

PATENT SPECIFICATION

(11)

1 550 145

1 550 145

- (21) Application No. 39033/78 (22) Filed 7 Oct. 1976
(62) Divided out of No. 1550144
(31) Convention Application No. 690621 (32) Filed 27 May 1976 in
(33) United States of America (US)
(44) Complete Specification Published 8 Aug. 1979
(51) INT. CL.² B41J 3/00
G09C 1/00
(52) Index at Acceptance
B6F NB

(19)



(54) CHARACTER BLOCKS FOR USE IN CHINESE TYPEWRITERS

(71) I, CHAN-HUE YEH, a citizen of the United States of America, of c/o 1031 E. East Duane Avenue, Sunnyvale, California 94086, United States of America, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:-

This application is divided out from Application No. 41617/76 (Serial No. 1550144).

This invention relates to character blocks for use in Chinese typewriters.

This invention is related to my prior U.S. Patent 3,820,644 issued 28th June 1974 and entitled "System for the Electronic Data Processing of Chinese characters", the disclosure of which is incorporated herein by reference. In my aforesaid prior U.S. Patent there is described a method by which each of the approximately 10,000 Chinese characters can be assigned a unique 14-bit binary code so that each character is uniquely identified. For example the Chinese character 北 (Pei or North) is assigned a unique decimal character 10165 which has an equivalent binary representation 010001000000101. A keyboard is so designed that each character can be easily accessed electronically by pressing not more than three keys on the keyboard at speeds far in excess of that possible by human encoding. It is, however, sometimes desirable that Chinese characters be both human-readable and machine-readable and it will be appreciated that a standard Chinese typewriter is not adapted to type both human-readable characters and the somewhat cumbersome 14-bit binary code which is machine-readable. It is, therefore, desirable that the machine-readable 14-bit binary code be further reduced to a line code which is also machine-readable. Line codes for representing the Roman alphabet are known to the art, for example in U.S. patent 3,657,522 entitled "Record

for Machine Scanning" issued 18th April 1972 to Wildhaber, in which each letter of the alphabet is assigned a number from 1 to 26 which is then transcribed in binary form so that, for example, the second letter of the alphabet B can be written as 00010 or as merely a bar in the fourth position from the left or start. For convenience a short bar is provided preceding each coding to indicate the start of a code, thus A can be represented by ' . . . 1, B can be represented by ' . . . 1., C can be represented by ' . . . 11, and so on for all 26 characters of the alphabet. It will be appreciated that even 26 characters requires a relatively large and clumsy binary layout containing a marker and 5 binary bar positions. The difficulties encountered when encoding 10,000 or more characters are immeasurably greater, and as has been indicated in my prior Patent a 14-bit binary notation is the simplest which can be used to uniquely identify all 10,000 or so Chinese characters. Even with modern scanning equipment which can be read or scan lines 0.01" wide and 0.2" high the space required for a 15 bar code (a marker bit plus 14 information bits) is too great for the bar code to be incorporated on a character font of a Chinese typewriter.

According to the present invention there is provided a lead font character block, for use in a Chinese typewriter, having incorporated thereon a selected humanly-readable Chinese character and a machine-readable line code uniquely representative of that character.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which;

Figure 1 is a perspective view of a Chinese typewriter provided with a plurality of lead font character blocks;

Figure 2 is a perspective view of a lead font character block according to the pre-

50

55

60

65

70

75

80

85

90

sent invention;

Figure 3 is a sketch of a machine-readable 14-line code representing a 14-bit binary representation;

5 Figure 4 is a sketch of the 14-line code of Figure 3 broken into two 7-line segments;

Figure 5 is a sketch of the 14-line code of Figure 4 in which the bottom 7-line segment is inverted;

10 Figure 6 is a sketch showing the segments of Figure 5 joined to form a new 7-line code;

Figure 7 is a sketch showing the code of Figure 6 with a lead or start line;

15 Figure 8a is a sketch showing the 4 possible line lengths and positions for the code of Figure 6; and

Figure 8b is a sketch showing a further line code derived from the code of Figure 7.

20 Turning firstly to Figure 1 there is shown a Chinese typewriter 1 having a base 2, a slidable carriage 3 and roller 4 around which the record medium 5 such as a sheet of paper is wound in conventional manner. In place of the conventional keys in a standard western-style typewriter, a plurality of rows of lead font character blocks 6 are provided each adapted to be lifted out of its storage position to a printing position by means of a hammer mechanism 7 on movement of selector 8 and actuator lever 9. In a standard Chinese typewriter the character fonts are similar in size and shape to the font 6 shown in Figure 2 but are embossed with the appropriate human-readable character 10 only. According to the present invention the character font is also provided with an 8-line machine-readable code 11 which is generated according to the principles described in more detail hereinafter.

