said six line skip NAND gate;
means for coupling the output of said skip counter enable OR gate as an enabling input to said skip counter;
means for coupling the second output of said three line skip flip-flop and said six line skip flip-flop as first and second inputs to said skip counter enable OR gate;
means for coupling the second output of said three line skip flip-flop as an input to said three line skip NAND gate;
means for coupling the second output of said six line skip flip-flop as an input to said six line skip NAND gate;
means for coupling the output of said three line skip NAND gate to the first input of said three line skip flip-flop;
means for coupling the output of said six line skip NAND gate to the first input of said six line skip flip-flop;
a skip counter reset NOR gate;
means for coupling the outputs of said three line skip NAND gate and said six line skip NAND gate as first and second inputs to said skip counter reset NOR gate;
means for coupling the output of said skip counter reset NOR gate as a resetting input to said skip counter;
a thumbwheel switch assembly capable of assuming positions indicative of the form length of the forms into which said paper web is prepared for generating corresponding form length signals;
a latch circuit for accepting and storing said form length signals;
a line counter for counting said line advance signals;

means for coupling said form length signals from said thumbwheel switch assembly to said latch circuit;

means for coupling the line advance signal output from said line advance NAND gate to said line counter for counting said line advance signals;
a comparator coupled to said latch circuit and said line counter for comparing the form length stored in said latch circuit to the line count stored in said

line counter and generating an end-of-form signal when said comparison is equal;

an end-of-form NAND gate;

an end-of-form NOR gate;

means for coupling said end-of-form signal as inputs to said end-of-form NAND gate and said end-of-form NOR gate;

means for coupling the output of said end-of-form NOR gate to said line counter for resetting said line count to zero;

means for coupling the output of said end-of-form NAND gate to the second input of said six line skip flip-flop;

means for coupling the output of said six line skip flip-flop;

means for coupling the output of said three line skip NAND gate as an input to said end-of-form NOR gate;

means for coupling the output of said six line skip NAND gate as an input to said end-of-form NOR gate;

a form setting NAND gate;

skip switch means;

set switch means;

means for coupling said set switch as an enabling input to said form setting NAND gate and to said end-of-form NOR gate;

means for coupling said skip switch as an enabling input to said form setting NAND gate and to said end-of-form NAND gate;

means for coupling said set switch to said latch circuit for enabling said latch circuit to accept and store said form length signals;

said set switch means setting said three line skip flip-flop and through said line advance NOR gate and said line advance NAND gate enabling said timing signal to couple said line advance signals to said electromechanical means and to said skip counter for incrementing said skip counter three line skip counts to enable said three line skip NAND gate to toggle said three line skip flip-flop and to disable said line advance NAND gate;

said skip switch means enabling said end-of-form signal at said end-of-form NAND gate to toggle said six line skip flip-flop and through said line advance NOR gate and said line advance NAND gate enabling said timing signal to couple said line advance signals to said electromechanical means and to said skip counter for incrementing said skip counter six line skip counts to enable said six line skip NAND gate to toggle said six line skip flip-flop and to disable said line advance NAND gate.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,856,128 Dated December 24, 1974

Inventor(s) James A. Taggart

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

IN THE PRINTED PATENT:

Column 9, Line 23, after "length" insert -- signal --.

Column 11, Lines 14 and 15, delete in their entirety.

Signed and sealed this 4th day of March 1975.

(SEAL)
Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents
and Trademarks

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