Jan. 14, 1964 C. H. DOERSAM, JR 3,117,514

SINGLE DISC PRINTER CONTROL

Filed April 26, 1961

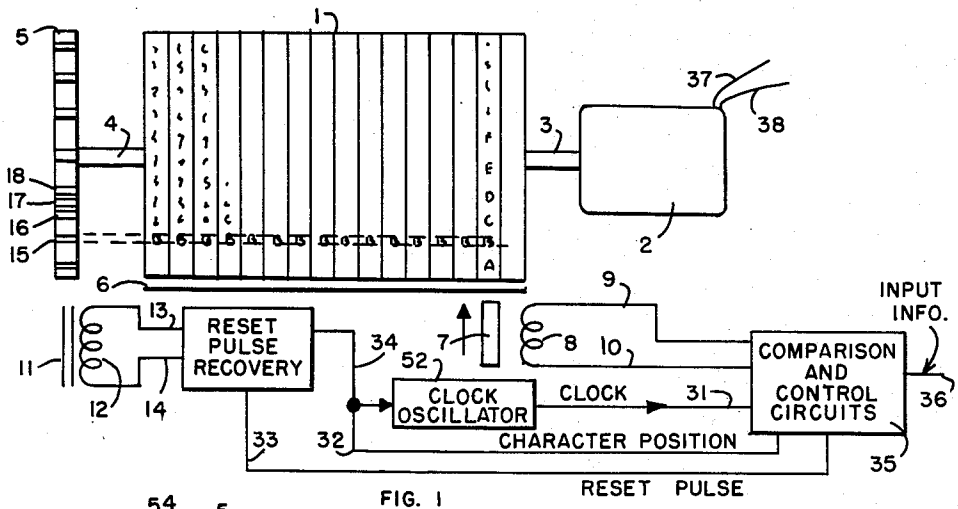


FIG. 1

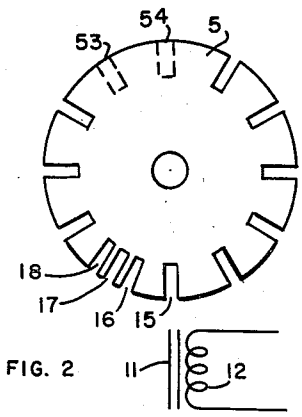


FIG. 2

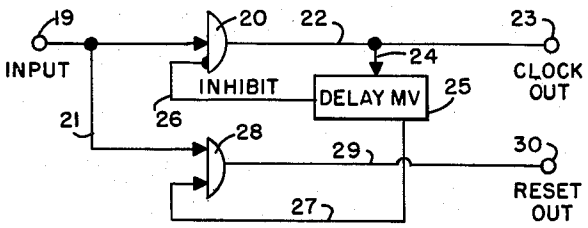


FIG. 3

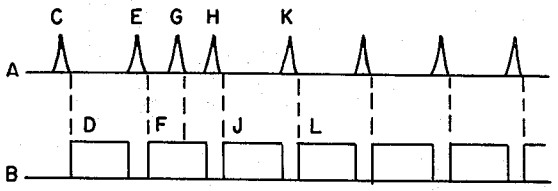


FIG. 4

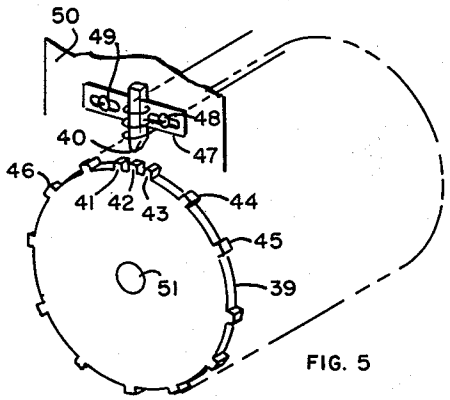


FIG. 5

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SINGLE DISC PRINTER CONTROL

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The present invention concerns high speed drum printers and, in particular, timing wheels and associated circuitry for such printers.