40 As described in my prior US. Patent 3,820,644 each of the approximately 10,000 Chinese characters can be assigned a unique 14-bit binary code which serves to uniquely identify each character. For example the character 10 ("Pei" or North) is assigned the number 10165 which can be defined in an equivalent binary form as 01000100000101. As machines can be programmed to read binary codes either on the basis of go-no-go or by scanning the length of a line, a machine-readable code in which both the 0 and 1 are represented by a line can be developed. Thus a short line represents 0 and a long line (twice the length of the short line) represents 1, and the 14-bit binary code for Pei can be represented as shown in Figure 3, the lines being disposed in a side by side parallel relationship along a common base. This 14-line code is still too long to be incorporated onto a font 6, which is only of the order of 0.25" wide. The next step, therefore, is to break the 14-line code into two 7-line groups and place one group vertically above the other as shown in Figure 4. In order to prevent undue or unnecessary su-

perimposition the bottom group is inverted, about a line parallel to its base, as shown in Figure 5. The two segments are then joined as shown in Figure 6 to provide a 7-line code which uniquely defines the 14-bit binary representation of the decimal coding of each Chinese character. It will be appreciated that there are only four possible notations for the derived code lines, which vary in length from 2-4 lengths inclusive, that is 4 lengths (2-2), 3 lengths (2-1, 1-2), and 2 lengths (1-1) - the numbers in brackets referring to the line references in Figures 6 and 8a always reading from the top downwards. Surprisingly, it has been found that these four possible lengths and relative positions are sufficient to uniquely define the 14-bit binary codings necessary to define all 10,000 or so Chinese characters.

Optical readers are, of course, known in the art and commercially available readers are capable of reading or scanning lines which are 0.01" wide and 0.2" high and which are spaced by 0.01". Thus the 7-line code described above can be compressed into a space of 0.14" and hence can be embossed on the font of Figure 2, so that both machine and humanly readable characters can be provided on a single font.

In a preferred embodiment of the present invention, a lead line is added to the 7-line code, as shown in Figure 7, in order to indicate to the reading machine the start of the line code and to reset the machine status. In this embodiment it will be appreciated that the width of the machine-readable code will be about 0.16".

It will also be appreciated that Chinese may either be read in horizontal style, from left to right or in vertical style from the top down and from right to left. The human-readable and machine-readable code may therefore be embossed on the font one above the other, as shown in Figure 2, or side by side (not shown).

The 7 or 8-line code can be modified to be compatible with alternative optical readers using different logic designs and which are also commercially available. Thus the four lines described hereinabove with reference to Figure 8a can be represented by uniform length bars of different width as desired. As shown in Figure 8b the shortest line (1-1) is represented by a bar of zero width 81, line (2-1) is represented by a bar of say 0.01" width 82, line (1-2) is represented by a bar of 0.02", width 83, and line (2-2) is represented by a bar of 0.03" width 84, so that the 8-line code of Figure 6 can be written in an equivalent form as shown in Figure 8b. Other modifications of the final readout form code will suggest themselves to those skilled in the art.

WHAT I CLAIM IS:-

1. A lead font character block, for use in

70

75

80

85

90

95

100

105

110

115

120

125

130



sent invention;

Figure 3 is a sketch of a machine-readable 14-line code representing a 14-bit binary representation;

5 Figure 4 is a sketch of the 14-line code of Figure 3 broken into two 7-line segments;

Figure 5 is a sketch of the 14-line code of Figure 4 in which the bottom 7-line segment is inverted;

10 Figure 6 is a sketch showing the segments of Figure 5 joined to form a new 7-line code;

Figure 7 is a sketch showing the code of Figure 6 with a lead or start line;

15 Figure 8a is a sketch showing the 4 possible line lengths and positions for the code of Figure 6; and

Figure 8b is a sketch showing a further line code derived from the code of Figure 7.

20 Turning firstly to Figure 1 there is shown a Chinese typewriter 1 having a base 2, a slidable carriage 3 and roller 4 around which the record medium 5 such as a sheet of paper is wound in conventional manner. In place of the conventional keys in a standard western-style typewriter, a plurality of rows of lead font character blocks 6 are provided each adapted to be lifted out of its storage position to a printing position by means of a hammer mechanism 7 on movement of selector 8 and actuator lever 9. In a standard Chinese typewriter the character fonts are similar in size and shape to the font 6 shown in Figure 2 but are embossed with the appropriate human-readable character 10 only. According to the present invention the character font is also provided with an 8 line machine-readable code 11 which is generated according to the principles described in more detail hereinafter.

