

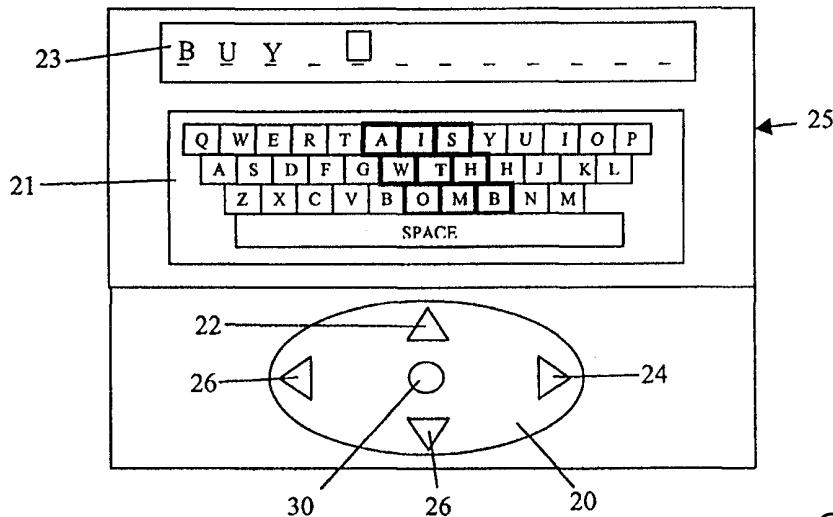


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(54) Title: A METHOD FOR MOBILE TEXT ENTRY



(57) Abstract

A method for inputting characters in a device having a character display and a navigation key responsive to user manipulation for navigating a cursor in the character display. The characters are displayed in a predetermined layout on the display for character input. The layout contains a fixed set of characters as well as a dynamic subset of characters. The dynamic subset is determined by a previously entered single character or string of characters. A character is selected by a user from one of the aforementioned sets. It is selected by navigating a cursor to the desired character. In a preferred embodiment, the device may include a pager, a cellular telephone, or the like.

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## A Method for Mobile Text Entry

This invention relates to hand-held personal electronic devices such as cellular telephone systems, pagers, and the like, and in particular it relates to text entry for such devices.

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### BACKGROUND OF THE INVENTION

There is an increasingly strong demand around the world for portable communication devices such as cellular phone and pagers. As technology advances these products are becoming more portable and more affordable. Such devices have been able to receive text messages for some time now, but with the growing ubiquity of email, products that have the capability to send text messages are now beginning to surface.

The requirement of mobility imposes a unique set of restrictions on the design of a text entry strategy. Typically there is only enough space on the device for a very few extra buttons. Therefore, a full keyboard, even a miniature one, is not feasible. Also, a user may not always have both hands free when operating the device, so it is desirable that text can be input with only one hand. In this disclosure, the term "mobile text entry" refers to text entry limited by this set of restrictions.

One method that addresses the issue of mobile text entry is a telephone keypad method. It is well known that keys 2 through 9 on a telephone keypad contain three reference letters of the alphabet. Entering a letter involves selecting the key it appears on as well as specifying which of the three letters is desired. The letter selection can be achieved in several different ways.

A second method for text entry is referred to as the date stamp method. The method is so named because, as with a date stamp, a desired character is made visible by rotating a wheel containing an entire set of characters. Cursor keys are used to navigate a cursor in a display while increment and decrement keys are used to cycle sequentially through the character set at the cursor position. Players of video arcade games are familiar with this technique, which is used to input the player's initials into a list of high scorers. Selection of a character is performed implicitly by simply moving the cursor to another location. In effect, the cursor position is a moveable editing window of one character.

A third method is referred to as a soft keyboard method. In this method a display is functionally split into an output and an input section. The input section of the display either

shows the full character set or allows for parts of the character set to be viewed by scrolling. The character output appears in a ticker tape fashion along one or more lines in the display section. Arrow keys are used to move a cursor around the character set and characters are selected by explicitly depressing a select key.

5 For example, an on-screen keyboard, sometimes called a soft keyboard, is a character set that appears on a device's Liquid Crystal Display (LCD) or on a computer monitor. With an on-screen keyboard, the advantage of have a fixed layout is familiarity. As familiarity increases, the time to locate a character in the layout approaches zero. The disadvantage of the fixed layout is that the distance between characters, and thus the time to move the cursor, stylus or finger from one character to the next, is often high.

10 The problem with the aforementioned techniques is that an excessive number of keystrokes are required for text entry. The fewer the keystrokes required, the more efficient the text entry system. By bringing likely next characters closer to the cursor, keystrokes are reduced, which can lead to an increase in entry speeds. This can be accomplished by surrounding the cursor with a dynamic region. The larger the number of dynamic positions that are available on the keyboard, the more likely a desired character will occur within the available positions.

15 In U.S. patent number 5,128,672 a dynamic keyboard is disclosed. However, the keyboard disclosed requires the presence of numerous physical keys, which is not practical for use with cellular phones and pagers. In U.S. patent 5,797,098 a dynamic keyboard is also disclosed, but this keyboard only displays several options at a time. If the desired character is not presented on the display, it is necessary to scroll to the following screen and repeat the search for the character. This may need to be repeated several times until the character is found which can be tedious and frustrating for the user.

25 It is an object of the present invention to obviate or mitigate some of these problems.

#### SUMMARY OF THE INVENTION

In general terms, the present invention provides a method for inputting characters in a device having a character display, and a navigation key responsive to user manipulation for navigating a cursor in the character display. The method comprises the steps of:

- 30 (a) displaying a character set having a predetermined layout on the display, the layout being fixed for one or more character input;
- (b) displaying a subset of the character set in a dynamic layout wherein the subset of characters are determined by at least one preceding input character; and

- (c) selecting at least one of the characters from the layouts by navigating the cursor to a desired character.

## BRIEF DESCRIPTION OF THE DRAWINGS

- 5           These and other embodiments of the invention will now be described by way of example only, with reference to the accompanying drawings in which:
- Figure 1** is a schematic top view of a hybrid keyboard layout according to an embodiment of the invention;
- Figure 2** is a schematic diagram showing a pager having a cursor control key;
- 10          **Figure 3** is a top view of part of a keyboard according to the present invention;
- Figure 4** is an example of a character probability look-up table;
- Figures 5a and 5b** are examples of a probability matrix;
- Figures 6a and 6b** are schematic diagrams of a layout after different keys are selected;
- 15          **Figure 7** is an illustration of characters assigned to particular positions in the dynamic region;
- Figures 8a and 8b** are schematic diagrams of a layout incorporating the fixed positions of figure 7 after different keys are selected;
- Figures 9a, 9b, 9c, 9d, 9e, and 9f** illustrate various positioning patterns for a dynamic
- 20          region;
- Figures 10a, 10b, and 10c** are schematic diagrams representing various dynamic region layouts;
- Figures 11a, 11b, 11c, 11d and 11e** illustrate various positions and arrangements of the dynamic region layout within the fixed layout;
- 25          **Figure 12** illustrates a positioning algorithm for the dynamic region;
- Figures 13a and 13b** are flow charts showing the display of characters in the dynamic region;
- Figures 14a and 14b** show steps for generating a list for display in the dynamic region;
- 30          **Figure 15** is a flow diagram showing the steps for arranging characters in the dynamic region.

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