In the field of electronic computers it is often required to print out information of various kinds. Since electronic computers are very high speed devices, printing devices which will be compatible must be capable of high speed operation. Typically the type of high speed printers with which the present invention is concerned are capable of printing ten or more lines of information per second. One printer configuration capable of this rate of printing utilizes a type drum and a separate hammer for each character position in a line. The type drum carries a ring of characters around its periphery for each character position in a line. The sheet to be printed upon is passed between the hammers and the type drum. Thus, if a line of 20 characters is to be printed, a drum carrying 20 sets of type in which each set comprises a ring around the drum containing one each of all different characters to be printed and 20 hammers are arranged in a line parallel to the drum axis and facing it. The drum is continuously rotated at an r.p.s. equal to the number of lines to be printed per second, for example, 10 r.p.s. to print 10 lines per second. The hammers are actuated at the instant a particular character is to be printed at a particular hammer position. The instruction in the hammer is generated when input information calling for a particular character at a particular position coincides with the presence of that character on the drum under the hammer at the particular position called for. A system in accordance with the above general description is shown and described in the application for Letters Patent of Carl I. Wasserman entitled "Logical System for High Speed Printer," filed on May 27, 1960, and bearing Serial No. 32,333, now Patent No. 3,024,723.

One of the essential components of a high speed printer as set forth above is a timing device which can be utilized to determine the positions of various characters on the type drum while the drum is rotating during normal operation. This, for example, may be a phonic wheel device attached to or suitably coupled to the type drum. Since accuracy in the positional determination is extremely important, the timing wheel is usually carried by the same shaft as is the character drum. The system shown in the above referred to application utilized two phonic wheels and three pick-ups for carrying out the various timing functions which depend on the rotation of the type drum. According to the present invention the timing function is accomplished with a single timing wheel and a single pick-up thus affecting a considerable saving in cost of the system. This single wheel carries notches or teeth, one for each different character around the type drum and an additional notch or tooth the signal from which is decoded and utilized for resetting purposes i.e. a start signal. If blank character positions exist on the type drum, the corresponding tooth or notch on the character position indicator timing wheel may be omitted. An oscillator normally synchronized by the character wheel pulses may be utilized to supply the missing pulses by carrying over the gap, thereby recreating a true clock signal. A further simplification embodied in the present invention is the casting or engraving of the character tone wheel directly on the character drum.

Accordingly one object of the present invention is to provide a cost saving character tone wheel system for high speed drum printers and the like.

Another object is to provide for generating a resetting or start pulse with a single tone wheel and available through a single pick-up device.

Still another object is to provide a character tone wheel as an integral part of a type drum.

A further object is to provide a method of and means for carrying over the blank encountered in type drums having blank character positions.

These and other objects will be apparent to those skilled in the art from the detailed description of the invention given in connection with the various figures of the drawing.

In the drawing:

FIGURE 1 is a diagrammatic representation of one form of the present invention.

FIGURE 2 is an end view of a tone wheel in accordance with the present invention.

FIGURE 3 is a block diagram of one circuit which may be utilized to recover the starting signal.

FIGURE 4 is a set of pulse diagrams useful in explaining the operation of the invention.

FIGURE 5 is an end view of a modified form of the present invention.

FIG. 1 shows a type drum **1** carrying a plurality of rows of type faces on its periphery arranged in ring fashion. Drum **1** is rotated by suitable means such as motor **2** receiving power from a suitable source, not shown, and coupled by shaft **3**. At the other end of drum **1** shaft **4** is provided mounting character position indicating tone wheel **5**. Printing with drum **1** is accomplished on a suitable sheet **6**, for example, a pressure sensitive paper, by means of a row of hammers one of which is shown as hammer **7** energized by coil **8** over leads **9** and **10**. The character position indicating tone is picked up by reluctance pick-up **11** having signal coil **12** connected by leads **13** and **14** to synchronous signal oscillator **52** and over leads **33** and **34** to control unit **35**. Tone wheel **5** is provided with suitable tone generating elements such as notches **15**, **16**, **17**, **18** etc. which in passing pick-up **11** cause signal pulses to be generated in coil **12**. With the exception of the start signal notch **17**, each of the other notches **15**, **16**, **18** etc. corresponds in position with a row of characters on type drum **1**. For example, if there are 20 rows of type faces around drum **1**, there will be 20 corresponding notches in wheel **5** plus 1 for the start signal. Thus notch **15** corresponds with the row of B's on the drum, and notch **16** with C's, etc.