40 As described in my prior US. Patent 3,820,644 each of the approximately 10,000 Chinese characters can be assigned a unique 14-bit binary code which serves to uniquely identify each character. For example the character 10 ("Pei" or North) is assigned the number 10165 which can be defined in an equivalent binary form as 01000100000101. As machines can be programmed to read binary codes either on the basis of go-no-go or by scanning the length of a line, a machine-readable code in which both the 0 and 1 are represented by a line can be developed. Thus a short line represents 0 and a long line (twice the length of the short line) represents 1, and the 14-bit binary code for Pei can be represented as shown in Figure 3, the lines being disposed in a side by side parallel relationship along a common base. This 14-line code is still too long to be incorporated onto a font 6, which is only of the order of 0.25" wide. The next step, therefore, is to break the 14-line code into two 7-line groups and place one group vertically above the other as shown in Figure 4. In order to prevent undue or unnecessary su-

perimposition the bottom group is inverted, about a line parallel to its base, as shown in Figure 5. The two segments are then joined as shown in Figure 6 to provide a 7-line code which uniquely defines the 14-bit binary representation of the decimal coding of each Chinese character. It will be appreciated that there are only four possible notations for the derived code lines, which vary in length from 2-4 lengths inclusive, that is 4 lengths (2-2), 3 lengths (2-1, 1-2), and 2 lengths (1-1) - the numbers in brackets referring to the line references in Figures 6 and 8a always reading from the top downwards. Surprisingly, it has been found that these four possible lengths and relative positions are sufficient to uniquely define the 14-bit binary codings necessary to define all 10,000 or so Chinese characters.

Optical readers are, of course, known in the art and commercially available readers are capable of reading or scanning lines which are 0.01" wide and 0.2" high and which are spaced by 0.01". Thus the 7-line code described above can be compressed into a space of 0.14" and hence can be embossed on the font of Figure 2, so that both machine and humanly readable characters can be provided on a single font.

In a preferred embodiment of the present invention, a lead line is added to the 7-line code, as shown in Figure 7, in order to indicate to the reading machine the start of the line code and to reset the machine status. In this embodiment it will be appreciated that the width of the machine-readable code will be about 0.16".

It will also be appreciated that Chinese may either be read in horizontal style, from left to right or in vertical style from the top down and from right to left. The human-readable and machine-readable code may therefore be embossed on the font one above the other, as shown in Figure 2, or side by side (not shown).

The 7 or 8-line code can be modified to be compatible with alternative optical readers using different logic designs and which are also commercially available. Thus the four lines described hereinabove with reference to Figure 8a can be represented by uniform length bars of different width as desired. As shown in Figure 8b the shortest line (1-1) is represented by a bar of zero width 81, line (2-1) is represented by a bar of say 0.01" width 82, line (1-2) is represented by a bar of 0.02", width 83, and line (2-2) is represented by a bar of 0.03" width 84, so that the 8-line code of Figure 6 can be written in an equivalent form as shown in Figure 8b. Other modifications of the final readout form code will suggest themselves to those skilled in the art.

WHAT I CLAIM IS:-

1. A lead font character block, for use in

70

75

80

85

90

95

100

105

110

115

120

125

130



16

3

1,550,145

3

- 5 a Chinese typewriter, having incorporated thereon a selected humanly-readable Chinese character and a machine-readable line code uniquely representative of that character.
- 10 2. A character block as claimed in claim 1 wherein said line code comprises a 7-line code derived from 14-bit binary word assigned to said selected Chinese character.
- 15 3. A character block as claimed in claim 1 or 2 wherein said line code includes a line representative of the start of said code.
4. A character block as claimed in any one of the preceding claims wherein each of the lines of said line code is any one of four lines which differ from one another in size or relative position or both.
5. A character block as claimed in claim 4 wherein each line of said line code is represented on said block by a uniform length line of one of four different selected widths (which may include zero width).
6. A character block as claimed in claim 5 wherein the widths of said uniform length lines vary incrementally from zero to three line widths.
7. A lead font character block substantially as hereinbefore described with reference to the accompanying drawing.
8. A chinese typewriter provided with a plurality of character blocks as claimed in any one of the preceding claims.
- MICHAEL BURNSIDE & PARTNERS,
Chartered Patent Agents,
Hancock House,
87 Vincent Square,
London SW1P 2PH.
Agents for the Applicants.