FIG. 2 shows an end view of the tone wheel **5** with the same numbers designating the parts corresponding of FIG. 1. FIG. 2 also shows how at points **53** and **54** the notches may be missing due to blank spaces at corresponding positions on the type drum. Thus a tone generating notch is provided for each character peripheral position of drum **1** which provides a tone pulse to be utilized in comparison and control unit **35**. A steady clock tone is provided by oscillator **52** synchronized by the character positional pulses and is fed to circuits **35** over leads **31** and **32**. Information signals are provided over input lead **36**. The utilization of the clock, character position and information signals is carried out in control unit **35**, for example, as set forth in the above referred to application.

In order to separate the start or resetting signal due to notch **17** from the composite tone wheel signal, a circuit as shown in FIG. 3 may be utilized. The input consisting of the composite tone wheel signal is applied to input **19** and INHIBIT gate **20** and over lead **21** to AND gate **28**. This signal will be as shown on line A

of FIG. 4 including pulses C, E, G, H, K, etc. Unless inhibited by a signal on line 26 from delay multivibrator 25, these pulses will pass through gate 20, over line 22 to output 23 where they may be utilized as clock signals or in the case of blank character space conditions, to synchronize the clock oscillator. Delay multi-vibrator 25 is coupled to the signal line over line 24 and is designed to turn on for a predetermined interval in response to each input pulse. While on its output as shown on line B of FIG. 4 provides an AND gate signal over line 27 and an INHIBIT signal over line 26. Thus, for each character position pulse C, E, etc. there will be provided periods D, F, J, L, etc. during which gate 20 is inhibited and gate 28 is provided with an enable signal. The normal character positional signals C, E, H, K etc. will pass INHIBIT gate 20 since they occur while multi-vibrator 25 is off, and will not pass AND gate 28 for the same reason. The start or reset pulse G, however, since it occurs during the on time of multi-vibrator 25 will pass gate 28 and appear over line 29 as reset signal at 30 and will not pass gate 20. Thus, character position signals and start or reset signals may be separated from the composite signal. As stated above clock signals may be generated in response to the character position signals so that it has been shown how all three signals may be derived from a single tone wheel utilizing a single pick-up.

FIG. 5 shows a modification of the present invention in which the teeth or slots (teeth are shown) are formed as an integral part of the type drum in the same manner used to provide the type faces. FIG. 5 shows timing teeth 46, 41, 43, 44, 45, etc. extending completely around the periphery of drum 39 carried on shaft 51. The additional tooth for reset or start pulse generation is shown at 42 being substantially mid-way between the regular timing teeth 41 and 43. The pick-up 40 is mounted on a suitable bracket 47 which is made adjustable on frame member 50 by means of mounting slots 48 and 49. This adjustment is provided so that an accurate calibration of the timing or clock pulses may be made while the drum is rotating.

While only two forms of the present invention have been shown and described, modifications will be apparent to those skilled in the art and within the spirit and scope of the invention as set forth in particular in the appended claims.

What is claimed is:

1. In a character type drum high speed printing system, the combination of, a type drum mounted on a shaft to be rotated by an electric motor, at least one printing hammer for cooperating with type characters carried by said drum to print on a printing sheet, hammer energizing means, phonic wheels means mounted on said shaft and rotated thereby carrying character signal generating elements coordinated with the position of the type on said drum formed on the surface of said drum, at least one non-character element on said wheel positioned to provide a resetting signal for said hammer energizing means, a single signal pickup means responsive to both the character and non-character elements, and signal separating circuit means for separating said resetting signal from said character signals.

2. In a character type drum high speed printing system as set forth in claim 1 wherein said signal separating circuit means includes two gate means and a timing circuit for selectively controlling said gate means, whereby said resetting signal is directed past one gate means while the other gate means is inhibited and said character signals are directed past the other of said gate means during an interval when it is not inhibited.

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